



SCCWRP Director's Report



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FALL 2016 ISSUE

Bioaccumulation study informs health risks from sediment

SCCWRP and its partners have completed a comprehensive investigation into how sediment contamination is transferred through Southern California marine food webs, a study that has enabled scientists to close key data gaps and build more accurate models for estimating health risks to wildlife and humans across coastal California.

The three-year study, which was finalized in October, was conducted in San Diego Bay; it already is being used to refine and calibrate a standardized sediment assessment framework under development for California's coastal embayments to extend greater protections to human health. The statewide Sediment Quality Objective (SQO) for protection of human health – which relies on bioaccumulation models to explain how contaminants travel through food webs – will help inform sediment clean-up targets and other management actions for embayments.

The study involved linking major contaminants found in San Diego Bay

sediment – including PCBs, pesticides and trace metals – to the contaminants that were found to be bioaccumulating in organisms throughout the marine food web, from sediment-dwelling organisms to seabirds. Sediment contaminants are transferred through food webs by each successive predator that consumes its prey.

The study found that all types of sportfish examined had contamination levels that exceeded statewide safe-eating guidelines for humans, and seabirds also were potentially at risk from eating fish that had mercury and PCB contamination.

However, the health risks from sediment contamination were low, and conditions have improved in recent years, according to the study. For example, PCB contamination in seafood has dropped two- to five-fold over the past 15 years.

San Diego Bay environmental managers will use the study's findings to take more effective, targeted actions to continue to improve the bay's sediment quality.

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Cover photo: A researcher collects abandoned bird eggs from the California least tern in South San Diego Bay's Salt Works area. Field sampling was conducted for organisms at multiple levels of the marine food web for a San Diego Bay contaminant bioaccumulation study. (Photo credit: Lea Squires)

Calendar

Thursday, November 3
CTAG quarterly meeting

Friday, November 18
Seminar: "Advanced analytical monitoring for direct potable reuse systems"

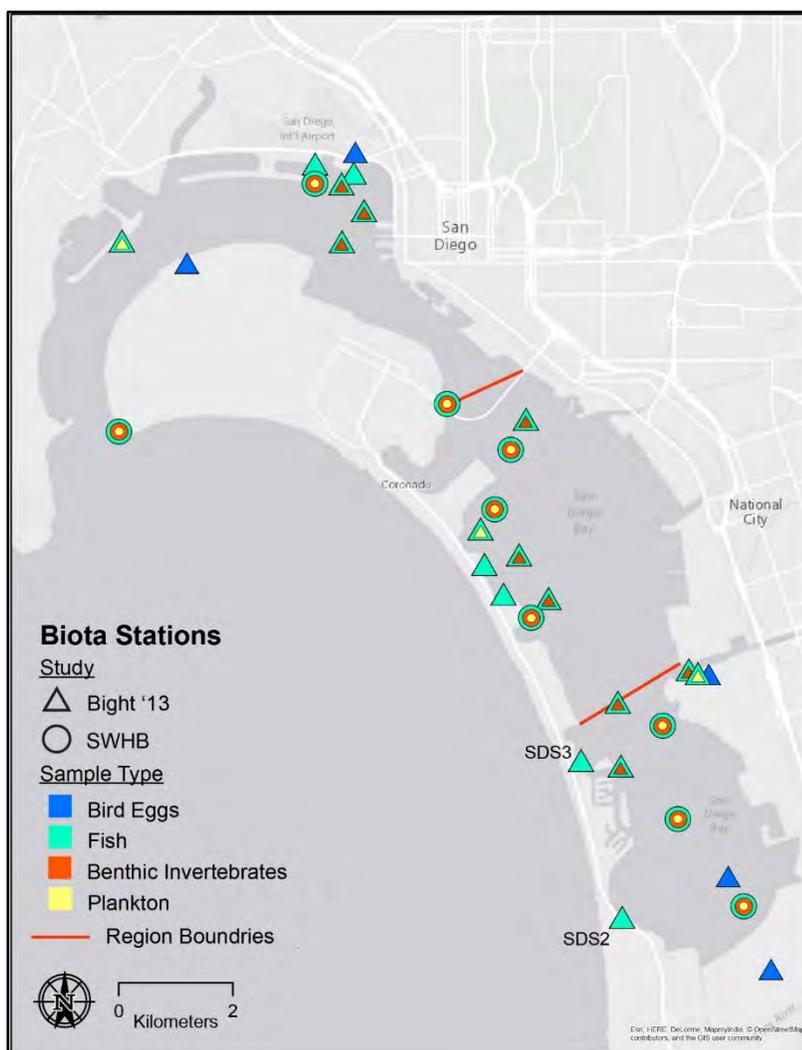
Friday, December 2
SCCWRP Commission meeting

Friday, March 3
SCCWRP Commission meeting

In early 2017, the State Water Board is expected to release a draft of the California SQO assessment framework for protection of human health; the framework has been improved using data obtained from the San Diego Bay bioaccumulation study and other case studies. The counterpart to the SQO human health framework – the SQO assessment framework for the protection of sediment-dwelling aquatic life – was co-developed by SCCWRP and adopted by the State Water Board in 2009.



Researchers collected abandoned eggs from the California least tern and other bird species during a bioaccumulation study in San Diego Bay.



The San Diego Bay bioaccumulation study analyzed 209 tissue samples (plotted on map) from across San Diego Bay, as well as 64 sediment samples. The study was done in partnership with the Southern California Bight 2013 Regional Monitoring Program, San Diego Regional Harbor Monitoring Program, and City of San Diego.

Scientists, managers lay foundation for developing acidification criteria at workshop

Scientists and coastal managers from across the West Coast began laying the groundwork for the development of ecologically relevant criteria for coastal ocean acidification during a two-day workshop in October at Stanford University.

At the workshop, titled [An Uncommon Dialogue: Ocean Acidification: Setting Water Quality Goals](#), participants sought to develop consensus around how to apply ocean acidification science to improve management of the coastal ocean, as well as what research is most needed to support development of management

criteria. The October 17-18 workshop was hosted by Stanford University's Woods Institute for the Environment, the Center for Ocean Solutions, the California Ocean Protection Council and SCCWRP.

In particular, workshop participants stressed the need for improved understanding of how the chemical indicators of ocean acidification (e.g., carbonate saturation state, pH) relate to how biological communities respond to acidification (e.g., free-swimming pteropods, or sea snails).

The pH-based criteria that West Coast managers have been using for decades to

protect ocean health are based on outdated science, with marine communities harmed at pH thresholds that fall within the criteria's range.

Furthermore, because development of ocean acidification criteria to manage coastal waters is still years into the future, participants discussed how they could advance acidification science to a point where West Coast managers could use it to improve their monitoring and management practices in the short term. For example, participants explored how to use observational acidification data in tandem with a West Coast-wide ocean

acidification modeling effort to help quantify natural variability in ocean state.

The timely workshop follows on the heels of two new state laws ([SB 1363](#) and [AB 2139](#)) that direct the California Ocean Protection Council and other state agencies to implement the recommendations of a 20-member West Coast advisory panel of leading ocean scientists. The [West Coast Ocean Acidification and Hypoxia Science Panel](#) released a series of short- and long-term management actions for combatting ocean acidification in April; SCCWRP's Dr. Steve Weisberg and Dr. Martha Sutula were among the panelists.

Already, the California Ocean Protection Council has responded to the new legislative directive by announcing funding for a broad suite of acidification-related initiatives, including a SCCWRP-led effort to develop a synthesis of existing science



Acidification of West Coast ocean waters is making it harder for marine organisms like the pteropod, or sea snail, above, to maintain its calcium carbonate shell. The shell of a healthy pteropod, left, looks visibly different from a pteropod that's been stressed by acidification, right.

regarding ocean acidification indicators and their response thresholds, and an expansion of the ongoing West Coast acidification modeling effort. The West Coast acidification model, which is being co-developed by SCCWRP, seeks to understand which marine habitats are

most vulnerable to acidification and to what extent local, land-based sources of pollution are exacerbating acidification.

For more information, contact Dr. [Steve Weisberg](#).

Workshop highlights need for improved science to manage 'climate-ready' bar-built estuaries



Malibu Lagoon in Los Angeles County is a bar-built estuary that is periodically cut off from the ocean by the natural build-up of a sandy barrier at its mouth. This hydrologic isolation makes it particularly vulnerable to the impacts of land-based pollution and climate change.

SCCWRP in September helped kick-start a wide-ranging discussion with California water-quality and natural resource managers about how to more effectively manage a common type of coastal estuary known as a bar-built estuary that is periodically cut off from the open ocean through the natural build-up of sandy barriers.

The intermittently open phenomenon, which affects about 90% of the state's 400-plus coastal estuaries, is intrinsic to bar-built estuaries, but the hydrologic isolation makes them particularly vulnerable to the impacts of land-based pollution and global climate change. Anytime that bar-built estuaries are shut off from dynamically mixing with the open ocean for extended periods, they can experience a precipitous decline in water quality that threatens the health of their inhabitants.

Water-quality managers commonly breach the sandy berms of bar-built estuaries to flush out these systems and boost water

quality, but this strategy is at odds with efforts to restore and maintain bar-built estuaries in a more ecologically natural state. The endangered tidewater goby, for example, is a fish that depends on the periodic closing of bar-built estuaries to complete their lifecycle.

During the workshop, held in September at SCCWRP, participants agreed that the inherent tension between water-quality goals and preservation goals for bar-built estuaries will intensify in the coming decades. Climate change is expected to trigger prolonged drought and more frequent storm surges, which will tend to strengthen the sandy berms of bar-built estuaries and keep them shut off from the open ocean for longer periods of time.

To enable managers to take a “climate-ready” approach to bar-built estuary management, workshop participants emphasized the need for improved science to inform management decisions. In particular, more ecologically relevant water quality indicators and targets are needed.

Already, researchers have begun developing the science to help bar-built estuary managers balance water-quality and preservation goals.

At the workshop, SCCWRP presented the findings of a recent study that found that bar-built estuary managers aren't using ecologically relevant thresholds for



Coastal estuaries like San Mateo Lagoon in San Diego County that are cut off from the ocean by naturally forming sand barriers often face water-quality challenges. Although artificially breaching the estuary mouth can restore water quality, this management strategy is at odds with goals to restore and maintain the site in a more ecologically natural state. Improved science can help bar-built estuary managers make better decisions about the management of these ecologically sensitive systems.

dissolved oxygen levels in their decision-making. In fact, SCCWRP and its partners found that bar-built estuaries in reference condition failed to meet existing objectives for dissolved oxygen (DO) 26% to 60% of the time, signaling that existing DO objectives require updating to be useful in guiding management decision-making.

SCCWRP also highlighted its recently completed effort to develop macroalgal numeric targets for bar-built estuaries – an example of a more ecologically relevant indicator.

Workshop participants agreed that researchers should continue down this path, including improving on existing tools for bottom-dwelling estuarine organisms to measure overall ecological health, and using innovative modeling and conceptual frameworks to adaptively manage bar-built estuaries.

Researchers' long-term goal is to develop a full suite of assessment tools that can help managers make science-informed decisions about how best to protect both water quality and habitat condition in intermittently open estuaries, especially in light of climate change. This management toolbox will be modeled after the robust, multi-pronged approaches developed in recent years to improve management of California streams.

For more information, contact Dr. [Martha Sutula](#) and Dr. [Eric Stein](#).

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

Expert panel weighs in on extrapolation limits of stream condition scores

SCCWRP and the California Department of Fish and Wildlife convened an expert panel in September to review how far stream condition scores calculated for a given stream sampling site can be extrapolated upstream and downstream of the site.

The panel's feedback will be integrated into a detailed statistical analysis of stream condition data from two watersheds to arrive at a final recommendation on extrapolation limits for the California Stream Condition Index. The final report is expected to be completed in December.

The California Stream Condition Index, co-developed by SCCWRP, is a scoring tool for evaluating the ecological health of streams statewide.

Stream managers need to be able to extrapolate California Stream Condition Index scores because they don't have enough resources to conduct bioassessment work along every kilometer of every stream in California. A stream bioassessment is typically conducted along a site spanning just 150 meters, while there are more than 5,000

kilometers of streams in Southern California alone.

The ability to extrapolate California Stream Condition Index scores will become increasingly important as this scoring tool is integrated into regulatory and stream management programs statewide.

During the panel's deliberations in September, the panel also recommended exploring an alternate stream condition prediction approach known as spatial statistical network (SSN) modeling. This approach, developed by the U.S. Forest Service, fills in data gaps for stream sites based on distance from existing sampling sites and environmental factors. SCCWRP already has begun evaluating the SSN modeling approach.

Year 1 field sampling wraps up for developing intermittent stream bioindicators

SCCWRP and its partners have completed Year 1 of field sampling for a study investigating the feasibility of using terrestrial arthropods, riparian insects and bryophytes (e.g., mosses) to assess the

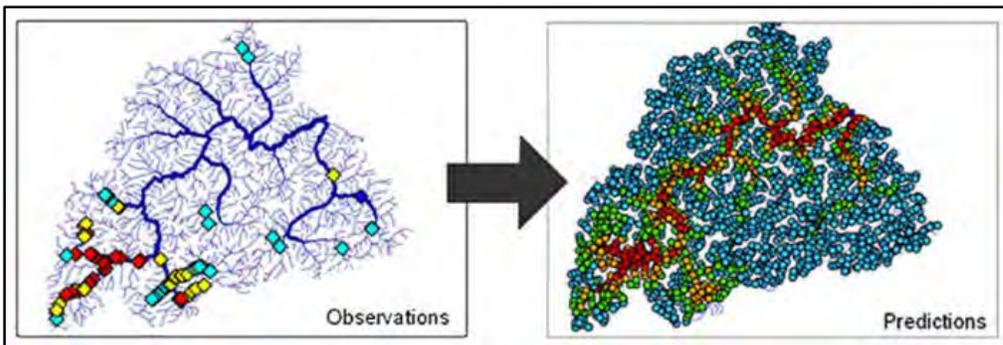


SCCWRP's Jeff Brown, left, and Matt Robinson of Cal State San Marcos use a brush beating method to capture riparian insects living on the vegetation. SCCWRP and its partners are performing taxonomic analyses on the organisms to gain insights into how to develop a scoring tool for streams that run dry for much of the year.

biological condition of streams that run dry for much of the year.

Field researchers this summer collected data from 39 stream sites across the San Diego area representing a range of conditions and environmental settings. The goal is to develop a regional Southern California scoring tool for intermittent and ephemeral streams, similar to the California Stream Condition Index scoring tool that is used in perennial streams statewide.

Although intermittent streams make up about 60% of all streams in Southern California, there is no scoring tool calibrated for intermittent streams at the drier end of the hydrologic spectrum.



Field bioassessment work is only conducted at a limited number of sites along a watershed, making it important to be able to accurately extrapolate bioassessment data across the larger watershed. Above, an approach known as spatial statistical modeling, developed by the U.S. Forest Service, makes use of limited observational data points, left, to predict conditions across an entire watershed, right.

Researchers hope that terrestrial arthropods, which include insects and crustaceans, can serve as sentinel indicators of how intermittent streams are impacted by agricultural and urban runoff. Bryophytes like mosses and liverworts, meanwhile, have been shown to be highly sensitive to changes in water quality and siltation.

Researchers anticipate sharing initial data and analyses in spring 2017; more field work also is planned in the spring.

biological indicators of stream condition, were co-developed by SCCWRP to help watershed managers balance the often-conflicting goals of maintaining flows, improving water quality and supporting in-stream biological health.

The findings of the San Diego River Watershed demonstration study are chronicled in a [technical report](#) published in October.

SCCWRP and its partners at Colorado State University and the U.S. Geological Survey ran the demonstration study as part of a broader study that is developing a scientific framework that guides how to set ecologically relevant flow targets for streams across Southern California. This regional framework is based on the national Ecological Limits of Hydrologic Alteration (ELOHA) framework.

SCCWRP already has begun offering training to watershed managers on how to use the flow-ecology modeling tools, which take into account a wide variety of factors, including projected changes in land use and installation of runoff controls.

The tools will be particularly useful for municipalities and other agencies tasked with managing watersheds with impacted and impaired flows.

EUTROPHICATION

Year 2 sampling of toxic algae wraps up for 2 recreational lakes

SCCWRP and its partners have finished the second year of sampling in two Riverside County lakes for a study chronicling the proliferation of toxic algae through the bloom season.

During sampling this summer at Lake Elsinore, cyanotoxin concentrations exceeded state human health guidelines beginning in July, triggering lake managers to close the recreational lake to bodily contact. Water and scum samples collected from Lake Elsinore contained toxin concentrations that were among the highest ever recorded in California, with multiple types of cyanotoxins exceeding state guidelines for 60% of the sampling time points.

Meanwhile, in nearby Canyon Lake, cyanotoxin concentrations also briefly exceeded state guidelines, triggering a one-week closure in August.

The goal of the study, which will be published in late 2017, is to evaluate whether routine cyanotoxin monitoring should be implemented for these and other recreational water bodies.

SCCWRP assembles expert panel to help set eutrophication indicator ranges for California streams

SCCWRP has assembled a 16-member panel of experts to place stream sites across California into different classes based on the ecological health of their algae and bottom-dwelling macroinvertebrate communities, a classification approach known as the Biological Condition Gradient (BCG).

The work of the BCG panel will support the State Water Board in its ongoing effort to develop biointegrity policies that center around limiting nutrient inputs to streams. Excess nutrients are responsible for triggering eutrophication in wadeable streams statewide.

ECOHYDROLOGY

Study shows watershed managers how to apply new flow-ecology modeling tools

SCCWRP and its partners in the San Diego River Watershed have completed a demonstration study showing how to use a newly developed suite of flow-ecology modeling tools to optimally manage flows across a watershed.

The modeling tools, which explain how hydrological flow alterations affect



The community of Mission Valley in the San Diego River Watershed was the focus of a demonstration study showing how to use a newly developed suite of flow-ecology modeling tools to help watershed managers balance the often-conflicting goals of maintaining flows, improving water quality and supporting in-stream biological health.

The BCG uses a consensus approach among experts to create eutrophication indicator ranges that correspond to particular levels of ecological condition. The State Water Board will use the ranges developed by the panel to understand what nutrient targets are appropriate and realistically attainable for a variety of common stream types across California, including highly modified streams.

The panel will hold its first two meetings at SCCWRP in December and January.

Analysis of ocean acidification conditions across Bight wraps up

SCCWRP and its partners have completed a synoptic analysis of ocean acidification

conditions across the Southern California Bight continental shelf, the first phase of a multi-part Bight '13 study documenting water quality in coastal waters.

The first-of-its-kind analysis, completed in October by the Southern California Bight 2013 Regional Monitoring Program, involved taking field measurements of pH and total alkalinity at variable ocean depths across all four seasons for two years, then calculating key indicators of ocean acidification, including aragonite saturation state.

Aragonite saturation state indicates whether shell-forming organisms are able to build and maintain their shells; as the world's oceans acidify, shell-forming organisms are experiencing increasing difficulty forming calcium carbonate shells.

The study found that some Bight marine communities are being exposed to waters at or near aragonite saturation state thresholds, which are levels at which organisms may experience adverse biological impacts, including shell dissolution and growth inhibition.

Deeper waters tended to be more acidic and have lower aragonite saturation states during the winter and spring, according to the study. Winter and spring are when seasonal mixing and upwelling move deeper, more acidic waters closer to the surface and to shore.

The findings are in line with data collected by the California Cooperative Oceanic Fisheries Investigations program (CalCOFI), which sampled farther offshore and observed similar patterns.

The ocean acidification analysis will feed into an ongoing, multi-year modeling study assessing the relative influence of anthropogenic vs. natural sources of nutrient inputs on biogeochemical cycling in the Southern California Bight.

SEDIMENT QUALITY

Marina del Rey stressor identification rules out possible causes of degraded sediment quality

SCCWRP and its partners have ruled out some potential causes of degraded sediment quality in Marina del Rey Harbor, part of an ongoing stressor identification study aimed at understanding why bottom-dwelling marine communities are being adversely impacted by the sediment.

During two rounds of tests on sediment that was sampled in January and July, researchers examined whether a number of toxic chemicals – including trace metals, PAHs and chlorinated hydrocarbons – could be responsible for degraded sediment quality in Marina del Rey Harbor. The Los Angeles County boat harbor has a TMDL (total maximum daily load) for these toxics.

In October, researchers completed sediment Toxicity Identification and Evaluation (TIE) testing; none of the toxics listed in the TMDL were associated with



Field samplers lower a CTD (conductivity, temperature, depth) rosette into the ocean to take a variety of measurements for a synoptic analysis of ocean acidification conditions across the Southern California Bight continental shelf. The study found that Bight marine communities are being exposed to waters at or near thresholds where they can experience adverse biological effects.

the sediment toxicity that was detected during the lab tests. In other words, researchers were able to rule out a number of chemicals that are not responsible for degraded sediment quality, but still don't know which factors are responsible.

Researchers theorize that other types of toxic chemicals could be responsible for the degraded sediment quality, or that high concentrations of fine-grained sediment in the harbor may be interfering with the lab testing method.

SCCWRP and its partners are conducting additional stressor identification analyses to understand the magnitude and cause of the sediment impacts to resident bottom-dwelling organisms in Marina del Rey Harbor. A full study report is expected to be released by the end of this year.

Sediment toxicity database expanded to improve availability of high-quality data

SCCWRP, in association with the Society of Environmental Toxicology and Chemistry (SETAC), has completed a major expansion of a publicly accessible database designed to improve environmental managers' access to high-quality sediment toxicity data when developing sediment management plans and clean-up targets.



A field crew from Weston Solutions Inc. retrieves a sediment grab sample from the bottom of Marina del Rey Harbor in July 2016. The ongoing stressor identification study in the harbor aims to understand why bottom-dwelling marine communities are being adversely impacted by the harbor's sediment quality.

The updated Spiked Sediment Toxicity Database, available online at <http://data.sccwrp.org/sedag>, organizes data from nearly 200 sediment toxicity studies into a searchable database, enabling users to instantly pull up side-by-side information about study test conditions, sediment characteristics, spiking methods and study quality.

The database encompasses 110 different chemicals, as well as toxicity responses for 65 freshwater and marine species. For copper and nickel alone, there are more than 700 results; for pyrethroids, there are more than 1,000 results.

The database update, which was completed in October, will be presented at a national SETAC conference in November.

The database is intended to help managers refine their sediment testing methods and data interpretation tools, as well as facilitate the use of high-quality sediment toxicity data in developing sediment management plans.

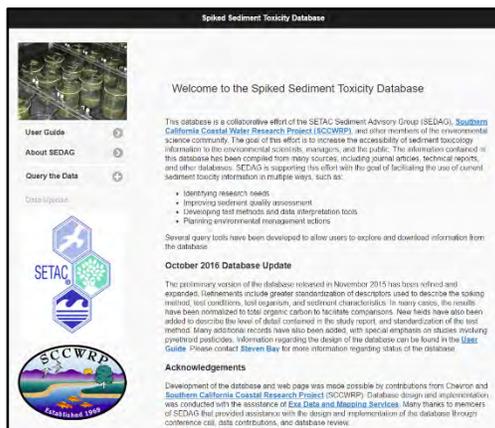
CONTAMINANTS OF EMERGING CONCERN

Sampling completed for L.A.-area evaluation of bioassay effectiveness for CEC screening

SCCWRP and its partners have completed sampling of river water in the Los Angeles region for a study assessing the effectiveness of cell-based bioassays to screen for CECs.

Water samples were collected upstream and downstream from wastewater treatment plants that discharge effluent into the Los Angeles River and San Gabriel River; the sampling took place during two dry-weather periods: July and October.

The goal is to evaluate whether cell bioassays are effective for screening waterways for the presence of CECs, which would enable them to complement conventional targeted chemical



The recently updated Spiked Sediment Toxicity Database enables environmental managers to instantly pull up side-by-side information about test conditions, sediment characteristics, spiking methods and study quality for nearly 200 sediment toxicity studies.

monitoring. Cell bioassays are commonly used by the pharmaceutical and food industries to rapidly screen a wide variety of chemicals for potential toxicity.

The Los Angeles study is one of a series of pilot studies being conducted across the state to test-drive the utility of a new, multi-tiered framework for monitoring CECs in waterways across California. The framework, co-developed by SCCWRP, is designed to give water-quality managers a more efficient, cost-effective way to zero in on the CECs that pose the greatest potential health risks.

The Los Angeles and San Gabriel River samples will be analyzed over the coming month. The Sanitation Districts of Los Angeles County will screen the samples using targeted chemical analysis methods, while SCCWRP will perform the bioassay screening.

Findings are expected to be released in summer 2017.



SCCWRP's Dario Diehl, left, and Dr. Wayne Lao collect water samples from the San Gabriel River watershed near a wastewater treatment plant. Researchers want to know whether cell bioassays are effective at screening waterways for the presence of CECs.

MICROBIAL WATER QUALITY

Study to investigate whether antibiotic resistance bacteria, genes being discharged in wastewater effluent

SCCWRP is collaborating with its member agencies to design a 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 early next year, will measure the prevalence of antibiotic-resistant bacteria entering wastewater treatment plants across Southern California, and the types of bacteria and genetic material surviving treatment and being discharged into the environment.

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 the

environment. Once in the environment, potentially pathogenic bacteria in the environment can take up the antibiotic resistance genes, which could confer antibiotic resistance to bacterial strains that can make humans sick.

Prior 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.

The SCCWRP-facilitated study will involve participation by seven wastewater treatment plants in Los Angeles, Orange and San Diego Counties, which will screen both influent and effluent samples for a range of antibiotic-resistant bacteria and antibiotic resistance genes. Sampling will take place once a quarter for a year.

Study participants are meeting over the next few months to finalize sampling dates and schedule training for lab personnel.

Summer sampling completed to support health risk modeling study

SCCWRP and its partners have completed an initial round of sampling at Inner Cabrillo Beach for a study that aims to ascertain whether high fecal indicator levels at the Los Angeles County beach are indicative of a health threat to beachgoers who enter the water.

Data from the summer sampling effort will enable the study's advisory committee to determine if and how to move forward with using a health risk model known as Quantitative Microbial Risk Assessment (QMRA) to quantify the risk of gastrointestinal illness for Inner Cabrillo beachgoers.

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

bacterial TMDL (total maximum daily load).

This summer's sampling effort was focused on determining whether the bacterial contamination at Inner Cabrillo is from human vs. non-human sources, such as birds. Human sources of contamination are much more likely to contain the pathogens that make people sick.

QMRA is designed for use in places where the contamination sources are not human, according to 2012 guidelines issued by the U.S. Environmental Protection Agency. To date, a QMRA has not been conducted in California, nor at any U.S. marine beach.

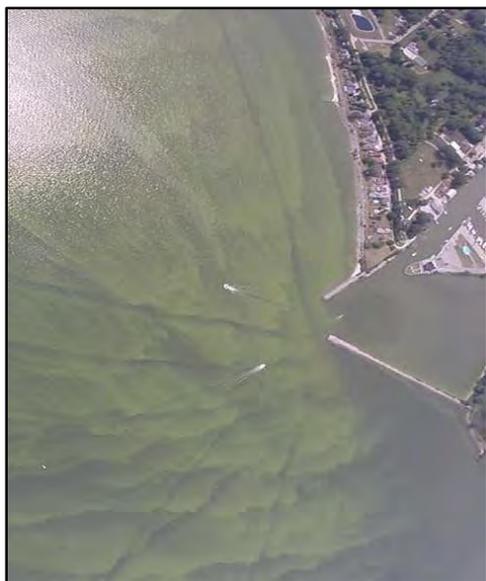
The advisory committee will meet in November to interpret the Inner Cabrillo data.



Courtesy of 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. SCCWRP has completed an initial round of sampling for a study that aims to ascertain whether high fecal indicator levels at the beach are indicative of a health threat to beachgoers.

INFORMATION TECHNOLOGY & VISUALIZATION



SCCWRP and its partners are building a prototype image processing system to autonomously analyze aerial photos of water bodies, such as this one of an algal bloom in Michigan's Lake Erie. The goal is for the software to automatically identify HAB-like features, giving water-quality managers early warnings about potential HABs events.

Prototype image processing system could provide early warnings for HAB events

SCCWRP has partnered with Ohio's NASA Glenn Research Center and Wright State University to build a prototype computer system that can autonomously analyze aerial photos of water bodies susceptible to harmful algal blooms (HABs).

The system will allow airplane pilots who volunteer as citizen scientists to upload photos they capture during flight to an online database. Then, image analysis software will automatically process and analyze the photos, looking for unexpected or unusual features that could be indicative of a HAB event.

General aviation pilots already help monitor potential HAB events by snapping aerial photos of water bodies, but these

citizen science programs are limited because the images that pilots collect must be manually reviewed by trained personnel.

HAB events occur when colonies of aquatic algae suddenly proliferate, releasing toxins that are harmful to humans and wildlife and triggering other adverse ecological impacts.

This summer, SCCWRP began working with the [NASA Glenn Research Center](#) and Wright State University in Ohio on a prototype MatLab image processing tool that uses quantum classification of spectral data to identify HABs-like features in aerial photos.

In the coming months, the system will undergo rigorous testing and refinement with a wide variety of aerial photos, including those captured by unmanned autonomous systems.

Virtual-reality simulation to enable exploration of changing environmental conditions in Tijuana estuary

SCCWRP has teamed up with the geospatial software firm Esri to create a computer game-like re-creation of the Tijuana River estuary that will enable users to travel through the habitat and view pop-up information about past, present and future conditions.

The virtual reality demonstration project is intended to showcase the power of geospatial software to explore an environment on a computer or tablet, and

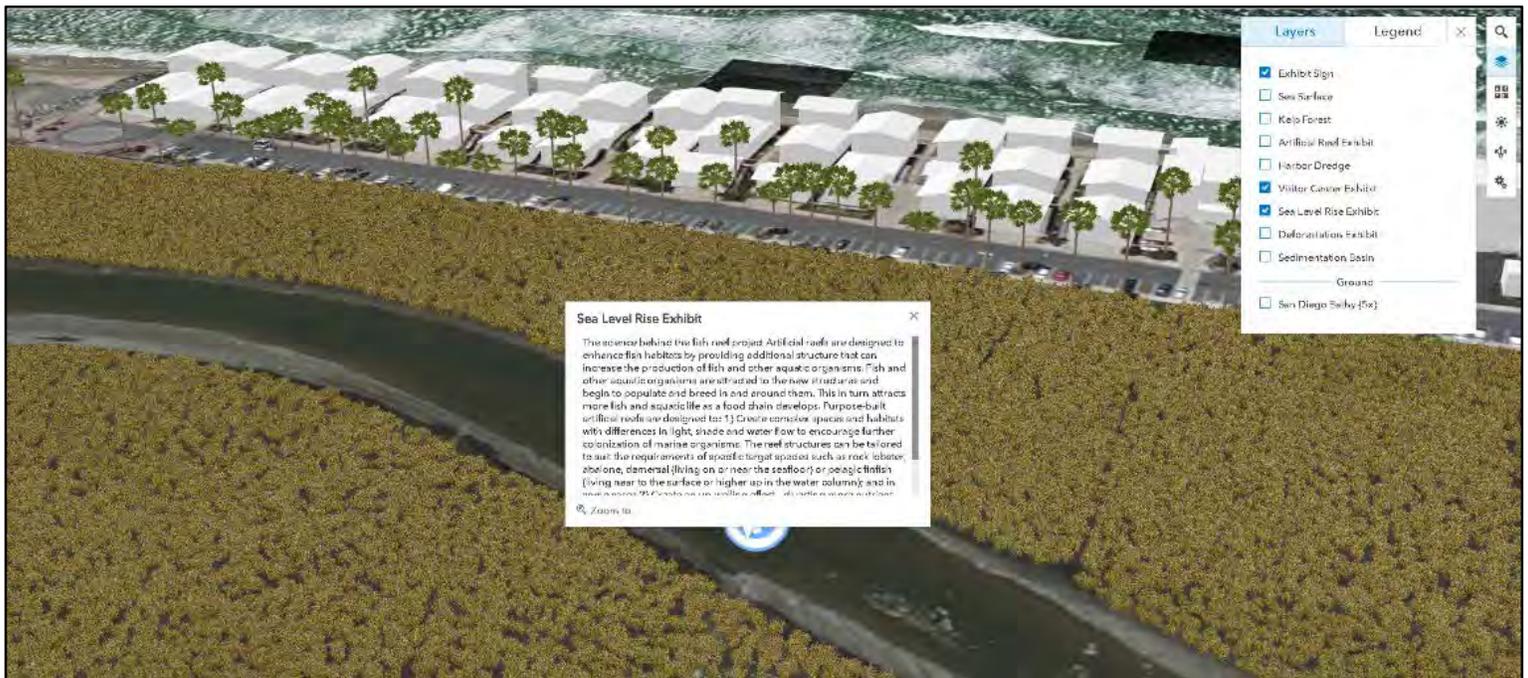
to understand how changing conditions – both human-induced and natural – have impacted and will continue to impact this ecologically sensitive site. The Tijuana River National Estuarine Research Reserve, which also is involved with the project, is located just north of the U.S.-Mexico border.

Through the estuary's virtual reality tour, for example, users will be able to view the state of its riparian forests before and after an invasive beetle infestation. Users also will be able to view changes to water levels and sedimentation through 2100 as projected by U.S. Geological Survey modeling. Pop-up windows along the tour will provide narrative information about changing environmental conditions.

This project builds off previous Tijuana estuary work with Esri exploring how geospatial software can help natural resource managers visualize and engage in long-term planning for ecologically sensitive areas.

An initial version of the virtual reality project will be presented at an Esri-hosted [marine GIS conference](#) in November in Redlands.

SCCWRP and Esri intend to continue adding to the tour, including visiting underwater sites and overlaying the landscape with alternate scenarios to aid in long-term planning.



SCCWRP is co-developing a computer game-like re-creation of the Tijuana estuary in San Diego County that will allow users to explore past, present and future environmental conditions in the estuary. Pop-up windows along the virtual reality tour will provide a narrative description of how conditions have changed and will continue to change over time.

New SCCWRP Publications

Journal Articles (Published)

Arnold, B.F., T.J. Wade, J. Benjamin-Chung, K.C. [Schiff](#), J.F. [Griffith](#), A.P. Dufour, S.B. [Weisberg](#), J.M. Colford, Jr. 2016. [Acute gastroenteritis and recreational water: Highest burden among young US children](#). *American Journal of Public Health* 106:1690–1697.

Davis, J.A., J.R.M. Ross, S. Bezalel, L. Sim, A. Bonnema, G. Ichikawa, W.A. Heim, K. [Schiff](#), C.A. Eagles-Smith, J.T. Ackerman. 2016. [Hg concentrations in fish from coastal waters of California and Western North America](#). *Science of the Total Environment* 568:1146–1156.

Maraccini, P.A., M.C. Mattioli, L.M. Sassoubre, Y. [Cao](#), J. [Griffith](#), J. Ervin, L.V. de Werfhorst and A.B. Boehm. 2016. [Solar Inactivation of Enterococci and Escherichia coli in Natural Waters: Effects of Water Absorbance and Depth](#). *Environmental Science & Technology* 50:5068–5076.

[Nezlin](#), N.P., J.A.T. Booth, C. Beegan, C.L. Cash, J.R. Gully, M.J. Mengel, G.L. Robertson, A. Steele and S.B. [Weisberg](#). 2016. [Assessment of wastewater impact on dissolved oxygen around southern California's submerged ocean outfalls](#). *Regional Studies in Marine Science* 7:177–184.

Pondella II, D., J.P. Williams, J. Claisse, R. Schaffner, K. Ritter, K. [Schiff](#). 2015. [The Physical Characteristics of Nearshore Rocky Reefs in The Southern California Bight](#). *Bulletin of the Southern California Academy of Sciences* 114(3):105–122.

[Stein](#), E.D., L.G. Lackey, and J. [Brown](#). 2016. [How accurate are probability-based estimates of wetland extent? Results of a California validation study](#). *Wetlands Ecology and Management* 24:347–356. DOI 10.1007/s11273-015-9460-0.

[Weisberg](#), S.B., N. Bednarek, R.A. Feely, F. Chan, T.S. Fleming, A.B. Boehm, M. [Sutula](#), J.L. Ruesink, B. Hales, J.L. Largier, and J.A. Newton. 2016. [Water quality criteria for an acidifying ocean: Challenges and opportunities for improvement](#). *Ocean and Coastal Management* 126:31–41.

Journal Articles (Online)

[Howard](#), M.D.A., R.M. Kudela, K. [McLaughlin](#). 2016. [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* DOI: 10.1016/j.ecss.2016.06.028.

[McLaughlin](#), K., N. [Nezlin](#), M.D.A. [Howard](#), C.D.A. [Beck](#), R.M. Kudela, M.L. Mengel, G.L. Robertson. 2016. [Rapid nitrification of wastewater ammonium near coastal ocean outfalls, Southern California, USA](#). *Estuarine Coastal and Shelf Science* DOI: 10.1016/j.ecss.2016.05.013.

Sato, K.N., L.A. Levin, K. [Schiff](#). 2016. [Habitat compression and expansion of sea urchins in response to changing climate conditions on the California continental shelf and slope \(1994-2013\)](#). *Deep-Sea Research II* DOI: 10.1016/j.dsr2.2016.08.012.

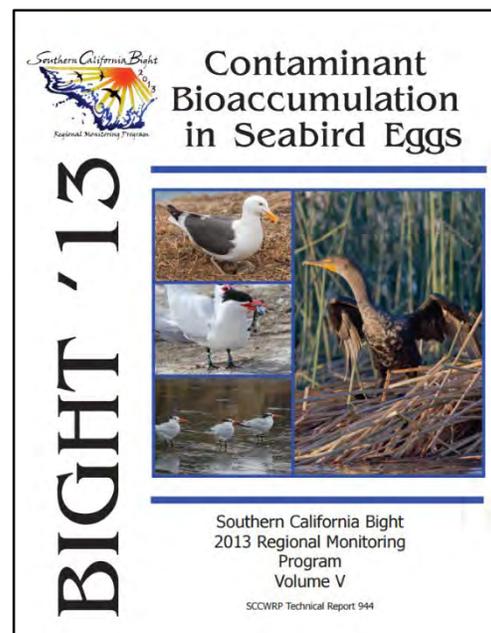
[Schiff](#), K.C., L.L. [Tiefenthaler](#), S.M. [Bay](#), D.J. [Greenstein](#). 2016. [Effects of Rainfall Intensity and Duration on the First Flush from Parking Lots](#). *Water* 8(320): DOI: 10.3390/w808032.

Wu, J., Y. [Cao](#), B. Young, Y. Yuen, S. Jiang, D. Melendez, J.F. [Griffith](#), J.R. Stewart. 2016. [Decay of Coliphages in Sewage-Contaminated Freshwater: Uncertainty and Seasonal Effects](#). *Environmental Science & Technology* DOI: 10.1021/acs.est.6b03916.

Book Chapters

[Cao](#), Y., J.F. [Griffith](#), and S.B. [Weisberg](#). 2016. [The next generation PCR-based quantification method for ambient waters: Digital PCR](#). in: S.J. Bourlat (ed.), *Methods in Molecular Biology Series: Marine Genomics*. Springer. New York, NY.

Feldman, D.L., S.B. Grant, A. [Sengupta](#), L. Stuvick, N. Bijoor, M. Sahimi, M. Arora, V. Pettigrove, K. Burry. 2017. [The Water Sustainable City: Science, Policy, Practice](#). Edward Elgar Ltd. Cheltenham, UK. Redlands, CA.



The Southern California Bight 2013 Regional Monitoring Program has published its final assessment report on contaminant bioaccumulation in seabird eggs. All Bight reports are available on SCCWRP's website.

Technical Reports

Clatterbuck, C.A., R.A. Lewison, N. Dodder, C. Zeeman, K. [Schiff](#). 2016. [Southern California Bight 2013 Regional Monitoring Program: Volume IV. Contaminant Bioaccumulation in Seabird Eggs of the Southern California Bight](#). Technical Report 944. Southern California Coastal Water Research Project Authority. Costa Mesa, CA.

Denslow, N.D., K. Kroll, S. Jayasinghe, O. Adeyemo, C. Lavelle, E. Li, A.C. [Mehinto](#), K.A. [Maruya](#), S.M. [Bay](#). 2016. Linkage of In Vitro Assay Results With In Vivo End Points – Phases 1 and 2 Final Report. San Francisco Estuary Institute. Richmond, CA.

[Schiff](#), K., J. [Griffith](#), J. [Steele](#), B. Arnold, A. Ercumen, J. Benjamin-Chung, J.M. Colford Jr., J. Soller, R. Wilson, C. McGee. 2016. [The Surfer Health Study: A Three-Year Study Examining Illness Rates Associated with Surfing During Wet Weather](#). Technical Report 943. Southern California Coastal Water Research Project Authority. Costa Mesa, CA.

[Stein, E.D., J. Brown](#), and K. Lunde. 2016. Assessment of the Condition of San Francisco Bay Area Depressional Wetlands. Technical Report 940. Surface Water Ambient Monitoring Program. Sacramento, CA.

[Stein, E.D., A. Sengupta, R. Mazor](#), and K. [McCune](#). 2016. [Application of Regional Flow-ecology to Inform Management Decision in the San Diego River Watershed](#). Technical Report 948. Southern California Coastal Water Research Project. Costa Mesa, CA.

Quarter in Review

Conference Presentations

[Gillett, D.](#) [Changes in Condition and Composition of the Channel Islands' Macro-benthic Communities](#). California Islands Symposium. October 3-7, 2016. Ventura, CA.

[Griffith, J.F.](#) Development of a flow-through automated digital PCR instrument for environmental water monitoring. qPCR and digital PCR Congress. July 12, 2016. Philadelphia, PA.

[Griffith, J.F.](#) Keeping up with changing PCR methods. National Environmental Monitoring Conference. August 12, 2016. Anaheim, CA.

[Howard, M.](#) Widespread prevalence of cyanotoxin production and toxin transfer at the land-sea interface in Southern California coastal waterbodies. 17th International Conference on Harmful Algae. October 9-14, 2016. Florianopolis, Brazil.

[Mazor, R.](#) [What Kind of Biological Conditions Do Engineered Channels Support?](#) California Association of Stormwater Quality Agencies 12th Annual Conference. September 11-13, 2016. San Diego, CA.

[Mazor, R.](#) [Setting Regional Targets Based on Flow-ecology Relationships to Support Biological Integrity](#). California Aquatic Bioassessment Workgroup 23rd Annual Meeting. October 18-19, 2016. Davis, CA.

[Mehinto, A.C., W. Lao, D.R. Vandervort, R. Mazor, G. He, M.S. Denison, S. Vliet, D. Volz, K.A. Maruya.](#) [High throughput bioanalytical screening of inland waters of southern California](#). 36th International Symposium on Halogenated Persistent

Organic Pollutants. August 28-September 2, 2016. Florence, Italy.

[Nezlin, N.P., D.W. Diehl, A. Feit, M.D.A. Howard, K. McLaughlin, M.J. Mengel, V.E. Raco-Rands, G.L. Robertson, A. Steele, G. Welch.](#) [Effect of wastewater discharge on phytoplankton in southern California coastal ocean](#). Eastern Pacific Ocean 63rd Annual Conference. September 21-24, 2016. Mount Hood, OR.

[Sengupta, A.](#) Hydrology 101: Understanding the Nexus of Flow and Biology special workshop. California Aquatic Bioassessment Workgroup 23rd Annual Meeting. October 18-19, 2016. Davis, CA.

[Stein, E.](#) Introduction to Statewide Efforts to Develop Biologically-relevant Instream Flow Recommendations. California Aquatic Bioassessment Workgroup 23rd Annual Meeting. October 18-19, 2016. Davis, CA.

[Stein, E.](#) Regional Cooperative Monitoring Programs – Southern California Bio-Assessment. California Association of Stormwater Quality Agencies 12th Annual Conference. September 11-13, 2016. San Diego, CA.

[Stein, E.](#) [Setting Instream Flow Targets in California Using Biological Community Health Indices](#). California Association of Stormwater Quality Agencies 12th Annual Conference. September 11-13, 2016. San Diego, CA.

[Steinberg, S.J., S. Moore and P. Smith.](#) [A Geospatial Survey of Anglers to Assess Fish Consumption from San Diego Bay, California, ESA. Qualitative Methods: Qualitative Research Summit. September 1-3, 2016](#). Krakow, Poland.

[Theroux, S.](#) [California Statewide Algae Plan: Past, Present, and Future](#). California Aquatic Bioassessment Workgroup 23rd Annual Meeting. October 18-19, 2016. Davis, CA.

Other Presentations

Griffith, J.F. Droplet digital PCR for Microbial Risk Assessment in Beach Water. Next Generation D_x Summit. August 26, 2016. Washington, DC.

Howard, M. Marine Harmful Algal Bloom Programs. California Water Quality Monitoring Council Meeting. August 23, 2016. Sacramento, CA.

Lanier, A., S.J. Steinberg, and A. Bailey. Improving ocean data access and coordination: West Coast Ocean Data Portal. West Coast Ocean Partnership Meeting. October 25, 2016. Portland, OR.

Lanier, A., S.J. Steinberg, and A. Bailey. West Coast Ocean Data Portal Update. West Coast Regional Planning Body 2016 Annual Meeting. October 26-27, 2016. Portland, OR.

Mazor, R. Results and applications of the SMC regional stream assessment. San Diego County co-permittee workgroup. July 13, 2016. San Diego, CA.

Mazor, R. Results and applications of the SMC regional stream assessment. Ventura County co-permittee workgroup. July 21, 2016. San Diego, CA.

Mehinto, A. Developing New Strategies for CEC Monitoring – Linkage among in vitro bioassays responses, molecular changes and whole organism effects. City of San Diego Public Utilities Department. September 20, 2016. San Diego, CA.

Mehinto, A. Overview of bioanalytical screening tools for environmental monitoring. Surface Water Ambient Monitoring Program (SWAMP) CEC Focus Group Meeting. October 26, 2016. Sacramento, CA.

Moore, S. A Regional Perspective on Trash and Debris from Rivers to the Sea in Southern California. Orange County NPDES Stormwater Program General Permittee Committee. August 25, 2016. Irvine, CA.

Steele, J.A. The Surfer Health Study. San Diego Microbiology Laboratory Group/Marine Biology Group. October 12, 2016. San Diego, CA.

Stein, E. Coastal Wetlands and Stream Vulnerability. Climate Science Alliance Climate Change Mini Forum. September 8, 2016. San Diego, CA.

Stein, E. Incorporating Climate-Smart Adaptive Strategies into Wetlands Recovery in Coastal Southern California. Natural Areas Conference 2016. October 19, 2016. Davis, CA.

Stein, E. San Diego River Flow-ecology Demonstration Project. San Diego River Conservancy Governing Board Meeting. September 8, 2016. San Diego, CA.

Stein, E. Setting Instream Flow Targets in California Using Biological Community

Health Indices. State Water Resources Control Board Office of Information Management & Analysis Brown Bag Seminar. August 25, 2016. Sacramento, CA.

Stein, E. Short course on wetland and stream assessment (co-teacher). Army Corps of Engineers Regulatory Program Retreat. October 20, 2016. San Diego, CA.

Sutula, M. Managing Water Quality in Intermittently Open Estuaries. California Coastal Conservancy Workshop on Intermittently Open Estuaries: Science and Management Perspectives. September 28, 2016. Costa Mesa, CA.

Sutula, M. Update on Science Supporting Wadeable Stream Nutrient and Biointegrity Policies. California Association of Sanitary Agencies Quarterly Meeting Regulatory Workgroup. October 13, 2016. Fountain Valley, CA.

Weisberg, S. Seminar on ocean acidification. University of Southern California. October 25, 2016. Los Angeles, CA.

External Content Featuring SCCWRP

[This study proved that surfing makes you sick more often.](#) October 23, 2016. The Inertia.

[Surfers take to sometimes-tainted water in the name of science.](#) October 21, 2016. Los Angeles Times.

[Surfers take part in waterborne illness study.](#) October 21, 2016. San Diego Union-Tribune.

[Study examines the real risk of illness when surfing in rain runoff.](#) October 21, 2016. GrindTV.

[What are we surfing in? A look at stormwater infrastructure in La Jolla.](#) October 12, 2016. La Jolla Light.

[Letter to the Editor: Let's Stop Ocean Pollution.](#) October 6, 2016. Laguna Beach Independent.

[What are we swimming in? Experts weigh in on beach water advisories](#) October 4, 2016. La Jolla Light.

[Climate Change L.A.: Climate Resolve Talk with a Scientist.](#) September 25, 2016. KCET.

[Development of molecular methods to identify stream algae.](#) Summer 2016. Surface Water Ambient Monitoring Program.

SCCWRP Personnel Notes

Commission



Arne Anselm, Deputy Director of Water Resources for the Ventura County Watershed Protection District, was appointed a Commissioner in October. Anselm, who

was recently promoted into the spot vacated by former Commissioner Gerhardt Hubner, also will continue to serve as a CTAG Representative.



Robert Ferrante, Assistant Chief Engineer and Assistant General Manager for the Sanitation Districts of Los Angeles County, was appointed an Alternate Commissioner in September, replacing Philip Friess.

The **Sanitation Districts of Los Angeles County**, represented by Commissioner Grace Hyde and Alternate Commissioner Robert Ferrante, was elected Chair of the SCCWRP Commission in September.

The **California Ocean Protection Council**, represented by Commissioner Deborah Halberstadt and Alternate Commissioner Jennifer Phillips, was re-elected Vice Chair of the SCCWRP Commission in September.

CTAG



Denise Li, a Water Biologist for the City of Los Angeles Bureau of Sanitation's Environmental Monitoring Division, was appointed to CTAG in October,

replacing Stan Asato, who retired. Asato served on CTAG for two years, from 2014 to 2016.

Scientific Leadership

Dr. **Keith Maruya** served as session chair for the 36th International Symposium on Halogenated Persistent Organic Pollutants, held August 28 to September 2 in Florence, Italy.

Ken Schiff served as chair of a session titled "Pollutant specific TMDLs: Nutrients" at the California Association of Stormwater Quality Agencies 12th Annual Conference in September in San Diego. Also at the conference, Dr. **Ashmita Sengupta** led a pre-conference workshop titled "Stormwater Management through Natural Treatment Systems."

Dr. **Steve Steinberg** served as conference co-chair for the 3rd National Symposium on Unmanned Autonomous Systems (UAS) Mapping, held in May in Palm Springs.

Dr. **Steven Steinberg** has been appointed to the American Society of Photogrammetry and Remote Sensing's Committee for Unmanned Autonomous Systems (UAS) Mapping Accuracy Standards.

Dr. **Martha Sutula** has been appointed to serve on the Science Advisory Panel to the Tijuana Estuary Tidal Restoration Program.

Dr. **Martha Sutula** served on the organizing committee for the California Coastal Conservancy Workshop on Intermittently Open Estuaries: Science and Management Perspectives, held in September at SCCWRP.

Dr. **Martha Sutula** served on the organizing committee for the Workshop on Monitoring of Ocean Acidification: San Francisco Bay Case Study, sponsored by the California Ocean Science Trust, NOAA and EPA and held in October at the San Francisco Estuary Institute.

Transitions



Justin Vanderwal, a Laboratory Assistant in the Biogeochemistry Department since 2015, was promoted to a full-time Research Technician

in October.



Lucy Mao, a Research Technician in the Microbiology Department who left SCCWRP in July, returned to SCCWRP in September. She will split

her time between the Microbiology and Chemistry Departments.

Departures

Darcy VanDervort, a Senior Research Technician in the Chemistry Department since 2015, left SCCWRP in October for a new job opportunity.

SCCWRP COMMISSIONER SPOTLIGHT

Hazardous waste specialist pivots to water quality

Amanda Carr stumbled into the world of water-quality management almost by accident, and she's never looked back.



Amanda Carr

In college, Carr was interested in a career in hazardous waste management. While working on a dual master's in environmental science and public affairs at Indiana University in the mid-1990s, she focused on legacy soil contamination and how it presents challenging legal liability issues for current and prospective property owners. Her first job was working for the State of Arizona on state and federal Brownfields and Superfund programs, which help develop clean-up solutions for contaminated sites.

Three years later, in 2001, Carr relocated to Orange County for her husband's job. Among the places she applied was the County of Orange stormwater program, which at the time was looking for someone with strong grant-writing experience. She was hired as an environmental resources specialist.

"It really started my interest in water-quality issues, and once I saw the obvious benefits of water quality and their importance to communities, it became my next love," Carr said.

Carr spent nine years working for the Orange County stormwater program, moving through the ranks to become Chief of Water Quality Planning.

In 2011, seeking to broaden her career experience, Carr took a new position as the City of Irvine's Water Quality Administrator, which she held for five years. Instead of focusing primarily on TMDLs (total maximum daily loads) as she'd done at the county, Carr

Amanda Carr

Job: Deputy Director, Environmental Resources, Orange County Public Works

SCCWRP role: Commissioner (2016-present)

Prior jobs: Water Quality Administrator, City of Irvine (2011-16); Water Quality Planning Chief and Environmental Resources Specialist, Orange County Public Works (2002-11); Consulting Project Manager, Environmental Management Group in California (2001-02); Superfund Programs Project Manager and Community Involvement Coordinator, Arizona Department of Environmental Quality (2000-01); Brownfields Coordinator, Arizona Department of Environmental Quality (1998-2000)

Education: Master of Public Affairs and M.S. environmental science, Indiana University Bloomington (1997); B.A. international studies, Trinity University in Texas (1994)

Residence: Lake Forest

Family: Husband Colby, a semiconductor purchasing manager; son Riley, 12, and daughter Katy, 9; dog Rosie, a black Labrador

Hometown: Naperville, Ill.

Hobbies: Playing board and card games; backyard basketball; cooking; member of two book clubs

focused on a wider array of stormwater compliance issues, albeit in just one watershed (Newport Bay).

"It was an opportunity to broaden my regulatory focus, but narrow my geographic focus," Carr said. "It was a very good learning experience, but also helped me realize that while I can appreciate a tighter geographic focus, I prefer a broader countywide program."

In July 2016, Carr was rehired by the County of Orange, this time as Deputy Director of Environmental Resources. She oversees nearly 100 employees spread out across four units: Water Quality Compliance, Watershed Management, Environmental Monitoring, and the Agricultural Commissioner/Sealer of Weights and Measures unit, which enforces agricultural and pesticide regulations and certifies commercial devices for weighing and measuring.

As for her decision to remain in the public sector for her entire career instead of working for an NGO or a consulting firm, Carr said the choice has always been clear to her.

"Working on behalf of the public makes me feel like I'm on the right side of the issue," she said. "I strongly believe in giving back and making a difference."



Amanda Carr and daughter Katy go canoeing on the Dordogne River in France during a 2014 family vacation.

CTAG SPOTLIGHT

Land conservationist makes leap to ocean work

For the past two decades, Tom Maloney has burnished a reputation as a leader in the land management sector.



Tom Maloney

He spent seven years as Executive Director of the Tejon Ranch Conservancy, a 375-square-mile land trust that straddles Kern and Los Angeles Counties. Before that, he spent eight years working on conservation issues for The Nature Conservancy. And just last year, he completed a strategic assessment of land assets for the National Audubon Society.

But last summer, Maloney decided to shift gears and tackle a conservation challenge of a different kind: the coastal ocean.

In July, Maloney was named Executive Director of the California Ocean Science Trust, an Oakland nonprofit created by the state Legislature to improve stewardship of California's coastal ocean and bring the best ocean science to coastal and marine resource managers and other stakeholders. In this role, Maloney also serves as science adviser to the California Ocean Protection Council, a state agency.

"The harder part for me has not been learning the science," Maloney said. "The harder part is learning the network of individuals and organizations, making those connections."

Fortunately, network-building and coalition-building have been at the heart of Maloney's expansive career in land conservation. As founding director of the Tejon Ranch Conservancy from 2009 to 2015, Maloney was responsible for partnering with numerous stakeholder groups – including the private, for-profit corporation that owns virtually all of the land covered by the conservancy's easements – to improve stewardship of the ranch and expand public access.



Ian Shive

Tom Maloney, an avid bird-watcher, uses a spotting scope to bird-watch during sunrise at Tejon Ranch Conservancy north of Los Angeles in 2010.

Thomas "Tom" Maloney

Job: Executive Director, California Ocean Science Trust (2016-present)

SCCWRP role: CTAG Representative for the California Ocean Protection Council (2016-present)

Prior jobs: Private contractor, National Audubon Society (2015-16); Executive Director, Tejon Ranch Conservancy (2009-15); Program Manager, Program Director and Interim Ecoregional Director, The Nature Conservancy (2001-09); River Steward, Connecticut River Watershed Council, Easthampton, Mass. (1994-2001); Planning Technician in Brattleboro, Vt. (1991-94);

Education: M.S. resource management and administration, Antioch University in New Hampshire (1993); B.A. economics, Boston University (1986)

Residence: Oakland

Family: Wife Andrea, director of bird conservation for Audubon California; two cats

Hometown: Atherton in the San Francisco Bay Area

Hobbies: Bird-watching; guiding birding tours; co-founder of the nonprofit Bird Conservation Fund; backpacking; cooking

"We do the same thing at OST," Maloney said. "Whether it's the land or the ocean, the bread and butter of sound resource management is to use the best possible science to inform and create dialogue around the science."

Maloney's interest in environmental conservation began as a Boston University student, when he often visited his older brother, a bay scallop fisherman, on Nantucket Island. As Maloney saw development encroach on the island's pristine nature, he felt drawn to study it and understand how to find balanced solutions.

Also during college, Maloney's brother-in-law introduced him to bird-watching, which has since become one of his biggest passions. He's become so knowledgeable and well-versed that he's led birding tours on three continents. He met his wife, Andrea, while birding, and he's a cofounder of the Bird Conservation Fund, a fledgling nonprofit aiming to use crowd-sourcing to fund small bird conservation projects around the world. His favorite local spot to bird-watch is Point Reyes north of San Francisco.

"It gives you a reason to go places, a context for connecting with a place," Maloney said. "It's a whole new way to look at the world; birds are indicators of whatever habitat you happen to be in."

SCCWRP PARTNER SPOTLIGHT

Professor rethinks role in management, policy

As a young academic, Dr. Raphe Kudela believed his role was to do pure research, then take a hands-off approach as others interpreted and applied this work within a management and policy context.



Dr. Raphe Kudela

Then, about a decade ago, the UC Santa Cruz professor received a rude wake-up call that he was wrong – and he says he’s all the better for it.

Kudela’s career-defining moment came in 2007, during a training workshop he attended with water-quality managers on how to do toxin monitoring. When asked how far managers could push the limits of one of Kudela’s research findings, Kudela replied that it wasn’t his job to answer this question.

His response prompted a prominent State Water Board staffer to take Kudela to task during the workshop.

“He called me out in front of everyone: ‘Your job is to provide the best research and explain why it’s useful in a decision-making process – it’s not enough to simply put the research out there,’” Kudela recalled. “This really got me rethinking my entire role.”

Today, Kudela, a Professor of Ocean Sciences, sees water-quality research and its application to management as inseparable. Academic research has tremendous value to water-quality managers, Kudela says, but only when it’s placed into a framework and a context that managers can use.

Through the years, Kudela has invested considerable time and



Dr. Raphe Kudela explores the top of a glacier in New Zealand in 2015 with, from left, daughter Eleanor, wife Sarah and son Robert.

Raphael “Raphe” Kudela, Ph.D.

Job: Professor, Ocean Sciences Department, University of California, Santa Cruz (1999-present)

SCCWRP role: Research collaborator on harmful algal blooms (HABs) and marine biogeochemical cycling research

Prior jobs: Collaborating Scientist, Monterey Bay Aquarium Research Institute (1999-2004)

Education: Ph.D. biological sciences, University of Southern California (1995); B.S. biology/marine sciences, Drake University in Iowa (1989)

Residence: Unincorporated Santa Cruz County

Family: Wife Sarah, director of donor relations at UC Santa Cruz; daughter Eleanor, 8; son Robert, 5

Hometown: Mankato, Minn.

Hobbies: Hiking and bike-riding with his kids; tending to a backyard vegetable garden; photography; kayaking

energy into helping managers apply and interpret water-quality science. He’s served on dozens of technical advisory committees and workgroups around the world, even as he juggles his own research and teaching obligations back home.

“This is one of those jobs where, if I chose not to do all these things, I would be fine,” Kudela said. “But I really enjoy working with people outside the U.S., seeing those different perspectives.”

Kudela also has developed tremendous appreciation for SCCWRP and its focus on translating science to management; in fact, he says, there’s not much he’s involved with today that does not have some overlap with SCCWRP. SCCWRP’s Dr. Meredith Howard earned her Ph.D. in Kudela’s lab in 2007.

“I see more and more connections; oftentimes, it’s seeing the influence of SCCWRP in activities I’m participating in,” Kudela said.

Kudela says being offered a faculty position at UC Santa Cruz in 1999 after finishing his post-doc at the Monterey Bay Aquarium Research Institute was his dream job. He loves teaching and learning from his students, as well as the tremendous freedom to pursue his personal interests.

“I tell people, being an oceanographer at an academic institution allows me to do anything I want,” he said.

SCCWRP STAFF SPOTLIGHT

Toxicologist focuses on sediment contamination

As an undergraduate biochemistry major at the University of San Diego, Dr. Ashley Parks did not know what working in the toxicology field entailed, but she was curious to find out. So she got a job working in a lab that does long-term water quality monitoring in Baja California.



Dr. Ashley Parks

Parks loved working in the field on projects that have a direct impact on the environment. When she applied to graduate school, she searched for chemistry departments that focused not only on environmental work, but also toxicology.

"I was really intrigued by what was causing observed nutrient load and contamination issues and water-quality issues," Parks said. "That's really when I got my foot in the door of environmental chemistry and toxicology."

Parks' focus at SCCWRP is on sediment toxicity and bioaccumulation. She is working on developing a bioaccumulation model for marine systems that helps explain whether observed and measured contaminant concentrations found in fish tissue are being caused by sediment toxicity or another source.

Parks has also been working to improve toxicity identification evaluation (TIE) methods for determining which contaminants are causing toxicity in sediment.

"You can do a general toxicity test, and if you find toxicity, then you know there's something there killing the organisms, but you don't



Dr. Ashley Parks and husband Ryan commemorate a hike to Quandary Peak in Breckenridge, Colo., by holding up a handmade cardboard sign that reads "Elevation 14,271 feet, 6/27/16."

Ashley Parks, Ph.D.

Job: Toxicologist, SCCWRP Toxicology Department

Started: July 2016

Prior jobs: National Research Council postdoctoral research associate at U.S. Environmental Protection Agency (2013-16); joint graduate research assistant at Duke University/University of South Carolina (2009-13); Student Services Contractor at USEPA, Atlantic Ecology Division (2008-13); undergraduate research assistant at University of San Diego (2006-08)

Education: Ph.D. environment, Duke University (2013); Integrated toxicology and environmental health certificate, Duke University (2013); B.A. biochemistry, University of San Diego (2008)

Residence: Costa Mesa

Family: Husband Ryan Haywood, high school chemistry teacher; black Labrador mix named Roxy

Hometown: Moorpark, Calif.

Hobbies: Hiking; backpacking; scuba diving; indoor rock climbing; photography; calligraphy

know what it is," Parks said. "You have to identify the chemical class."

Before coming to SCCWRP, Parks completed her Ph.D. work on single-walled carbon nanotubes and her postdoctoral research on nano-copper pressure-treated lumber at a U.S. Environmental Protection Agency lab in Rhode Island.

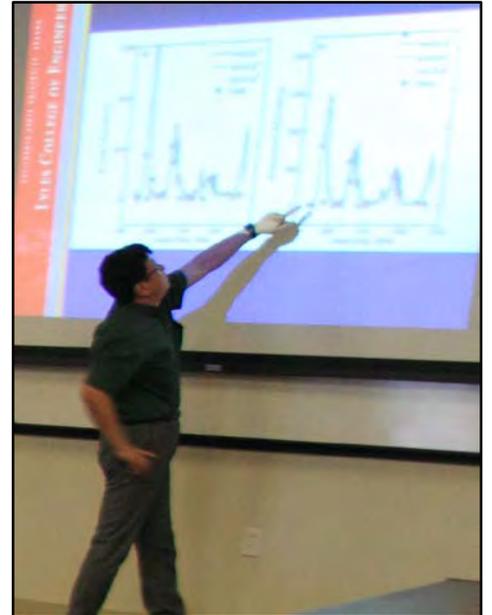
Parks started working in the Rhode Island lab as a Ph.D. student, when she was a joint graduate research assistant between Duke University and the EPA. She would work in the EPA toxicity lab in the summer, then ship her samples back to Duke to finish the research in an analytical lab.

It was during this time that Parks was introduced to SCCWRP through Dr. Lee Ferguson, her advisor, and Dr. Rob Burgess, whom she worked with during her Ph.D. After hearing how positively they spoke of their collaborations with SCCWRP, Parks knew she wanted to do science that has a direct applied impact.

"It's nice to be able to be involved in science that can then be useful for future policies and regulations, and to just better communicate science to people who may not have the background," Parks said. "You want to be able to use the ocean as a future resource, but also protect it and protect humans."

Transcontinental exchange of ideas

A delegation of environmental scientists from the Chinese Research Academy of Environmental Sciences in Beijing visited SCCWRP for a day-long meeting in October to present their research and discuss partnership opportunities. The four-member delegation, accompanied by a host professor from California State University, Fresno, gave presentations focusing on freshwater eutrophication, the design of riparian buffer zones, ecological restorations and pollution control issues.



Dr. Lubo Liu from California State University, Fresno, in green shirt, facilitates a discussion with SCCWRP and a visiting delegation of Chinese environmental scientists. SCCWRP's Dr. John Griffith, bottom right in foreground, was among the participants in the discussion.