



SCCWRP Director's Report



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SUMMER 2015 ISSUE

SCCWRP to test suitcase-sized microbial detection device

A suitcase-sized instrument that could revolutionize the speed at which beach ocean water is tested for microbial contamination is being prepared for an initial round of testing and calibration at SCCWRP after five years of research and development.

The droplet digital PCR instrument was delivered to SCCWRP in early August by Arizona State University researchers, who collaborated with SCCWRP and the Monterey Bay Aquarium Research Institute to conceptualize and build this portable water-quality testing device.

Unlike traditional methods that require water samples to be analyzed in a lab – a process that can take up to 24 hours – the ddPCR machine can be used by a field technician on the beach, producing results within two hours.

SCCWRP, a world leader in adapting ddPCR for environmental monitoring, is preparing to launch extensive laboratory

testing of the device, using both cultures and environmental samples.

Then, in the spring, SCCWRP will begin field testing, followed by beta-testing by local agencies, including SCCWRP's member agencies.

Over the past five years, SCCWRP and the Monterey Bay Aquarium Research Institute have provided expertise and guidance to the Arizona researchers about the design of a reliable, field-deployable ddPCR instrument with an interface so simple that even a beach lifeguard will be able to operate it.

About the size of a small suitcase, the ddPCR instrument will have the capability to detect and quantify microbial targets in the field within two hours of collection.

Shortening the testing window means that public-health officials can warn beachgoers much faster about potentially dangerous levels of pathogens in the water.

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Cover photo

Dr. Joshua Steele calibrates SCCWRP's new portable microbial detection device.

Calendar

Thursday, August 13
CTAG quarterly meeting

Friday, September 11
Commission meeting

Fall 2015 (Date TBD)
CTAG research planning workshop on microbial water quality

Thursday, November 12
CTAG meeting

Friday, December 4
Commission meeting

This technology also could help investigators follow sources of fecal bacteria and other aquatic contamination to their upstream origin.

For more information about the portable ddPCR instrument, contact Dr. [John Griffith](#).

SCCWRP's mobile microbial testing featured in new Nature Methods article

SCCWRP's pioneering work to adapt mobile PCR technology to monitor microbial contaminants in beach ocean water is featured in a new overview article in the journal [Nature Methods](#).

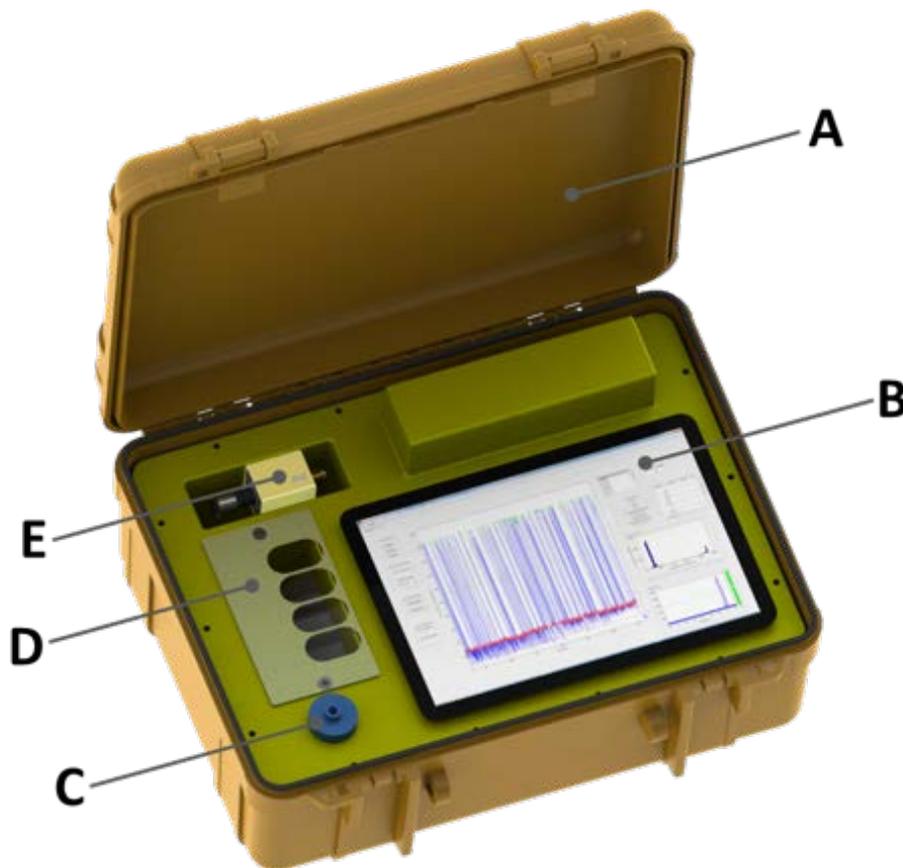
The five-page article, headlined "[PCR heads into the field](#)" and published in the journal's May issue, devotes an extensive write-up to SCCWRP's ongoing efforts to develop a mobile, suitcase-style laboratory that can more rapidly detect microbial contaminants using droplet digital PCR.

Nature Methods is a publication of the prestigious journal Nature that focuses on laboratory techniques and practices.

The journal quotes Dr. John Griffith, head of the Microbiology Department, discussing the many potential applications of this mobile testing lab, including rapid detection of disease-causing pathogens in fishery waters and inclusion as a sensor on autonomous underwater vehicles.

SCCWRP's research on using ddPCR methods to develop rapid microbial monitoring methods also was featured last year in a [magazine article and accompanying short documentary](#) from the life sciences company Bio-Rad.

For more information about SCCWRP's ddPCR work and to request a copy of the Nature Methods article for personal use, contact [John Griffith](#).



SCCWRP is planning to test the utility of a suitcase-sized droplet digital PCR instrument that could dramatically speed up how quickly beach ocean water can be tested for microbial contamination. This rendering shows the plastic housing (A), a tablet PC mounted inside (B), the sample injection port (C), the rapid-replace consumable reagent bay (D), and the target primer library (E).

XPRIZE-developed pH sensors being tested as Bight profilers

SCCWRP and its four POTW member agencies have kicked off a year-long effort to evaluate whether ocean pH monitoring instruments developed through an international XPRIZE competition can be used effectively for nearshore regulatory monitoring in the Southern California Bight.

SCCWRP – along with the Sanitation Districts of Los Angeles County, City of Los Angeles Sanitation, Orange County Sanitation District, and City of San Diego Public Utilities Department – completed a test deployment in early August during a training exercise in the nearshore waters off Crystal Cove. Next, the member

agencies will deploy the XPRIZE sensors during their routine regulatory monitoring.

All semifinalists in the XPRIZE's \$2 million [Wendy Schmidt Ocean Health competition](#) have been invited to compete in SCCWRP's post-prize competition to assess the potential regulatory application of their devices.

The main XPRIZE competition, which concluded in July, was a global contest that invited researchers to design and build next-generation pH sensor technologies that improve the ability to measure ocean chemistry and accurately track ocean acidification trends. The

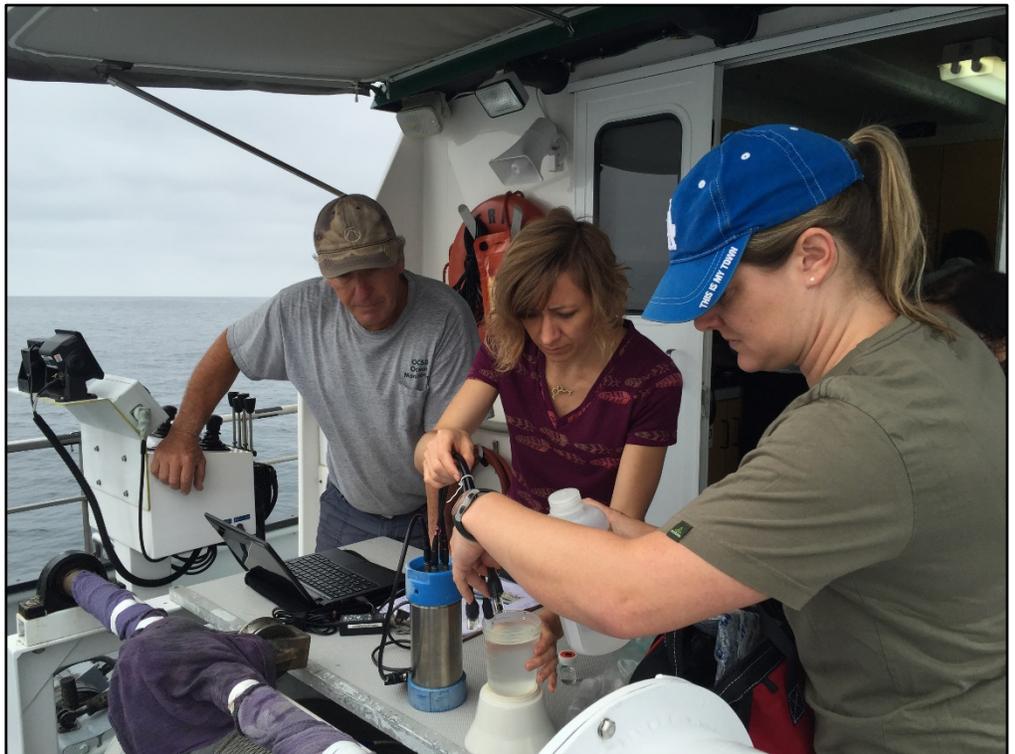
winner was Sunburst Sensors of Missoula, Mont.

The goal of the SCCWRP-facilitated post-prize competition is to identify one or more viable XPRIZE technologies to replace glass electrodes, which are the standard pH profiling instrument used for nearshore regulatory monitoring.

SCCWRP has previously demonstrated that glass electrodes cannot track changes at the level of precision required to address California's Ocean Plan Standard, which mandates that ocean pH must not be changed by more than ± 0.2 pH units from that which occurs naturally.

So far, three finalists from the XPRIZE competition have submitted their sensors for post-prize evaluation: the **ANB sensor**, a novel electrochemical electrochemical system that can measure pH of low-ionic-strength solutions with no natural buffer; the **Cross Strait sensor**, a device built with micro solid ion selective electrodes (ISEs) and designed for resistance to ocean bio-fouling and chemo-fouling; and the **SINDEN sensor**, a non-glass *in situ* pH sensor that uses an ion sensitive field effect transistor (ISFET) as the pH electrode and a chloride ion selective electrode (Cl-ISE) as the reference electrode.

SCCWRP also is pursuing other strategies for improving the precision of routine pH



George Robertson of the Orange County Sanitation District, left, and Ashley Booth, center, and Erin Oderlin of the City of Los Angeles Sanitation calibrate and prepare an XPRIZE-developed ocean pH monitoring sensor for a test deployment in nearshore waters off Crystal Cove. All four of SCCWRP's POTW member agencies participated in the training exercise in early August.

ocean profiling. As part of Bight '13, SCCWRP and its member agencies are investigating use of discrete pH bottle measurements to improve *in situ* calibration with glass electrodes.

For more information about the SCCWRP-facilitated regulatory evaluation phase of the XPRIZE prototype sensors, contact Dr. [Karen McLaughlin](#).



Multiple varieties of algal matter cover the rocky floor of the Santa Margarita River watershed near Temecula. The science plan that SCCWRP and its partners have written to support development of statewide nutrient objectives is intended to limit nutrient inputs that are triggering eutrophication in wadeable streams statewide.

Expert panel evaluates SCCWRP nutrient science plan

A four-member expert review panel tasked with reviewing a science plan supporting the State Water Board's effort to develop nutrient objectives for California wadeable streams has concluded that SCCWRP's approach is "thorough and state-of-the-art," with appropriate opportunities to engage stakeholders throughout the process.

The review process culminated with a two-day panel meeting at SCCWRP in June, and marks an important milestone for this multi-year project, which is expected to

conclude in 2017. SCCWRP leads a team of scientists from Tetra Tech Inc. and the U.S. Environmental Protection Agency's Office of Research and Development that has produced the "[Science Plan to Support the Development of a Nutrient Control Program for California Wadeable Streams](#)."

In particular, the review panel applauded SCCWRP's plan to use a consensus approach among experts to establish eutrophication indicator ranges that correspond to particular levels of

ecological condition, a concept known as the Biological Condition Gradient (BCG) Model. Tetra Tech and SCCWRP will begin development of the model this fall, allowing experts to use indicator data from stream algae and/or benthic macroinvertebrates to place stream sites into classes based on their condition.

The BCG model is intended to improve policymakers' understanding of what nutrient targets are realistically attainable

for a variety of common stream types across California.

The expert panel also issued a series of recommendations to SCCWRP designed to improve transparency during the development of nutrient objectives for streams. The panel recommended, among other things, that stakeholders be furnished with tools that can more explicitly link nutrient source information to the concentrations of nutrients

observed in a stream. The panel also recommended that more specific information be provided regarding how uncertainty will be quantified in statistical models that predict the effects of nutrients on biological responses.

To request a copy of the expert review panel's full report, or for more information about this project, contact Dr. [Martha Sutula](#).

Stream survey tracks biological degradation across Southern California

A five-year monitoring study of Southern California's perennial wadeable streams has found that 75% of the region's 4,300 miles of streams are degraded, with no discernable improvements in the health of the streams from 2009 to 2013.

The comprehensive study with the Southern California Stormwater Monitoring Coalition also identified the stressors most likely to be associated with degraded biological condition: sulfate, habitat degradation, and the nutrients nitrogen and phosphorus.

The study's findings, which were [published as a SCCWRP technical report](#) in June, have paved the way for environmental managers to refocus their efforts, as the stressors that have historically received the most attention – metals, pyrethroids and toxicity – were found to be spatially limited or weakly associated with degraded biological condition.

The survey also has paved the way for a second, five-year monitoring cycle, which [kicked off in 2014](#). The second cycle will be expanded to include nonperennial streams, a critical habitat that makes up more than half of all streams in Southern California.



Caballero Creek, a channelized, algae-filled stream in the Los Angeles watershed, exemplifies severe habitat alteration and nutrient enrichment, which are two of the main factors believed to be responsible for the biological degradation of 75% of Southern California's 4,300 miles of perennial streams. A SCCWRP-facilitated monitoring study from 2009 to 2013 indicated that the biological condition of the streams showed no signs of improvement over the five-year period.

The second cycle also will examine knowledge gaps concerning the biological impacts imposed by channel engineering and the linkage with biotic integrity.

For more information about the Stormwater Monitoring Coalition's Regional Watershed Monitoring Program, which is facilitated by SCCWRP, contact [Ken Schiff](#).

Pilot study launched to test SCCWRP's new CEC monitoring framework statewide

SCCWRP has launched a three-year pilot study to evaluate its newly developed CEC monitoring framework across Southern California watersheds, an effort to understand how to effectively apply the framework to identify and monitor the most relevant environmental contaminants in receiving waters statewide.

The pilot study, launched in May, will test the effectiveness of the [CEC monitoring framework developed by SCCWRP](#) last year. This framework incorporates [bioanalytical screening tools](#) and diagnostic non-targeted chemical analyses to improve CEC monitoring; the framework is intended to improve upon the traditional, chemical-specific, risk-based paradigm, which has not been able to keep pace with the many thousands of chemicals introduced via stormwater runoff to ambient receiving waters.

SCCWRP worked with the Southern California Stormwater Monitoring Coalition's Regional Watershed Monitoring Program to collect water samples from 30 sites in Los Angeles,



SCCWRP's Darcy VanDervort processes receiving water samples to prepare them for screening with a bioassay developed by SCCWRP. The CEC bioassay is the first level of screening within a new, multi-tiered CEC assessment framework.

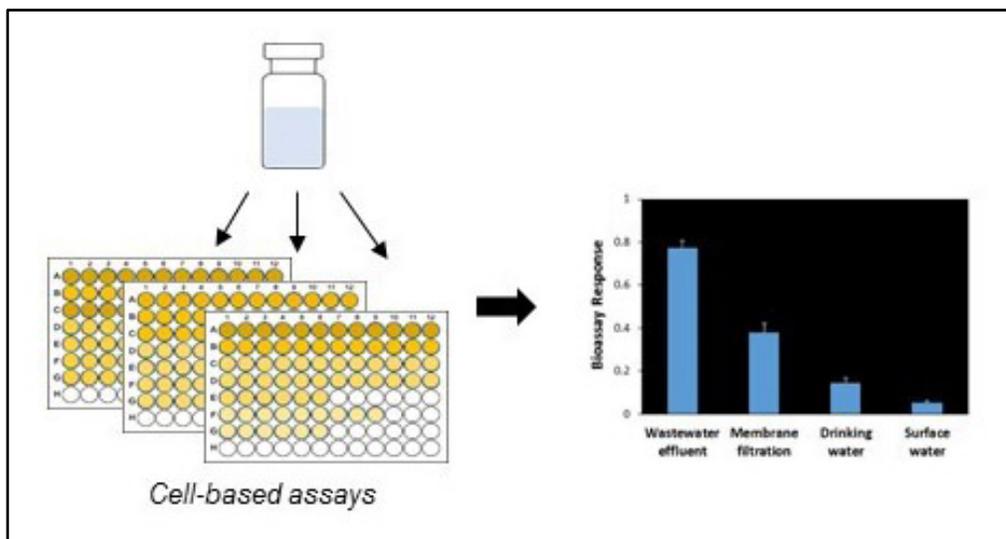
Orange/Riverside and San Diego counties in May. With Year 1 sampling and processing recently completed, SCCWRP

has commenced screening the samples using *in vitro* CEC bioassays.

Once screening by bioassays is complete, the CEC framework may call for diagnostic non-targeted chemical analysis to identify bioactive contaminants missed by conventional monitoring (i.e., the targeted chemical analysis).

The Stormwater Monitoring Coalition pilot study marks the first opportunity to test the CEC monitoring framework. SCCWRP is collaborating with water-quality managers across California to conduct other regional and statewide pilot studies to further develop and test this framework.

For more information, contact Dr. [Keith Maruya](#).



Bioanalytical screening involves using cell-based assays to comprehensively screen for the presence of CECs in a receiving water sample. The bioassay is designed to offer a strong response signal in the presence of CECs.

SCCWRP hosts transcontinental stormwater management workshop in India

Leading stormwater scientists from across three continents came together at a SCCWRP-facilitated forum in India in March to discuss more effective ways to capture and use rainfall runoff in drought-prone areas.

The two-day workshop, which was funded through a grant from the Indo-U.S. Science and Technology Forum, brought together 16 scientists from the United States, India and Australia for an in-depth discussion on large-scale best practices for urban stormwater management. Five participants came from the Indian Institute of Technology (IIT), two from the Indian Institute of Science (IISc), four from the University of California, Irvine, one from UCLA, and one from the University of Melbourne. All but five were able to attend in person.

The workshop, titled "[Transforming Stormwater into a Resource: Design, Risks, & Benefits](#)," took place March 16-17 at the Metropolitan Hotel in downtown New Dehli. It was organized by SCCWRP hydrogeologist Dr. Ashmita Sengupta and a counterpart at the Indian Institute of Technology, Dr. M.L. Kansal. Dr. Eric Stein, head of SCCWRP's Biology Department, also attended.

Four review papers that follow from that workshop will explore various facets of using low-impact development (LID) strategies to reclaim stormwater in the U.S. and India.

The first paper will focus on the hydrological and ecological impacts of climate change on India and the U.S. The second will examine how different nations define and monitor environmental flows. The third will delve into governance issues



Leading stormwater scientists from three continents gather for a two-day stormwater management workshop in March in New Dehli, India. Top row, from left, Amir AghaKouchak (UCI), Sekhar Muddu (IISc), Ashok Keshari (IIT), M.L. Kansal (IIT), Ashmita Sengupta (SCCWRP), Dhanya C.T. (IIT), and Pradeep Mujumdar (IISc). Bottom row, Richard Ambrose (UCLA), Eric Stein (SCCWRP), Jean-Daniel Saphores (UCI), and Cameron Patel (UCI).

associated with water management offsets. And the fourth will look at future demand for recycled stormwater and obstacles to implementation.

The review papers are expected to be published by the end of 2015.

The India stormwater workshop was one of seven proposals selected by the Indo-U.S. Science and Technology Forum to be funded for 2014-15. Grant winners were announced in July 2014.

The [annual IUSSTF workshops](#) take place in either India or the United States, and span a wide variety of science and technology disciplines. IUSSTF's goal is to promote interaction and collaboration between U.S. and Indian researchers in academia, R&D laboratories, industry and government.

For more information about the workshop, contact Dr. [Ashmita Sengupta](#).

BIOASSESSMENT

SCCWRP applies bioassessment index to streams statewide

A new scoring tool that was developed to assess the biological condition of California's wadeable streams has been applied for the first time to all wadeable streams statewide, with the results showing that about 44% of California's 23,877 miles of streams are in good biological condition.

The [2015 Perennial Streams Assessment](#) report, released in June by the State Water Board's Surface Water Ambient Monitoring Program (SWAMP), marks the most comprehensive assessment of wadeable streams ever conducted in California.

The sweeping assessment was conducted using the [California Stream Condition Index](#) (CSCI), a scoring tool released in 2013 by SCCWRP and the California Department of Fish and Wildlife. The next-generation scoring tool translates complex data about benthic invertebrate communities living in a stream into an overall measure of stream health.

The wadeable stream assessment incorporated 13 years of monitoring data (2000 to 2012) collected from nearly 1,400 sampling sites.

While 44% of stream miles were calculated to be in good biological condition, 34% were in degraded (i.e., poor or very poor) condition and 22% were in fair condition.

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

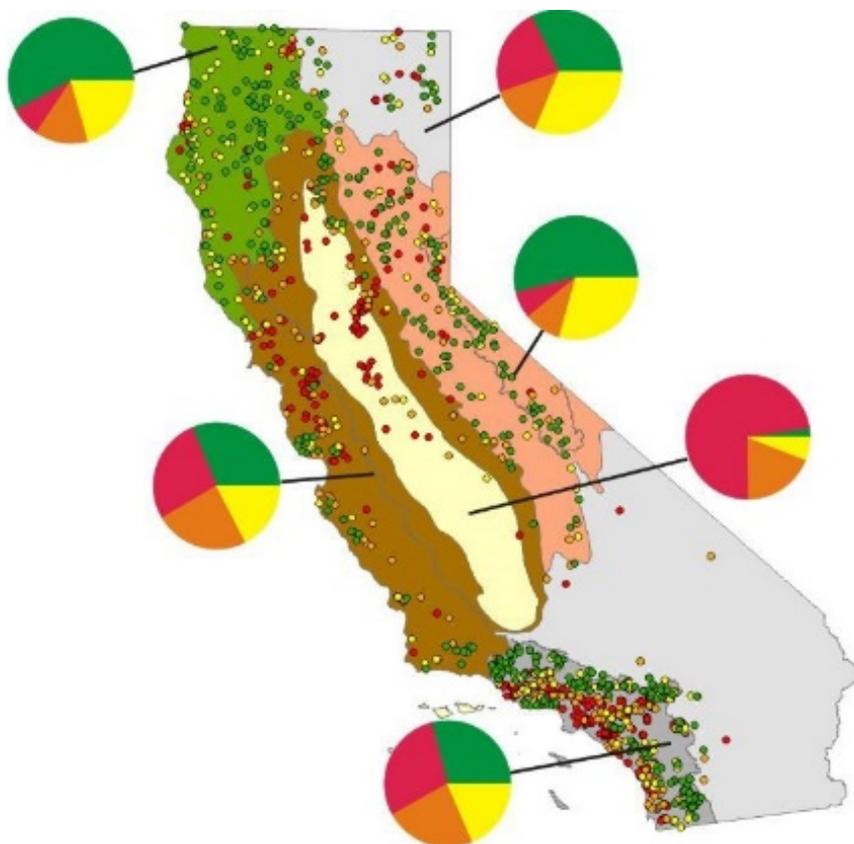
In brief ...

Historical benthos study underway: SCCWRP's four POTW member agencies have created a uniform data set, including a uniform taxonomic list, for four decades of Southern California Bight benthic monitoring data. This is the first step in a historical study examining the relative influences of local and regional stressors on macrobenthic biological communities

from the 1970s to the present. SCCWRP also is working to consolidate corresponding data sets regarding chemistry and sediment composition.

CSCI automation project moving forward: SCCWRP has been working with the State Water Board to prepare a feasibility assessment and draft scope of

work for a project that will automate the process of using the California Stream Condition Index (CSCI). The index uses complex computer algorithms to calculate a numerical score for the condition of wadeable streams; automating the calculations will facilitate its transfer to management applications.



The California Stream Condition Index has revealed what portion of wadeable streams in each of six regions in California are in good (green), fair (yellow), poor (orange), and very poor (red) condition. The Central Valley is home to the highest portion of stream miles in poor biological condition, according to the analysis.

San Diego bio-objectives planning to be prioritized: SCCWRP met with the San Diego Regional Water Quality Control Board in early August to prioritize research and planning efforts related to the creation of a bio-objectives program for the state and the region. The bio-objectives program will use benthic macroinvertebrate indicators.

San Diego causal assessment developing action plan: SCCWRP and its partners have started developing a post-causal assessment action plan for the San Diego River Watershed as part of an ongoing causal assessment pilot study there. The actions focus on stressors previously identified as likely causes of impairment (synthetic pyrethroid pesticides and

elevated conductivity) and stressors identified as indeterminate (altered physical habitat and elevated nutrients) from the initial causal assessment.

SEDIMENT QUALITY

Bight '13 toxicity data suggest sediment quality is improving

Sediment toxicity testing conducted as part of the [2013 Southern California Bight Regional Monitoring Program](#) has revealed evidence of continuing improvement to sediment quality, according to the findings of the Bight '13 Sediment Toxicity Report that is out for final review.

More than 88% of Bight sediments were found to be nontoxic, and most of the

toxicity detected was of low severity.

In particular, bays and estuaries – traditionally the locations of greatest impact – showed a continuing trend of toxicity improvement relative to past Bight surveys.

While the toxicity report provides evidence of improving sediment quality, the toxicity data alone are not sufficient to provide

conclusive evidence. That's because sediment quality assessments are based on three measures of condition; data analysis for these other two measures – chemistry and benthic macrofaunal community composition – is ongoing.

The Bight '13 Sediment Toxicity Report, set to be published in August, will be the first in a series of Bight '13 technical reports that will be issued over the next few years.

The toxicity report incorporates data from six toxicity testing laboratories, including those of four SCCWRP member agencies, which tested a combined 232 samples collected from bays, estuaries, the offshore shelf and submarine canyons.

Toxicity was measured using two methods: survival of sediment-dwelling amphipods, and development of mussel embryos.

Among the key changes made for Bight '13 toxicity data collection was expanding sampling into submarine canyons for the first time. The data revealed that these canyon sediments had a much greater extent of toxicity (16% of area) compared to surrounding shelf sediments (<2%).

The likely cause and significance of this result will be determined once the Bight '13 sediment chemistry and biology analyses are completed.

For more information about the Bight sediment toxicity results, contact [Steve Bay](#).



Bight '13 toxicity sampling begins with collecting grab samples in summer 2013 (top left and bottom left), then exposing amphipods (top right) to a layer of surface sediment in a beaker (bottom right) to study their survival rates.

In brief ...

Fishing derby held for bioaccumulation study: SCCWRP and Amec Foster Wheeler hosted a day-long fishing derby June 6 in San Diego Bay to collect representative sport fish samples for a bioaccumulation study evaluating human consumption risk from seafood contamination. Nearly 100 volunteer anglers donated 90 specimens from 11 species, greatly enhancing the number and diversity of samples for the study. The samples will be analyzed in the coming months.

Harbors SQO compliance framework developed: The Harbors Technical Workgroup (HTWG), facilitated by SCCWRP, has developed a compliance framework for the toxics TMDL in Los Angeles and Long Beach Harbors that is intended to assess compliance with the state's Sediment Quality Objectives (SQOs) regulations for aquatic life. The framework, completed in June, assesses the spatial extent of impacted sediments and incorporates regional monitoring and stressor identification data. The State Water Board is planning to adapt the framework for other programs.



SCCWRP's Patricia Gonzalez processes fish samples collected from volunteer anglers in San Diego Bay during the day-long Fishing for Science Derby. The anglers fished from piers and the shore as well as from personal watercraft, donating 90 specimens in all.

CONTAMINANTS OF EMERGING CONCERN

In brief ...

EDC bioassay study moving forward: SCCWRP has completed a second round of dose-response testing for a study that is examining how *Menidia* spp., an estuarine fish, responds to endocrine-disrupting chemicals (EDCs). The study's goal is to quantify the relationship between observed biological impacts and the responses of an *in vitro* bioassay screening tool. By September, SCCWRP expects to select an optimal wastewater effluent sample for the final round of testing.

CEC catalog results to be presented: Interim results of a two-year project to

catalog bioaccumulative, halogenated chemicals in marine birds and mammals will be presented at the International Dioxin Conference in Brazil in August, followed by a Society of Environmental Toxicology and Chemistry (SETAC) conference in November. The catalog is being built from data obtained with a type of non-targeted chemical analysis called "two-dimensional gas chromatography time-of-flight mass spectrometry." The catalog will inform future monitoring of bioaccumulative CECs.

Passive-sampling pesticide study underway: SCCWRP in June finished compiling field data collected from a series of passive-sampling deployments in the Southern California Bight. The data will be used in a study examining how passive sampling methods (PSMs) can more accurately be applied in field situations. Data from these multiple field deployments will allow SCCWRP to correct for non-equilibrium conditions, which is important in improving PSM accuracy. Next, SCCWRP is planning to apply the newly developed PSMs to contaminated sediments in San Diego Bay.

EUTROPHICATION

In brief ...

CyanoHABs strategy report nearing completion: A report that outlines a proposed statewide monitoring strategy for cyanobacterial toxins and blooms is nearing completion, with a public draft expected to be released by the end of August. The cyanoHABs strategy, which SCCWRP has taken the lead on developing, is intended to unify monitoring and research efforts that are taking place in various freshwater habitats and the coastal zone across California. The final report is expected to be released in late fall.

SCCWRP launches cyanotoxin lake study: SCCWRP in May kicked off a two-year project to study cyanotoxins in two Riverside County lakes. The study, which is

being done in collaboration with California State University, San Bernardino, involves using resin-filled bags to adsorb cyanotoxins from the water column, a new technology known as solid phase adsorption toxin tracking (SPATT).

Bight nutrient modeling work making progress: SCCWRP in August will launch the second of two sampling events intended to gather data for development of a coupled physical-biogeochemical model predicting the effects of anthropogenic nutrients on ocean acidification and hypoxia in the California Current, including the Southern California Bight. SCCWRP is working to compile "process study" data on ocean ambient conditions and rates of biogeochemical

processes, which will be critical pieces for the causal modeling project. Separately, SCCWRP helped compile atmospheric deposition data from the Community Multi-Scale Air Quality model, which also will feed into the coupled physical-biogeochemical model.

Outfall diversion journal issue almost finished: SCCWRP is working with the journal *Estuarine Coastal and Shelf Science* to put the finishing touches on a special journal issue examining the findings of a "living experiment" in which the Orange County Sanitation District's offshore deepwater pipe was temporarily diverted during routine maintenance to a nearshore pipe in the photic zone. The special issue will be released this fall.

MICROBIAL WATER QUALITY

In brief ...



SCCWRP field technicians set up tanks filled with diluted sewage on the patio of Kerckhoff Marine Laboratory in Newport Beach. The mesocosm experiments are part of a study examining the relative degradation of source-associated DNA markers, fecal indicator bacteria and pathogens.

Microbial source tracking experiments completed: SCCWRP and its partners in May completed the final round of mesocosm experiments at the Kerckhoff Marine Laboratory in Newport Beach to gauge degradation of source-associated markers, fecal indicator bacteria, and pathogens in the different major water types found in California. Laboratory and data analysis is underway. The findings will feed into a study that is seeking to develop standardized protocols for identifying microbial contamination sources at beaches statewide.

QMRA sampling wraps up: SCCWRP in March completed daily sampling and sample processing for a study that seeks to determine whether the Quantitative Microbial Risk Assessment (QMRA) method is effective at discerning whether fecal indicator bacteria at beaches are predominantly from human vs. non-human sources. Molecular analysis of the general and human-associated fecal indicators is ongoing.

ECOHYDROLOGY

Case study for flow-ecology framework kicks off in San Diego

SCCWRP and its partners kicked off a case study in May that aims to demonstrate the utility of using a scientific framework known as the [Ecological Limits of Hydrologic Alteration](#) (ELOHA) to evaluate environmental flow requirements in the San Diego River Watershed.

The flow ecology demonstration project will use the ELOHA framework to guide management targets and decision-making regarding flow needs within the 440-square-mile watershed. ELOHA relies on existing hydrologic and biological response data to figure out what are appropriate environmental flows that will support in-stream biological communities.

A kickoff meeting for the project, held May 20, was attended by 20 members of the

[San Diego River Watershed monitoring workgroup](#); the full demonstration begins this fall.

The San Diego demonstration project is part of a larger ELOHA analysis that seeks to develop recommended flow objectives for protecting the biological integrity of perennial and intermittent streams across Southern California.

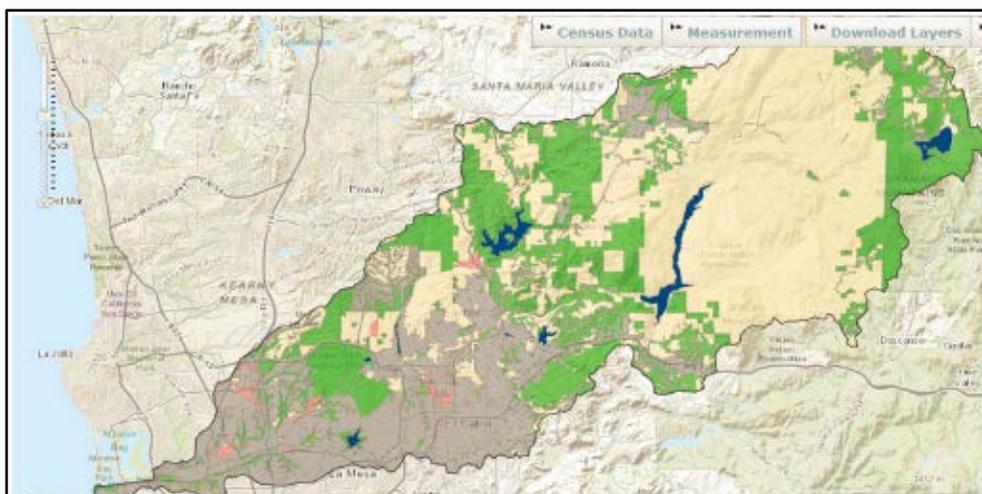
SCCWRP and its San Diego partners will work to apply previously developed ELOHA technical tools to the San Diego watershed, with the goal of building a generic framework that could be implemented more broadly in other areas and watersheds.

During the project, SCCWRP and its

partners will recommend to watershed managers specific hydrologic profiles that can support identified biological objectives. Project participants also are aiming to identify additional tools necessary for analysis and modeling, as well as to understand barriers to development of flow targets.

The San Diego River Watershed was selected for the ELOHA demonstration project for a number of reasons, including its active and ongoing watershed monitoring program, its geographical diversity, and an engaged workgroup willing to partner with SCCWRP on the project.

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



The San Diego River watershed offers an active, integrated monitoring program and geographical diversity, which makes it an ideal choice for a demonstration study testing the utility of ELOHA. The framework aims to help stream managers set flow targets that support in-stream biological health.

In brief ...

Ungaged stream models ready for ELOHA study: SCCWRP in early August wrapped up the model selection process for a study that will use the ELOHA framework to evaluate flow requirements for wadeable streams across Southern California. SCCWRP developed, calibrated and cross-validated a series of 45 catchment-scale predictive models for use in calculating key flow metrics for about 850 ungaged Southern California stream sites. Then, SCCWRP developed a model selection tool for determining the most appropriate model to use at each ungaged site.

WETLANDS

Standard protocols for estuary assessments published in manual

The [Santa Monica Bay Foundation](#) and its partners, including SCCWRP, have completed a draft guidance document that establishes standard protocols for monitoring and assessing coastal lagoons and intertidal estuaries in Southern California.

The guidance manual was submitted in June to the U.S. Environmental Protection Agency for final review and publication; it marks the first time that intensive, site-specific assessment methods have been standardized for use in coastal estuaries and lagoons across Southern California.

Standard operating procedures are important because they allow for comparison between sites and thus allow

for data about wetland condition to be compiled at a regional and statewide level.

The guidance manual, titled "Standard Procedures for Estuarine Wetland Monitoring Manual," features procedures for monitoring soil/sediment, water quality, invertebrates, fish, birds and mammals. For each parameter, simple and intensive levels of assessment are summarized, along with information on accuracy, repeatability, time and cost considerations.

The intent is that individual projects or sites can develop specific ambient monitoring programs designed to meet their objectives/questions by using different combinations of procedures from

the manual.

The standardized protocols for each parameter were selected based on a review of previously developed methods and analysis of their relationship with rapid assessment data.

The guidance manual represents a major breakthrough in efforts to share site-specific assessment information among studies. The lack of a consistent approach fostered redundancy, with each site developing independent protocols and generating data that could not be compared.

Standardized protocols are already in place for rapid assessments, including the [California Rapid Assessment Method](#).

The guidance manual is expected to be released this fall. For more information, contact Dr. [Eric Stein](#).



The Los Cerritos Wetlands complex near the mouth of the San Gabriel River is an example of a wetlands area where researchers are interested in conducting condition assessments at specific sites. The sites of interest, identified in this aerial photo with yellow lines, are in the Steamshovel Slough zone.

In brief ...

Guide to wetland tracking published: SCCWRP in May published a report that demonstrates how to estimate the extent, distribution and change over time to California's wetlands. The report, titled "[Demonstrating the California Wetland Status and Trends Program: A Probabilistic Approach for Estimating Statewide Aquatic Resource Extent, Distribution and Change over Time](#)," mapped 110 plots in California to show how to apply the California Wetland Status and Trends Program, which was adapted from a federal program.

REGIONAL MONITORING

In brief ...

First Bight '13 reports nearing completion: An initial round of Bight '13 final assessment reports are being prepared for publication as some elements of the 2013 cycle of the Southern California Bight Regional Monitoring Program wind down. The sediment toxicity volume of the Contaminant Impact Assessment report is being reviewed by the Planning Committee, and the fish and sediment chemistry volumes are expected to be reviewed this fall; they are wrapping up their quality assurance activities and data analysis this summer.

Bight '13 Microbiology extends sampling by a year: The Bight '13 Planning Committee has decided to extend beach water quality sampling for the Microbiology element by one year to accommodate California's extreme drought, which has impacted the ability to collect sufficient wet-weather data. Sampling will now continue through spring 2016. Despite this challenge, the Microbiology element has achieved its goal of transferring new microbial detection methods successfully to SCCWRP member agencies and other public health laboratories.

Bight '13 Nutrients element partners with NOAA to model OA: The Bight '13 Nutrients element has partnered with NOAA to develop predictive models aimed at understanding whether reducing nutrient levels at local ocean outfalls might be able to offset global ocean acidification. SCCWRP and NOAA will work over the next two years to collect the necessary data and to build the models. The goal is to predict whether management actions that reduce nutrient outputs at ocean outfalls reduce or delay the impacts of ocean acidification.

INFORMATION TECHNOLOGY & VISUALIZATION

CTAG user groups delve into next-gen tech projects at first meetings

Two new CTAG user groups that will pool together resources and expertise from SCCWRP's member agencies to tackle next-generation data acquisition and visualization technology projects met for the first time in May and June.

The Data Acquisition Users Group, which met May 26, decided to move forward with a pilot project that will adapt field data entry forms for use on mobile platforms. A subset of this user group met again a month later, on June 24, to develop specific guidelines and protocols for writing and organizing the code for this project.

The Analysis and Visualization Users Group, which met June 17, decided to begin developing web-based calculator tools to generate data for the SCCWRP-developed Fish Response Index and Fecal Indicator Bacteria Index. A follow-up meeting on August 4 attracted renowned statistician [Dr. Andrew Robinson](#) of the University of Melbourne in Australia, who provided expert guidance to group members.



Members of the new CTAG Data Acquisition Users Group discuss their pilot effort to adapt field data entry forms for use on mobile platforms at their first meeting in May at SCCWRP. The group is an outgrowth of a day-long planning workshop between SCCWRP and CTAG staff about the future of information technology and visualization research.

Both user groups are an outgrowth of a day-long research planning workshop in January, when CTAG and SCCWRP staff came together to solidify [the long-range vision for SCCWRP's Information Technology & Visualization](#) research area.

The user groups have been well-attended, attracting 15 to 16 participants each at

their kickoff meetings. The Data Acquisition Users Group is led by [Larry Cooper](#) and [Paul Smith](#) of the SCCWRP Information Management & Analysis Department; the Analysis And Visualization Users Group is led by [Shelly Moore](#).

The Data Acquisition Users Group already has scheduled its third meeting for Sept. 23, when members are scheduled to begin contributing code to the mobile data entry project.

For more information about the CTAG user groups, contact [Dr. Steve Steinberg](#).

In brief ...

CellScope testing initiated: SCCWRP has begun testing the utility of the CellScope portable microscope to collect environmental images in the field. Five of the devices, which use a smartphone camera as the viewfinder, were deployed this summer for testing by SCCWRP, San Diego Regional Water Quality Control Board, University of Southern California, and University of California, Santa Cruz. Initial feedback from users indicates the microscope is effective in both marine and freshwater settings.

Angler consumption survey underway: SCCWRP has developed a custom-built tablet app to survey San Diego Bay anglers about their fishing behavior and

consumption habits, part of the ongoing San Diego Bay Fish Consumption Study. Interview responses have already been collected from approximately 800 anglers since May 1. The app returns survey data wirelessly to SCCWRP at the conclusion of each sampling day. Surveying will continue for a full calendar year to capture possible seasonal variations.

Automation added to consumption study reporting: SCCWRP in June rolled out R scripts that can automatically process, summarize and produced a PDF status report for the San Diego Bay Fish Consumption Study, allowing project participants to easily gain a snapshot of where the study stands in real time. The

automation also will expedite the final project report. The CTAG Analysis and Visualization Users Group intends to use the project as a template for developing similar automated analysis and reporting tools.

Data management recommendations finalized: A technical advisory group tasked with reviewing recommendations for San Diego County's proposed new Integrated Water Resource Data Management System approved the final draft report in May with minor revisions. The recommendations will be presented to the San Diego County Regional Advisory Committee on October 7.

New SCCWRP Publications

Journal Articles (Published)

Barton, A., G.G. Waldbusser, R.A. Feely, S.B. [Weisberg](#), J.A. Newton, B. Hales, S. Cudd, B. Eudeline, C.J. Langdon, I. Jefferds, T. King, A. Suhrbier, K. [McLaughlin](#). 2015. [Impacts of coastal acidification on the Pacific Northwest shellfish industry and adaptation strategies implemented in response](#). *Oceanography* 28:146-159.

Boehm, A.B., M.Z. Jacobson, M.J. O'Donnell, M. [Sutula](#), W.W. Wakefield,

S.B. [Weisberg](#), E. Whiteman. 2015. [Ocean acidification science needs for natural resource managers of the North American west coast](#). *Oceanography* 28:170-181.

Cooley, S.R., E.B. Jewett, J. Reichert, L. Robbins, G. Shrestha, D. Wiczorek, S.B. [Weisberg](#). 2015. [Getting ocean acidification on decision makers' to-do lists: Dissecting the process through case studies](#). *Oceanography* 28:198-211.

[Gillett](#), D.J., S.B. [Weisberg](#), T. Grayson, A. Hamilton, V. Hansen, E.W. Leppo, M.C. Pelletier, A. Borja, D. Cadien, D. Dauer, R. Diaz, M. Dutch, J.L. Hyland, M. Kellogg, P.F. Larsen, J.S. Levinton, R. Llansó, L.L. Lovell, P.A. Montagna, D. Pasko, C.A. Phillips, C. Rakocinski, J.A. Ranasinghe, D.M. Sanger, H. Teixeira, R.F. Van Dolah, R.G. Velarde, K.I. Welch. 2015. [Effect of ecological group classification schemes on performance of the AMBI benthic index in US coastal waters](#). *Ecological Indicators* 50:99-107.

Greenfield, B.K., A.R. Melwani, S.M. [Bay](#). 2015. [A tiered assessment framework to evaluate human health risk of contaminated sediment](#). *Integrated Environmental Assessment and Management* 11:459-473.

Joyce, A.S., M.S. Pirogovsky, R.G. Adams, W. [Lao](#), D. Tsukada, C.L. Cash, J.F. Haw, K.A. [Maruya](#). 2015. [Using performance reference compound-corrected polyethylene passive samplers and caged bivalves to measure hydrophobic contaminants of concern in urban coastal seawaters](#). *Chemosphere* 127:10-17.

[McLaughlin](#), K., S.B. [Weisberg](#), A.G. Dickson, G.E. Hofmann, J.A. Newton, D. Aseltine-Neilson, A. Barton, S. Cudd, R.A. Feely, I.W. Jefferds, E.B. Jewett, T. King, C.J. Langdon, S. McAfee, D. Pleschner-Steele, B. Steele. 2015. [Core principles of the California Current Acidification Network: Linking chemistry, physics, and ecological effects](#). *Oceanography* 28:160-169.

[Mehinto](#), A.C., A. Jia, S.A. Snyder, B.S. Jayasinghe, N.D. Denslow, J. Crago, D. Schlenk, C. Menzie, S.D. Westerheide, F.D.L. Leusch, K.A. [Maruya](#). 2015.

[Interlaboratory comparison of in vitro bioassays for screening of endocrine disrupting chemicals in recycled water](#). *Water Research* 83:303-309.

Millow, C.J., S.A. Mackintosh, R.L. Lewison, N.G. [Dodder](#), E. Hoh. 2015. [Identifying bioaccumulative halogenated organic compounds using a nontargeted analytical approach: seabirds as sentinels](#). *PLoS One* 10: e0127205.

SCCWRP contributes to special journal issue on ocean acidification

The Oceanography Society in June published a special journal issue dedicated to ocean acidification (OA) that encompasses the most comprehensive summary review of OA research and findings to date.

The full text of the articles is [available for free online](#).

SCCWRP scientists were privileged to have been co-authors on four of the articles:

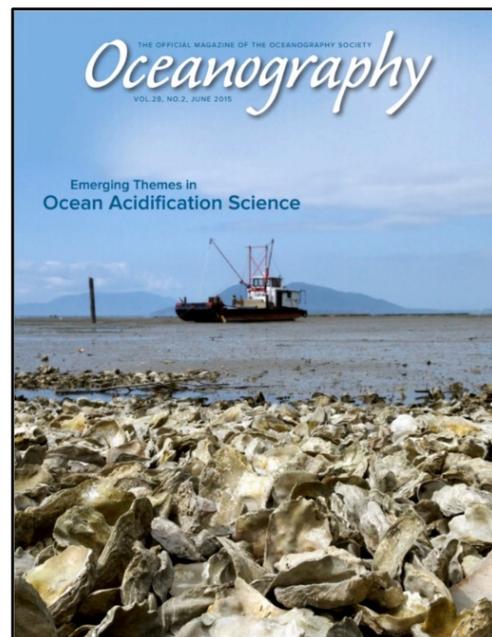
» How the Pacific Northwest shellfish industry has [worked with scientists to adapt its strategies for long-term sustainability](#) in response to the threat of coastal acidification (SCCWRP co-authors: [Dr. Steve Weisberg](#) and [Dr. Karen McLaughlin](#))

» Recommended strategies for [an integrated, multi-discipline approach to monitoring the West Coast effects of acidification](#) ([McLaughlin](#), [Weisberg](#))

» What scientific information [West Coast managers need](#) to respond effectively to acidification ([Dr. Martha Sutula](#), [Weisberg](#))

» A review of case studies offering insights on [how to get ocean acidification onto managers' radar](#) ([Weisberg](#))

For more information on SCCWRP's acidification research, contact Dr. [Steve Weisberg](#).



The June 2015 issue of *Oceanography* magazine is a special issue that focuses on the nexus of ocean acidification science and management action. SCCWRP scientists co-authored four of the articles.

Journal Articles (Online)

Feldman, D.L., A. [Sengupta](#), L. Stuvick, E. [Stein](#), V. Pettigrove, M. Arora. 2015. [Governance issues in developing and implementing offsets for water management benefits: Can preliminary evaluation guide implementation effectiveness?](#) *WIREs Water* DOI:10.1002/wat2.1061.

Journal Articles (Accepted)

Judd, N., Y. Lowney, P. Anderson, S. Baird, S.M. [Bay](#), J. Breidt, M. Buonanduci, Z. Dong, D. Essig, M.R. Garry, R.C. Jim, G.

Kirkwood, S. [Moore](#), C. Niemi, R. O'Rourke, B. Ruffle, L.A. Schaidler, D.E. [Vidal-Dorsch](#). In press. Fish Consumption as a Driver of Risk Management Decisions and Human Health-Based Water Quality Criteria. *Environmental Toxicology and Chemistry*.

[Maruya](#), K.A., N.G. [Dodder](#), A.C. [Mehinto](#), N.D. Denslow, D. Schlenk, S.A. Snyder, S.B. [Weisberg](#). In press. A tiered, integrated biological and chemical monitoring framework for contaminants of emerging concern (CECs) in aquatic ecosystems. *Integrated Environmental Assessment and Management*.

[Maruya](#), K.A., W. [Lao](#), D. Tsukada, D. [Diehl](#). In press. A passive sampler based on solid phase microextraction (SPME) for sediment-associated organic pollutants: comparing freely-dissolved concentration with bioaccumulation. *Chemosphere*.

[Schiff](#), K.C., D. [Greenstein](#), N. [Dodder](#), D. [Gillett](#). In press. Southern California Bight Regional Monitoring. *Journal of Regional Studies in Marine Science*.

[Vidal-Dorsch](#), D.E., S.M. [Bay](#), S. [Moore](#), B. Layton, A.C. [Mehinto](#), C.D. Vulpe, M. Brown-Augustine, A. Loguinov, H.Poynton, N. Garcia-Reyero, E.J. Perkins,

L. Escalon, N. Denslow, R.C. Colli-Dula, T. Doan, S. Shukradas, J. Bruno, L. Brown, G. Van Agglen, P. Jackman, M. Bauer. In press. Ecotoxicogenomics: microarray interlaboratory comparability. *Chemosphere*.

Book Chapters

Hallenbeck, T., T. Welch, S.J. [Steinberg](#), A. Lanier. 2015. "[Extending Esri Geoportal Server to Meet the Needs of the West Coast Ocean Data Network and Inform Regional Ocean Management](#)." pp. 171-184 in: Dawn J. Wright (ed.), *Ocean Solutions Earth Solutions*. Esri Press. Redlands, CA.

Lee, R.F., K.A. [Maruya](#), U. Warttinger, K. Bulski, A.N. Walker. 2014. [Emulsions Produced after Oil Spills. Their Fate in Estuaries and Effects on the Grass Shrimp, Palaemonetes pugio and Blue Crab, Callinectes sapidus](#). In *Crude Oils: Production, Environmental Impacts and Global Market Challenges*, Valenti, C. (ed), Nova Science Publishers, ISBN 978-1-63117-950-1. p. 1-22.

Schaffner, R.A., S.J. [Steinberg](#), K.C. [Schiff](#). 2015. "[A GIS Tool to Compute a Pollutant Exposure Index for the Southern California Bight](#)." pp. 171-184 in: Dawn J. Wright

(ed.), *Ocean Solutions Earth Solutions*. Esri Press. Redlands, CA.

Technical Reports

Fetscher, A.E., K. Lunde, E.D. [Stein](#), J.S. [Brown](#). 2015. [Standard Operating Procedures \(SOP\) for Collection of Macroinvertebrates, Benthic Algae, and Associated Physical Habitat Data in California Depressional Wetlands](#). Technical Report 832. Southern California Coastal Water Research Project. Costa Mesa, CA.

[Mazor](#), R.D. 2015. [Bioassessment of Perennial Streams in Southern California: A Report on the First Five Years of the Stormwater Monitoring Coalition's Regional Stream Survey](#). Technical Report 844. Southern California Coastal Water Research Project. Costa Mesa, CA.

[Stein](#), E.D., P. Pendleton, K. O'Connor, C. Endris, J. Adalaars, M. Salomon, K. Cayce, and A. Jong. 2015. [Demonstrating the California Wetland Status and Trends Program: A Probabilistic Approach for Estimating Statewide Aquatic Resource Extent, Distribution and Change over Time – Pilot Study Results](#). Technical Report 859. Southern California Coastal Water Research Project. Costa Mesa, CA.

Quarter in Review

Conference Presentations

[Cao](#), Y., M.R. [Raith](#), J.F. [Griffith](#). "Degradation of Pathogens, General and Host-associated Fecal Indicators as Measured by qPCR and digital PCR in Freshwater." UNC Water Institute Water Microbiology Conference. May 18-21, 2015. Chapel Hill, NC.

Denslow, N.D., K.J. Kroll, O.K. Adeyemo, B.S. Jayasinghe, C. Lavelle, A.C. [Mehinto](#), S. [Bay](#), K.A. [Maruya](#). [Linkages between in vitro assays and higher order in vivo endpoints for Menidia beryllina](#). 18th Pollutant Responses in Marine Organisms Symposium. May 24-27, 2015. Trondheim, Norway.

May, J., D. Carlisle, L. Brown, R. [Mazor](#), E. [Stein](#), A. Rehn. [Assessment Of](#)

[Macroinvertebrate Trait Affinities Along A Gradient Of Streamflow Permanence In The Xeric Region Of California, USA](#). Annual Meeting of the Society for Freshwater Science. May 17-21, 2015. Milwaukee, WI.

[Mazor](#), R.D., M. Engeln, E. [Stein](#) and P. Ode. [Effective visualizations of complex bioassessment indices based on predictive models](#). Annual Meeting of the Society for Freshwater Science. May 17-21, 2015. Milwaukee, WI.

[Moore](#), S. "[Data, Data Everywhere: Turning Data into Useful Information through Analysis and Visualization](#)." Southern California Academy of Science 2015 Annual Meeting. May 15-16, 2015. Los Angeles, CA.

[Schiff](#), K.C. "[Climate change management in marine ecosystems: ocean acidification and hypoxia](#)." American Water Resources Association Specialty Conference on Climate Change. June 15-17, 2015. New Orleans, LA.

Shaul, N.J., N.G. [Dodder](#), L.I. Aluwihare, S.A. Mackintosh, K.A. [Maruya](#), S.J. Chivers, K. Danil, D.W. Weller, E. Hoh. "Nontargeted biomonitoring of halogenated organic compounds in two ecotypes of bottlenose dolphins from the Southern California Bight." SETAC Southern California Chapter 2015 Annual Meeting. April 21-22, 2015. San Pedro, CA.

[Steele](#), J.A., B.A. Layton, M.R. [Raith](#), Y. [Cao](#), K.C. [Schiff](#), J.F. [Griffith](#). "[The Surfer Health Study: Microbial Water Quality Measurements Supporting a Combined](#)

[Wet Weather Surfer Epidemiology and QMRA Study in San Diego, CA.](#) UNC Water Institute Water Microbiology Conference. May 18-21, 2015. Chapel Hill, NC.

[Stein, E.D., R. Mazor, B. White. Application of eDNA and Metabarcoding to Routine Stream and Wetland Biomonitoring Programs in California.](#) Annual Meeting of the Society of Wetland Scientists. May 31-June 4, 2015. Providence, RI.

[Stein, E.D., D. Bram, S. Dark, R. Grossinger, M. Salomon. Historical Wetland Change along the Southern California Coast: A Tool to Inform Regional Restoration Planning.](#) Annual Meeting of the Society of Wetland Scientists. May 31-June 4, 2015. Providence, RI.

[Steinberg, S.J. "A Lab Quality, Portable Cellphone-Based Microscope for Field Data Collection."](#) Southern California Academy of Science 2015 Annual Meeting. May 15-16, 2015. Los Angeles, CA.

[Steinberg, S.J., and A. Santana. Temporal Visualization to Inform Wetland Restoration in Southern California."](#) Southern California Academy of Science 2015 Annual Meeting. May 15-16, 2015. Los Angeles, CA.

[Steinberg, S.J. "West Coast Ocean Data Portal."](#) Southern California Academy of Science 2015 Annual Meeting. May 15-16, 2015. Los Angeles, CA.

Conference Posters

[Cao, Y., M.R. Raith, J.F. Griffith. "Effect of Sunlight and Fecal Source on Decay of Fecal Indicator Bacteria in Freshwater."](#) 115th [General Meeting of the American](#)

[Society of Microbiology. May 30-June 2, 2015.](#) New Orleans, LA.

Hallenbeck, T.R., S.J. [Steinberg](#), A. Lanier. "[Assessing Marine Debris Policies with the West Coast Ocean Data Portal.](#)" Southern California Academy of Science 2015 Annual Meeting. May 15-16, 2015. Los Angeles, CA.

[Steele, J.A., M.R. Raith, B.A. Layton, A.D. Blackwood, R.T. Noble, J.F. Griffith. "Comparison of Three Filtration Methods to Capture Pathogenic Viruses and Bacteria from Brackish Storm Water."](#) 115th General Meeting of the American Society of Microbiology. May 30-June 2, 2015. New Orleans, LA.

[Steinberg, S.J. and A. Santana. "Mapping Stormwater Plume Interactions with Southern California Bight MPAs."](#) Southern California Academy of Science 2015 Annual Meeting. May 15-16, 2015. Los Angeles, CA.

[Steinberg, S.J. and A. Santana. "Mapping Stormwater Plume Interactions with Southern California Bight Marine Protected Areas \(MPAs\)."](#) Southern California Academy of Science 2015 Annual Meeting. May 15-16, 2015. Los Angeles, CA.

Other Presentations

[Cao, Y.](#) "Digital PCR technology and its application in the environment." UCI-Water PIRE UPP Down Under. June 19, 2015. Irvine, CA.

[Gillett, D. and K. Schiff.](#) "Causal Assessment in California: Lessons Learned and New Additions." Northern California SETAC meeting. April 29, 2015. Sacramento, CA.

[Griffith, J.](#) "Digital droplet PCR as a Tool for Environmental Monitoring." qPCR and Digital PCR Congress. June 26, 2015. San Diego, CA.

[Mazor, R.](#) "Collaborative stream monitoring." San Diego Regional Water Quality Control Board public workshop on a draft tentative order for an agricultural permit. July 15, 2015. San Diego, CA.

[Schiff, K.C.](#) "Southern California Coastal Water Research Project Research Plan." California State University, Long Beach. May 5, 2015. Long Beach, CA.

[Stein, E.](#) "Potential Climate Change Effects on Water Quality." UC Irvine Oceans Workshop on Fostering Climate Resilient Coastal Communities. July 22, 2015. Irvine, CA.

External Articles Featuring SCCWRP

["PCR heads into the field."](#) Nature Methods. April 29, 2015.

["ASU expertise results in faster, portable microbial analysis in the field."](#) Arizona State University. May 22, 2015.

["Large bloom of toxic algae under way in Monterey Bay and beyond."](#) University of California, Santa Cruz. June 2, 2015.

["Bolsa Chica Conservancy to mark 25 years of maintaining, promoting the wetlands."](#) Orange County Register. July 21, 2015.

["NOAA awards \\$88,000 in grant funding to respond to West Coast harmful algal bloom outbreak."](#) National Oceanic and Atmospheric Administration. July 23, 2015.

SCCWRP Personnel Notes

Commission and CTAG



Arne Anselm, stormwater resources manager for the Ventura County Watershed Protection District, joined CTAG in June, replacing Dr. Bram Sercu.



Dr. **Bram Sercu**, who has served on CTAG since 2012, left CTAG in May to take a new job as an assistant hydrologist for the United Water Conservation District in

Santa Paula.

New Faces



Darcy VanDervort, who just earned her master's in environmental science at the University of Arizona, joined SCCWRP in June as a senior research technician in the Chemistry Department.



Cheryl Doughty, a Ph.D. student in geography at the University of California, Los Angeles, joined SCCWRP in July as a Sea Grant fellow in the

Biology Department. She will work at SCCWRP for one year.

Promotions



Lucy Mao, a part-time laboratory assistant in the Microbiology Department, was promoted in May to a full-time research technician in the

Microbiology Department.

Honors and Awards

Dr. **Steve Steinberg** received an Advancement in Collaboration award from the California Geographic Information Association in June for leading a collaborative geospatial visualization project to map the Tijuana River National Estuarine Research Reserve.

Professional Appointments

Dr. **Nathan Dodder** was elected to the board of the Southern California chapter of the Society of Environmental Toxicology and Chemistry in July.

Dr. **David Gillett** was appointed to an advisory panel for the NOAA RESTORE Act Science Program Grant Review.

Dr. **Keith Maruya** was appointed as an external reviewer by the Consortium for Ocean Leadership for the Gulf of Mexico Research Initiative (GOMRI) Cycle V Technology Developments (Theme 4) Request for Proposals.

Dr. **Alvina Mehinto** was appointed as a scientific advisor for the Sturgeon Gene Expression Project, a follow-up to the Deepwater Horizon oil spill.

Ken Schiff has been appointed to the California Stormwater Quality Association Annual Meeting Planning Committee.

Dr. **Steve Steinberg** has been appointed conference co-chair for the 22nd Annual California GIS Conference scheduled for Spring 2016 in Southern California.

Dr. **Steve Steinberg** was asked to organize a preconference workshop on Unmanned Aerial Systems during the California Geographic Information Association's 2015 conference in June.

Departures



David Tsukada, a senior research technician in the Chemistry Department since 1978, retired in June after a 37-year career at SCCWRP.

Alexandra Shaffer, a research technician in the Biogeochemistry Department since January 2015, left in May to pursue her master's in conservation ecology at Angelo State University in San Angelo, Texas.

Dr. **Betty Fetscher**, a senior scientist in the Biology Department since 2003, left in late July to take a staff scientist job with the San Diego Regional Water Quality Control Board.

Dr. **Blythe Layton**, a scientist in the Microbiology Department since 2010, left in June to enroll in a science communications program at the University of California, Santa Cruz.

SCCWRP COMMISSIONER SPOTLIGHT

Public policy at center of Commissioner's work

Todd Snyder has long gravitated to the public policy aspects of environmental protection. He earned his master's in public policy, and his first job out of college was with the County of Orange's stormwater division.



As he's risen through the ranks of the public sector – primarily in county government – his focus has remained on creating sound public policy in the environmental arena.

If there's one thing he's learned over his 15-year career, Snyder says, it's that sound public policy is driven by sound science – the type of science that SCCWRP excels at.

Todd Snyder

"Without that strong scientific basis, the regulations have a much less strong chance of succeeding," Snyder said. "For me, as someone who comes from a policy background, SCCWRP is really an essential organization because it provides the science and information that policymakers use to develop their programs and regulations."

Snyder first became interested in water science after learning about the history of water in California in college. Following in the footsteps of his father, he gravitated toward the public sector and found his calling in stormwater management early on, during a college internship with the County of Orange.

After spending two years with the County of Orange, he moved to the San Diego area in 2002 to be closer to his girlfriend, Laura, a Baja California native he eventually married.



Todd Snyder and his wife, Laura, relax by the pool at the Loreto Bay Resort & Spa in Baja California Sur in June. They make frequent road trips to Baja California, where Laura's family lives.

Todd Snyder

Job: Manager, Watershed Protection Program, County of San Diego Department of Public Works

SCCWRP role: Commissioner (2014-present)

Prior jobs: Chief, Advance Planning Division, County of San Diego Planning & Development Services (2013-14); land use/environmental planning manager, Watershed Protection Program, County of San Diego (2007-13); environmental programs manager, City of Imperial Beach (2005-07); environmental health specialist, County of San Diego (2002-05); environmental resources specialist, County of Orange (2000-02)

Education: M.P.P. public policy, University of California, Los Angeles (2000); B.A. political science and history, UCLA (1998)

Residence: Santee

Family: Wife Laura, a stay-at-home mom; daughters Gabriela, 7, and Amanda, 4; two dachshunds, Frijol and Mingus

Hometown: Fountain Valley

Hobbies: Road trips, especially to Baja California to visit his wife's family; going to the beach; snorkeling; listening to music from a variety of genres

Although the majority of Snyder's career has been with the County of San Diego, he also worked for the City of Imperial Beach for three years managing the municipal stormwater, solid-waste and recycling programs.

"After a couple of years, I decided I really missed being engaged in the more regional policy-type discussions," Snyder said. "The County of San Diego is seen as a leader, and I missed the regional policy aspect."

In his role as manager of the County of San Diego's Watershed Protection Program, Snyder manages a division of 35 employees and a \$15 million annual budget. The division's responsibilities include inspection and code enforcement, watershed structural projects, treatment facilities, monitoring, and stormwater management.

His division's biggest challenge is improving stormwater quality by working to change public behavior, he says. The solution is a combination of education, incentive programs and enforcement.

"At the end of the day, the mission is a good one: We're all trying to improve water quality," Snyder said. "The question is how to do it most efficiently and to find the financial resources to support it."

CTAG SPOTLIGHT

Ventura's CTAG rep worked on Bight '94

Arne Anselm first crossed paths with SCCWRP in 1994 while working as a manager for a private environmental laboratory in Camarillo. The company, Pace Analytical Services, had been retained to extract livers from flat fish samples and analyze them for the presence of the industrial chemical PCB (polychlorinated biphenyl).



Arne Anselm

The contract was part of an ambitious new pilot project to monitor the health of the Southern California Bight. And the project, Anselm recalled, was unlike anything he had ever worked on.

Anselm's lab went through an intense audit, and project representatives devoted extensive time to explaining what they were trying to accomplish – a highly coordinated, multi-agency initiative that would eventually morph into the Southern California Bight Regional Monitoring Program.

"It gave our lab purpose," Anselm said. "Before Bight '94, we were doing a lot of site-specific groundwater cleanup and toxicity testing. Then SCCWRP came and said, 'We're going to do something bigger and broader.' It elevated our view of our role in protecting the environment."

Shortly after helping to launch Bight '94, Anselm left Pace Analytical for the City of Thousand Oaks, where he worked for 11 years, first as a water resources specialist and then a management analyst. He implemented stormwater and TMDL (total maximum daily load) programs and oversaw drinking water quality, source-control initiatives, and stormwater and industrial-user inspections.

In 2006, he switched gears again to manage stormwater resources for the Ventura County Watershed Protection District, a job that's allowed him to build on his experience doing both lab and municipal



Arne Anselm, second from right, plays the upright bass for a six-member gypsy swing group called Swing Cheese. Founded in 2000, the group performs mostly at local benefits and restaurants.

Arne Anselm

Job: Stormwater resources manager, Water Resources Section, Ventura County Watershed Protection District

SCCWRP role: CTAG representative (2008-12, 2015-present)

Prior jobs: Microbiology, bioassay and organic prep lab manager, Pace Analytical Services, Camarillo (1989-94); management analyst and water resources specialist, City of Thousand Oaks (1995-2006)

Education: M.P.P.A. public policy and administration, California Lutheran University, Thousand Oaks (2002); B.S. biological sciences, California Polytechnic State University, San Luis Obispo (1989)

Residence: Ventura

Family: Wife Michelle Velderrain, a chemist; dogs Marco, an Italian greyhound mix, and Lilli, a beagle mix; cat Duchess; M1, a chicken

Hometown: Cupertino, Calif.

Hobbies: Surfing; recreational diving, especially in the Channel Islands; upright bass player for the gypsy swing music group Swing Cheese

stormwater work. Stormwater management offers an opportunity to not only identify problems through on-site sampling and analysis work, but also to identify solutions to those problems, Anselm said.

"We're making a difference, as opposed to calling out that a difference needs to be made," he said.

Anselm said the type of challenges that stormwater programs are tackling has evolved rapidly over the past decade, from a focus on stopping the most blatant pollutants – leaking oil and brake dust from cars – to more complex issues, such as how to address hydromodification and impacts to biological integrity.

The next major frontier for stormwater management will be stormwater capture, Anselm said. The drought, in particular, has reinvigorated the public's interest in capturing rainfall.

"The drought has brought attention to the fact that stormwater is a resource," Anselm said. "We've got everyone's attention, and now is our time to act."

SCCWRP PARTNER SPOTLIGHT

Visiting scientist from China studying microbes

When Dr. Xinping Yang won a prestigious government fellowship from the China Scholarship Council two years ago, it included the ability to study abroad for one year, at any research institution or university of her choosing.



Yang, an associate professor of environmental science and engineering at China's Nanjing Agricultural University, was interested in learning about fate and transport of fecal contamination in China's aquatic environments. So she chose SCCWRP, an organization internationally known for its microbial water quality research related to fecal contamination.

Dr. Xinping Yang

"I wanted to learn about SCCWRP's molecular microbiological methods to assess pollution," said Yang, who arrived in Southern California in April. "The fate and transport of fecal material is the same in America and China."

Yang's research at Nanjing Agricultural University revolves around improved treatment processes for contaminated water and soil. She runs an eight-member lab of graduate students whom she keeps in touch with almost daily, even while she's in Southern California.

Yang said the Chinese government has taken a particularly strong interest in environmental protection in recent years, following decades of rapid economic growth that have created widespread environmental contamination across the nation, particularly in underserved rural areas.



Dr. Xinping Yang's son, Qingyuan Zhu, pictured with his coach, is enrolled this summer at a youth basketball camp at Concordia University in Irvine.

Dr. Xinping Yang

Job: Associate professor, College of Resources and Environmental Sciences, Nanjing Agricultural University, Nanjing, China

SCCWRP role: Visiting scientist, Microbiology Department (until April 2016)

Prior jobs: Lecturer, Department of Environmental Science and Engineering, Nanjing Agricultural University, China (2002-11); assistant engineer, Sinopec Urumqi Petrochemical Company, China (1994-99)

Education: Ph.D. ecology, Nanjing Agricultural University (2009); M.S. environmental engineering, Southeast University, China (2002); B.S. water supply and sewage engineering, Changzhou University, China (1994)

Residence: Irvine (permanent residence: Nanjing, China)

Family: Husband Gaolong Zhu, a computer engineer; son Qingyuan Zhu, 10

Hometown: Xinjing province in northwestern China

Hobbies: Mountain hiking; spending time outdoors; watching her son play sports

"The Chinese government has taken a lot of efforts to protect the environment, but we still need better methods to monitor and remove pollutants from the soil and water," Yang said.

At SCCWRP, Yang is working with Drs. John Griffith and Yiping Cao to learn cutting-edge techniques for quantifying and tracking fecal degradation rates. She also is working with SCCWRP collaborator Dr. Peter Bowler, a restoration ecologist at the University of California, Irvine. Yang said she expects to write at least one journal article during her time here.

Yang grew up in northwestern China's remote Xinjing province, but moved to Changzhou near Shanghai to attend college. After graduating from college in 1994, Yang worked as a chemical engineer for the Sinopec Urumqi Petrochemical Company for five years, then returned to school to earn her master's and Ph.D. She was appointed an associate professor at Nanjing Agricultural University in 2011.

Yang is living in Irvine with her 10-year-old son, Qingyuan Zhu, who's enrolled in a basketball day camp this summer and attends an Irvine elementary school. Her husband, Gaolong Zhu, a computer engineer, stayed behind in Nanjing.

During her time here, she's already visited Yellowstone National Park, and she's also planning to take her son to SeaWorld.

SCCWRP STAFF SPOTLIGHT

New hire found calling as stream volunteer

Darcy VanDervort decided she wanted to pursue a career in aquatic research in 2012, during a year-long AmeriCorps volunteer project examining legacy contamination in a tributary of the Ohio River.



Darcy VanDervort

She had just finished studying earth sciences as an Ohio University undergraduate and was trying her hand at water-quality work.

During the Raccoon Creek stream sampling project, which took place near her hometown of Licking County, Ohio, VanDervort surveyed fish populations and aquatic macroinvertebrates in an effort to chronicle the impacts of legacy coal mining.

"I studied rocks and minerals and geologic formations as an undergrad, so biology was a little bit foreign to me," she said. "But it was really interesting to me – biology is just as much of a tool as chemistry."

After the AmeriCorps project ended, she began her master's in environmental science at the University of Arizona, working under Dr. Shane Snyder, a SCCWRP collaborator.

Almost from Day 1, VanDervort was introduced to SCCWRP. Her first project in Snyder's lab was assisting on a SCCWRP-led study examining *in vitro* bioassays for screening endocrine-active chemicals.



Darcy VanDervort goes backpacking through the Grand Canyon last year. Because of the wet weather conditions, she used a plastic garbage bag to cover her backpack.

Darcy VanDervort

Job: Senior research technician, SCCWRP Chemistry Department

Started: June 2015

Prior job: AmeriCorps volunteer, Raccoon Creek Partnership stream sampling study, Athens, Ohio (2012-13)

Education: M.S. environmental science, University of Arizona (2015); B.S. environmental geology and B.A. Spanish, Ohio University (2012)

Residence: Long Beach

Family: Parents Lynn, an investment banker, and Beth, a radiographer; siblings Brett, 24, an insurance broker, and Dana, 22, a swimming pool manager; dog Timmy, a dachshund

Hometown: Licking County, Ohio

Hobbies: Fusion bellydancing; exploring Los Angeles with friends from Ohio; going hiking and camping

VanDervort wrote her master's thesis on the impacts of steroid hormones called glucocorticoids in the Santa Cruz River in Tucson, downstream from two wastewater treatment facilities.

By the final year of her master's program, she'd met Dr. Keith Maruya, head of the Chemistry Department, and Dr. Alvina Mehinto of the Toxicology Department, and entered discussions to come work at SCCWRP.

VanDervort started at SCCWRP in mid-June, immediately after finishing her master's. She replaced Senior Research Technician David Tsukada, who retired in June after 37 years.

VanDervort says she particularly enjoys working for SCCWRP because she has the opportunity to continue the water-quality work she enjoyed so much as an AmeriCorps volunteer in the Raccoon Creek watershed.

As for getting acclimated to her new home, VanDervort says she's been exploring Los Angeles with a couple of other Ohio transplants. She and her friends particularly enjoy L.A.'s big "foodie" culture.

VanDervort also joined a fusion bellydancing troupe called the Los Angeles Bellydance Improv Academy to continue a passion she started back in college. The group performs mostly at local music festivals.

"It's really addicting," VanDervort says. "It's like learning a new language, a very extensive dance language."

Offering their statistical expertise

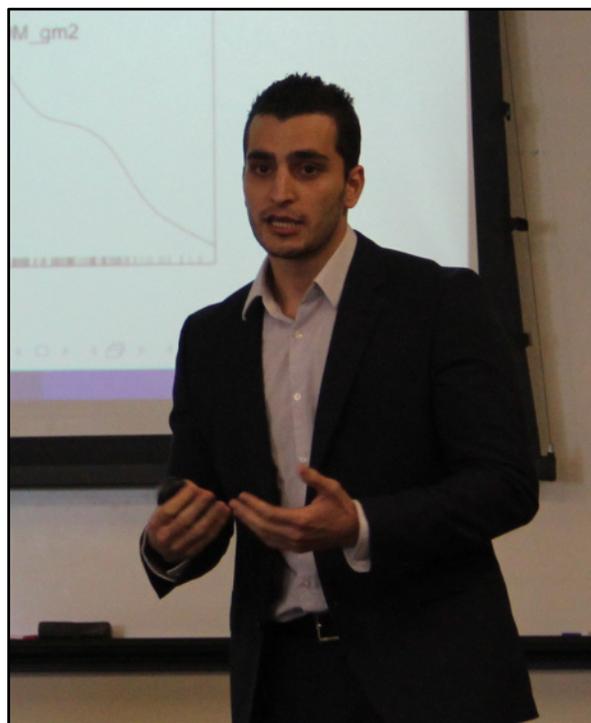
A group of Cal State Fullerton master's students in statistics who used statistical imputation techniques to help SCCWRP fill in missing values for bioassessment data presented the findings of their work May 8 at SCCWRP. During the two-hour presentation, the students provided an overview of their work and took questions from SCCWRP scientists Drs. Raphael Mazor and Ashmita Sengupta, who oversaw their project. The group project was the culmination of the students' Statistical Consulting course taught by Professor Mortaza Jamshidian and Assistant Professor Kevin Nichols.



Above, Cal State Fullerton master's students pose for a photo with their instructors and SCCWRP scientists Dr. Ashmita Sengupta and Raphael Mazor, who are at center.

Top right, Antonio Kassab discusses how he and fellow statistics students used imputation to help SCCWRP scientists fill in missing bioassessment data. The students' May 8 presentation was the culmination of an applied statistics course.

Bottom right, master's student Lawrence Park delivers part of a presentation on how statistical imputation techniques can be used to fill in gaps in SCCWRP bioassessment data. Behind him is fellow co-presenter Eden Ellis.





Mowing down the competition

SCCWRP staff donned human-sized, inflatable balls for a friendly game of knockerball during a lunchtime picnic in the spring at Wakeham Park in Costa Mesa. SCCWRP played the game elimination-style, where every player was transformed into a human battering ram attempting to knock all opponents off their feet. Knockerball, also known as bubble soccer, allows players to tumble and flip over with minimal risk of injury. All SCCWRP staff were invited to take part in the staff bonding event or simply cheer from the sidelines.



Above left, Alexandra Shaffer, left, keeps an eye on Steve Steinberg, right, as he comes in to try to knock her off her feet.

Above right, knockerball players run toward one other as they attempt to be the last player standing during the elimination-style competition at Wakeham Park in Costa Mesa.

Left, Shelly Moore, left, goes head to head with Bryan Nece during SCCWRP's knockerball competition.