SCCWRP Director's Report

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SCCWRP coordinates post-fire aquatic monitoring network

SCCWRP has helped bring together more than two dozen organizations to form a water-quality monitoring network that is tracking how pollution and debris from the Palisades and Eaton fires are spreading through coastal ecosystems and adversely affecting ecological and human health.

The Los Angeles-area Post-Fire Water Quality Monitoring Network – which was formed in February following two of the most destructive fires in Los Angeles County history – is working to generate high-quality, comparable data on the levels and types of common post-fire contaminants in aquatic systems, as well as general chemistry measurements such as dissolved oxygen and suspended particles.

The Los Angeles Regional Water Quality Control Board, which is overseeing California's post-fire monitoring in aquatic habitats, and the California Ocean Protection Council asked SCCWRP in January to lead the development and facilitation of the Post-Fire Water Quality Monitoring Network. SCCWRP rapidly organized a 25-agency workgroup that is monitoring nearly 200 sampling sites across Santa Monca Bay and the Los Angeles River and San Gabriel River watersheds.

In April, SCCWRP worked with the Los Angeles County Department of Public Health to unveil an initial version of a post-fire water-quality monitoring data portal that serves as a centralized place to publish results from all the sites monitored and constituents measured.

The monitoring data will help inform a range of post-fire management decisions, including determining if and for how long to close beaches due to post-fire runoff contamination, whether to issue fish consumption advisories for contaminated fish and shellfish, and how to remediate post-fire pollution in sediment and sand.

Following the Palisades and Eaton fires and subsequent storms in January, dozens of organizations jumped into action, rapidly mobilizing to begin tracking what levels and types of pollutants and debris

Contents

Cover photo: A field crew member from Heal the Bay collects a water sample from Santa Monica Bay as part of an ongoing, multi-agency water-quality monitoring initiative that SCCWRP is leading in the wake of the Palisades and Eaton fires. (Photo courtesy of Los Angeles County Fire Department Lifeguard Division)

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Calendar

Thursday, May 8
CTAG quarterly meeting
(In-person meeting)

Friday, June 6
Commission meeting
(In-person meeting)

from the fires were entering aquatic systems, where and how far these pollutants are traveling, and how aquatic life and humans were being affected.

Fire-related contaminants being measured include heavy metals (e.g., mercury, lead) and combustion byproducts that are known carcinogens (e.g., polycyclic aromatic hydrocarbons). Other general water chemistry parameters often affected by wildfires also are being measured, including dissolved oxygen, pH and amounts of suspended particles.

The speed of the post-fire monitoring response led to multiple challenges, including gaps in monitoring locations, overlap and duplication of efforts, and inadequate training in the use of rigorous sampling and analysis methods. Monitoring groups also lacked a structured mechanism through which to share their data, and to adjust their monitoring designs over time.

SCCWRP, which already had been informally receiving requests for guidance and support from individual monitoring participants, was well-positioned to rapidly organize and coordinate among disparate groups, given the agency's reputation as a neutral scientific authority that diverse groups trust to develop and lead cross-sector monitoring programs.

Already, the network has helped forge new partnerships that have led to coordinated sampling efforts and sharing of samples and sampling resources. Through the network, monitoring participants also have expanded the number of monitoring sites and the number of constituents of potential concern to human and aquatic health. Meanwhile, monitoring groups with limited experience doing post-fire monitoring are learning how to collect, preserve, and analyze samples, and interpret their results with the appropriate context.

A field crew from the Los Angeles Regional Water Quality Control Board collects a water sample near the Rustic Creek storm drain at Will Rogers State Beach in Pacific Palisades. SCCWRP has helped bring together dozens of organizations to track what levels and types of pollutants and debris from the fires have entered aquatic systems.

The L.A.-area post-fire water-quality monitoring network is part of a larger, coordinated statewide effort to comprehensively track the environmental consequences of the Palisades and Eaton fires.

While the water-quality monitoring network is focused on the coastal ocean and watersheds, a separate group is tracking contamination of swimming pools by post-fire airborne pollutants. Other groups are monitoring indoor air quality, outdoor air quality, soil quality (including beach sand and dust), debris, and human health (including fire-related pollutants found in bloodstreams).

To ensure all monitoring data are publicly accessible, the Los Angeles County Department of Public Health has developed a data dashboard that presents all published air, water and soil data on an interactive mapping tool.

As more water quality data are collected, SCCWRP and its partners are planning to conduct a large-scale synthesis of overall post-fire water-quality effects to the Los Angeles region, as well as compare the findings to available risk thresholds for aquatic and human health.

For more information, contact Dr. Alvina Mehinto.

Index scoring tool for rating BMP performance released

SCCWRP has developed a scoring tool that quantifies the degree to which structural BMPs (best management practices) contribute to improving the health of downstream aquatic ecosystems – a novel method for rating the performance of existing BMPs that has the potential to reduce reliance on less insightful, legacy evaluation approaches.

The Multi-Metric BMP Performance Index, which was publicly unveiled in April, generates a quantitative performance score that provides insights into whether individual BMPs are performing at levels that contribute to meeting watershed-specific water-quality goals, or whether further management action is needed for the BMPs to perform at these levels.

The index's assessment approach is unique in that traditional BMP performance assessments tend to focus on whether BMPs are meeting static expectations as specified in BMP design manuals and TMDLs, and/or meeting performance targets established by regulators – but not necessarily whether the BMP is essentially

"pulling its own weight" in protecting the downstream ecosystem.

Researchers' ultimate goal is to help managers conduct more insightful, quantitative BMP performance evaluations than are currently possible, ensuring managers gain actionable information that helps maximize the value of BMPs already built, as well as better plan for future BMPs and runoff water-quality management strategies.

Already, some stormwater management agencies have started beta-testing the Multi-Metric BMP Performance Index, including the Riverside County Flood Control and Water Conservation District. SCCWRP is preparing to test-drive the index with additional stormwater agencies this summer.

In Southern California, stormwater managers have spent billions of dollars implementing and managing bioswales, bioretention systems, infiltration galleries and other types of structural stormwater BMPs. But they have had limited access to rigorous tools for determining whether the BMPs are performing as intended.

Existing BMP performance evaluations don't focus on estimating how a BMP influences aquatic health, ecosystem services and other beneficial uses, even though protection of these beneficial uses is the primary reason that managers invest in BMPs.

Instead, managers generally focus on whether a BMP has been built according to specifications and standards – either spelled out in a BMP design manual or in regulatory objectives. These types of evaluations offer comparatively little insight into BMPs' role in protecting downstream ecosystems. Performance can vary widely from one BMP to another, even when they're the same BMP type, and from one storm to another – a consequence of the wide range of ways that BMPs are designed, built and maintained, plus the wide range of levels and types of pollutants that BMPs treat.

For example, through a traditional BMP performance evaluation, a stormwater manager might determine that the BMP is reducing pollution loading by a certain percentage. While this pollution removal figure might be deemed adequate for complying with a regulatory objective or management program, this assessment would not shed light on the central question of whether the BMP's design, construction and maintenance enable it to adequately contribute to restoring or protecting the downstream beneficial uses.

A bioswale that runs along the side of a roadway in Orange County collects and treats stormwater runoff. SCCWRP has developed a scoring tool known as the Multi-Metric BMP Performance Index to quantify the performance of structural BMPs and provide insights into whether they are performing at levels that contribute to meeting watershed-specific water-quality goals.

Researchers' breakthrough with the Multi-Metric BMP Performance Index was developing a robust method for quantifying two discrete aspects of performance for an individual BMP:

» The **water-quality assessment** benchmarks field-collected pollution removal data for the BMP with water-quality objectives associated with the watershed where the BMP is located. The goal of this assessment is to determine if the BMP is contributing adequately to achieving downstream water-quality improvement goals. Data from existing BMPs also can be used to support planning and management strategies for other watersheds; the user simply benchmarks by the locally relevant water quality objectives, i.e., as if the same BMP were being used to achieve different water quality goals.

» The **hydrology assessment** benchmarks field-collected data on the runoff volumes being retained by the BMP with corresponding design specifications associated with that particular BMP, including the BMP's specific dimensions and water capture estimates. The goal of this assessment is to determine if the BMP is capturing runoff as intended by planning and design. Data from existing BMPs also can be used to help plan future BMPs – specifically, by identifying beneficial design features and/or systematic design or maintenance condition issues.

Because mangers are often concerned about multiple pollutants at the same time (e.g., BMP sites with downstream TMDLs for multiple contaminants), a water-quality index score can be generated for each individual pollutant for which monitoring data are available.

The index uses a two-step process to generate an index score for each individual pollutant: First, benchmarked monitoring data are binned into categories. Then, these categories are consolidated using a weighted averaging approach to generate the final index score for that pollutant. A similar two-step process (benchmarking, binning, and applying a weighted average) is used to generate the hydrology index score.

Final scores for individual pollutant or hydrology performance are associated with performance categories that, in turn, are linked to a specific set of recommended follow-up management actions. Recommended actions range from "take remedial action" to "check

data" to "take no action." Examples of specific remedial actions include: "inspect for maintenance condition," "investigate design/construction," and "additional treatment needed."

A key advantage of the Multi-Metric BMP Performance Index is that managers can evaluate water quality index scores for any number of individual pollutants, or can combine them together and also include the hydrology assessment as part of an overall performance index assessment.

The tool's BMP-specific approach to benchmarking performance enables apples-to-apples comparisons between BMPs of the same type, as well as across BMPs of different types (i.e., because each individual BMP is assessed relative to its own design specifications or intentions).

An initial version of the BMP performance index tool was originally developed last year in partnership with the Los Angeles County Department of Public Works. But given the tool's widespread applicability across Southern California and beyond, SCCWRP has been focusing in recent months on adapting and expanding the tool for broader use.

The Multi-Metric BMP Performance Index is publicly accessible via this ShinyApps web portal.

For more information, contact Dr. Elizabeth Fassman-Beck.

OAH modeling stakeholders helping SCCWRP prioritize expert panel's recommendations

A stakeholder steering committee that oversaw an independent expert review of a suite of coastal ocean acidification and hypoxia (OAH) modeling tools has begun deliberating about how best to implement recommendations developed through the review process for enhancing the tools' management utility – a community-building initiative that is designed to improve stakeholder confidence and understanding of the modeling tools' predictive capabilities.

In April, the steering committee – which is comprised of water-quality regulatory agencies, the regulated community and environmental advocacy groups – met to prioritize among the expert panel's 40 recommendations, which represent millions of dollars of investments in modeling science.

This consensus-building work is critical as coastal ocean managers weigh how much confidence to place in the OAH modeling tools and decide if and how to use the tools as a basis for taking management actions.

The modeling tools, which were developed by a research team that includes SCCWRP, are designed to predict how natural oceanic sources of nutrients and local nutrient discharges influence coastal OAH conditions and ecosystem health.

The independent expert panel that reviewed the OAH modeling tools concluded its work last November, finding that the modeling tools are built on fundamentally sound science and offering 40 recommendations to continue building on this work, including quantifying modeling uncertainty, making the modeling outputs and other work more accessible to a broad community of end users, and adapting the modeling tools for use at scales relevant to coastal discharge processes for wastewater.

The same stakeholder committee that formed this expert panel and oversaw its deliberations is now tasked with coming to agreement on which recommendations to fund and when, as well as how costs of implementing the recommendations should be shared among stakeholders.

In a parallel effort, the SCCWRP Commission's Technical Advisory Group (CTAG) has established a CTAG modeling subcommittee tasked with providing technical review of all of the OAH

Courtesy of National Oceanic and Atmospheric Administration

A pteropod, or sea snail, with pit marks on its shell, shows signs of shell dissolution in response to ocean acidification. A stakeholder steering committee has begun working to prioritize recommendations developed as part of an independent review process of a suite of coastal ocean acidification and hypoxia modeling tools.

modeling team's work, including projects prioritized by the steering committee.

In February, SCCWRP and CTAG subcommittee began developing a quality assurance project plan (QAPP) that is intended to enhance transparency and stakeholder understanding of how the modeling tools are being used. The QAPP is expected to be completed in late 2025.

The CTAG subcommittee also is helping to tailor modeling scenario runs to generate the predictive insights that managers need, as well as exploring how to develop data visualization products that will make modeling predictions more transparent and accessible to stakeholders.

Finally, the CTAG subcommittee is setting expectations about the levels and types of technical scrutiny that the modeling tools should be subjected to – an effort that will pave the way for managers to develop comprehensive understanding of the strengths and limitations of the modeling tools' predictive capabilities.

OAH is a global phenomenon in which seawater is moving to an incrementally more acidic state, and dissolved oxygen levels are falling to create hypoxic conditions for marine life. Given that the West Coast is uniquely vulnerable to OAH due to ocean circulation patterns, the modeling tools are designed to predict whether elevated levels of local, land-based nutrient discharges from dense population centers along the coastline are exacerbating local OAH conditions.

The OAH modeling tools consist of an coastal ocean water-quality model that is made up of two component models – collectively known as ROMS-BEC (Regional Ocean Modeling System-Biogeochemical Elemental Cycling) – that work in tandem to predict the relative influence of natural oceanic sources of nutrients vs. local nutrient discharges on seawater chemistry in coastal ecosystems. An associated set of biological modeling tools, meanwhile, translates how ROMS-BEC's predictions about changing ocean chemistry will adversely affect the health of marine life that are sensitive to these changes.

For more information, contact Dr. Martha Sutula.

Workshop examines how to use eDNA-based method to monitor OA's biological effects

A group of 15 scientific experts has developed a coordinated West Coast plan for using environmental DNA (eDNA) to track the effects of ocean acidification (OA) on vulnerable shell-forming organisms – an approach that has the potential to generate different types of insights than manually inspecting for signs of shell dissolution under a microscope.

During a two-day workshop held in mid-March and hosted by SCCWRP, experts on eDNA and West Coast OA monitoring agreed that analyzing the DNA from pteropods, crab larvae and other tiny shell-forming organisms could serve as a valuable line of evidence for tracking OA's ecological effects along the West Coast; these organisms are having a tougher time building and maintaining their shells as a result of OA.

Workshop participants also developed a framework for how to standardize an eDNA-based monitoring method for the West Coast. Standardization will pave the way for researchers to stitch together eDNA data sets to paint a West Coast-wide picture of how OA's ecological effects are unfolding.

eDNA-based monitoring uses the DNA shed by organisms into their environment to identify the levels and types of organisms that were present – an alternative to traditional manual identification of organisms by trained taxonomists. eDNA-based monitoring is being piloted across multiple types of aquatic environments nationwide.

Researchers envision eDNA-based OA monitoring serving as a cost-effective, insightful complement to an OA shell dissolution method that's already been standardized for use by programs including the Southern California Bight Regional Monitoring Program.

Tiny sea snails known as pteropods, which are collected using a plankton tow net, have provided some of the earliest signs of the ecological effects of ocean acidification and hypoxia in California coastal waters. Scientific experts have developed a West Coast plan for using environmental DNA from shell-forming organisms such as pteropods to track the ecological effects of ocean acidification.

The shell dissolution method focuses on assessing shell-forming organisms under a scanning electron microscope to visually quantify the degree of shell damage caused by OA. SCCWRP helped standardize this method for pteropods four years ago in partnership with multiple West Coast OA monitoring programs.

By contrast, eDNA-based OA monitoring counts the number of organisms in a water sample – known as abundance – to estimate the degree to which OA has affected organisms at the site.

Workshop participants agreed that neither monitoring method is perfect on its own, but that the two methods have the potential to be particularly insightful if used together.

For example, the eDNA method, which looks for the presence or absence of organisms, is not designed to definitively link the absence of a shell-forming organism to the corrosive effects of OA – whereas the shell dissolution method can make this linkage.

Meanwhile, the shell dissolution method is limited to tracking only species for which manual shell dissolution analyses have already been standardized – whereas the eDNA method, once standardized, will be able to track a wide range of species simultaneously.

eDNA-based analyses also are a faster, cheaper method than manually examining shells under a microscope.

Workshop participants agreed that researchers should focus on adapting a technology known as quantitative polymerase chain reaction (qPCR) to analyze eDNA samples.

OA is a global phenomenon in which seawater chemistry is moving to a more acidic state and becoming less habitable for a range of organisms. West Coast ocean managers have prioritized tracking when, where and how these changes are playing out; ocean circulation patterns make the West Coast uniquely vulnerable to OA.

Workshop participants agreed that while water eDNA sampling methods have already largely been harmonized across marine monitoring programs, researchers still have more work to do to standardize eDNA analysis methods. Specifically, researchers need to standardize interpretation of eDNA data, integrate existing data sets, and process existing eDNA sample archives. Coordination has been lacking among West Coast OA monitoring programs, which has resulted in fragmented eDNA data sets.

Workshop participants included multiple SCCWRP member agencies, including the California Ocean Protection Council, Orange County Sanitation District, and City of San Diego.

SCCWRP will summarize the workshop findings and recommended next steps in a technical report, expected to be published in mid-2025.

For more information, contact Dr. Susanna Theroux.

Updates by Thematic Area

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

BIOASSESSMENT

Effort underway to coordinate SAV assessments along West Coast

SCCWRP has begun coordinating with a network of West Coast monitoring agencies to build their capacity to assess the health of eelgrass beds and other submerged aquatic vegetation (SAV) – an effort that will ensure Southern California monitoring data can be placed into West Coast-wide context.

During a meeting in April hosted by the National Oceanic and Atmospheric Administration's National Marine Fisheries Service, SCCWRP introduced the SAV monitoring framework that SCCWRP co-developed in 2020 to quantitatively assess SAV health using standardized, bioassessment-based methods.

This framework already has been incorporated into the ongoing SAV study element of the Southern California Bight 2023 Regional Monitoring Program; it also is in the process of being incorporated into California's Estuarine Marine Protected Areas (EMPA) monitoring program.

Coordinated West Coast monitoring will provide managers with access to high-quality, directly comparable data sets on the health of these ecologically fragile coastal habitats.

A nudibranch nestles in the blades of an eelgrass bed in Newport Bay. SCCWRP is working to help build the capacity of West Coast monitoring agencies to assess the health of submerged aquatic vegetation using standardized methods that were developed and that are being piloted in Southern California.

Prototype dashboard built to help identify ecologically healthy streams to protect

SCCWRP has developed an initial prototype of a public facing data dashboard designed to help watershed managers statewide visualize and determine which streams that are ecologically healthy should be priorities for protection.

The protective assessment dashboard, unveiled in April, is intended to help managers use their bioassessment data to identify stressors that may pose a risk to the ongoing health of these streams, enabling managers to make informed decisions about long-term protection and resiliency planning.

For a given stream segment, users will be able to query bioassessment data, watershed stressors, and receive an evaluation of the risks to the integrity of healthy watersheds.

The dashboard will integrate multiple stream health assessment tools, including the Stream Quality Index (SQI) and Rapid Screening Causal Assessment (RSCA) – both co-developed by SCCWRP.

ECOHYDROLOGY

Technical foundation built for California to evaluate cannabis growers' requests for stream flow diversions

SCCWRP and its partners have developed a standardized assessment framework that enables California to assess whether the water that cannabis growers are requesting to divert from nearby streams to support cannabis cultivation will adversely affect the streams' ecological health.

The framework, presented in March to a statewide technical advisory group overseeing the work, provides a rigorous scientific approach for assessing potential ecological risks to stream health from proposed flow diversions. The framework is based on the California Environmental Flows Framework, which was co-developed by SCCWRP to bring consistency and standardization to how flow targets get set statewide.

While the framework was initially piloted in the North Coast region of California, researchers are exploring how to adapt it for statewide application. The framework also has the potential to be used to support decision-making on flow diversion requests beyond just cannabis growers.

EMERGING CONTAMINANTS

Microplastics collection method transferred to end users during pair of workshops

SCCWRP and its partners have begun the process of transferring to end users a newly standardized method for collecting samples from drinking water treatment plants in preparation for measuring their microplastics content.

During a pair of workshops in February at SCCWRP and the San Francisco Bay Area, respectively, that attracted a combined 120 attendees, attendees were introduced to a sample collection method developed by the University of Toronto that researchers found is most efficient at capturing microplastic particles while mitigating potential airborne contamination.

The work is part of California's ongoing effort to develop a comprehensive statewide monitoring program capable of generating high-quality, directly comparable data on the prevalence and spread of microplastics across diverse aquatic settings. Under a policy approved by the State Water Resources Control Board in 2022, drinking water agencies are being required to monitor microplastics for an initial four-year period.

The University of Toronto method was standardized following a two-year study that compared the performance of an open-system method approved by the American Society for Testing and Materials (ASTM) and a University of Toronto closed-system method. Drinking water samples can require filtering thousands of liters of water to collect enough microplastics particles to become measurable, underscoring the challenge posed by airborne contamination.

Study surveying fish consumption at urban lakes in L.A. region completed

SCCWRP has completed a year-long study intended to help managers decide if one or more urban lakes in the Los Angeles region should receive a regulatory designation known as a Subsistence Fishing beneficial use based on the consumption habits of people who eat fish from the lakes.

The fish consumption study, completed in March and submitted as a report to the Los Angeles Regional Water Quality Control Board, found that average consumption rates for most anglers and their households were below consumption thresholds of concern as defined by California's Office of Environmental Health Hazard Assessment (OEHHA).

Researchers interviewed about 500 anglers at four urban lakes – Alondra Park Lake, Magic Johnson Lake, Legg Lake, and Peck Road Park Lake – about their fishing and consumption habits. Just 8% of anglers reported consuming their catches, and only four surveyed anglers reported eating more than 100 grams of caught fish every day.

The study builds on a SCCWRP study about two decades ago that found that most fishing and consumption in the L.A. region takes place at urban lakes and mountain reservoirs.

Passive samplers retrieved from offshore DDT barrels dump site

SCCWRP and its partners at Scripps Institution of Oceanography have successfully retrieved passive samplers that were deployed for six months to measure sediment contamination at a former industrial waste dump site in the San Pedro Basin.

The passive samplers, retrieved in March, will support an ongoing effort to measure levels of the pesticide DDT that are diffusing out of seafloor sediment into the water column above. The deployment was the first such attempt to deploy passive samplers offshore following the dump site's discovery in 2021.

Located between the mainland and Catalina Island, the DDT dump site received thousands of barrels and bulk waste from the former Montrose Chemical Corporation in Los Angeles County, which was at the time the largest DDT manufacturer in the nation.

Passive sampling devices consist of thin membrane films that can detect low levels of contaminants in surface layers of sediment that dissolve into the water column. Sediment contamination poses a potential health risk for marine life and humans who consume bottom-dwelling fish.

A field crew deploys passive sampling devices at an offshore site where thousands of barrels and bulk waste from production of the pesticide DDT were dumped. Researchers successfully retrieved the device after a six-month deployment.

STORMWATER BMPS

Rainfall generator built to support ongoing turf replacement BMP study

SCCWRP has designed and custom-built a second rainfall generator that will support an ongoing study measuring how much rainfall soaks into the ground vs. runs off the land at sites with drip irrigation and drought-tolerant landscaping.

The new instrument, developed over the past few months and initially tested in April, will enable researchers to simulate relevant, controlled rainfall patterns at sites where spray-irrigated turf has been replaced with drip irrigation systems. Unlike SCCWRP's original rainfall generator, which was developed in 2023 for water-quality studies, the new rainfall generator is designed to produce multiple rainfall intensities that are relevant for studying runoff hydrology.

Stormwater managers want to know the ratio of water that soaks into the ground vs. runs off the land at turf replacement sites – known as the runoff coefficient – so they can model how much rainfall and irrigation is expected to be retained. Although managers typically take this information from reference textbooks and practitioner manuals, there are no published values for turf replacement sites because it is a novel land-use type that doubles as a non-structural BMP.

Researchers are using the rainfall generator, affectionately known as the Soaker 2.0, to quantify runoff coefficients from three land-use types (turf replacement BMPs, conventional turf, and asphalt) so they can quantify the relative water savings and runoff volumes from each land-use type.

A SCCWRP field crew sets up and tests a custom-built rainfall generator in preparation for using it to measure how much rainfall soaks into the ground vs. runs off the land at sites with drip irrigation and drought-tolerant landscaping. The instrument creates controlled rainfall across a 400-square-foot footprint – more than four times as large as an earlier rainfall generator that SCCWRP developed in 2023.

REGIONAL MONITORING

First Bight '23 Sediment Quality assessment report published

The Southern California Bight 2023 Regional Monitoring Program has published the first of its Sediment Quality assessment reports summarizing the extent and magnitude of sediment toxicity across Southern California's coastal ocean.

The Bight '23 Sediment Toxicity report, published in April, found that sediment toxicity remained low overall, with over 95% of sediment Bight-wide considered low or not toxic – a finding that has remained consistent over the past 15 years.

The sediment toxicity assessment is one of five lines of evidence that the Bight program is using to assess the influence of sediment contamination on the health of Southern California's coastal ecosystems.

Other Bight '23 Sediment Quality assessments are ongoing, including Sediment Chemistry, Benthic Infauna, Bioaccumulation in Sportfish, and Trawl-Caught Fish and Invertebrates. The five lines of evidence will be synthesized to generate an overall assessment of sediment health.

Third sampling year completed for Regional BMP Monitoring Network

The Southern California Stormwater Monitoring Coalition (SMC) has completed the third year of sampling for its Regional BMP Monitoring Network – a SCCWRP-facilitated effort that is enabling Southern California stormwater managers to generate high-quality, comparable data sets on the performance of structural stormwater BMPs.

Sampling work, which wrapped up in April, spanned 12 BMP sites. Four SMC member agencies measured the water-quality treatment performance of eight flow-through/partial-capture BMPs, while six SMC member agencies collected data from 11 BMPs to support maintenance research.

SCCWRP is planning to lead the SMC this summer in the group's first deep dive into the data. Because of the limited number of storms and the extensive planning and training required to collect BMP performance data, it has taken multiple years for the SMC to build a robust Southern California data set.

To help managers analyze their raw field-collected data, SCCWRP has developed multiple tools, including the Rainfall and Flow Analysis Calculator and Flow-Weighting and EMC Calculator. These tools convert raw BMP monitoring data that were generated by flow meters and water-quality samplers and sensors in the field, into information that can be used to quantify a BMP's effectiveness in removing contaminants from runoff. An infiltration calculator also is under development.

New SCCWRP Publications

Journal Articles

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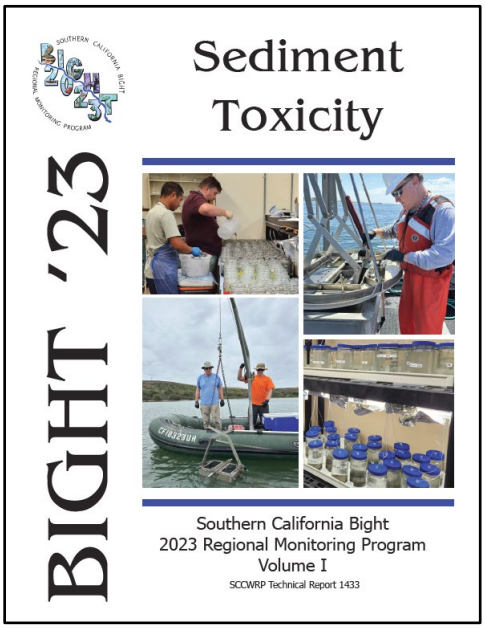

The Southern California Bight 2023 Regional Monitoring Program has published its first assessment report examining sediment toxicity in the coastal ocean.

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Journal Articles (Accepted)

Fassman-Beck, E., E. Tiernan, K.L. Cheng, K.C. Schiff. A Data-Driven Index for Evaluating BMP Water Quality Performance. *Water Research*.

Irving, K., K. Taniguchi-Quan, A. Santana, M. Treglia, R. Fisher, J. Haas, C. Loflen, C. Brown, E. Stein. Vulnerability of an endangered amphibian to climate change induced hydrologic change. *River Research and Applications.*

Steele, J.A., A.G. Zimmer-Faust, T.J. Clerkin, A. González-Fernández, S.A. Lowry, A.D. Blackwood, K. Raygoza, K. Langlois, A.B. Boehm, R.T. Noble, J.F. Griffith, K.C. Schiff. 2025. Survey of pathogens and human fecal markers in stormwater across a highly populated urban region. *Environmental Science: Processes & Impacts.*

Tiernan, E.D., J. Gray, L.S. Beck, E. Fassman-Beck. Design of a mobile, field-scale rainfall generator for urban runoff water quality studies. *Journal of Irrigation and Drainage Engineering.*

Technical Reports

Mazor, R.D., J.S. Brown, L.L. Tiefenthaler, A. Le Compte Santiago, G. Keating. 2025. Hydrologic assessment of reference streams in the Los Angeles region. Technical Report 1412. Southern California Coastal Water Research Project. Costa Mesa, CA.

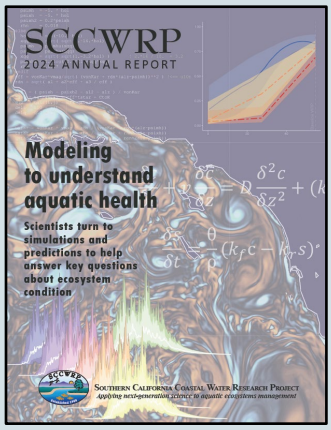
Mehinto, A.C., D.J. Greenstein, K.C. Schiff. 2025. Southern California Bight 2023 Regional Monitoring Program: Volume I. Sediment Toxicity. Technical Report 1433.

Southern California Coastal Water Research Project. Costa Mesa, CA.

Stein, E.D., B. Bledsoe, E. Fassman-Beck, J. Hathaway, S. Struck. 2025. Application of Nature-Based Solutions for Temperature Management Santa Clara River Case Study: Summary of Expert Panel Workshop May 5-8, 2024. Technical Report 1418. Southern California Coastal Water Research Project. Costa Mesa, CA.

Thornton Hampton, L.M., A.C. Mehinto, S.B. Weisberg. 2025. Standard Operating Procedures for the Collection of Samples for Microplastics Analysis Part 1: Surface Sediment and Aquatic Biota. Technical Report 1410.A. Southern California Coastal Water Research Project. Costa Mesa, CA.

SCCWRP Annual Report



SCCWRP has published its 2024 Annual Report highlighting how SCCWRP and its research partners have incorporated modeling into their work – and the transformative effect that modeling has had on SCCWRP's ability to answer complex, pressing management questions about aquatic health.

The three feature articles in the Annual Report focus on SCCWRP's work to model the ecological consequences of coastal ocean acidification, how changes in flow patterns affect aquatic life, and how to more effectively use stormwater BMPs (best management practices) to treat and manage runoff.

Quarter in Review

Conference Presentations

Fassman-Beck, E. Tiernan. Measuring Runoff Water Quality Improvement from Street Sweeping. Center for Watershed Protection Conference. April 8-10, 2025. San Juan, Puerto Rico.

Fassman-Beck, E. Tiernan, K. Schiff. A Multi-metric, Data-driven Index to Evaluate BMP Water Quality and Hydrologic Mitigation Performance. Center for Watershed Protection Conference. April 8-10, 2025. San Juan, Puerto Rico.

Fassman-Beck, E. Tiernan, D. McCarthy. Automated Detection of Transient Illicit Discharges Using IoT Sensors. Center for Watershed Protection Conference. April 8-10, 2025. San Juan, Puerto Rico.

Schiff, K, J. Steele, J. Griffith. Quantifying Sanitary Sewer Exfiltration in the San Diego River Watershed. National Water Quality Monitoring Conference. March 10-13, 2025. Green Bay, WI.

Schiff, K., J.B. Hinds. Microbial Water Quality Impacts from People Experiencing Homelessness. National Water Quality Monitoring Conference. March 10-13, 2025. Green Bay, WI.

Schiff, K. Southern California Bight Regional Monitoring: Long-Term Monitoring Evolving with New Management Needs. National Water Quality Monitoring Conference. March 10-13, 2025. Green Bay, WI.

Schiff, K., E. Fassman-Beck, E. Tiernan. Measuring Runoff Water Quality Impacts from Street Sweeping in Southern California. National Water Quality Monitoring Conference. March 10-13, 2025. Green Bay, WI.

Taniguchi-Quan, K., B. Stanford, S. Yarnell, A. Milward, E.D. Stein, T. Grantham. The California Environmental Flows Framework: Integrating groundwater and surface water management. Annual Salmonid Restoration Federation Conference. May 2, 2025. Santa Cruz, CA.

Theroux, S. State of play: Coupling mesocosms and DNA metabarcoding to illuminate the role of bacterial communities in marine eDNA decay. February 19, 2025. 2nd Australian and New Zealand Environmental DNA Conference. February 19, 2025. Wellington, New Zealand.

Theroux, S., E. Stein. Advances and opportunities to implement the National eDNA strategy. National Water Quality Monitoring Conference. March 10-13, 2025. Green Bay, WI.

Walker, J., E. Stein, K. O'Connor, C. Whitcraft, B. Hughes, J. Largier, D. Jacobs, and C. Toms. Monitoring for Management: A modular, ecosystem function-based assessment framework to assess estuarine condition. National Water Quality Monitoring Conference. March 10-13, 2025. Green Bay, WI.

Walker, J. K. O'Connor, C. Toms. California Estuarine Marine Protected Area (EMPA) Monitoring Program. Annual Salmonid Restoration Federation Conference. April 30, 2025. Santa Cruz, CA.

Xin, D., E. Fassman-Beck, A.P. Davis. Effect of Engineered Media Properties on Cu and PFAS Treatment in Biofiltration Columns. National Water Quality Monitoring Conference. March 10-13, 2025. Via webinar.

Conference Posters

Fassman-Beck, E. Tiernan, Schiff, K. New, Unbiased Metrics to Evaluate BMP Water Quality and Hydrologic Mitigation Performance. National Water Quality Monitoring Conference. March 10-13, 2025. Green Bay, WI.

Mehinto, A.C., V. McGruer, M. Konig, B. Escher. Rapid Bioassay Screening Methods to Evaluate Water Quality Improvements from Street Sweeping. National Water Quality Monitoring Conference. March 10-13, 2025. Green Bay, WI.

Other Presentations

Fassman-Beck, E. Tiernan, K. Schiff. Measuring Runoff Water Quality Improvement from Street Sweeping in Southern California. February 11, 2025. Orange County Public Works LIP/PEA Subcommittee. February 11, 2025. Via webinar.

Fassman-Beck, E. Advancing Stormwater BMP Field Monitoring and Performance Metrics. Mar 14, 2025. Colorado State University Civil & Environmental Engineering Water Seminar. March 14, 2025. Fort Collins, CO.

Fassman-Beck, E. Advancing Stormwater BMP Field Monitoring and Performance Metrics. University of Colorado, Boulder. March 14, 2025. Boulder, CO.

Fassman-Beck, E. Advancing Stormwater BMP Field Monitoring and Performance Metrics. Water Resources Research Seminar, University of Hawai'i at Mānoa. April 25, 2026. Via webinar.

Fassman-Beck, E. An Engineering Perspective on Microplastics, Tire Wear Particles and Stormwater BMPs. Ocean Protection Council Tire Microplastics Workshop. March 25, 2025. Via webinar.

Mazor, R., K. Taniguchi-Quan, E. Stein. SCCWRP's Ecohydrology Research Program and Flow Ecology Assessment in Modified Streams. EPA's Hydromodification and Flow Alteration Workgroup. April 7, 2025. Via webinar.

Mazor, R. New directions of the Stormwater Monitoring Coalition's streams survey. San Gabriel River Regional Monitoring Program's Technical Steering Group. February 13, 2025. Via webinar.

Mehinto, A. Updates from the Post-Fire Monitoring Workgroup for Aquatic Habitats. Los Angeles Regional Water Quality Control Board meeting. March 27, 2025. Los Angeles, CA.

Mehinto, A. Bioscreening Tools for Class-Based Prioritization of Emerging Chemicals. Regional Monitoring Program for Water Quality in San Francisco Bay, Emerging Contaminants Workgroup. April 23-24, 2025. Richmond, CA.

Stein, E. Advancing State Wetland Programs. National Association of Wetland Managers Annual Meeting. April 8-10, Stevenson, WA.

Taniguchi-Quan, K. CDFW Grant: Operationalizing the California Environmental Flows Framework. Environmental Flows Workgroup of the CA Water Quality Monitoring Council. February 11, 2025. Via webinar.

Taniguchi-Quan, K. SCCWRP's Ecohydrology Research Program. Presentation to the United Nations Intergovernmental Hydrological Programme's Ecohydrology Lab Network. March 14, 2025. Via webinar.

Taniguchi-Quan, K. Applied research scientist: Career path, recommendations, and student opportunities at SCCWRP. Seminar for Chapman University's Environmental Science and Policy sophomore students. April 16, 2025. Orange, CA.

Thornton Hampton, L.M. Generating Meaningful Microplastics Occurrence Data. Water Research Foundation Collaborative Forum on Microplastics. March 5-6, 2025, Camden, NJ.

Thornton Hampton, L.M. Sampling Strategies for Microplastics. Water Research Foundation Collaborative Forum on Microplastics. March 5-6, 2025, Camden, NJ.

Tupitza, J. Developing an SAV monitoring framework in Southern California. Nearshore SAVE Science Input Team Workshop. April 7, 2025. Seattle, WA.

Weisberg, S.B. Overview of SCCWRP and its research initiatives. Santa Ana Regional Water Quality Control Board Meeting. April 25, 2025. Santa Ana, CA.

Wong, C.S. Constituents of Emerging Concern (CECs): How do we deal with understanding occurrence, fate, and effects of the latest environmental contaminants? American Chemical Society Spring Meeting. March 23-27, 2025. San Diego CA.

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SCCWRP Personnel Notes

Commission

Christine Tolchin, Watershed Protection Program Manager for the San Diego County Watershed Protection Program, was elevated from Alternate Commissioner to Commissioner in March, replacing Justin Gamble, who took on a new role. Tolchin has served as an Alternate Commissioner since 2023.

Neil Searing, Water Resources Manager for the San Diego County Watershed Protection Program, was named an Alternate Commissioner in March, replacing Christine Tolchin, who was elevated into the Commissioner role. Searing will continue to serve as a CTAG Representative.

CTAG

Lauren Briggs, Senior Environmental Scientist at the Santa Ana Regional Water Quality Control Board, was appointed a CTAG Representative in March, replacing Dr. Jason Freshwater, who served as a CTAG Representative for about four years. Briggs previously served as a CTAG Alternate Representative.

Dr. **Kyla Kelly,** Water Quality Program Manager for the California Ocean Protection Council, was appointed a CTAG Representative in February, filling a vacancy.

Emily Kochert, Land Use/Environmental Planner for the San Diego County Watershed Protection Program, was appointed a CTAG Alternate Representative in February, supporting Neil Searing.

Scientific Leadership

Dr. **Raphael Mazor** has been appointed to the organizational committee for the 2026 Society for Freshwater Science annual meeting.

Dr. **Alvina Mehinto** has been appointed Co-Chair of the California Cyanobacteria and Harmful Algal Bloom (CCHAB) Network's Fish and Wildlife Workgroup.

Dr. **Kris Taniguchi-Quan** has been appointed to the United Nations Educational, Scientific and Cultural Organization (UNESCO) Intergovernmental Hydrological Programme's Ecohydrology Lab Network.

Dr. **Kris Taniguchi-Quan** has been appointed to the Flood Managed Aquifer Recharge (MAR) Instream Flows Action Team.

Dr. **Kris Taniguchi-Quan** has been appointed to the expert panel for the University of California's California Institute for Water Resources Early Career Research Grant Program.

Dr. **Susanna Theroux** has been appointed to the master's thesis committee of Surabhi Nair at California State University, Monterey Bay.

Dr. **Jan Walker** co-organized the California Estuarine Research Society (CAERS) annual meeting, held in April at SCCWRP in Costa Mesa, CA.

Favian Tong, an Environmental Scientist at the Santa Ana Regional Water Quality Control Board, was appointed a CTAG Alternate Representative in March, replacing Lauren Briggs, who has been appointed CTAG Representative.

New Faces

Dr. **Lara Jansen,** who just completed her postdoctoral research at the U.S. Environmental Protection Agency, joined SCCWRP in April as a Scientist in the Biology Department. She is an ecologist who specializes in drivers of biological condition in streams and lakes.

Dan Murphy joined SCCWRP in March as the agency's Network Engineer. He holds a B.S. in computer science from the University of California, Riverside and is wrapping up his master's in computer science, also from UC Riverside, later this year.

SCCWRP COMMISSIONER SPOTLIGHT

Stormwater manager driven by environmental impact

Christine Tolchin has built her 20-year career in environmental management at the County of San Diego, working on everything from stormwater compliance to resource management.

Christine Tolchin

Tolchin first joined the County as a volunteer in the Environment Services Unit, where she conducted CEQA reviews for Department of Public Works (DPW) projects. At the time, she was also working as a researcher at a pharmeceutical company, but her passion for nature led her to pursue a more direct role in environmental protection.

Tolchin landed her first full-time role with the County as an Environmental Planner in the Department of Planning and Land Use, where she quickly found her way into Watershed Planning. Over the years, she broadened her experience across other departments, including Parks and Recreation, before returning to what she calls her professional home: the DPW Watershed Protection Program.

"I knew I needed to do environmental work where I felt like I was making a difference," Tolchin said. "What resonated with me was the connection between people's actions and their impact on the environment, and I quickly found my niche in the Watershed Protection Program."

Now the Program Manager of the Watershed Protection Program, Tolchin was named the Commissioner in March after previously serving as the Alternate Commissioner for a year and a half.

In her current role, Tolchin leads a 45-person team responsible for preventing pollution in San Diego County's storm drain systems, by providing stormwater plans, watershed monitoring, community engagement, and delivering green infrastructure projects. Before officially stepping into her role, she served as Interim Program Manager on three separate occasions between 2021-2025. She also serves on the Board of Directors for the California Stormwater Quality Association (CASQA).

Christine Tolchin, husband Justin, and daughters Skye and Saige enjoy a family trip to Yosemite in 2024.

Christine Tolchin

Job: Program Manager, San Diego County Watershed Protection Program (since March 2025)

SCCWRP role: Commissioner (started March 2025)

Prior jobs: *20 years with San Diego County (2005-present)*: Interim Program Manager, Watershed Protection (2021-2022), (2023-2024), (2024-2025); Group Program Manager, Watershed Protection (2021-2025); Program Coordinator, Watershed Pollution Prevention (2018-2021); Chief of Operations, Resource Management Division (2014-2018); Project Manager, Alternative Compliance/Watershed Structural Projects (2013-2014); Program Coordinator, Watershed Development and Construction (2009-2013); LUEP II, Watershed Planning (2006-2009); LUEP I (2005-2006)

Education: M.S. biological sciences, Wright State University (1999); B.S. biological sciences, Wright State University (1997)

Residence: San Diego

Hometown: Cincinnati, Ohio

Family: Husband Justin; daughters Skye, 7, and Saige 6; dog Mocha; chickens Cupcake, Space, Cinnamon Roll, Kachoo

Hobbies: Hiking; camping; gardening; raising chickens

Tolchin first began working with SCCWRP in 2010 on the County's hydromodification management tools. Since becoming a Commissioner, she has enjoyed expanding her understanding of water quality issues beyond her day-to-day responsibilities and exploring SCCWRP's cutting-edge research.

Growing up in Ohio, Tolchin spent her childhood climbing trees, exploring creeks, and catching frogs and crayfish – experiences that sparked her lifelong passion for the environment. She went on to get both a B.S. and M.S. in biological sciences from Wright State University.

"I love nature, and knowing that my efforts help keep our waterways clean and healthy gives me the drive to face even the toughest parts of the job," Tolchin said.

Outside of work, Tolchin enjoys spending time outdoors with her family doing activities like hiking, camping, and raising backyard chickens.

CTAG SPOTLIGHT

Manager blends HAB expertise with policy planning

A researcher by trade, Dr. Kyla Kelly became interested in water-quality mangement as a graduate student at the University of Southern California after witnessing multiple harmful algal bloom (HAB) events that impacted marine mammals across Southern California.

Dr. Kyla Kelly

Kelly, who studied the impacts of climate change stressors on *Pseudo-nitzschia* growth and toxicity, knew from a scientific perspective why and how blooms were happening, but she was also curious about how her research could make an impact from a management and policy perspective.

After graduating, Kelly began exploring opportunities in environmental management and joined the National Oceanic and Atmospheric Administration as a Sea Grant Knauss Fellow, where she led the development of NOAA Research's 10-year Ocean Carbon Observing Science Plan for monitoring ocean's carbon cycle.

"I wanted to see how the science we do can be used to make decisions that impact human and environmental health," Kelly said. "I was able to explore that through my fellowship, which really solidified by desire to stay in the policy realm."

After her fellowship, Kelly joined the the California Ocean Protection Council as the Water Quality Program Manager in February and became the OPC's CTAG Representative.

In her role, she leads the OPC's coastal and marine water quality research, policies, and programs for HABs, ocean acidification, and plastic pollution.

For Kelly, being at the intersection of aquatic research and water-quality mangement has been a dream come true.

Dr. Kyla Kelly encounters a colony of *Trichodesmium* cyanobacteria during a dive in Cozumel, Mexico in 2021.

Kyla Kelly, Ph.D.

Job: Water Quality Program Manager, California Ocean Protection Council (since February 2025)

SCCWRP role: CTAG Representative (started February 2025)

Prior jobs: Carbon Coordination and Communication Knauss Fellow, National Oceanic and Atmospheric Administration's Global Ocean Monitoring and Observing Program (2024-2025)

Education: Ph.D. marine biology and biological oceanography, University of Southern California (2024); B.S. marine biology, University of New Haven (2018)

Residence: Sacramento

Hometown: Marlborough, Connecticut

Hobbies: Scuba diving; cycling; hiking; backpacking; skiing; rock climbing

"This role really is the perfect blend between by scientific expertise and the program management experience I gained during my fellowship," Kelly said.

Kelly received a B.S. in marine biology from the University of New Haven and a Ph.D. in marine biology and biological oceanography from USC. During her graduate program, Kelly met SCCWRP's Dr. Jayme Smith, whom she has stayed in contact with since their time at USC.

Kelly has worked with SCCWRP on various HAB-related initiatives, including collecting offshore samples during a HAB event in 2023 that sickened hundreds of sea lions and other marine mammals. Now as a member of CTAG, Kelly is excited to work with SCCWRP in a different capacity.

Growing up in Connecticut, Kelly spent a lot of time at the beach and in the ocean with her parents, who are both scuba divers. She became a certified diver herself at 12 years old and has been diving ever since.

"I became obsessed with being in the underwater world and observing the marine life," Kelly said. "I think seeing that rich and diverse ecosystem is what really got me interested in marine biology and conservation."

In her spare time, she enjoys other outdoor activities like cycling, hiking, and backpacking. This summer, Kelly is participating in the seven-day, 545-mile AIDS/LifeCycle bike ride from San Francisco to Los Angeles to raise money for charity.

SCCWRP STAFF SPOTLIGHT

Network engineer merges data, science interests

Dan Murphy began his career in IT as the go-to person in his family for technical support – from fixing computers at his mom's real estate group to setting up the information database for his uncle's tree service company.

Dan Murphy

Then Murphy learned how data can be used to tell stories and solve problems after taking an undergraduate data analysis class at UC Riverside. He began incorporating data-driven solutions into his work, including generating visualizations and building out data workflows for his family's businesses.

"Most of my early experiences were completely voluntary, so I had free reign to try out all of these new things," Murphy said. "Working with data allowed me to understand the whole picture of how everything we do is related."

Murphy, who is expected to graduate from UC Riverside with an M.S. in Computer Science in late 2025, joined SCCWRP's IT team in March as the agency's Network Engineer. He is responsible for maintaining SCCWRP's network and cloud server and supporting staff with IT-related tasks.

In his graduate program, Murphy is focused on processing big data, optimizing network performance, and using artificial intelligence.

Murphy learned about SCCWRP when he came across a job listing online and saw the perfect opportunity to merge his passion for data with science – one of his other interests; Murphy started as a chemistry major before deciding to study computer science at UC Riverside.

Dan Murphy takes a personal watercraft out into the Sea of Cortez during a vacation in Los Cabos, Mexico in 2024.

Dan Murphy

Job: Network Engineer, Cross-Departmental Technical Support (started March 2025)

Prior jobs: Business Analyst, Sunscape Eyewear (2024-2025); Data Engineer, AAA Tree Service (2021-2023); Data Analyst, Lodestone Real Estate (2018-2021); Assistant System Administrator, University of California, Riverside (2018-2020); System Administrator, ERA Donahoe Real Estate (2016-2018)

Education: M.S. computer science, University of California, Riverside (expected late 2025); B.S. computer science, University of California, Riverside (2021)

Residence: Laguna Niguel

Hometown: Azusa

Family: Mother Leah, a real estate agent; girlfriend Emily, a school counselor

Hobbies: Practicing martial arts; boating, wakeboarding; playing video games, MMOs & strategy games; airsofting

"I've always kind of been drawn to the sciences, so it's cool that this role ties those two different aspects of my interests together," Murphy said. "I feel like everyone at SCCWRP is very passionate about what they do and that work is super meaningful in terms of our environment."

Murphy's knack for problem-solving grew from his desire as a child to find solutions. When he was just 8 years old, he used his grandparents' tools to take apart their fridge to try to fix a clanking noise. This general curiosity evolved as he began to dabble in different interests throughout high school, including robotics and engineering.

A big advocate for education, Murphy would like to partner with engineering/computer science programs that bridge what K-12 students learn in the classroom with hands-on experiences in STEM.

Murphy is a fan of martial arts and has practiced various styles since 2001, including karate, Brazilian jiu-jitsu, and kung fu. Now, he mainly practices kung fu and wants to learn Wing Chun, a style of kung fu famously practiced by Bruce Lee under the renowned master Yip Man in Hong Kong.

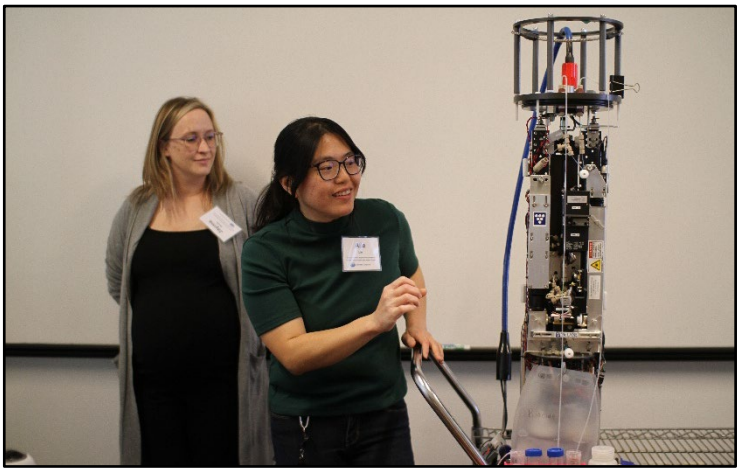
"I really like the discipline aspect of martial arts," Murphy said. "It isn't so much about the physical exercise for me, but rather being able to control and be observant of my surroundings."

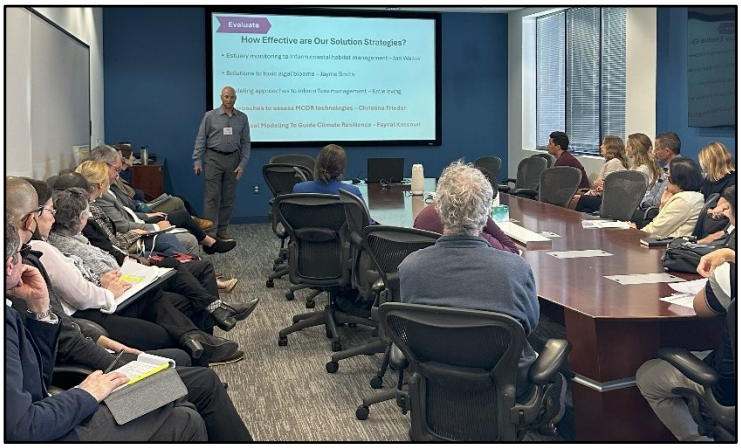
In his spare time, Murphy also enjoys playing his favorite video game Destiny, airsofting and boating during the summer.

SCCWRP SCENES

Showcasing SCCWRP research, technology

SCCWRP hosted its 10th biennial Symposium – an all-day event for staff of SCCWRP member agencies to learn about SCCWRP's work – in March, bringing together more than 130 attendees to interact and build connections. More than half of the attendees had never visited SCCWRP prior to the Symposium. SCCWRP presented 28 scientific talks and demonstrations.





Clockwise from top right, SCCWRP's Dr. Alle Lie, right, and Dr. Jayme Smith demonstrate how to use the Imaging FlowCytobot to detect harmful algal blooms; SCCWRP's Dr. Eric Stein provides an overview of climate resilient solutions; SCCWRP's Ashlyn Leang prepares a droplet reader instrument that uses the droplet digital polymerase chain reaction (ddPCR) method; Symposium guests mingle during a morning icebreaker activity; and SCCWRP's Dr. Edward Tiernan demonstrates a custom-built rainfall generator that simulates rainfall at a controlled rate and duration.