SCCWRP Director's Report

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SPRING 2016 ISSUE

Expert panel urges action on West Coast ocean acidification

Global carbon dioxide emissions are triggering fundamental changes to ocean chemistry along the North American West Coast that should be addressed through immediate and decisive management actions, including development of a coordinated regional management strategy, a panel of leading ocean scientists has unanimously concluded.

A failure to adequately respond to this change in seawater chemistry, known as ocean acidification (OA), is anticipated to have devastating ecological consequences for the West Coast in the decades to come, according to the 20-member West Coast Ocean Acidification and Hypoxia Science Panel, which published its findings in April.

The panelists, who include two SCCWRP scientists, say they hope the findings will serve as a catalyst for coordinated West Coast management action aimed at mitigating the impacts of ocean acidification and to get ahead of future OA-related challenges.

Already, some West Coast marine shelled organisms are having difficulty forming their protective outer shells, and the West Coast shellfish industry is seeing high mortality rates during early life stages when shell formation is critical.

Because of the way the Pacific Ocean circulates, the North American West Coast is exposed to disproportionately high volumes of seawater at elevated acidity levels.

In its final report, the panel recommended a number of specific, multi-agency solutions that can be implemented immediately, including:

- Exploring approaches that involve the use of seagrass to remove carbon dioxide from seawater.
- Supporting wholesale revisions to OA-related water-quality criteria.
- Identifying strategies for reducing the amounts of land-based pollution entering coastal waters.

Contents

Cover photo: Pteropods are among the marine organisms having difficulty forming their shells as a result of ocean acidification. Photo courtesy of Nina Bednarsek, NOAA

Calendar

Wednesday, May 4
CTAG research planning workshop on marine and estuarine nutrients

Thursday, May 5
CTAG quarterly meeting

Friday, May 13
Seminar: "Non-stationary suspended sediment dynamics: Water quality implications, monitoring and impact assessment challenges"

Friday, June 3
Commission meeting

- Enhancing a West Coast-wide monitoring network that provides information toward development of coastal ecosystem management plans.

More long-term recommendations include developing predictive mathematical models that provide insight into how West Coast ecosystems are impacted by ocean acidification and a related phenomenon known as hypoxia, or low dissolved oxygen levels. SCCWRP is already working in this arena by collaborating with multiple partners on the development of coupled physical and biogeochemical ocean models that estimate OAH impacts from global carbon dioxide emissions, natural upwelling process and nutrients introduced via local discharges.

The Panel was convened in 2013 to explore how West Coast government agencies could work together with scientists to combat the effects of ocean acidification and hypoxia.

For more information, contact Dr. Steve Weisberg.

SCCWRP to test new EPA health risk model at Inner Cabrillo Beach

SCCWRP in May will launch a first-of-its-kind study aimed at ascertaining whether high fecal indicator bacteria levels at Inner Cabrillo Beach in the Los Angeles Harbor area are indicative of a health threat to beachgoers who enter the water.

The study involves using a health risk model known as Quantitative Microbial Risk Assessment (QMRA), which was recently endorsed by the U.S. Environmental Protection Agency to quantify the risk of gastrointestinal illness from waterborne contamination at the beach. Inner Cabrillo Beach is a popular swimming area in San Pedro that receives about half a million beachgoers annually.

For the past 15 years, beach water-quality managers have worked without success to reduce the concentration of a type of fecal indicator bacteria called *Enterococcus*, which is periodically found at levels that exceed water-quality guidelines. Managers have spent more than $20 million on structural and nonstructural improvements, including testing and replacing sewer collection lines and installing bird exclusion devices designed to reduce avian fecal matter.

Performing a QMRA at the beach will offer important new insights into how much risk is associated with swimming at Inner Cabrillo Beach. If the contamination is coming from human sources, such as leaking sanitation infrastructure, it would pose a greater human health risk than if the contamination were coming from non-human sources, such as dogs and seagulls.

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 will launch a study in May to ascertain whether high levels of fecal indicator bacteria that remain at the beach despite cleanup efforts are indicative of a health threat to beachgoers.

QMRAs are designed to estimate health risks on a site-specific basis using a dose-response model that factors in the concentration of the pathogens in the water, the volumes of water being ingested, and the pathogens' infectivity to humans. The EPA recommends using QMRAs only when a beach is contaminated with non-human bacterial sources.

The SCCWRP-led study will mark the first time a QMRA has been conducted at a California marine beach in dry weather, setting a precedent for how to conduct QMRAs of this type in the future.

For more information, contact Ken Schiff.

HAB experts develop statewide strategy for responding to toxic cyanobacterial blooms

A group of scientific experts on harmful algal blooms in California has developed a statewide strategy for responding to HABs and mitigating their impacts in water bodies across California.

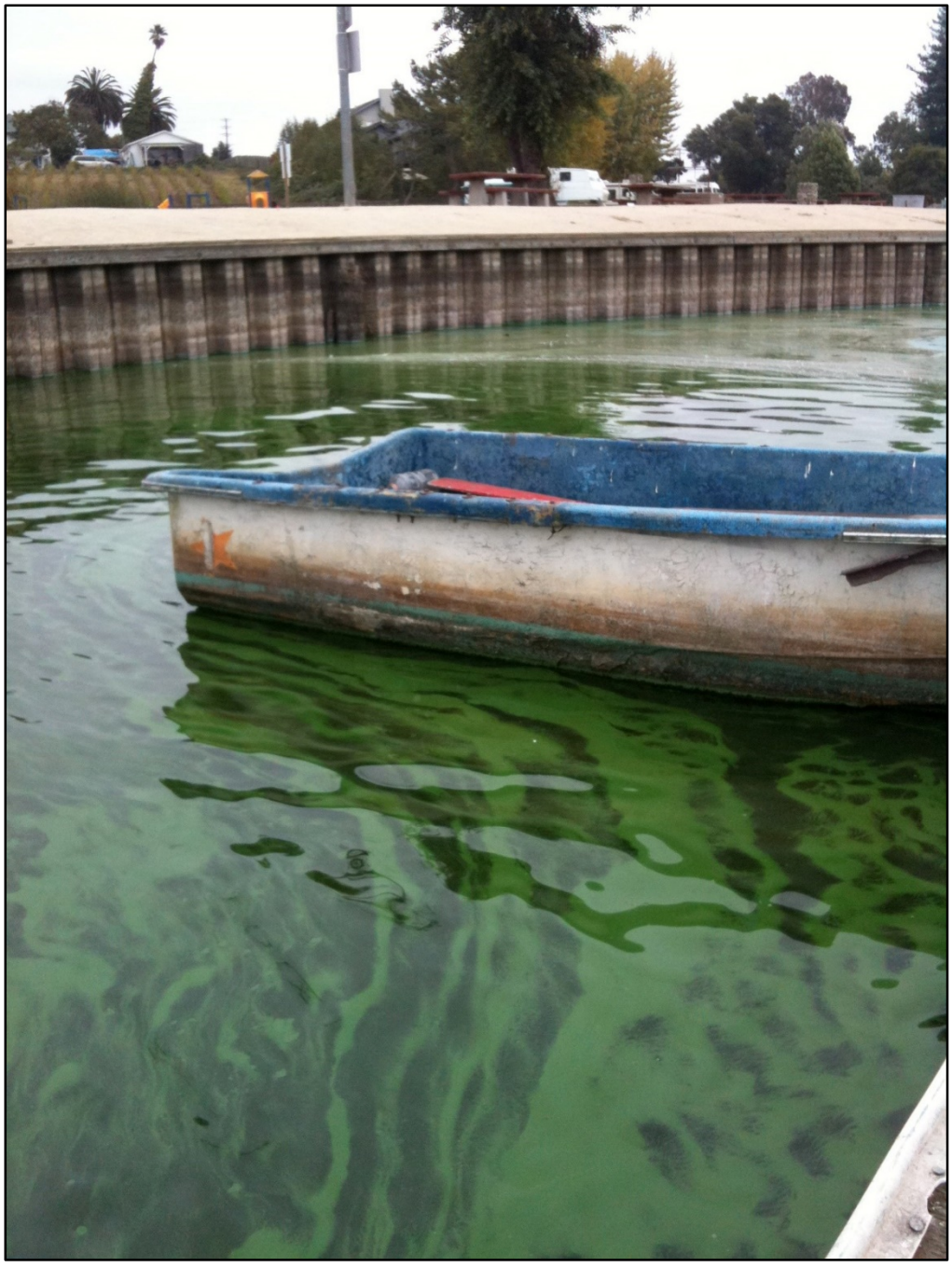
The strategy, co-authored by SCCWRP and published in February by the State Water Board's Surface Water Ambient Monitoring Program (SWAMP), provides a roadmap that California's aquatic resource agencies can use to build capacity for monitoring HABs, assessing a water body's susceptibility to these toxic blooms, and coordinating management responses.

HABs are events that trigger production of algal toxins that can impair water quality and recreational uses, as well as threaten the health of humans, wildlife, and pets that come into contact with these toxins. Multiple water bodies in California already have been placed on the state's 303(d) listing of impaired water bodies due to the toxins produced by HABs.

Among the report's recommendations is to use satellite imagery to identify these blooms, develop a centralized online database for tracking HAB events and for issuing bloom advisories, and craft consistent statewide procedures for sampling, health and safety, and quality assurance.

The report, titled California Freshwater Harmful Algal Blooms Assessment and Support Strategy, is an outgrowth of a 2012 workshop hosted by SWAMP aimed at addressing the growing threat posed by cyanotoxins. One of the workshop's key recommendations was to develop a long-term, statewide vision and strategic plan for responding to the issue in California.

This strategy report is intended to serve as a conversation starter that various aquatic resource agencies can use to coordinate and implement a comprehensive strategy. SWAMP already has begun implementing many of the report's recommendations with support from SCCWRP and others.



Pinto Lake in Santa Cruz County is tainted a murky greenish color by toxic cyanobacteria. HAB events in Pinto Lake have triggered the recreational water body to be placed on the state's 303(d) listing of impaired water bodies. A new statewide strategy co-authored by SCCWRP aims to help aquatic resource managers respond to and mitigate HAB events across California.

For more information, contact Dr. Meredith Howard.

Bight '13 regional monitoring wrapping up major elements

Three of the five elements of the Southern California Bight 2013 Regional Monitoring Program are winding down as a series of final assessment reports is published over the next few weeks.

The Sediment Chemistry volume of Bight '13 was published in April, complementing the Sediment Toxicology volume published in December, and the Rocky Reefs and Trash and Marine Debris elements will be publishing their final reports in May.

The Shoreline Microbiology element, which is focused on developing rapid microbial contamination detection methods, and the Nutrients element, which is focused on modeling the relative contributions of land-based nutrient inputs to the Bight's biogeochemical cycling processes, will publish their findings in 2017.

Bight '13, the fifth cycle of the signature Bight marine monitoring program, involves nearly 100 participating agencies and sampling at nearly 400 sites. It builds on a two-decade legacy of uniting Southern California water-quality management agencies to conduct highly leveraged, coordinated monitoring across the entire Bight region, from the bottom of the deepest ocean basins to the top of estuaries.

Facilitated by SCCWRP since its inception in 1994, the Bight regional monitoring program has effectively consolidated and integrated what were once discrete, disconnected programs. The program's goal since its inception has been to answer big-picture questions about the ecological health of the Bight and how conditions are changing over time.

SCCWRP and its original 12 participating agencies designed the Bight program in response to sharp criticisms from the National Research Council and others that Bight monitoring efforts were focused too narrowly on the areas surrounding wastewater outfalls; the Bight program is now recognized as a model emulated nationwide.

Planning for the sixth cycle of the program – Bight '18 – will kick off in 2017. For more information, contact Ken Schiff.

BIGHT '13 SEDIMENT CHEMISTRY

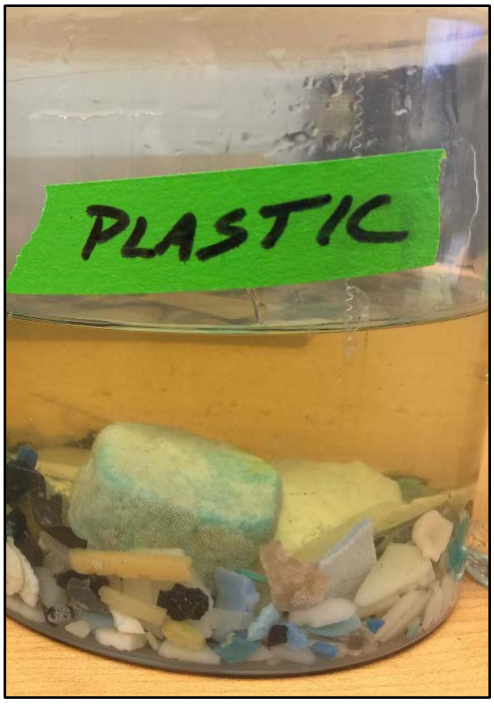
Concentration of PBDEs falls dramatically across Bight

The concentration of the class of flame retardant chemicals known as polybrominated diphenyl ethers (PBDEs) has dropped by 92% in Southern California Bight embayments over a five-year period, and by 50% offshore, according to the findings of the Bight '13 Sediment Chemistry element.

The declines indicate that management actions to restrict the sources of these contaminants have been successful. From 2004 to 2013, regulators implemented various restrictions on production and use of the commercial formulations of PBDEs, including in California.

The Bight '13 Sediment Chemistry final assessment report also found that concentrations of legacy contaminants such as DDTs, PCBs and metals remain largely unchanged.

Participants of the Bight '13 program collect sediment samples to measure contamination levels. The Bight '13 Sediment Chemistry final assessment report has been published online.



The area of the Southern California Bight seafloor that contains plastic particles has tripled since 1994, according to the findings of the Bight '13 Trash and Marine Debris element, which will publish its final report in the coming weeks.

BIGHT '13 TRASH AND MARINE DEBRIS

Trash, debris spreading across Bight, watersheds

Trash has been found in more than three-fourths of Southern California's 7,400 kilometers of streams, and marine debris has been found in about one-third of ocean bottoms, according to the findings of the Bight '13 Trash and Marine Debris element.

Overall, the study found that the area of the Southern California Bight seafloor containing debris has doubled since 1994, when Bight regional monitoring was first launched. The area of the Bight seafloor containing plastics has tripled since 1994.

BIGHT '13 ROCKY REEFS

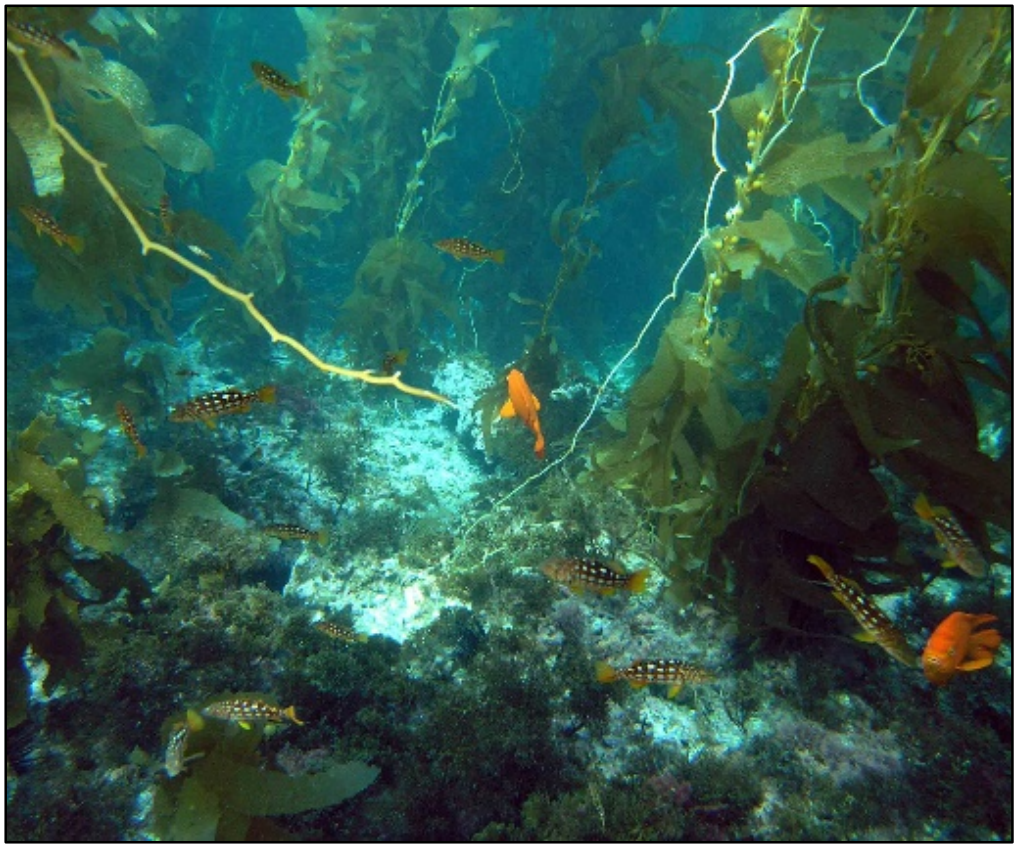
New tools seek to discern impacts of fishing vs. pollution

A series of environmental scoring tools has been created for the Bight '13 Rocky Reefs element to gain new insights into the relative impacts of fishing vs. pollutant discharges on Bight subtidal rocky reefs.

A fishing index was created to measure extraction density, a plume exposure index was created to measure pollutant loading and plume exposure, and a reef response index was created to measure biological impacts.

An analysis using the tools found that overall, rocky reefs appear to be more sensitive to fishing than to pollution loading, although these twin stressors tend to build upon one another to exert cumulative impacts.

The Bight '13 Rocky Reefs element recommends continued monitoring of rocky reefs as stormwater best management practices (BMPs) are implemented and as Marine Protected Areas reduce fishing pressures.



Subtidal rocky reefs, which make up 25% of Bight coastline, are home to among the most productive marine ecosystems on earth. The Bight '13 Rocky Reefs element developed new environmental scoring tools to help discern whether ecological impacts to the Southern California Bight's rocky reefs are triggered by fishing practices vs. impaired water quality.

Updates by Thematic Area

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

BIOASSESSMENT

SCCWRP unveils algaeMetrics tool to simplify algae-based bioassessment calculations

SCCWRP has created a free online tool to help Southern California stream managers and scientists automatically generate stream bioassessment scores using raw algae data collected from wadeable streams.

The algaeMetrics calculator, unveiled in April, is designed to streamline the process by which algal indices of biotic integrity (IBIs) are calculated during stream bioassessments.

Prior to development of the calculator, stream managers were required to perform a series of lengthy calculations that required familiarity with a statistical programming language.

With the algaeMetrics calculator, the user simply uploads raw spreadsheet data to a web-based calculator, and the calculator automatically computes scores for three primary benthic algal IBIs that are used for Southern California stream bioassessments.

The three algal IBIs are described in a 2014 journal article co-authored by SCCWRP.

To request a demonstration of the calculator, contact Shelly Moore.

SEDIMENT QUALITY

San Diego Bay bioaccumulation study nearing completion

A three-year study that quantifies how sediment contamination in San Diego Bay is transferred through various levels of the marine food web has completed its first phase of data analysis and reporting.

The study is the most comprehensive Southern California investigation ever conducted into how contamination from sediment and other sources bioaccumulates in marine life and threatens the health of seabirds and humans at the top of the food web. The final study report is scheduled to be published this summer.

SCCWRP and its partners documented DDTs, PCBs, mercury and other chemical contaminants at elevated levels in sport fish consumed by humans and in the eggs of seabirds such as the California least tern.

The study's preliminary findings were submitted in March to the San Diego Regional Water Quality Control Board, which commissioned the study.

Study data will be used to refine an assessment framework under development that explains how to interpret California's sediment quality objective to protect human health.

The California least tern is among the San Diego Bay wildlife susceptible to food web contamination. SCCWRP and its partners are quantifying the health risks associated with these contaminants in a bioaccumulation study to be published this summer.

Anglers cast their lines off a pier in San Diego Bay. SCCWRP has interviewed more than 1,600 San Diego Bay anglers over a one-year period to understand whether they're at risk from consuming potentially contaminated seafood.

SCCWRP completes data collection for fish consumption study

SCCWRP has completed a year-long effort to interview more than 1,600 San Diego Bay anglers about their fish consumption habits for a study that will ascertain whether local anglers and their families are being exposed to unsafe levels of contamination in the fish they eat.

The information was collected by individually approaching and interviewing the anglers across San Diego Bay over a one-year period that ended in late April. SCCWRP used a custom-designed tablet app to store and transmit this data.

Anglers were asked what types of fish they catch from the bay and how often they consume these fish, as well as a variety of demographic information. About 1,100 anglers provided responses to every question.

SCCWRP is analyzing the data and will publish its findings this fall.

EUTROPHICATION

Effort launched to identify Santa Margarita algae using DNA

SCCWRP and its partners have begun using DNA-based methods to try to identify algal species in the Santa Margarita River watershed that are sensitive to nutrient over-enrichment, in an effort to compare the effectiveness of molecular vs. traditional taxonomic algae identification methods.

The molecular methods evaluation work is part of an ongoing project that seeks to determine the degree to which nutrient management in the Santa Margarita River watershed in northern San Diego County is needed to address eutrophication-related impairments to water quality in the estuary and river.

The Santa Margarita work will support a statewide initiative to develop improved capacity to assess biological condition of streams using stream algae.

Field sampling wraps up for OAH study examining influence of wastewater nutrients in coastal waters

SCCWRP and its member agencies have finished collecting two years of field sampling data for a study that will assess the relative influence of anthropogenic vs. natural sources of nutrient inputs on biogeochemical cycling in the Southern California Bight.

The study is intended to ascertain whether there are differences in dissolved oxygen levels, pH and algal blooms along the coastline and/or offshore as a result of discharging nutrients, including nitrogen, in wastewater effluent.

Changes in biogeochemical cycling can trigger ocean acidification and hypoxia (OAH), but it is unclear if natural upwelling is the dominant driver of these processes or if nutrients in wastewater effluent also are driving OAH.

During field sampling, nitrogen and carbon cycling were measured in multiple ways, including primary production and respiration, nitrogen uptake by primary producers, and nitrification, in which the dominant form of nitrogen in effluent is biologically transformed into nitrite.

Stable isotope source tracking techniques also were applied to determine the contribution of distinct nitrogen sources to standing stocks of phytoplankton, zooplankton and water column nutrients.

The field data are being used to validate a new coupled physical-biogeochemical model of the Southern California Bight that will estimate the extent to which anthropogenic vs. natural sources of nutrients are impacting biogeochemical cycling.

Field samplers lower a CTD (conductivity, temperature, depth) rosette into the ocean to take a variety of measurements that will help SCCWRP and its partners determine whether there are differences in dissolved oxygen levels, pH and algal blooms in different areas of the Southern California Bight as a result of discharging the nutrient nitrogen in wastewater effluent.

CONTAMINANTS OF EMERGING CONCERN

SMC samples advance to nontargeted analysis phase of CEC monitoring framework

SCCWRP and its collaborators have advanced some of the 31 water samples collected by the Southern California Stormwater Monitoring Coalition (SMC) to the nontargeted phase of chemical analysis, a recognition that the initial bioanalytical testing has detected CECs in the water samples.

SCCWRP is analyzing the SMC samples using nontargeted chemical analysis, which involves separating and identifying chemicals based on physical and chemical characteristics.

These analyses are part of a SCCWRP pilot study test-driving the utility of a new, multi-tiered monitoring framework for detecting CECs in receiving waters. Each tier becomes progressively more complex, lengthy and costly to execute, giving managers an efficient, cost-effective way to zero in on the CECs that pose the greatest potential health risks.

In accordance with the framework, the results of the cell-based bioanalytical tests helped prioritize which SMC samples will undergo additional screening and which chemicals to analyze via targeted chemical analysis.

Ultimately, the findings of the multi-tiered CEC screening process will help narrow down which Southern California watersheds will continue to be monitored for CECs and other chemicals going forward.

Water samples collected from 31 streams across Southern California are being screened for the presence of chemicals using a new, multi-tiered CEC monitoring framework. Some of the samples have advanced from the bioanalytical assay phase to the nontargeted analysis phase.

MICROBIAL WATER QUALITY

SCCWRP to launch field testing of suitcase-sized microbial detection device this summer

SCCWRP this summer will begin field-testing a suitcase-sized instrument prototype designed to rapidly detect microbial contamination in beach ocean water.

The droplet digital PCR (polymerase chain reaction) instrument, developed by Arizona State University researchers, was recently paired to an automated water sampling and processing module, creating a contiguous automated system capable of measuring microbes in raw water samples from start to finish with no human manipulation.

The Monterey Bay Aquarium Research Institute, which paired the ddPCR instrument to the sample acquisition and processing module, is continuing to test the instrument prior to field deployment this summer.

The researchers are working to build a microbial detection system that can produce results in the field within two hours, eliminating the need to transport water samples to a lab for analysis. The goal is to eventually design a system so simple to use that a non-microbiologist, such as a beach lifeguard, could operate it.

WETLANDS

SCCWRP-facilitated design charrette helps create priorities for estuary restoration

SCCWRP has submitted to the California State Coastal Conservancy a report outlining how the design charrette process can be used to develop restoration goals and priorities for small coastal estuaries common to Southern California.

The report sums up the outcomes of a two-day, SCCWRP-facilitated design charrette workshop in December aimed at helping local project proponents and the Coastal Conservancy establish priorities and goals for an upcoming restoration of the Aliso Creek Estuary in Orange County.

A design charrette encourages participants to approach a challenge from a relatively unconstrained perspective.

Coastal managers are interested in improving restoration planning practices for small estuaries because these systems have historically not been studied in much detail, despite their prevalence across the region and the state.

The Southern California Wetlands Recovery Project, which used the Aliso Creek workshop to test-drive the design charrette approach for the first time with small coastal systems, intends to replicate the approach for planning other small estuary restoration projects.

The Aliso Creek Estuary project is an effort to restore a fully functional estuary at the mouth of Aliso Creek in southern Orange County.

Scientists and managers discuss priorities and goals for the restoration of Aliso Creek Estuary in Orange County during a SCCWRP-facilitated design charrette. SCCWRP has summarized the outcome and benefits of the design charrette process in a report to the California State Coastal Conservancy.

ECOHYDROLOGY

Framework developed for establishing Southern California stream flow thresholds

SCCWRP and its partners have completed development of a framework that can be used to establish ecologically relevant flow targets for stream sites across Southern California.

The framework, which relates flow alterations to biological indicators of stream condition, marks the final stage of a three-year study aimed at developing tools for incorporating flow-ecology principles into water resources management.

The study, conducted in partnership with Colorado State University and the U.S. Geological Survey, used a scientific framework known as the Ecological Limits of Hydrologic Alteration (ELOHA) to evaluate minimum environmental flow requirements at more than 800 ungauged stream sites across Southern California.

The study involved establishing preliminary thresholds for each of five flow metrics identified as being the most influential indicators of biological condition; flow augmentations or depletions beyond these flow thresholds are expected to be associated with declines in biological condition. The project's technical advisory committee reviewed the initial analysis at a March meeting.

The project's goal is to understand how to apply flow-ecology relationships to optimally balance the often-conflicting goals of maintaining water supply, improving water quality and supporting in-stream health.

Already, the preliminary regional flow thresholds that were developed through this work have been applied to an ELOHA case study in the San Diego River watershed to inform restoration efforts and other management actions.

Drafts of the final project reports are expected to be ready this summer.

SCCWRP's Jeff Brown and ABC Labs' Karin Wisenbaker demonstrate sediment sampling methods at Santa Paula Creek in Ventura County during a Stormwater Monitoring Coalition intercalibration exercise in March. The sediment sampling will support a special study evaluating the feasibility of adding sediment quality as an indicator of stream condition.

REGIONAL MONITORING

SMC kicks off second-year sampling with new program elements

The Southern California Stormwater Monitoring Coalition kicked off second-year sampling in March for the second cycle of its Regional Watershed Monitoring Program.

New program elements being incorporated into the second year include a special study evaluating the feasibility of adding sediment quality as an indicator of stream condition. SMC members from the Counties of Orange and Ventura are using protocols developed by the Surface Water Ambient Monitoring Program's Stream Pollution Trends (SPoT) program to test stream sediment samples.

SMC participants also are documenting sediment characteristics to estimate the extent of streams across Southern California where sediment sampling will be feasible in future phases.

Finally, SMC participants are collecting additional data on features associated with engineered channels. SMC aims to use the ranges of observed conditions in different channel types to inform decisions regarding modified stream management and how to maximize their ability to support aquatic life uses.

SMC second-year sampling will continue through July.

INFORMATION TECHNOLOGY & VISUALIZATION

SCCWRP completes feasibility study for stormwater dashboard

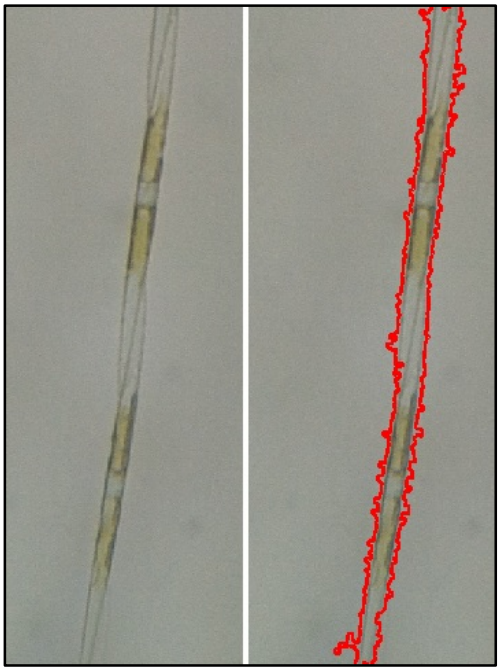
SCCWRP has completed a study examining the feasibility of building a statewide stormwater management dashboard that could help improve data access and communication among stormwater permittees and regulators.

SCCWRP interviewed stormwater managers from three regional boards and nine counties to determine what information and metrics to include in the web-based dashboard interface. SCCWRP also completed mockups of what the interface might look like.

The Southern California Stormwater Monitoring Coalition is interested in using SCCWRP's research to possibly move forward with building the dashboard over the next few years.

Master's students to present CellScope image analysis project at SCCWRP

A group of master's students in statistics at California State University, Fullerton, who have spent the past semester helping SCCWRP automate analysis and processing of microscope photos will present the results of their work at SCCWRP in May.



A raw CellScope Aquatic image of the toxin-producing *Pseudo-nitzschia* diatom, left, is separated into a discrete candidate object, right. Master's students at Cal State Fullerton are developing a statistical model to help SCCWRP identify *Pseudo-nitzschia* in CellScope images.

GIS professionals and aficionados learn about how GIS technologies are being used in aquatic marine environments during a meeting of the newly formed Southern California Marine GIS Users Group. SCCWRP hosted the group's second meeting in March.

The students' project involves developing a statistical model to distinguish images that contain the toxin-producing *Pseudo-nitzschia* diatom from images that do not. The images were all taken by the CellScope Aquatic, a microscope prototype co-developed by SCCWRP that uses a smartphone as the viewfinder.

The students' work will help SCCWRP define procedural approaches for creating an analytical library that can rapidly process samples containing a wide variety of algae and diatoms.

The Cal State Fullerton students, who are enrolled in a statistical consulting course, will present their findings on Friday, May 20 at 1 p.m.; the presentation is open to member agencies and the public.

SCCWRP hosts second meeting of GIS users group

About 30 GIS professionals and aficionados convened at SCCWRP on March 2 for the second meeting of the newly formed Southern California Marine GIS Users Group.

The group heard five presentations, including about marine 3D webscenes and 3D visualization, underwater survey workflows, and rockfish habitat suitability modeling.

The group's next quarterly meeting will be held this summer in San Diego. To be added to the GIS group's email listserver, which is managed by SCCWRP, contact Dr. Steve Steinberg.

New SCCWRP Publications

Journal Articles (Published)

Ambrose, R.F., J.H. Dorsey, K. Johnston, E.D. Stein. 2015. Habitat Conditions: Coastal Wetlands. *Urban Coast* 5(1):59-68.

Brooks, R.P., D. Faber-Langendoen, G. Serenbetz, J. Rocchio, E.D. Stein, K. Walz. 2016. Towards Creating a National Reference Wetlands Registry. *National Wetlands Newsletter* 38(3):7-11.

Cao, Y., M.R. Raith, J.F. Griffith. 2016. A duplex digital PCR assay for simultaneous quantification of the *Enterococcus* spp. and the human Fecal-associated HF183 marker in waters. *Journal of Visualized Experiments* e53611, doi:10.3791/53611.

Cox, H., E.D. Stein, L. Protopapadakis, M. Dojiri. 2015. Water Resources: Water Supply and Use from a Water Quality Perspective. *Urban Coast* 5(1):3-10.

Crago, J., E.G. Xu, A. Kupsco, F. Jia, A.C. Mehinto, W. Lao, K.A. Maruya, J. Gan, D. Schenk. 2016. Trophic transfer and effects of DDT in male hornyhead turbot (Pleuronichthys verticalis) from Palos Verdes Superfund site, CA (USA) and comparisons to field monitoring. *Environmental Pollution* 213:940-948.

Dagit, R., F. Federico, L. Kats, E.D. Stein. 2015. Habitat Conditions: Freshwater Aquatic and Riparian Habitats. *Urban Coast* 5(1):48-58.

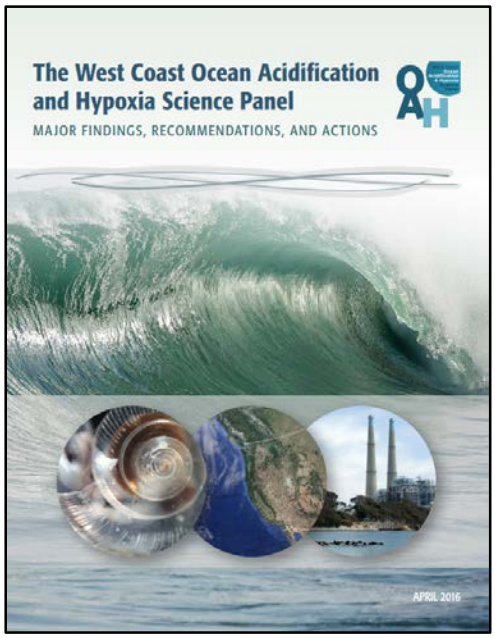
Ferguson, D.M., S.B. Weisberg, C. Hagedorn, K. De Leon, V. Mofidi, J. Wolfe, M. Zimmerman and J.A. Jay. 2016. *Enterococcus* growth on eelgrass (*Zostera marina*); Implications for water quality. *FEMS Microbiology Ecology* 92:1-7. doi: 10.1093/femsec/fiw047.

Graham, E.B., J.E. Knelman, A .Schindlbacher, S. Siciliano, M. Breulmann, A. Yannarell, J.M. Beman, G. Abell, L. Philippot, J. Prosser, A. Foulquier, J.C. Yuste, H.C. Glanville, D. Jones, R. Angel, J. Salminen, R.J. Newton, H. Bürgmann, L.J. Ingram, U. Hamer, H.M. Siljanen, K. Peltoniemi, K. Potthast, L. Bañeras, M. Hartmann, S. Banerjee, R.-Q. Yu, G. Nogaro, A. Richter, M. Koranda, S. Castle, M. Goberna, B. Song, A. Chatterjee, O.C. Nunes, A.R. Lopes, Y. Cao, A. Kaisermann, S. Hallin, M.S. Strickland, J. Garcia-Pausas, J. Barba, H. Kang, K. Isobe, S. Papaspyrou, R. Pastorelli, A. Lagomarsino, E. Lindström, N. Basiliko, D.R. Nemergut. 2016. Microbes as engines of ecosystem function: when does community structure enhance predictions of ecosystem processes? *Frontiers in Microbiology* http://dx.doi.org/10.3389/fmicb.2016.00214.

Fetscher, A.E., E.D. Stein, M.D.A. Howard. 2015. Looking Ahead: Preliminary Examination of Stream Cyanotoxins in Santa Monica Bay and California Watersheds. *Urban Coast* 5(1):198-200.

Griffith, J. 2015. Looking Ahead: New Development in Beach Water Quality Monitoring and Bacterial Source Identification. *Urban Coast* 5(1):180-184.

Griffith, J.F., S.B. Weisberg, B.F. Arnold, Y. Cao, K.C. Schiff, and J.M. Colford Jr. 2016. Epidemiologic evaluation of multiple alternate microbial water quality monitoring indicators at three California beaches. *Water Research* 94, 371-381.



The West Coast Ocean Acidification and Hypoxia Science Panel has released its final recommendations for mitigating the threat of changing seawater chemistry on the West Coast. SCCWRP's Dr. Martha Sutula and Dr. Steve Weisberg served as two of the 20 panelists.

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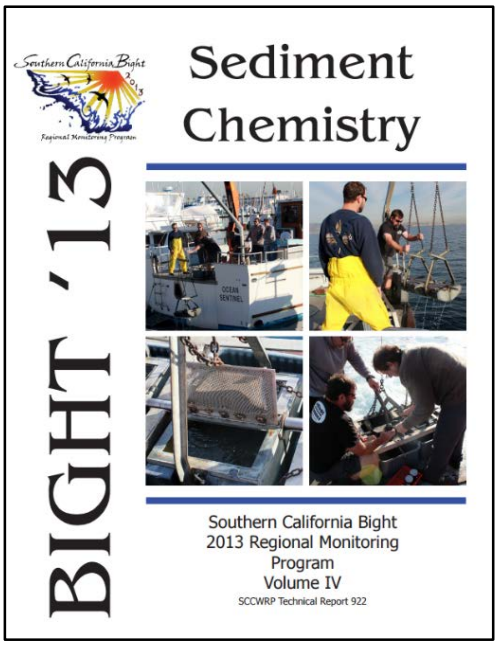

The Bight '13 Sediment Chemistry element has published its final assessment report. Two other Bight '13 reports – Rocky Reefs and Trash and Marine Debris – will be published in the coming weeks.

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Quarter in Review

Conference Presentations

Bay, S.M., and N.G. Dodder. Changes in toxicity and contamination in southern California bays and estuaries. Southern California Society of Environmental Toxicology and Chemistry. April 19-20, 2016. San Diego, CA.

Howard, M. Inland Water Quality Issues Caused By Harmful Algal Blooms in California: Recent Events and New Monitoring Approaches. Western Aquatic Plant Management 2016 Annual Conference. March 21-23, 2016. San Diego, CA.

Kang, D.-K., Y. Cao, J.F. Griffith, W. Zhao. 2016. Development of rapid and sensitive bacteria test for environmental water without sample processing. International Symposium on Potable Reuse. January 25-27, 2016. Long Beach, CA.

McLaughlin, K., N.P. Nezlin, S.B. Weisberg. An Evaluation of Potentiometric pH Sensors in Coastal Monitoring Applications. California Estuarine Research Federation Spring 2016 Conference. April 29-30, 2016. Long Beach, CA.

Stein, E.D. Monitoring the effects of 2015-2016 El Niño on coastal wetlands: Insights to future sea level changes. Newport Bay Conservancy Symposium on Climate Change, El Niño, and Their Impacts on Oceans and Estuaries. January 30, 2016. Newport Beach, CA.

Steinberg, S.J. and M.D.A. Howard. CellScope Aquatic: A lab quality, portable cellphone-based microscope for on-site collection of algae images. Ocean Sciences 2016. February 21-26, 2016. New Orleans, LA.

Theroux, S., W. Hartman, S. Tringe. To Salinity and Beyond: Wetland Microbial Community Response to Restoration. California Estuarine Research Federation Spring 2016 Conference. April 29, 2016. Long Beach, CA.

Conference Posters

Cao, Y., J.F. Griffith, S.B. Weisberg. 2016. The next generation PCR-based quantification method for ambient waters: Digital PCR. USEPA 2016 Recreational Waters Conference. April 12-15, 2016. New Orleans, LA.

McLaughlin, K., Meredith D.A. Howard, C.D.A. Beck, L. Emler, N.P. Nezlin, M. Sutula. Determination of the relative influence of anthropogenic versus natural nitrogen in the Southern California Bight. Ocean Sciences 2016 Meeting. February 21-26, 2016. New Orleans, LA.

McWilliams, J., C. Deutsch, R. Feely, M. Sutula, S. Alin, R. Ambrose, N. Bednarsek, D. Bianchi, H. Frenzel, M. Gold, F. Kessouri, K. McLaughlin, L. Ohlsson, L. Renault, S. Weisberg. Integrated Model of Ocean Acidification and Hypoxia to Support Ecosystem Prediction and Environmental Management in the California Current Ecosystem. Ocean Sciences 2016 Meeting. February 21-26, 2016. New Orleans, LA.

Steele, J.A., K.C. Schiff, A.D. Blackwell, R.T. Noble, J.F. Griffith. Pathogenic Viruses and Bacteria in Storm Water Discharging to Beaches with Year-round Surfer Populations in San Diego, California. USEPA 2016 Recreational Waters Conference. April 12-14, 2016. New Orleans, LA.

Other Presentations

Cao, Y. Application of a Human Fecal Index to Prioritize Beaches for Remediation. Southern California Beach Water Quality Workgroup Meeting. February 17, 2016. Costa Mesa, CA.

Gillett, D. Can Ecological Traits Information Produce Better Assessments of Ecosystem Function? USEPA Coastal Biodiversity Risk Analysis Tool (CBRAT) Traits workshop. March 2, 2016. Lacey, WA.

Gillett, D. Next-generation causal assessment tools. USEPA causal assessment symposium. January 29, 2016. San Diego, CA.

Howard, M. An Overview of Harmful Algal Blooms in California: Impacts and Recent Events. Beach Water Quality Workgroup. February 17, 2016. Costa Mesa, CA.

Howard, M. New Monitoring and Assessment Approaches for HABs in California. EPA Region 10 HABs Workshop. March 29-31, 2016. Seattle, WA.

Schiff, K. Regional monitoring in Southern California. Chapman University Seminar Series. February 19, 2016. Orange, CA.

Schiff, K. Regional monitoring in Southern California. California State University, Long Beach Seminar Series. March 17, 2016. Long Beach, CA.

Stein, E.D. Setting Instream Flow Targets in California Using Biological Community Health Indices. University of Melbourne. February 11, 2016. Melbourne, Australia.

Stein, E.D. Approaches to set instream flow targets. State Water Board and the Department of Water Resources. March 28, 2016. Sacramento, CA.

Stein E.D. Historical Wetland Loss Along the Southern California Coast: A Tool to Inform Regional Restoration Planning. National Academy of Sciences – U.S.-Iran Symposium on Wetlands. March 29, 2016. Irvine, CA.

Stein, E.D. Wetland Restoration Webinar: Evaluating the Ecological Performance of Compensatory Mitigation. Association of State Wetland Managers webinar series "Towards a National Evaluation of Compensatory Mitigation Sites." February 2, 2016.

Theroux, S. Microbial sentinels of climate change and human perturbation. University of California, Irvine. April 21, 2016. Irvine, CA.

Theroux, S., and E.D. Stein. Development of molecular methods to support taxonomic identification of algae for use in bioassessment programs. SWAMP Roundtable. April 5, 2016. Sacramento, CA.

SCCWRP Personnel Notes

Commission and CTAG

Karen Larsen, deputy director of the State Water Board's Division of Water Quality, was appointed to the Commission in February, replacing Vicky Whitney, who retired.

Deborah Halberstadt, executive director of the California Ocean Protection Council and deputy secretary for oceans and coastal policy for the California Natural Resources Agency, was appointed to the Commission in April, replacing Catherine Kuhlman.

Jo Ann Weber, program coordinator for the County of San Diego's Watershed Protection Program, was appointed to CTAG in February, replacing Eric Klein, who moved to a new job with the county.

Departures

Dr. **Doris Vidal-Dorsch,** a scientist in the Toxicology Department since 2001, left SCCWRP in February to pursue new opportunities.

Leadership at Scientific Conferences

Dr. **Raphael Mazor** has been appointed to the planning and program committee for the international Society for Freshwater Sciences Annual Meeting, scheduled for May 2016 in Sacramento.

Ken Schiff has been appointed to the organizing committee for the California Stormwater Quality Association Annual Conference, scheduled for September 2016 in San Diego.

Dr. **Steve Weisberg** organized and chaired a session on bacteriophage at the EPA National Beach Conference in April 2016 in New Orleans, La.

Leadership in Scientific Organizations

Dr. **John Griffith** has been elected chair-elect of the General and Applied Microbiology Division of the American Society for Microbiology.

Appointments and Editorships

Steven Bay has been elected chair of the Santa Monica Bay Restoration Commission Technical Advisory Committee.

Dr. **Raphael Mazor** has been appointed a reviewer for Proposition 1 grant proposals for the San Gabriel River and Mountains Conservancy.

Ken Schiff has been appointed to the University of California's Marine Managed Areas Interagency Coordinating Committee.

Ken Schiff has been appointed to the Expert Advisory Group for Orange County's Infrastructure Report Card.

Ken Schiff has been appointed chair of a Technical Advisory Committee conducting a Cost Benefit Analysis of Wet Weather Bacteria TMDL Compliance in San Diego.

Dr. **Martha Sutula** has been appointed to the Ph.D. committee of Kelly Ramin at the University of California, Irvine.

Awards

Dr. **John Griffith** was honored by the U.S. Environmental Protection Agency in February with two Scientific and Technological Achievement Honorable Mention Awards for his role in advancing water-quality monitoring and measurement methods, and in developing assays to measure waterfowl aquatic fecal contamination.

SCCWRP COMMISSIONER SPOTLIGHT

Toxicologist drawn to state policy development

Karen Larsen couldn't have known she'd be running the State Water Board's Division of Water Quality when she started working as an aquatic toxicologist for a regional board 17 years ago.

Karen Larsen

But from the very beginning, she was fortunate to be exposed to a number of high-level programs that taught her a tremendous amount about the inner workings of the State Water Board and its regional boards.

In 1999, just a few years after finishing college, she was hired as an entry-level environmental scientist for the Central Valley Regional Water Quality Control Board in Rancho Cordova, where she was placed into a unit that oversaw water-quality issues across the Sacramento River watershed. She performed tasks ranging from running stakeholder meetings to developing policy to managing technical studies and monitoring programs.

"I got some very good mentoring and the timing was right," Larsen said. "My initial interest was working on the technical side, but I was placed in a unit where I just happened to get broader exposure."

In February, Larsen was appointed deputy director of the Division of Water Quality, where she oversees 136 employees and a $33 million annual budget. She replaced Vicky Whitney, who retired.

Throughout her career, Larsen's most important mentor has been Valerie Connor, who hired her at the Central Valley regional board in 1999 and then, a decade later, encouraged her to make the leap from the regional board to the State Water Board. Connor had already made this leap herself a few years prior.

Karen Larsen and husband Doug head out for Easter brunch. The couple have two teenage daughters.

Karen Larsen

Job: Deputy director, Division of Water Quality, State Water Resources Control Board

SCCWRP role: Commissioner (2016-present)

Prior jobs: Assistant deputy director, Division of Drinking Water, SWRCB (2014-16); deputy director and assistant deputy director, Office of Information Management and Analysis, SWRCB (2009-14); environmental scientist and senior environmental scientist, Central Valley Regional Water Quality Control Board (1999-2009); post-graduate researcher, Aquatic Toxicology Laboratory, University of California, Davis (1995-99)

Education: B.S. biology, University of California, Davis (1995)

Residence: Carmichael, a suburb of Sacramento

Family: Husband Doug, a school bus driver; daughters Kate, 19, a biomedical engineering major at Colorado State University, and Brooke, 16, who's committed to attending Academy of Art University in fall 2017; dogs Roxie, a terrier chihuahua mix, and Sampson, a bichon mix; cat Chloe

Hometown: Portland, Ore.

Hobbies: Sewing clothes and handbags; crafting; wine tasting; playing golf; camping in the Sierras

In Larsen's first role at the State Water Board in Sacramento, she began tackling her most ambitious project to date: The development of a statewide biointegrity policy to regulate the health of California's perennial streams. The policy, which is still under development, will take advantage of a treasure trove of bioassessment data being collected through the State Water Board's Surface Water Ambient Monitoring Program and similar efforts.

"I don't just want to identify the problems with our watersheds; I want to be involved with how we use our bioassessment data to fix streams and protect the streams that are still in good condition," Larsen said.

Larsen's involvement on the stream biointegrity policy also has brought her into a close working relationship with SCCWRP, which is taking a leading role in developing the technical underpinnings of the program.

"What SCCWRP does more so than any other entity is align pure research and applied science," Larsen said. "SCCWRP figures out how to develop the science we need to make decisions."

CTAG SPOTLIGHT

Discharge waiver keeps biologist's job exciting

About every five to seven years, Dr. Tim Stebbins launches into one of the most exciting and complex aspects of his job: Applying for renewal of a federal 301(h) modified permit that allows San Diego's Point Loma Wastewater Treatment Plant to continue discharging advanced primary effluent into the coastal ocean.

Dr. Tim Stebbins

As one of the last major municipal wastewater treatment plants that has not upgraded to full secondary treatment, Point Loma is subject to stricter regulatory requirements.

For Stebbins, who manages the ocean monitoring program for the City of San Diego Public Utilities Department, the multi-year waiver renewal process means an opportunity to conduct more in-depth analyses and assessments of the scientific data that support the city's application.

"Through this process, we've been able to develop really good working relationships with our regional board, EPA and other stakeholders," said Stebbins, who is working on his fourth waiver application, submitted in 2015. "Now when we have a question, we can just call them up and say, 'This is what we're thinking of doing. What do you think?'"

The waiver process isn't the only aspect of Stebbins' job that sets it apart. San Diego also is in the midst of an initiative to generate one-third of its drinking water supply from recycled sources by 2035. Known as Pure Water San Diego, the program will mean a reduction to the amount of wastewater San Diego discharges into the ocean.

"Although Pure Water isn't going to dramatically affect the breadth and scope of our ocean monitoring program, it's causing us to reexamine how we allocate our resources," Stebbins said. "It's great to do monitoring, but if you could answer the same question for half the cost, then you're better off putting that money elsewhere."

Dr. Tim Stebbins tours Down House, the home of Charles Darwin, with his daughter, Emma, when she studied abroad in London last year.

Timothy Stebbins, Ph.D.

Job: Senior marine biologist, Marine Biology & Ocean Operations Section, City of San Diego Public Utilities Department (2001-present)

SCCWRP role: CTAG representative (2005-present)

Prior jobs: Marine Biologist I-III, Marine Biology & Ocean Operations Section, City of San Diego (1989-2001); Curatorial Assistant, Crustacea Laboratory, Natural History Museum of Los Angeles County (1987-89)

Education: Ph.D. biology, University of Southern California (1988); M.A. biology, Humboldt State University (1982); B.S. zoology, University of California, Davis (1978)

Residence: San Diego

Family: Wife Leslie, a high school health technician; son Thomas, 24, a biology major at California State University, San Marcos; daughter Emma, 22, a psychology major at San Francisco State University; dogs Arlo and Ruby; a chinchilla, Sancho; a gecko, Liz; a tortoise, Gumby

Hometown: Whittier, Calif.

Hobbies: Day hikes with family and dogs; watching movies; attending concerts; reading natural history books

Stebbins said SCCWRP has repeatedly proven its value to San Diego's ocean monitoring program over the years, facilitating productive working relationships with regulators, helping to identify newer technologies, and refining both local and regional monitoring programs.

Stebbins started with the City of San Diego in 1989, shortly after finishing his doctorate in biology at USC. Although he didn't initially plan to spend his entire career in municipal ocean monitoring, professional opportunities and family kept him rooted to his job and the area.

Since 2001, he has overseen a robust ocean monitoring program that encompasses 340 square miles, 23 scientific staff, and 150 to 200 sampling days each year.

Stebbins lives in Rancho Peñasquitos in northern San Diego, where he enjoys spending time outdoors. He and his wife recently began "reliving" their younger days by attending local concerts featuring Paul McCartney, the Rolling Stones, Neil Young and others.

SCCWRP PARTNER SPOTLIGHT

Professor juggles two intertwined, distinct jobs

Dr. Dan Pondella splits his time equally between two jobs that seem very different at first glance, but that actually represent a perfect melding of his professional interests.

Dr. Dan Pondella

He works halftime as director of the Southern California Marine Institute in San Pedro, a consortium of Southern California universities and marine organizations that promotes and facilitates hands-on marine studies for researchers and students.

And he holds a 50% appointment as an associate professor of biology at Occidental College in Los Angeles. There, he serves as department chair overseeing about 140 undergraduate biology majors, teaches up to two marine science classes a year, and runs a campus marine biology lab employing about two dozen undergraduates and five full-time researchers.

"My jobs are a little bit unusual, but they're intertwined," Pondella said. "If I'm teaching at Oxy, I'm looking for students to join my lab. Occidental is part of SCMI, so the fact that SCMI provides research and teaching activities to students is very similar to what I'm already doing at Oxy."

The distinct hats that Pondella wears also advance his overall interest in using science to document and improve the health of Southern California's marine environment.

Consequently, Pondella's interests align perfectly with SCCWRP's, especially via the signature Southern California Bight Regional Monitoring Program that SCCWRP facilitates.

Pondella's involvement in the Bight program began in 2003, when he was hired as a contractor to help collect trawl data. A few years later, he pitched to SCCWRP the idea of adding a rocky reef monitoring component to the Bight program. Program participants agreed to add this element to Bight '08 and again to Bight '13, with Pondella at the helm of its steering committee.

Dr. Dan Pondella, left, dives in Cozumel, Mexico, with wife Alison.

Daniel Pondella II, Ph.D.

Job: Director, Southern California Marine Institute in San Pedro (2012-present); associate professor and chair of biology, Occidental College (2003-present); Director, Vantuna Research Group, Occidental College (1996-present)

SCCWRP role: Chair, Rocky Reef/Marine Protected Areas steering committee, Southern California Bight 2013 Regional Monitoring Program

Prior jobs: Adjunct biology instructor, Santa Monica College and Glendale Community College (1992-96)

Education: Ph.D. biology, University of California, Los Angeles (2001); M.A. biology, Occidental College (1992); A.B. biology and philosophy, Occidental College (1987)

Residence: Hermosa Beach

Family: Wife Alison, a high school teacher; a cat named Point

Hometown: Sherman Oaks, Calif.

Hobbies: Golfing; bike riding and walking along the beach; diving

"SCCWRP is so great because you can't study all of the Bight yourself – there's just no way," Pondella said. "SCCWRP brings people together to work on big regional problems."

Pondella has been fascinated with marine biology since he was a third-grader in the San Fernando Valley. He chose to attend Occidental as an undergraduate specifically for its marine biology program, and went on to earn a master's and work there as a marine researcher.

In 1996, the same year he began his Ph.D. at UCLA, he was appointed director of Occidental's Vantuna Research Group, the campus marine biology lab he still runs to this day. He became an adjunct professor in 2003, two years after earning his Ph.D.

"Oxy is totally supportive of me, and it's been a very positive experience," Pondella said.

Pondella lives in Hermosa Beach within walking distance of King Harbor, where at least one of his Occidental research vessels is always docked. He dives at least once a week with his staff, usually on Fridays. If he wasn't diving for work, Pondella said, he would be doing it for fun.

"My life is very similar to my research interests," he explained.

SCCWRP STAFF SPOTLIGHT

Postdoc's work has ecological, fisheries angles

When Dr. Dovi Kacev decided to focus his postdoctoral work around using molecular approaches to analyze the larvae of fish, he realized there were two sides to this coin: An ecological perspective and a fisheries perspective.

Dr. Dovi Kacev

That's why Kacev is splitting his poctdoctoral tenure between SCCWRP and the Southwest Fisheries Science Center in La Jolla. At SCCWRP, he's coming at his research from the perspective of how the types and distributions of fish larvae can inform scientists' understanding of ecological condition of marine ecosystems. And at Southwest Fisheries, he's working to understand how his research can inform assessment and management of fisheries.

"Molecular tools and genetics have the potential to answer a lot of questions on both the fisheries side and the ecosystem side," Kacev said. "That's why this work represents such a good opportunity for collaboration between these two agencies."

Kacev, who started at SCCWRP in December, is working to design an approach that will allow fish larvae samples collected from the water column to be identified via high-throughput DNA sequencing. This molecular-based identification has the potential to be far cheaper and faster than traditional microscope-based identification methods, Kacev said.

"We want to take an entire larval tow and, instead of sorting them one by one, analyze all of the tissue at once," Kacev said.

Kacev, who was born in South Africa and lived there until moving to San Diego at age 4, developed an appreciation early on for the animal world.

Dr. Dovi Kacev and girlfriend Dallas Brown explore Cape Point in South Africa. Kacev is a native of Johannesburg.

Dovi Kacev, Ph.D.

Job: Joint postdoctoral researcher for SCCWRP and the NOAA Southwest Fisheries Science Center in La Jolla (2015-present)

Prior jobs: Program coordinator, Moishe House Without Walls Jewish development group (2012-13); coastal program coordinator for Tijuana River watershed restoration, Wildcoast (2005-06); accounting assistant for father's electronics parts business (2002-03); pet accessories salesman at mall kiosk (2003-04)

Education: Ph.D. ecology, San Diego State University and University of California, Davis (2015); B.S. biology and B.A. economics, University of California, Los Angeles (2002)

Residence: La Jolla

Family: Parents Les, owner of an electronic parts business, and Glenda, a teacher; brother Benjamin, a lawyer; girlfriend Dallas, marketing director for a wellness and meditation center; dog Isabelle, a miniature schnauzer

Hometown: Johannesburg, South Africa

Hobbies: Surfing, rock climbing, biking

In college, he became interested in marine work and, after finishing his undergraduate studies in 2002, started volunteering part time at the Southwest Fisheries Science Center.

"It got me excited about applied research," Kacev said.

In 2006, Kacev began his Ph.D. in ecology through a joint program offered by San Diego State University and UC Davis. During his second year, he took his coursework at UC Davis.

Kacev first learned about SCCWRP while working under Dr. Rebecca Lewison at San Diego State University, a key SCCWRP collaborator. A few years later, as Kacev was putting together his poctdoctoral project, Dr. Andrew Thompson at Southwest Fisheries suggested he do it in collaboration with SCCWRP.

"SCCWRP plays a very important role in conservation and management," Kacev said. "It spans both government and industry, which makes it a really exciting place to work. It's on this level where real differences can be made."

In his spare time, Kacev enjoys being outdoors. His favorite pastime is surfing, although he insists he's not very good at it.

Learning from their U.S. counterparts

A delegation of 11 wastewater treatment managers from China visited SCCWRP in March to learn about how SCCWRP uses science to improve environmental management. The scientists and executives, who were representing the China Petroleum and Petrochemical Engineering Institute, work at environmental agencies in China that oversee the treatment of petroleum industry wastewater. During their visit, they learned about how SCCWRP disseminates scientific information, transfers technology and builds consensus.

Above, SCCWRP's Dr. Yiping Cao and Dr. Wayne Lao, at far left, give a tour of SCCWRP to a delegation of visiting Chinese wastewater treatment managers in March.

Wastewater treatment managers visiting from China take photos and skim through SCCWRP's 2015 Annual Report, above, during an afternoon tour of the agency's headquarters. The managers were representing the China Petroleum and Petrochemical Engineering Institute, a nonprofit consortium that promotes technological advances in China's petroleum industry, including treatment of petroleum industry wastewater.