SCCWRP Director's Report

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SUMMER 2023 ISSUE

Mechanistic study to open stormwater BMP 'black box'

SCCWRP and its partners have launched a three-year study to characterize the mechanistic inner processes by which a ubiquitous class of stormwater BMPs (best management practices) removes common types of stormwater pollutants as runoff flows through them – an investigation that has the potential to open the "black box" for how these systems work and how managers can optimize their long-term performance.

The project, which kicked off in June with separate presentations to State Water Resources Control Board staff and the Southern California Stormwater Monitoring Coalition (SMC), will focus on biofiltration BMPs, an engineered system that removes metals, nutrients, and persistent organic pollutants as runoff filters gradually through the system. Typically vegetated, biofiltration BMPs consist of engineered media, plus hydrologic and hydraulic controls.

The mechanistic processes by which BMPs remove contaminants is a "black box" – with researchers routinely measuring the properties of the runoff entering and exiting the BMP, but not fully understanding what happens to this runoff while it is being treated inside the BMP.

Once researchers understand these internal mechanistic processes, they'll be able to design and maintain BMPs optimized to treat runoff over the long term – particularly valuable given the significant investments Southern California has been making in implementing biofiltration systems and similar types of structural BMPs over the past decade.

Traditionally, stormwater managers have relied on published BMP design guidance manuals to inform how they design, construct and maintain BMPs. But the guidance in these manuals is based on incomplete mechanistic understanding of BMP performance.

The BMP processes and mechanisms study – a joint collaboration between SCCWRP, the State Water Board and the SMC – will

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Cover photo: A field crew installs monitoring instruments and engineered media in a bioretention BMP in Riverside County. SCCWRP and its partners have launched a study to characterize the mechanistic inner processes by which biofiltration BMPs remove common contaminants in runoff. (Photo credit: Adrian Montoya, Riverside County Flood Control and Watershed Protection District)

To subscribe: The SCCWRP Director's Report is published quarterly by the Southern California Coastal Water Research Project. To receive this newsletter by email, contact pubrequest@sccwrp.org.

Calendar

Thursday, August 10
CTAG quarterly meeting
(In-person meeting)

Friday, September 8
Commission meeting
(In-person meeting)

probe how measurable properties of biofiltration media, along with a range of hydrologic and hydraulic conditions, influence the systems' effectiveness at removing pollutants.

Researchers will work to link the physicochemical and biological processes by which pollution removal occurs – including sedimentation, sorption, chemical transformation, and biological degradation – to measurable biofiltration BMP properties. The study will focus on three pollutants: copper, nitrate, and per- and poly-fluoroalkyl substances (PFAS).

Previous studies probing BMP performance have shied away from methodically disentangling the processes and mechanisms that explain why BMPs perform as they do, creating a perpetual "black box" around BMPs that has limited managers' ability to optimize BMP performance effectiveness.

SCCWRP's Dario Diehl inspects a series of flow-through columns that have been built to mimic how runoff flows through a bioretention BMP. Researchers are working to open the "black box" for how these systems work, starting with a laboratory-scale investigation, above, that enables researchers to control and quantify a bioretention BMP's mechanistic processes.

For example, many past BMP studies have compared the performance of different mixes of commercially available biofiltration media to one another – but none have successfully pinpointed the specific measurable properties of the media that explain why some media mixes perform better than others. Similarly, many studies have sought to optimize BMP designs in a laboratory – but few have attempted to transfer these design specifications into the real world to validate their findings.

The SCCWRP-led study will start with a two-year laboratory-based investigation to control and quantify the mechanistic processes that will be studied, followed by field validation. The study's goal is to bridge the knowledge gap between what happens in a controlled laboratory setting vs. in highly dynamic environmental conditions in the real world. Local environmental conditions can have a significant influence on how BMPs perform.

This study marks the start of what researchers hope will become a series of studies to more fully open the "black box" around BMPs. The initial three-year investigation will serve as a proof-of-concept that this type of study design can be used to gain mechanistic insights into BMP performance.

For more information, and to propose potential collaboration opportunities, contact Dr. Elizabeth Fassman-Beck.

Rapid-response monitoring effort to help illuminate how HABs affect marine mammals

SCCWRP and its partners have helped mobilize and coordinate a rapid-response effort to collect offshore field sampling data on toxin-producing harmful algal blooms (HABs) in Southern California coastal waters, following a massive bloom event this summer that sickened or killed more than 500 marine mammals.

The new data set – collected during a toxin-producing *Pseudo-nitzschia* bloom that peaked in late June – is helping researchers build modeling tools for predicting when and where these disruptive events will occur, and for estimating how sea lions, dolphins and other marine animals will be affected. *Pseudo-nitzschia* blooms produce a neurotoxin known as domoic acid that can cause seizures, disorientation, beach strandings and even death.

During major bloom events, marine mammal rescue centers – which are mostly volunteer-driven operations – struggle to keep up with sudden, dramatic spikes in marine mammal strandings on beaches. Generally, about 40%-60% of all stranded mammals that are rescued can recover if administered appropriate anti-seizure medications and/or moved from populated beaches to local rehabilitation centers.

The rapid-response HABs monitoring effort has nearly doubled in size an offshore data set that was collected last year during a similarly disruptive bloom

event. Because bloom events of this scale do not occur every year and do not unfold along a consistent timeline, researchers must rapidly mobilize sampling teams to collect offshore HABs data when opportunities arise.

In summer 2022 – during a bloom event that sickened more than 250 marine mammals in the Santa Barbara Channel area – SCCWRP helped rapidly mobilize four research cruises.

As soon as the bloom began in June 2023, SCCWRP helped train and mobilize seven research cruises that sampled in both the Santa Barbara Channel and Los Angeles County coastal waters. SCCWRP's partners included the Southern California Coastal Ocean Observing System (SCCOOS), National Oceanic and Atmospheric Administration (NOAA), University of California, Santa Cruz, and members of California's Marine Mammal Stranding Network.

Also as part of this rapid-response effort, SCCWRP developed marine HAB sampling kits and training resources to better support partners with HABs monitoring in the future.

Researchers will pair the bloom data sets with data collected by Southern California marine mammal centers on the numbers of mammals stranded along the coastline and how much domoic acid is found in their blood and urine.

The paired data sets will be used to refine a set of prototype modeling tools designed to predict the locations and severity of toxin-producing bloom events at the earliest possible stages. The tools can be used to help predict the likelihood of marine mammals becoming stranded on the beach as a result of neurotoxin exposure, enabling local rescue centers to mobilize their resources ahead of anticipated mass strandings.

Courtesy of Channel Islands Marine & Wildlife Institute

A rescue crew from the Channel Islands Marine & Wildlife Institute prepares to transport a sea lion stranded on the beach as a result of domoic acid exposure to a rehabilitation center for treatment. SCCWRP helped mobilize and coordinate a rapid-response effort this summer to collect offshore field sampling data on toxin-producing harmful algal blooms, which are believed to be responsible for seasonal marine mammal strandings. (Note: Rescue activities conducted under a stranding agreement with the National Oceanic and Atmospheric Administration)

Pseudo-nitzschia and other ecologically disruptive blooms are becoming increasingly commonplace and more intense as climate change intensifies.

Although California has been collecting HABs monitoring data for more than a decade via the Harmful Algal Bloom Monitoring and Alert Program (HABMAP), HABMAP targets nearshore coastal waters only. Offshore HABs monitoring data have the potential to complement HABMAP data, extending the data's utility as an early-warning indicator of larger-scale bloom events. For example, the *Pseudo-nitzschia* blooms in 2022 and 2023 started further offshore.

For more information, contact Dr. Jayme Smith.

Managers chart path for promoting optimized restoration and assessment of eelgrass beds

SCCWRP and its partners have helped Southern California coastal managers chart a path forward for how to promote optimized restoration and assessment of eelgrass beds, with managers agreeing to develop a modeling tool that will pinpoint where along Southern California's coastline these ecologically fragile habitats are most likely to survive and thrive.

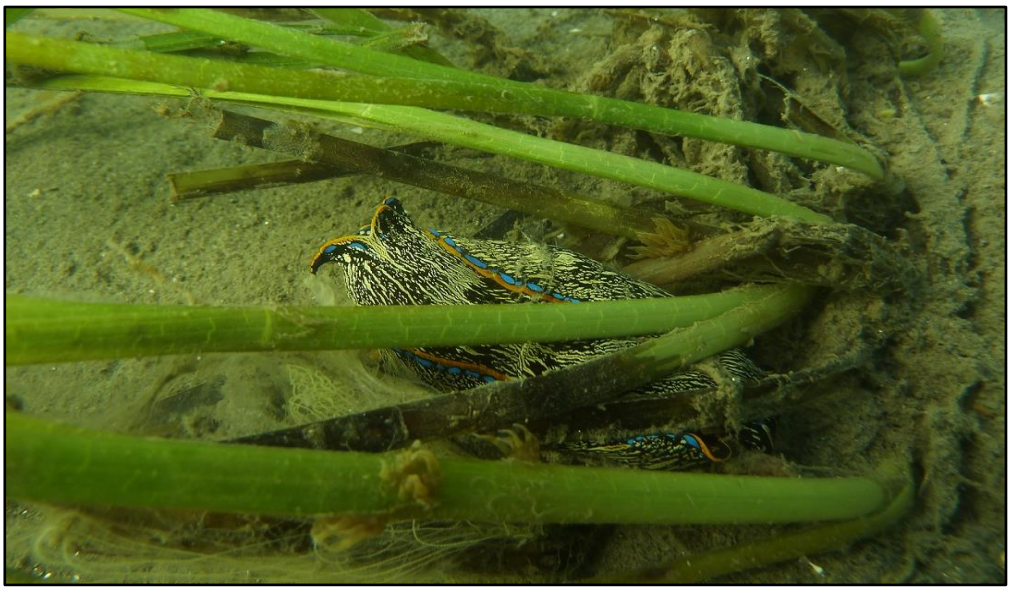
The eelgrass habitat suitability model – described in a SCCWRP technical report published in July – will consist of a mechanistic model for predicting eelgrass growth along Southern California's coast. Eelgrass beds provide essential habitat for endangered or threatened species, can buffer against the ecological effects of localized ocean acidification, and have the potential to serve as a carbon sink.

In recent years, estuary managers across Southern California have invested significant resources to restore and maintain eelgrass beds in accordance with California's Eelgrass Mitigation Policy. However, managers have relied on

incomplete historical data and best professional judgment to inform their decision-making about protection and restoration, leading to mixed success with eelgrass sustainability.

SCCWRP brought together water-quality regulators, federal agencies, academic researchers and others to work toward consensus on what is needed to optimize restoration and protection of eelgrass beds in Southern California. The group evaluated the latest literature, local historical data and a variety of existing eelgrass bed models to assess eelgrass bed state of the science and management options.

The outcome was identifying the most important data gaps and how to fill them, plus acknowledging that the new eelgrass suitability model is necessary for successful Southern California decision-making.



A nudibranch nestles in an eelgrass bed in Newport Bay. Southern California coastal managers have reached consensus on the design of a modeling tool that will help managers pinpoint where along Southern California's coastline these ecologically fragile habitats can survive and thrive.

The eelgrass habitat suitability model that the group agreed to develop will enable Southern California managers to predict how much eelgrass should be growing at a given site in the present day, under conditions of minimal disturbance from human activities. The model also will be able to make this prediction after taking into consideration future projections about sea level rise and water temperature changes at the site.

Furthermore, the model's ability to predict reference condition – what the site would look like in the absence of human activities – will provide critical context as coastal managers work to understand a site's potential to sustain eelgrass beds over the long term, even in the face of climate change.

Eelgrass beds, which are submerged meadows of aquatic flowering plants that grow only in shallow coastal waters, are sensitive to even small changes in water quality and water turbidity, which can reduce sunlight. Much of the eelgrass beds that historically dotted the Southern California coastline have been decimated by human development.

Under California's Eelgrass Mitigation Policy, coastal managers are often required to offset the impacts of coastal development and similar human activities by restoring eelgrass beds and/or taking mitigation measures to protect these habitats. Successful planting efforts in Southern California include Mission Bay and Upper Newport Bay, where much of the existing eelgrass monitoring data has been generated.

However, significant data gaps remain, particularly in Southern California's many smaller embayments and coastal ecosystems.

Although modeling tools have been developed to inform where eelgrass beds are likely to survive under present-day conditions, these relatively simple tools do not generate insights about reference conditions for an eelgrass bed, nor do they provide insight into how climate change will alter where eelgrass beds can survive over the long term.

With the appropriate data, a predictive eelgrass habitat suitability model for Southern California could be built in three to five years.

The modeling tool will complement other tools that SCCWRP and its partners have already developed or are working on to support eelgrass management efforts in Southern California. The tools are organized into a three-tiered framework for assessing eelgrass health, and include development of mapping tools for estimating historical extent of eelgrass beds, a method for rapidly screening eelgrass beds to assess their overall health, and a more involved assessment method that evaluates ecological functioning.

For more information, contact Dr. David Gillett.

Evaluation of CO_2 removal technology to shed light on possible solution for climate change

SCCWRP and its partners have begun working to evaluate the effectiveness of a technology designed to remove dissolved carbon dioxide directly from coastal waters – an investigation that will shed light on whether this potential management solution could help combat global climate change as well as alleviate the effects of intensifying West Coast ocean acidification.

In July, SCCWRP began working with startup company Captura to examine if the company's electrodialysis technology – known as direct ocean capture – has the potential to draw down carbon dioxide in the atmosphere by removing carbon dioxide from coastal waters. Captura's technology uses renewable energy to isolate and trap dissolved carbon dioxide so it can be stored or reused.

Captura's working hypothesis is that carbon dioxide removal will increase the waters' capacity to absorb carbon dioxide from the atmosphere. The company hopes the water, in turn, will draw down carbon dioxide emissions in the atmosphere that are driving climate change.

SCCWRP will use the opportunity to explore whether Captura's technology also has the potential to offset the ecological effects of ocean acidification in Southern California coastal waters. Ocean acidification is a consequence of the world's ocean absorbing about a third of all atmospheric carbon dioxide emissions.

To assess whether Captura's technology could achieve its goals if deployed in coastal waters, researchers will apply a computer model that was originally developed to predict the trajectory of ocean acidification and hypoxia (OAH) in coastal waters. Known as ROMS-BEC (Regional Ocean Modeling System + Biogeochemical Elemental Cycling), the modeling tool was developed by a team that includes SCCWRP.

Courtesy of Captura Corporation

Researchers are working with startup company Captura to investigate whether its electrodialysis technology, pictured above on a pier in Newport Beach, has the potential to help combat global climate change as well as alleviate the effects of intensifying West Coast ocean acidification. Captura's technology uses renewable energy to isolate and trap carbon dioxide from coastal waters.

Captura's electrodialysis technology, which won an XPRIZE award in a carbon removal competition in 2022, was developed by a research team based at the California Institute of Technology (Caltech). The Los Angeles-based company wants to use the ROMS-BEC model to study the technology's effectiveness in Southern California coastal waters.

Electrodialysis is one of multiple marine carbon dioxide removal (mCDR) technologies being investigated as potential solutions for the effects of climate change and coastal OAH. Other burgeoning mCDR technologies include ocean alkalinity enhancement, artificial upwelling and downwelling, and macroalgal farming.

For macroalgal farming – in which offshore kelp farms are used to promote removal of nutrients and carbon dioxide from surrounding waters – researchers are using the same ROMS-BEC model to investigate the potential effectiveness of this nature-based mCDR technology.

In evaluating all of these potential mCDR solutions, researchers are focusing on understanding the interplay between potential local management actions and the global trajectories at which climate change and ocean acidification are unfolding. The degree to which mCDR technologies can be scaled up and/or used in combination with other management solutions could play a pivotal role in mitigating and offsetting these dual consequences of rising atmospheric carbon dioxide emissions.

For more information, contact Dr. Christina Frieder.

Updates by Thematic Area

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

BIOASSESSMENT

Consensus reached on priority recommendations for supporting development of national eDNA strategy

A federal task force that includes SCCWRP has reached agreement on the technical and management actions that will need to be taken to support development of a coordinated national strategy for incorporating environmental DNA (eDNA) methods into aquatic monitoring programs nationwide.

The task force's consensus recommendations, described in a manuscript published in May by the journal *Environmental DNA*, outlines priority steps that scientists and managers should take to coordinate and harmonize eDNA policies across agencies, build monitoring capacity, and fill knowledge gaps. The eDNA task force was convened by the White House Office of Science and Technology Policy.

eDNA-based monitoring has the potential to serve as a cost-effective complement and/or alternative to traditional morphology-based monitoring methods. eDNA monitoring uses the DNA that organisms shed into their environment to monitor a broad range of organisms – often with greater speed, accuracy and precision than traditional monitoring methods.

A draft of the national eDNA strategy is expected to be available this winter.

Researchers working to develop a coordinated national strategy for incorporating environmental DNA (eDNA) methods into aquatic monitoring programs have reached agreement on the technical and management actions that will need to be taken to support the strategy's development. eDNA monitoring has the potential to make it easier and more effective to conduct routine biological monitoring of fish like kelp bass, above, a popularly caught sport fish in Southern California.

Webinar series highlights eDNA methods, applications for environmental monitoring

The California Water Quality Monitoring Council and its partners have launched a six-part webinar series to educate managers and other interested parties on how environmental DNA (eDNA) methods can be incorporated into a range of environmental monitoring applications.

The webinars, organized by SCCWRP's Dr. Susanna Theroux, provide an overview of eDNA-based methods and their application in bioassessment, harmful algal bloom monitoring, species surveillance, pathogen detection and data analysis/bioinformatics. The first three webinars were held in February, March and June.

Recordings and materials from the first three webinars are available online. The remaining three webinars have not yet been scheduled.

Standardized monitoring protocols to enable eelgrass beds to be assessed based on ecological functioning

SCCWRP has completed development of a set of standardized assessment protocols for assessing the health of eelgrass beds based on their ecological functioning.

Development of the eelgrass beds monitoring SOPs (standard operating procedures) – completed in June – will enable managers to take a consistent, bioassessment-based approach to evaluating the ability of this ecologically fragile habitat to provide refugia to fish and other animals, as well as attenuate ocean waves and sequester carbon.

Researchers developed the SOPs by reviewing existing assessment protocols already in use by disparate agencies and programs, working to identify field and laboratory best practices.

These new SOPs will be applied in ongoing regional monitoring programs for eelgrass, including the Regional Eelgrass Survey of Condition and Quality (RESCQ) and the 2023 cycle of the Southern California Bight Regional Monitoring Program.

In a separate but parallel development, researchers also have developed a modeling tool for predicting where along Southern California's coastline eelgrass beds are most likely to survive and thrive.

ECOHYDROLOGY

Workplan developed for study probing how water temperature affects stream health

SCCWRP and its partners have developed a workplan for a two-year study that aims to improve managers' understanding of how water temperature affects the health of sensitive aquatic life in Southern California streams where treated wastewater effluent is being discharged.

The study workplan, presented in June to the project's technical advisory committee, focuses on the upper Santa Clara River watershed, and complements a similar ongoing study in the San Gabriel River watershed. Wastewater effluent is typically discharged into streams above the stream's ambient temperature.

Unlike the San Gabriel River watershed, the Santa Clara River watershed receives inputs from groundwater supplies. Groundwater is thought to have a cooling effect on river temperature, meaning the groundwater in the Santa Clara River has the potential to help offset increased temperatures from the wastewater discharges.

The investigations are motivated by a new generation of wastewater discharge permits that have lowered the maximum temperature at which receiving water is required to be maintained.

EUTROPHICATION

Statewide effort launched to update management guidance for benthic HABs

A statewide HABs monitoring workgroup has reconvened a subcommittee to be co-led by SCCWRP that will examine how to improve management options for protecting humans, dogs, and wildlife from toxin-producing benthic blooms, which tend to form mats along the bottom of water bodies.

The Benthic HABs Subcommittee of the California Cyanobacterial and Harmful Algal Bloom (CCHAB) Network, which reconvened in May, will refine and build on its original 2020 recommendations for how to monitor benthic HABs in California lakes, streams and other freshwater systems, as well as when and how to notify the public about blooms that may pose a health threat.

Unlike planktonic HABs that grow in the water column, benthic HABs have not been as extensively studied. In California, existing HAB toxin thresholds designed to protect humans and wildlife from exposure are for water-column HABs only. Meanwhile, because benthic HABs form as mats that attach to a range of bottom substrates, researchers believe humans and wildlife can be exposed to benthic HABs in less predictable ways (i.e., when pieces of the mat suddenly break off and become suspended in the water column or stranded on the shoreline).

The subcommittee plans to provide recommendations by the end of 2024. To join the subcommittee, contact Dr. Jayme Smith.

CLIMATE CHANGE

Steering committee convened to review ocean numerical model for mitigating climate change effects

A steering committee has been convened to guide an upcoming, independent scientific review of a computer modeling tool that was developed by a team that includes SCCWRP to predict the trajectory of intensifying ocean acidification and hypoxia (OAH) in California coastal waters.

The charge of the steering committee – which was convened in May – is to assemble and oversee an independent panel of scientific experts that will review the coastal OAH model and weigh in on

Researchers are working to understand how water temperature affects the health of sensitive aquatic life in the Santa Clara River watershed, above, where treated wastewater effluent is being discharged. The river receives inputs from groundwater supplies that may help offset increased temperatures resulting from the wastewater discharges.

how much confidence is appropriate for managers to place in the OAH modeling predictions. The expert review panel is expected to begin meeting this winter.

The steering committee is made up of representatives from the regulated and regulatory communities – including multiple SCCWRP member agencies – as well as an environmental NGO (California Coastkeeper Alliance) and two *ex officio* science advisors. The steering committee's work is being facilitated by the National Water Research Institute.

The coastal OAH model and associated biological interpretation tools predict, among other things, how discharges of land-based nutrients are expected to exacerbate OAH's ecological effects in Southern California's coastal ocean in the coming years – underscoring the importance of getting independent feedback on its relevance and value for management decision-making.

Tools being developed to evaluate resiliency of coastal wetlands to sea level rise

SCCWRP and its partners have begun developing a set of regional assessment tools to evaluate the resiliency of Southern California's coastal wetlands to sea level rise – a project that will help inform wetland managers' long-term coastal resiliency planning efforts.

The project, which kicked off in May, builds on a standardized, statewide framework co-developed by SCCWRP for monitoring the ecological health of coastal estuaries. This estuarine assessment framework already has been incorporated into California's new Estuary Marine Protected Areas (MPA) Monitoring Program.

Unlike the estuarine MPA assessment framework, the new tools will focus specifically on evaluating the vulnerability of Southern California's low-lying coastal estuaries to future sea level rise.

With these insights, managers will be able to make informed decisions about how to prioritize long-term restoration and protection actions that optimally promote coastal wetland resiliency across Southern California.

CONTAMINANTS OF EMERGING CONCERN

Study launched to expand use of bioanalytical cell assays for more aquatic matrices

SCCWRP and its partners have launched an intercalibration exercise to evaluate laboratories' proficiency using bioanalytical cell assays to detect contaminants in surface water, stormwater, seawater and other aquatic matrices.

The intercalibration exercise, launched in July, is intended to help expand the number of aquatic matrices and types of bioactive contaminants that can be routinely screened in California using bioanalytical cell assays.

The intercalibration exercise will focus on evaluating laboratories' proficiency screening five aquatic matrices using three assays: the glucocorticoid receptor assay, which screens for immunotoxic chemicals, and the androgen receptor and anti-androgen receptor assays, both of which screen hormones controlling male sexual development and reproduction.

In 2020, California began requiring certain types of recycled water to be screened for bioactive contaminants using two other assays: the estrogen receptor assay and the aryl hydrocarbon receptor assay.

Bioanalytical screening serves as a valuable additional line of evidence for detecting chemical contamination, especially for chemicals not being routinely monitored.

STORMWATER BMPs

Pair of calculator tools developed to streamline analysis of BMP performance data

SCCWRP has developed a pair of open-source calculator tools to streamline and standardize how stormwater managers process raw monitoring data they've collected in the field on the performance of stormwater BMPs (best management practices).

The Rainfall and Flow Analysis Calculator and Flow-Weighting and EMC Calculator, which were published online last spring, 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.

Stormwater managers traditionally have not had access to standardized methods

Courtesy of Kirk Gilligan

High tides surround an endangered Ridgeway's rail as it tends to its nest at the Seal Beach National Wildlife Refuge in Orange County. Researchers have begun developing a set of regional assessment tools to evaluate the resiliency of coastal wetlands to future sea level rise.

for processing raw BMP data, leading to inconsistent approaches.

End users have already begun beta-testing the new calculator tools as part of their routine BMP data analysis activities.

Custom-built rainfall generator that creates controlled wet-weather conditions to be used initially for street sweeping study

SCCWRP has developed a custom-built, field-deployable rainfall generator capable of creating repeatable, controlled wet-weather conditions to support a study investigating the effectiveness of routine street sweeping in removing contaminants that enter storm drains and contribute to runoff pollution.

Researchers envision the rainfall generator – which researchers plan to deploy in the field for the first time in August – having widespread utility beyond the street sweeping study. The instrument will enable researchers to eliminate much of the variability that surrounds interpreting water-quality data from real-world rainfall and runoff events.

The street sweeping study, which is being done in cooperation with the Southern California Stormwater Monitoring Coalition (SMC) and the City of Santa Barbara, is using a novel study design to measure how much bacteria, nutrients, trace heavy metals, microplastics and other common stormwater contaminants are transported from streets into storm drains during wet-weather flows, and if street sweeping is effective in preventing the transport of at least some of this pollution into storm drains.

The rainfall generator, affectionately known as the SCCWRPer Soaker, can generate rainfall at a controlled rate and duration across 84 square feet of surface area. The instrument spans the width of approximately one standard traffic lane and can be broken down into pieces for transport in a trailer. Researchers plan to publish the full design specifications in a peer-reviewed journal.

A custom-built, field-deployable rainfall generator, pictured above under construction at SCCWRP, will be used initially to support a study investigating the effectiveness of routine street sweeping in removing contaminants that enter storm drains and contribute to runoff pollution. The rainfall generator creates repeatable, controlled wet-weather conditions across 84 square feet of surface area.

Pilot study examining potential of low-cost prototype sensors to detect illicit storm drain discharges

SCCWRP and Orange County Public Works have deployed a set of low-cost, prototype field sensors into Orange County storm drains as part of a pilot project aiming to automate the process of detecting illicit pollutant discharges.

The sensor deployment, which was completed in June at four sites, is generating a continuous stream of real-time flow and water-quality data as runoff moves through the storm drain system, enabling managers to look for fluctuations in the monitoring data that could be indicative of a transitory pollutant discharge.

Stormwater managers traditionally monitor for illicit discharges via periodic, in-person site visits, which limits the chances of detecting intermittent pollutant discharges that can pass rapidly through the system. By contrast, automated monitoring produces a continuous stream of real-time data, so managers can look for spikes and other sudden changes that become the basis for follow-up investigations.

The sensors being used in the pilot study were developed by an Australian research team based at Monash University and Queensland University of Technology, and feature open-source software and hardware.

REGIONAL MONITORING

Bight '23 field sampling underway to evaluate sediment quality

The 2023 cycle of the Southern California Bight Regional Monitoring Program has kicked off field sampling of coastal seafloor sediment to evaluate the chemical, toxicological and biological health of Southern California's marine ecosystems.

The Bight '23 Sediment Quality study element, which launched in July, involves collecting more than 350 sediment grab samples and 140 benthic trawls across more than 1,500 square miles of coastal waters.

The same sampling effort also will be leveraged by the Bight '23 Trash and Microplastic element to track the spread of trash across the coastal seafloor. The field sampling work is scheduled to wrap up in late September.

Among the sediment contaminants to be monitored during Bight '23 will be PFAS (per- and polyfluoroalkyl substances), tire wear compounds, and microplastics – all identified as monitoring priorities by a recently reconvened statewide review

panel of experts on CECs (contaminants of emerging concern).

Sampling for multiple other Bight '23 study elements is scheduled to begin this fall and winter.

Bight '23 using newly standardized methods to analyze microplastics in sediment and shellfish

The Trash and Microplastics study element of the Southern California Bight 2023 Regional Monitoring Program is leveraging newly standardized methods for collecting and measuring microplastic particles to conduct a regional assessment of microplastics contamination in seafloor sediment and shellfish.

The Bight '23 microplastics assessment, which kicked off in July, represents a dramatic step forward in how the Bight program collects, detects and quantifies microplastics – compared to a decade ago when the Bight program first conducted a regional survey of microplastics in sediment.

During Bight '13, the smallest particles analyzed were 1 millimeter in size, and plastic type was determined via a float test plus reaction to treatment with various solvents. By contrast, Bight '23 can analyze particles as small as 125 microns, and will use Fourier-transform infrared (FTIR) and Raman spectroscopy to determine material type.

A key focus of the Bight '23 microplastics assessment will be investigating how microplastics can potentially be transported from land-based sources into the ocean; researchers are collecting sediment samples from embayments, marinas, ports and the inner shelf.

The Bight '23 regional survey will also help California realize its goal of building a statewide microplastics monitoring network for the coastal ocean.

Study shows more than 77% of Southern California's coastal stream kilometers contains trash

The Southern California Bight 2018 Regional Monitoring Program has published the findings of a regional survey of trash in aquatic environments that concluded that 77% of Southern California's 4,600 miles of wadeable streams contain trash – with plastic being the most abundant type of trash.

The study, described in an article published in June by the journal *Frontiers in Environmental Science*, found that urbanized areas had about twice the amount of trash as natural areas. High road density and proximity to roads were two influential factors associated with high trash levels.

Researchers also found a significant decrease in the number of plastic bags in streams compared to a previous 2011-2013 stream trash survey; between the surveys, a 2016 statewide ban on single-use plastic bags went into effect. The study, which was done in partnership with the Southern California Stormwater Monitoring Coalition (SMC), concluded that such management actions are having a positive effect on reducing trash pollution.

The study data is expected to help develop mitigation strategies for reducing trash pollution in coastal watersheds and evaluate management successes.

ADDITIONAL RESEARCH AREAS

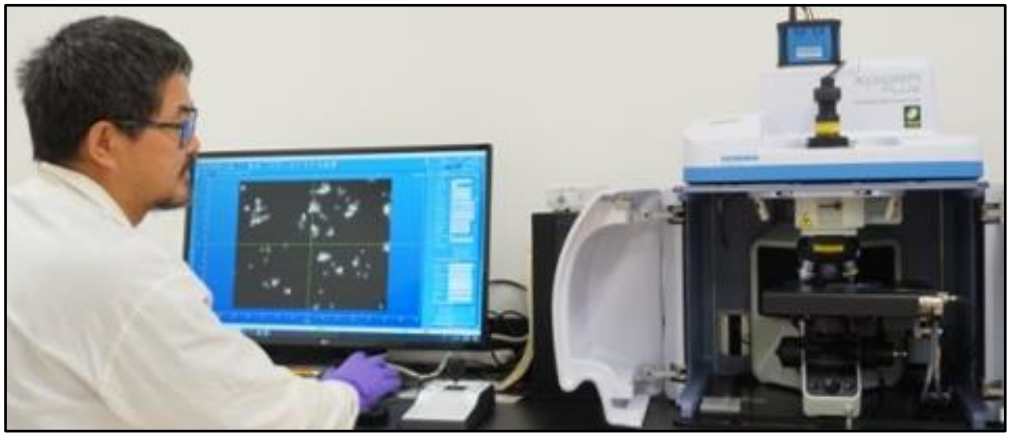
Final intercalibration exercise completed for *Ceriodaphnia dubia* toxicity testing study

A SCCWRP-led study probing the sources of inconsistent results produced by California-accredited laboratories that use a toxicity test commonly used to evaluate discharge water quality has completed its second and final intercalibration exercise.

The intercalibration exercise, completed in June, invited participating laboratories to perform the *Ceriodaphnia dubia* chronic reproduction test during three rounds of split-sample testing. The exercise followed a training workshop for all participating laboratories that was intended to help reduce variability in test results.

Environmental managers have used the *C. dubia* test for decades as part of a suite of toxicity tests to protect California's enclosed bays, estuaries and inland water bodies from contaminated discharges. But in recent years, end users of the *C. dubia* test have expressed growing concerns about accuracy, repeatability and consistency associated with interpreting test results.

Findings from the laboratory intercalibration exercises will be used by the project's expert science panel to develop test recommendations for improving test results. The draft recommendations are expected to be released in early September 2023.



SCCWRP's Dr. Wayne Lao uses a Raman spectroscopy instrument to examine microplastic particles in a water sample. This technology is being leveraged by the Trash and Microplastics study element of the Southern California Bight 2023 Regional Monitoring Program to collect and measure microplastics in sediment and shellfish.

New SCCWRP Publications

Journal Articles

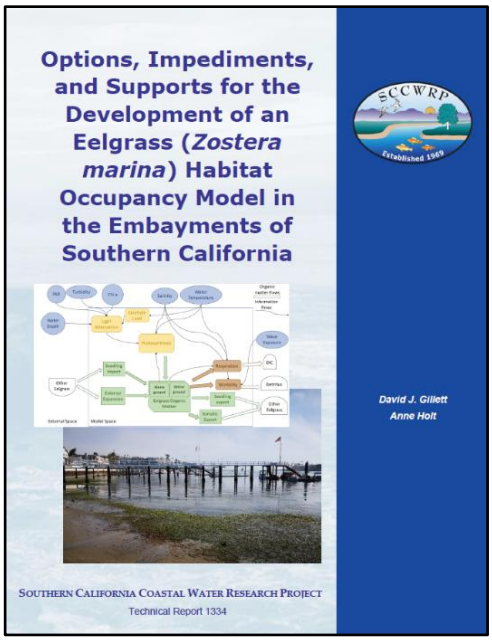
Arzeno-Soltero, I.B., B.T. Saenz, C.A. Frieder, M.C. Long, J. DeAngelo, S.J. Davis, K.A. Davis. 2023. Large global variations in the carbon dioxide removal potential of seaweed farming due to biophysical constraints. *Proceedings of the National Academy of Sciences* 4:185.

Kelly, R.P., D.M. Lodge, K.N. Lee, S. Theroux, A.J. Sepulveda, C.A. Scholin, J.M. Craine, E.A. Allan, K.M. Nichols, K.M. Parsons, K.D. Goodwin, Z. Gold, F.P. Chavez, R.T. Noble, C.L. Abbott, M.R. Baerwald, A.M. Naaum, P.M. Thielen, A.L. Simons, C.L. Jerde, J.J. Duda, M.E. Hunter, J.A. Hagan, R.S. Meyer, J.A. Steele, M.Y. Stoeckle, H.M. Bik, C.P. Meyer, E.D. Stein, K.E. James, A.C. Thomas, E. Demir-Hilton, M.A. Timmers, J.F. Griffith, M.J. Weise, S.B. Weisberg. 2023. Toward a national eDNA strategy for the United States. *Environmental DNA* DOI:10.1002/edn3.432.

Kenitz, K.M., E.C. Orenstein, C.R. Anderson, A.J. Barth, C. Briseno-Avena, D.A. Caron, M.L. Carter, E. Eggleston, P.J.S. Franks, J.T. Fumo, J.S. Jaffe, K.A. McBeain, A. Odell, K. Seech, R. Shipe, J. Smith, D.A.A. Taniguchi, E.L. Venrick, A.D. Barton. 2023. Convening Expert Taxonomists to Build Image Libraries for Training Automated Classifiers. *Limnology and Oceanography Bulletin* DOI:10.1002/lob.10584.

Lohmann, R., B. Vrana, D. Muir, F. Smedes, J. Sobotka, E.Y. Zeng, L. Bao, I.J. Allan, P. Astrahan, R.O. Barra, T. Bidleman, E. Dykyi, N. Estoppey, G. Fillmann, N. Greenwood, P.A. Helm, L. Jantunen, S. Kaserzon, J.V. Macias, K.A. Maruya, F. Molina, B. Newman, R.M. Prats, M. Tsapakis, M. Tysklind, B.L. van Drooge, C.J. Veal, C.S. Wong. 2023. Passive-Sampler-Derived PCB and OCP Concentrations in the Waters of the World—First Results from the AQUA-GAPS/MONET Network. *Environmental Science and Technology* 57:9342-9352.

McLaughlin, K., R.D. Mazor, M. Sutula, K.C. Schiff. 2023. Regional assessment of trash in Southern California coastal watersheds, United States. *Frontiers in Environmental Science* 11:1210201.



SCCWRP has published a technical report outlining recommendations for the development of a regional-scale habitat occupancy model for eelgrass in Southern California's coastal embayments.

Mehinto, A.C., B. Du, E. Wenger, Z. Tian, E.P. Kolodziej, D. Apeti, K.A. Maruya. 2023. Bioanalytical and non-targeted mass spectrometric screening for contaminants of emerging concern in Southern California bight sediments. *Chemosphere* 331:138789.

Munno, K., A.L. Lusher, E.C. Minor, A. Gray, K. Ho, J. Hankett, C.T. Lee, S. Primpke, R.E. McNeish, C.S. Wong, C. Rochman. 2023. Patterns of microparticles in blank samples: A study to inform best practices for microplastic analysis. *Chemosphere* 333:138883.

Sandoval-Belmar, M., J. Smith, A.R. Moreno, C. Anderson, R.M. Kudela, M. Sutula, F. Kessouri, D.A. Caron, F.P. Chavez, D. Bianchi. 2023. A cross-regional examination of patterns and environmental drivers of Pseudo-nitzschia harmful algal blooms along the California coast. *Harmful Algae* 126:102435.

Schiff, K.C., J.F. Griffith, J.A. Steele, A.G. Zimmer-Faust. 2023. Dry and Wet Weather Survey for Human Fecal Sources in the San Diego River Watershed. *Water* 15:2239.

Thornton Hampton, L.M., H. De Frond, K. Gesulga, S. Kotar, W. Lao, C. Matuch, S.B. Weisberg, C.S. Wong, S. Brander, S. Christansen, C.R. Cook, F. Du, S. Ghosal, A.B. Gray, J. Hankett, P.A. Helm, K.T. Ho, T. Kefela, G. Lattin, A. Lusher, L. Mai, R.E. McNeish, O. Mina, E.C. Minor, S. Primpke, K. Rickabaugh, V.C. Renick, S. Singh, B.V. Bavel, F. Vollnhals, C.M. Rochman. 2023. The influence of complex matrices on method performance in extracting and monitoring for microplastics. *Chemosphere* 334:138875.

Technical Reports

Gillett, D.J., R.D. Mazor, A.E. Holt, R. Darling, R. Butler. 2023. Instructions for Application of the Rapid Screening Causal Assessment (RSCA) Tools v 2.0 in California's Streams. Technical Report 1310. Southern California Coastal Water Research Project. Costa Mesa, CA.

Gillett, D.J., A. Holt. 2023. Options, Impediments, and Supports for the Development of an Eelgrass (Zostera marina) Habitat Occupancy Model in the Embayments of Southern California. Technical Report 1334. Southern California Coastal Water Research Project. Costa Mesa, CA.

Smith, J., D. Shultz, A. Lie, S. Theroux. 2023. Diversity and Prevalence of Cyanobacteria and Cyanotoxins in Los Angeles Region Recreational Lakes and Reservoirs. Technical Report 1309. Southern California Coastal Water Research Project. Costa Mesa, CA.

Quarter in Review

Conference Presentations

Fassman-Beck, E. New Data-Driven Metrics for Evaluating BMP Performance. Center for Watershed Protection Annual Conference. April 24-27, 2023. San Diego, CA.

Fassman-Beck, E. and E. Tiernan. An Open Source Tool for Flow-Weighting and Calculating Event Mean Concentrations. Center for Watershed Protection Annual Conference. April 24-27, 2023. San Diego, CA.

Fassman-Beck, E. and E. Tiernan. Measuring Effectiveness of Turf-Replacement BMPs to Minimize Dry and Wet Weather Runoff. Center for Watershed Protection Annual Conference. April 24-27, 2023. San Diego, CA.

Fassman-Beck, E. and E. Tiernan. An Open Source Tool for Flow-Weighting and Calculating Event Mean Concentrations. EWRI Water Resources and Environmental Congress. May 21-25, 2023. Henderson, NV.

Fassman-Beck, E. New Metrics for Evaluating Hydrologic Performance of SCMs. EWRI Water Resources and Environmental Congress. May 21-25, 2023. Henderson, NV.

Mazor, R. A framework for assessing indicators of biological condition and eutrophication in modified channels in California. Society of Freshwater Science Annual Meeting. June 2-7, 2023. Brisbane, Australia.

Stein, E. Developing a Risk-Decision Framework for Evaluating Vulnerability of Streams to Hydrologic Alteration. Society of Freshwater Science Annual Meeting. June 2-7, 2023. Brisbane, Australia.

Stein, E. Prioritizing Stream Protection, Restoration and Management Actions Using Landscape Modeling and Spatial Analysis. Society of Freshwater Science Annual Meeting. June 2-7, 2023. Brisbane, Australia.

Stein, E. Incorporating Ecosystem Services into Compensatory Mitigation Programs. Society of Wetland Scientists Annual Meeting. June27-30, 2023. Spokane, WA.

Other Presentations

Fassman-Beck, E. Measuring Effectiveness of Turf-Replacement BMPs to Minimize Dry Weather Runoff. County of San Diego Watershed Protection Program and Flood Control staff. June 6, 2023. Via webinar.

Gillett, D. A Potential Rapid Causal Assessment Framework for California. USEPA Biocriteria Program webinar. May 23, 2023. Via webinar.

Mehinto, A. Using in vitro bioassays for water quality monitoring. Organization for Economic Co-operation and Development (OECD) Working Party on biodiversity, water and ecosystems. May 16, 2023. Via webinar.

Thornton Hampton, L. Current Research Initiatives & Strategies for Microplastic Management in California. International Council of Chemical Associations Microplastics Advanced Research and Innovation Initiative (ICCA-MARII) Workshop. June 12, 2023. Seattle, WA.

Smith, J. and S. Theroux. eDNA for Harmful Algal Blooms (HABs). California Molecular Methods Workgroup. June 14, 2023. Via webinar.

Sutula, M. Science Supporting the Elkhorn Slough Nutrient Total Maximum Daily Load (TMDL) Study: What did we learn and where do we go from here? Elkhorn Slough Water Quality Science Mini-Symposium. June 29, 2023. Via webinar.

Sutula, M. Ocean Modeling to Support Coastal Water Quality Management: A Progress Report. California Regional Board Chair meeting. May 26, 2023. Sacramento, CA. Via webinar.

Sutula M. NOAA - California Partnership on Numerical Modeling: How Can we Build on our Success? NOAA Science Advisory Board meeting. Costa Mesa, CA. Via webinar.

Walker, J. Statewide Estuary MPA monitoring program. Coastal Wetland Restoration, UC Lab Fees Research Program annual team meeting. May 6, 2023. Santa Cruz, CA.

Walker, J. and E. Stein. Future directions for the Estuary MPA monitoring program as part of the MPA decadal review process in Moss Landing. Marine Protected Area (MPA) management staff. July 11, 2023. Moss Landing, CA.

SCCWRP Personnel Notes

Commission

Susana Arredondo, the newly hired Executive Officer of the Los Angeles Regional Water Quality Control Board, was named a Commissioner in May, replacing Renee Purdy, who retired after serving on the Commission for 4-1/2 years.

Christine Tolchin, Interim Program Manager for the San Diego County Watershed Protection Program, was named an Alternate Commissioner in June, replacing Jo Ann Weber, who retired after serving on the Commission for nearly two years.

Keith Lilley, Deputy Director of Water Resources for the Los Angeles County Flood Control District, retired in July after 34 years of service in Public Works. Lilley served as a Commissioner for 1-1/2 years. His replacement has not yet been named.

CTAG

Neil Searing, Water Resources Manager for the San Diego County Watershed Protection Program, was named a CTAG Representative in June, replacing Jo Ann Weber, who retired after serving on and off as a CTAG Representative for more than 16 years total. Searing previously served as a CTAG Representative from 2019 to 2021.

Scientific Leadership

Dr. **Elizabeth Fassman-Beck** has been appointed to the American Society for Testing and Materials (ASTM) committee on stormwater control measures.

Darrin Greenstein has been appointed to the NELAC Institute (TNI) Whole Effluent Toxicity Testing Expert Committee.

Dr. **Alvina Mehinto** has been appointed to the master's thesis committee of Tommy Rocca at California State University, Long Beach.

Ken Schiff has been appointed to the planning committee for the 2024 National Stormwater Conference.

Dr. **Eric Stein** has been elected President-Elect of the Society for Wetland Scientists.

Dr. **Martha Sutula** has been appointed to the Ocean Acidification Research for Sustainability (OARS) Working Group II for the Global Ocean Acidification Observing Network.

Dr. **Martha Sutula** has been appointed an expert advisor to the Launchpad program of the nonprofit Ocean Visions.

Promotions

Dr. **Leah Thornton Hampton,** who has worked as a Scientist in the Toxicology Department since 2020, was promoted in July to Senior Scientist.

Dr. **Janet Walker,** who has worked as a Scientist in the Biology Department since 2020, was promoted in July to Senior Scientist.

Samuel Lillywhite, who has been working as a part-time Laboratory Assistant in the Biogeochemistry Department since November, was promoted in July to a full-time Research Technician. He recently graduated from the University of California, Irvine with a bachelor's in biological sciences.

Departures

Dana Briggs, who has worked at SCCWRP since 2021, most recently as a Research Technician in the Toxicology Department, left SCCWRP in June for another job opportunity.

Cody Fees, who has worked at SCCWRP since 2016, most recently as a Research Technician in the Engineering Department, left SCCWRP in July for another job opportunity.

Kayla Raygoza, who has worked at SCCWRP since 2021, most recently as a Research Technician in the Microbiology Department, left SCCWRP in July to enroll in a Ph.D. program at the University of California, Irvine.

SCCWRP COMMISSIONER SPOTLIGHT

Head of L.A. Board brings fresh perspective

Susana Arredondo was selected for the top job at the Los Angeles Regional Water Quality Control Board earlier this year not because she has years of experience working for the Water Boards as a regulator, but because of the fresh outsider perspective she brings to the role.

Susana Arredondo

Arredondo, the first Latino/a to serve as Executive Officer of the L.A. Regional Board, has focused her career on serving and advocating for disadvantaged communities – in particular, the BIPOC (Black, Indigenous and People of Color) community.

"I'm an Executive Officer who looks and speaks like the diverse, progressive people of Los Angeles," Arredondo said. "When I'm visiting farms, for example, I can connect with not just the people who own the farms, but the people who touch the dirt – letting them understand my agency's agenda in their own language, making sure they're not getting the short end of the stick."

Arredondo, who started at the L.A. Regional Board in May, previously worked as Laboratory Manager for the San Elijo Joint Powers Authority, a wastewater and recycled water utility serving Encinitas, Solana Beach and Del Mar. On the SCCWRP Commission, Arredondo has replaced Renee Purdy, who retired in February.

Arredondo's top priority at the L.A. Regional Board is getting out into local communities to connect with the diverse groups her agency regulates, as well as creating forums that enable stakeholders to directly engage with the agency's top officials.

"It sends a big message when I'm the one going into the community, boots on the ground," Arredondo said. "I may not possess all the institutional knowledge my staff does yet, but I can present information in ways where the permittees and the public can understand it."

Susana Arredondo, top right and surrounded by her cousins, celebrates her grandmother, Carmen Martinez, bottom center, receiving an honorary college degree from Southwestern College in 2022.

Susana Arredondo

Job: Executive Officer, Los Angeles Regional Water Quality Control Board (started May 2023)

SCCWRP role: Commissioner

Prior jobs: 15 years with San Elijo Joint Powers Authority: Laboratory Manager (2018-2023), Senior Laboratory Analyst (2016-2018), Laboratory Analyst 2 (2011-2016), Laboratory Analyst 1 (2008-2011); Laboratory Intern, Sweetwater Authority (2006-2008)

Education: Master of Environmental Management, Duke University (2018); B.A. biological anthropology, University of California, San Diego (2005)

Residence: Burbank

Hometown: San Ysidro

Family: Husband Ron, a project manager for a solar electricity company; dog Arlo, a Queensland heeler

Hobbies: Traveling with family; riding a Peloton Bike; listening to podcasts

Throughout her life, Arredondo's biggest inspiration and role model has been her grandmother, now 99, one of the founding mothers of a tiny community health clinic in San Ysidro. The clinic, known as San Ysidro Health, spans more than 20 locations today.

"She taught me the importance of being a voice for historically underserved people," Arredondo said. "No matter where this path takes me, she tells me to never forget where I came from."

For the past 16 years, Arredondo has worked at the San Elijo Joint Powers Authority, starting as an entry-level laboratory analyst who washed glassware and rising through the ranks to become Laboratory Manager. Her responsibilities included compliance with the agency's wastewater discharge permit, capital improvement project planning, and laboratory accreditation.

Arredondo is excited about serving as a SCCWRP Commissioner. She has taken part in SCCWRP-led trainings and kept up on SCCWRP's work over the years by reading the Director's Report.

Last spring, she and her husband, Ron, relocated from their home in Rancho Bernardo to Burbank. In her spare time, she listens to podcasts – on topics ranging from general news to science to leadership.

SCCWRP PARTNER SPOTLIGHT

Professor focuses on impacts to wetland ecology

Dr. Christine Whitcraft had envisioned a career in wetland ecology after her internship mentors encouraged her to zero in on her interest and make it a part of what she wanted to do.

Dr. Christine Whitcraft

As a research intern at the Nature Conservancy and the Smithsonian Environmental Research Center, Whitcraft became fascinated with environmental science, specifically studying freshwater wetlands and how non-native species influence the ecological functioning of the habitats.

This interest in the relationship between wetlands and their surroundings formed the foundation for her current research on how human activities – including introduction of invasive species, climate change and altered hydrology – impact the ecology of coastal wetlands.

"It's not only important to understand the negative impacts of human activities, but to also design solutions to help mitigate those impacts," said Whitcraft, a Professor of Biological Sciences at California State University, Long Beach. "Then we can think about what we need to do to restore and protect the ecosystem and the organisms that live there."

Although Whitcraft initially wanted to be a researcher for an environmental agency, she discovered her passion for the classroom after teaching an undergraduate class during her Ph.D. program at the Scripps Institution of Oceanography. Her greatest motivation as an educator is to help promote scientific literacy among the next generation of environmental stewards and scientists.

"Even if my students don't end up in wetland science, I want them to have a positive experience in my classes and understand why wetlands are important so they can help influence the future of the habitat," Whitcraft said.

Dr. Christine Whitcraft stands in a field of cattails and bulrush at Los Peñasquitos Lagoon in 2021. Whitcraft and a graduate student were investigating how an invasive plant (yellow flag iris) can alter the ecology of these native wetland plants.

Christine Whitcraft, Ph.D.

Job: Professor, Biological Sciences, California State University, Long Beach (started August 2019); Director, Environmental Science and Policy, California State University, Long Beach

SCCWRP role: Research partner on wetland habitat monitoring and restoration

Prior jobs: Associate Professor, California State University, Long Beach (2014-2019); Assistant Professor, California State University, Long Beach (2008-2014); Postdoctoral Fellow, San Francisco State University (2007-2009)

Education: Ph.D. biological oceanography, University of California, San Diego (2007); B.A. biology, Williams College (1999)

Residence: Long Beach

Hometown: Elkton, Maryland

Family: Husband Jon, an engineer; son Alden, 11; cat Obi

Hobbies: Playing indoor volleyball; hiking; backpacking

After graduating from Scripps, Whitcraft worked with Dr. Eric Stein, Head of the SCCWRP's Biology Department, on various wetland studies and has since been a long-time key SCCWRP collaborator on projects to monitor and restore wetland habitats, including eelgrass beds.

Whitcraft has been working with SCCWRP in ongoing efforts to develop a monitoring framework for assessing the health of eelgrass beds in Southern California by evaluating ecological functioning – their ability to provide refugia and ecological services to fish and other animals.

She appreciates that SCCWRP puts the research she does at the university into a larger context in terms of policy and management.

In her spare time, Whitcraft enjoys hiking and backpacking with her family through the Sierra Nevada mountains and on Catalina Island. She also spends time with her black cat, Obi, who is named after the whitetip reef shark (*Triaenodon obesus*) for his habit of biting people's feet.

"When people ask me if he's named after Obi-Wan Kenobi from Star Wars, I tell them the reason is actually nerdier than that," she explained.

SCCWRP STAFF SPOTLIGHT

Engineer uses qPCR to review sanitation efforts

Dr. Amanda Lai has designed water treatment systems as an environmental engineer and is now looking at these infrastructures through a microbiological lens to evaluate their effectiveness at protecting public health in low-income countries.

Dr. Amanda Lai

Lai partnered with researchers in Cambodia during her Ph.D. and Mozambique for her postdoc to evaluate the health impacts of sanitation interventions previously put in place by international nonprofits, using quantitative polymerase chain reaction (qPCR) methods to detect and quantify pathogens and antimicrobial resistant genes in children's stool samples.

"There's a ton of money that goes into improving wastewater treatment in low-income countries, but little has been done to evaluate whether or not the infrastructures actually work," Lai said. "With objective science, we can work to fill these knowledge gaps."

Lai, who recently wrapped up her postdoc at the University of North Carolina at Chapel Hill, joined SCCWRP in May as an Engineer in the Engineering Department. She will be focused on assessing and improving the performance of stormwater BMPs (best management practices) on reducing microbes in runoff.

She will also be collaborating closely with the Microbiology Department, starting with a study examining sources of antimicrobial resistance in sea lions.

When she was an undergraduate student at UCLA, Lai changed her majors several times – starting out pre-med and switching to math and economics – before landing in civil engineering after being drawn to the idea of building structures that people could use every day.

Dr. Amanda Lai and husband Alex hike along the coastline of Tayrona National Park during a trip to Colombia in 2022.

Amanda Lai, Ph.D., P.E.

Job: Engineer, SCCWRP Engineering Department (started May 2023)

Prior jobs: Postdoctoral Researcher, University of North Carolina at Chapel Hill (2021-2023); Graduate Research Assistant, Georgia Institute of Technology (2017-2020); Waste Management Lead, Bel-Zhan Social Enterprise (2017); Water/Wastewater Engineer, Kleinfelder (2015-2017); Civil Engineer, Parsons Corporation (2012-2015)

Education: Ph.D. environmental engineering, Georgia Institute of Technology (2021); B.S. civil and environmental engineering, University of California, Los Angeles (2011)

Residence: Long Beach

Hometown: San Gabriel

Family: Husband Alex, a technical recruiter; dog Harold, a 14-year-old Bassett hound and labrador mutt

Hobbies: Pottery; backpacking; cooking and baking; fermenting; crocheting and knitting

Lai worked as a civil engineer at Parsons for three years, designing roadways in San Diego and ensuring standard compliance. She also partnered with stormwater engineers on modeling projects for BMPs, which shifted her interest to environmental engineering.

"Working on huge roadway projects felt very destructive, so I wanted to do something that felt right to me and design things that would be good for both people and the environment," Lai said.

Lai learned about SCCWRP a year ago after reaching out to a research group at the Scripps Institute of Oceanography about a fellowship program. She connected with former SCCWRP postdoc scientist Dr. Rachel Diner, who introduced Lai to Dr. John Griffith, head of SCCWRP's Microbiology Department.

After more than six years of living on the East Coast, Lai is excited to be back in California and closer to her family in San Gabriel.

She and her husband, Alex, recently relocated to Long Beach, which is a central location between the SCCWRP office and his job in West Los Angeles.

In her spare time, Lai explores the different hobbies she picked up while living in Carrboro, North Carolina for her postdoc, including pottery, knitting, crocheting and fermenting her own kombucha.

She also enjoys backpacking with her husband and going on walks with her "sweet but grumpy" senior dog, Harold.

SCCWRP SCENES

Connecting SCCWRP with its member agencies

SCCWRP hosted its ninth biennial Symposium – an all-day event for staff of SCCWRP member agencies to learn about SCCWRP's work– on May 24, bringing together more than 125 attendees to interact and build connections. SCCWRP presented 29 scientific talks and demonstrations during the Symposium. It was the first SCCWRP Symposium to be held since 2017.

Clockwise from top right, Dr. Elizabeth Fassman-Beck discusses bioretention BMPs during a hands-on demonstration; SCCWRP's Dr. Raphael Mazor provides an overview the Southern California Stormwater Monitoring Coalition's regional stream bioassessment program; Symposium guests mingle between sessions; Kameron Wong, left, and Dr. Alvina Mehinto demonstrate how to use bioanalytical cell assays to screen for bioactive contaminants; and Dr. Leah Thornton Hampton prepares a sample to analyze its microplastics content.