SCCWRP Director's Report

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Tool developed to assess BMP performance effectiveness

SCCWRP has developed an integrated web-based tool intended to help California's stormwater management community assess the effectiveness of vegetated swales, permeable pavement and other best management practices (BMPs) in removing contaminants during wet weather.

The California BMP Effectiveness Calculator, unveiled in March and publicly available online, provides a wealth of California-specific data on the performance effectiveness of a common type of engineered BMP solution known as a flow-through BMP. With a flow-through BMP, contaminants are treated and removed as stormwater passes through.

Southern California's stormwater management community has invested millions of dollars – and is planning to invest billions more in the coming decades – to install BMPs to improve the water quality of wet-weather runoff, even as the long-term performance effectiveness of these solutions remains murky.

California stormwater managers will be able to use the California BMP Effectiveness Calculator to assess how well five types of flow-through BMPs perform in treating more than a dozen types of stormwater contaminants, from dissolved copper to nitrate. The web-based calculator automatically estimates the concentration of the effluent, based on incoming contaminant concentration in the stormwater.

The calculator also automatically calculates the level of certainty associated with estimates of BMP performance effectiveness. These certainty analyses historically have been done in an ad-hoc, non-standardized manner, even as these analyses are a critical component of modeling the effectiveness of BMPs that have yet to be implemented in a watershed.

In particular, estimating the effectiveness of yet-to-be-implemented BMPs is a foundational aspect of Alternative Compliance, a new regulatory approach

Contents

Cover photo: A vegetated swale that abuts the shoreline in Long Beach filters and removes stormwater contaminants, helping to protect beach water quality. Researchers have developed a new tool for predicting stormwater BMP effectiveness.

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, May 23
CTAG quarterly meeting

Friday, June 14
Seminar: "Aquaculture in the era of climate change: Utilizing biological modeling and physiological studies to benefit industry, climate and the urban ocean"

Friday, June 21
Commission meeting

for complying with stormwater discharge permits that is being used across Southern California.

Under an Alternative Compliance pathway, long-term water-quality improvement plans are supported by reasonable assurance analysis (RAA) to demonstrate that the BMPs planned over the next two to three decades will meet desired improvement goals.

The BMP calculator plays a key role in bringing rigor and standardization to how stormwater managers conduct RAA for Alternative Compliance in California.

SCCWRP built the data set that powers the calculator's performance estimates by compiling a wealth of effectiveness data for flow-through BMPs from across the state. Traditionally, stormwater managers have pulled this information from the International Stormwater BMP Database, which contains data from across North America but has limited California-specific data. The SCCWRP-developed tool has roughly doubled the amount of California-specific data – and also provided newer data sets.

Using the tool, researchers found that treatment effectiveness varies by BMP type, with some flow-through BMPs performing better than others for certain pollutants. Researchers also found that while no BMP removed all pollutants, flow-through BMPs are effective in locations where stormwater flows either cannot or will not infiltrate into the ground.

Courtesy of Orange County Public Works

A field crew from Orange County Public Works installs pervious pavers in a parking lot. This structural BMP solution is designed to let water soak into subsurface treatment and detention facilities, preventing potentially contaminated stormwater from running off the site and impacting water quality downstream.

Researchers, however, still lack sufficient data to fully understand the specific reasons behind variability in flow-through BMP performance. SCCWRP and its partners are working to collect more data so they can continue to investigate factors such climate, geology, design and maintenance.

Researchers also compared the performance of four different statistical approaches for calculating uncertainty of the performance estimates, concluding that a new approach known as quantile regression is the optimal method.

The finding is significant because no standardized method exists for assessing BMP performance. Even so, the BMP calculator allows users to select from any of the four analysis methods.

For more information, contact Ken Schiff.

Science products endorsed as foundation for crafting statewide stream policy

An expert scientific panel has endorsed a set of draft science products developed by SCCWRP as a strong technical foundation for crafting a State Water Board policy intended to better protect wadeable streams' biological integrity from the impacts of eutrophication and other stressors.

The Science Advisory Panel, which completed its review in March, found that the suite of six technical reports, journal manuscripts and assessment tools developed by SCCWRP and its partners is either ready for State Water Board staff to use in developing California's proposed biointegrity-biostimulatory stream policy, or ready for refinement as the State Water Board coalesces around potential policy options.

The panel's review is the culmination of nearly four years of efforts by researchers to develop the draft science products. The State Water Board commissioned the expert panel in 2017 to incrementally review SCCWRP's work and eventually evaluate whether the science was robust enough to support development of statewide stream policy. The six-member panel is made up of international experts in stream ecology and biogeochemistry.

A SCCWRP field crew collects algae samples in the Santa Margarita River, which spans Riverside and northern San Diego Counties. An expert scientific panel has endorsed a set of draft science products developed by SCCWRP as a strong technical foundation for crafting a State Water Board policy intended to better protect wadeable streams' biological integrity from the impacts of eutrophication and other stressors.

State Water Board staff have announced their intent to spend the next 1-1/2 years drafting the biointegrity-biostimulatory policy; it could be released in draft form as early as fall 2020.

The biointegrity-biostimulatory policy is expected to include numeric guidance on how to limit the biostimulatory impacts from eutrophication and other stressors on aquatic life and other beneficial uses. In subsequent phases, the State Water Board plans to create similar technical foundations for developing numeric guidance for lakes, estuaries, enclosed bays and non-wadeable streams.

Other agencies, including California's Regional Water Quality Control Boards, are exploring how to incorporate the draft products into their stream management programs as well. For example, at an April workshop, the San Diego Regional Board discussed using stream biointegrity scoring tools developed by SCCWRP to measure attainment of biological objectives.

Although the Science Advisory Panel endorsed the science products as a strong foundation for policy development, panelists provided recommendations for refining the analyses and written products to address concerns expressed by stakeholders. SCCWRP has begun working through these recommendations.

The science products developed by SCCWRP and its partners fall into two main categories:

» The **biointegrity reports** explain how quantitative measures of a wadeable stream's biological condition relate to the stream's overall ecological health. These include the Algal Stream Condition Index and a GIS modeling tool that predicts the degree to which stream biointegrity scores are likely to be limited, or "constrained," by urban and agricultural development.

» The **biostimulatory reports** identify a suite of eutrophication indicators (e.g., algal biomass, total nitrogen and phosphorus) for quantifying biostimulatory stresses on wadeable streams. They also summarize the scientific basis for setting numeric targets for these eutrophication indicators to guard against biostimulatory impacts. In future revisions, researchers will focus on aligning the biostimulatory-related scientific analyses to policy options under consideration by State Water Board staff.

The Science Advisory Panel's full recommendations to State Water Board staff have been published in full online. The draft science products, released in October 2018, also are available online.

For more information, contact Dr. Martha Sutula or Dr. Raphael Mazor.

International microplastics measurement study being developed following 2-day workshop

A group of international experts on aquatic microplastic pollution that convened at SCCWRP for a two-day workshop in April has begun laying the groundwork to build scientific consensus around methods for monitoring microplastic particles in aquatic environments.

The experts, who hail from as far away as Germany, Norway and Canada, are helping to develop a study that aims to standardize microplastic monitoring methods worldwide, a response to recently enacted California legislation that calls for microplastics to be tracked in drinking water and the coastal ocean.

The two-year study, which could kick off as early as September, will examine precision, repeatability, cost and other issues associated with five different, commonly used technologies for measuring microplastics in aquatic environments: Raman spectroscopy, Fourier-transform infrared spectroscopy

(FTIR), stereoscopy, stereoscopy with staining, and Pyrolysis-GCMS (gas chromatography/mass spectrometry).

Already, more than a dozen research laboratories have signed onto the method standardization study. SCCWRP will help facilitate the study, and serve as a regional training facility for Raman spectroscopy and FTIR.

Defined as plastic particles less than 5 mm in diameter, microplastics have become ubiquitous in aquatic environments, even as scientists have relatively little understanding of how they impact the health of humans and wildlife that inadvertently ingest them.

Particularly challenging is how to track microplastics that are so small that they can't be seen under a light microscope.

Microplastics have been documented in the guts of fish and other marine life; they've also been found in human feces. In aquatic environments, chemical contaminants can stick to microplastics, compounding potential health risks from ingestion.

SCCWRP and its partners have been working since fall 2018 to bring together leading microplastics scientists to develop recommendations for how California should build capacity to conduct routine microplastics monitoring.

California Senate Bill 1422, which was signed into law in September 2018, requires the State Water Board to develop plans for quantifying microplastic particles in drinking water by 2021. Similarly, California Senate Bill 1263, also signed into law in September 2018, requires the California Ocean Protection Council to adopt and implement a statewide strategy for illuminating the ecological risks of microplastics in marine environments.

Microplastics scientists from around the world convened at SCCWRP in April for a two-day workshop on methods for measuring microplastics in aquatic environments. The workshop has laid the groundwork to begin building scientific consensus around standardized measurement methods.

Darrin Polhemus, Deputy Director for the State Water Board's Division of Drinking Water, and Deborah Halberstadt, Executive Director of the California Ocean Protection Council, were among the more than 120 workshop attendees.

During the microplastics workshop, experts discussed the state of knowledge around different microplastics measurement methods. They also shared the most up-to-date information on approaches for monitoring microplastics in wastewater, stormwater, coastal waters and seafloor sediment, underscoring the need for a standardized method for comparing results.

For more information, contact Shelly Moore.

Newport Bay study to examine scientific basis for shellfish water-quality standard

SCCWRP and its partners will launch a study in May evaluating whether a water-quality standard designed to protect the health of people who consume shellfish from Newport Bay in Orange County has been appropriately set, a response to a looming regulatory compliance deadline regarding recreational shellfishing.

The study, which is about two years in the making, will examine whether California's existing standard for permissible bacterial levels in the water correlates to potentially unsafe levels of pathogens in bivalve shellfish harvested from Newport Bay. Bivalve shellfish such as mussels and oysters are filter feeders that can take up bacteria and viruses from the water column, potentially concentrating them in their tissues.

Researchers and water-quality managers developed the study in response to a looming bacterial TMDL (total maximum daily load) regulatory deadline in Newport Bay that mandates compliance with the statewide recreational shellfish water-quality standard by 2022. The standard is commonly abbreviated SHEL.

Newport Bay, which is failing the standard year-round, is the first water body in California that faces a TMDL deadline related to the SHEL standard.

The Santa Ana Regional Water Quality Control Board is among the regulatory agencies that have questioned whether the standard – set nearly a century ago

and not validated using local shellfish data – is supported by a sufficient technical foundation.

The SHEL standard caps monthly median fecal coliform counts in the water column – a proxy for potential pathogenic contamination – at 14 per 100 mL. This standard is far more difficult to meet than California's REC-1 standard designed to protect the health of swimmers. The REC-1 standard caps monthly median fecal coliform counts at 200 per 100 mL, among other measures.

Newport Bay water-quality managers are largely in compliance with REC-1 water-quality standards during the popular summer beachgoing months, although they struggle with compliance during wet weather.

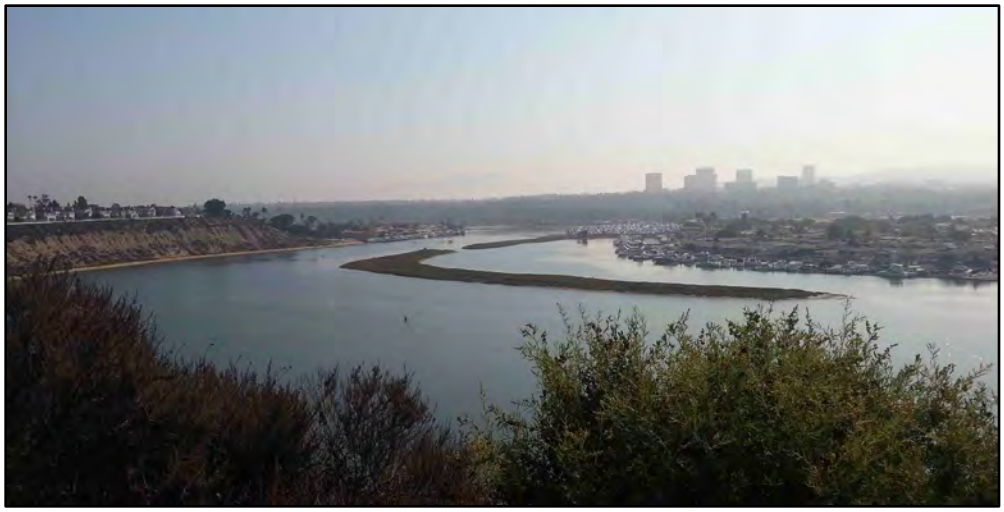
The Newport Bay shellfish study will kick off in late spring with a pilot study that involves deploying Pacific oysters in cages at multiple sites around the bay over a six-week period. The oysters will be harvested at different time points, and researchers will measure viral pathogens and fecal bacterial indicators in their tissues to assess accumulation rates. Water samples also will be collected to determine if a relationship exists between contamination in the water column and in the oysters.

The results of the six-week pilot study will inform if and how researchers move forward with an expanded study spanning the wet-weather and post-wet seasons.

If the water-column bacterial indicator measurements are found to positively correlate with pathogen levels found in the shellfish, researchers would conclude that California's existing SHEL standard is working as designed, likely rendering the larger study unnecessary.

If, however, there is no relationship between the water-quality indicators and pathogens found in the shellfish, the study could provide a scientific basis for pursuing development of a site-specific SHEL standard for Newport Bay, and/or a follow-up study examining the appropriateness of using a fecal coliform-based standard in California to protect shellfish.

For more information, contact Dr. John Griffith.



Newport Bay in Orange County faces a looming regulatory compliance deadline for recreational shellfishing. SCCWRP and its partners are launching a study to evaluate whether a water-quality standard designed to protect the health of people who consume shellfish from the bay has been appropriately set.

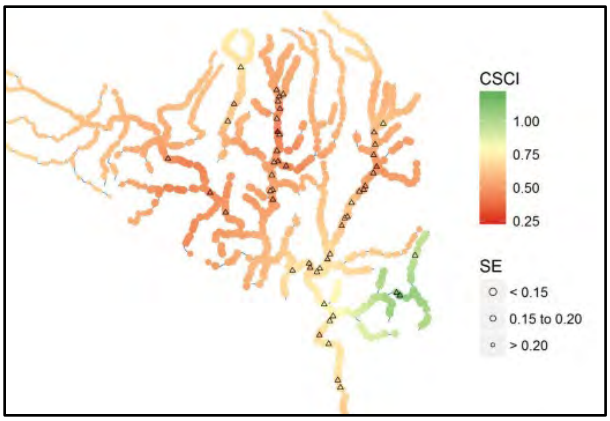
Updates by Thematic Area

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

BIOASSESSMENT

Bioassessment scores to be extrapolated for 4 modified streams via statistical modeling

SCCWRP and its partners have launched a one-year study to determine the geographical extent to which ecological condition scores calculated for four modified streams in California may be



This map showing extrapolated bioassessment data for the Malibu Creek watershed reveals the estimated ecological condition of stream reaches throughout the watershed. Triangle designate bioassessment sampling sites, and the size of the colored circles indicates confidence in the modeling's estimates. Additional extrapolation maps are being developed for modified streams in California.

extrapolated to unsampled reaches elsewhere in the watershed.

The demonstration study, launched in March, will build off a 2017 pilot study that examined how to use spatial statistical network models to extrapolate stream bioassessment scores in California watersheds. The study concluded that a single extrapolation model cannot be applied to all watersheds in California; rather, models must be developed for each watershed that consider local properties, patterns of degradation, and distribution of sampling locations.

Stream bioassessment is typically conducted at a limited number of reaches within a watershed, so the extrapolation maps for California streams will enable watershed managers to get a better sense of the areas where they already have sufficient data to estimate overall ecological condition, and the areas where they should consider more intensive sampling to improve confidence in selecting management options. This becomes especially important for optimizing bioassessment work across the 7,000+ stream-kilometers in Southern California.

Treated wastewater effluent is discharged into the Los Angeles River from the nearby L.A.-Glendale Water Reclamation Plant. Water-quality managers for the effluent-dominated river are exploring the potential ecological and recreational effects of diverting effluent and runoff from the river for water recycling purposes.

ECOHYDROLOGY

L.A. River environmental flows study holds first stakeholder meeting

A two-year study that seeks to determine the potential ecological and recreational effects of diverting treated wastewater effluent and runoff from the Los Angeles River for water recycling purposes held its first stakeholder meeting in March in Los Angeles to get feedback on the study design.

At the meeting, which attracted about 50 people, stakeholders provided feedback on how the river is being used, key habitat and species considerations, and management options for offsetting impacts.

Stakeholders also began discussing whether to expand the study to evaluate impacts to water quality, and whether to add additional L.A. River tributaries to the study design. The next stakeholder meeting will be in fall 2019.

The environmental flows study, which is being facilitated by SCCWRP, marks the first effort by California's water-quality management community to understand how sensitive species, habitats and other beneficial uses will be impacted as increased water recycling practices reduce land-based discharges to the river. Three wastewater treatment plants discharge into the effluent-dominated L.A. River.

Beta version of stream geomorphology tool developed to aid in setting environmental flow targets

SCCWRP and its partners have developed a beta version of a tool that can provide information on geomorphic structure for stream sites across coastal California, part of an ongoing effort to help watershed managers better manage environmental flows in streams statewide.

The geomorphology classification tool, which is undergoing review by a California Water Quality Monitoring Council workgroup, is intended to provide insights into how a stream's geomorphic structure influences its hydrologic flow patterns and overall ecological functioning.

The tool incorporates geomorphic field data from about 240 stream sites, including more than 60 in Southern California.

The geomorphology tool is the latest step in the ongoing development of the California Environmental Flows Framework, a best-practices approach for evaluating environmental flow needs and setting scientifically defensible flow targets that optimally protect the health of coastal streams across California.

Study examining how to use flow-capture BMPs to improve San Juan Creek flow patterns

SCCWRP and its partners have launched a study examining how to implement flow-capture BMPs (best management practices) in San Juan Creek in Orange County to restore more natural flow patterns to the watershed.

The study, launched in April, will examine a range of potential management strategies for eliminating unnatural dry-weather flows and improving flow regimes.

The project will support the area's water-quality improvement plan, as well as serve as a demonstration project for the California Environmental Flows Framework, a best-practices statewide approach for setting stream environmental flow targets that optimally protect watershed health. Development of the framework is ongoing.

Researchers will document flow-ecology relationships in San Juan Creek to illuminate which flow characteristics are necessary to support healthy biological communities and, ultimately, to inform where to place flow-capture BMPs.

EUTROPHICATION

Workgroup to design statewide HABs monitoring program

California's Surface Water Ambient Monitoring Program (SWAMP) has convened a workgroup to be facilitated by SCCWRP that will work toward developing a statewide strategy for monitoring harmful algal blooms (HABs) in freshwater environments.

At the workgroup's first meeting June 11-12, 2019 in Sacramento, participants will begin conceptualizing a vision for how California can systematically increase its capacity to assess a water body's susceptibility to toxic blooms, understand drivers and inform how managers can optimally respond.

The need for a freshwater HABs monitoring program was articulated in a 2016 HABs strategy report co-authored by SCCWRP and published by SWAMP.

CLIMATE CHANGE

Modelers generate initial assessment of nutrient effects on acidification in Bight

Researchers working to develop a computer model that predicts how the Southern California Bight will be affected by ocean acidification and hypoxia (OAH) have generated an initial assessment shedding light on whether land-based nutrient sources are exacerbating coastal OAH conditions.

At an all-day Stakeholder Advisory Committee meeting on May 20, 2019 at SCCWRP, modelers will present simulated OAH effects on Southern California's coastal ocean under two scenarios: with existing atmospheric and land-based nutrient sources, and without these sources.

The modeling results will provide coarse insights into if and how nutrients introduced via wastewater effluent, stormwater runoff and atmospheric deposition are affecting pH and dissolved oxygen levels in the Bight.

The computer model that was used for the analysis is a geographically focused version of an OAH model that SCCWRP and its partners developed for the West Coast.

SCCWRP member agencies and other stakeholders played key roles in validating the Bight model, determining that the model's resolution required a fine-scale grid size of 300 meters, and reaching consensus on how to interpret the model's predictions of biological impacts in the Bight.

Acidification vulnerability assessment completed for Salish Sea marine calcifiers

SCCWRP and its partners have completed a year-long study examining how to assess the vulnerability of marine calcifying communities in the Pacific Northwest's Salish Sea to ocean acidification (OA), including whether land-based pollution sources are exacerbating OA's impacts on sensitive organisms.

Researchers took advantage of recently reached scientific consensus on how pteropods, echinoderms and Dungeness

Pteropods, or sea snails, are among the marine calcifying organisms that can serve as sentinel indicators of the biological impacts of ocean acidification. SCCWRP has wrapped up a study examining how to assess the vulnerability of these organisms to ocean acidification in the Pacific Northwest's Salish Sea.

crabs are being affected by OA as the researchers interpreted computer models that predict how OA is changing the Salish Sea's water chemistry. The Salish Sea, which encompasses Puget Sound, straddles the Washington-Canada border.

The project dovetails with a broader computer modeling effort to understand how marine communities along the North American West Coast are being affected by OA, and the degree to which land-based pollution sources are exacerbating acidification and hypoxia conditions.

The Salish Sea study also has laid a scientific foundation to assess OA's economic impacts on the local Dungeness crab industry, which is valued at more than $100 million.

The technical approaches used in the Salish Sea are being compared to those being used to assess OA's biological impacts in the Southern California Bight and the San Francisco-Monterey coastal region.

Climate change's impacts on sensitive aquatic species modeled for L.A. region

SCCWRP and its partners have completed a study examining how changing rainfall patterns and temperatures in the Los Angeles region stemming from climate change will impact sensitive aquatic species and habitats.

The 2-1/2-year study, completed in May, found that some species such as the endangered arroyo toad – which is dependent on specific seasonal rainfall patterns – are expected to be significantly impacted. Other species that are sensitive to changes in water temperature could be similarly impacted.

The study involved using regional flow ecology relationships to model how projected changes in rainfall and temperature patterns over the next century can be expected to impact sensitive biological communities, then use this information for developing watershed vulnerability maps.

Courtesy of U.S. Fish and Wildlife Service

The endangered arroyo toad, which breeds at the edges of aquatic habitats, can be impacted by even small changes in flow patterns. SCCWRP and its partners have completed a study examining how changing rainfall patterns and temperatures in the Los Angeles region stemming from climate change will impact this organism and other sensitive aquatic species.

The approach used in the study can now be replicated to model climate change's long-term impacts on other regions of California.

Lab study to simulate marine organisms' exposure to multiple stressors triggered by climate change

SCCWRP and its partners are launching a one-year laboratory study this summer that will simulate how marine organisms are impacted by ocean acidification and multiple other environmental changes triggered by climate change.

The study, scheduled to kick off in July, will control for variables including water temperature, dissolved oxygen and pH, enabling researchers to more comprehensively understand how climate change is impacting sensitive biological communities.

Considerable attention has been focused in recent years on tracking West Coast ocean acidification, but acidification will play out against a backdrop of other co-occurring environmental stressors – some of which may combine to exert synergistic impacts.

A new state-of-the-art laboratory experimental exposure system is being constructed at SCCWRP that will enable researchers to run a series of dynamic environmental exposure scenarios on a range of marine calcifiers and other organisms, including oysters, mussels, abalone, pteropods, echinoderms and juvenile pink salmon.

SEDIMENT QUALITY

EPA grants final approval to framework for assessing sediment's impacts on humans

The U.S. Environmental Protection Agency has signed off on a standardized sediment assessment framework intended to better protect the health of humans who consume seafood caught in California's enclosed bays and estuaries, the final administrative step to implementing the SCCWRP framework statewide.

EPA Region 9, which approved the framework in March, noted the "robust science and stakeholder engagement" that went into the framework's development.

The framework, described in a 2017 SCCWRP technical report, is now California's official method for implementing California's Sediment Quality Objective (SQO) for protection of human health. The human health SQO – one of three adopted by the State Water Board in 2008 for enclosed bays and estuaries – is a one-sentence regulatory target that calls on sediment contamination to not be present "at levels that will bioaccumulate in aquatic life to levels that are harmful to human health."

The framework defines for environmental managers how to assess compliance with the human health SQO. SCCWRP is in the process of updating technical guidance documents and data analysis software, and developing a training course to support the framework's implementation.

CONTAMINANTS OF EMERGING CONCERN

Film-based passive sampling for tracking cyanotoxins to be evaluated at L.A.-area lakes

SCCWRP and its partners have identified at least two Los Angeles-area lakes where a class of cyanotoxins known as microcystins appears to be present, paving the way for researchers to evaluate the performance of novel, film-based passive sampling technology for tracking microcystin levels.

Researchers in January obtained the findings by analyzing water and sediment samples via an enzyme-linked immunosorbent assay (ELISA); the screening results also are in the process of being compared to results from liquid chromatography mass spectrometry (LC-MS), which is a more exact but costly method.

In August, passive sampling devices made of hydrophilic-lipophilic balanced (HLB) polymers will be deployed in the two lakes alongside resin-based passive sampling devices known as Solid Phase Adsorption Toxin Tracking (SPATT).

SPATT devices, which are commonly used for harmful algal blooms (HABs) monitoring, are difficult to calibrate and provide only semi-quantitative estimates of toxin levels in the water column and in sediment. Researchers hope the film-based passive sampling can offer a cheaper, more precise alternative for cyanotoxin monitoring.

MICROBIAL WATER QUALITY

Effort to model health risks to Inner Cabrillo beachgoers wraps up

SCCWRP and its partners have completed a three-year effort to identify the sources of persistent fecal contamination at Inner Cabrillo Beach in Los Angeles County and to model health risks for beachgoers.

The study, described in a SCCWRP technical report published in April, attempted to use a health risk modeling approach known as Quantitative Microbial Risk Assessment (QMRA) to determine the degree of risk posed by exposure to fecal contamination in the beach water. But despite collecting more 4,000 samples over the three-year study and identifying non-human fecal sources, water-quality managers were unable to identify and eliminate Inner Cabrillo's persistent human fecal signal.

Thus, the QMRA approach could not be used at Inner Cabrillo. QMRA is designed for use at sites where microbial contamination sources are not predominantly human.

Inner Cabrillo is a popular swimming spot in the Los Angeles Harbor area where fecal contamination levels sometimes exceed water-quality targets. More than $20

SCCWRP has developed a sediment quality assessment framework that defines for environmental managers how to assess compliance with a statewide policy intended to protect humans who consume seafood from California's enclosed bays and estuaries. Humans can become exposed to sediment contamination via food web transfer.

million has been spent to improve the beach's water quality, but bacterial concentrations continue to exceed objectives; the beach has a TMDL (total maximum daily load) for fecal bacteria.

Sampling completed for study documenting antibiotic-resistant bacteria, genes in effluent

Participants of a SCCWRP-led study examining whether viable antibiotic-resistant bacteria – and the genes that code for antibiotic resistance – are being discharged into the environment following the wastewater treatment process have completed sampling of all influent and effluent samples.

SCCWRP's four POTW member agencies conducted quarterly sampling for a year at 10 wastewater treatment facilities across Southern California, including an international treatment plant at the U.S.-Mexico border. The final samples were collected in February; analysis of the samples is ongoing.

The study will provide a baseline understanding of how prevalent antibiotic-resistant bacteria and associated genetic material are in wastewater effluent, and which treatment processes seem to be most effective at reducing antibiotic-resistant bacteria and genes in effluent.

In cases where genetic material is surviving the treatment processes that destroy most bacterial cells, antibiotic resistance genes could be traveling via treated effluent into aquatic systems and being taken up by pathogenic bacteria. This process could create multidrug-resistant "superbugs."

Initial results are expected to be available as early as August.

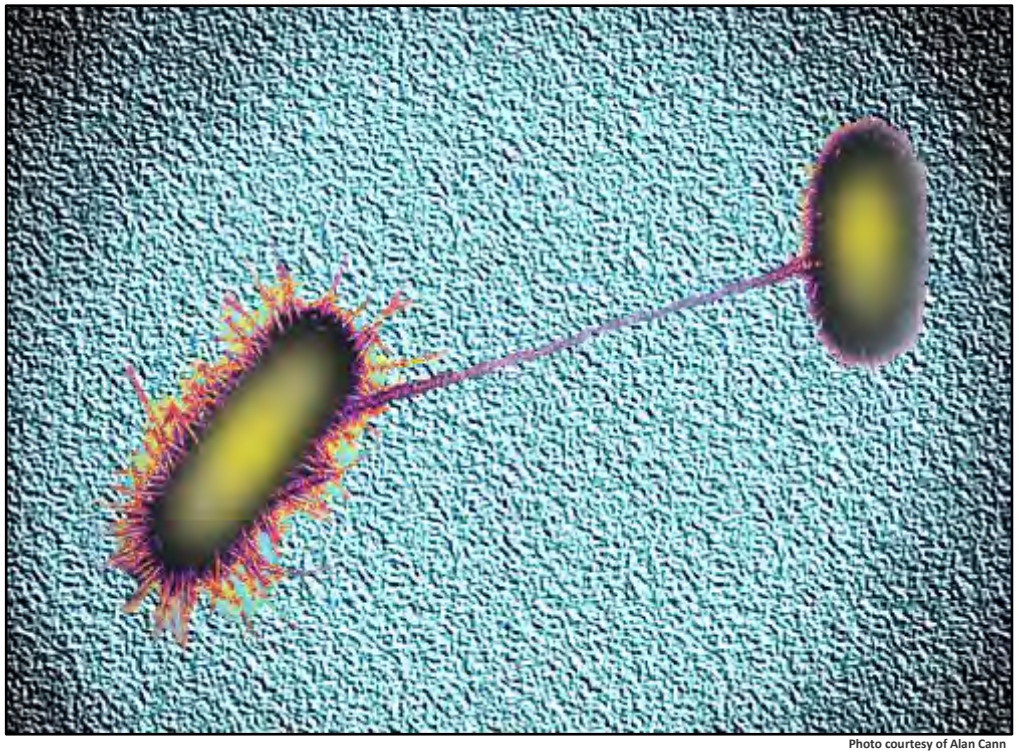


Photo courtesy of Alan Cann

Bacterial conjugation, shown in this image, is one of the ways that bacterial cells can swap genetic material, potentially conferring antibiotic resistance to one another. SCCWRP and its wastewater treatment member agencies are tracking whether the genetic material that codes for antibiotic resistance is being discharged into the environment following the wastewater treatment process.

REGIONAL MONITORING

Bight '18 sediment, fish samples to be screened using bioanalytical assays

SCCWRP and its partners in June will begin screening sediment and sportfish tissue samples collected from across the Southern California Bight for bioactive chemical contaminants using bioanalytical screening assays.

More than 100 samples will be screened using the androgen receptor assay, estrogen receptor assay and aryl hydrocarbon receptor assay.

The samples were collected through the Southern California Bight 2018 Regional Monitoring Program's Sediment Quality element. Bight '18 marks the first time bioanalytical screening will be used at a regional scale to screen for chemical contaminants.

A subset of the samples subsequently will be screened using non-targeted chemical analysis, with a goal to establish habitat-specific chemical fingerprints and identify bioactive chemicals.

Bight '18 HABs study preparing to track freshwater cyanotoxins in coastal zone

The Southern California Bight 2018 Regional Monitoring Program's Harmful Algal Blooms element has tentatively greenlighted a study that will explore whether freshwater cyanotoxins are being transported in the coastal zone.

Mussels will be deployed in cages in about two dozen coastal estuaries across Southern California this summer, according to the study plan tentatively approved in May. Then, researchers will measure levels of a cyanotoxin known as microcystin in mussel tissue.

The Bight '18 HABs element completed a pilot study in December showing that such a study would be feasible in both wet and dry weather.

Microcystins, which are produced by freshwater cyanobacteria, have the potential to adversely impact marine life and coastal habitat quality. Researchers are concerned they are being transported via waterways to the coastal zone.

Bight '18 pilot study to assess how acidification is impacting marine calcifiers

The Ocean Acidification element of the Southern California Bight 2018 Regional Monitoring Program has launched a pilot study examining how ocean acidification is impacting sensitive marine calcifiers in Southern California's coastal ocean.

The pilot study, which kicked off in May, will test newly developed protocols for collecting pteropods and other marine calcifiers from the pelagic zone, and for measuring the degree to which they have been stressed by acidification. Zooplankton tows will be used to collect the organisms.

The pilot study will help prepare Bight '18's Ocean Acidification element to conduct a full survey in 2020 with the National Oceanic and Atmospheric Administration's Pacific Marine Environmental Laboratory, which will be administering the survey across the West Coast.

A field crew conducts an intercalibration exercise in Agoura Hills for the SMC's 2019-2023 Regional Watershed Monitoring Program. The next five-year cycle of the stream monitoring program will include a regional evaluation of the effectiveness of stormwater BMPs in improving stream water quality.

SMC regional monitoring to include stormwater BMP effectiveness evaluation

The Southern California Stormwater Monitoring Coalition has begun designing the next five-year cycle of its stream monitoring program to include a regional evaluation of the effectiveness of stormwater BMPs (best management practices) in improving stream water quality.

The SMC's 2019-2023 Regional Watershed Monitoring Program will compare water quality at stream sites that receive BMP-treated stormwater to ecologically similar sites that lack BMPs. The sites will be identified by an SMC technical workgroup over the next several months, with a workplan expected to be finalized by winter 2020.

BMPs encompass a wide variety of stormwater control measures that are both structural (e.g., detention basins) and non-structural (e.g., street sweeping, habitat restoration).

Monitoring programs for stormwater BMPs typically focus on evaluating performance of the BMP itself, not on tracking how receiving water quality is affected.

New SCCWRP Publications

Journal Articles (Published)

Cossaboon, J.M., E. Hoh, S.J. Chivers, D.W. Weller, K. Danil, K.A. Maruya, N.G. Dodder. 2019. Apex marine predators and ocean health: proactive screening of halogenated organic contaminants reveals ecosystem indicator species. *Chemosphere* 221:565-664.

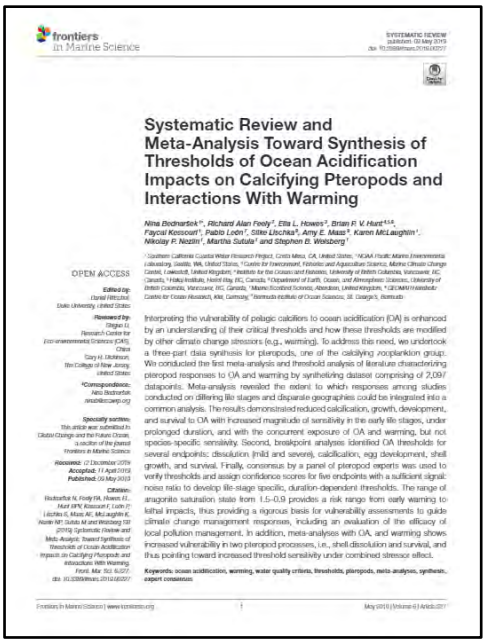
Janssen, A.W., S.L. Bush, N. Bednarsek. 2019. The shelled pteropods of the Northeastern Pacific Ocean (Mollusca: Heterobranchia, Pteropoda). *Zoosymposia* 13:305-346.

Greenstein, D.J., A.S. Parks, S.M. Bay. 2019. Using spatial and temporal variability data to optimize sediment toxicity identification evaluation (TIE) study designs. *Integrated Environmental Assessment and Management* 15:248-258.

Parker, S.R., S.K. Adams, R.W. Lammers, E.D. Stein, B.P. Bledsoe. 2019. Targeted hydrologic model calibration to improve prediction of ecologically-relevant flow metrics. *Journal of Hydrology* 573:546-556.

Journal Articles (Online)

Bednarsek, N., R.A. Feely, E.L. Howes, B.P.V. Hunt, F. Kessouri, P. Leon, R. Lischka, A.E. Maas, K. McLaughlin, N.P. Nezlin, M. Sutula, S.B. Weisberg. 2019. Systematic Review and Meta-Analysis Toward Synthesis of Thresholds of Ocean Acidification Impacts on Calcifying Pteropods and Interactions With Warming. *Frontiers in Marine Science* 6:227.


frontiers in Marine Science

Systematic Review and Meta-Analysis Toward Synthesis of Thresholds of Ocean Acidification Impacts on Calcifying Pteropods and Interactions With Warming

Scientific experts on pteropods, or sea snails, have reached consensus on biologically relevant thresholds at which these sensitive marine organisms can be expected to experience adverse impacts from ocean acidification. The findings are described in a newly published article in the journal *Frontiers in Marine Science*.

Buitenhuis, E.T., C.L. Quere, N. Bednarsek, R. Schiebel. 2019. Large Contribution of Pteropods to Shallow $CaCO_3$ Export. *Global Biogeochemical Cycles* 33:458-468.

Engstrom-Ost, J., O. Glippa, R.A. Feely, J.E. Keister, S.R. Alin, B.R. Carter, A.K. McLaskey, K.A. Vuori, N. Bednarsek. 2019. Eco-physiological responses of copepods and pteropods to ocean warming and acidification. *Scientific Reports* 9:4748.

Simons, A.L., R.D. Mazor, E.D. Stein, S. Nuzhdin. 2019. Using alpha, beta, and zeta diversity in describing the health of stream-based benthic macroinvertebrate communities. *Ecological Applications* DOI:10.1002/eap.1896.

Journal Articles (Accepted)

Gudino-Elizondo, N., T.W. Biggs, R.L. Bingner, E.J. Langendoen, T. Kretzschmar, E.V. Taguas, K.T. Taniguchi-Quan, D. Liden, and Y. Yuan. In press. Modelling runoff and sediment loads in a developing coastal watershed of the US-Mexico border. *Water*.

Technical Reports

Gillett, D.J., A.N. Parks, S.M. Bay. 2019. Calibration of the multivariate AZTI Marine Biotic Index (M-AMBI) for potential inclusion into California sediment quality objective assessments in San Francisco Bay. Technical Report 1070. San Francisco Estuary Institute. Richmond, CA.

Schiff, K.C., J.F. Griffith, J.A. Steele, A.G. Zimmer-Faust, J.A. Soller. 2019. Inner Cabrillo Beach Microbial Source Tracking and Quantitative Microbial Risk Assessment (QMRA). Technical Report 1068. Southern California Coastal Water Research Project. Costa Mesa, CA.

Stein, E.D., J.S. Brown, A. Barrera. 2019. Aquatic Resource Type Conversion Evaluation Framework: Literature Review and Summary of Existing State of Practice. Technical Report 1074. Southern California Coastal Water Research Project. Costa Mesa, CA.

Quarter in Review

Conference Presentations

Bednarsek, N., et al. Carapace dissolution observed under current low pH is high risk strategy of dungeness crab larval stages. Association for the Sciences of Limnology and Oceanography Conference. February 24-March 1, 2019. Puerto Rico.

Bednarsek, N., et al. Application of thresholds for climate change vulnerability assessment. Association for the Sciences of Limnology and Oceanography Conference. February 24-March 1, 2019. Puerto Rico.

Bednarsek, N et al. Carapace dissolution observed under current low pH is high risk strategy of dungeness crab larval stages. Global Ocean Acidification Observing Network International Workshop. April 14-18, 2019. Hangzou, China.

Brander, S., B. DeCourten, J. Forbes, H. Roark, N. Burns, K. Major, J. Li, W. White, A. Mehinto, R. Connon. Multi- and transgenerational effects of environmental stressors: Responses in a euryhaline model and implications for risk. SoCal SETAC Annual Meeting. May 6-7, 2019. La Jolla, CA.

Du, B. L. Darjany, W. Lao, E. Wenger, D. Diehl, J. Zhu, K. Maruya. Detection of Microcystins in Water Samples from Los Angeles Area Waterbodies. SoCal SETAC Annual Meeting. May 6-7, 2019. La Jolla, CA.

Kessouri, F., J. McWilliams, D. Bianchi, L. Renault, C. Deutsch, H. Frenzel, M. Sutula, R. Feely. Submesoscale Circulation Modulates the Seasonal Cycle of Nutrients and Productivity in the California Current System. Association for the Sciences of Limnology and Oceanography Conference. February 24-March 1, 2019. Puerto Rico.

Mehinto, A. New monitoring strategies to assess risks of CECs in aquatic environments. 29th Annual International Conference on Soil, Water, Energy, and Air. March 18-21, 2019. San Diego, CA.

Mehinto, A., K.A. Maruya, N.D. Denslow, S.B. Weisberg. Novel screening methods to assess environmental contaminants in aquatic environments. SoCal SETAC Annual Meeting. May 6-7, 2019. La Jolla, CA.

Moore, S.L. and T. Hale. Trash Monitoring Methods in Aquatic Environments: Challenges in Standardization and Answering Management Questions. National Water Quality Monitoring Council 11th National Water Monitoring Conference. March 25-29, 2019. Denver, CO.

Moore, S.L. Trash and Microplastics in California. Impacts of Microplastics in the Urban Environment Conference. March 28-29, 2019. New Brunswick, NJ.

Parks, A.N. Site-specific water quality objectives: Applications of water-effect ratios. SoCal SETAC Annual Meeting. May 6-7, 2019. La Jolla, CA.

Schiff, K. Fecal Indicator Bacteria in Wet Weather: Do They Indicate Illness? National Water Quality Monitoring Council 11th National Water Monitoring Conference. March 25-29, 2019. Denver, CO.

Schiff, K., Gillett, D Comparator Site Selection to Inform Screening-Level Causal Assessments. National Water Quality Monitoring Council 11th National Water Monitoring Conference. March 25-29, 2019. Denver, CO.

Schiff, K. Southern California Bight Regional Monitoring: 25 Years Overcoming Challenges. National Water Quality Monitoring Council 11th National Water Monitoring Conference. March 25-29, 2019. Denver, CO.

Schiff, K. Linking Fecal Indicator Bacteria and Human Health in Wet Weather. Center for Watershed Protection 2019 Annual Conference. April 29-May 2, 2019. Charleston, SC.

Schiff, K. Southern California Stormwater Monitoring Coalition: A Regional Collaboration to Improve Stormwater Management. Center for Watershed Protection 2019 Annual Conference. April 29-May 2, 2019. Charleston, SC.

Stein, E.D. and S. Theroux. Metabarcoding: How Far Are We from Operation? National Water Quality Monitoring Council Meeting. March 28, 2019. Denver, CO.

Sutula, M., F. Kessouri, J. McWilliams, D. Bianchi, L. Renault, C. Deutsch, H. Frenzel, R. Feely. Acidification and Hypoxia Modeling of the California Current System: Can Local Pollution Management Reduce Stress? Association for the Sciences of Limnology and Oceanography Conference. February 24-March 1, 2019. Puerto Rico.

Sutula, M., M. Paul, B. Jessup, R. Mazor, S. Theroux, P. Ode, and L. Webber. Biological Condition Gradient Model Supports the Development of a Combined Biointegrity and Biostimulatory Policy for California Wadeable Streams. National Water Quality Monitoring Council 11th National Water Monitoring Conference. March 25-29, 2019. Denver, CO.

Conference Posters

Du, B.K. Peter, J. Steele, J. Griffith, E. Kolodziej, K. Maruya. Non-Target HRMS for tracking sources of human contamination to stormwater conveyances. SoCal SETAC Annual Meeting. May 6-7, 2019. La Jolla, CA.

Greenstein, D. Optimization of sediment toxicity identification evaluation study designs to account for spatial and temporal variability. SoCal SETAC Annual Meeting. May 6-7, 2019. San Diego, CA.

Harraka, G.T., B. Du, J. Magnuson, D. Schlenk. Evaluating the impact of wastewater effluent discharge into the Santa Ana River. SoCal SETAC Annual Meeting. May 6-7, 2019. La Jolla, CA.

Wenger, E.J., W. Lao, A.N. Parks, S.M.Bay, K.A. Maruya. Sensing the freely dissolved concentration of PCBs in San Diego Bay using low density polyethylene passive samplers. SoCal SETAC Annual Meeting. May 6-7, 2019. La Jolla, CA.

Other Presentations

Beck, M. The use of open science to inform restoration projects in estuaries. Gulf of Mexico Oil Spill & Ecosystem Science Conference. February 4-7, 2019.

Bednarsek, N et al. Pteropods over large scales in the North Pacific. Japan Agency for Marine-Earth Science and Technology. February 13-19, 2019. Yokohama, Japan.

Hale, T. and S.L. Moore. Trash Monitoring Methods in Aquatic Environments: Challenges in Standardization and Answering Management Questions. California Department of Health Tobacco Product Waste Strategic Policy Planning Session. March 18, 2019. Sacramento, CA.

Maruya, K. California's priority DPR research topics: Monitoring for chemicals of emerging concern (CECs). WateReuse California 2019 Annual Conference. March 18, 2019. Garden Grove, CA.

Maruya, K. Evaluating methods for low molecular weight unknowns. WateReuse Advisory Committee Meeting. April 15, 2019, Aurora, CO.

Mazor, R.D. Assessment of riverine wetland conditions on Santa Rosa Island. National Parks Service Mediterranean Monitoring Network. February 28, 2019.

Mehinto, A. Bioanalytical Screening Tools for Recycled Water – An Emerging Technology to Assess Complex Mixtures in Aquatic Environments. WateReuse. May 15, 2019. Via webinar.

Moore, S.L. Debris in Southern California: From the Rivers to the Sea. 2019 Southern California Marine Mammal Workshop. February 1, 2019. Newport Beach, CA.

Moore, S.L. Debris in Southern California: From the Rivers to the Sea. Water Advisory Committee of Orange County. February 1, 2019. Fountain Valley, CA.

Moore, S.L. There is a great future in plastics: So what's the big (and little) deal? Cabrillo Marine Aquarium Discovery Lecture Series. April 5, 2019. San Pedro, CA.

Moore, S.L. and T. Hale. Trash Monitoring Methods in Aquatic Environments: Challenges in Standardization and Answering Management Questions. State Water Board's Office of Information Management and Analysis and the Clean Water Team Citizen Science Day Celebrating Emergent Innovation. April 16, 2019. Sacramento, CA.

Schiff, K. Research Opportunities at the Southern California Coastal Water Research Project. Argyos Forum, Chapman University. February 25, 2019. Orange, CA.

Schiff, K., J Griffith, J Steele, A. Zimmer-Faust. Inner Cabrillo Beach Source Tracking Study and Quantitative Microbial Risk Assessment (QMRA). California Beach Water Quality Workgroup. February 27, 2019. Costa Mesa, CA.

Schiff, K. Southern California Bight Regional Monitoring Program. Hale Seminar Series. March 21, 2019. Escondido, CA.

Schiff, K. Southern California Coastal Water Research Project. Ridge-2-Reef Seminar Series, University of California. April 18, 2019. Irvine, CA.

Stein, E.D. Linking Monitoring Indicators to Performance Standards. Association of State Wetland Managers Annual State, Tribal, Federal Coordination Meeting. Aprils 2-4, 2019. Leesburg, VA.

Stein, E.D. Ecologically Coherent Performance Standards. USEPA/Association of State Wetland Managers Compensatory Mitigation webinar series. April 18, 2019. Via webinar.

Stein, E.D. Conservation and Management of Aquatic Resources at the Urban Interface. UC Riverside Center for Conservation Biology Symposium on Wildland-Urban Interfaces. April 19, 2019. Riverside, CA.

Stein, E.D. Major Research Needs in Aquatic Resources Management. San Diego State University Water Days Symposium. April 23, 2019. San Diego, CA.

Stein, E.D. How Much is Enough? Optimizing Flows for Ecological and Human Uses. Colorado School of Mines Engineering Seminar Series. February 15, 2019. Golden, CO.

Sutula, M. Fish kills and algal blooms in LA County Inland Waterbodies: How do They Happen? Los Angeles County Department of Public Works Fish Kill and Algal Bloom Training Workshop. April 10, 2019.

SCCWRP Personnel Notes

Commission

Renee Purdy, Alternate Commissioner for the Los Angeles Regional Water Quality Control Board since August 2018, became Commissioner in April, following her promotion from Assistant Executive Officer to Executive Officer. She replaces Deborah Smith, who retired after serving on the Commission for 20 years. Smith is the fourth-longest-serving Commissioner in SCCWRP history.

Lan Wiborg, who has been hired as the Orange County Sanitation District's Director of Environmental Services, was named Alternate Commissioner in May, replacing Jim Colston, who recently took a new job with the Irvine Ranch Water District.

Justine Kimball, who started in March as the California Ocean Protection Council's Senior Climate Change Program Manager, was named Alternate Commissioner in May, replacing Jennifer Phillips, who recently took a job with the California Governor's Office of Planning and Research.

CTAG

Neil Searing, a Land Use/Environmental Planner III for the San Diego County Watershed Protection Program, was appointed to CTAG in February, replacing Jo Ann Weber, who has assumed new job responsibilities. He also has been elected CTAG Vice Chair.

Scientific Leadership

Dr. **John Griffith** was named in May to the Editorial Board for the journal *Applied and Environmental Microbiology*.

Dr. **Keith Maruya** served as Executive Chair for the Southern California chapter of the Society of Environmental Toxicology and Chemistry's 2019 Annual Meeting, held May 6-7, 2019 in La Jolla, CA.

Dr. **Keith Maruya** has been named Associate Editor for the journal *Heliyon: Environment*.

Dr. **Keith Maruya** has received the 2018-2019 Marissa Gaumond Memorial Award from the Society of Environmental Toxicology and Chemistry.

Dr. **Alvina Mehinto** served as the Student Judge Coordinator for the Southern California chapter of the Society of Environmental Toxicology and Chemistry's 2019 Annual Meeting, held May 6-7, 2019 in La Jolla, CA.

Shelly Moore was appointed Co-Chair of the California Water Quality Monitoring Council's newly formed California Trash Monitoring Workgroup in January.

Dr. **Jayme Smith** has been appointed Committee Facilitator of the California Harmful Algal Bloom Monitoring and Alert Program (Cal HABMAP).

Dr. **Jayme Smith** was appointed a member of Vanguard University's Science and Pre-Engineering Advisory Council in February.

Dr. **Jayme Smith** was appointed a member on the Interstate Technology and Regulatory Council's Harmful Cyanobacterial Blooms Team in April.

Dr. **Martha Sutula** has been appointed Scientific Program Co-chair for the Coastal and Estuarine Research Federation's 2021 Conference in Richmond, Virginia.

Dr. **Martha Sutula** has been appointed to a three-year term on the National Academy of Sciences' Committee on Independent Scientific Review of Everglades Restoration Progress (CISRERP).

Stacee Karnya, a Senior Chemist and Acting Biology Lab Manager for the City of Los Angeles Bureau of Sanitation, was appointed to CTAG in April, replacing Denise Li, who relocated out of the area.

Jason Bill, an Environmental Scientist for the Santa Ana Regional Water Quality Control Board, was appointed to CTAG in April, replacing Doug Shibberu, who has taken on new job responsibilities.

Staff

Dr. **Nabiul Afrooz,** a Scientist since 2017, left SCCWRP in February to take a position with the State Water Resources Control Board's Division of Financial Assistance in Sacramento.

SCCWRP COMMISSIONER SPOTLIGHT

Veteran regulator sees projects come full circle

One of the most rewarding aspects of Renee Purdy's two-decade-long career with the Los Angeles Regional Water Quality Control Board has been seeing multiple high-profile projects she's worked on come full circle.

Renee Purdy

In the early 2000s, Purdy pioneered an approach to setting bacterial water-quality goals for L.A.-area beaches that is based on reference site conditions. Nearly two decades later, her approach was codified into statewide implementation provisions as a recommended option for all Regional Boards to follow.

Similarly, Purdy played a key role in a 2012 update to the Los Angeles County MS4 stormwater discharge permit, developing a watershed framework to incentivize the County's 86 co-permittees to develop regional stormwater capture projects collaboratively. Six years later, County taxpayers voted to set aside an estimated $300 million annually to pay for these projects via the Safe, Clean Water Program, passed as Measure W.

"I feel that being a regulator has enabled me to do some real good for the environment and water resources in the L.A. region and California," said Purdy, who was named Executive Officer for the L.A. Regional Board in April. "I'm a pretty big-picture thinker, so it's gratifying to be able to find ways to get programs out of siloes and get people to work more collaboratively across programs and agencies."

Purdy, a SCCWRP Alternate Commissioner since June 2018, became Commissioner in April following the retirement of Deborah Smith, the fourth-longest-serving Commissioner in SCCWRP history.

Purdy's commitment to a career in water was solidified as an undergraduate at the College of William & Mary in Virginia, where her academic advisor helped connect her to diverse field opportunities, including running a drill rig, monitoring saltwater intrusion beneath Jamestown Island, and measuring nutrient loading to Chesapeake Bay. From these experiences, she designed her own major: water resources and public health.

Renee Purdy explores Joshua Tree National Park during a camping trip circa 2013.

Purdy has spent the vast majority of her career working on the regulatory side of water management. One notable exception was a two-year stint with the Santa Monica Bay Restoration Project when she first moved to California in 1997.

It was during her time at the Restoration Project that she first started interacting with SCCWRP, which helped her complete a Santa Monica Bay fisheries resource inventory. Her appreciation for SCCWRP has only grown in the decades since.

"The SCCWRP Commission is a valuable opportunity to begin gathering the information we need make decisions on regional policy issues and set regional priorities," Purdy said.

When she's not working, Purdy is a big fan of hot yoga and coffee shops. She also enjoys hiking and camping; her favorite California destinations are Joshua Tree National Park and Carpinteria.

Renee Purdy

Job: Executive Officer, Los Angeles Regional Water Quality Control Board (April 2019-present)

SCCWRP role: Commissioner (started April 2019); formerly Alternate Commissioner (2018-19)

Prior jobs: Multiple roles with L.A. Regional Board (1999-present); Environmental Scientist, Santa Monica Bay Restoration Project (1997-99); Regional Planner, Massachusetts Department of Environmental Protection (1995-97); Project Coordinator, New England Interstate Water Pollution Control Commission (1993-95); Project Manager/Hydrogeologist, Westinghouse Environmental and Geotechnical Services (1989-91)

Education: Master of Regional Planning, University of North Carolina at Chapel Hill (1993); B.S. water resources and public health, College of William & Mary (1989)

Residence: Culver City

Hometown: Shenandoah Valley, Virginia

Family: Daughter Abigail, a Claremont McKenna College sophomore studying neuroscience and ethics; a cat, Zuma

Hobbies: Yoga; traveling internationally; cooking; hiking and camping

CTAG SPOTLIGHT

Stormwater manager pivots from regulatory role

For 16 years, Neil Searing worked in a primarily regulatory role for the San Diego County Department of Environmental Health, overseeing and inspecting a wide variety of water and wastewater systems – both private and public.

Neil Searing

Then, about 1-1/2 years ago, he jumped to the other side of the regulatory fence, joining the San Diego County Department of Public Works' Watershed Protection Program. Now he's responsible for helping the County and its co-permittees comply with the County's MS4 stormwater permit.

"I went from being the regulator to being regulated," said Searing, a Land Use/Environmental Planner III. "Having seen it from both sides, it's really all about partnerships – we're all trying to achieve the same end game."

Searing joined CTAG in early 2019, replacing his supervisor, Jo Ann Weber, who has assumed new job responsibilities. He was elected CTAG Vice Chair in February.

Searing works for the Watershed Protection Program's 30-member Science Monitoring and Policy unit, where his duties include lead planner for the San Luis Rey watershed and project manager for the County's Bacterial TMDL (total maximum daily load) studies.

What Searing loves most about stormwater management is the opportunity to be immersed in cutting-edge science. He's especially interested in advancing the science around HF183, a genetic marker for human fecal contamination. Managers can readily detect HF183, but don't know how it correlates to a level of human health risk.

Neil Searing hikes up Yosemite Falls during a winter 2018 trip to Yosemite National Park.

Neil Searing

Job: Land Use/Environmental Planner III, Watershed Protection Program, San Diego County Department of Public Works

SCCWRP role: CTAG Vice Chair (started 2019)

Prior jobs: Environmental Health Specialist (Supervising, III, II and I), San Diego County Department of Environmental Health (2003-17); Materials Management Specialist, Pfizer Global R&D (2001-03)

Education: B.S. biological sciences, San Diego State University (2001)

Residence: Oceanside

Family: Wife Shannon, who works in sales and marketing; daughter Trinity, 13; two dogs, a Labrador and a shepherd husky mix; a cat

Hometown: Rancho Palos Verdes

Hobbies: Surfing; hiking and backpacking

"We want to be able to use HF183 to prioritize and measure the greatest threats to human health," Searing said. "It's interesting to me to help solve this puzzle."

Searing, a Southern California native, entered college thinking he'd major in business, but a semester of science classes changed his mind. He became interested in the intersection of environmental science and public health.

After graduating from San Diego State University in 2001, Searing spent two years working in private industry, then was hired by the San Diego County Department of Environmental Health.

Searing first began interacting with SCCWRP nearly a decade ago, when he worked with SCCWRP to roll out a County beach water-quality monitoring database. Over the years, he's come to fully appreciate the value of SCCWRP science.

"When you have SCCWRP's buyoff and name behind a study, it's good science," Searing said.

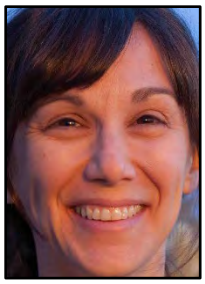
When he's not working, Searing is typically surfing – a passion since childhood. His favorite surfing spot is Oceanside Harbor at the terminus of the San Luis Rey River.

Searing also plans an annual family backpacking trip in the Sierras; he picks a new location to visit each year. For the "quintessential Sierra backcountry experience," he recommends checking out the Ansel Adams Wilderness area in the Sierra and Inyo National Forests.

SCCWRP PARTNER SPOTLIGHT

Professor comes of age with microplastics field

By the time Dr. Chelsea Rochman finished her undergraduate degree at UC San Diego in 2007, she knew exactly what she wanted to study in grad school and for a career. The problem was that it was difficult to find an adviser to study with.



Dr. Chelsea Rochman

Plastic debris as a research discipline was still in its infancy, and multiple professors she approached in marine ecology and oceanography struggled to wrap their heads around what research questions she wanted to answer.

"People were like, 'You want to look at what?'" Rochman recalled. "I couldn't find a professor who focused specifically on studying microplastics in the environment and their impacts on ecosystems."

Rochman, who found a Ph.D. adviser at San Diego State University, has seen her research career evolve in lockstep with the maturation of the microplastics research field itself – from an ill-defined issue to a top-ranked environmental challenge.

Today, Rochman is an Assistant Professor of Ecology and Evolutionary Biology at the University of Toronto, where she runs a 35-member lab that is about 97% focused on microplastics work.

In recent months, Rochman has begun working with an international group of microplastics researchers, including SCCWRP, to design a study that will establish best practices for lab methods that measure microplastics in aquatic environments.

Set to kick off as early as this fall, the study is intended to help California build capacity to conduct routine, standardized microplastics monitoring, especially for particles so small that they can't be seen under a standard light microscope.

Dr. Chelsea Rochman transports her canoe over her head during a trip through Ontario's famous Algonquin wilderness in 2018.

Chelsea Rochman, Ph.D.

Job: Assistant Professor, Department of Ecology and Evolutionary Biology, University of Toronto; part-time Research Consultant, Ocean Conservancy (2016-present)

Past jobs: Postdoctoral Fellow, Society for Conservation Biology (2014-16); Postdoctoral Scholar, University of California, Davis (2013-14)

Education: Ph.D. ecology, UC Davis and San Diego State University (2013); B.S. biology, UC San Diego (2007)

Residence: Toronto, Canada

Family: Partner Luke, a University of Toronto herpetology professor

Hometown: Tucson, Arizona

Hobbies: Lake swimming; biking; jogging

"I never wanted to spend so much time on method development, but the field needs it," Rochman said. "SCCWRP is experienced at transitioning research methods to government agencies, so I hope to learn a lot from SCCWRP about how to harmonize and standardize microplastics methods."

Rochman's desire to work on plastic pollution issues was solidified when she studied abroad in Queensland, Australia as a UC San Diego undergraduate. As part of her studies, she visited an uninhabited island a two-hour boat ride away from the mainland – and was shocked by what she saw on the beach.

"No one lived on the island, but the beach was absolutely covered in trash," Rochman said. "Those visuals really stuck with me."

Being a microplastics researcher is Rochman's second career path. In 2002, she dropped out of college in Arizona to move to Hollywood to pursue a career as an actress; she had been doing community theater in Arizona. After nine months of auditions and working as an extra, she realized she hated "how vain Hollywood is." She re-enrolled in community college and never looked back.

Rochman will officially be on the University of Toronto's tenure track as of July 1, 2019.

When she's not working, Rochman is an avid jogger, bicyclist and lake swimmer. Getting used to Toronto's chilly weather has been a learning process for the Arizona native; she runs outdoors year-round, so she's had to learn how to breathe in sub-zero weather.

SCCWRP STAFF SPOTLIGHT

Microbiology tech brings diverse experiences

In his nearly two decades of experience working in molecular biology labs, David Wanless has tried his hand at a wide variety of research disciplines.

David Wanless

Early in his career, he worked for two years on targeted cancer therapies for a private Santa Monica firm. Then, for 2-1/2 years, he performed contract work – including paternity tests on domestic cats – for a Texas company. He's also tracked the spread of Dengue fever, influenza and other diseases for the Walter Reed Army Institute of Research in Maryland, where he worked in a molecular lab for three years. And he spent six years working in an environmental microbiology lab at the University of Miami.

"I love working in molecular labs," Wanless said. "I'm fascinated by how little microbes work and how they make you sick, and how to manipulate them to do what you want them to do."

Wanless joined SCCWRP in mid-August as a Senior Research Technician in the Microbiology Department, where he'll serve as the molecular biology lab manager.

Working at SCCWRP has enabled Wanless to return to his grad school roots. He spent six years working part time on his master's in marine biology and fisheries at the University of Miami, while simultaneously working full time as a microbiology research associate at the university's Cooperative Institute for Marine and Atmospheric Studies.

David Wanless, right, with his wife Shannon, daughter Beau and son Winston.

David Wanless

Job: Senior Research Technician, Microbiology Department (started August 2018)

Prior jobs: Draftsman, TL Sneed Consulting (2017-18); Research Technician, Walter Reed Army Institute of Research in Maryland (2013-17); Research Associate 2, Cooperative Institute for Marine and Atmospheric Studies, University of Miami (2005-11); Laboratory Technician, Lark Technologies in Texas (2003-05); Research Associate, Agensys in Santa Monica (2000-02); Research Associate 2, Institute for Genomic Research (1999-2000)

Education: M.S. marine biology and fisheries, University of Miami (2012); B.S. bacteriology, University of Wisconsin, Madison (1998)

Residence: Glendale

Family: Wife Shannon, regional director for the Leukemia & Lymphoma Society; children Winston, 8, and Beau, 3

Hometown: Madison, Wisconsin

Hobbies: Lake and river fishing; bike riding; spending time with his children

Wanless's master's thesis focused on how to develop and optimize molecular assays for microbial water testing. Also during grad school, Wanless collaborated on research with SCCWRP, which was focused at the time on an international effort to standardize methods for microbial source tracking.

"I knew SCCWRP was one of the best places for water-quality research," he said.

A native of Wisconsin, Wanless has lived and worked in four U.S. states. He has moved for two main reasons – either so he or his wife could take a job, or for grad school for himself or his wife.

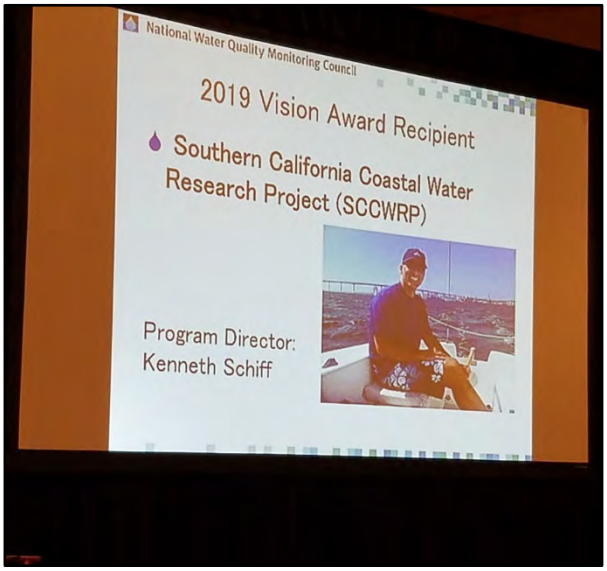
Wanless relocated to Southern California about a year ago when his wife became Executive Director of the California Southland chapter of the Leukemia & Lymphoma Society. While he searched for a molecular biology lab postiion, he worked as a draftsman for a La Cañada Flintridge engineering consulting firm, helping colleagues transition to AutoCAD software.

In his spare time, Wanless is an avid fisherman. His greatest joy is catching (and then releasing) golden trout, which are typically only found at elevations above 7,000 feet. He also enjoys spending time with his wife and two young children.

SCCWRP SCENES

A recognition of vision

SCCWRP has been awarded the National Water Quality Monitoring Council's 2019 Vision Award for demonstrating vision and cooperation in enhancing the management and protection of aquatic resources. SCCWRP Deputy Director Ken Schiff accepted the award on behalf of SCCWRP in March during the Council's national conference in Denver.



Clockwise from top left, the National Water Quality Monitoring Council announces that SCCWRP has won the Council's 2019 Vision Award; Ken Schiff addresses conference attendees after accepting the award; and Schiff poses with, from left, Gary Rowe, Council Co-Chair; Christopher Bellucci, Council Awards Committee Chair; and Susan Holdsworth, Council Co-Chair.