



# SOUTHERN CALIFORNIA COASTAL OCEAN OBSERVING SYSTEM

## Aug - Nov 2021 Newsletter

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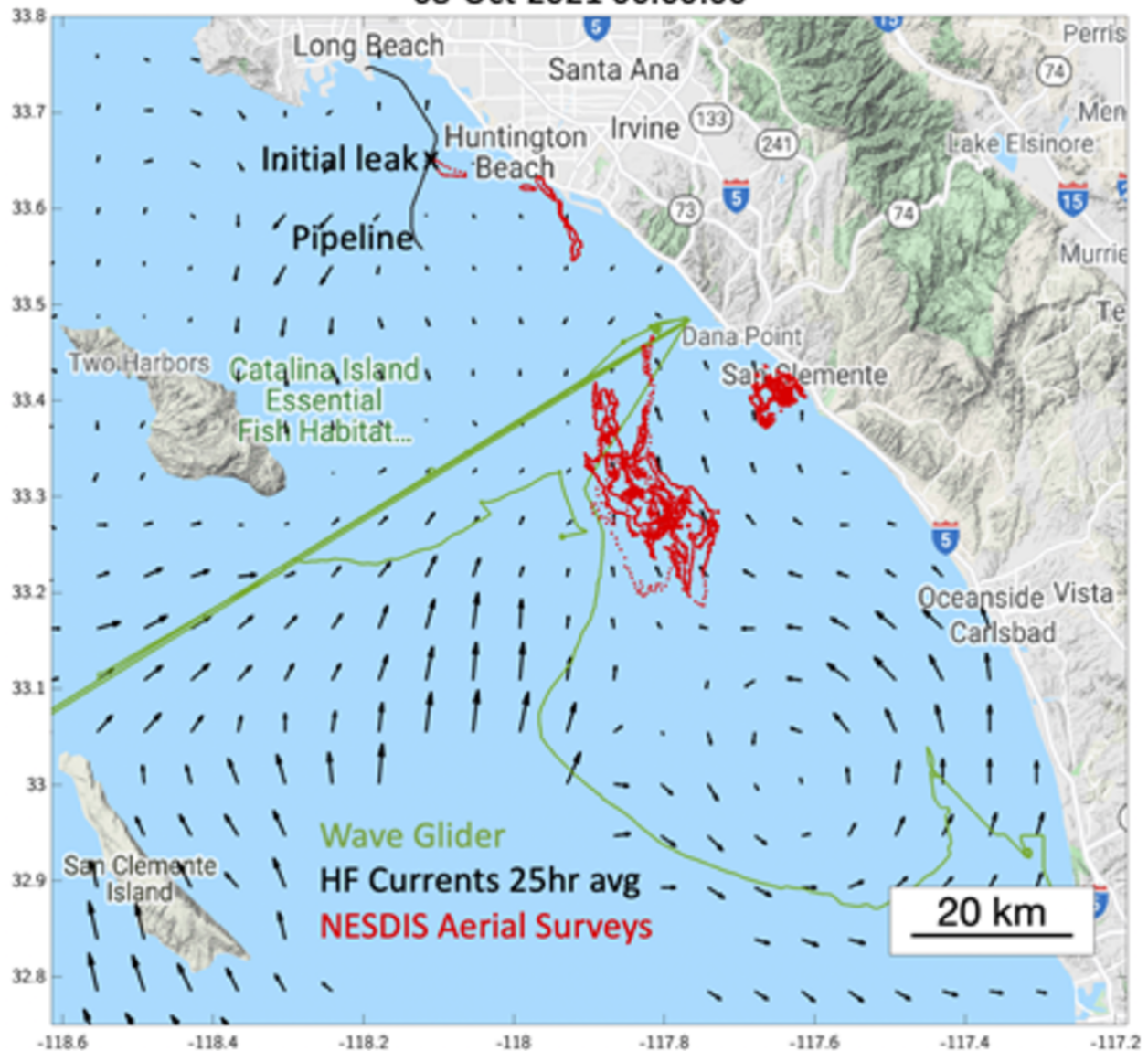
## **Congratulations Dan Rudnick on receiving the 2021 Compass Distinguished Achievement Award!**



Professor Dan Rudnick was recognized by the Marine Technology Society for outstanding contributions to physical oceanography, his many multidisciplinary collaborations, his dedication to ocean observing, and his astute understanding of stakeholder/community needs. Rudnick is a professor at ucsd Scripps Institution of Oceanography and Chairman of SCCOOS Executive Steering Committee and SCCOOS PI of the California Underwater Glider Network. He is considered one of the world's leading experts in applying subsurface observations to advancing our understanding of the ocean dynamics, heat budgets, and circulation. To that end, he has collaborated with many ocean modelers to ensure that glider data are used and useful for model validation and data assimilation methods.

## **SCCOOS Provides Critical Information to Inform Response Efforts to Huntington Beach Oil Spill**

08-Oct-2021 06:00:00



Coastal currents are influenced by the winds, tides, and larger scale oceanographic features. The HF Radar network provided real-time ocean current observations to help track and project the oil spill trajectory (black arrows). Improved wind observations were needed to help computations for the GNOME trajectory forecasts supporting the clean-up efforts so SIO diverted two Boeing Liquid Robotics wavegliders equipped with a Scripps METOC sensing payload and one with a hydrocarbon fluorometer to the offshore location of the oil from the Huntington Beach Spill (wave glider track in green). NESDIS aerial surveys detected oil sheen (in red). Amplify Energy pipeline is in black with an "x" marked for the area of the pipeline that was displaced.

When disasters like the Huntington Beach oil spill in Southern California occur, Regional Associations like the Southern California Coastal Ocean Observing System (SCCOOS) monitor and publicize key information that can inform response efforts.

In October, an estimated 25,000 gallons of oil were released from a displaced undersea pipeline off of Huntington Beach. With concerns over damage to regional ecosystems and

beaches, as well as to disruptions in the operations at the Ports of Los Angeles and Long Beach, monitoring ocean conditions such as ocean surface currents, wave and swell forecasts, and wind conditions around the oil spill is of critical importance to promoting safety at sea and informed decision-making.

Technology such as High Frequency (HF) Radar surface current mapping and Wave Gliders have been able to provide supporting information to stakeholders about the spread of the oil spill. The HF Radar Network (HFRNet) team at the Coastal Observing Research and Development Center (CORDC) at Scripps Institution of Oceanography (SIO) has been providing hourly maps of SCCOOS-supported surface current data in near-real time to help guide the oil spill response. Additionally, Boeing Liquid Robotics Wave Gliders, autonomous uncrewed surface vehicles (USV) equipped with environmental sensors, have provided real-time wind measurements to inform NOAA's Office of Response and Restoration (OR&R) forecast models for the spill. The Wave Glider, supported by NOAA's Office of Marine and Aviation Operations (OMAO) through a memorandum of understanding (MOU) with SIO, was diverted from an established track in order to provide observational measurements to the response team led by the US Coast Guard and CA Department of Fish and Wildlife Office of Spill Prevention and Response (CDFW-OSPR). The particular system on-scene was provided to CORDC by Boeing as an in-kind contribution to the demonstration program. CORDC has also deployed a second unit with a hydrocarbon-tuned fluorometer. Given that there are gaps in NDBC buoy deployments in the region of the oil spill, CORDC has also assisted with deriving the wind data from the USACE and California State-funded Coastal Data Information Program (CDIP) wave buoys along with the wave glider-derived winds.

SCCOOS Executive Director Clarissa Anderson worked closely with CORDC and local and state governments to track the spill and inform response efforts. Anderson emphasized the need for accurate and real-time information stating that "The user-driven science behind SCCOOS has enabled us to give local and state government cleanup efforts timely, actionable information on present and future ocean conditions to help guide spill response. These data are a key part of the informed decision-making that seeks to mitigate the further disruption this spill may cause."

## **NOAA Awards \$7M for California Ocean Observing**

In September, NOAA's U.S. Integrated Ocean Observing System (IOOS®) Office announced funding for 11 new five-year cooperative agreements that support the



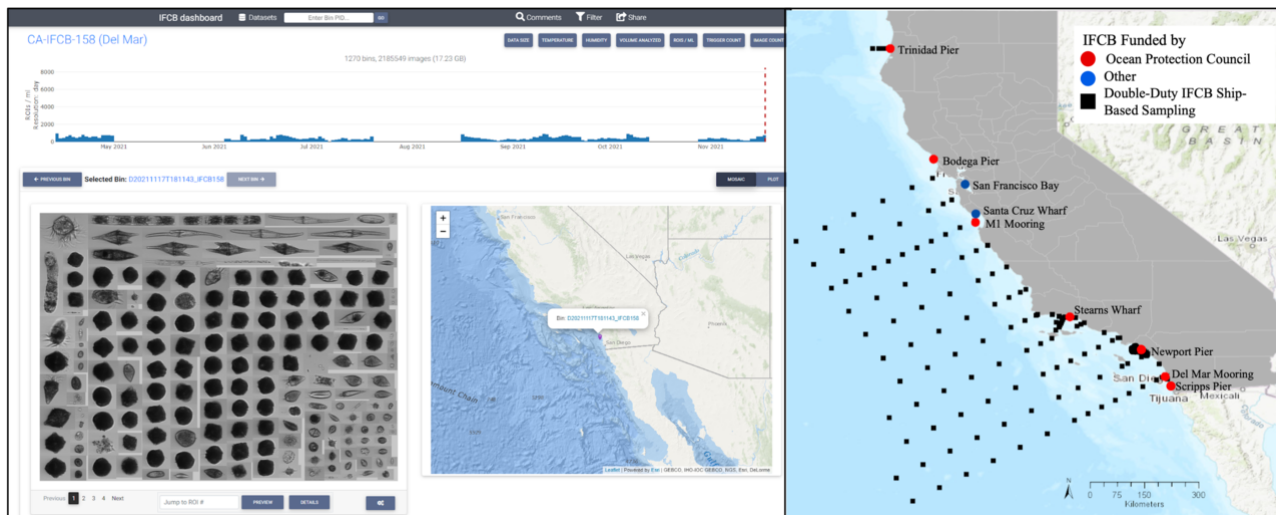
continued growth, expansion, and modernization of our nation’s coastal, ocean, and Great Lakes observing capabilities. In the first year, the Southern California Coastal Ocean Observing System (SCCOOS) and the Central and Northern California Ocean Observing System (CeNCOOS) will jointly receive over \$7 million to cover observing efforts along the California coastline.

“This renewal of funding builds upon our capabilities to understand ocean physics and to provide needed information on biogeochemistry, biology, and ecosystems” said Henry Ruhl, Director, CeNCOOS. “We will continue to collaborate with regional, state, and federal, and tribal partners to provide high-priority ocean and coastal information in relevant and useful formats.”

“In the next five years, CeNCOOS and SCCOOS aim to integrate several advanced observing technologies to fill critical gaps in biological and ecosystem observing and continue critical long-term, high-quality real-time water quality measurements,” said Clarissa Anderson, Executive Director, SCCOOS. “This includes funding to support a world-leading network of robotic microscopes called Imaging FlowCytobots installed at piers and offshore moorings throughout California to continuously monitor planktonic organisms and provide an early warning of harmful algal blooms.”

Click to read [SCCOOS and CeNCOOS Press Release](#).

## NOAA Awards \$15.2M for Harmful Algal Bloom Research



Left: Screenshot of the IFCB dashboard showing real-time images of *Phytoplankton* detected at Del Mar Mooring on November 17, 2021. As you can see in the image the IFCB is detecting a large amount of *Lingulodinium polyedra*, a phytoplankton known to produce magnificent displays of bioluminescence at night. Right: Figure of where the IFCBs are located throughout California and opportunistic cruise tracks.

NOAA announced the award of \$15.2M in funding for Harmful Algal Bloom Research with allocations from the National Centers for Coastal Ocean Science (NCCOS) and the U.S. Integrated Ocean Observing System Office (IOOS).

This investment helps support SCCOOS and CeNCOOS to operate and maintain a network of eleven Imaging FlowCytobots (IFCBs) along California's coast. The overarching goal of the CA IFCB Network is to implement an automated early warning system for the detection and identification of a suite of potential HABs to enable rapid response and better decision-making. The CA IFCB Network is a multi-institutional collaboration that heavily leverages on-going programs and funds from the California Ocean Protection Council, U.S. IOOS, NOAA-ECOHAB, and Orange County Sanitation District.

More information from NCCOS and IOOS, including details on new grant awards can be found in the [NOAA announcement](#).

## **What's New in the Field?**

### **California High-Frequency Radar Network**

SCCOOS HF radar personnel have been conducting field work in Southern California. Brian Emery of UCSB has been leading a series of NSF-funded field experiments in which drifters are deployed along range cells of HF radars near Santa Barbara, CA. The radial velocities observed by individual radars are compared with radial currents measured by the drifters. The goal of the field work is to improve quantification of HF radar errors. David Salazar, Eduardo Romero, and Carter Ohlmann also participated in the experiments. A deployment on 27 October was coordinated with oil-related research conducted by SCCOOS Board of Governors member, Ben Holt, and other scientists at NASA/JPL. One objective of this research is to use aircraft Synthetic Aperture Radar (SAR) for measuring the thickness of oil spills. This could lead to better estimates of oil spill volume from satellite SAR imagery.

Another component of the HFR experiments was a set of deployments of a newly developed drifter that can be deployed by quad-rotor drones. The goal of this component was to compare the drift characteristics of the small drifter with those of the widely used, and well-calibrated MicroStar drifters. The new drifter was designed and fabricated by a UCSB undergraduate research intern, Julia Santos with advice and assistance from Eduardo Romero and Libe Washburn.

David Salazar and Eduardo Romero of UCSB and Matthew Ragan of USC performed maintenance operations on radars that measured surface currents in the area of the recent oil spill offshore of Orange County. Matthew Ragan and David Salazar also reinstalled a radar on Catalina Island in support of the spill response. The reinstallation had been delayed due to COVID restrictions at USC, but these restrictions were relaxed and permission was granted to access the site by the USC administration.

Cal Poly HFR PI Ryan Walter published a paper in *Continental Shelf Research* with undergraduate student Nicholas Trautman looking at seasonal changes in upwelling/downwelling-driven circulation patterns around San Luis Obispo Bay using a decade of HFR data collected locally.

## Harmful Algal Bloom Monitoring Alert Program (HABMAP)

This August, Nicholas Soares, Cal Poly's previous HABs sampler and recent graduate, completed the Frost Summer Undergraduate Research Program with HABs PIs Alexis Pasulka and Ryan Walter. Over the summer Nick expanded HAB sampling in our region to Morro Bay as well as explored the temporal variability of phytoplankton in SLO Bay at a higher resolution (e.g., hourly over a 12-hour period). He presented his work comparing the phytoplankton composition between Morro Bay and SLO Bay at the recent CERF Conference in the 'estuarine and coastal plankton communities: sentinels of evolving ecosystems' session.



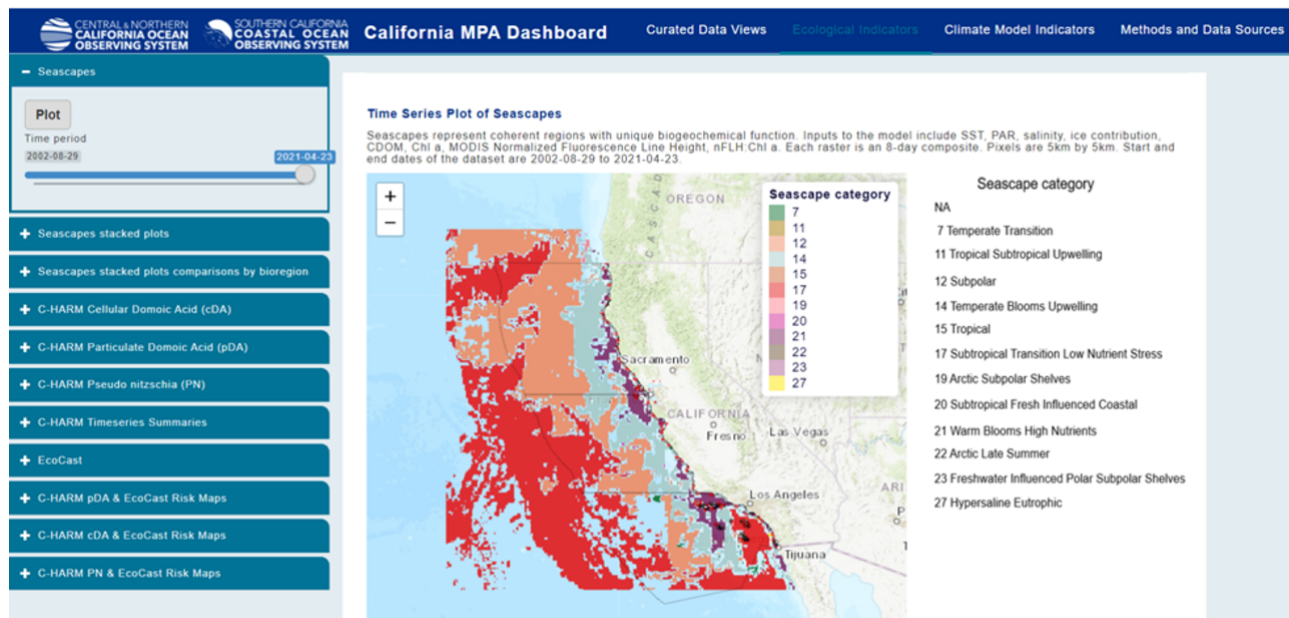
*Nicholas Soares collects surface samples of phytoplankton in Morro Bay to compare weekly*

phytoplankton abundance and community composition to SLO Bay. Photo by Joe P. Johnston, Cal Poly Photographer.

## MPA Project Update

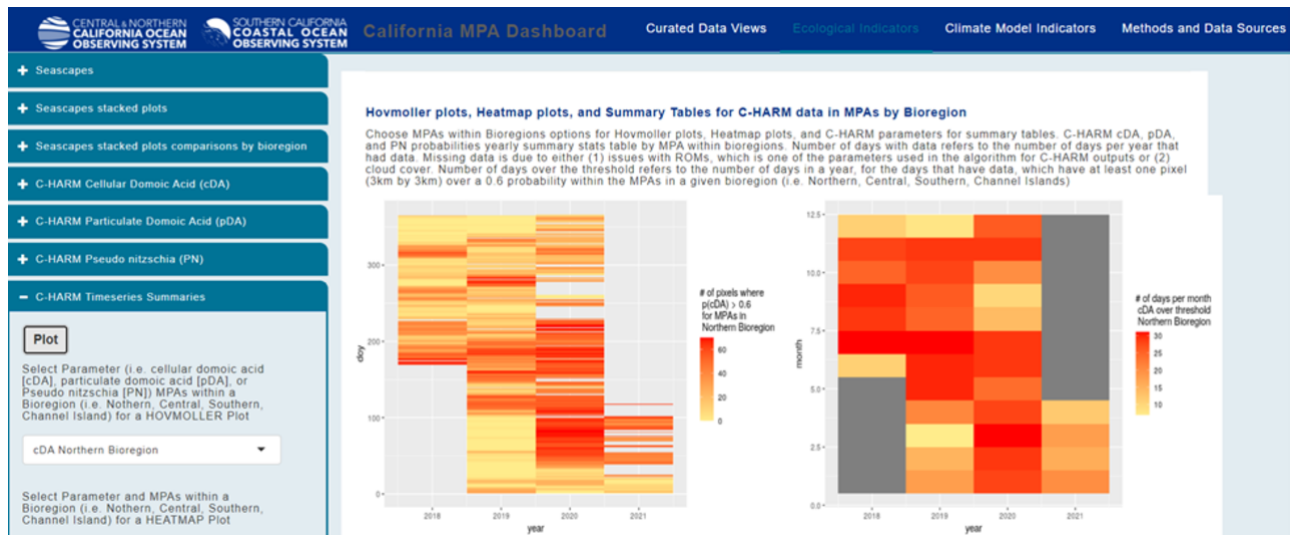
Postdoctoral Researcher, Dr. Florybeth La Valle, contributed to the [draft MPA technical Report](#) on “Integrated ocean observing systems for assessing marine protected areas across California.”

The project used the Integrated Ocean Observing System (IOOS) framework to develop curated data analytics that compiled ocean physics, ocean biogeochemistry and ecosystems for MPA monitoring, as well as to cross-reference to atmospheric and runoff conditions. These curated data views capture data from numerous sources into a virtual California MPA Dashboard of current and past conditions. Curated elements can be recombined in myriad ways to support MPA assessment from regional to statewide scales. This integrated assessment enables analysis of MPA network performance. This work bridges the five conceptual scales that have been suggested as being important when considering change in MPAs: Basin/Quasi-Global, Large Marine Ecosystem, Region/Sub-ecosystem, Mesoscale, and Local. The final MPA technical report will be available soon!



Screenshot of [Ecological Indicators app](#) - Seascapes time series.





Screenshot of *Ecological Indicators app* - C-HARM Hovmoller plots, heatmap plots, and summary tables page.

## Thank You Dean Wendt for serving on SCCOOS Board of Governors



On behalf of SCCOOS and all of our investigators, we would like to extend our sincere gratitude for your years of service on our Board of Governors and Board Executive Committee. While serving as CalPoly's representative, you have been an effective advocate for broad participation in SCCOOS and CeNCOOS activities by the California State Universities. We have always appreciated your sound advice and judgement on the

critical issues that SCCOOS has faced during your tenure. We also appreciate your mentoring of young investigators at CalPoly who have become valuable contributors to the SCCOOS mission.

Your generosity of time and expertise has greatly benefited SCCOOS as it has worked to create our California Ocean Observing System. We wish you all the best in your continuing leadership roles at CalPoly!

## Recent Workshops, Conferences, and Webinars

SCCOOS has co-organized, participated in, and presented at several virtual workshops over the past few months. Meeting agendas, notes, and presentations are available by clicking the links below.

- Aug 18: Regional Ocean Data Sharing Initiative Technical Work Group Meeting
- Aug 27: Host House Transportation and Infrastructure Cmte Staff
- SCCWRP SCB OAH TAG Meeting
- Sept 1: HABON Webinar Series: Implementation Strategy for a National Harmful Algal Bloom Observing Network, presented by Dr. Greg Doucette, NOAA NCCOS
- Sep 13-17: 3rd NOAA Workshop on Leveraging AI in Environmental Sciences, virtual
- Sep 14: OPC Meeting
- Sept 17: CINMS SAC Meeting, virtual
- Sep 20-23: Oceans Conference 2021, San Diego, CA
- Sep 26-29: Eastern Pacific Ocean Conference (EPOC), Fallen Leaf Lake, Tahoe, C
- Oct 6-8: IOOS Fall Meeting, virtual
- Oct 10-15: International Conference on Harmful Algae (ICHA) - virtual (La Paz, MX)  
- Clarissa chaired a session
- Oct 11-13: 49th Annual MRA Educational Conference & Trade Show in Partnership with California Association of Harbor Masters and Port Captains, La Jolla, CA - Clarissa Presented
- Oct 13-14: MBON Plankton Workshop: Plankton ecosystem functions, biodiversity, and forecasting, virtual
- Oct 19: Rear Admiral Schofield meeting - interested in HFRNET, Coastal Surveillance program, and any other programs dealing with Maritime Domain Awareness, Search and Rescue, countering IUU fishing, or oil spill response and recovery
- Oct 19-21: Community Modeling Workshop, virtual
- Oct 22: US-MBON Meeting - Clarissa moderated a session
- Oct 24-27: APP Conference, Ports and Climate Resilience - Clarissa presentation
- Oct 26: West Watch Webinar - SCCOOS presented

- Oct 26-27: National Association of Marine Laboratories (NAML) Biennial Fall meeting, virtual
- Oct 26-28: Sea Grant Extension Meeting
- Oct 27-28: NASA Ocean Color Research Team (OCRT) Meeting, virtual
- Nov 4: CA State Senate for the Joint Committee on Fisheries and Aquaculture hearing schedule - Clarissa presented (2:02:40 mark)
- Nov 1-4 & 8-11: Coastal Estuarine Research Federation (CERF) 26th Biennial Conference, virtual
- Nov 15-19: BlueTech Week, virtual
- Nov 15-16: 9th annual Ocean Tracking Network (OTN) Symposium, virtual
- Nov 16: SCCOOS and CeNCOOS Water Quality Focus Group Meeting, virtual
- Nov 18-19: OASIS for a Clean Ocean Workshop, virtual
- Nov 18: LA/LB SAROPS tour
- Nov 18: NASA DEVELOP Final Presentations "Using Remote Sensing to Detect the Frequency and Drivers of Red Tide Blooms in California."

## Funding Opportunities

- FY2022-2023 Margaret A. Davidson Fellowship Request for Proposals
  - Full proposals are due 10-December, 2021.
- Nancy Foster Scholarship Program
  - Full proposals are due 14-December, 2021.
- FY2022 US Marine Life Observations
  - Full proposals are due 17-December, 2021.
- Understanding multi-stressor impacts on marine ecosystems under climate change
  - Full proposals are due 18-January, 2022.
- Integrated Research on Coastal and Ocean Acidification and Harmful Algal Blooms
  - Full proposals are due 19-January, 2022.

## Recent Publication

- ATN-MBON-OTN Regional Workshops Synthesis of National & Regional Themes, Needs, Findings, & Recommendations Report.
- Bernstein S., Ruiz-Cooley R.I., Kudela R., Anderson C., Dunkin R., Field J.C. (2021). Stable isotope analysis reveals differences in domoic acid accumulation and feeding strategies of key vectors in a California hotspot for outbreaks. Harmful Algae. V. 110. <https://doi.org/10.1016/j.hal.2021.102117>
- Estes M., Anderson C., Appletans W., Bax N., Bednarsek N., Canonico G., Djavidnia S., Escobar E., Fietzek P., ... Weatherdon L. (2021). Enhanced monitoring of life in the sea is a critical component of conservation management and sustainable

economic growth. *Marine Policy*. Volume 132, <https://doi.org/10.1016/j.marpol.2021.104699>.

- Gibble C.M., Kudela R., Knowles S., Bodenstein B., and Lefebvre K.A. (2021). Domoic acid and saxitoxin in seabirds in the United States between 2007 and 2018. *Harmful Algae* 103, 101981. <https://doi.org/10.1016/j.hal.2021.101981>.
- Hardison E. A., Kraskura K., Van Wert J., Nguyen T., & Eliason E.J. (2021). Diet mediates thermal performance traits: implications for marine ectotherms. *Journal of Experimental Biology*. <https://doi.org/10.1242/jeb.242846>.
- IOOS Association. 2021. [Detecting the Coastal Climate Signal: The IOOS Contribution](https://www.ioosassociation.org). IOOSassociation.org.
- Kessouri F., McLaughlin K., Sutula M. A., Bianchi D., Ho M., McWilliams J.C., ... & Leinweber A. (2021). Configuration and validation of an oceanic physical and biogeochemical model to investigate coastal eutrophication in the Southern California Bight. *Journal of Advances in Modeling Earth Systems*. [doi.org/10.1029/2020MS002296](https://doi.org/10.1029/2020MS002296).
- Mitchell, R. (2021). Global Perspectives on Harmful Algal Blooms: Impacts and Responses. Clark University. [Clark Digital Commons](https://www.clarku.edu). - Master's paper. Mentions SCCOOS HABMAP data.
- Neeley, Aimee, Beaulieu, Stace E., Proctor, Chris, Cetinić, Ivona, Futrelle, Joe, Soto Ramos, Inia, Sosik, Heidi M., Devred, Emmanuel, Karp-Boss, Lee, Picheral, Marc, Poulton, Nicole, Roesler, Collin S., Shepherd, Adam, "Standards and practices for reporting plankton and other particle observations from images", 2021-07-26, DOI:10.1575/1912/27377, <https://hdl.handle.net/1912/27377>.
- [OPC MPA LTM Draft Final Technical Report](#) - Integrated ocean observing systems for assessing marine protected areas across California.
- [Regional Ecosystem Services Observation Network: A summary report of RESONs summer workshop: Ecosystem unknowns and societal monitoring needs June 28-29, 2021](#).
- Rockwood, R. C., Adams, J. D., Hastings, S., Morten, J., & Jahncke, J. (2021). Modeling whale deaths from vessel strikes to reduce the risk of fatality to endangered whales. *Frontiers in Marine Science*, 919. <https://doi.org/10.3389/fmars.2021.649890>.
- Shi, H., García-Reyes, M., Jacox, M. G., Rykaczewski, R. R., Black, B. A., Bograd, S. J., & Sydeman, W. J. [Co-occurrence of California drought and northeast Pacific marine heatwaves under climate change](#). *Geophysical Research Letters*, e2021GL092765.
- Smith, J., Shultz, D., Howard, M. D., Robertson, G., Phonsiri, V., Renick, V., ... & McLaughlin, K. (2021). Persistent domoic acid in marine sediments and benthic infauna along the coast of Southern California. *Harmful Algae*, 108, 102103. <https://doi.org/10.1016/j.hal.2021.102103>.



- Sydeman, W. J., Thompson, S. A., Piatt, J. F., Zador, S., & Dorn, M. W. (2021). Integrating seabird dietary and groundfish stock assessment data: Can puffins predict pollock spawning stock biomass in the North Pacific?. *Fish and Fisheries*. <https://doi.org/10.1111/faf.12611>.
- Trautman, N., & Walter, R. K. (2021). Seasonal variability of upwelling and downwelling surface current patterns in a small coastal embayment. *Continental Shelf Research*. <https://doi.org/10.1016/j.csr.2021.104490>.
- Turner, E., E. Ombres, J. Bennett-Mintz, Q. Dortch, M. Broadwater, H. Berger, M. Harris. 2021. NOAA Ocean Acidification Program: Harmful Algal Blooms and Ocean Acidification Workshop: Defining a Research Agenda. U.S. Department of Commerce, NOAA Technical Memorandum OAR-OAP-3, 76 p.
- Waite, H. R., & Sorte, C. J. Negative carry-over effects on larval thermal tolerances across a natural thermal gradient. *Ecology*, e03565. <https://doi.org/10.1002/ecy.3565>.

## SCCOOS in the News

- Padilla, G. Algae blooms make appearance at Central Coast beaches. KSBY. August 25, 2021. - Features SCCOOS PIs Alexis Paulka and Ryan Walter, Cal Poly
- More Tar Balls Washing Up at San Diego Beaches, Public Urged Not to Touch Them. NBC San Diego. Published October 10, 2021 - Features Clarissa Anderson
- Bravo, C. and Gregorio-Nieto, B. Oil Spill Response Teams Scanning Half of San Diego County Shoreline. NBC San Diego. October 8, 2021. - Features Clarissa Anderson
- Fryer, H. Changing weather raises fear that O.C. oil spill could reach more coastal areas. Los Angeles Times. Published October 6, 2021. - Features Eric Terrill
- Curwen, T. How a coast crowded with ships, port gridlock and an anchor may have cause O.C. oil spill. LA Times. Published October 6, 2021.- features Kip Luitt, SCCOOS BOG
- Wisckol, M. Seabird fatalities from oil spill expected to grow 'considerably'. The Orange County Register. Published October 5, 2021. - Features Clarissa Anderson and Bill Sydeman
- Colbert, A. SoCal Oil Spill. Kpbs. 5-October, 2021 - Features Eric Terrill

## Upcoming Activities

- Nov 29 & Dec 6 - IOOS Advisory Committee Public Meeting, virtual
- Dec 1-2: CalCOFI Conference: Social-ecological indicators to support marine management in a changing climate, virtual
- Dec 13-17: AGU Fall Meeting, New Orleans, LA & online

- Feb 27-Mar 4: Ocean Sciences Meeting, virtual
- Mar 8-10: IOOS Spring Meeting, Washington, D.C.
- March 24-25: NANOOS Community Workshop, Astoria, OR
- April 19-21: NASA ISRO Synthetic Aperture Radar (NISAR) Science Community Workshop, Pasadena, CA
- Apr 26-27: IOOS Code Sprint, Chicago, IL
- May 9-13: GlobalHAB Workshop
- May 24-25: SCCOOS and CeNCOOS Principal Investigators and Joint Strategic Advisory Council Meeting (JSAC), Avila Beach, CA
- September 19-23, 2022: Open Science Conference on Eastern Boundary Upwelling Systems (EBUS): Past, Present and Future & Second International Conference on the Humboldt Current System, Lima, Peru



Southern California Coastal Ocean Observing System  
info@sccoos.org | <https://sccoos.org/>  
Scripps Institution of Oceanography  
8880 Biological Grade, 155 MESOM  
La Jolla, CA 92093-0206