



# SCCWRP Director's Report



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WINTER 2016 ISSUE

## Harmful algae conference focuses on research, strategy

Researchers and environmental managers working to understand and address the threat of harmful algal blooms (HABs) across the nation coalesced in Long Beach in November for a five-day national scientific conference on HABs co-organized by SCCWRP and the University of Southern California.

The [Eighth Symposium on Harmful Algae in the U.S.](#) provided an in-depth forum for scientific exchange and technical communication on strategies to manage both freshwater and marine HABs. It was held aboard the historic Queen Mary ocean liner docked in Long Beach.

Presentations focused on the role of climate change, anthropogenic nutrient inputs, and other human and natural factors in exacerbating the proliferation of HABs worldwide.

A key focus was on one of the largest and most toxic HABs events ever to hit the West Coast – the proliferation of domoic

acid-producing *Pseudo-nitzschia* throughout spring and summer 2015.

Attendees also learned about HAB modeling, forecasting and predicting, management and remediation strategies, and discussed strategies and planning efforts for better managing HABs during the El Nino season.

The keynote speaker, Dr. Raphael Kudela of the University of California, Santa Cruz, focused his talk on chronicling HABs research in California that SCCWRP has contributed to and remains a key collaborator on.

Dr. Meredith Howard of SCCWRP, the conference's co-organizer, presented a talk on cyanobacteria and cyanotoxin research.

The conference attracted 260 attendees from a wide cross-section of the HABs community – state, federal and local

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### Calendar

**Thursday, February 4**  
CTAG quarterly meeting

**Friday, February 5**  
**Seminar:** "Fate and effects of engineered nanomaterials in the marine environment"

**Friday, March 4**  
Commission meeting

**Friday, March 11**  
**Seminar:** "Effects of ocean acidification on fish eggs and larvae in laboratory and natural experiments"

**Spring 2016 (Date TBD)**  
CTAG research planning workshop on marine nutrients

government, academic scientists, tribal governments, NGOs, and the private sector. The conference deliberately did not run concurrent sessions, allowing every attendee to participate in every session and maximizing opportunities for interactions.

For more information, contact Dr. [Meredith Howard](#).

## SCCWRP, partners launching outreach campaign for OAH modeling

A team of scientists that is developing a predictive model examining how the West Coast is impacted by ocean acidification and hypoxia (OAH) will launch a public outreach campaign in March to solicit input from Southern California scientists, coastal managers and other stakeholders.

Project scientists want to share with the broader scientific and management community the approach being used to develop the model and get suggestions for how to maximize its utility while the project is still in its formative stages. The stakeholders will be asked for suggestions about data that can be used to both calibrate and validate the model.

Later, as the model is validated and uncertainty is quantified, project scientists will continue to work with this outreach group to help define the nutrient management scenario analyses that will be run in the model.

SCCWRP will host the first outreach meeting in March; the meeting date will be announced in early February.

The West Coast OAH modeling project is a sweeping initiative to help West Coast managers understand which marine



Photo credit: Lori Elgayar, Long Beach Convention & Visitors Bureau  
**Dr. Raphael Kudela of the University of California, Santa Cruz, delivers the HABs conference's opening plenary session in the Grand Salon ballroom of the Queen Mary in Long Beach. All five days of the Eighth Symposium on Harmful Algae in the U.S. took place on the historic ocean liner.**

habitats are most vulnerable to OAH and to what extent local, land-based sources of pollution are exacerbating coastal OAH conditions.

SCCWRP is working on the project with the University of California, Los Angeles, University of Washington, and National Oceanic and Atmospheric Administration's Pacific Marine Environmental Laboratory.

The modeling work involves coupling West Coast physical and biogeochemical ocean models together to predict the relative contributions of global carbon dioxide emissions, natural upwelling processes, and nutrients introduced via local discharges.

The model also will be valuable for assessing local management strategies, such as carbon sequestration. A downscaled version of the model is being developed specifically for the Southern California Bight.

When the model is finished in 2018, scientists hope to be able to share with the management community whether the actions they take at the local level can have a meaningful effect in reducing or eliminating the harmful effects of OAH.

Those harmful effects include the ability of calcifying organisms to form their shells.

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

## SCCWRP testing utility of remote sensing to assess hydromodification risk

SCCWRP has partnered with Orange County Public Works and the manufacturer of a professional-grade unmanned aerial system equipped with sensors to begin conducting high-resolution mapping of waterways susceptible to hydromodification.

The first-of-its-kind pilot project will involve flying [PrecisionHawk](#) remote-controlled aircraft over stream channels in south Orange County that stormwater managers are working to protect from erosion and other morphological change.

SCCWRP is interested in adapting professional-grade aerial monitoring

systems for environmental applications because, unlike traditional airplanes and helicopters, they can be deployed to gather data quickly, at low altitudes, and at far less expense than could be accomplished by typical on-ground surveys.

PrecisionHawk, a Raleigh, N.C.-based manufacturer of professional-grade remote sensing systems, is sending a small unmanned aerial systems (sUAS) crew and system engineer to Orange County to pilot the aircraft during the project.

PrecisionHawk uses on-board navigation and industry-standard imaging sensors to

generate high-resolution location and elevation information. For the initial data collection, PrecisionHawk and SCCWRP are testing a visible spectrum camera, a multispectral infrared camera, and a LiDAR (Light Detection and Ranging) laser profiling system capable of penetrating gaps in dense foliage to generate imagery of the ground surface below.

A PrecisionHawk team visited SCCWRP in late January to begin an initial round of flight tests, including in the San Bernardino Mountains. The initial flight tests were an opportunity to assess the feasibility of using the technology for mapping areas covered in dense

**Below, Eric Postma, a PrecisionHawk electronics engineer, conducts a pre-flight test on a unmanned aerial system in the San Bernardino Mountains in January. SCCWRP and Orange County Public Works are partnering with PrecisionHawk to map waterways susceptible to hydromodification.**



**Above, Vev Jackson, a PrecisionHawk UAS pilot, prepares to launch a fixed-wing UAS for a high-altitude test flight in the San Bernardino Mountains in January. The team was testing the use of a multispectral camera system at an elevation of 6,500 feet near Big Bear along the upper Santa Ana River.**

vegetation and snow pack. SCCWRP is working to assess the viability of unmanned aerial systems for member agency applications.

PrecisionHawk also will benefit from the partnership, as the company is interested in learning how its sUAS systems – which are primarily used in the agriculture industry – might be extended to

applications in the environmental monitoring arena.

The PrecisionHawk project, part of a larger initiative to assess the value of sUAS systems for a range of environmental monitoring applications, is being conducted in partnership with the San Francisco Estuary Institute, SCCWRP's sister organization in Northern California.

Future potential applications of sUAS that SCCWRP and SFEI will be exploring include quantifying and mapping harmful algal blooms (HABs), collecting water samples from hard-to-access water bodies, mapping estuaries and wetlands, and identifying debris and pollution plumes.

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

## Updates by Thematic Area

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

### BIOASSESSMENT

#### SCCWRP hosts kickoff meeting to develop statewide algae assessment program

SCCWRP hosted a day-long kickoff meeting with state, federal and local agencies in January to begin developing a statewide freshwater bioassessment program that uses algae as the indicator of waterbody condition.

The January 15 meeting marked an important opportunity to update the Surface Water Ambient Monitoring Program's existing statewide algae plan, broaden partnerships to include other programs that use (or are considering using) algal indicators, and prioritize technical work and tool development over the next several years.

Meeting attendees focused on how to build capacity for bioassessments using algal assemblage composition and structure (e.g., an index of stream condition), biomass (e.g., ash-free dry mass or chlorophyll-a) and/or eutrophic condition.

Priorities that emerged from the meeting included the need to build taxonomic capacity in the short term, transition tools to molecular approaches over the long term, and establish standard approaches,

quality assurance measures, and data pipelines.

The statewide algae freshwater bioassessment program will build on the state's existing California Stream Condition Index, which uses benthic macroinvertebrates such as aquatic insects to assess stream health.

### SEDIMENT QUALITY

#### Sediment stressor identification study launched in Marina del Rey

SCCWRP in late January kicked off a study that seeks to determine the cause of sediment toxicity and benthic community impairment in Marina del Rey Harbor.

The study involves using a method known as toxicity identification evaluation (TIE) to determine why sediment samples are toxic to bottom-dwelling organisms.

Sediment samples from five toxic hotspots already have been collected, and additional sampling is planned later this year. Full study findings are expected to be released in early 2017.

#### Draft study plan released for planned Marina del Rey copper bioavailability study

SCCWRP in January released a draft study plan for an upcoming Marina del Rey Harbor study that will seek to measure the influence of harbor water characteristics and environmental variations on the toxicity of copper to marine life.

The draft plan includes a study justification report and a project work plan. A technical advisory committee will be reviewing the plan following approval of the study justification report, and the plan also will be subject to a public comment review period.

The one-year study, expected to be launched in spring 2016, will investigate variations in the bioavailability of dissolved copper.

#### San Diego Bay bioaccumulation study working to quantify DDTs, PCBs

SCCWRP and its partners in December began analyzing and interpreting data collected from more than 300 San Diego Bay sediment and animal-tissue samples as part of a two-year study that seeks to

understand the risks to wildlife and humans from consuming Bay fish.

Scientists are using statistical analysis and ecological risk assessment methods to understand how PCBs, DDTs and mercury bioaccumulate at different levels of the food web, from sediment-dwelling invertebrates to sport fish.

Scientists also are seeking to flesh out the link between contaminants found in sediment and contaminants found in fish and birds.

The study's findings are scheduled to be published in summer 2016.

## SCCWRP-developed sediment bioaccumulation model being tested in L.A./Long Beach Harbors

SCCWRP and the Harbor Technical Work Group, which is working to address a TMDL (total maximum daily load) in Los Angeles and Long Beach Harbors, launched an effort in November to evaluate the accuracy of a new statewide sediment quality tool developed by SCCWRP.

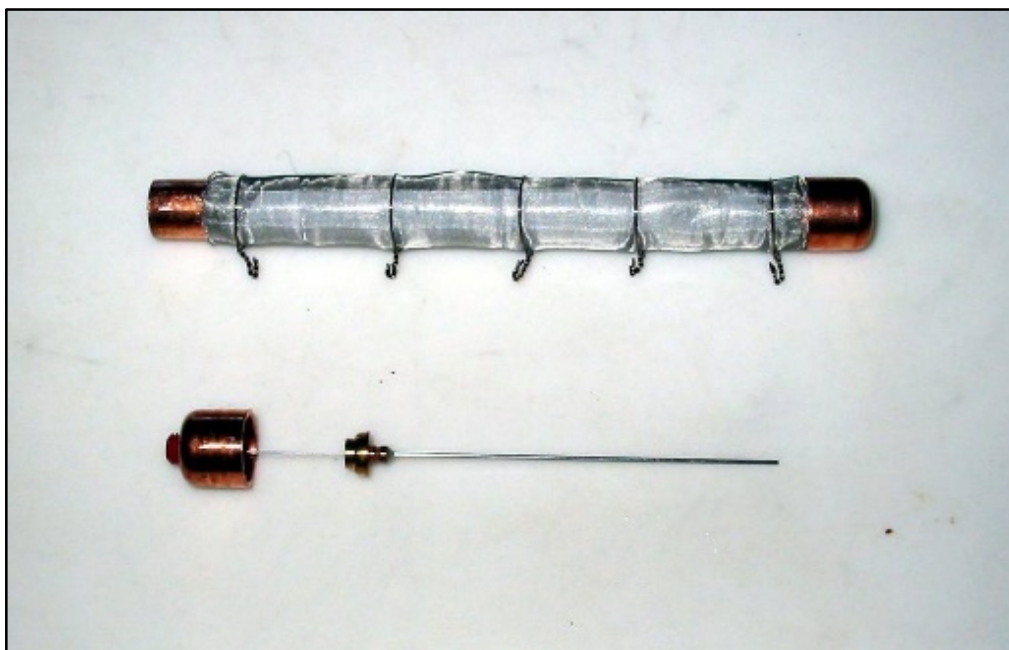
Project participants are using TMDL data collected from the Harbors area to assess the effectiveness of a bioaccumulation model for the State Water Board's Sediment Quality Objectives program.

The bioaccumulation model, which quantifies health risks to humans from seafood contamination, is intended to help coastal managers achieve California's goals for sediment quality in enclosed bays and estuaries statewide.

### CONTAMINANTS OF EMERGING CONCERN

## SCCWRP working to adapt passive sampling technology to monitor CECs in sediment

SCCWRP in January launched a two-year effort to adapt commercially available passive sampling devices to measure the freely dissolved concentration ( $C_{free}$ ) of



A passive sampling device, bottom, is enclosed in protective metal housing, top, before being placed in sediment. The passive sampler is made up of a thin, hollow fiber coated with a thin film of silicone that can absorb trace organics from sediment, including CECs that can dissolve and escape into the water column. SCCWRP is working to adapt this commercially available technology for environmental monitoring.

CECs in sediment. Passive sampling devices consist of thin, hollow fibers that absorb trace organics from sediment and are then analyzed by gas chromatography.

About 50 leading scientists endorsed moving toward passive sampling technology at a SCCWRP-hosted CEC workshop in 2011; it also was evaluated during a recent international laboratory round-robin study.

Passive sampling is viewed as key to improving the relevance of the existing method for quantifying sediment contamination – namely, measuring bulk sediment concentration. SCCWRP will work to optimize, validate and apply the devices in a lab this year, then test the effectiveness of the methods in 2017 using sediment samples collected from San Diego Bay.

### EUTROPHICATION

## Likely causes of cyanobacterial blooms, nuisance vegetation in Bay Delta chronicled in new reports

SCCWRP and its partners have completed a comprehensive review of the likely causes of cyanobacterial blooms and nuisance vegetation in the San Francisco Bay Delta, concluding that nutrient loading likely plays a role but that other factors such as temperature and hydrological modification also are likely to be important drivers.

The review noted that existing monitoring efforts have been inadequate to properly characterize the magnitude of the problem.

The review of the Delta was published as two SCCWRP technical reports – one on [macrophytes](#) and one on [cyanobacteria](#).

The findings will help Delta managers set research and funding priorities in the coming years.



Macroalgal blooms cover the banks of an estuary following overenrichment by nutrients. SCCWRP is studying nutrient loading in the Santa Margarita River estuary in northern San Diego County in an effort to learn how to set appropriate nutrient targets for estuaries.

**MICROBIAL WATER QUALITY**

**SCCWRP to present preliminary results for source tracking study**

SCCWRP in February will present the preliminary findings of a microbial source tracking study intended to gauge the relative degradation rates of pathogens, fecal indicator bacteria and source-associated markers in California waters.

The study's goal is to develop a model to help beach managers statewide with interpreting data from microbial source tracking studies. SCCWRP and its partners conducted a series of field and mesocosm experiments in a variety of environmental settings.

Preliminary findings will be presented to the Beach Water Quality Workgroup on February 17 at SCCWRP.

**Suitcase-sized microbial detection device enters next stage of development**

A suitcase-sized instrument that could revolutionize the speed at which beach ocean water is tested for microbial contamination has been delivered to the Monterey Bay Aquarium Research Institute to be paired with an instrument that will automate sample acquisition and preparation.

The droplet digital PCR (polymerase chain reaction) instrument was developed by Arizona State University researchers in collaboration with SCCWRP and the Monterey Bay Aquarium Research Institute (MBARI). 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 will be able to be used in the field, producing results within two hours.

When the two instruments are paired by MBARI this spring, it will create a contiguous automated system capable of measuring microbes in raw water samples from start to finish – a system so simple that it could be operated by a lifeguard.

**SCCWRP, partners seeking comments on framework for assessing nutrient overenrichment in S.F. Bay**

SCCWRP and its partners are seeking public comment on a draft of a scientific assessment framework that will be used for assessing the effects of nutrient overenrichment in San Francisco Bay.

The framework is built on five key indicators of condition: phytoplankton biomass (expressed as surface water chlorophyll-a concentration), harmful algal bloom abundance, HABs toxin concentrations, and dissolved oxygen levels.

Project participants will review stakeholder feedback on the draft assessment framework at a meeting February 9 at the San Francisco Bay Regional Board offices in Oakland.

At that meeting, SCCWRP and its partners also will kick off a review of the scientific basis for dissolved oxygen objectives for

intertidal and tidal slough habitats in San Francisco Bay, including [Suisun Marsh](#).

**Water-quality model calibrated for Santa Margarita River estuary**

SCCWRP and its partners have completed calibrating a new water-quality model that will be used to study nutrient loading in the Santa Margarita River estuary in northern San Diego County.

The model is intended to offer a more precise simulation of the nutrient dynamics of this estuary, which is dominated by macroalgae.

Project participants are seeking to determine the degree to which nutrient loading in the estuary should be reduced to support beneficial uses.

The model was adapted from an open-source, USEPA-supported model called the Water Quality Simulation Program (WASP).

Scientists are now engaging in discussions about setting appropriate numeric targets for the estuary.

ECOHYDROLOGY

## Workgroup for San Diego flow ecology study begins meeting

SCCWRP in November facilitated the inaugural meeting of a San Diego-area workgroup that will be working to ascertain the minimum flow requirements necessary to sustain the ecological health of streams across the San Diego River Watershed.

The San Diego River Watershed Flow Ecology Demonstration Project will apply a series of SCCWRP-developed modeling tools to determine relationships between key flow metrics and in-stream biological indicators.

The San Diego River Watershed presents an ideal opportunity to learn 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.

The project workgroup, which is meeting monthly, is made up of representatives from local municipalities, land conservancies, water districts, NGOs, and the San Diego State University Watershed Science Institute. The San Diego Regional Water Quality Control Board also is actively involved.

Project participants hope to learn from this study how they can incorporate flow-ecology relationships into management decisions at the watershed scale. The study's findings are expected to be released in summer 2016.

WETLANDS

## Coastal vulnerability to storm surge being documented at 10 sites

SCCWRP and its project partners have begun using camera stations and water-level loggers set up at 10 Southern California sites to collect data on how El



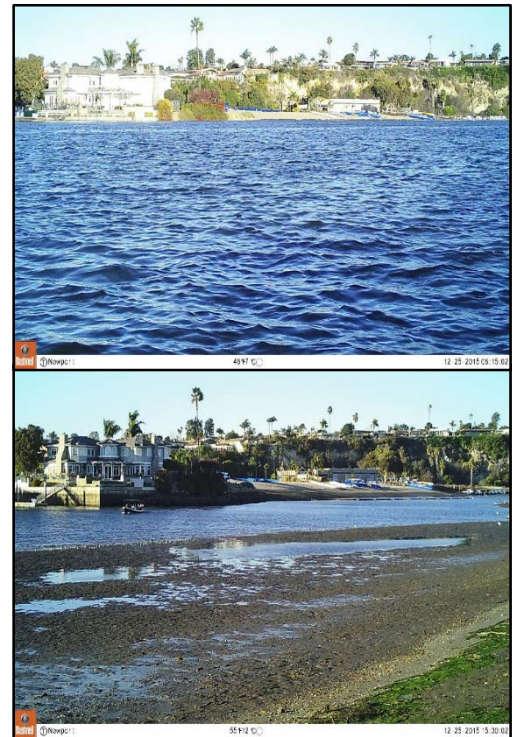
**The streams and tributaries that feed into the El Capitan Reservoir in San Diego County's Cuyamaca Mountains are the subject of a SCCWRP-facilitated flow ecology study that seeks to understand the minimum flows needed to sustain healthy in-stream biological communities. Study participants hope this information will help watershed managers make better-informed management decisions.**

Nino storm surges this winter impact vulnerable coastal lagoons and estuaries.

The El Nino lagoon and estuary monitoring project is an effort to understand how sea level rise fueled by global climate change may impact low-lying coastal areas.

In addition to the 10 priority sites being monitored by SCCWRP and Scripps Institution of Oceanography, 25 additional coastal sites stretching from San Diego to the Central Coast are being monitored by other project partners, including a group of citizen scientists.

Data from the project are expected to be used to help calibrate sea-level rise response models being developed by the U.S. Geological Survey and others.



**A camera station in Upper Newport Bay in Orange County captures the "before" (top) and "after" (bottom) of an enormous King Tide that raised water levels 6.6 feet on Christmas Day. SCCWRP and its partners are working to methodically document the impacts of El Nino-fueled storm surges in vulnerable coastal zones.**

## INFORMATION TECHNOLOGY &amp; VISUALIZATION

## CTAG-formed user groups take divergent paths

Two information management user groups established by CTAG and SCCWRP in spring 2015 to help transition technologies to member agencies have taken different paths.

The first of those, the Analysis and Visualization Users Group, has begun building an online fish and invertebrate biointegrity tool to visually analyze and compare Southern California Bight data. The tool will use summary statistics, maps and graphs to examine trends, diversity, richness and class size, among other parameters, allowing member agencies to view their own data and compare the data to other regions of the Bight.

The biointegrity tool will initially feature analyses developed in 2013 by the Trawl element of the Southern California Bight Regional Monitoring Program. Eventually, other types of data will be incorporated, including grain size, biomass, and debris.

The Analysis and Visualization Users Group met three times in 2015 to begin planning for the tool's development.

The second of the CTAG groups, the Data Acquisition Users Group, was indefinitely suspended in November because of a lack of participation by members with software development interest and expertise.

SCCWRP facilitates the CTAG user groups, but the participants are individually responsible for the workload.

The Data Acquisition Users Group identified a mobile data collection app last year that members were interested in building. Ultimately, however, the user group was hampered by lack of active involvement by member agency staff with app development experience.

Although the group has disbanded, SCCWRP will continue to develop mobile data acquisition tools as project opportunities arise, and interact with member agencies on design, beta testing, and implementation upon request.

## SCCWRP hosting second meeting of new marine GIS users group

SCCWRP in March will host the second meeting of a newly formed marine Geographic Information Systems users group that is working to improve and accelerate innovation in the GIS marine and maritime community.

The first meeting of the [Southern](#)

[California Marine GIS Users Group](#), held at the Long Beach Aquarium of the Pacific in fall 2015, brought together a group of GIS professionals and aficionados interested in sharing knowledge and creating stronger connections.

The user group's spring 2016 meeting will be held at SCCWRP on March 2 from 1 p.m. to 4 p.m., followed by a social hour at a nearby restaurant. The meeting will feature innovative GIS work taking place in academia, government and the private sector.

The meeting is free and open to all members of the local GIS community. For more information about the group, contact Dr. [Steve Steinberg](#). To register to attend, [click here](#).



The first meeting of the Southern California Marine GIS Users Group at the Long Beach Aquarium of the Pacific brought together a group of GIS professionals and aficionados. SCCWRP will host the group's second meeting in March.



# New SCCWRP Publications

## Journal Articles (Published)

Alonso, M.B., J. Lailson-Brito, A. Azevedo, E. Santos-Neto, J.P.M. Torres, O. Malm, E. Hoh, N. [Dodder](#), K. [Maruya](#). 2015. Comprehensive non-targeted screening of halogenated organic compounds in dolphins from Brazil. *Organohalogen Compounds* 77:337-340.

[Bay](#), S. 2015. [Water Resources: Toxics TMDLs](#). *Urban Coast* 5(1): 22- 28.

[Bay](#), S., R. Hoenicke, and K. [Maruya](#). 2015. [Water Resources: Contaminants of Emerging Concern](#). *Urban Coast* 5(1): 35-40.

[Bay](#), S., M. Dojiri, and J. Gully. 2015. [Habitat Conditions: Soft-Bottom Benthos](#). *Urban Coast* 5(1): 108-115.

Brooks, B.W., J.M. Lazorchak, M.D.A. [Howard](#), M.V.V. Johnson, S.L. Morton, D.A.K. Perkins, E.D. Reavie, G.I. Scott, S.A. Smith, J.A. Stevens. 2016. [Are Harmful Algal Blooms Becoming the Greatest Inland Water Quality Threat to Public Health and Aquatic Ecosystems](#). *Environmental Toxicology and Chemistry* 35(1):6-13.

Compton Renick, V., K. Weinersmith, D.E. [Vidal-Dorsch](#), T.W. Anderson. 2015. [Effects of a pesticide and a parasite on neurological, endocrine, and behavioral responses of an estuarine fish](#). *Aquatic Toxicology*  
<http://dx.doi.org/10.1016/j.aquatox.2015.09.010>.

Fetscher, A.E., E.D. [Stein](#), and 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.

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](#). 2015. [Fish consumption as a driver of risk management decisions and human health based water quality criteria](#). *Environmental Toxicology and Chemistry* 34:2427-2436.

[Sutula](#), M., L. Green, G. Cicchetti, N. Detenbeck, P. Fong. 2014. [Thresholds of Adverse Effects of Macroalgal Abundance and Sediment Organic Matter on Benthic Habitat Quality in Estuarine Intertidal Flats](#). *Estuaries and Coasts* DOI 10.1007/s12237-014-9796-3.

## Journal Articles (Online)

[Maruya](#), K.A., N.G. [Dodder](#), A. [Sengupta](#), D.J. Smith, J.M. Lyons, A.T. Heil, J.E. Drewes. [Multi-media screening of contaminants of emerging concern \(CECs\) in coastal urban watersheds in southern California](#). *Environmental Toxicology and Chemistry* DOI 10.1002/etc.3348.

## Journal Articles (Accepted)

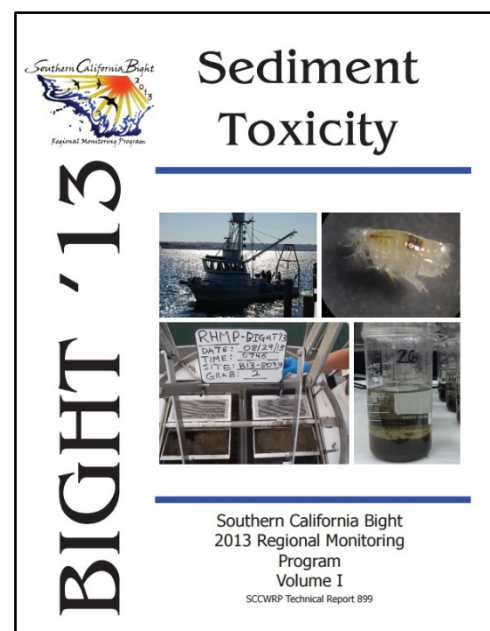
[Schiff](#), K., P.R. Trowbridge, E.T. Sherwood, P. Tango, R.A. Batiuk. In press. Regional Monitoring Programs in the United States: Synthesis of Four Case Studies from Pacific, Atlantic, and Gulf Coasts. *Regional Studies in Marine Science*.

## Book Chapters (Accepted)

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

## Technical Reports

[Bay](#), S.M., L. Wiborg, D.J. [Greenstein](#), N. Haring, C. Pottios, C. Stransky, K. [Schiff](#). 2015. [Southern California Bight 2013 Regional Monitoring Program: Volume I - Sediment Toxicity Report](#). Technical Report 899. Southern California Coastal Water Research Project. Costa Mesa, CA.



The Sediment Toxicity assessment report for the Southern California Bight 2013 Regional Monitoring Program has been published. It is the first element of Bight '13 to publish its final assessment report.

Boyer, K., M. [Sutula](#). 2015. [Factors Affecting Growth of Submersed and Floating Macrophytes in the Sacramento-San Joaquin Delta](#). Technical Report 870. Southern California Coastal Water Research Project. Costa Mesa, CA.

# Quarter in Review

## Conference Presentations

Bittick, S.J., M. [Sutula](#), and P. Fong. [A tale of two algal blooms: Differential negative effects of Ulva and Gracilariopsis on seagrass and its epiphytes](#). Coastal and Estuarine Research Federation Conference. November 8-12, 2015. Portland, OR.

Brooks, B.W., J.M. Lazorchak, M.D.A. [Howard](#), M.V. Johnson, S.L. Morton, D.A.K. Perkins, E.D. Reavie, G.I. Scott, S.A. Smith, and J.A. Steevens. Are harmful algal blooms becoming the greatest inland water quality threat to public health and aquatic ecosystems? Eighth Symposium on Harmful Algae in the U.S. November 15-19, 2015. Long Beach, CA.

Caron, D.A., A.O. Tatters, A.G. Gellene, J. Smith, M.D.A. [Howard](#), C. Nagoda and L. Busse. Go west, young haptophyte: Gish kills attributable to *Prymnesium parvum* spread to southern California. Eighth Symposium on Harmful Algae in the U.S. November 15-19, 2015. Long Beach, CA.

[Gillett](#), D. The Benefits and Difficulties of Defining Reference Conditions in Coastal and Estuarine Systems. Coastal and Estuarine Research Federation Conference. November 8-12, 2015. Portland, OR.

[Howard](#), M.D.A., C. Nagoda, B. Fetscher, R. Kudela, L. Busse, D. Caron, M. [Sutula](#), E. [Stein](#), A. Tatters, J. [Brown](#). [Widespread prevalence of microcystins from a variety of southern California waterbodies and implications for toxin loading to coastal waters](#). Eighth Symposium on Harmful Algae in the U.S. November 15-19, 2015. Long Beach, CA.

Kudela, R., C. Anderson, J. Birch, H. Bowers, D. Caron, G. Doucette, A. Gellene, K. Hayashi, M.D.A. [Howard](#), Burt Jones, John Ryan, Chris Scholin, G Jason Smith, Yi Chao. Realized and potential HAB hotspots along the California coast: what triggers a bloom? Eighth Symposium on Harmful Algae in the U.S. November 15-19, 2015. Long Beach, CA.

[Lao](#), W., Y. Hong, D. [Tsukada](#), K.A. [Maruya](#), J. Gan. [Evaluation of various](#)

[polymers for equilibrium passive sampling of moderately hydrophobic emerging pollutants in water](#). 12th International Symposium on Persistent Toxic Substances. November 16, 2015. Riverside, CA.

[Maruya](#), K. (plenary session) [A tiered biological and chemical monitoring framework for contaminants of emerging concern \(CECs\) in water](#). 12th International Symposium on Persistent Toxic Substances. November 16-17, 2015. Riverside, CA.

[Mazor](#), R. Improving comparator site selection with a predictive index. California Aquatic Bioassessment Workgroup Annual Meeting. October 20-21, 2015. Davis, CA.

Nagoda, C.M., L. Busse, M.D.A. [Howard](#), B. Fetscher, J. [Brown](#), E. [Stein](#), A. Tatters, R.M. Kudela, K. Hayashi, M. [Sutula](#). Cyanotoxins and blooms detected in multiple water body types throughout the San Diego region. Eighth Symposium on Harmful Algae in the U.S. November 15-19, 2015. Long Beach, CA.

[Nezlin](#), N. Depth and magnitude of subsurface chlorophyll maximum in southern California coastal ocean. Eastern Pacific Ocean Conference. September 20-23, 2015. South Lake Tahoe, CA.

[Sengupta](#), A. [From gaged to ungaged: Predicting long term environmental flows, and ecosystem responses](#). American Geophysical Union Annual Fall Meeting. December 14-18, 2015. San Francisco, CA.

Stancheva, R., C. Fuller, E. Fetscher, M.D.A. [Howard](#), R.M. Kudela, E. [Stein](#), M. [Sutula](#), L.B. Busse, and R.G. Sheath. Wadeable streams as widespread sources of benthic cyanotoxins in California. Eighth Symposium on Harmful Algae in the U.S. November 15-19, 2015. Long Beach, CA.

[Stein](#), E. Monitoring the effects of 2015-2016 El Niño on coastal wetlands: Insights to future sea level changes. Newport Bay Conservancy Symposium. January 30, 2016. Newport Beach, CA.

[Steinberg](#), S.J. CellScope Aquatic: A Lab Quality, Portable Cellphone-Based

Microscope for On-Site Collection of Algae Images. Eighth Symposium on Harmful Algae in the U.S. November 15-19, 2015. Long Beach, CA.

[Sutula](#), M., R. Kudela, J. Hagy, L. Harding, J. Cloern, D. Senn, S. Bricker, and M. Berg. Scientific bases for chlorophyll-a endpoints in San Francisco Bay. Coastal and Estuarine Research Federation Conference. November 8-12, 2015. Portland, OR.

Taberski, K., M.D.A. [Howard](#), L. Busse, K. Worcester, L. Webber, B. Anderson-Abbs, T. Jabusch, R. Turner, T. Fleming and S. Keydel. Statewide strategy for monitoring and managing freshwater HABs in California: a water quality managers' perspective. Eighth Symposium on Harmful Algae in the U.S. November 15-19, 2015. Long Beach, CA.

Tatters, A.O., M.D.A. [Howard](#), C. Nagoda, L. Busse, D.A. Caron. Multiple stressors at the land-sea interface. Eighth Symposium on Harmful Algae in the U.S. November 15-19, 2015. Long Beach, CA.

## Conference Posters

[Lao](#), W., D. [Tsukada](#), K.A. [Maruya](#). [Incorporating performance reference compounds \(PRCs\) for passive sampling of organic contaminants using solid phase microextraction \(SPME\)](#). 12th International Symposium on Persistent Toxic Substances. November 16, 2015. Riverside, CA.

[McLaughlin](#), K., N. [Nezlin](#), S. [Weisberg](#). An evaluation of potentiometric pH sensors in coastal monitoring applications. CERF Biennial Conference, Portland, OR. November 8-12, 2015.

## Other Presentations

Gillett, D. Building better bioassessment with ecogenomics: Where are we at and where are we going? City of San Diego molecular lab staff. October 28, 2015. San Diego, CA.

Mazor, R. Elements of the state's bioassessment research program. SWAMP roundtable strategic planning review. November 4, 2015. Riverside, CA.

Mazor, R. Overview of the Stormwater Monitoring Coalition stream survey program and bioassessment. National Parks Service. November 21, 2015. Channel Islands, CA.

Mazor, R. The Stormwater Monitoring Coalition stream survey program and bioassessment. San Diego Regional Water

Quality Control Board. December 2, 2015. San Diego, CA.

Schiff, K. Beach Water Quality: New Testing and Surfer Health Study Update. San Diego Regional Water Control Board. December 16, 2015. San Diego, CA.

Schiff, K. Surfer Health Study. San Diego Regional Water Control Board Advisory Committee. January 5, 2016. San Diego, CA.

Stein, E. Future directions in bioassessment and causal assessment. California State University, Long Beach. November 10, 2015. Long Beach, CA.

Stein, E. Assessment and Management of Intermittently Open Estuaries. Wetland Recovery Project Board of Governors meeting. December 8, 2015. Costa Mesa, CA.

Stein, E. Function-based crediting for in lieu fee mitigation. Environmental Law Institute Research and Policy webinar series. January 13, 2016. Costa Mesa, CA.

## External Articles Featuring SCCWRP

["To prepare for climate change, California Sea Grant funds emergency research on El Niño storms."](#) California Sea Grant. January 27, 2016.

["Citizen science will help assess effects of El Niño."](#) Scripps Institution of Oceanography. November 3, 2015.

["New technical memo from SWAMP on assessing health of freshwater streams."](#) Maven's Notebook. October 23, 2015.

# SCCWRP Personnel Notes

## Commission and CTAG



**Vicky Whitney**, a member of the SCCWRP Commission since 2010, has retired from her job as deputy director for the State Water Board's Division of Water Quality.



**Mary Anne Skorpanich**, a member of the SCCWRP Commission since 2007, has retired from her job as deputy director of Orange County Public Works.



**Jennifer Phillips**, an Alternate Commissioner since 2015, has also been appointed CTAG representative for the California Ocean Protection Council.

## New Faces



**Dr. Susanna Theroux**, who just completed a postdoctoral fellowship with the U.S. Department of Energy's Joint Genome Institute in Walnut Creek, joined SCCWRP in January

as a stream ecologist in the Biogeochemistry Department.



**Dr. Dovi Kacev**, who recently earned his Ph.D. in ecology through a joint program at San Diego State University and the University of California, Davis, joined SCCWRP in

December as a joint postdoctoral researcher in the Biology Department and the Southwest Fisheries Science Center.



**Dr. Fayçal Kessouri**, who just earned his Ph.D. in ocean physical-biogeochemical modeling from the University of Toulouse in France, joined SCCWRP in January as a

## Leadership at Scientific Conferences

**Steven Bay** organized and co-chaired a session titled "Design and Use of Spiked Sediment Toxicity Tests to Improve Environmental Management and Decision Making" at the SETAC North America 36th Annual Meeting in November in Salt Lake City, Utah.

Dr. **David Gillett** chaired a special session titled "Defining Reference Condition in Coastal and Estuarine Systems" at the Coastal and Estuarine Research Federation Conference in November in Portland, Ore.

Dr. **Raphael Mazor** organized a session on causal assessment and a forum on the development of tools to support bioassessment at the California Aquatic Bioassessment Workgroup Annual Meeting in October in Davis, Calif.

Dr. **Steve Steinberg** has been appointed co-chair of the 3rd ASPRS National Symposium on Unmanned Aerial Systems, scheduled for September 2016 in Palm Springs, Calif.

Dr. **Doris Vidal-Dorsch** organized and co-chaired two sessions titled "Biaccumulation in Management and Regulation" and "Omic Technologies and Their Real-World Applications" at the SETAC North America 36th Annual Meeting in November in Salt Lake City, Utah.

Dr. **Steve Weisberg** has been appointed to the planning committee for the EPA National Beach Conference.

## Leadership in Scientific Organizations

Dr. **David Gillett** was elected secretary/treasurer of the California Estuarine Research Society.

Dr. **Karen McLaughlin** was elected member-at-large of the California Estuarine Research Federation in November.

Dr. **Steve Weisberg** was elected president of the Western Association of Marine Laboratories.

## Appointments and Editorships

Dr. **Steve Weisberg** has been appointed to an expert review panel to help develop the research portfolio of the National Estuarine Research Reserve System.

Dr. **Steve Weisberg** has been appointed to the Chesapeake Bay Water Quality Criteria Addendum Technical Review Committee.

Dr. **Yiping Cao** has been appointed a guest co-editor for a special issue of the journal *Water* titled "Pathogens in water."

joint postdoctoral researcher in the Biogeochemistry Department and the University of California, Los Angeles.



**Mayra Molina**, who recently earned her master's in biology from California State University, Los Angeles, joined

SCCWRP in January as a Sea Grant Fellow in the Biogeochemistry Department.

SCCWRP COMMISSIONER SPOTLIGHT

# Engineer finds calling in watershed management

During the first half of Angela George's 22-year tenure with the Los Angeles County Department of Public Works, she worked in two distinct divisions: Traffic & Lighting and Construction.



During the second half of her tenure, she's stayed in just one division – Watershed Management – rising from a senior civil engineer to an assistant deputy director.

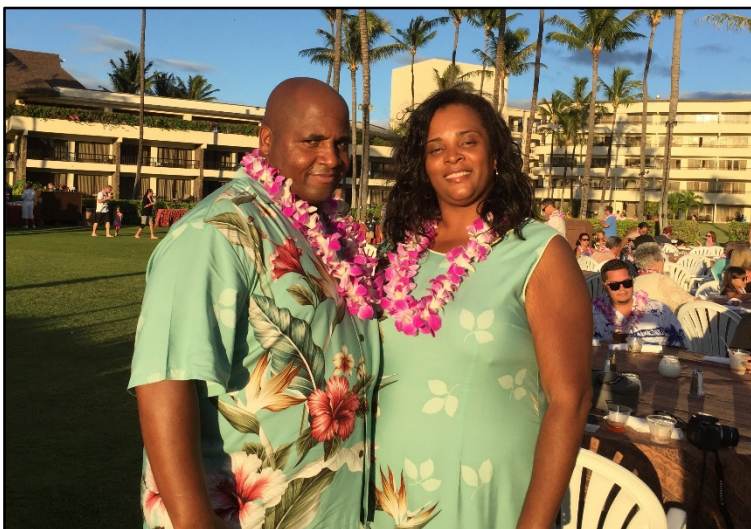
"Everything hinges on water; it has a resounding effect on our communities and the environment on a day-to-day basis," said George, a licensed civil engineer. "That's why I think I've stayed with it."

Angela George

Since October 2014, she's served as the Watershed Management division's assistant deputy director, where she oversees planning and development for the 834-square-mile Los Angeles County Flood Control District. She manages a staff of nearly 100 engineers, scientists, and field technicians who work on stormwater permit compliance, water quality improvement, and flood risk mitigation.

"We work on multi-benefit projects that promote flood protection, improved water quality, water recharge and reuse, improved aesthetic and recreation; there's never one focus," George said. "So instead of a project having a sole purpose, we look at the whole watershed and ensure that we are planning for the comprehensive needs of the community."

George has been with the Department of Public Works for her entire career. She started as a chemical engineering major at UC Davis, but switched to civil engineering after summer internships with the California Department of Transportation and the California Public Utilities Commission.



Angela George attends a luau with husband James during their honeymoon on the Hawaiian island of Maui in October 2015.

## Angela George

**Job:** Assistant Deputy Director, Watershed Management, Los Angeles County Department of Public Works

**SCCWRP role:** Alternate Commissioner (2015-present); CTAG representative (2011-15)

**Prior jobs with L.A. County:** Civil Engineering Associate, Traffic and Lighting Division, Los Angeles County Department of Public Works (1993-96); Associate Civil Engineer/Civil Engineer, Construction Division, DPW (1996-2005); Senior Civil Engineer/Principal Engineer, Watershed Management, DPW (2005-14)

**Education:** B.S. civil engineering, University of California, Davis (1993)

**Residence:** Los Angeles

**Family:** Husband James, a law enforcement officer for the State of California; stepdaughter Sierra, 18, a freshman at Agnes Scott College in Georgia; stepson Jalen, 16; two maltipoo dogs, Chloe and Cooper

**Hometown:** Los Angeles

**Hobbies:** Playing the piano; going to paint nights; reading as a member of book clubs; going to teahouses with a social club called PERFECTS (Public Employee Registered Female Engineer Conversation & Tea Society)

"My family has always worked in the public sector, so I grew up recognizing the importance of serving our communities," she said.

George began interfacing with SCCWRP in 2005 while working on a Santa Monica Bay bacterial source identification project, one of her first projects for Watershed Management. She said she noticed instantly how SCCWRP was able to bring both the regulator and regulated communities together to discuss sound science.

"I really love that we can come to SCCWRP to ask questions and get good information back that helps facilitate constructive discussions and the establishment of partnerships with other agencies," George said.

George, an L.A. native, has lived in the area all of her life, except for her years at UC Davis. In October 2015, George married her husband, James, forming a blended family of his two children and her two dogs.

CTAG SPOTLIGHT

# EPA rep's job closely intertwined with SCCWRP

Terry Fleming has been intimately involved with Southern California's water-quality management community and SCCWRP since he started working for the U.S. Environmental Protection Agency in San Francisco 25 years ago.



Terry Fleming

His first EPA assignment was to review and evaluate ocean monitoring data from Southern California wastewater dischargers that had applied for federal 301(h) waivers exempting them from full secondary treatments.

Recognizing the opportunity to leverage this data for regional monitoring, Fleming began working with the EPA's Environmental Monitoring and Assessment Program (EMAP) and SCCWRP to establish a monitoring program for the Southern California Bight.

"I was amazed by the amount of monitoring data being generated by the facilities about conditions in and around the wastewater outfalls, and I wondered if we would be better served by a regional monitoring program," Fleming said. "SCCWRP was a perfect partner for us in setting up a pilot monitoring program."

Over the years, Fleming also has worked on Total Maximum Daily Loads for waterbodies across the Los Angeles region, and helped establish Southern California water-quality models to predict stormwater loadings and water quality.

For the past decade, Fleming's main responsibility has been guiding and nurturing the growth of the Surface Water Ambient Monitoring Program, a statewide initiative supported in part with EPA funding.



Terry Fleming hikes through Las Trampas Regional Wilderness, a park near his home in the San Francisco Bay Area.

## Terry Fleming

**Job:** Environmental scientist, U.S. Environmental Protection Agency Region 9 (Pacific Southwest), San Francisco

**SCCWRP role:** CTAG representative (1991-present)

**Prior jobs:** Marine ecologist, U.S. Army Corps of Engineers, Waltham, MA (1987-91); environmental education instructor, Nature's Classroom campground on Thompson Island in Boston Harbor (1981-83); environmental education instructor, Acadia Institute of Oceanography in Maine (summer 1982)

**Education:** M.S. marine ecology, University of Massachusetts (1987); B.A. biology with marine emphasis, University of California, Berkeley (1981)

**Residence:** Walnut Creek

**Family:** Daughter Joni, an Army psychology technician in Georgia; grandsons R.J., 6, and Maliki, 4; two Chihuahuas, Prince and Chloe

**Hometown:** Danville, Calif.

**Hobbies:** Day hikes in the East Bay Area hills; bike-riding; watching Bay Area sports; reading award-winning books

Since 2008, he also has been the water quality standard coordinator for EPA Region 9.

Fleming said he has enjoyed watching SCCWRP blossom during his 25 years as a CTAG representative, from a small marine organization into a respected aquatic science organization.

"I've seen SCCWRP evolve into a really exciting place that is doing lots of interesting, cutting-edge research in areas that are directly applicable to the work I do," Fleming said.

Fleming became interested in marine biology when he took an invertebrate zoology class at Bodega Bay Marine Lab as a University of California, Berkeley undergraduate. After graduating, he spent a few years teaching environmental science to middle school students at an educational camp in Boston Harbor. From there, he earned his master's in marine ecology, then went to work for the U.S. Army Corps of Engineers in Massachusetts for four years.

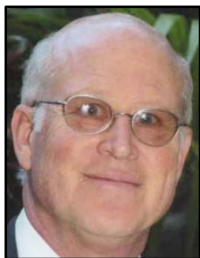
Landing the EPA job in San Francisco in 1991 was an opportunity for him to return home to his Bay Area roots.

On weekends, Fleming enjoys grabbing coffee with his parents and going on local hikes. He also is raising two Chihuahuas he recently inherited.

## SCCWRP PARTNER SPOTLIGHT

# UCLA professor lends ocean modeling expertise

Dr. James C. McWilliams spent the first two decades of his career on the theory and modeling of global climate and ocean circulation patterns at the National Center for Atmospheric Research in Boulder, Colo. He worked at the dawn of the computing age, leveraging increasingly powerful computer programs to solve physical equations.



**Dr. James C. McWilliams**

But by the mid-1990s, McWilliams had become “mid-life itchy” in his research job. He decided he wanted to transition away from working at the global scale – and to refocus his research at a smaller scale. Modeling resolution is necessarily coarse at a global scale, which can be frustrating for a scientist, he explained.

“When you make a computational model of the whole Earth, you must make a very uncomfortable compromise: Your computer isn’t big enough to cover the Earth and also extend your calculations down to smaller scales,” McWilliams said. “So I decided that if I worked at a smaller scale, I had the chance to be much more complete.”

In 1994, McWilliams joined the Department of Oceanic and Atmospheric Sciences at the University of California, Los Angeles, where for the past two decades he has focused on modeling the physical oceanic processes of the California Current System that runs along the U.S. West Coast.

He is one of the world’s leading experts on physical oceanic modeling, and last year partnered with SCCWRP and other



**Dr. James McWilliams, right, accompanies his friend and former UCLA faculty member Dr. Burkhard Bascheck on a cruise aboard the research vessel Zodiac in Marina del Rey harbor.**

## Dr. James C. McWilliams

**Job:** Louis B. Slichter Professor of Earth Sciences, University of California, Los Angeles (1994-present)

**SCCWRP role:** Collaborator on West Coast ocean acidification and hypoxia modeling project

**Prior jobs:** Senior research scientist, National Center for Atmospheric Research in Boulder, Colo. (1974-94); research fellow in geophysical fluid dynamics, Harvard University (1971-74)

**Education:** Ph.D. applied mathematics, Harvard University (1971); M.S. applied mathematics, Harvard (1969); B.S. engineering and applied mathematics, California Institute of Technology (1968)

**Residence:** West Los Angeles

**Family:** Wife Diana, administrator and editor for her husband; son Cyrus, a computer animator; two Australian cattle dogs, Loki and Ember

**Hometown:** Tulsa, Okla.

**Hobbies:** Taking his dogs on walks around his cabin in Sequoia National Monument in the southern Sierra Nevada

collaborators to build and refine a coupled physical-biogeochemical ocean model for the U.S. West Coast. The model, which will be downscaled for the Southern California Bight and other regions, will offer insights into whether coastal managers can take meaningful local actions to mitigate the growing threat of global ocean acidification and hypoxia.

“Our goal is to understand local pollution influences, and then to communicate that to the natural resource managers and pollution managers,” McWilliams said. “SCCWRP is valuable for the latter part, and they’re doing a good job of rising to this responsibility.”

McWilliams first began interacting with SCCWRP in the early 2000s, when he worked with UCLA students who were focused on regional water-quality issues. In the mid-2000s, he and SCCWRP’s Dr. Steve Weisberg worked together to help establish the Southern California Ocean Observing System, one of 11 regional coastal U.S. data integration centers.

Although his primary residence is in West Los Angeles near UCLA, McWilliams and his wife, Diana, spend much of their free time at their cabin near Sequoia National Park, especially in the summer.

“It’s a cabin in the middle of a giant sequoia grove, so it’s no small job to keep it up,” McWilliams said. “But it does have the modern comforts, including a satellite connection.”

## SCCWRP STAFF SPOTLIGHT

# Postdoc sampled phytoplankton in Mediterranean

As a Ph.D. student at the University of Toulouse, Dr. Fayçal Kessouri worked in ocean biogeochemistry, specializing in applying 3D models of plankton ecosystems using observation and modeling techniques.



**Dr. Fayçal Kessouri**

Now, as a joint postdoctoral researcher at SCCWRP and the University of California, Los Angeles, he is applying the same approach to analyze how the California Current System impacts biogeochemical cycles, oxygen concentration, and ocean acidification. He is working with SCCWRP's Biogeochemistry Department and UCLA researcher Dr. James C. McWilliams to develop and test a coupled physical-biogeochemical model that predicts the extent, location and causes of West Coast acidification and hypoxia.

"I wanted to find a topic about modeling and observation because this kind of integrated study is rare," Kessouri said. "I focus a lot on the realism of the models. There is no realistic modeling without observation, and there are no relevant multiscale studies without modeling."

For his doctoral thesis, Kessouri used modeling and observation to focus on two objectives: assess the impact on nutrient production in deep convection areas, and model large biogeochemical elements cycles in the Mediterranean Sea over the span of a decade. After finishing his Ph.D. in 2015, he searched for projects closely related to his thesis topic, which eventually led him to SCCWRP.

Kessouri said he has wanted to work with the ocean since he began



**Dr. Fayçal Kessouri competes in the swimming segment of a triathlon in Toulouse, France, in 2013.**

## Dr. Fayçal Kessouri

**Job:** Joint postdoctoral researcher at SCCWRP and the University of California, Los Angeles

**Started:** January 2016

**Prior jobs:** Intern, Villefranche Oceanographic Laboratory in France (2011-12)

**Education:** Ph.D. ocean physical-biogeochemical modeling, University of Toulouse (2015); M.S. ocean environment, Pierre and Marie Curie University (2012); B.S. engineering in coastal and marine environment, University of Algiers (2008)

**Residence:** Long Beach

**Family:** Parents Ahsene and Halima, experts in pedagogy; three brothers, Amine, a professor of statistics and data analysis at the University of Algiers, Samy, a market research manager in Algiers, and Anis, a university student

**Hometown:** Algiers, Algeria

**Hobbies:** Swimming, water polo, hiking, jogging, and triathlons; reading books by Paulo Coelho, his favorite author

his studies at the University of Algiers in 2003. A native of Algiers, Algeria, he moved to Paris, France, at age 24 to attend Pierre and Marie Curie University. There, he began to explore the impact of nutrients and chlorophyll distribution during deep convection in the Mediterranean Sea.

"I really love the sea," Kessouri said. "I was born on the border of the Mediterranean Sea, and this sea has these special features including circulation. The thermohaline circulation inside the sea is considered a small model for the world circulation."

Kessouri has participated in six scientific sea cruises to collect biogeochemical samples. On his most recent cruise in spring 2015, he spent a month living in the northwestern Mediterranean Sea. The objective was to observe phytoplankton blooms after deep convection, and how the phytoplankton reacted to nutrient mixing. Despite some strong conditions during the trip, Kessouri says it was his most memorable.

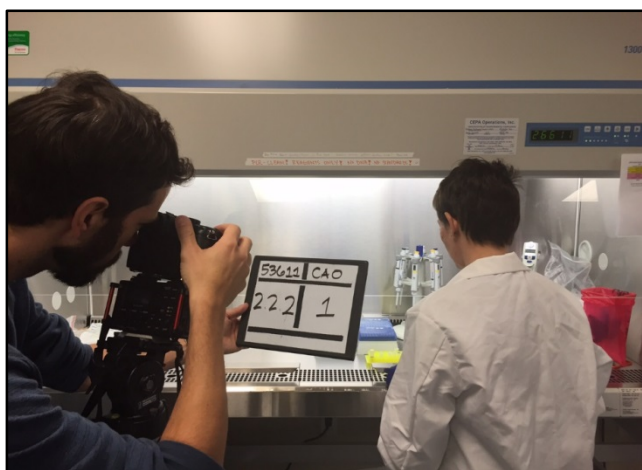
"During my experiment, we had some days where the storm was very strong and the waves were so big – 4-meter waves," Kessouri said. "We tried not to move around in the boat a lot. The waves were so high, it was incredible."

In his spare time, Kessouri swims, which he has been doing for more than 22 years, as well as goes hiking and biking. When not outdoors, he enjoys reading novels by Brazilian author Paulo Coelho, his favorite being *The Pilgrimage*.



## Capturing SCCWRP science on film

The *Journal of Visual Experiments* dispatched a camera crew to SCCWRP in December to film an instructional video on how to use a duplex digital PCR (polymerase chain reaction) assay to monitor aquatic microbial contamination. In the film and accompanying journal article, SCCWRP chronicles the advantages of using duplex digital PCR instead of published quantitative PCR methods. The *Journal of Visualized Experiments* is a peer-reviewed "video" journal that publishes scientific research in a visual format to help researchers more easily pick up new experimental techniques.



Above left, videographer Brandon Hutchisonian from the *Journal of Visualized Experiments* films SCCWRP's Meredith Raith as she sets up a duplex digital PCR assay in SCCWRP's microbiology lab. The assay, adapted for aquatic monitoring by SCCWRP, represents an advancement over published quantitative PCR methods.

Above right, Meredith Raith is interviewed on camera about how to perform a duplex digital PCR assay.

Right, Meredith Raith, Dr. John Griffith, and Dr. Yiping Cao pose for a photograph with videographer Brandon Hutchisonian during filming in SCCWRP's microbiology lab.

