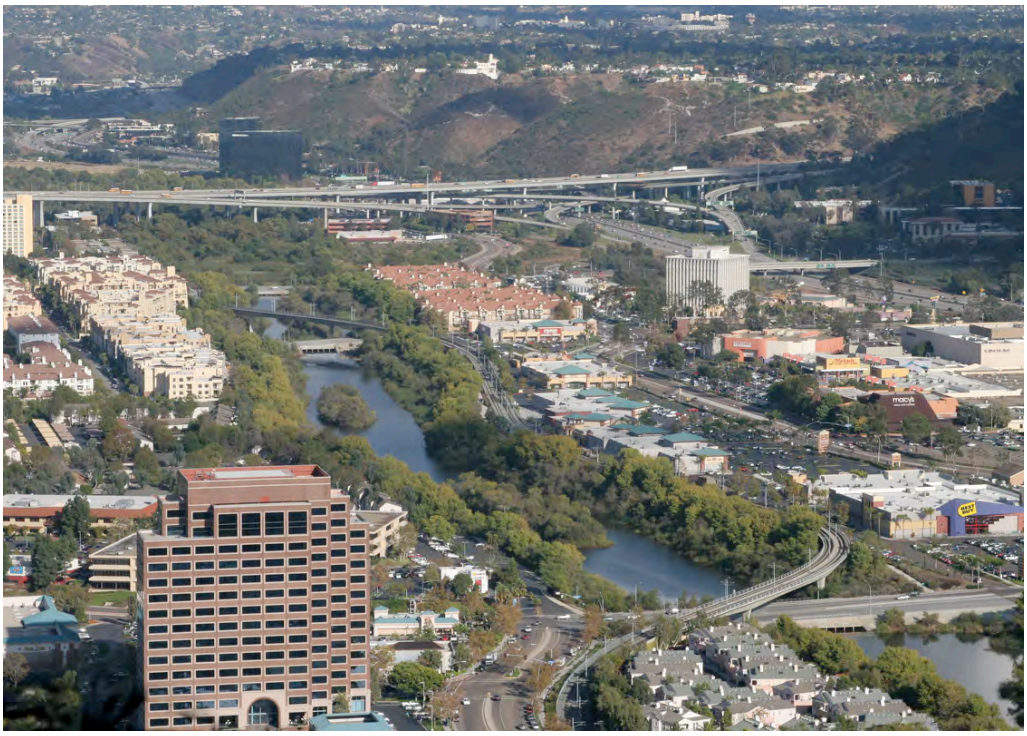


SCCWRP Director's Report

PUBLISHED APRIL 28, 2017 | COVERING FEBRUARY 4-APRIL 28, 2017

SPRING 2017 ISSUE

New stream flow targets aid in watershed planning decisions

SCCWRP and its partners have published a comprehensive study outlining how to use a suite of newly developed flow-ecology modeling tools to optimally protect the in-stream biological communities of more than 600 wadeable stream sites across Southern California.

The three-year study, published in March, is intended to help Southern California watershed managers as they make difficult decisions regarding how to set stream flow targets across a watershed – decisions that can affect everything from reservoir operations to stormwater capture and use strategies.

The flow-ecology modeling work involved mathematically modeling the hydrological flow patterns that are necessary to sustain healthy, in-stream biological communities for 572 wadeable stream sites across Southern California.

Watershed managers already have begun using the flow-target data sets, along with associated assessment tools developed during the study, to understand the ecological implications of altering hydrological flow patterns in various watersheds. Study data also are being used to inform development of a statewide assessment framework that will guide watershed managers in setting recommended flow targets for streams statewide.

The scientific framework that SCCWRP and its partners used to develop the recommended flow targets is known as the Ecological Limits of Hydrologic Alteration (ELOHA). The framework relates flow alterations to stream condition as indicated by benthic macroinvertebrate stream communities. With ELOHA, researchers are able to factor in a wide range of flow conditions (i.e., stormwater flows vs. low flows) and climatic conditions (i.e., wet vs. dry years).

During the study, researchers identified seven flow metrics identified as having the most influence on biological condition; flow alterations beyond the thresholds proposed by the study were assumed to be

Contents

Cover photo: The San Diego River watershed served as the first case study for evaluating the utility of new flow-ecology modeling tools co-developed by SCCWRP to better protect in-stream biological communities.

Calendar

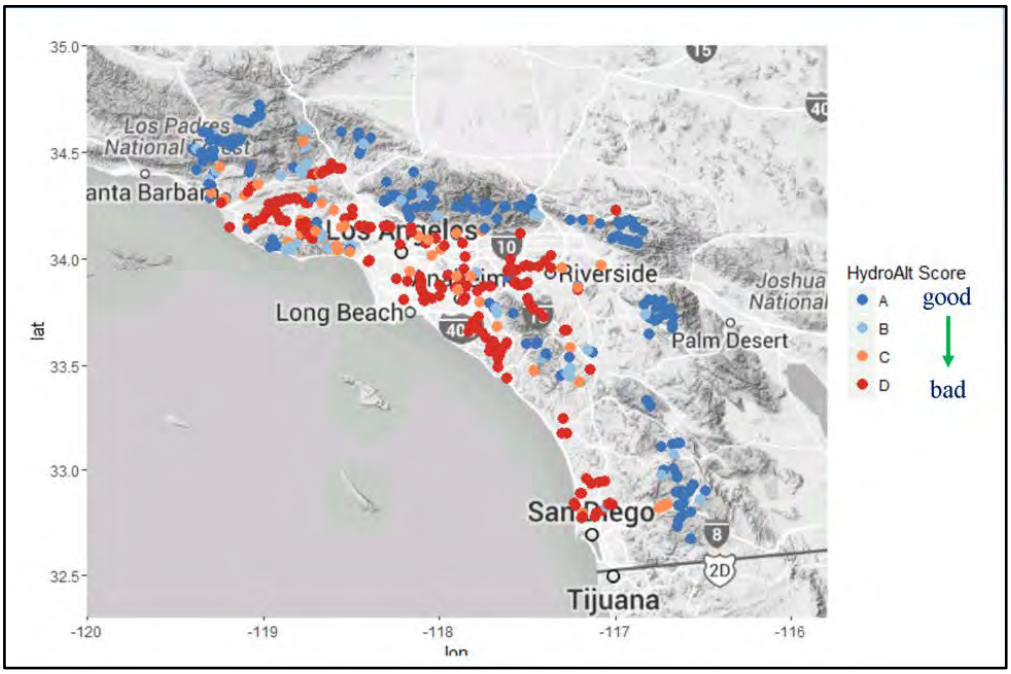
Thursday, May 4
CTAG quarterly meeting

Friday, May 5
Seminar: "Influence of Nutrients and Temperature on the Distribution and Diversity Pelagic Microbes in the Southern California Current Ecosystem"

Friday, June 2
SCCWRP Commission meeting

associated with declines in in-stream biological condition.

Watershed managers can now use the stream flow-target data and assessment tools to evaluate the impacts of proposed flow alterations, as well as prioritize areas for protection. The flow-target data also offer insights into the level of influence that flow patterns have in terms of altering in-stream biological health at a given site, relative to other factors such as contamination and habitat alteration.



A SCCWRP-led flow-ecology study has generated data on the hydrologic flow patterns that are necessary to support healthy, in-stream biological communities for hundreds of wadeable stream sites in Southern California. Many of these sites don't presently have optimal flow patterns for in-stream biological communities, as shown in the map above, where flow conditions at various sites have been scored and assigned a grade of A through D.

In-stream biological health is one of numerous factors that watershed managers must take into account as they set flow targets for various streams. Watershed managers also are responsible for maintaining flood-control protections, maximizing conservation and reuse, and being responsive to requests to maintain existing flows for ecological purposes.

The San Diego River watershed served as the first case study evaluating the utility of the new flow-ecology modeling tools. Watershed managers there used the tools to evaluate how proposed changes in reservoir management strategies would impact in-stream biological communities. The managers also examined how the proposed installation of low-impact development (LID) solutions for managing stormwater runoff would impact in-stream biological health.

For more information, contact Dr. Eric Stein.

SCCWRP research featured at S.D. Regional Board workshop on monitoring technologies

Next-generation environmental monitoring technologies being developed by SCCWRP and its research partners were featured at an April workshop hosted by the San Diego Regional Water Quality Control Board that focused on how newer technologies could improve the quality and speed of routine data collection.

The technology workshop, titled "Use of Remote Monitoring Technologies to Assist the San Diego Water Board Mission," was designed to expose Regional Board members to promising, next-generation solutions for environmental monitoring.

The April 12 agenda item prominently featured SCCWRP presentations and demonstrations, and covered topics

SCCWRP's Shelly Moore, left, guides Melissa Valdovinos of the San Diego Regional Water Quality Control Board through a virtual-reality tour of the mouth of the Tijuana River during a board meeting in April. During the meeting, SCCWRP delivered a series of presentations and demonstrations for board members on next-generation monitoring technologies.

that ranged from unmanned aerial systems to bioanalytical screening tools. The board spent about an hour listening to presentations and engaging in discussion, then took part in demonstrations over a 90-minute lunch break.

Four SCCWRP staff attended the meeting to give presentations and lead demonstrations:

» Dr. Steve Steinberg provided an overview of how multispectral cameras can be attached to unmanned aerial systems to obtain high-quality imagery and develop topographic models.

» Dr. Alvina Mehinto discussed the adaption of commercially available cell bioassays to rapidly screen receiving waters for contaminants of emerging concern (CECs).

» Shelly Moore demonstrated the potential of virtual-reality goggles to aid in scenario planning and to visit inaccessible and difficult-to-reach areas.

» Paul Smith demonstrated the use of mobile applications for streamlining field data collection, as well as open-access portals for storing and sharing data.

Other presentations covered topics for which SCCWRP serves as a research collaborator, including *in situ* passive sampling devices for measuring contaminants in receiving waters, and a field instrument that can continuously monitor receiving waters for microbial contamination.

SCCWRP's interactions with board members and others during the Regional Board meeting will help the agency refine and expand its research directions going forward.

For more information, contact Dr. Steve Steinberg.

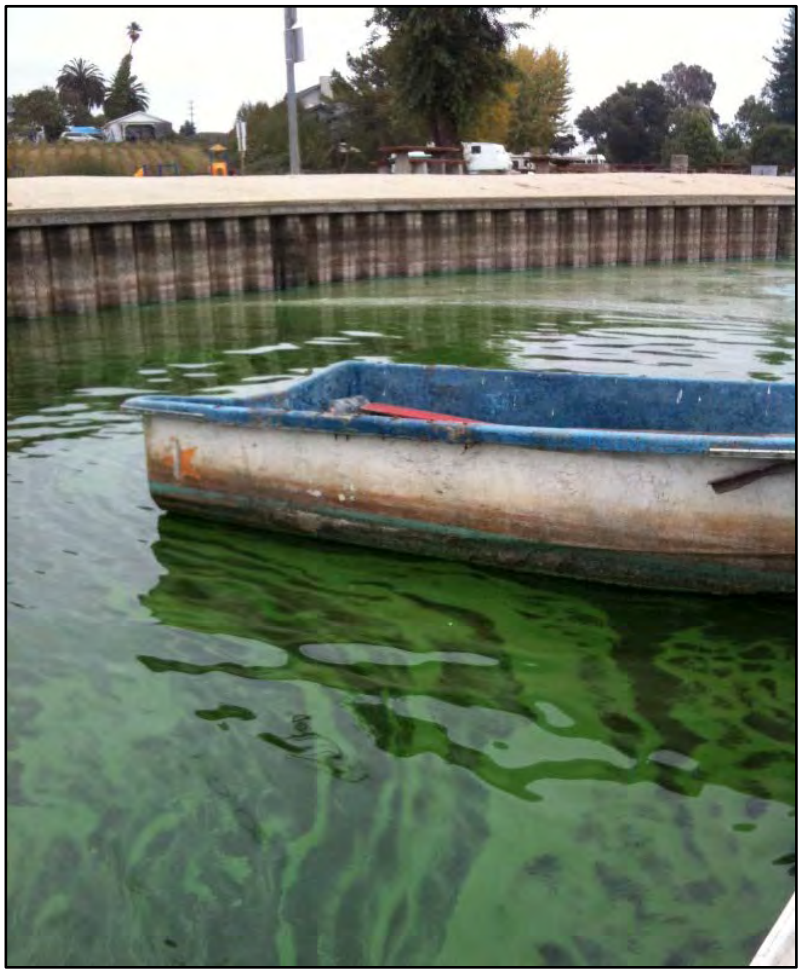
EPA workshop focuses on science-informed solutions for managing HABs

About 150 water-quality managers from across the nation discussed the state of knowledge about harmful algal blooms (HABs) and best-practices solutions and strategies for combatting them during a management-focused workshop in April at SCCWRP.

The three-day workshop, hosted by the U.S. Environmental Protection Agency and California's Surface Water Ambient Monitoring Program, provided a forum for lake managers, public health officials, tribal leaders and other water-quality managers to get up to speed on the latest science and to share their in-field experiences with HABs.

HAB events trigger production of algal toxins that can impair water quality and threaten the health of humans, wildlife and domestic pets.

SCCWRP, which was invited by the EPA to co-organize the workshop, will use the feedback provided by meeting attendees to help shape its own HAB research agenda. SCCWRP already co-authored a statewide strategy in 2016 intended to help California water-quality managers build capacity for HAB monitoring and



Raphael Kudela, University of California, Santa Cruz

Pinto Lake in Santa Cruz County, tainted a murky greenish color by toxic cyanobacteria, is an example of the type of HAB events that water-quality managers are working to curb through more research and ongoing monitoring. HAB management was the focus of a three-day EPA workshop at SCCWRP.

assessment work and to coordinate management responses.

In particular, meeting attendees – who hailed from California, Nevada, Arizona, Washington and the Pacific Islands, including Hawaii – underscored the need for more research on freshwater HABs.

Furthermore, lake managers discussed their experiences relying on "Band-Aid" approaches – such as algicides and nutrient binders – to curb HAB events. The national HAB experts who presented at the workshop, including SCCWRP's Dr. Meredith Howard, emphasized that these temporary solutions should only be one component of a multi-pronged HAB management strategy.

To effectively manage HABs over the long term, experts at the workshop recommended site-specific investigations to understand the environmental factors driving blooms and toxin production, including nutrient inputs, hydrology and water residence time, salinity and temperature. By understanding the primary drivers of HAB events within a waterbody, water-quality managers can develop targeted, customized watershed management plans, as well as strategies for appropriately utilizing short-term waterbody treatments.

The workshop featured on-the-ground testimonials from water-quality managers from as far away as Ohio, Massachusetts and South Carolina who have been successful in managing HAB events. They offered practical advice for how to develop a HAB monitoring program grounded in the latest science.

About 100 people attended the workshop in person, plus about 50 more via webinar.

For more information, contact Dr. Meredith Howard.

SCCWRP-developed CEC monitoring framework highlighted at State Water Board meeting

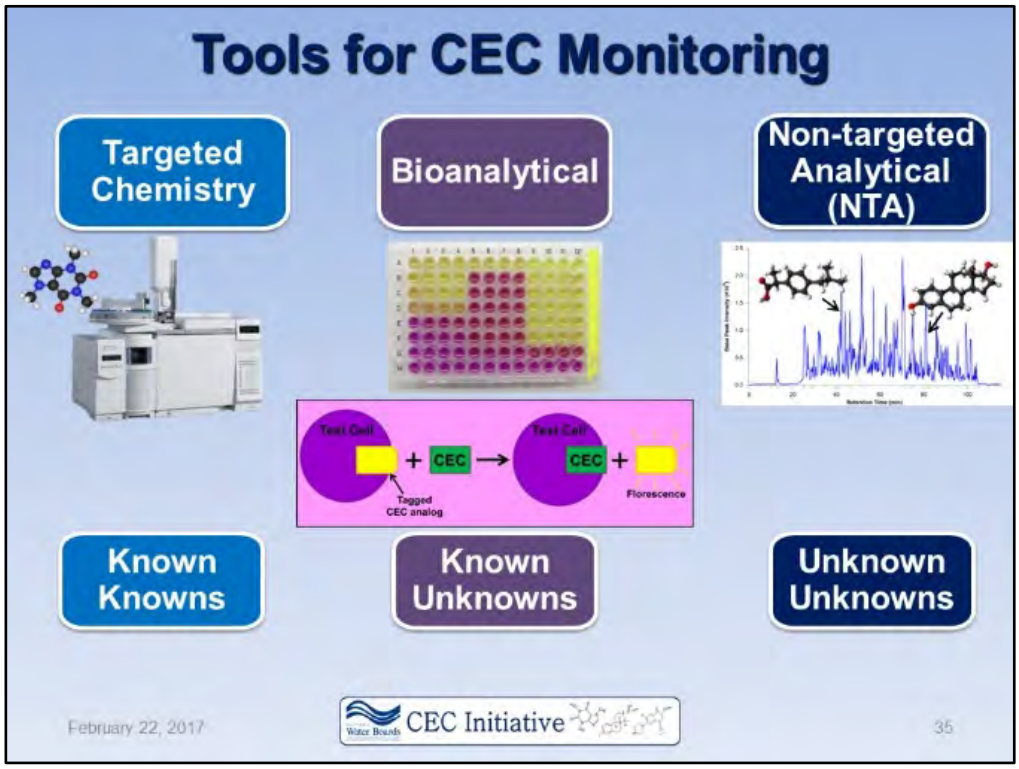
State Water Board members explored multiple approaches being taken to improve CEC monitoring statewide during an informational meeting agenda item in February.

Some of the presentations they heard at the meeting highlighted an adaptive management strategy developed by SCCWRP to evaluate the risks of CECs in aquatic systems.

Two Regional Water Quality Control Boards – North Coast and Los Angeles – discussed the pilot studies they're undertaking with SCCWRP in their respective regions to evaluate the utility of this CEC monitoring strategy.

Initially unveiled by SCCWRP in 2015, the risk-based adaptive management strategy is intended to provide water-quality managers with an efficient, cost-effective way to zero in on the CECs that pose the greatest potential risks to humans and ecosystems.

Through the pilot studies, water-quality managers will gain insights into whether the monitoring strategy could be effectively applied to aquatic systems across California, particularly water bodies with significant water-quality impairments.



Next-generation CEC monitoring strategies that SCCWRP is working to test and validate were described by State Water Board staff during a presentation to board members exploring the approaches being used to improve CEC monitoring statewide.

During the February 22 informational agenda item, State Water Board staff also briefed board members on the underlying research that SCCWRP and its partners are conducting to refine the scientific tools that are foundational to the strategy.

SCCWRP's CEC monitoring strategy focuses on two emerging technologies that SCCWRP has been working on with collaborators for nearly a decade:

» Bioanalytical screening assays, in which engineered cell lines are exposed to water samples so that a potential biological response can be measured

» Non-targeted chemical analysis, in which chromatography and rapid-scan mass spectrometry are used to separate and identify chemicals in complex mixtures based on physical and chemical properties

These technologies have the potential to enable water-quality managers to screen a much larger universe of CECs than they can with existing, chemical-specific monitoring methods. Incorporation of these CEC screening tools could streamline existing monitoring workflows and make more efficient use of labor-intensive, time-consuming traditional methods, such as whole-organism toxicity testing and targeted chemical analyses.

In May, SCCWRP is scheduled to brief regulators and dischargers from the Central Valley and Delta regions on the CEC monitoring strategy during a two-day workshop in Sacramento.

And later this year, SCCWRP will reassemble an expert advisory panel that will help SCCWRP vet and help shape research to improve CEC monitoring in recycled water. SCCWRP assembled the initial statewide panel in 2009.

For more information, contact Dr. Keith Maruya.

Updates by Thematic Area

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

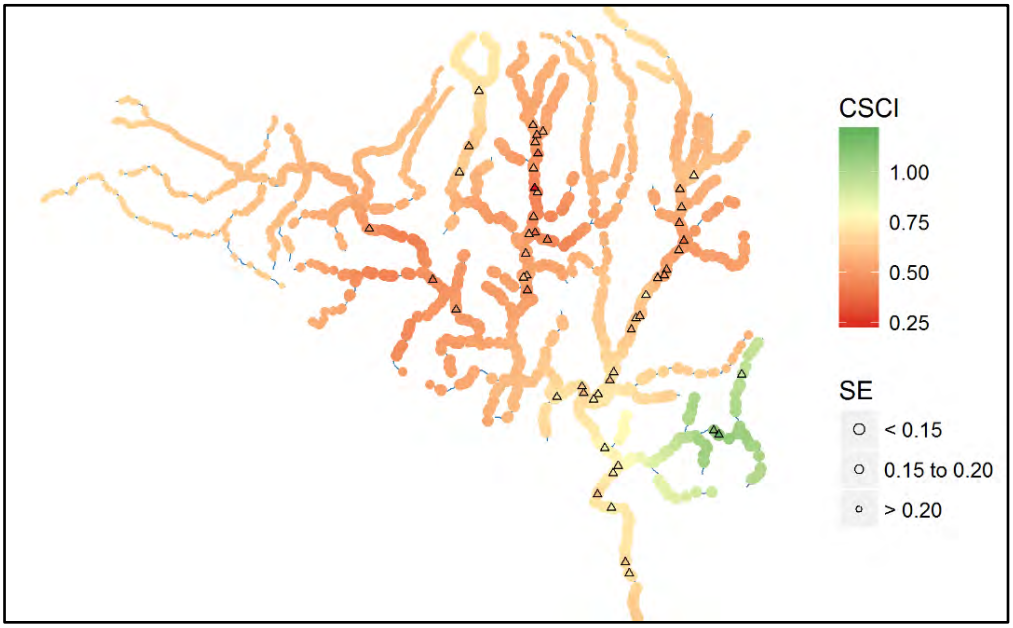
BIOASSESSMENT

SCCWRP exploring expanded use of extrapolation modeling technique for stream condition assessments

SCCWRP and its partners are exploring how to expand use of a modeling technique for extrapolating bioassessment results to unmonitored stream reaches , following the completion of a pilot study that successfully applied the approach to six watersheds in California.

The extrapolation technique, known as Spatial Statistical Network (SSN) modeling, reveals the geographical extent to which ecological condition scores calculated for stream sampling sites may be extrapolated to unsampled reaches upstream and downstream of the sites, with various levels of confidence.

Bioassessment data points don't cover all stream reaches within watersheds, as some reaches are difficult to access and stream managers don't have the resources to conduct field bioassessment work along every stream reach in California.



The bioassessment data extrapolation map for the Malibu Creek watershed, above, shows how limited field bioassessment data points, plotted as triangles, are used to extrapolate bioassessment data across all stream reaches within a watershed. The bioassessment scores are calculated using the California Stream Condition Index (CSCI) scoring tool; the size of each colored point indicates the level of confidence in the prediction (SE = standard error).

SCCWRP in April published a report describing the application of the extrapolation technique to six demonstration watersheds in California. The project, completed in partnership with the California Stormwater Quality Association, can help stream managers optimize how they apply stream bioassessment data to inform decision-making and policy development at larger scales, from subcatchments to whole watersheds.

SCCWRP is now seeking to broaden the application of the technique to create extrapolated data maps for every stream reach in coastal Southern California. Researchers also are interested in combining field bioassessment data from multiple sources (i.e., from multiple study designs) to create watershed-scale extrapolation maps.

The extrapolation technique has the potential to provide key pieces of information that will aid in watershed planning efforts. SCCWRP is exploring how the extrapolation maps could be used to establish a technical foundation for classifying high-quality vs. impaired streams. Additionally, the extrapolation maps could be used to pinpoint where additional field sampling would be most helpful in improving understanding of overall watershed health.

Furthermore, the extrapolation technique isn't limited to bioassessment data; SCCWRP also will explore how it could be applied to fill in missing chemistry and toxicity data points for streams.

SCCWRP begins documenting persistence of eDNA in stream environments

SCCWRP has completed a pilot study examining how long the environmental DNA signal of an organism lingers in a stream following the removal of the source organism, part of an effort to assess whether eDNA can be used to reliably document the species present in streams.

eDNA, which is the genetic material that organisms shed into their environment, has the potential to offer a rapid, cost-effective assessment of what species are living in a stream. It would be particularly useful for providing early warnings for the emergence of an invasive species, or for tracking endangered species.

The pilot study, completed in February, involved placing marine mussels into concrete-lined Coyote Creek in Orange County. Marine mussels are not naturally found in this freshwater environment.

The study found that the mussels' eDNA signal was detectable at least 1.5 kilometers downstream of the site, but also that the signal quickly dissipated after the mussels were removed from the channel.

EUTROPHICATION

Researchers using Bight data to evaluating accuracy of ocean acidification model

Researchers working to develop a West Coast computer model that predicts how land-based sources of nutrients influence ocean acidification in nearshore coastal waters have begun using field data collected from the Southern California Bight to evaluate the accuracy of the model's predictions.

The model validation step involves plugging Bight biogeochemical cycling data into the computer model to determine how accurately the model predicts acidification and hypoxia conditions across the Bight continental shelf.

Validating the model's performance with locally collected data will give managers increased confidence that the model's predictions can be used reliably for management decision-making.

The Bight validation data sets are made up of measurements of key biogeochemical cycling rates and processes, including primary production, respiration, nitrogen uptake by phytoplankton, and nitrification.

SCCWRP's POTW member agencies, which collected the field data last year, approved the "process studies" data in March for use by the West Coast modelers.

The West Coast acidification modeling effort, of which SCCWRP is a part, is a three-year initiative to help West Coast managers understand which marine habitats are most vulnerable to ocean acidification and to what extent local, land-based source of nutrients are exacerbating acidification conditions.

The modeling work involves coupling West Coast physical and biogeochemical ocean models together to understand the relative contributions of global carbon dioxide emissions, natural upwelling processes, and nutrients introduced via wastewater effluent, stormwater runoff and atmospheric deposition.

Mussels are placed in metal mesh bags and tied to a post in Coyote Creek in Orange County for a pilot study examining how long the organism's environmental DNA signal lingers following the removal of the organism.

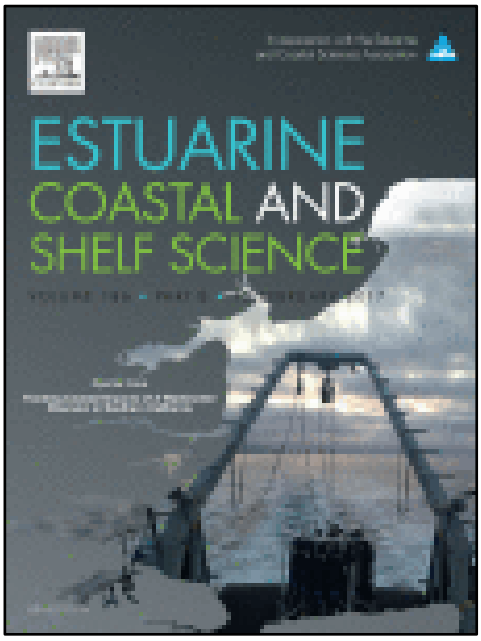
Modelers are now feeding the biogeochemical cycling validation data into a downscaled Bight acidification model to understand how accurately it predicts what happens when nutrients are introduced to coastal waters.

The modelers will present the results of this model validation phase at a stakeholder advisory meeting scheduled for June 23.

Special journal issue chronicles how Bight ecosystems influenced by diversion of wastewater effluent

The journal *Estuarine, Coastal and Shelf Science* has published a special journal issue dedicated to a series of SCCWRP-coordinated journal articles that assessed how temporarily diverting an Orange County wastewater effluent discharge closer to shore affected the nearshore ecosystem.

The nine-part special issue, published in April, chronicles the biological effects on phytoplankton and bacterial communities from moving the discharge zone for treated wastewater effluent from five miles offshore to one mile offshore. The journal articles focus on changes in biogeochemical cycling that accompanied a sudden influx of nitrogen, which is discharged in effluent and serves as a major nutrient source for primary producers.



A special issue of the journal *Estuarine, Coastal and Shelf Science* explores the ecological impacts of temporarily diverting a wastewater effluent discharge closer to shore.

The studies were conducted in fall 2012 at the request of the Orange County Sanitation District, which was performing routine maintenance on its main outfall pipe. Multiple organizations were involved in the studies during the three-week diversion project.

SCCWRP helped the Sanitation District coordinate the multiple research efforts, and two of the four guest editors for the special journal issue were SCCWRP scientists. The special journal issue is titled "Tracking impacts of anthropogenic nutrient inputs in an urban coastal ecosystem during a wastewater diversion in the Southern California Bight."

Sean Baumgarten, San Francisco Estuary Institute

SCCWRP and its partners have developed a vulnerability index model that predicts how low-lying coastal wetlands across Southern California, including Los Peñasquitos Lagoon in San Diego, above, will be impacted by sea level rise over the next century.

CLIMATE CHANGE

Model evaluates vulnerability of 104 wetlands to sea level rise

SCCWRP and its partners have developed a vulnerability index model that predicts how Southern California coastal wetlands of all types and sizes could be impacted by sea level rise over the next century.

The two-year modeling project, completed in late 2016, is intended to help the State Coastal Conservancy and its management partners prioritize efforts for wetland restoration, as well as set goals for long-term wetland management.

The vulnerability index model was applied to 104 low-lying coastal wetland areas to understand their relative vulnerability to climate change. The model found that small coastal lagoons will be less vulnerable to sea level rise than large, complex systems.

Overall, the modeling work found that without any management intervention,

nearly 70% of coastal wetlands and mudflats could be lost if sea levels rise by 1.6 meters, as they are predicted to do by 2100.

However, with aggressive planning and interventions, wetland managers would be able to allow wetland areas to migrate farther inland, allowing coastal Southern California to experience a net gain of wetland area, according to the analysis.

The most dramatic impacts to coastal wetlands from sea level rise are predicted after 2050, giving managers time to respond and prevent dramatic losses of wetland areas.

SEDIMENT QUALITY

San Diego Bay study examines fish consumption habits among local anglers

SCCWRP and its partners have completed a comprehensive, two-year study illuminating the fish consumption habits of San Diego Bay anglers who catch fish that could potentially be contaminated.

The San Diego Bay Fish Consumption Study, published as a technical report in April, found that while average consumption rates were below thresholds of concern, certain demographic populations consumed San Diego Bay fish at significantly higher rates that, in some cases, exceeded consumption guidelines.

The findings will be used to inform development of fish consumption guidelines that are specific to San Diego Bay. A similar fish consumption study in Santa Monica Bay – completed more than two decades ago by SCCWRP – was used in the development of statewide fish consumption guidelines.

The San Diego Bay findings are based on a survey of more than 1,000 anglers over a one-year period. The survey data were gathered by individually approaching and interviewing anglers at public piers, on boat ramps and along the shoreline. SCCWRP used a custom-designed tablet app to store and transmit the data.

Anglers were asked what types of fish they catch from the bay, how often they consume these fish and whether they are aware of existing fish consumption advisories. About half of survey participants reported being aware of consumption guidelines, although it did not appear to affect their decision to consume fish from the bay.

Marina del Rey Harbor study highlights need for improved tools to investigate cause of sediment toxicity

SCCWRP and its partners have completed a comprehensive investigation into the potential causes of degraded sediment quality in Marina del Rey Harbor, a study that has underscored the need for next-generation sediment Toxicity Identification and Evaluation (TIE) analysis methods.

The one-year study was not able to associate any of the toxic chemicals listed in the boat harbor's Total Maximum Daily Load (TMDL) regulatory plan with the sediment toxicity measured during laboratory testing.

Consequently, researchers were not able to determine which specific toxics are responsible for the impaired condition of sediment-dwelling marine communities in the Los Angeles County boat harbor.

The study did, however, confirm that sediment toxics could be a cause of impairments to bottom-dwelling biological communities in the harbor.

Researchers theorize that other types of toxic chemicals that enter Marina del Rey Harbor via stormwater runoff could be responsible for the toxicity observed during the TIE analysis.

The study has highlighted the need for new, more sensitive alternatives to traditional TIE testing methods, which were developed decades ago.

The Marina del Rey study marked the first formal demonstration of the stressor

Anglers cast their nets into San Diego Bay. SCCWRP and its partners have completed a two-year study examining fish consumption habits of people who catch fish that could potentially be contaminated. The data will inform development of fish consumption guidelines specific to San Diego Bay.

A field crew retrieves sediment grab samples from the bottom of Marina del Rey Harbor. The stressor identification study in the harbor has underscored the need for next-generation sediment Toxicity Identification and Evaluation (TIE) analysis methods.

identification process required under the state's water quality control plan for sediment quality, and one of the first attempts to characterize the cause of impacts to bottom-dwelling marine communities.

Human health assessment framework for embayment sediment quality being finalized

SCCWRP and its partners are wrapping up a final round of updates to a draft statewide assessment framework that evaluates how contaminated sediment affects the health of humans who consume fish caught in California's enclosed bays and estuaries.

The human health sediment quality objective framework is being submitted to the State Water Board in the coming weeks for review and, eventually, possible adoption. The State Water Board adopted a comparable embayment assessment framework in 2009 that focuses on the protection of sediment-dwelling aquatic life.

The human health framework uses contamination data obtained through fish tissue sampling to estimate the level of chemical exposure via human consumption. A bioaccumulation model that explains how the contaminants have traveled through marine food webs is used to estimate what role sediment contamination played in contaminating the fish.

The draft statewide framework also includes a decision support tool to help end users with implementation.

In recent months, SCCWRP and its partners have refined the framework and decision support tool in response to feedback by the project's stakeholder advisory committee. Enhancements include:

» incorporating fish consumption advisory levels from the state's Office of Environmental Health Hazard Assessment (OEHAA) into the framework to assess chemical exposure

» updating a water column contaminant model to reflect relationships between local sediment contaminant concentrations and measured dissolved contaminant concentrations in the water column

» improving data comparability by updating the congener list for the PCB contaminant class with that used in current monitoring programs

If adopted, the human health assessment framework would be incorporated into a revised version of the state's Water Quality Control Plan for Enclosed Bays and Estuaries.

CONTAMINANTS OF EMERGING CONCERN

International passive sampling study to examine persistent organic pollutants in Channel Islands

SCCWRP in June will deploy a series of passive sampling arrays in the Channel Islands National Marine Sanctuary to measure persistent organic pollutants (POPs), part of an international effort to track the prevalence of toxic chemicals resistant to environmental breakdown.

The passive sampling arrays will be placed in the ocean for two months, allowing researchers to measure the background concentration of POPs in the water column.

SCCWRP was invited to take part in the international study by the Aquatic Global Passive Sampling Network (AQUA-GAPS), a consortium of scientists and resource managers working to create a global database of oceanic water quality.

SCCWRP will use the opportunity to fine-tune field assessments of POPs using standardized passive sampling methods. SCCWRP also will analyze the chemicals sorbed by the passive samplers using the latest generation of bioanalytical screening tools.

The passive sampling arrays, which are made of plastic and silicone rubber, offer a

cost-effective way to measure chemical contaminants, even at very low levels.

The Channel Islands National Marine Sanctuary will provide ship time for the project.

Passive sampling method for measuring sediment contaminants validated in laboratory

SCCWRP and its partners have completed the validation phase of a two-year study that aims to adapt commercially available passive sampling devices to measure the freely dissolved concentration of CECs in sediment.

The validation phase provides a laboratory proof-of-concept that polyethylene film – a cheap and widely available plastic material – can accurately detect contamination in sediment samples that are just a few ounces in size over an accelerated 10-day testing period.

The passive sampling devices are now being tested on sediment samples collected from dozens of sites across San Diego Bay that reflect a range of bulk sediment contamination levels. SCCWRP and its partners also are testing the utility of other plastic materials for measuring high-priority CECs, including the pesticide fipronil that can be toxic to aquatic life at low levels.

Passive sampling devices have the potential to provide a more accurate measurement of the "bioavailable" portion of chemical contaminants that could be ingested and absorbed by sediment-dwelling organisms – a contrast to conventional measurement methods such as bulk sediment chemistry.

MICROBIAL WATER QUALITY

Human fecal contamination sources identified at Inner Cabrillo Beach during QMRA study

A SCCWRP-led effort to use a health risk modeling approach known as Quantitative Microbial Risk Assessment (QMRA) at Inner Cabrillo Beach in Los Angeles County has turned up evidence that microbial contamination at the beach is largely from human sources.

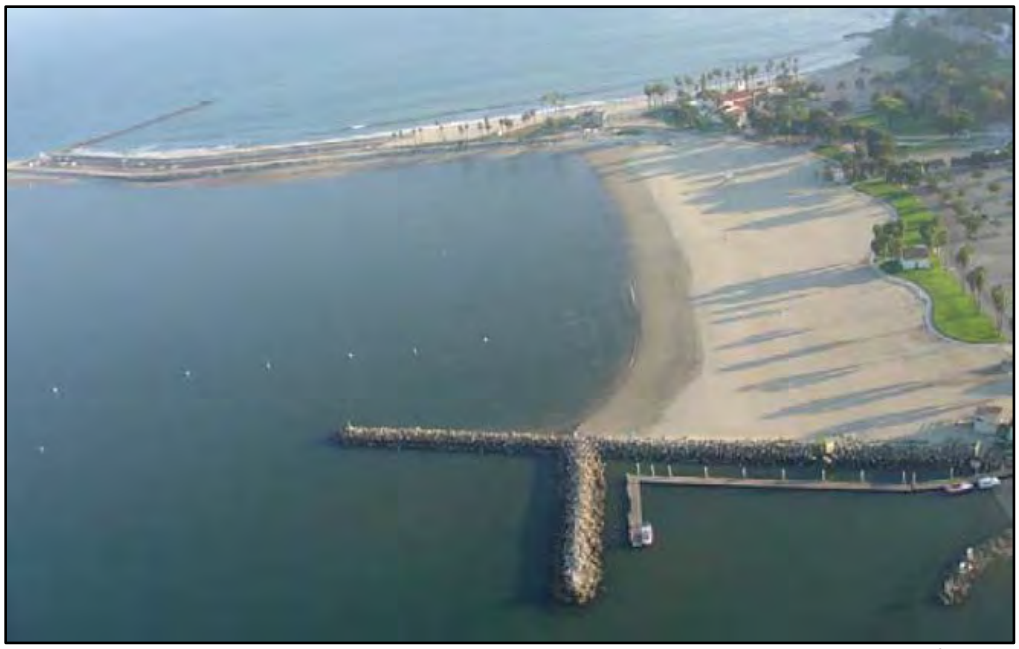
The conclusion, which was reached by the project's advisory committee in February, means that the QMRA analysis cannot move forward until repairs are made to sanitary sewer infrastructure in the area. The QMRA risk modeling approach is designed for use only at sites where microbial contamination sources are not predominantly human; human contaminant sources are much more likely to contain pathogens that can make humans sick.

After reviewing the water-quality data at Inner Cabrillo, the committee determined that the frequency of detectable levels of a genetic marker for human fecal material was too high to proceed with the QMRA. During a subsequent examination of the sanitary sewer infrastructure at the beach, the Port of Los Angeles identified numerous potential issues that could be contributing to the beach's elevated contamination levels. Repairs are expected to take at least one year.

In the interim, SCCWRP and the Port of Los Angeles will conduct studies in the harbor area surrounding the beach to determine whether a wastewater plume from a nearby treatment facility on Terminal Island may also be a source of human fecal material to the beach.

Inner Cabrillo is a popular swimming spot in the Los Angeles Harbor area where fecal indicator bacteria concentrations frequently exceed water-quality guidelines. More than $20 million has been spent to reduce contamination levels, but bacterial concentrations continue to exceed objectives; the beach has a TMDL (total maximum daily load) for fecal bacteria.

The QMRA can resume after all possible sources of human contamination to the beach have been abated or characterized as minimal.



Port of Los Angeles

Inner Cabrillo Beach in the Los Angeles Harbor area has been the subject of more than $20 million in unsuccessful clean-up efforts. A SCCWRP-led effort to use a health risk modeling approach known as Quantitative Microbial Risk Assessment (QMRA) has turned up evidence that microbial contamination at the beach is predominantly coming from human sources.

POTW labs to start training for study examining antibiotic-resistant bacteria, genes in effluent

SCCWRP and its POTW member agencies in May will begin practicing collection and analysis techniques for a year-long study examining whether viable antibiotic-resistant bacteria – and the genetic material that codes for antibiotic resistance – are being discharged into the environment following the wastewater treatment process.

The study, scheduled to begin in June, will measure the prevalence of antibiotic-resistance bacteria entering nine wastewater treatments across Southern California, including an international plant at the U.S.-Mexico border. Researchers will track which bacteria and genetic material survive treatment and are discharged into receiving waters.

Researchers are particularly concerned about antibiotic resistance genes in wastewater effluent because these genes may survive the treatment processes that destroy most bacterial cells, and then may travel via treated effluent into aquatic systems. Once in the environment, potentially pathogenic bacteria in the environment can take up the antibiotic resistance genes, which could confer antibiotic resistance to other bacteria, including pathogenic strains that make humans sick.

Previous studies have documented a broad array of antibiotic resistance genes in wastewater effluent, as well as how commonly bacterial cells swap their antibiotic resistance genes with one another.

In preparation for the study's kickoff, standard operating procedures are being circulated to all participating labs, so they can practice the techniques and ensure they can generate high-quality, comparable results.

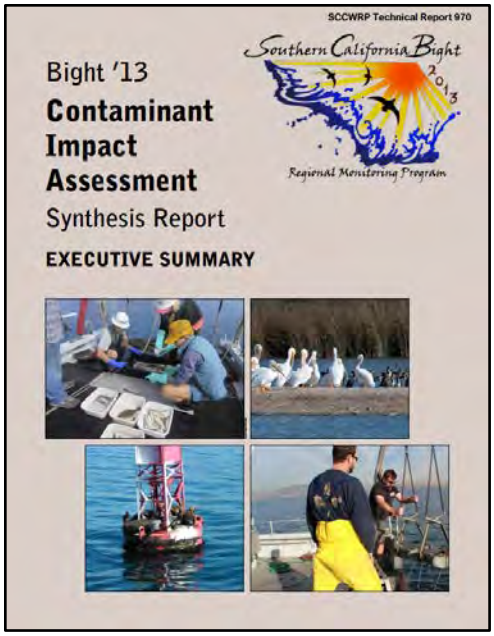
REGIONAL MONITORING

Bight '13 CIA element publishes integrated summary reports

The integrated findings of the Contaminant Impact Assessment (CIA) element of Bight '13 have been published in a final assessment report and an accompanying, 12-page executive summary intended for a management audience.

The Bight '13 Contaminant Impact Assessment Planning Committee, which published the summary documents in March with facilitation by SCCWRP, synthesized the findings of five detailed assessment reports that chronicle the multiple scientific approaches taken to assess how sediment contamination has impacted marine ecosystems across 1,539 square miles of Southern California's coastal waters.

The five assessment reports that were synthesized are Sediment Chemistry, Sediment Toxicity, Benthic Infauna, Demersal Fishes and Megabenthic Invertebrates, and Contaminant Bioaccumulation.



The Southern California Bight 2013 Regional Monitoring Program has completed an assessment report and accompanying executive summary, above, of the synthesized findings of the Bight '13 Contaminant Impact Assessment element.

Primary findings from the Bight '13 CIA element were:

» About 94% of the assessed area of the entire Bight is unimpacted or likely unimpacted by sediment contamination.

» About one-half of the assessed area of marina seafloors, and one-third of the assessed area of estuary seafloors, are possibly or likely impacted by sediment contamination. In contrast, about 5% of the offshore continental shelf area is possibly or likely impacted by sediment contamination.

» The total area of embayment seafloors impacted by sediment contamination has decreased by two-thirds since the late 1990s, from nearly 50% of the area in 1998 to 18% of area in 2013.

The CIA Synthesis Executive Summary has been professionally printed in full color; additional copies are available from SCCWRP upon request. All of the Bight '13 assessment reports are available online.

SMC kicks off Year 3 field sampling for second cycle of stream monitoring program

The Southern California Stormwater Monitoring Coalition in March kicked off Year 3 of field sampling for the second five-year cycle of its regional stream monitoring program.

The SMC Regional Watershed Monitoring Program, which is facilitated by SCCWRP, will build on the expanded sampling efforts initiated in Year 2. Assessments of hydromodification, vertebrate presence and flow monitoring that were initiated last year will continue in Year 3.

Additionally, the SMC will introduce sediment chemistry assessments in Year 3, augmenting sediment toxicity assessments.

Year 3 of field sampling also will include a new partnership with the U.S. National Park Service to sample sites on Santa Rosa Island, which will provide the first opportunity for the SMC to collect data from Channel Islands freshwater systems, including wet and flowing streams, as well as drier streams with less flow.

New SCCWRP Publications

Journal Articles (Published)

Bednaršek, N.A, T. Klinger, C.J. Harvey, S. Weisberg, R.M. McCabe, R.A. Feely, J. Newton, and N. Tolimieri. 2017. New ocean, new needs: Application of pteropod shell dissolution as a biological indicator for marine resource management. *Ecological Indicators* 76:240–244.

McLaughlin, K., A. Dickson, S.B. Weisberg, K. Coale, V. Elrod, C. Hunter, K.S. Johnson, S. Kram, R. Kudela, T. Martz, K. Negrey, U. Passow, F. Shaughnessy, D. Tadesse, L. Washburn, and K.R. Weis. 2017. An evaluation of ISFET sensors for coastal pH monitoring applications. *Regional Studies in Marine Science* 12:11-18.

Howard, M.D.A., R.M. Kudela, K. McLaughlin. 2017. New insights into impacts of anthropogenic nutrients on urban ecosystem processes on the Southern California coastal shelf: Introduction and synthesis. *Estuarine, Coastal and Shelf Science* 186:163-170.

Caron, D.A., A.G. Gellene, J. Smith, E.L. Seubert, V. Campbell, G.S. Sukhatme, B. Seegers, B. H. Jones, A.A.Y. Lie, R. Terrado, M.D.A. Howard, R.M. Kudela, K. Hayashi, J. Ryan, J. Birch, E. Demir-Hilton, K. Yamahara, C. Scholin, M. Mengel, G. Robertson. 2017. Response of phytoplankton and bacterial biomass during a wastewater effluent diversion into nearshore coastal waters. *Estuarine, Coastal and Shelf Science* 186:223-236.

Kudela, R.M., M.D.A. Howard, K. Hayashi, C. Beck. 2017. Evaluation of uptake kinetics during a wastewater diversion into nearshore coastal waters in southern California. *Estuarine, Coastal and Shelf Science*, 186:237-249.

Kudela, R.M., A.J. Lucas, K. Hayashi, M. Howard, K. McLaughlin. 2017. Death from below: Investigation of inhibitory factors in bloom development during a wastewater effluent diversion. *Estuarine, Coastal and Shelf Science* 186:209-222.

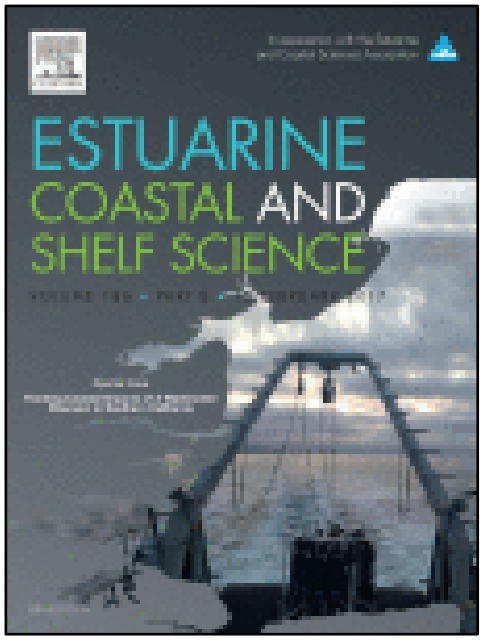
McLaughlin, K., N. Nezlin, M.D.A. Howard, C.D.A. Beck, R.M. Kudela, M.L. Mengel, G.L. Robertson. 2017. Rapid nitrification of wastewater ammonium near coastal ocean outfalls, Southern California, USA. *Estuarine, Coastal and Shelf Science* 186:263-275.

Chen, C., M.O. Gribble, J. Bartroff, S.M. Bay, L. Goldstein. 2017. The Sequential Probability Ratio Test: An efficient alternative to exact binomial testing for Clean Water Act 303(d) evaluation. *Journal of Environmental Management* 192:89-93.

Fong, L.S., E.D. Stein, and R.F. Ambrose. 2017. Development of restoration performance curves for streams in Southern California using an Integrative Condition Index. *Wetlands* 37:289-299.

Mackintosh, S.A., N.G. Dodder, N.J. Shaul, L. Aluwihare, K.A. Maruya, S.A. Chivers, K. Danil, D.W. Weller, E. Hoh. 2016. Newly identified DDT-related compounds accumulating in Southern California bottlenose dolphins. *Environmental Science & Technology* 50:12129-12137.

Tatters, A.O., M.D.A. Howard, C. Nagoda, L. Busse, A.G. Gellene, D.A. Caron. 2017. Multiple stressors at the land-sea interface: Cyanotoxins at the land-sea interface in the Southern California Bight. *Toxins* 9:95.



A special issue of the journal *Estuarine, Coastal and Shelf Science* explores the ecological impacts of temporarily diverting a wastewater effluent discharge closer to shore. Multiple articles co-authored by SCCWRP are featured.

Alonso, M.B., K.A. Maruya, N.G. Dodder, J. Lailson-Brito, A. Azevedo, E. Santos-Neto, J.P.M. Torres, O. Malm, E. Hoh. 2017. Non-targeted screening of halogenated organic compounds in bottlenose dolphins (*Tursiops truncatus*) from Rio de Janeiro, Brazil. *Environmental Science & Technology* 51:1176-1185.

Journal Articles (Online)

Zimmer-Faust, A.G., V. Thulsiraj, C. Marambio-Jones, Y. Cao, J.F. Griffith, P.A. Holden, J.A. Jay. 2017. Effect of freshwater sediment characteristics on the persistence of fecal indicator bacteria and genetic markers within a Southern California watershed. *Water Research* 119:1-11.

Journal Articles (Accepted)

Brooks, B.W., J.M. Lazorchak, M.D.A. Howard, M.V. Johnson, S.L. Morton, D.A.K. Perkins, E.D. Reavie, G.I. Scott, S.A. Smith, J.A. Steevens. In press. In some places, in some cases and at some times, harmful algal blooms are the greatest threat to inland water quality. *Environmental Toxicology and Chemistry.*

Mazdiyasni, O., A. AghaKouchak, S.J. Davis, S. Madadgar, A. Mehran, E. Ragno, M. Sadegh, A. Sengupta, Subimal Ghosh, C.T. Dhanya, Mohsen Niknejad. In press. Increasing probability of mass-mortality during Indian heatwaves. *Science Advances*.

Technical Reports

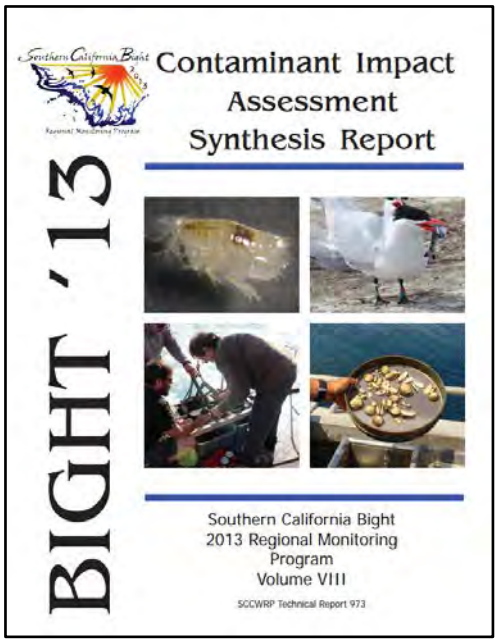
Bight '13 Contaminant Impact Assessment Planning Committee. 2017. Southern California Bight 2013 Regional Monitoring Program: Volume VIII. Contaminant Impact Assessment Synthesis Report. Technical Report 973. Southern California Coastal Water Research Project. Costa Mesa, CA.

Bight '13 Contaminant Impact Assessment Planning Committee. 2017. Southern California Bight 2013 Regional Monitoring Program Contaminant Impact Assessment Synthesis Report Executive Summary. Technical Report 970. Southern California Coastal Water Research Project. Costa Mesa, CA.

Cao, Y., G.L. Andersen, A.A. Boehm, P. Holden, J.A. Jay, J.F. Griffith. 2017. Determination of DNA-based fecal marker aging characteristics for use in quantitative microbial source tracking. Technical Report 978. Southern California Coastal Water Research Project. Costa Mesa, CA.

Gillett, D.J., L.L. Lovell, K.C. Schiff. 2017. Southern California Bight 2013 Regional Monitoring Program: Volume VI. Benthic Infauna. Technical Report 971. Southern California Coastal Water Research Project. Costa Mesa, CA.

Mazor, R., P.R. Ode, A.C. Rehn, E.D. Stein. 2017. Spatial statistical network models to estimate the spatial representativeness of bioassessment samples. Technical Report 979. Southern California Coastal Water Research Project. Costa Mesa, CA.



The Bight '13 Contaminant Impact Assessment Synthesis Report integrates the findings of five detailed assessments assessment reports from the Southern California Bight 2013 Regional Monitoring Program that chronicle how sediment contamination has impacted Bight marine ecosystems.

Mazor, R. and E. Stein. 2017. 2015 Report on the Stormwater Monitoring Coalition regional stream survey. Technical Report 963. Southern California Coastal Water Research Project. Costa Mesa, CA.

Phelps, L., J. Adelson, S. Arms, D. Speis. 2017. Progress assessment and final recommendations by the Expert Review Panel for the State of California's Environmental Laboratory Accreditation Program: Year Two Final Report. Technical Report 977. Southern California Coastal Water Research Project. Costa Mesa, CA.

Safran, S.M., S.A. Baumgarten, E.E. Beller, J.A. Crooks, R.M. Grossinger, J. Lorda, T.R. Longcore, D.L. Bram, S.J. Dark, E.D. Stein, T. McIntosh. 2017. Tijuana River Valley historical ecology investigation. Prepared for the State Coastal Conservancy. SCCWRP Technical Report 967. San Francisco Estuary Institute. Richmond, CA.

Stein, E.D., R.D. Mazor, A. Sengupta, K. McCune, B. Bledsoe, S. Adams, S. Eberhart, M. Pyne, P. Ode, and A. Rehn. 2017. Development of recommended flow targets to support biological integrity based on regional flow-ecology relationships for benthic macroinvertebrates in Southern California Streams. Technical Report 974. Southern California Coastal Water Research Project. Costa Mesa, CA.

Steinberg, S.J. and S.L. Moore. 2017. San Diego Bay fish consumption study. Technical Report 976. Southern California Coastal Water Research Project. Costa Mesa, CA.

Quarter in Review

Conference Presentations

Bay, S.M. Regional trends in sediment quality in southern California: responses to multiple stressors. 253rd American Chemical Society National Meeting. April 5, 2017. San Francisco, CA.

Gan, J., W. Lao, C. Liao, A. Xue, J. Richards, K.A. Maruya. Passive samplers for *in situ* monitoring of pesticides in urban surface water. 253rd American Chemical Society National Meeting. April 2-6, 2017. San Francisco, CA.

Howard, M., C. Nagoda, B. Fetscher, C. Loften, H. Boyd, R. Kudela, K. Hayashi, A. Tatters, D. Caron. Freshwater harmful algal blooms: Recent events and impacts in southern California. Southern California Society of Environmental Toxicology and Chemistry Annual Meeting. April 27-28, 2017. Dana Point, CA.

Martindale, S. Effectively communicating scientific findings to lay audiences. California Estuarine Research Society and Pacific Estuarine Research Society 2017 Conference. March 17-19, 2017. Coos Bay, OR.

Maruya, K.A., A.C. Mehinto, R.D. Mazor, E. Nelson, E. Hoh, S.A. Snyder, R. Fadness, J.M. Lyons. Combining chemical and bioanalytical methods to screen for emerging contaminants in California's receiving waters. 253rd American Chemical Society National Meeting. April 2-6, 2017. San Francisco, CA.

Mehinto, A. Field application of bioanalytical methods to screen for emerging contaminants and infer toxicity in California waters. Southern California Society of Environmental Toxicology and Chemistry Annual Meeting. April 27-28, 2017. Dana Point, CA.

Stein, E. Overview of a three-tiered framework for establishing environmental flows for California streams. Cal-Neva Chapter of the American Fisheries Society 51st Annual Meeting. April 6-7, 2017. Eureka, CA.

Stein, E. Development of recommended flow targets to support biological integrity based on regional flow-ecology relationships for benthic macroinvertebrates in southern California streams. Cal-Neva Chapter of the American Fisheries Society 51st Annual Meeting. April 6-7, 2017. Eureka, CA.

Theroux, S. A high-throughput DNA sequencing approach to algae monitoring allows for enhanced bioassessment. Southern California Society of Environmental Toxicology and Chemistry Annual Meeting. April 27-28, 2017. Dana Point, CA.

Weisberg, S. Climate and environment panel on ocean vulnerability to climate change: acidification. Oceanology International Conference. February 15, 2017. San Diego, CA.

Conference Posters

Gillett, D. An estuarine benthic assessment tool for those without one of their own. California Estuarine Research Society and Pacific Estuarine Research Society 2017 Conference. March 17-19, 2017. Coos Bay, OR.

Greenstein, D. and K. Schiff. Toxicity laboratory intercalibration for stormwater in Southern California. Southern California Society of Environmental Toxicology and Chemistry Annual Meeting. April 27-28, 2017. Dana Point, CA.

Kessouri, F., J. McWilliams, M. Sutula, C. Deutsch, L. Renault, D. Bianchi, H. Frenzel, K. McLaughlin, R. Feely, S. Alin, M. Gold, R. F. Ambrose, N. Bednaršek and S. Weisberg. Integrated model of ocean acidification and hypoxia to support ecosystem prediction and environmental management in the California Current System. Association for the Sciences of Limnology and Oceanography Aquatic Sciences Meeting. February 26-March 3, 2017. Honolulu, HI.

Lao, W., G.B. Kim, K.A. Maruya. Developing passive sampling methods for bioavailable current-used pesticides in sediment. 253rd American Chemical Society National Meeting. April 2-6, 2017. San Francisco, CA.

Other Presentations

Howard, M. Freshwater harmful algal blooms in California: Recent events and impacts. Lake Elsinore/Canyon Lake TMDL Task Force Meeting. March 22, 2017. Riverside, CA.

Howard, M. New HAB Monitoring Tools and Techniques. Harmful algal blooms meeting. April 25-27, 2017. Costa Mesa, CA.

Mazor, R. Bioassessment on streams with developed catchments. Surface Water Ambient Monitoring Program Roundtable. February 17, 2017. Sacramento, CA.

Mazor, R. Streams with developed catchments. Surface Water Ambient Monitoring Program Bioassessment Workgroup. February 23, 2017. Sacramento, CA.

Mazor, R. and J. Brown. Southern California Stormwater Monitoring Coalition annual training and intercalibration. March 15, 2017. San Diego, CA.

Mehinto, A. New field special study on CECs impact in fish. Upper Los Angeles River Watershed Management Group Meeting. February 2, 2017. Los Angeles, CA.

Mehinto, A. New bioanalytical screening tools to monitor constituents of emerging concern. San Diego Regional Water Quality Control Board. April 12, 2017. San Diego, CA.

Moore, S. Virtual reality demonstration for Sea Level Rise in the Tijuana Estuary. San Diego Regional Water Quality Control Board. April 12, 2017. San Diego, CA.

Schiff, K. Southern California Bight regional marine monitoring and Marine Protected Areas. Marine Protected Area Stakeholder Meeting. March 20, 2017. San Clemente, CA.

Smith, P. Comprehensive data workflow including mobile applications, data quality checkers and web-based data management and access tools. San Diego Regional Water Quality Control Board. April 12, 2017. San Diego, CA.

Steinberg, S. Update on the West Coast Ocean Data Portal. San Diego Marine Planning Update meeting. February 13, 2017. San Diego, CA.

Steinberg, S. "The Big What For?" Panel on Data Sharing. Environmental Protection Agency Tribal Exchange Network meeting. February 27-28, 2017. Alpine, CA.

Steinberg, S. Final report of the San Diego Bay Fish Consumption Study. San Diego Regional Water Quality Control Board. April 12, 2017. San Diego, CA.

Steinberg, S. Imaging and visualization technologies for environmental monitoring and assessment. San Diego Regional Water Quality Control Board. April 12, 2017. San Diego, CA.

Steinberg, S. Concepts of participatory mapping. West Coast Tribal Caucus Meeting. April 20, 2017. Sacramento, CA.

Weisberg, S. Ocean acidification webinar for the American Petroleum Institute. April 12, 2017.

SCCWRP Personnel Notes

CTAG

Chad Loflen, a Senior Environmental Scientist for the San Diego Regional Water Quality Control Board, has been appointed to CTAG, replacing Bruce Posthumus, who is retiring this year. Posthumus served on CTAG from 1994 to April 2017; he also served as an Alternate Commissioner from 1990 to 1995.

New Faces

Dr. **Nabiul Afrooz,** who just completed a two-year postdoctoral program at Stanford University, will join SCCWRP in mid-May as a Scientist under Cross-Department Technical Support. His focus will be on stormwater research.

Departures

Carly Beck, a Senior Research Technician in the Biogeochemistry Department who started at SCCWRP in 2007 as a Laboratory Assistant, left SCCWRP in April for a position with the California Department of Fish and Wildlife.

Scientific Leadership

Dr. **John Griffith** has been appointed a Councilor on the American Society for Microbiology's Council on Microbial Sciences, the main advisory body to the Society's Board of Directors. He will serve a two-year term.

Dr. **Keith Maruya** was appointed session chair for the Annual Meeting of the Southern California Society of Environmental Toxicology and Chemistry, held April 27-28, 2017 in Dana Point, Calif.

Dr. **Keith Maruya** has been appointed a member of the Global Aquatic Passive Sampling Network (AQUA-GAPS).

Dr. **Raphael Mazor** has been appointed to a technical advisory group for the Freshwater Mussel Restoration Project in the Los Angeles region.

Ken Schiff has been appointed to the organizing committee for the 18th International Conference on Diffuse Pollution and Eutrophication, to be held August 13-17, 2017 in Los Angeles, Calif.

Ken Schiff was awarded a certificate of appreciation from the American Association of Civil Engineers on February 1, 2017 for outstanding contributions to the 2016 Orange County Report Card.

SCCWRP COMMISSIONER SPOTLIGHT

Water-quality manager decides against law career

In 1994, five years into his career at the Orange County Sanitation District, Jim Colston gave notice that he would be quitting. He'd just finished night law school and was planning to take a position as a contract attorney.

Jim Colston

But rather than wish him well, his supervisors urged him to stay: They were creating a new position called Regulatory Specialist that would require someone with a strong legal background. Colston agreed to stay on.

More than two decades later, Colston is still working for the Orange County Sanitation District – and he's never again considered leaving.

"I'm really happy I stayed here; I just never had a desire to practice law," said Colston, who remains an active member of the California State Bar. "What I do is very rewarding: public health protection, environmental protection and resource recovery. What's better than that?"

In his role as Director of Environmental Services, which he was appointed to last year, Colston oversees multiple divisions: Environmental Services Administration; Resource Protection; and Laboratory, Monitoring and Compliance. He manages a 92-member team and a $17 million annual budget.

Colston began his 27-year career at the Orange County Sanitation District as an Industrial Waste Inspector in 1989, shortly after graduating from college. As he moved up the ranks, he became involved in key milestones in the district's history, including a 2002 decision to voluntarily upgrade to full secondary treatment and the 2008 launch of a pioneering groundwater replenishment program.

Jim Colston camouflages himself with "duck blind" clothing during a 2016 duck-hunting trip in Athens, Texas.

Jim Colston, J.D.

Job: Director of Environmental Services, Orange County Sanitation District

SCCWRP role: Alternate Commissioner (2016-present)

Prior jobs: OCSD Environmental Compliance and Regulatory Affairs Manager (2009-16); OCSD Environmental Supervisor (2005-09); OCSD Legal and Regulatory Affairs Liaison (2000-05); OCSD Regulatory Specialist (1994-2000); OCSD Industrial Waste Inspector (1989-94); University of California, Irvine staff research associate (1988-89); Pomona College staff research associate (1987-88)

Education: J.D. law, Western State University College of Law (1993); B.S. biochemistry, University of California, Riverside (1987)

Residence: Trabuco Canyon

Family: Wife Eva, a mobile notary; sons Jack, 21, a community college student in Chicago, and Shane, 19, a Marine Corps recruit in San Diego; dog Rowan, a German shorthaired pointer

Hometown: Miraleste (now Rancho Palos Verdes)

Hobbies: Motorcycle off-roading; bird hunting; camping, scuba diving

Colston's law degree has come in handy at multiple points throughout his career, especially in interactions with legal counsel.

However, Colston, who majored in biochemistry at UC Riverside, has never lost his passion for science. He appreciates the way that science allows managers to continually investigate and answer new questions about the environment, even using data they collected decades earlier.

"We don't always understand the significance of the data we collect, but when it comes to issues like climate change, we're able to go back years later and start mining this data to understand how our ocean is changing," Colston said.

Colston, who has been interacting with SCCWRP since his earliest days working for the Sanitation District, is especially appreciative of the invaluable connections SCCWRP maintains to water-quality regulators, academic insitutions and federal institutions – connections that all member agencies benefit from, he said.

When he's not at work, Colston enjoys motorcycle off-roading on his Kawasaki trail bike and going bird hunting. He quail-hunts on his family's Central Valley cattle ranch and is a member of a Salton Sea duck-hunting club.

CTAG SPOTLIGHT

Biologist attuned to water quality since childhood

Growing up in a water-oriented San Diego family in the 1980s and 90s, Chad Loflen developed a first-person understanding of the need for effective water-quality management.

Chad Loflen

His parents, who owned a boat, were avid recreational fish and lobster anglers who often ate what they caught from across San Diego Bay and beyond. Loflen and his family also went diving, swimming and surfing almost every weekend.

Although Loflen developed an intuitive sense as a child of which areas should be avoided – and when – because of poor water quality, he also recognized that his family would have benefitted from more formal water-quality monitoring and public health advisories.

"We didn't know back then what we know today," said Loflen, Senior Environmental Scientist for the San Diego Regional Water Quality Control Board. "I'm a lot more careful in my decision-making process about where I surf and when, and what fish I eat."

Loflen was appointed to CTAG in April, replacing Bruce Posthumus, who is planning to retire later this year.

Chad Loflen

Job: Senior Environmental Scientist, San Diego Regional Water Quality Control Board

SCCWRP role: CTAG Representative (started April 2017)

Prior jobs: Environmental Scientist, S.D. Regional Board (2007-14); California Sea Grant Trainee (2005-07); Research Associate, Tenera Environmental (2004-05); Scientific Research SCUBA Diver, San Diego State University (2003-05)

Education: M.S. biology (2007) and B.S. biology with marine emphasis (2005), San Diego State University

Residence: San Diego

Family: Wife Jessica, sales support manager for the nutrition ingredient industry; daughter Claire, 4; son Shane, 2; dog Maple, a pointer

Hometown: San Diego

Hobbies: Surfing; diving; fishing; camping; hiking

Chad Loflen, left, goes hiking in Yosemite National Park with daughter Claire, wife Jessica and son Shane in November 2016.

Loflen's desire to improve water quality for fellow San Diego-area residents drives his motivation and passion for his work today. He serves as lead of the Monitoring Assessment and Research Unit, where he oversees a three-scientist team that conducts and coordinates monitoring activities for ecological and public-health protection.

In this role, Loflen works closely with the state's Surface Water Ambient Monitoring Program (SWAMP), Office of Environmental Health Hazard Assessment (OEHAA) and other agencies to oversee shellfish and fish tissue monitoring across the region. Loflen also serves on the state's Bioaccumulation Oversight Group.

Also at the Regional Board, Loflen serves as technical lead for a biological objectives program designed to regulate the ecological health of wadeable streams. The program, which is under development, will be based in part on assessments of the condition of in-stream benthic macroinvertebrate and algal biological communities.

Loflen said the Regional Board's stream bio-objectives program could not have been created without SCCWRP, which developed the underlying science for the program in collaboration with the California Department of Fish and Wildlife and SWAMP.

"All of this work is informed by research by SCCWRP and other collaborators," Loflen said. "It's a critical foundation that SCCWRP and others have laid for us."

SCCWRP PARTNER SPOTLIGHT

Visiting scientist helps develop dPCR technology

After reading a journal article co-authored by SCCWRP about digital polymerase chain reaction (dPCR) methods, Dr. Yawei Wang wanted to learn more about the emerging microbial source identification technology.

Dr. Yawei Wang

He asked his friends about working in the United States, and when they recommended that he pursue it, Wang contacted one of the article's authors, SCCWRP's Dr. Yiping Cao, to inquire about potentially working at SCCWRP.

"I studied a lot about wastewater and sewer sludge treatment, and ecological river restoration in China," Wang said. "But not much research in China focuses on these topics, so I decided to study in the U.S., and the dPCR technology attracted me here."

Wang, an Assistant Professor at the Research Center for Eco-Environmental Sciences at the Chinese Academy of Sciences in Beijing, is working as a Visiting Scientist in the Microbiology Department for one year, as well as serving as a Visiting Assistant Professor at the University of California, Irvine. At UCI, he works with Dr. Stanley Grant, a SCCWRP collaborator.

Wang's research focuses on developing methods to detect DNA sources in water, and using the methods to examine the effects of fecal pollutants in biofiltering.

At SCCWRP, he is working with the Microbiology Department on the ongoing development of dPCR to detect human marker pathogen sources in reclaimed water.

Dr. Yawei Wang explores the Top of the World outlook point during a hike in Laguna Beach in January.

Yawei Wang, Ph.D.

Job: Assistant Professor, Department of Water Pollution Control, Research Center for Eco-Environmental Sciences, Chinese Academy of Sciences (2011-present)

SCCWRP role: Visiting Scientist, Microbiology Department (until December 2017)

Prior jobs: Postdoctoral researcher, Research Center for Eco-Environmental Sciences, Chinese Academy of Sciences (2009-2011)

Education: Ph.D. environmental engineering, Research Center for Eco-Environmental Sciences, Chinese Academy of Sciences (2009); B.S. environmental engineering, Tianjin University (2003)

Residence: Irvine (permanent residence: Beijing, China)

Family: Daughter Yuri, 4

Hometown: Henan Province, China

Hobbies: Swimming; jogging; learning world and Chinese history

Wang said he is excited to learn more about dPCR and microbial pollutant management systems from SCCWRP scientists.

"China doesn't have good microbial water research, so coming here, I wanted to learn the different developments in that topics," Wang said.

In China, Wang worked on wetland and river restoration projects, where he helped develop watershed management plans and online programs for pollutant monitoring.

"Because of the lack of river protection and wastewater treatment infrastructures, the water in the rivers became so bad that it smelled, so people began to put money into water restoration projects and scientists began doing research," Wang said. "I helped with designing treatment plants to help with this problem."

Wang lives in Irvine; he has a 4-year-old daughter, Yuri, who remained with her mother in Beijing.

During his free time, Wang enjoys swimming and jogging, although he insists he is not very good at them.

Wang hasn't found time yet to travel in California, but he says he's hoping to visit Yosemite National Park.

SCCWRP STAFF SPOTLIGHT

Industrial waste leaves imprint on researcher

Dr. Nabiul Afrooz's passion for improving water quality was forged on frequent bus rides home to his rural village in Bangladesh from undergraduate classes in the capital city of Dhaka.

Dr. Nabiul Afrooz

As Afrooz passed endless rows of textile mills and other export-focused industries, he was confronted with a stark reality: Many of these businesses were discharging their waste into the same water bodies that residents were drinking from.

This disheartening scenario convinced Afrooz that he wanted to focus his career around improving water quality, instead of becoming a structural engineer as originally planned.

"I realized I could work to make water treatment technology more effective and more affordable," said Afrooz, who will join SCCWRP in May as a stormwater researcher. "The best way to protect our water bodies from contamination is to understand contaminant fate and transport, so we can design affordable water treatment technologies."

After completing his undergraduate degree, Afrooz moved to the United States to continue his education. Midway through his doctoral program at the University of South Carolina, his adviser, Dr. Navid Saleh, accepted a faculty position at the University of Texas, Austin. Thus, Afrooz earned his master's at the University of South Carolina and his Ph.D. at UT Austin.

In 2015, Afrooz started his postdoc at Stanford University under Dr. Alexandra Boehm, a SCCWRP research collaborator. Afrooz's research focuses on optimizing the design of engineered biofiltration systems to remove nutrients, pathogens and pathogen indicators in stormwater runoff.

Dr. Nabiul Afrooz and wife Sumaia Hossen visit Lake Mead in 2015.

Nabiul Afrooz, Ph.D.

Job: Stormwater Researcher, Cross-Departmental Technical Support

Starting: May 2017

Prior jobs: Postdoctoral Scholar, Stanford University (2015-17); Research Assistant, University of Texas, Austin and University of South Carolina (2010-15); Lecturer, Chittagong University of Engineering and Technology (2009)

Education: Ph.D. environmental engineering, University of Texas, Austin; M.E. environmental engineering, University of South Carolina (2012); B.S. civil engineering, Bangladesh University of Engineering and Technology (2009)

Residence: Santa Clara (until mid-May), then Fountain Valley

Family: Wife Sumaia Hossen, intern at an architectural firm

Hometown: Haluaghat, Mymensingh, Bangladesh

Hobbies: Blogging; reading; taking road trips

The next-generation solutions that Afrooz has been pioneering in lab-based studies are now being transitioned to field testing, making it a logical time to wrap up his postdoc, Afrooz said.

Afrooz started working with SCCWRP in 2015, when he co-authored a paper with SCCWRP's Dr. Yiping Cao that reviewed stormwater best management practices (BMPs) for the removal of microbial contaminants.

The experience gave him an inside look at SCCWRP's role at the nexus of science and management – and he was captivated.

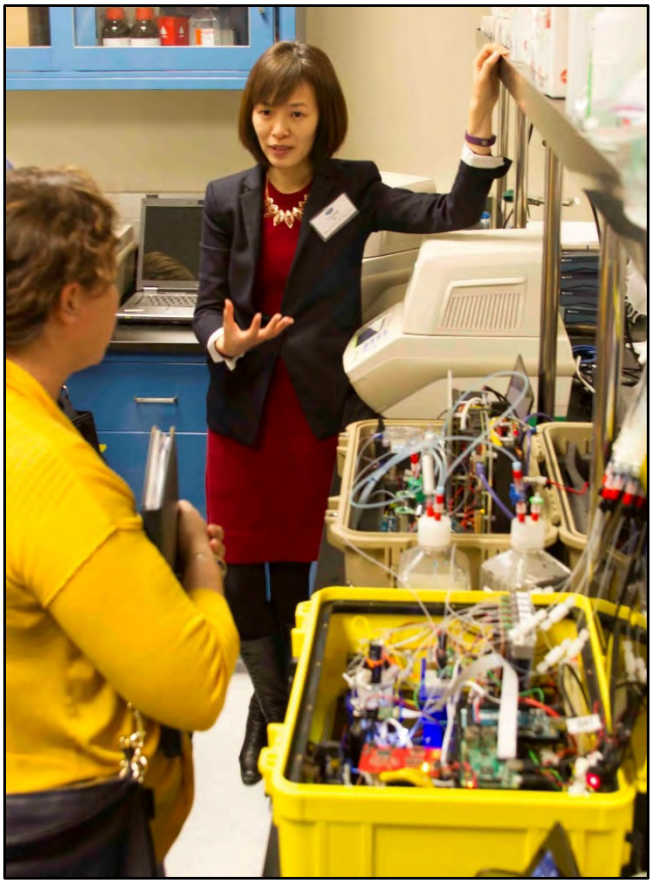
"I find it amazing how SCCWRP makes sure that science gets translated into application and policy," Afrooz said. "The path from the lab to the field to the end users is more direct at SCCWRP than with any organization that I know of. It's a really robust model that you don't see in other places."

When he's not working, Afrooz enjoys reading poetry; his favorite Bengali poet is Jibanananda Das, and his favorite English-language poets are Robert Frost and William Blake.

He also enjoys taking road trips with his wife. His favorite destinations so far have been Big Sur and Lake Tahoe.

Sharing knowledge with member agencies

SCCWRP hosted its eighth biennial Symposium on March 1, an all-day opportunity for the staff and guests of SCCWRP's member agencies to learn about SCCWRP research via presentations and interactive, hands-on demonstrations. About 100 invitees were in attendance. The goal of the SCCWRP Symposium is to enhance interactions and improve communication between SCCWRP researchers and the staff of SCCWRP's member agencies.



Clockwise from top right, SCCWRP's Dr. Alvina Mehinto demonstrates bioanalytical screening technology, Symposium guests mix and mingle between sessions, SCCWRP's Dr. Meredith Howard delivers the plenary session on harmful algal blooms, SCCWRP's Shelly Moore demonstrates virtual-reality goggles, SCCWRP Commission Chair Robert Ferrante delivers opening remarks, and SCCWRP's Dr. Yiping Cao discusses a prototype microbial contamination detection instrument.