Award 1232779 - annual Project Report

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Cover

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- Daniel C Reed
- Principal Investigator

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09/21/2015
Signature of Submitting Official (signature shall be submitted in accordance with agency specific instructions)
Daniel C Reed

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Accomplishments

* What are the major goals of the project?

The Santa Barbara Coastal LTER (SBC) seeks to develop a predictive understanding of how land and ocean processes alter the biological structure and ecological functions of giant kelp forests

under varying conditions of disturbance and climate. The amounts of inorganic nutrients, organic matter, and sediments exchanged between kelp forests and the land and sea that adjoin them vary in response to changes in climate, ocean conditions and land use. Variation in the supply of these materials interacts with natural and human-caused disturbances to influence the abundance and species composition of kelp forest inhabitants, their ecological functions and the ecosystem services that they provide. Thus a general goal of SBC is to understand how coastal ecosystems at the land-sea margin are linked through the exchange of materials. Giant kelp forests are highlighted in our research because they are prominent coastal ecosystems in California and other temperate regions of the world. Site-based research focuses around the following three inter-related themes: (1) Biotic and abiotic drivers of kelp forest structure and function, (2) Material exchange at the land-ocean margin, and (3) Movement and fluxes of inorganic and organic matter in the coastal ocean.

The major objectives of each of our three research themes are:

Theme 1: To determine how variations in climate, wave disturbance and fishing influence the structure and dynamics of kelp forest communities and the fate of net primary production by giant kelp.

Theme 2: To determine how the input of dissolved and particulate nutrients from watersheds and coastal margins to nearshore waters vary as a function of land use, disturbance by fire, coastal erosion and storms. Capturing the full range of the very large temporal and spatial variability in these fluxes requires a multi-tiered research approach.

Theme 3: To determine how oceanographic processes influence: (a) the dilution and dispersal of freshwater runoff plumes, (b) nitrogen recycling and efflux from benthic sediments within and adjacent to kelp forests, and (c) the fate of net primary production by phytoplankton.

* What was accomplished under these goals (you must provide information for at least one of the 4 categories below)?

Major Activities:

We collected data for a core group of long-term integrated measurements on land and in the ocean aimed at quantifying climate, disturbance and inorganic and organic subsidies to and from giant kelp forests and their effects on kelp forest community structure, productivity and dynamics. With supplemental funding we added sensors for pH, oxygen and chlorophyll fluorescence to our instrumented oceanographic moorings to better characterize long-term trends in the nearshore carbonate system. Other major activities for each research theme follow below.

Theme 1a. Effects of wave disturbance and climate variation on kelp forest structure and function:

We continued to maintain and evaluate our long-term kelp removal experiment designed to investigate the consequences of increased wave disturbance on kelp forest

communities. Our long-term kelp forest community data were analyzed to test key ecological theories pertaining to processes governing species diversity, net primary production and stability. We analyzed our recently developed time-series of kelp forest invertebrate biomass (derived from species specific relationships between shell free dry mass and % cover or density applied to long-term data of invertebrate abundance) to examine how the trophic structure, taxonomic composition and diversity of sessile invertebrates vary with giant kelp biomass. We continued processing Landsat satellite imagery to estimate kelp biomass throughout California and Baja California, Mexico and constructed an algorithm to fill in missing data resulting from a scan line corrector malfunction of Landsat 7 to facilitate our ongoing research on the regional determinants of kelp biomass and metapopulation dynamics.

Theme 1b. Determining the fate of kelp NPP:

We incorporated results from field experiments on the determinants of DOC (dissolved organic carbon) exudation by giant kelp and time series data on surface and bottom irradiance into our empirical model of reef-scale NPP to examine seasonal and interannual variation in the contribution of kelp derived DOC to the coastal carbon pool. Rates of blade senescence obtained from in situ measurements of kelp blade life span at different depths and locations in the forest are being incorporated into our model of kelp NPP to account for the proportion of frond biomass lost to blade senescence prior to the death of the frond. An algorithm was developed to estimate physiological condition (Chl:C) of giant kelp blades from reflectance to enhance our ability to track regional changes in the growth state of giant kelp via airborne or satellite imagery.

Theme 1c. Effects of fishing on kelp forest structure and function:

Quarterly sampling of community structure and NPP in experimental plots was completed at two reefs recently protected from fishing and three reefs unprotected from fishing. Densities of the extensively fished spiny lobster (a key kelp forest predator) were also assessed at these reefs and lobster fishing effort was measured twice per month during the fishing season. GIS mapping of fishing logbook data 5 years before and after the establishment of MPAs at the Channel Islands coupled with fishery interviews were used to test whether lobster fishermen aggregated their efforts at MPA borders as an adaptive fishing strategy.

Theme 2A Export of nutrients from watersheds

Activities related to watershed hydrology included updating and expanding the rain gauge network, investigating interpolation approaches to spatially distribute rainfall and examining the relationships between climate variability and rainfall events. Stream discharge files were updated and are being combined with hydrochemical data to calculate fluxes of solutes from watersheds to the ocean. These data sets are also being used in a collaborative modeling project funded by NOAA and California Sea Grant to examine how rainfall and runoff will vary as a function of climate change. The effects of fire on nitrogen cycling in chaparral soils was investigated in greenhouse experiments in

which pH and NH_4 concentration were varied orthogonally in soils with different burn histories. Measurements of plant and soil properties were combined with the ecohydrologic model RHESSys to project the effects of changing climate and fire timing on N cycling and retention in chaparral soils. Whole ecosystem metabolism based on diel variations in dissolved oxygen was studied in urban and undeveloped streams during multi-day deployments over several months.

Theme 2b. Trajectories of landscape changes in coastal watersheds:

Investigations of how fire, urbanization and agriculture alter the landscape to modify material input to the coastal ocean focused on applying Multiple Endmember Spectral Mixture Analysis (MESMA) to imagery obtained from AVIRIS overflights to map plant species distributions. Visible-Shortwave Infrared (VSWIR) and Thermal Infrared (TIR) spectroscopy were used to estimate chemical and biophysical properties of chaparral plants including water content, lignin, cellulose, nitrogen, carbon and Leaf Mass/Area. Seismic profiles and long cores in Carpinteria Marsh and Goleta Slough were obtained to investigate long-term changes in coastal ecosystems. Cores from Dune Pond near Devereux Slough were examined for pollen, an indicator of vegetation and fire history.

Theme 2c. Exchanges of nutrients on beaches

We continued monthly bird, people and dog censuses and measurements of inputs of macroalgal wrack to beaches at six core sites. We continued to survey densities of wrack consumers (talitrid amphipods) bimonthly at two of our core sites to evaluate recovery of these populations from episodic erosion and loss of habitat. One of our six beach sites was impacted by extensive oiling from a ruptured pipeline and by subsequent clean-up activities that removed oiled sand and wrack and disturbed the affected beaches for many weeks. We are monitoring the recovery of talitrid amphipod populations following the impacts caused by the oil spill and spill response activities.

Theme 3a. Dilution and dispersal of freshwater runoff plumes

We performed numerical simulations of storm runoff plumes to parameterize the dilution surrounding kelp forests as a function of freshwater discharge, ocean currents, and wind conditions. High spatial resolution numerical simulations using Regional Ocean Modeling System (ROMS) of storm water plumes from two creeks near Mohawk Reef were done for the two wettest seasons in the last 15 years. The dilution of storm water plumes was characterized with respect to discharge, distance from sources, cross-shelf distance, currents, winds, stratification, and vertical mixing. Dispersion of the freshwater plume was compared with our previously published parameterizations of cross- and along-shelf dispersion of Lagrangian particles to test the generality of the coastal plume dispersion results.

Theme 3b. Nitrogen recycling and efflux from sediments

Pilot studies using benthic chambers were initiated to examine the efflux of ammonia from benthic sediments.

Theme 3c. Transport and fate of phytoplankton NPP

We completed analysis of physical and bio-optical data collected from >400 cross-shelf sections obtained from an ocean glider over a wide range of oceanographic conditions. Modeling efforts with ROMS focused on the dynamical characterization of shelf currents, including coastal-trapped waves and submesoscale variability. Analysis of high-resolution towed profiler data and acoustic Doppler current profiler (ADCP) data from earlier oceanographic cruises was completed. These data were used to quantify the total chlorophyll biomass in offshore waters of the Santa Barbara Channel and to quantify chlorophyll biomass below the euphotic zone due to water mass subduction. We continued to collaborate with researchers from the University of South Carolina and the CCE LTER to maintain a 20+ year sediment trap time series in the Santa Barbara Basin located at 250 and 540 m depths.

Specific Objectives:

Theme 1a. Effects of wave disturbance on kelp forest structure and function:

Determine the importance of wave disturbance on kelp forest community structure primary production and metapopulation dynamics under different climatic conditions using data from long-term experiments and core time-series measurements.

Theme 1b. Determining the fate of kelp NPP:

Determine the amount, rates and forms of biomass lost by giant kelp, the factors affecting these losses and the proportion of giant kelp NPP that is retained and utilized in the kelp forest versus exported to other ecosystems.

Theme 1c. Effects of fishing on kelp forest structure and function:

Experimentally investigate the short and long-term effects of fishing on kelp forest structure and function, and place these effects within the context of past variability resulting from different climatic conditions.

Theme 2a. Export of nutrients from watersheds:

Determine climatic variation in the fluxes of dissolved and particulate nutrients, organic matter and sediments to the Santa Barbara Channel from watersheds with different fire histories and land uses. Estimate post-fire nitrogen cycling and vegetation growth in chaparral ecosystems and determine the factors controlling the amount of nitrogen exported from them.

Theme 2b. Trajectories of landscape changes in coastal watersheds:

Use time series of airborne hyperspectral data to develop land cover maps before and after fires for use in ecohydrological modeling, nutrient flux calculations and examination of riparian conditions along streams. Calculate gully depths and erosion rates from Lidar data for unburned and burned catchments. Extend the time scale of our examination of landscape changes with cosmogenic radionuclide analysis of riverine sands and analyses of sediment cores taken from estuaries that border the Santa Barbara Channel.

Theme 2c. Exchanges of nutrients on beaches

Determine the degree to which beach ecosystems supply recycled marine nutrients to nearshore waters. Determine the effect of varying organic matter source and processing history on the dissolved organic and inorganic carbon and nitrogen dynamics in intertidal beach sands.

Theme 3a. Dilution and dispersal of freshwater runoff plumes

Simulate several realizations of stormwater plumes to enable a robust statistical characterization of the dispersal and dilution of runoff in the coastal environment. Analyze the flow fields generated with ROMS and data collected from moored instrument arrays during the 2012 runoff season to better understand cross-shelf exchanges in the nearshore due to runoff.

Theme 3b. Nitrogen recycling and efflux from sediments

Determine the importance of regenerated N to the nitrogen demand of giant kelp by measuring rates of nitrogen efflux from sediments and rates of N recycling by kelp forest consumers.

Theme 3c. Transport and fate of phytoplankton NPP

Characterize coastal dispersal with respect to several environmental parameters such as season, coastal geometry, distance from the shore, surface wave forcing, and flow characteristics. Deploy an autonomous glider to resolve cross-shelf sections of water properties and particle fields during various oceanographic conditions. Estimate net community production, particle size distribution, particulate organic carbon, and transport velocities. Complete analysis of a very large data set collected during oceanographic cruises. Use statistical methods and time-series data from moored instruments and cruises to determine patterns and sources of variation in ocean physics, particle distributions and chlorophyll at biologically relevant time and space scales.

Significant Results:

Theme 1a. Effects of wave disturbance on kelp forest structure and function

Results from the long-term kelp removal experiment revealed that a combination of natural processes acted indiscriminately to reduce kelp in both kelp removal and control

plots leading to predicted patterns of community structure at only 1 of 4 sites. Analyses of long-term kelp forest data showed that changes in the temporal stability of kelp forest NPP were positively related to algal species richness and negatively related to algal species evenness. Kelp forest invertebrate biomass was dominated by filter feeding bivalves and herbivorous echinoderms. The trophic structure of invertebrate biomass was unrelated to kelp biomass, which is consistent with our recent finding that kelp's role in modifying the physical habitat rather than serving as a food source accounts for the increased abundance of sessile invertebrates in giant kelp forests. Statistical models using Landsat imagery and ROMS simulations demonstrated that demographic connectivity strongly predicted local population dynamics of giant kelp providing the first comprehensive evidence that populations of giant kelp in southern California function as a metapopulation system.

Theme 1b. Determining the fate of kelp NPP

Our updated reef-scale model of kelp NPP showed the fraction of NPP released as DOC averaged ~14% of total NPP; the absolute amount varied greatly among years for any given season due to large inter-annual oscillations in standing biomass. The loss of dissolved exudates from giant kelp are sufficient to account for elevated levels of DOM that we previously observed in coastal waters adjacent to giant kelp forests. The algorithm developed to estimate physiological condition (Chl:C) of giant kelp blades from reflectance was applied to hyperspectral aerial imagery of kelp forests in the Santa Barbara Channel. Results of these analyses showed that the physiological state of the surface canopy was positively correlated with reef depth.

Theme 1c. Effects of fishing on kelp forest structure and function

Lobster densities increased in recently established reserve sites relative to sites where fishing effort remained high. Lobster fishers did not concentrate their efforts at the boundaries of MPAs following their establishment. This finding has important policy implications for marine spatial planning, and suggests avenues for future research.

Theme 2a. Export of nutrients from watersheds

Suspended-sediment concentrations in coastal watersheds ranged between 1 and over 200,000 mg L^{-1} and were weakly correlated with discharge (r^2 = 0.10–0.25). Results from greenhouse soil incubation experiments showed that nitrification was highest in soils collected from the most recently burned sites, and was most constrained by NH_4. Model simulations using RHESSys revealed that nitrification increases after fire as soil nitrate and ammonium recover to pre-fire levels within 2-5 months. Studies of stream metabolism showed that streams with some urban development had larger daily variations in dissolved oxygen and higher rates of gross primary production than streams in undeveloped watersheds. All watersheds had negative net ecosystem production, despite algal biomass accumulation in the most urban streams.

Theme 2b. Trajectories of landscape changes in coastal watersheds

The combination of VSWIR and TIR allowed estimation of chemical and biophysical properties of chaparral plants. TIR was best for water content and VSWIR was best for nitrogen and cellulose. A single equation was derived for predicting each biochemical (except lignin) with high accuracy, which when applied to AVIRIS/MASTER may prove useful for mapping key biochemical properties. Seismic profiles and cores from coastal marshes showed that long-term subsidence resulted from abrupt change caused by tectonic events rather than gradual subsidence. The record indicates these events altered the ways in which rivers connect to the ocean as open bays periodically appear (on millennial time-scales) to act as a buffer between the land and the ocean. Cores revealed changes in fire frequency and the existence of four pollen zones over the last ~5,000 years that show the vegetation transitioned from dry grasses (5050-3700 ybp) to oak woodlands with wetter soils and algal spores (3700-1150 ybp), to drier soils and the disappearance of algal spores (1789-1150 ybp) to introduced species (1789-present).

Theme 2c. Exchanges of nutrients on beaches

Episodic events that erode beaches can modify the strong seasonal patterns of wrack inputs and consumer abundance on SBC beaches. Our measurements spanning a 2014 storm-induced erosion event indicated recovery of wrack consumer populations was protracted, particularly on bluff-backed beaches typical of the SBC coastline. Recovery dynamics of these shredder populations can affect the fate and processing of wrack subsidies with implications for nutrient regeneration in beach sands as well as for the diversity and function of intertidal food webs.

Theme 3a. Dilution and dispersal of freshwater runoff plumes

The numerical simulations of storm water runoff predict plumes that are generally trapped against the coast and cross-shelf exchange that is largely influenced by surface winds and flow structures. Lateral spreading of plumes from storm water runoff is largely anisotropic, spreading 10 times faster along-shelf than cross-shelf. Simulated runoff events over 2 seasons were linked to the wind forcing, which leads to an initially narrow freshwater front at ~ 0.5 km from shore that widens to a cross-shelf extent of ~ 2 km. These results were used to develop a model describing the dilution field as a function of discharge, input tracer concentration, wind and current variability, and background density gradients. The results also allowed the quantification of relevant measures of the dilution field such as the fraction of time exceeding threshold concentrations, maximum dilution and probability density functions of the dilution field.

Theme 3b. Nitrogen recycling and efflux from sediments

Nothing to report.

Theme 3c. Transport and fate of phytoplankton NPP

We made substantial progress in analyzing particle fields over the inner shelf from >400 cross-shelf sections obtained from an ocean glider during a wide range of oceanographic

conditions. Overall, the bio-optical and water property data from the glider sections, and complementary data from instrumented moorings, reveal cross-shore flow pathways between the inner-shelf and offshore waters. Sequences of glider sections showed rapid evolution of layers of phytoplankton and resuspended sediments due to surface gravity waves, internal waves, wind forcing, and larger scale currents. Rapid onshore excursions of phytoplankton blooms were also observed. These suggest the presence of rapidly evolving, cross-shore transport processes at the sub-mesoscale that are not well understood and are poorly simulated in numerical models used to date in the SBCLTER. A conceptual model of particle dynamics and cross-shore transport was also refined for the waters in and around kelp forests. Analysis of towed profiler data from earlier oceanographic cruises revealed strong phytoplankton subduction at density fronts where large-scale water masses collide after entering the SB Channel. Quantitative estimates of the vertical velocity resulting from water mass advection along sloping density surfaces indicate that the flux of chlorophyll biomass due to subduction far exceeds that due to sinking as estimated from sediment traps. Our results indicate that phytoplankton subduction is a major contributor to the downward flux of particulate organic carbon out of the euphotic zone. Cruise observations revealed large (2-10 km) plumes of sinking phytoplankton near the base of the euphotic zone. We hypothesize that these plumes are the dominant physical transport process for delivering chlorophyll to the sea floor in the Santa Barbara Basin.

Key outcomes or Other achievements:

See significant results.

* What opportunities for training and professional development has the project provided?

Education and training are tightly integrated into all aspects of SBC LTER research. During the past year (year 3 of SBC III), 6 postdoctoral fellows, 32 graduate students, 5 REU students and 79 additional undergraduate students participated in SBC research. UCSB undergraduates have a high propensity to get involved in sponsored research and the SBC LTER contributes substantially in this regard. In addition to gaining valuable research experience, many undergraduates earn academic credit or received monetary compensation for participating in SBC research as interns and honors students. REU students work closely with SBC LTER researchers on a wide range of topics and most choose to pursue an advanced degree following their undergraduate education.

The focus of SBC's mentoring and training of postdoctoral scientists is on providing them with strong interdisciplinary skills, professional development opportunities, and the experience, and support required for them to transition to career faculty positions. In addition to the specific training associated with the SBC project, postdoctoral scientists are mentored through grant proposal development and writing and the job application and interview process by SBC investigators and via access to UCSB's resources for postdoctoral scientists. During this past year former SBC post doc, Andrew Rassweiler, accepted a position as a tenure-track assistant professor at Florida State University.

SBC graduate student and postdoctoral training are coordinated with several graduate programs on the UCSB campus to promote opportunities for interdisciplinary graduate training in ecology, physiology, geology, geography, hydrology, oceanography, and coastal policy. This enables valuable cross-training on environmental issues pertaining to coastal ecosystems, provides a common language for communicating scientific information on these issues, and contributes to the creation of a diverse scientific community of students and postdocs that fosters a respect and appreciation for other disciplines.

UCSB's teaching aquarium (Research Experience & Education Facility know as the "REEF") features SBC LTER research and provides a wide range of training and professional development opportunities. The REEF also serves as a marine ecology teaching facility for UCSB courses in Earth Sciences, Ecology Evolution & Marine Biology, English and Teacher Ed programs through the Gevirtz Graduate School of Education and for many area colleges including Cal Lutheran Thousand Oaks, California State University Channel Islands, and Santa Barbara and Ventura community colleges. The REEF is equipped with state-of-the-art, aquaria and touch tanks. The REEF also utilizes a high-tech life support system for the Research Tank, which features current SBC LTER research. One of the joint goals of the SBC LTER and the REEF programs is to provide UCSB undergraduates majoring in Aquatic Biology, with a solid foundation in temperate and tropical marine ecology and research. The REEF training provides them with the basis for communicating this knowledge in an educational format. To that end, The REEF develops its *Oceans-to-Classrooms* curriculum around a number of research programs at UCSB and SBC LTER is the most significant contributor to this endeavor. Support from the SBC Schoolyard LTER program has allowed the REEF to obtain teaching supplies and equipment for curriculum as well as provide salaries for professional staff and undergraduate internships. The REEF also utilizes SBC graduate students, research staff, and post-docs from the SBC LTER to train REEF interns, which, in turn, enhances their training as laboratory and field assistants and research divers for SBC research. A total of 37 undergraduate interns were trained this year in this rigorous and pedagogically sound program.

* How have the results been disseminated to communities of interest?

SBC's Schoolyard LTER (sLTER) program is organized around a theme of kelp forest ecology in the context of the Research Overview of the SBC LTER. Curriculum is developed around and delivered through the Research Experience & Education Facility (REEF), UCSB's teaching aquarium and the Marine Science Institute's *Oceans-to-Classrooms* curricula. Our focus is on long-term connections with local, regional and state schools through a number of partnerships that include both on, and off, campus programs. Our approach also allows for an integrated program that spans both academic year activities, as well as summer programs, and includes undergraduate and graduate students, K-12 teachers, K-12 students, the UC Community and the General Public. Through *Oceans-to-Classrooms* and the REEF, SBC LTER-based curriculum, rich in STEM content that supported California State Science Standards, Common Core Standards and the introduction of Next Generation Science Standards to over 20,000 visitors last year , through continued outreach visits to schools, community events and on-campus programs. This included visits from primary and secondary schools from the San Joaquin Valley and Los Angeles, Ventura, Kern, San Bernardino Counties and Sedona, Arizona! This year sLTER specific program content reached nearly 11,000 students in grades 6-12. We continue to develop

and adapt marine science lesson plans that engage students with learning about the local environment in the context of the LTER. These lessons incorporate ongoing SBC research that includes working with project data. The program is developed to build student's skills in scientific inquiry through activities that move from structured or guided investigation to open-ended inquiry and experimentation. Third, our program includes a combination of school-based activities, field trips, and on-campus experiences that immerse students in the environment of a college campus.

1. Focused sLTER Programming:

This year, sLTER focused on three partnership programs, 1) the American Association of University Women's (AAUW): Tech Trek Program, 2) Math-Science-Partnership (MSP) Project: Pathways to Environmental Literacy, 3) and Kids In Nature (KIN).

- Tech Trek is an on-campus residential science and math summer program designed to develop interest, excitement and self-confidence in young women entering the eighth grade. Tech Trek is part of an interdisciplinary partnership involving science, technology, engineering, and math departments at UCSB through the Office of Education Partnerships (OEP). The goal of OEP is to build college-going communities that improve student learning, increase college-going rates in underrepresented populations, and provide equal access to higher education for California's diverse students. In working with Tech Trek, the SBC SLTER program engaged two groups of 86 girls each from junior high and middle schools from San Luis Obispo, Santa Barbara, Ventura, Kern and Los Angeles counties, representing a diverse range of socioeconomic and demographic groups. During a weeklong residential immersion at UCSB, students participated in "core" science courses. This year the program focused on solutions to three real-world challenges, Ocean Exploration and Climate Change, Sustainable Foods, and What to Do With Decommissioned Oil Rigs. Participants enrolled in a "core" class based on their discipline of interest: Physics, Math, Engineering, or Marine Science. Cooperative project groups were then formed with "specialist" from each core area. The girls also engaged in a number of place-based, hands-on, activities that promoted concept application and citizenship, including a boat trip to SBC-LTER Kelp Forest study sites and SBC-based Floating Lab that focused on marine ecology and ecosystem services. Through this long-term commitment, we are now seeing former program participants enrolling in UCSB. Verizon has shown interest in supporting the program and worked with us this year to develop an apps course. This year's program Kick-off Speaker was US Congresswoman Lois Capps, and key AAUW National Office personnel interested in expanding our learning model to other Tech Trek sites, as well as a reporter from the French Magazine, *"Elle."*

- The MSP ***Pathways to Environmental Literacy*** project connects the research and education strengths in the environmental sciences of universities and sites within LTER with teacher professional development in science and mathematics of partner middle schools and high schools. It involves a number LTER research sites, including Baltimore Ecosystems Study (BES), Kellogg Biological Station (KBS), and Santa Barbara Coastal (SBC) and their partnering institutions, the LTER Network Office, and the K-12 schools

and districts that they will directly impact. This year, SBC LTER site worked with 26 targeted teachers from Santa Barbara Unified School District (SBUSD) that used place-based science of the SBC-LTER to enhance The Lawrence Hall of Science "Ocean Science Sequence" curriculum. All elementary schools in the SBUSD are engaged in an initiative to standardize science content built around the Next Generation Science Standards. Our PD focused on improving science literacy content and competency for 6th grade teachers of the SBUSD. The PD included an on-campus visit that included an SBC research seminar and SBC ecology-based activities. A number of SBC graduate students, post-docs and investigators gave talks on their research and led activities for field trips and programs.

- **The *Kids in Nature* Program at the Cheadle Center for Biodiversity and Ecological Restoration** provides selected classrooms with a total of twelve educational activities offered with their partners, the Marine Science Institute's REEF program, Coal Oil Point Reserve, Santa Barbara Botanic Garden and Arroyo Hondo Preserve. KIN curriculum emphasizes hands-on, placed based activities in outdoor environments and also includes classroom visits where UCSB students mentor and assist with the fifth grade activities in the established native plant gardens on the elementary school campuses. During the yearlong program, KIN students experience approximately 100 hours of small group education. KIN has a significant impact on the students' understanding, involvement in, and awareness of environmental issues through engaging and challenging activities and positive interactions with scientists, graduate and undergraduate students both in class and in the field. KIN students spend a significant amount of time on the UCSB campus, which provides the students with opportunities to learn about college and the campus environment.

2. SBC hosted a booth at the 2015 Santa Barbara Earth Day Festival to raise public awareness about LTER research. This year's festival attracted > 29,000 people. A highlight was a virtual kelp forest in which SBC students and staff acted as 'dive buddies' for children who toured the forest and collected data on kelp forest inhabitamts.

3. SBC investigators and students contributed to the following media stories:

- Invasive algae research by SBC graduate student in the Orange County Register http://www.ocregister.com/articles/sargassum-646894-kelp-california.html

- SBC LTER's partnership with new demonstration biodiversity observation network in the Santa Barbara Channel, http://www.news.ucsb.edu/2014/014428/ocean-s-future

- SBC LTER researchers respond to the May 2015 Refugio Oil Spill http://lternet.edu/node/8414

- Finding Floating Forests, NASA Earth Observatory

  http://earthobservatory.nasa.gov/Features/FloatingForests/

- NASA Earth Observatory: Image of the Day

  – Floating Forests Revealed

  http://earthobservatory.nasa.gov/IOTD/view.php?id=85023

  – Finding Cortez

  http://earthobservatory.nasa.gov/IOTD/view.php?id=85059

  – Kelp Losing Their Grip on the Seafloor

  http://earthobservatory.nasa.gov/IOTD/view.php?id=85105

*** What do you plan to do during the next reporting period to accomplish the goals?**

Continue research activities as planned.

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Products

Books

Book Chapters

- Carr, MH and Reed, DC (). Shallow rocky reefs and kelp forests. *Ecosystems of California – A source book* Mooney, H and Zavaleta, E. University of California Press. . Status = AWAITING_PUBLICATION; Acknowledgement of Federal Support = No ; Peer Reviewed = Yes
- Dugan, JE and Hubbard, DM (). Sandy Beach Ecosystems. *Ecosystems of California – A source book* Mooney, H and Zavaleta, E. University of California Press. . Status = AWAITING_PUBLICATION; Acknowledgement of Federal Support = No ; Peer Reviewed = Yes
- Power, ME, Kupferberg, SJ, Cooper, SD and Deas, ML (). California's river ecosystems. *Ecosystems of California – A source book* Mooney, H and Zavaleta, E. University of California Press. . Status = AWAITING_PUBLICATION; Acknowledgement of Federal Support = No ; Peer Reviewed = Yes

Conference Papers and Presentations

- Dugan, J., K. Emery, M. Alber, C. Alexander, J. Byers, A. Gehman, S. Lawson, K. McGlathery, N. McLenaghan (2015). *A conceptual model for predicting the ecological effects of coastal armoring in soft sediment environments*. 2015 LTER All Scientists

Meeting. Estes Park, Colorado. Status = OTHER; Acknowledgement of Federal Support = Yes

- Osborne, E., Thunell, R., Bizimis, M., Buckley, W., and Cai, W. (2015). *A sediment trap evaluation of B/Ca in planktonic foraminifera as a carbonate system proxy, August 2015*. Goldschmidt Conference. Prague,. Status = OTHER; Acknowledgement of Federal Support = Yes
- Jones, J, J Sweet, U Passow, GE Hofmann and L Washburn (2013). *A year of in situ pH monitoring at Stearns Wharf: Establishing variance and reliability with point sampling*. SBC LTER Annual Meeting. Santa Barbara, CA. Status = OTHER; Acknowledgement of Federal Support = Yes
- Dugan, JE, Hubbard, DM and Quigley, B (2013). *Beyond beach width: steps toward identifying and integrating dynamic ecological envelopes with geomorphic features and datums for sandy beach ecosystems (invited)*. 44th Annual Binghamton Geomorphology Symposium. Newark, NJ. Status = OTHER; Acknowledgement of Federal Support = Yes
- Goodridge, B and Melack, JM (2013). *Carbon and nitrogen stoichiometry regulates the magnitude and temporal dynamics of nitrogenous nutrient regeneration in sandy beach pore water*. American Geophysical Union, Annual Meeting. San Francisco, CA. Status = OTHER; Acknowledgement of Federal Support = Yes
- Jones, J (2014). *Carbonate system monitoring and manipulation: current and future research*. UCSB Interdepartmental Graduate Program in Marine Science Seminar. Santa Barbara, CA. Status = OTHER; Acknowledgement of Federal Support = Yes
- Schooler, NK, Dugan, JE, Hubbard, DM and Straughan, D (2013). *Changing sandy beach ecosystems in California: comparisons of intertidal biodiversity three decades apart*. 44th Annual Binghamton Geomorphology Symposium. Newark, NJ. Status = OTHER; Acknowledgement of Federal Support = Yes
- Schooler, NK, Dugan, JE, Hubbard, DM and Straughan, D (2013). *Changing sandy beach ecosystems in California: comparisons of intertidal biodiversity three decades apart (poster)*. 44th Annual Binghamton Geomorphology Symposium. Newark, NJ. Status = OTHER; Acknowledgement of Federal Support = Yes
- Washburn, L (2014). *Circulation along the central California coast: Response to relaxations of upwelling winds*. King Abdullah University of Science and Technology. ThuwalKingdom of Saudi Arabia. Status = OTHER; Acknowledgement of Federal Support = Yes
- Emery, N and D'Antonio, C (2014). *Coastal fog effects on live fuel moisture of California shrublands*. International Society of Mediterranean Ecology (MEDECOS XIII). OlmueChile. Status = OTHER; Acknowledgement of Federal Support = Yes
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Thesis/Dissertations

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- Wong, S. H.. *Oceanography at the land-sea interface: linking physics to human health and ecosystems.*. (2014). Dept of Civil & Environmental Engineering, Stanford Univ.. Acknowledgement of Federal Support = Yes
- Okamoto, D.. *The role of fluctuating food supply on recruitment, survival and population dynamics in the sea.*. (2014). University of California, Santa Barbara.. Acknowledgement of Federal Support = Yes
- Rodriguez, G. E.. *Turnover dynamics of the giant kelp, Macrocystis pyrifera.*. (2014). University of California, Santa Barbara.. Acknowledgement of Federal Support = Yes

Websites

- *SBC LTER Website*
  http://sbc.lternet.edu

  Project website for the SBC LTER

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Participants/Organizations

What individuals have worked on the project?

Name	Most Senior Project Role	Nearest Person Month Worked
Reed, Daniel	PD/PI	3
Holbrook, Sally	Co PD/PI	2
Melack, John	Co PD/PI	2
Siegel, David	Co PD/PI	2
Alberto, Filipe	Co-Investigator	1
Benitez-Nelson, Claudia	Co-Investigator	1
Blanchette, Carol	Co-Investigator	1
Bookhagen, Bodo	Co-Investigator	1
Brzezinski, Mark	Co-Investigator	3
Byrnes, Jarrett	Co-Investigator	1
Carlson, Craig	Co-Investigator	2

Name	Most Senior Project Role	Nearest Person Month Worked
Cavanaugh, Kyle	Co-Investigator	1
Cooper, Scott	Co-Investigator	4
D'Antonio, Carla	Co-Investigator	1
Dugan, Jenifer	Co-Investigator	4
Fewings, Melanie	Co-Investigator	1
Guerrini, Anita	Co-Investigator	1
Hofmann, Gretchen	Co-Investigator	1
Lenihan, Hunter	Co-Investigator	1
Lopez-Carr, David	Co-Investigator	1
MacIntyre, Sally	Co-Investigator	2
McPhee-Shaw, Erika	Co-Investigator	1
McWilliams, Jim	Co-Investigator	1
Miller, Robert	Co-Investigator	3
Ohlmann, Carter	Co-Investigator	1
Page, Henry	Co-Investigator	2
Passow, Uta	Co-Investigator	1
Raimondi, Pete	Co-Investigator	1
Rassweiler, Andrew	Co-Investigator	2
Roberts, Dar	Co-Investigator	2
Schimel, Josh	Co-Investigator	1
Schmitt, Russ	Co-Investigator	1
Schroeter, Steve	Co-Investigator	1
Simms, Alexander	Co-Investigator	1
Tague, Naomi	Co-Investigator	1
Washburn, Libe	Co-Investigator	2
Whitmer, Ali	Co-Investigator	1
Wright, Bill	Co-Investigator	1
Thunell, Robert	Faculty	1
Kay, Matt	Community College Faculty	1
Aguilera, Rosana	Postdoctoral (scholar, fellow or other postdoctoral position)	12
Castorani, Max	Postdoctoral (scholar, fellow or other postdoctoral position)	2
Cortes, Alicia	Postdoctoral (scholar, fellow or other postdoctoral position)	12
Ejarque, Ana	Postdoctoral (scholar, fellow or other postdoctoral position)	1

Name	Most Senior Project Role	Nearest Person Month Worked
Goodridge, Blair	Postdoctoral (scholar, fellow or other postdoctoral position)	1
Romero, Leonel	Postdoctoral (scholar, fellow or other postdoctoral position)	12
Sadro, Steven	Postdoctoral (scholar, fellow or other postdoctoral position)	1
Gotschalk, Chris	Other Professional	2
Hubbard, David	Other Professional	1
Johnson, Cyril	Other Professional	1
Johnson, Michelle	Other Professional	2
Klose, Kristie	Other Professional	1
O'Brien, Margaret	Other Professional	12
Simon, Scott	Other Professional	2
Wiseman, Sheila	Other Professional	10
Bitter, Mark	Technician	2
Fields, Erik	Technician	1
Guillocheau, Nathalie	Technician	1
Halewood, Elisa	Technician	6
Halewood, Stuart	Technician	1
Harrer, Shannon	Technician	12
Jones, Janet	Technician	2
Madden, Jessica	Technician	4
Meyerhof, Matthew	Technician	12
Nelson, Clint	Technician	12
Romero, Eduardo	Technician	1
Salazar, David	Technician	3
Stassinos, Erik	Technician	1
Weaver, Crystal	Technician	3
Bennett, Danuta	Staff Scientist (doctoral level)	1
Even, Thomas	Staff Scientist (doctoral level)	1
Nelson, Craig	Staff Scientist (doctoral level)	1
Simons, Rachel	Staff Scientist (doctoral level)	1
Allen, James	Graduate Student (research assistant)	3
Barron, Rebecca	Graduate Student (research assistant)	3
Bell, Tom	Graduate Student (research assistant)	12
Bentz, Michael	Graduate Student (research assistant)	3
Berry, Heather	Graduate Student (research assistant)	12

Name	Most Senior Project Role	Nearest Person Month Worked
Chen, Helen	Graduate Student (research assistant)	12
Chen, Xiaoli	Graduate Student (research assistant)	3
Chen, Mingquan	Graduate Student (research assistant)	12
Dauhajre, Daniel	Graduate Student (research assistant)	3
Ellis, Daniel	Graduate Student (research assistant)	3
Emery, Nate	Graduate Student (research assistant)	3
Emery, Kyle	Graduate Student (research assistant)	1
Hanan, Erin	Graduate Student (research assistant)	6
Hendrikx Freitas, Fernanda	Graduate Student (research assistant)	6
Ho Chuen Wong, Simon	Graduate Student (research assistant)	1
Hoshijima, Umi	Graduate Student (research assistant)	3
Huynh, Nicholas	Graduate Student (research assistant)	12
James, Anna	Graduate Student (research assistant)	6
Johnson, Kevin	Graduate Student (research assistant)	3
Jones, Jonathan	Graduate Student (research assistant)	3
Kapsenberg, Lydia	Graduate Student (research assistant)	6
Koenigs, Craig	Graduate Student (research assistant)	12
Marks, Lindsay	Graduate Student (research assistant)	12
Meerdink, Susan	Graduate Student (research assistant)	3
Okamoto, Daniel	Graduate Student (research assistant)	2
Reynolds, Laura	Graduate Student (research assistant)	6
Rodriguez, Gabriel	Graduate Student (research assistant)	10
Schooler, Nicholas	Graduate Student (research assistant)	6
Viola, Sloane	Graduate Student (research assistant)	1
Wear, Emma	Graduate Student (research assistant)	3
Wetherly, Erin	Graduate Student (research assistant)	3
Yorke, Christie	Graduate Student (research assistant)	3
Abady, David	Undergraduate Student	1
Anderson, Kylie	Undergraduate Student	1
Applewhite, Conner	Undergraduate Student	1
Bachhuber, Silke	Undergraduate Student	1
Bao, Zhiping	Undergraduate Student	1
Bar, Matthew	Undergraduate Student	1
Barlev, Stephanie	Undergraduate Student	1
Bendell, Bradford	Undergraduate Student	1

Name	Most Senior Project Role	Nearest Person Month Worked
Beresford, Laura	Undergraduate Student	2
Bognar, Sebastian	Undergraduate Student	1
Bragg, Austin	Undergraduate Student	1
Callihan, Isolde	Undergraduate Student	1
Chang, Caroline	Undergraduate Student	1
Chellew, Joe	Undergraduate Student	1
Claycomb, Noelle	Undergraduate Student	1
Corwin, Garrett	Undergraduate Student	1
Cottrell, Kaitlin	Undergraduate Student	2
Daleiden, Cheyenne	Undergraduate Student	1
Daniel, Bryn	Undergraduate Student	1
Dao, Michael	Undergraduate Student	1
Darrow, Hailey	Undergraduate Student	1
Dodgen, Rose	Undergraduate Student	2
Duenas, Daisy	Undergraduate Student	1
English, Chance	Undergraduate Student	1
Fallgatter, Ryan	Undergraduate Student	1
Fitzgerald, Chad	Undergraduate Student	1
Flaherty, Devyn	Undergraduate Student	1
Flannery, Nicolette	Undergraduate Student	1
Fozard, Dylan	Undergraduate Student	1
Frey, Emily	Undergraduate Student	1
Gallagher, Jordan	Undergraduate Student	4
Garcia, Kristina	Undergraduate Student	1
Gibbs, Briana	Undergraduate Student	1
Gomez-Torrero, Fernando	Undergraduate Student	1
Grundberg, Brandon	Undergraduate Student	3
Gutierrez, Kali	Undergraduate Student	1
Heber, Emily	Undergraduate Student	1
Honeyman, Christopher	Undergraduate Student	2
Howard, Rebecca	Undergraduate Student	1
Hudson, Bryn	Undergraduate Student	1
Idiarte, Fernando	Undergraduate Student	1
Issac, Inji	Undergraduate Student	1
Johnson, Olivia	Undergraduate Student	1

Name	Most Senior Project Role	Nearest Person Month Worked
Kahler, Alexandra	Undergraduate Student	2
Kha, Kevin	Undergraduate Student	1
Kim, Vivian	Undergraduate Student	1
Kudo, Marissa	Undergraduate Student	1
Lee, Sunny	Undergraduate Student	1
Lee, Meikko	Undergraduate Student	1
Leflore, Monica	Undergraduate Student	1
Loberg, Maria	Undergraduate Student	1
Macarewich, Sophia	Undergraduate Student	1
Malone, Shannon	Undergraduate Student	1
Marks, Sean	Undergraduate Student	2
Martin, Trace	Undergraduate Student	2
Matamoros, Joselyne	Undergraduate Student	1
McCamy, Colleen	Undergraduate Student	2
Montiano, Olivia	Undergraduate Student	1
Munson, Brittany	Undergraduate Student	1
Nelson, Sharlyn	Undergraduate Student	1
Quan, Charles	Undergraduate Student	1
Raskin, Tatiana	Undergraduate Student	2
Rosenblatt, Sara	Undergraduate Student	1
Russel-Halterman, Kimikio	Undergraduate Student	1
Sager, Ria	Undergraduate Student	1
Salinas-Ruiz, Paulina	Undergraduate Student	1
Shyshka, Emily	Undergraduate Student	1
Simon, Dana	Undergraduate Student	1
Sloan, Erinn	Undergraduate Student	3
Smith, Kaitlyn	Undergraduate Student	2
Smithers, David	Undergraduate Student	1
Tsuruta, Gabriel	Undergraduate Student	1
Weinstein, Drew	Undergraduate Student	1
Weston, Joseph	Undergraduate Student	1
White, Carly	Undergraduate Student	1
White, Alison	Undergraduate Student	1
Witt, Kendra	Undergraduate Student	1
Worl, Kelli	Undergraduate Student	1

Name	Most Senior Project Role	Nearest Person Month Worked
Yom, Kimberly	Undergraduate Student	1
Zarate, Daniel	Undergraduate Student	2
Holehouse, Erin	High School Student	1
Lebow, Rose	High School Student	1
Magoun, Erin	High School Student	1
Moreno, Luiza	High School Student	1
Perez, Daniel	High School Student	1
Wachtell, Alexis	High School Student	1
Wheaton, Olivia	High School Student	2
Cedeno, Tiffany	Research Experience for Undergraduates (REU) Participant	2
Liedle, John	Research Experience for Undergraduates (REU) Participant	4
Lowenberg, Lance	Research Experience for Undergraduates (REU) Participant	3
Traxler, Taylor	Research Experience for Undergraduates (REU) Participant	4
Trong, Michael	Research Experience for Undergraduates (REU) Participant	1
Simon, Eleanor	Other	1

Full details of individuals who have worked on the project:

Daniel C Reed
Email: reed@lifesci.ucsb.edu
Most Senior Project Role: PD/PI
Nearest Person Month Worked: 3

Contribution to the Project: Project leader and lead for kelp forest components

Funding Support: University of California

International Collaboration: No
International Travel: No

Sally J Holbrook
Email: holbrook@lifesci.ucsb.edu
Most Senior Project Role: Co PD/PI
Nearest Person Month Worked: 2

Contribution to the Project: Contributes to kelp forest ecosystem research

Funding Support: UCSB

International Collaboration: No
International Travel: No

John M Melack
Email: melack@bren.ucsb.edu
Most Senior Project Role: Co PD/PI
Nearest Person Month Worked: 2

Contribution to the Project: Leads watershed research component of project

Funding Support: UCSB

International Collaboration: No
International Travel: No

David A Siegel
Email: davey@eri.ucsb.edu
Most Senior Project Role: Co PD/PI
Nearest Person Month Worked: 2

Contribution to the Project: leads remote sensing and oceanographic modeling component of project

Funding Support: UCSB

International Collaboration: No
International Travel: No

Filipe Alberto
Email: albertof@uwm.edu
Most Senior Project Role: Co-Investigator
Nearest Person Month Worked: 1

Contribution to the Project: conducted research on population genetics of giant kelp

Funding Support: none

International Collaboration: No
International Travel: No

Claudia Benitez-Nelson
Email: cbnelson@geol.sc.edu
Most Senior Project Role: Co-Investigator
Nearest Person Month Worked: 1

Contribution to the Project: conducted research on harmful algal blooms and biogeochemical cycling and mixing of ocean water

Funding Support: University of South Carolina

International Collaboration: No
International Travel: No

Carol Blanchette
Email: blanchette@lifesci.ucsb.edu
Most Senior Project Role: Co-Investigator
Nearest Person Month Worked: 1

Contribution to the Project: investigated ocean acidification and coordinated K-12 education activities

Funding Support: none

International Collaboration: No
International Travel: No

Bodo Bookhagen
Email: bodo@eri.ucsb.edu
Most Senior Project Role: Co-Investigator
Nearest Person Month Worked: 1

Contribution to the Project: studied sediment-mass transport and erosion in SBC watersheds

Funding Support: University of California, Santa Barbara

International Collaboration: No
International Travel: No

Mark Brzezinski
Email: brzezins@lifesci.ucsb.edu
Most Senior Project Role: Co-Investigator
Nearest Person Month Worked: 3

Contribution to the Project: Directed monthly monitoring of water chemistry at the core kelp forests sites. Participated in process studies involving i) the analysis of oceanographic data from SBC cruises ii) the partitioning of net primary production among giant kelp, understory algae and phytoplankton within kelp forests, iii) interactions between the kelp forest and its flow environment and iv) the connectivity between kelp forests and offshore waters and the exchange of materials across the continental shelf.

Funding Support: University of California, Santa Barbara

International Collaboration: No

International Travel: No

Jarrett Byrnes
Email: Jarrett.Byrnes@umb.edu
Most Senior Project Role: Co-Investigator
Nearest Person Month Worked: 1

Contribution to the Project: Investigated the direct and indirect effects of wave disturbance on kelp forest food web structure via changes in kelp abundance and productivity using long-term data records.

Funding Support: none

International Collaboration: No
International Travel: No

Craig Carlson
Email: carlson@lifesci.ucsb.edu
Most Senior Project Role: Co-Investigator
Nearest Person Month Worked: 2

Contribution to the Project: Investigates the role of microbial mediation of dissolved organic matter in near shore SBC system. Involved with data synthesis and sample analyses of DOM for SBC researchers.

Funding Support: none

International Collaboration: No
International Travel: No

Kyle Cavanaugh
Email: kyle@eri.ucsb.edu
Most Senior Project Role: Co-Investigator
Nearest Person Month Worked: 1

Contribution to the Project: Conducted studies of spatiotemporal variability of giant kelp biomass and production across multiple scales of observation. Combined satellite and aerial remote sensing with detailed field measurements to scale up local observations to larger areas and longer times.

Funding Support: none

International Collaboration: No
International Travel: No

Scott Cooper
Email: scooper@lifesci.ucsb.edu
Most Senior Project Role: Co-Investigator

Nearest Person Month Worked: 4

Contribution to the Project: Coordinated and oversaw projects dealing with stream ecology, performed field and laboratory work, analyzed data and wrote papers and reports.

Funding Support: UCSB

International Collaboration: No
International Travel: No

Carla D'Antonio
Email: dantonio@lifesci.ucsb.edu
Most Senior Project Role: Co-Investigator
Nearest Person Month Worked: 1

Contribution to the Project: Led evaluations of how plant communities and soil and plant nitrogen respond to high intensity wildfire

Funding Support: University of California, Santa Barbara

International Collaboration: No
International Travel: No

Jenifer Dugan
Email: j_dugan@lifesci.ucsb.edu
Most Senior Project Role: Co-Investigator
Nearest Person Month Worked: 4

Contribution to the Project: Assisted with overall project coordination. Led core measurements and ecological studies of sandy beach ecosystems

Funding Support: Sea Grant, NOAA

International Collaboration: No
International Travel: No

Melanie Fewings
Email: melanie.fewings@uconn.edu
Most Senior Project Role: Co-Investigator
Nearest Person Month Worked: 1

Contribution to the Project: investigated tidal and subtidal-frequency variations of water velocity and temperature on the inner continental shelves of California's Channel Islands and along the mainland in the Santa Barbara Basin, and how those patterns relate to the delivery of larval fish and invertebrates.

Funding Support: University of Connecticut

International Collaboration: No
International Travel: No

Anita Guerrini
Email: anita.guerrini@oregonstate.edu
Most Senior Project Role: Co-Investigator
Nearest Person Month Worked: 1

Contribution to the Project: investigating the role of history in informing ecological restoration in the coastal zone of the Santa Barbara Channel

Funding Support: Oregon State University

International Collaboration: No
International Travel: No

Gretchen Hofmann
Email: hofmann@lifesci.ucsb.edu
Most Senior Project Role: Co-Investigator
Nearest Person Month Worked: 1

Contribution to the Project: Led investigations of the impact on marine organisms of rising atmospheric CO2 concentrations via ocean warming and acidification

Funding Support: University of California, Santa Barbara

International Collaboration: No
International Travel: No

Hunter Lenihan
Email: lenihan@bren.ucsb.edu
Most Senior Project Role: Co-Investigator
Nearest Person Month Worked: 1

Contribution to the Project: Directed and conducted collaborative research in fisheries biology, ecology and management

Funding Support: University of California, Santa Barbara

International Collaboration: No
International Travel: No

David Lopez-Carr
Email: carr@geog.ucsb.edu
Most Senior Project Role: Co-Investigator
Nearest Person Month Worked: 1

Contribution to the Project: Conducted research on human impacts to coastal marine

ecosystems, and the adaptations of humans to environmental change in these systems

Funding Support: University of California, Santa Barbara

International Collaboration: No
International Travel: No

Sally MacIntyre
Email: sally@eri.ucsb.edu
Most Senior Project Role: Co-Investigator
Nearest Person Month Worked: 2

Contribution to the Project: studied inputs of incoming streams and delivery of subsidies to kelp and other organisms in the nearshore environment

Funding Support: UCSB

International Collaboration: No
International Travel: No

Erika McPhee-Shaw
Email: eshaw@mlml.calstate.edu
Most Senior Project Role: Co-Investigator
Nearest Person Month Worked: 1

Contribution to the Project: Collaborated on nearshore oceanographic analyses and research

Funding Support: University

International Collaboration: No
International Travel: No

Jim McWilliams
Email: jcm@atmos.ucla.edu
Most Senior Project Role: Co-Investigator
Nearest Person Month Worked: 1

Contribution to the Project: Contributes to studies of coastal circulation at SBC. Ran and applied the Regional Ocean Model System (ROMS) to several SBC LTER sites in the Santa Barbara Channel

Funding Support: UCLA

International Collaboration: No
International Travel: No

Robert Miller
Email: miller@msi.ucsb.edu
Most Senior Project Role: Co-Investigator

Nearest Person Month Worked: 3

Contribution to the Project: investigated the role of kelp detritus, phytoplankton, and other carbon sources to benthic suspension feeders

Funding Support: None

International Collaboration: No
International Travel: No

Carter Ohlmann
Email: carter@eri.ucsb.edu
Most Senior Project Role: Co-Investigator
Nearest Person Month Worked: 1

Contribution to the Project: conducted research on nearshore oceanographic circulation and dispersal of particles

Funding Support: none

International Collaboration: No
International Travel: No

Henry M Page
Email: page@lifesci.ucsb.edu
Most Senior Project Role: Co-Investigator
Nearest Person Month Worked: 2

Contribution to the Project: led research on studies that use stable isotope techniques to explore the sources of organic matter used by kelp forest and stream consumers

Funding Support: None

International Collaboration: No
International Travel: No

Uta Passow
Email: uta.passow@lifesci.ucsb.edu
Most Senior Project Role: Co-Investigator
Nearest Person Month Worked: 1

Contribution to the Project: conducted measurements of pH, DIC (dissolved inorganic carbon) and TA (total alkalinity) to ground-truth data from simultaneously deployed SeaFet sensors, which measure pH continuously

Funding Support: none

International Collaboration: No

International Travel: No

Pete Raimondi
Email: raimondi@biology.ucsc.edu
Most Senior Project Role: Co-Investigator
Nearest Person Month Worked: 1

Contribution to the Project: Co-leads investigations of the metapopulation dynamics of giant kelp, Macrocystis pyrifera

Funding Support: UCSC

International Collaboration: No
International Travel: No

Andrew Rassweiler
Email: rassweil@lifesci.ucsb.edu
Most Senior Project Role: Co-Investigator
Nearest Person Month Worked: 2

Contribution to the Project: Investigated long-term dynamics of kelp forest communities

Funding Support: none

International Collaboration: No
International Travel: No

Dar Roberts
Email: dar@geog.ucsb.edu
Most Senior Project Role: Co-Investigator
Nearest Person Month Worked: 2

Contribution to the Project: led studies mapping vegetation species and plant functional types, urban composition, pre-fire fuel conditions (fuel types, canopy moisture and fuel loads) and post-fire impacts in the various sBC watersheds that feed in to the coastal zone

Funding Support: UCSB

International Collaboration: No
International Travel: No

Josh Schimel
Email: Schimel@lifesci.ucsb.edu
Most Senior Project Role: Co-Investigator
Nearest Person Month Worked: 1

Contribution to the Project: investigated patterns and mechanisms affecting nutrient transport to the coastal ocean

Funding Support: UCSB

International Collaboration: No
International Travel: No

Russ Schmitt
Email: Schmitt@lifesci.ucsb.edu
Most Senior Project Role: Co-Investigator
Nearest Person Month Worked: 1

Contribution to the Project: co-leads investigations of kelp forest community dynamics

Funding Support: UCSB

International Collaboration: No
International Travel: No

Steve Schroeter
Email: schroete@lifesci.ucsb.edu
Most Senior Project Role: Co-Investigator
Nearest Person Month Worked: 1

Contribution to the Project: led integration of ongoing collection of long term dataset on coastal invertebrate larval settlement patterns into SBC core monitoring.

Funding Support: none

International Collaboration: No
International Travel: No

Alexander Simms
Email: asimms@geol.ucsb.edu
Most Senior Project Role: Co-Investigator
Nearest Person Month Worked: 1

Contribution to the Project: Directed research on the sedimentary record of SBC coastal ecosystems that can be used to decipher the long-term history of environmental changes. He directed the collection and analysis of sediment cores for reconstructing a long-term record of how physical processes affecting the coast have change through time.

Funding Support: University of California, Santa Barbara

International Collaboration: Yes, spain
International Travel: No

Naomi Tague
Email: ctague@bren.ucsb.edu
Most Senior Project Role: Co-Investigator

Nearest Person Month Worked: 1

Contribution to the Project: used LTER data on stream flow and stream chemistry as well as remote sensing analysis of terrestrial vegetation and land use to improve the parameterization of coupled eco-hydrologic models

Funding Support: UCSB

International Collaboration: No
International Travel: No

Libe Washburn
Email: washburn@eri.ucsb.edu
Most Senior Project Role: Co-Investigator
Nearest Person Month Worked: 2

Contribution to the Project: Continued analysis and synthesis of data from SBC-LTER cruises. Advised and helped design new mooring hardware. Assisted and advised on oversight of mooring operations. Coordinated ocean acidification sampling for SBC-LTER. Assisted with project planning. Helped develop SBC-LTER oceanographic research directions

Funding Support: UCSB

International Collaboration: No
International Travel: No

Ali Whitmer
Email: acw39@georgetown.edu
Most Senior Project Role: Co-Investigator
Nearest Person Month Worked: 1

Contribution to the Project: Contributes to education and outreach. Co-PI on MSP grant, works with all research and theme groups. Mentors postdoc (Hammond) in demographic research.

Funding Support: none

International Collaboration: No
International Travel: No

Bill Wright
Email: wwright@chapman.edu
Most Senior Project Role: Co-Investigator
Nearest Person Month Worked: 1

Contribution to the Project: conducted research on predator prey interactions and behavior inside and outside marine reserves

Funding Support: Chapman University

International Collaboration: No
International Travel: No

Robert C. Thunell
Email: thunell@geol.sc.edu
Most Senior Project Role: Faculty
Nearest Person Month Worked: 1

Contribution to the Project: Project Coordinator

Funding Support: University Supported

International Collaboration: No
International Travel: No

Matt Kay
Email: mattckay@gmail.com
Most Senior Project Role: Community College Faculty
Nearest Person Month Worked: 1

Contribution to the Project: conducted collaborative fisheries research on spiny lobster populations

Funding Support: none

International Collaboration: No
International Travel: No

Rosana Aguilera
Email: raguilera@bren.ucsb.edu
Most Senior Project Role: Postdoctoral (scholar, fellow or other postdoctoral position)
Nearest Person Month Worked: 12

Contribution to the Project: Hydrological modeling

Funding Support: NSF

International Collaboration: No
International Travel: No

Max Castorani
Email: max.castorani@ucsb.edu
Most Senior Project Role: Postdoctoral (scholar, fellow or other postdoctoral position)
Nearest Person Month Worked: 2

Contribution to the Project: Investigated long-term dynamics of kelp forest communities

Funding Support: NSF other

International Collaboration: No
International Travel: No

Alicia Cortes
Email: alicia.cortes@ucsb.edu
Most Senior Project Role: Postdoctoral (scholar, fellow or other postdoctoral position)
Nearest Person Month Worked: 12

Contribution to the Project: Physical oceanographic process studies

Funding Support: none

International Collaboration: No
International Travel: No

Ana Ejarque
Email: ana.ejarque@nau.edu
Most Senior Project Role: Postdoctoral (scholar, fellow or other postdoctoral position)
Nearest Person Month Worked: 1

Contribution to the Project: Data Collection/Analysis

Funding Support: None

International Collaboration: No
International Travel: No

Blair Goodridge
Email: bgoodridge@bren.ucsb.edu
Most Senior Project Role: Postdoctoral (scholar, fellow or other postdoctoral position)
Nearest Person Month Worked: 1

Contribution to the Project: Blair collected base flow samples manually and used automated sampling machines to collect storm samples from streams. He processed base flow samples. He measured conductivity and temperature of base flow samples. He prepared base flow samples for analysis of ammonium, nitrate, and phosphate. He prepared base flow, storm, and marine plume samples for analysis of total dissolved nitrogen (TDN) and total dissolved phosphorus (TDP) concentrations. He analyzed ammonium, nitrate, phosphate, total dissolved nitrogen (TDN), and total dissolved phosphorus (TDP) concentrations in base flow, storm, and marine plume samples. He analyzed total suspended solids (TSS) in storm samples. He downloaded data from in situ dataloggers and rain gauges. He surveyed the studied streams and measured discharge of them. He maintained field equipment including in situ dataloggers, rain gauges, and automated sampling machines. He interviewed, hired, trained, and supervised undergraduate student workers. He edited and updated the field and laboratory Standard Operating Procedures (SOPs). He edited and updated the Chemical Hygiene Plan and MSDS binders for the laboratory. He typed up and processed field and laboratory data. He analyzed field and laboratory data using

Matlab. He maintained cleanliness and organization of the laboratory, field room, and storage areas.

Funding Support: None

International Collaboration: No
International Travel: No

Leonel Romero
Email: leromero@eri.ucsb.edu
Most Senior Project Role: Postdoctoral (scholar, fellow or other postdoctoral position)
Nearest Person Month Worked: 12

Contribution to the Project: investigates the coastal circulation and mixing of runoff waters using the Regional Ocean Model System (ROMS) coupled to a wave model (e.g. Simulating Waves Nearshore - SWAN) to model surface wave-current interactions and stream water dispersion for several SBC LTER sites

Funding Support: none

International Collaboration: No
International Travel: No

Steven Sadro
Email: sadro@lifesci.ucsb.edu
Most Senior Project Role: Postdoctoral (scholar, fellow or other postdoctoral position)
Nearest Person Month Worked: 1

Contribution to the Project: Analyzed stream physical-chemical data and assisted with paper development.

Funding Support: None

International Collaboration: No
International Travel: No

Chris Gotschalk
Email: gots@lifesci.ucsb.edu
Most Senior Project Role: Other Professional
Nearest Person Month Worked: 2

Contribution to the Project: assisted with development of SBC's autonomous glider program, which included hands on experience in programing missions, trouble shooting equipment failures and developing methods of methods of processing and analyzing sensor data

Funding Support: NSF

International Collaboration: No

International Travel: No

David Hubbard
Email: hubbard@lifesci.ucsb.edu
Most Senior Project Role: Other Professional
Nearest Person Month Worked: 1

Contribution to the Project: assisted with sandy beach core monitoring

Funding Support: none

International Collaboration: No
International Travel: No

Cyril Johnson
Email: cjohnson@msi.ucsb.edu
Most Senior Project Role: Other Professional
Nearest Person Month Worked: 1

Contribution to the Project: Assisted with design and fabrication of mooring hardware

Funding Support: none

International Collaboration: No
International Travel: No

Michelle Johnson
Email: mjohnson@msi.ucsb.edu
Most Senior Project Role: Other Professional
Nearest Person Month Worked: 2

Contribution to the Project: Collaborated in the planning and delivery of professional development for teachers, as well as in-classroom support for teachers for the SBC and MSP projects.

Funding Support: NSF

International Collaboration: No
International Travel: No

Kristie Klose
Email: kristieaklose@fs.fed.us
Most Senior Project Role: Other Professional
Nearest Person Month Worked: 1

Contribution to the Project: Worked on papers associated with algal data.

Funding Support: None

International Collaboration: No
International Travel: No

Margaret O'Brien
Email: mob@msi.ucsb.edu
Most Senior Project Role: Other Professional
Nearest Person Month Worked: 12

Contribution to the Project: serves as information manager for project

Funding Support: none

International Collaboration: No
International Travel: No

Scott Simon
Email: simon@msi.ucsb.edu
Most Senior Project Role: Other Professional
Nearest Person Month Worked: 2

Contribution to the Project: Led the LTER schoolyard and PD programs at SBC.

Funding Support: NSF

International Collaboration: No
International Travel: No

Sheila Wiseman
Email: wiseman9@cox.net
Most Senior Project Role: Other Professional
Nearest Person Month Worked: 10

Contribution to the Project: Managed laboratory, assisted with field work, processed stream invertebrate samples, invertebrate gut analyses, entered and analyzed stream invertebrate and leaf litter data.

Funding Support: None

International Collaboration: No
International Travel: No

Mark Bitter
Email: mcbitter@umail.ucsb.edu
Most Senior Project Role: Technician
Nearest Person Month Worked: 2

Contribution to the Project: Ocean acidification studies

Funding Support: UCSB

International Collaboration: No
International Travel: No

Erik Fields
Email: fields@eri.ucsb.edu
Most Senior Project Role: Technician
Nearest Person Month Worked: 1

Contribution to the Project: Contributed to oceanographic remote sensing research

Funding Support: none

International Collaboration: No
International Travel: No

Nathalie Guillocheau
Email: nathalie@eri.ucsb.edu
Most Senior Project Role: Technician
Nearest Person Month Worked: 1

Contribution to the Project: conducted HPLC analyses for oceanographic research

Funding Support: none

International Collaboration: No
International Travel: No

Elisa Halewood
Email: elisa.wallner@lifesci.ucsb.edu
Most Senior Project Role: Technician
Nearest Person Month Worked: 6

Contribution to the Project: Served as laboratory manager and conducts DOM analyses. She has analyzed several large data sets for the SBC including the inshore monthly Time Series as well as experimental data sets from SBC researchers. She serves as the point of contact for data management for SBC related projects on microbial oceanography including DOM.

Funding Support: none

International Collaboration: No
International Travel: No

Stuart Halewood
Email: halewood@eri.ucsb.edu
Most Senior Project Role: Technician
Nearest Person Month Worked: 1

Contribution to the Project: assisted with development of SBC's autonomous glider program, which included hands on experience in programing missions, trouble shooting equipment failures and developing methods of methods of processing and analyzing sensor data

Funding Support: NSF

International Collaboration: No
International Travel: No

Shannon Harrer
Email: harrer@msi.ucsb.edu
Most Senior Project Role: Technician
Nearest Person Month Worked: 12

Contribution to the Project: Couduct field activities, supervise undergraduate interns and lead data management, quality control analysis and synthesis for kelp forests

Funding Support: NSF

International Collaboration: No
International Travel: No

Janet Jones
Email: ja_jones@lifesci.ucsb.edu
Most Senior Project Role: Technician
Nearest Person Month Worked: 2

Contribution to the Project: Data Collection/Analysis

Funding Support: NSF

International Collaboration: No
International Travel: No

Jessica Madden
Email: jessicamadden831@gmail.com
Most Senior Project Role: Technician
Nearest Person Month Worked: 4

Contribution to the Project: Assisted with field research

Funding Support: BOEM

International Collaboration: No
International Travel: No

Matthew Meyerhof
Email: mmeyerhof@bren.ucsb.edu
Most Senior Project Role: Technician

Nearest Person Month Worked: 12

Contribution to the Project: Collected base flow samples manually and used automated sampling machines to collect storm samples from streams. He processed base flow samples. He measured conductivity and temperature of base flow samples. He prepared base flow samples for analysis of ammonium, nitrate, and phosphate. He prepared base flow, storm, and marine plume samples for analysis of total dissolved nitrogen (TDN) and total dissolved phosphorus (TDP) concentrations. He analyzed ammonium, nitrate, phosphate, total dissolved nitrogen (TDN), and total dissolved phosphorus (TDP) concentrations in base flow, storm, and marine plume samples. He analyzed total suspended solids (TSS) in storm samples. He downloaded data from in situ dataloggers and rain gauges. He surveyed the studied streams and measured discharge of them. He maintained field equipment including in situ dataloggers, rain gauges, and automated sampling machines. He interviewed, hired, trained, and supervised undergraduate student workers. He edited and updated the field and laboratory Standard Operating Procedures (SOPs). He edited and updated the Chemical Hygiene Plan and MSDS binders for the laboratory. He typed up and processed field and laboratory data. He analyzed field and laboratory data using Matlab. He maintained cleanliness and organization of the laboratory, field room, and storage areas.

Funding Support: None

International Collaboration: No
International Travel: No

Clint Nelson
Email: c_nelson@lifesci.ucsb.edu
Most Senior Project Role: Technician
Nearest Person Month Worked: 12

Contribution to the Project: Lead SBC Field research activities

Funding Support: none

International Collaboration: No
International Travel: No

Eduardo Romero
Email: romero@msi.ucsb.edu
Most Senior Project Role: Technician
Nearest Person Month Worked: 1

Contribution to the Project: Assisted in coordinating field sampling. Assisted with preparation of instruments for field deployments. Participated in SCUBA diving to deploy instruments. Learned to operate research launch for mooring operations and other field sampling. Assisted with instrument preparations and calibration.

Funding Support: none

International Collaboration: No
International Travel: No

David Salazar
Email: Salazar@msi.ucsb.edu
Most Senior Project Role: Technician
Nearest Person Month Worked: 3

Contribution to the Project: Coordinated field sampling. Oversaw preparation of instruments for field deployments and oversaw instrument downloading from instruments and uploading to data base. Operated research launch for mooring deployments and other field sampling. Kept project records, and oversaw instrument calibrations, and arranged instrument servicing.

Funding Support: NSF

International Collaboration: No
International Travel: No

Erik Stassinos
Email: eriks@eri.ucsb.edu
Most Senior Project Role: Technician
Nearest Person Month Worked: 1

Contribution to the Project: assisted with SBC's autonomous glider program, which included hands on experience in programing missions, trouble shooting equipment failures and developing methods of methods of processing and analyzing sensor data

Funding Support: none

International Collaboration: No
International Travel: No

Crystal Weaver
Email: crissieo@sbcglobal.net
Most Senior Project Role: Technician
Nearest Person Month Worked: 3

Contribution to the Project: Assists with core monitoring of sandy beaches

Funding Support: Sea Grant

International Collaboration: No
International Travel: No

Danuta Bennett
Email: bennett@lifesci.ucsb.edu
Most Senior Project Role: Staff Scientist (doctoral level)
Nearest Person Month Worked: 1

Contribution to the Project: Processed algal samples, entered algal data, analyzed algal and invertebrate gut data.

Funding Support: None

International Collaboration: No
International Travel: No

Thomas Even
Email: even@lifesci.ucsb.edu
Most Senior Project Role: Staff Scientist (doctoral level)
Nearest Person Month Worked: 1

Contribution to the Project: Assisted with manuscript production

Funding Support: None

International Collaboration: No
International Travel: No

Craig Nelson
Email: cr_nelson@lifesci.ucsb.edu
Most Senior Project Role: Staff Scientist (doctoral level)
Nearest Person Month Worked: 1

Contribution to the Project: Prepared and analyzed microbial samples. Entered and analyzed microbial data.

Funding Support: None

International Collaboration: No
International Travel: No

Rachel Simons
Email: simons@eri.ucsb.edu
Most Senior Project Role: Staff Scientist (doctoral level)
Nearest Person Month Worked: 1

Contribution to the Project: investigated larval transport and population connectivity in the Southern California Bight, which includes the Santa Barbara Channel, using a three-dimensional physical-biological model.

Funding Support: none

International Collaboration: No
International Travel: No

James Allen
Email: jgallen@eri.ucsb.edu

Most Senior Project Role: Graduate Student (research assistant)
Nearest Person Month Worked: 3

Contribution to the Project: Data Collection/Analysis

Funding Support: UCSB

International Collaboration: No
International Travel: No

Rebecca Barron
Email: rebecca@eri.ucsb.edu
Most Senior Project Role: Graduate Student (research assistant)
Nearest Person Month Worked: 3

Contribution to the Project: investigated inherent optical properties (IOP) in the Santa Barbara Channel and factors controlling IOP variability

Funding Support: none

International Collaboration: No
International Travel: No

Tom Bell
Email: thomas.bell@lifesci.ucsb.edu
Most Senior Project Role: Graduate Student (research assistant)
Nearest Person Month Worked: 12

Contribution to the Project: Investigates biomass dynamics in kelp forests

Funding Support: none

International Collaboration: No
International Travel: No

Michael Bentz
Email: jmichaelbentz@gmail.com
Most Senior Project Role: Graduate Student (research assistant)
Nearest Person Month Worked: 3

Contribution to the Project: Data Collection/Analysis

Funding Support: None

International Collaboration: No
International Travel: No

Heather Berry
Email: heather.berry@geog.ucsb.edu

Most Senior Project Role: Graduate Student (research assistant)
Nearest Person Month Worked: 12

Contribution to the Project: Investigated responses of watershed hydrology to land use change

Funding Support: NSF, GRFP Fellowship, teaching assistant

International Collaboration: No
International Travel: No

Helen Chen
Email: hc10024@gmail.com
Most Senior Project Role: Graduate Student (research assistant)
Nearest Person Month Worked: 12

Contribution to the Project: Data Collection/Analysis

Funding Support: UCSB

International Collaboration: No
International Travel: No

Xiaoli Chen
Email: xiaoli_chen@umail.ucsb.edu
Most Senior Project Role: Graduate Student (research assistant)
Nearest Person Month Worked: 3

Contribution to the Project: Data Collection/Analysis

Funding Support: ERPI

International Collaboration: No
International Travel: No

Mingquan Chen
Email: mingquan@geog.ucsb.edu
Most Senior Project Role: Graduate Student (research assistant)
Nearest Person Month Worked: 12

Contribution to the Project: Land use and remote sensing

Funding Support: NASA

International Collaboration: No
International Travel: No

Daniel Dauhajre
Email: ddauhajre@atmos.ucla.edu
Most Senior Project Role: Graduate Student (research assistant)

Nearest Person Month Worked: 3

Contribution to the Project: Investigated nearshore ocean circulation using ROMs and other models

Funding Support: none

International Collaboration: Yes, japan
International Travel: No

Daniel Ellis
Email: daniel.ellis@lifesci.ucsb.edu
Most Senior Project Role: Graduate Student (research assistant)
Nearest Person Month Worked: 3

Contribution to the Project: worked on ocean circulation and nearshore processes

Funding Support: none

International Collaboration: No
International Travel: No

Nate Emery
Email: nemery@lifesci.ucsb.edu
Most Senior Project Role: Graduate Student (research assistant)
Nearest Person Month Worked: 3

Contribution to the Project: Data Collection/Analysis

Funding Support: NSF

International Collaboration: No
International Travel: No

Kyle Emery
Email: kyle.emery@lifesci.ucsb.edu
Most Senior Project Role: Graduate Student (research assistant)
Nearest Person Month Worked: 1

Contribution to the Project: Sandy Beach ecosystem research

Funding Support: NSF

International Collaboration: No
International Travel: No

Erin Hanan
Email: erin.hanan@lifesci.ucsb.edu
Most Senior Project Role: Graduate Student (research assistant)

Nearest Person Month Worked: 6

Contribution to the Project: led work analyzing fire effects on terrestrial biogeochemistry. This included work linking field measurements with remote sensing and modeling.

Funding Support: None

International Collaboration: No
International Travel: No

Fernanda Hendrikx Freitas
Email: fernanda@eri.ucsb.edu
Most Senior Project Role: Graduate Student (research assistant)
Nearest Person Month Worked: 6

Contribution to the Project: Conducted research on ocean optical properties using the autonomous glider

Funding Support: none

International Collaboration: No
International Travel: No

Simon Ho Chuen Wong
Email: whcsimon@stanford.edu
Most Senior Project Role: Graduate Student (research assistant)
Nearest Person Month Worked: 1

Contribution to the Project: investigated the fate and transport of runoff, including nutrients and pollutants, from two coastal streams that drain into the Santa Barbara Channel. My research includes numerical modeling of coastal streams in an idealized model using a coupled wave-current model, Regional Ocean Model System (ROMS) with Simulating WAves Nearshore (SWAN).

Funding Support: none

International Collaboration: No
International Travel: No

Umi Hoshijima
Email: umihiko.hoshijima@lifesci.ucsb.edu
Most Senior Project Role: Graduate Student (research assistant)
Nearest Person Month Worked: 3

Contribution to the Project: Data Collection/Analysis

Funding Support: None

International Collaboration: No
International Travel: No

Nicholas Huynh
Email: nicholasqhuynh@gmail.com
Most Senior Project Role: Graduate Student (research assistant)
Nearest Person Month Worked: 12

Contribution to the Project: Microbial oceanography and carbon cycling

Funding Support: UCSB

International Collaboration: No
International Travel: No

Anna James
Email: anna.james@lifesci.ucsb.edu
Most Senior Project Role: Graduate Student (research assistant)
Nearest Person Month Worked: 6

Contribution to the Project: investigated the impact of variable pCO2 on DOM production by Diatoms and DOM utilization by heterotrophic bacterioplankton. She uses samples and data from the SBC to help with interpretation of results.

Funding Support: NSF

International Collaboration: No
International Travel: No

Kevin Johnson
Email: kevin.johnson@lifesci.ucsb.edu
Most Senior Project Role: Graduate Student (research assistant)
Nearest Person Month Worked: 3

Contribution to the Project: Conducts research on ocean acidification

Funding Support: none

International Collaboration: No
International Travel: No

Jonathan Jones
Email: jonathan.jones@lifesci.ucsb.edu
Most Senior Project Role: Graduate Student (research assistant)
Nearest Person Month Worked: 3

Contribution to the Project: Data Collection/Analysis

Funding Support: None

International Collaboration: No
International Travel: No

Lydia Kapsenberg
Email: lydia.kapsenberg@lifesci.ucsb.edu
Most Senior Project Role: Graduate Student (research assistant)
Nearest Person Month Worked: 6

Contribution to the Project: conducted research on variation in pH in the Santa Barbara Channel and the effects of ocean acidification on marine invertebrates

Funding Support: none

International Collaboration: No
International Travel: No

Craig Koenigs
Email: craig.koenigs@lifesci.ucsb.edu
Most Senior Project Role: Graduate Student (research assistant)
Nearest Person Month Worked: 12

Contribution to the Project: Data Collection/Analysis

Funding Support: NSF

International Collaboration: No
International Travel: No

Lindsay Marks
Email: lindsay.marks85@gmail.com
Most Senior Project Role: Graduate Student (research assistant)
Nearest Person Month Worked: 12

Contribution to the Project: Investigated population dynamics of the invasive seaweed, Sargassum horneri.

Funding Support: UCSB

International Collaboration: No
International Travel: No

Susan Meerdink
Email: susanmeerdink@geog.ucsb.edu
Most Senior Project Role: Graduate Student (research assistant)
Nearest Person Month Worked: 3

Contribution to the Project: conducted research to calibrate remote sensing data with

vegetation in SBC watersheds

Funding Support: none

International Collaboration: No
International Travel: No

Daniel Okamoto
Email: okamoto@lifesci.ucsb.edu
Most Senior Project Role: Graduate Student (research assistant)
Nearest Person Month Worked: 2

Contribution to the Project: Investigated the role of resource availability in structuring Surfperch population dynamics in kelp forests

Funding Support: NSF

International Collaboration: No
International Travel: No

Laura Reynolds
Email: lcreynolds15@gmail.com
Most Senior Project Role: Graduate Student (research assistant)
Nearest Person Month Worked: 6

Contribution to the Project: Assisted with research on the sedimentary record of SBC coastal ecosystems including the collection and analysis of sediment cores for reconstructing a long-term record of how physical processes affecting the coast have change through time.

Funding Support: none

International Collaboration: Yes, spain
International Travel: No

Gabriel Rodriguez
Email: gerodriguez@umail.ucsb.edu
Most Senior Project Role: Graduate Student (research assistant)
Nearest Person Month Worked: 10

Contribution to the Project: Investigated dynamics of primary production, growth and losses of giant kelp individuals

Funding Support: NSF

International Collaboration: No
International Travel: No

Nicholas Schooler
Email: schooler@lifesci.ucsb.edu

Most Senior Project Role: Graduate Student (research assistant)
Nearest Person Month Worked: 6

Contribution to the Project: Assists with sandy beach monitoring and investigates biodiversity of sandy beaches

Funding Support: Sea Grant

International Collaboration: No
International Travel: No

Sloane Viola
Email: sloaneviola@gmail.com
Most Senior Project Role: Graduate Student (research assistant)
Nearest Person Month Worked: 1

Contribution to the Project: assisted with sandy beach research and sample processing

Funding Support: Sea Grant, BOEM

International Collaboration: Yes, new zealand
International Travel: No

Emma Wear
Email: emma.wear@lifesci.ucsb.edu
Most Senior Project Role: Graduate Student (research assistant)
Nearest Person Month Worked: 3

Contribution to the Project: Iinvestigated the temporal and spatial variability of DOM availability in the SBC and how that impacts bacterioplankton production and diversity as part of a collaborative project. Her research is aided by data and samples from the SBC and Plumes and Blooms projects

Funding Support: NSF , NASA

International Collaboration: No
International Travel: No

Erin Wetherly
Email: wetherley@geog.ucsb.edu
Most Senior Project Role: Graduate Student (research assistant)
Nearest Person Month Worked: 3

Contribution to the Project: Data Collection/Analysis

Funding Support: None

International Collaboration: No

International Travel: No

Christie Yorke
Email: christie.yorke@lifesci.ucsb.edu
Most Senior Project Role: Graduate Student (research assistant)
Nearest Person Month Worked: 3

Contribution to the Project: Conducts research on the role of kelp detritus in nearshore food webs

Funding Support: NSF fellowship

International Collaboration: Yes, new zealand
International Travel: No

David Abady
Email: david.a.abady@gmail.com
Most Senior Project Role: Undergraduate Student
Nearest Person Month Worked: 1

Contribution to the Project: sorted samples and participated in field work on sandy beaches

Funding Support: none

International Collaboration: No
International Travel: No

Kylie Anderson
Email: kylieandersonn@yahoo.com
Most Senior Project Role: Undergraduate Student
Nearest Person Month Worked: 1

Contribution to the Project: sorted samples and participated in field work on sandy beaches

Funding Support: none

International Collaboration: No
International Travel: No

Conner Applewhite
Email: conner.b.apple@gmail.com
Most Senior Project Role: Undergraduate Student
Nearest Person Month Worked: 1

Contribution to the Project: sLTER/REEF informal science education intern

Funding Support: UCSB Coastal Fund

International Collaboration: No

International Travel: No

Silke Bachhuber
Email: bachhuber@umail.ucsb.edu
Most Senior Project Role: Undergraduate Student
Nearest Person Month Worked: 1

Contribution to the Project: sLTER/REEF informal science education intern

Funding Support: UCSB Coastal Fund

International Collaboration: No
International Travel: No

Zhiping Bao
Email: zbao13@gmail.com
Most Senior Project Role: Undergraduate Student
Nearest Person Month Worked: 1

Contribution to the Project: sLTER/REEF informal science education intern

Funding Support: UCSB Coastal Fund

International Collaboration: No
International Travel: No

Matthew Bar
Email: Mbarr0118@gmail.com
Most Senior Project Role: Undergraduate Student
Nearest Person Month Worked: 1

Contribution to the Project: Data Collection/Analysis

Funding Support: NSF

International Collaboration: No
International Travel: No

Stephanie Barlev
Email: stephaniebarlev@gmail.com
Most Senior Project Role: Undergraduate Student
Nearest Person Month Worked: 1

Contribution to the Project: sorted samples and participated in field work on sandy beaches

Funding Support: none

International Collaboration: No
International Travel: No

Bradford Bendell
Email: fordbendell@gmail.com
Most Senior Project Role: Undergraduate Student
Nearest Person Month Worked: 1

Contribution to the Project: Data collection, processing, and analysis for sandy beach ecosystems

Funding Support: none

International Collaboration: No
International Travel: No

Laura Beresford
Email: lauraberesford@sbcglobal.net
Most Senior Project Role: Undergraduate Student
Nearest Person Month Worked: 2

Contribution to the Project: Data collection, processing, and analysis for sandy beach ecosystems

Funding Support: UCSB Coastal Fund

International Collaboration: No
International Travel: No

Sebastian Bognar
Email: sebastian17@comcast.net
Most Senior Project Role: Undergraduate Student
Nearest Person Month Worked: 1

Contribution to the Project: sample processing; data entry; field assistance

Funding Support: NSF

International Collaboration: No
International Travel: No

Austin Bragg
Email: austinbragg5195@aol.com
Most Senior Project Role: Undergraduate Student
Nearest Person Month Worked: 1

Contribution to the Project: Salaried sLTER informal science educator

Funding Support: UCSB Coastal fund

International Collaboration: No

International Travel: No

Isolde Callihan
Email: ibcallihan@umail.ucsb.edu
Most Senior Project Role: Undergraduate Student
Nearest Person Month Worked: 1

Contribution to the Project: sample processing; data collection; data entry; field assistance

Funding Support: NSF

International Collaboration: No
International Travel: No

Caroline Chang
Email: cbc@umail.ucsb.edu
Most Senior Project Role: Undergraduate Student
Nearest Person Month Worked: 1

Contribution to the Project: Data collection, data analysis

Funding Support: S. Calif. Earthquake Center

International Collaboration: No
International Travel: No

Joe Chellew
Email: joechellew@gmail.com
Most Senior Project Role: Undergraduate Student
Nearest Person Month Worked: 1

Contribution to the Project: Salaried sLTER informal science educator

Funding Support: UCSB Coastal fund

International Collaboration: No
International Travel: No

Noelle Claycomb
Email: claycomb.noelle@gmail.com
Most Senior Project Role: Undergraduate Student
Nearest Person Month Worked: 1

Contribution to the Project: Data collection, processing, and analysis for sandy beach ecosystems

Funding Support: none

International Collaboration: No

International Travel: No

Garrett Corwin
Email: garrettcorwin@gmail.com
Most Senior Project Role: Undergraduate Student
Nearest Person Month Worked: 1

Contribution to the Project: Assisted with kelp forest laboratory, field and data activities

Funding Support: NSF

International Collaboration: No
International Travel: No

Kaitlin Cottrell
Email: kaitlinmcottrell@gmail.com
Most Senior Project Role: Undergraduate Student
Nearest Person Month Worked: 2

Contribution to the Project: sorted samples and participated in field work on sandy beaches

Funding Support: Sea Grant, UCSB Coastal Fund

International Collaboration: No
International Travel: No

Cheyenne Daleiden
Email: littlechey.daleiden@yahoo.com
Most Senior Project Role: Undergraduate Student
Nearest Person Month Worked: 1

Contribution to the Project: Salaried sLTER informal science educator

Funding Support: UCSB Coastal fund

International Collaboration: No
International Travel: No

Bryn Daniel
Email: brynsomerset@mac.com
Most Senior Project Role: Undergraduate Student
Nearest Person Month Worked: 1

Contribution to the Project: Salaried sLTER informal science educator

Funding Support: UCSB Coastal fund

International Collaboration: No
International Travel: No

Michael Dao
Email: michaelledao@gmail.com
Most Senior Project Role: Undergraduate Student
Nearest Person Month Worked: 1

Contribution to the Project: Volunteer sLTER informal science educator

Funding Support: None

International Collaboration: No
International Travel: No

Hailey Darrow
Email: hdarrow@umail.ucsb.edu
Most Senior Project Role: Undergraduate Student
Nearest Person Month Worked: 1

Contribution to the Project: Volunteer sLTER informal science educator

Funding Support: None

International Collaboration: No
International Travel: No

Rose Dodgen
Email: redodgen@comcast.net
Most Senior Project Role: Undergraduate Student
Nearest Person Month Worked: 2

Contribution to the Project: sorted samples and participated in field work on sandy beaches

Funding Support: UCSB Coastal Fund

International Collaboration: No
International Travel: No

Daisy Duenas
Email: semidaisyy@gmail.com
Most Senior Project Role: Undergraduate Student
Nearest Person Month Worked: 1

Contribution to the Project: Volunteer sLTER informal science educator

Funding Support: None

International Collaboration: No
International Travel: No

Chance English

Email: cje@umail.ucsb.edu
Most Senior Project Role: Undergraduate Student
Nearest Person Month Worked: 1

Contribution to the Project: Salaried sLTER informal science educator

Funding Support: UCSB Coastal fund

International Collaboration: No
International Travel: No

Ryan Fallgatter
Email: rtfallgatter@gmail.com
Most Senior Project Role: Undergraduate Student
Nearest Person Month Worked: 1

Contribution to the Project: Stream sample collection and processing

Funding Support: none

International Collaboration: No
International Travel: No

Chad Fitzgerald
Email: fitzchad@gmail.com
Most Senior Project Role: Undergraduate Student
Nearest Person Month Worked: 1

Contribution to the Project: Volunteer sLTER informal science educator

Funding Support: None

International Collaboration: No
International Travel: No

Devyn Flaherty
Email: devyn.flaherty@yahoo.com
Most Senior Project Role: Undergraduate Student
Nearest Person Month Worked: 1

Contribution to the Project: sLTER/REEF informal science education intern

Funding Support: UCSB Coastal Fund

International Collaboration: No
International Travel: No

Nicolette Flannery
Email: nflannery1993@gmail.com

Most Senior Project Role: Undergraduate Student
Nearest Person Month Worked: 1

Contribution to the Project: Data collection, processing, and analysis for sandy beach ecosystems

Funding Support: none

International Collaboration: No
International Travel: No

Dylan Fozard
Email: dylfoz@gmail.com
Most Senior Project Role: Undergraduate Student
Nearest Person Month Worked: 1

Contribution to the Project: Salaried sLTER informal science educator

Funding Support: UCSB Coastal fund

International Collaboration: No
International Travel: No

Emily Frey
Email: emily8frey@gmail.com
Most Senior Project Role: Undergraduate Student
Nearest Person Month Worked: 1

Contribution to the Project: Data collection, processing, and analysis for sandy beach ecosystems

Funding Support: UCSB Coastal Fund

International Collaboration: No
International Travel: No

Jordan Gallagher
Email: jordanpgallagher@gmail.com
Most Senior Project Role: Undergraduate Student
Nearest Person Month Worked: 4

Contribution to the Project: Assisted with kelp forest laboratory, field and data activities

Funding Support: NSF

International Collaboration: No
International Travel: No

Kristina Garcia

Email: kristina.g993@gmail.com
Most Senior Project Role: Undergraduate Student
Nearest Person Month Worked: 1

Contribution to the Project: sLTER/REEF informal science education intern

Funding Support: UCSB Coastal Fund

International Collaboration: No
International Travel: No

Briana Gibbs
Email: bree.gibbs18@gmail.com
Most Senior Project Role: Undergraduate Student
Nearest Person Month Worked: 1

Contribution to the Project: Salaried sLTER informal science educator

Funding Support: UCSB Coastal fund

International Collaboration: No
International Travel: No

Fernando Gomez-Torrero
Email: fgomeztorrero@umail.ucsb.edu
Most Senior Project Role: Undergraduate Student
Nearest Person Month Worked: 1

Contribution to the Project: sLTER/REEF informal science education intern

Funding Support: UCSB Coastal Fund

International Collaboration: No
International Travel: No

Brandon Grundberg
Email: bgrunberg@umail.ucsb.edu
Most Senior Project Role: Undergraduate Student
Nearest Person Month Worked: 3

Contribution to the Project: Worked on new sampling bottle for pH. Assisted with instrument preparation

Funding Support: none

International Collaboration: No
International Travel: No

Kali Gutierrez

Email: waterpolochica@yahoo.com
Most Senior Project Role: Undergraduate Student
Nearest Person Month Worked: 1

Contribution to the Project: sLTER/REEF informal science education intern

Funding Support: UCSB Coastal Fund

International Collaboration: No
International Travel: No

Emily Heber
Email: emily_k_heber@umail.ucsb.edu
Most Senior Project Role: Undergraduate Student
Nearest Person Month Worked: 1

Contribution to the Project: sLTER/REEF informal science education intern

Funding Support: UCSB Coastal Fund

International Collaboration: No
International Travel: No

Christopher Honeyman
Email: chrishoneyman94@gmail.com
Most Senior Project Role: Undergraduate Student
Nearest Person Month Worked: 2

Contribution to the Project: Assisted with kelp forest laboratory, field and data activities

Funding Support: NSF

International Collaboration: No
International Travel: No

Rebecca Howard
Email: howardrebecca@gmail.com
Most Senior Project Role: Undergraduate Student
Nearest Person Month Worked: 1

Contribution to the Project: sLTER/REEF informal science education intern

Funding Support: UCSB Coastal Fund

International Collaboration: No
International Travel: No

Bryn Hudson
Email: brynhudson8@gmail.com

Most Senior Project Role: Undergraduate Student
Nearest Person Month Worked: 1

Contribution to the Project: Volunteer sLTER informal science educator

Funding Support: None

International Collaboration: No
International Travel: No

Fernando Idiarte
Email: fernando.idiarte@ago.org
Most Senior Project Role: Undergraduate Student
Nearest Person Month Worked: 1

Contribution to the Project: data collection, field assistance

Funding Support: NSF

International Collaboration: No
International Travel: No

Inji Issac
Email: inji2isaac@hotmail.com
Most Senior Project Role: Undergraduate Student
Nearest Person Month Worked: 1

Contribution to the Project: Salaried sLTER informal science educator

Funding Support: UCSB Coastal Fund

International Collaboration: No
International Travel: No

Olivia Johnson
Email: olivjjohnson@gmail.com
Most Senior Project Role: Undergraduate Student
Nearest Person Month Worked: 1

Contribution to the Project: Data collection, processing, and analysis for sandy beach ecosystems

Funding Support: none

International Collaboration: No
International Travel: No

Alexandra Kahler
Email: amkahler@umail.ucsb.edu

Most Senior Project Role: Undergraduate Student
Nearest Person Month Worked: 2

Contribution to the Project: Assisted with kelp forest laboratory, field and data activities

Funding Support: NSF

International Collaboration: No
International Travel: No

Kevin Kha
Email: kevinkha@umail.ucsb.edu
Most Senior Project Role: Undergraduate Student
Nearest Person Month Worked: 1

Contribution to the Project: Salaried sLTER informal science educator

Funding Support: UCSB Coastal fund

International Collaboration: No
International Travel: No

Vivian Kim
Email: kimviva13@live.com
Most Senior Project Role: Undergraduate Student
Nearest Person Month Worked: 1

Contribution to the Project: sLTER/REEF informal science education intern

Funding Support: UCSB Coastal Fund

International Collaboration: No
International Travel: No

Marissa Kudo
Email: marissakudo@gmail.com
Most Senior Project Role: Undergraduate Student
Nearest Person Month Worked: 1

Contribution to the Project: Data Collection/Analysis

Funding Support: NSF

International Collaboration: No
International Travel: No

Sunny Lee
Email: srosunnyl@gmail.com
Most Senior Project Role: Undergraduate Student

Nearest Person Month Worked: 1

Contribution to the Project: Data collection, processing, and analysis for sandy beach ecosystems

Funding Support: none

International Collaboration: No
International Travel: No

Meikko Lee
Email: meikko@umail.ucsb.edu
Most Senior Project Role: Undergraduate Student
Nearest Person Month Worked: 1

Contribution to the Project: Stream sample processing

Funding Support: NSF

International Collaboration: No
International Travel: No

Monica Leflore
Email: monica.leflore@gmail.com
Most Senior Project Role: Undergraduate Student
Nearest Person Month Worked: 1

Contribution to the Project: Salaried sLTER informal science educator

Funding Support: UCSB Coastal fund

International Collaboration: No
International Travel: No

Maria Loberg
Email: marialoberg@yahoo.com
Most Senior Project Role: Undergraduate Student
Nearest Person Month Worked: 1

Contribution to the Project: sLTER/REEF informal science education intern

Funding Support: UCSB Coastal Fund

International Collaboration: No
International Travel: No

Sophia Macarewich
Email: simacarewich@cox.net
Most Senior Project Role: Undergraduate Student

Nearest Person Month Worked: 1

Contribution to the Project: sLTER/REEF informal science education intern

Funding Support: UCSB Coastal Fund

International Collaboration: No
International Travel: No

Shannon Malone
Email: shannonmalone@umail.ucsb.edu
Most Senior Project Role: Undergraduate Student
Nearest Person Month Worked: 1

Contribution to the Project: Data Collection/Analysis

Funding Support: UCSB Coastal Fund

International Collaboration: No
International Travel: No

Sean Marks
Email: seanmarks@umail.ucsb.edu
Most Senior Project Role: Undergraduate Student
Nearest Person Month Worked: 2

Contribution to the Project: Assisted with kelp forest laboratory, field and data activities

Funding Support: NSF

International Collaboration: No
International Travel: No

Trace Martin
Email: trace.michael@hotmail.com
Most Senior Project Role: Undergraduate Student
Nearest Person Month Worked: 2

Contribution to the Project: sample processing; data entry; sample collection; field assistance

Funding Support: NSF

International Collaboration: No
International Travel: No

Joselyne Matamoros
Email: joselynematamoros@gmail.com
Most Senior Project Role: Undergraduate Student

Nearest Person Month Worked: 1

Contribution to the Project: Volunteer sLTER informal science educator

Funding Support: None

International Collaboration: No
International Travel: No

Colleen McCamy
Email: colleen.rebecca.mc@gmail.com
Most Senior Project Role: Undergraduate Student
Nearest Person Month Worked: 2

Contribution to the Project: Assisted with kelp forest laboratory, field and data activities

Funding Support: NSF

International Collaboration: No
International Travel: No

Olivia Montiano
Email: oliviamontiano@umail.com
Most Senior Project Role: Undergraduate Student
Nearest Person Month Worked: 1

Contribution to the Project: Assisted with kelp forest laboratory, field and data activities

Funding Support: none

International Collaboration: No
International Travel: No

Brittany Munson
Email: Brittany_fr_munson@yahoo.com
Most Senior Project Role: Undergraduate Student
Nearest Person Month Worked: 1

Contribution to the Project: Volunteer sLTER informal science educator

Funding Support: None

International Collaboration: No
International Travel: No

Sharlyn Nelson
Email: sharlynnelson@gmail.com
Most Senior Project Role: Undergraduate Student

Nearest Person Month Worked: 1

Contribution to the Project: Data collection, processing, and analysis for sandy beach ecosystems

Funding Support: none

International Collaboration: No
International Travel: No

Charles Quan
Email: xwyvern@gmail.com
Most Senior Project Role: Undergraduate Student
Nearest Person Month Worked: 1

Contribution to the Project: Assisted with kelp forest laboratory, field and data activities

Funding Support: none

International Collaboration: No
International Travel: No

Tatiana Raskin
Email: tar@umail.ucsb.edu
Most Senior Project Role: Undergraduate Student
Nearest Person Month Worked: 2

Contribution to the Project: Assisted with kelp forest laboratory, field and data activities

Funding Support: NSF

International Collaboration: No
International Travel: No

Sara Rosenblatt
Email: serosenblatt@umail.ucsb.edu
Most Senior Project Role: Undergraduate Student
Nearest Person Month Worked: 1

Contribution to the Project: sLTER/REEF informal science education intern

Funding Support: UCSB Coastal Fund

International Collaboration: No
International Travel: No

Kimikio Russel-Halterman
Email: kimiko@umail.ucsb.edu
Most Senior Project Role: Undergraduate Student

Nearest Person Month Worked: 1

Contribution to the Project: Salaried sLTER informal science educator

Funding Support: UCSB Coastal fund

International Collaboration: No
International Travel: No

Ria Sager
Email: riasager@umail.ucsb.edu
Most Senior Project Role: Undergraduate Student
Nearest Person Month Worked: 1

Contribution to the Project: Data collection, processing, and analysis for sandy beach ecosystems

Funding Support: none

International Collaboration: No
International Travel: No

Paulina Salinas-Ruiz
Email: pausr91@hotmail.com
Most Senior Project Role: Undergraduate Student
Nearest Person Month Worked: 1

Contribution to the Project: Assisted with kelp forest laboratory, field and data activities.

Funding Support: none

International Collaboration: No
International Travel: No

Emily Shyshka
Email: emilyshyshka@umail.ucsb.edu
Most Senior Project Role: Undergraduate Student
Nearest Person Month Worked: 1

Contribution to the Project: Assisted with kelp forest laboratory, field and data activities

Funding Support: none

International Collaboration: No
International Travel: No

Dana Simon
Email: snoopfrog555@gmail.com
Most Senior Project Role: Undergraduate Student

Nearest Person Month Worked: 1

Contribution to the Project: sample processing; data collection

Funding Support: NSF

International Collaboration: No
International Travel: No

Erinn Sloan
Email: esloan@umail.ucsb.edu
Most Senior Project Role: Undergraduate Student
Nearest Person Month Worked: 3

Contribution to the Project: Worked on new sampling bottle for pH. Assisted with instrument preparation

Funding Support: none

International Collaboration: No
International Travel: No

Kaitlyn Smith
Email: kaitlyncsmith11@gmail.com
Most Senior Project Role: Undergraduate Student
Nearest Person Month Worked: 2

Contribution to the Project: Stream sample collection and processing

Funding Support: NSF

International Collaboration: No
International Travel: No

David Smithers
Email: smithers_david@yahoo.com
Most Senior Project Role: Undergraduate Student
Nearest Person Month Worked: 1

Contribution to the Project: Volunteer sLTER informal science educator

Funding Support: None

International Collaboration: No
International Travel: No

Gabriel Tsuruta
Email: gtsuruta@sbcglobal.net
Most Senior Project Role: Undergraduate Student

Nearest Person Month Worked: 1

Contribution to the Project: Salaried sLTER informal science educator

Funding Support: UCSB Coastal fund

International Collaboration: No
International Travel: No

Drew Weinstein
Email: dreweweinstein@gmail.com
Most Senior Project Role: Undergraduate Student
Nearest Person Month Worked: 1

Contribution to the Project: Data collection, processing, and analysis for sandy beach ecosystems

Funding Support: none

International Collaboration: No
International Travel: No

Joseph Weston
Email: joeweston2@yahoo.com
Most Senior Project Role: Undergraduate Student
Nearest Person Month Worked: 1

Contribution to the Project: Salaried sLTER informal science educator

Funding Support: UCSB Coastal fund

International Collaboration: No
International Travel: No

Carly White
Email: carlyqwhite@gmail.com
Most Senior Project Role: Undergraduate Student
Nearest Person Month Worked: 1

Contribution to the Project: Salaried sLTER informal science educator

Funding Support: UCSB Coastal fund

International Collaboration: No
International Travel: No

Alison White
Email: aw24932@yahoo.com
Most Senior Project Role: Undergraduate Student

Nearest Person Month Worked: 1

Contribution to the Project: sample processing; data entry; field assistance

Funding Support: NSF

International Collaboration: No
International Travel: No

Kendra Witt
Email: kwitt@umail.ucsb.edu
Most Senior Project Role: Undergraduate Student
Nearest Person Month Worked: 1

Contribution to the Project: Volunteer sLTER informal science educator

Funding Support: None

International Collaboration: No
International Travel: No

Kelli Worl
Email: kworl111@gmail.com
Most Senior Project Role: Undergraduate Student
Nearest Person Month Worked: 1

Contribution to the Project: Data collection, processing, and analysis for sandy beach ecosystems

Funding Support: none

International Collaboration: No
International Travel: No

Kimberly Yom
Email: ksyom3@gmail.com
Most Senior Project Role: Undergraduate Student
Nearest Person Month Worked: 1

Contribution to the Project: Stream sample collection and processing

Funding Support: none

International Collaboration: No
International Travel: No

Daniel Zarate
Email: danielzarate@umail.ucsb.edu
Most Senior Project Role: Undergraduate Student

Nearest Person Month Worked: 2

Contribution to the Project: Assisted with kelp forest laboratory, field and data activities

Funding Support: NSF

International Collaboration: No
International Travel: No

Erin Holehouse
Email: eholehouse76@gmail.com
Most Senior Project Role: High School Student
Nearest Person Month Worked: 1

Contribution to the Project: Assisted with kelp forest laboratory and data activities

Funding Support: none

International Collaboration: No
International Travel: No

Rose Lebow
Email: rlebow144@gmail.com
Most Senior Project Role: High School Student
Nearest Person Month Worked: 1

Contribution to the Project: Assisted with kelp forest laboratory and data activities

Funding Support: none

International Collaboration: No
International Travel: No

Erin Magoun
Email: erinmagoun@gmail.com
Most Senior Project Role: High School Student
Nearest Person Month Worked: 1

Contribution to the Project: Assisted with kelp forest laboratory and data activities

Funding Support: none

International Collaboration: No
International Travel: No

Luiza Moreno
Email: luizaarm@gmail.com
Most Senior Project Role: High School Student

Nearest Person Month Worked: 1

Contribution to the Project: Assisted with kelp forest laboratory and data activities

Funding Support: none

International Collaboration: No
International Travel: No

Daniel Perez
Email: danperezsbsd@gmail.com
Most Senior Project Role: High School Student
Nearest Person Month Worked: 1

Contribution to the Project: Volunteer sLTER informal science educator

Funding Support: none

International Collaboration: No
International Travel: No

Alexis Wachtell
Email: wachtell@sbcglobal.net
Most Senior Project Role: High School Student
Nearest Person Month Worked: 1

Contribution to the Project: Volunteer sLTER informal science educator

Funding Support: None

International Collaboration: No
International Travel: No

Olivia Wheaton
Email: wheaton@gmail.com
Most Senior Project Role: High School Student
Nearest Person Month Worked: 2

Contribution to the Project: Scientific illustrations of kelp forest organisms

Funding Support: Pinhead Program

International Collaboration: No
International Travel: No

Tiffany Cedeno
Email: cedeno_tiffany@hotmail.com
Most Senior Project Role: Research Experience for Undergraduates (REU) Participant

Nearest Person Month Worked: 2

Contribution to the Project: Assisted with kelp forest laboratory, field and data activities

Funding Support: NSF REU

International Collaboration: No
International Travel: No
Year of schooling completed:
Home Institution:
Government fiscal year(s) was this REU participant supported:

John Liedle
Email: johnliedle@umail.ucsb.edu
Most Senior Project Role: Research Experience for Undergraduates (REU) Participant
Nearest Person Month Worked: 4

Contribution to the Project: Data Collection/Analysis, Assisted with kelp forest laboratory, field and data activities

Funding Support: NSF

International Collaboration: No
International Travel: No
Year of schooling completed:
Home Institution:
Government fiscal year(s) was this REU participant supported:

Lance Lowenberg
Email: lancelowenberg@umail.ucsb.edu
Most Senior Project Role: Research Experience for Undergraduates (REU) Participant
Nearest Person Month Worked: 3

Contribution to the Project: Worked on new sampling bottle for pH. Assisted with instrument preparation

Funding Support: NSF REU

International Collaboration: No
International Travel: No
Year of schooling completed:
Home Institution:
Government fiscal year(s) was this REU participant supported:

Taylor Traxler
Email: Ttrax4240@yahoo.com
Most Senior Project Role: Research Experience for Undergraduates (REU) Participant

Nearest Person Month Worked: 4

Contribution to the Project: Assisted with kelp forest laboratory, field and data activities

Funding Support: NSF REU

International Collaboration: No
International Travel: No
Year of schooling completed:
Home Institution:
Government fiscal year(s) was this REU participant supported:

Michael Trong
Email: michaeltruong994@gmail.com
Most Senior Project Role: Research Experience for Undergraduates (REU) Participant
Nearest Person Month Worked: 1

Contribution to the Project: Data collection, data analysis

Funding Support: NSF REU

International Collaboration: No
International Travel: No
Year of schooling completed:
Home Institution:
Government fiscal year(s) was this REU participant supported:

Eleanor Simon
Email: ELsimon02@gmail.com
Most Senior Project Role: Other
Nearest Person Month Worked: 1

Contribution to the Project: Volunteer sLTER informal science educator

Funding Support: none

International Collaboration: No
International Travel: No

What other organizations have been involved as partners?

Name	Type of Partner Organization	Location
American Assoc. Univ. Women, Tech Trek	Other Nonprofits	Santa Barbara, CA
Arizona State University	Academic Institution	Tempe, Arizona
La Cumbre Junior High School	School or School Systems	Santa Barbara, CA

Name	Type of Partner Organization	Location
Monash University	Academic Institution	Melbourne, Australia
Moss Landing Marine Laboratory	Academic Institution	Moss Landing, CA
National Marine Fisheries Service	Other Organizations (foreign or domestic)	US
Santa Barbara Channel Keeper	Other Nonprofits	Santa Barbara, CA
Santa Barbara Unified School District (SBUSD)	School or School Systems	Santa Barbara, CA
Scripps Institution of Oceanography	Academic Institution	La Jolla, CA
Southern California Coastal Ocean Observing System (SCCOOS)	Other Organizations (foreign or domestic)	California
US Forest Service	Other Organizations (foreign or domestic)	Santa Barbara, CA
US Geological Survey	Other Organizations (foreign or domestic)	Santa Cruz, CA
California Dept of Fish and Wildlife	State or Local Government	Sacramento, C
University of Auckland	Academic Institution	Auckland, New Zealand
University of Barcelona	Academic Institution	Barcelona, Spain
University of California Davis	Academic Institution	Bodega Bay, CA
University of California Los Angeles	Academic Institution	Los Angeles, CA
University of California San Diego	Academic Institution	La Jolla, CA
University of California Santa Cruz	Academic Institution	Santa Cruz, CA
University of Coimbra	Academic Institution	Coimbra, Portugal
University of Connecticut	Academic Institution	Groton, CT
University of Girona	Academic Institution	Girona, Spain
University of New Mexico	Academic Institution	Albuquerque, NM
California Sea Grant Extension Program	Academic Institution	La Jolla, CA
University of South Carolina	Academic Institution	Columbia, SC
University of Wisconsin	Academic Institution	Milwaukee, WI
Channel Islands National Marine Sanctuary	Other Organizations (foreign or domestic)	Santa Barbara, CA
Channel Islands National Park	Other Organizations (foreign or domestic)	Ventura, CA
City of Santa Barbara	State or Local Government	Santa Barbara, CA
County of Santa Barbara	State or Local Government	Santa Barbara, CA
Hope School District GATE Program	School or School Systems	Santa Barbara, CA
LTER Math Science Partnership	Academic Institution	Santa Barbara, CA

Full details of organizations that have been involved as partners:

American Assoc. Univ. Women, Tech Trek

Organization Type: Other Nonprofits
Organization Location: Santa Barbara, CA

Partner's Contribution to the Project:
Financial support
Facilities

More Detail on Partner and Contribution: Tech Trek is a math/science camp designed to develop interest, excitement and self-confidence in young women who will enter eighth grade in the fall. It features hands-on activities in math, science and related fields. All sleeping, eating, instructional and recreational facilities are located on a university campus where camps are held. Tech Trek is an ongoing SBC Schoolyard partner.

Arizona State University

Organization Type: Academic Institution
Organization Location: Tempe, Arizona

Partner's Contribution to the Project:
Collaborative Research

More Detail on Partner and Contribution:

California Dept of Fish and Wildlife

Organization Type: State or Local Government
Organization Location: Sacramento, C

Partner's Contribution to the Project:
Collaborative Research

More Detail on Partner and Contribution:

California Sea Grant Extension Program

Organization Type: Academic Institution
Organization Location: La Jolla, CA

Partner's Contribution to the Project:
Collaborative Research

More Detail on Partner and Contribution: Collaborate on new climate change assessment study for SBC

Channel Islands National Marine Sanctuary

Organization Type: Other Organizations (foreign or domestic)
Organization Location: Santa Barbara, CA

Partner's Contribution to the Project:
Facilities

More Detail on Partner and Contribution: Collaborated with SBC on oceanographic data collection and education activities

Channel Islands National Park

Organization Type: Other Organizations (foreign or domestic)
Organization Location: Ventura, CA

Partner's Contribution to the Project:
Facilities
Collaborative Research

More Detail on Partner and Contribution: Shared and collaborated on long term data on kelp forest communities in the Santa Barbara Channel

City of Santa Barbara

Organization Type: State or Local Government
Organization Location: Santa Barbara, CA

Partner's Contribution to the Project:
Collaborative Research

More Detail on Partner and Contribution:

County of Santa Barbara

Organization Type: State or Local Government
Organization Location: Santa Barbara, CA

Partner's Contribution to the Project:
Collaborative Research

More Detail on Partner and Contribution:

Hope School District GATE Program

Organization Type: School or School Systems
Organization Location: Santa Barbara, CA

Partner's Contribution to the Project:

Financial support
Facilities

More Detail on Partner and Contribution: Collaborates with SBC on K-12 education

LTER Math Science Partnership

Organization Type: Academic Institution
Organization Location: Santa Barbara, CA

Partner's Contribution to the Project:
Financial support
Collaborative Research

More Detail on Partner and Contribution: LTER Math-Science-Partnership (MSP) The project connects the research and education prowess in the environmental sciences of universities and sites within LTER with teacher professional development in science and mathematics of partner middle schools and high schools. It extends across the nation and involves four LTER research sites, the Shortgrass Steppe, Baltimore Ecosystems Study, Kellogg Biological Station, and Santa Barbara Coastal and their partnering institutions, the LTER Network Office, and a group of 22 K-12 schools and districts that will directly impact over 250 science and mathematics teachers and 70,000 students from diverse backgrounds.

La Cumbre Junior High School

Organization Type: School or School Systems
Organization Location: Santa Barbara, CA

Partner's Contribution to the Project:
Collaborative Research

More Detail on Partner and Contribution: SBC-LTER is collaborating with LCJHS through the NSF funded Math and Science Partnership.

Monash University

Organization Type: Academic Institution
Organization Location: Melbourne, Australia

Partner's Contribution to the Project:
Collaborative Research

More Detail on Partner and Contribution:

Moss Landing Marine Laboratory

Organization Type: Academic Institution
Organization Location: Moss Landing, CA

Partner's Contribution to the Project:
Collaborative Research

More Detail on Partner and Contribution:

National Marine Fisheries Service

Organization Type: Other Organizations (foreign or domestic)
Organization Location: US

Partner's Contribution to the Project:
Collaborative Research

More Detail on Partner and Contribution:

Santa Barbara Channel Keeper

Organization Type: Other Nonprofits
Organization Location: Santa Barbara, CA

Partner's Contribution to the Project:
Collaborative Research

More Detail on Partner and Contribution: The Santa Barbara Channel Keeper staff conduct monthly collections along the Ventura River, and we complement their in situ measurements with high quality nutrient chemistry on water samples from local streams and rivers.

Santa Barbara Unified School District (SBUSD)

Organization Type: School or School Systems
Organization Location: Santa Barbara, CA

Partner's Contribution to the Project:
Financial support
Facilities

More Detail on Partner and Contribution: Collaborates to conduct Explore the Sea Summer Program for K-12 students

Scripps Institution of Oceanography

Organization Type: Academic Institution
Organization Location: La Jolla, CA

Partner's Contribution to the Project:
Collaborative Research

More Detail on Partner and Contribution: Collaborate on new climate change assessment study for SBC

Southern California Coastal Ocean Observing System (SCCOOS)

Organization Type: Other Organizations (foreign or domestic)
Organization Location: California

Partner's Contribution to the Project:
Collaborative Research

More Detail on Partner and Contribution: SCCOOS: SBC partners with Scripps Institution of Oceanography, the University of Southern California, and Cal Poly San Luis Obispo as part of the Southern California Coastal Ocean Observing System (SCCOOS). SCCOOS has provided data and instrumentation to the SBC-LTER

US Forest Service

Organization Type: Other Organizations (foreign or domestic)
Organization Location: Santa Barbara, CA

Partner's Contribution to the Project:
Collaborative Research

More Detail on Partner and Contribution:

US Geological Survey

Organization Type: Other Organizations (foreign or domestic)
Organization Location: Santa Cruz, CA

Partner's Contribution to the Project:
Collaborative Research

More Detail on Partner and Contribution: Conducts collaborative research on kelp forest communities and coastal sediment inputs and dynamics

University of Auckland

Organization Type: Academic Institution
Organization Location: Auckland, New Zealand

Partner's Contribution to the Project:
In-Kind Support
Facilities
Collaborative Research

More Detail on Partner and Contribution:

University of Barcelona

Organization Type: Academic Institution

Organization Location: Barcelona, Spain

Partner's Contribution to the Project:
Collaborative Research

More Detail on Partner and Contribution:

University of California Davis

Organization Type: Academic Institution
Organization Location: Bodega Bay, CA

Partner's Contribution to the Project:
Collaborative Research

More Detail on Partner and Contribution: Collaborate on effects of kelp forests on flow and water column subsidies

University of California Los Angeles

Organization Type: Academic Institution
Organization Location: Los Angeles, CA

Partner's Contribution to the Project:
Collaborative Research

More Detail on Partner and Contribution: Collaborate on modeling studies of nearshore plume and particle dispersal

University of California San Diego

Organization Type: Academic Institution
Organization Location: La Jolla, CA

Partner's Contribution to the Project:
Collaborative Research

More Detail on Partner and Contribution: Collaborate on oceanographic data collection and analyses

University of California Santa Cruz

Organization Type: Academic Institution
Organization Location: Santa Cruz, CA

Partner's Contribution to the Project:
Collaborative Research

More Detail on Partner and Contribution: Collaborate on kelp forest metapopulation research

University of Coimbra

Organization Type: Academic Institution
Organization Location: Coimbra, Portugal

Partner's Contribution to the Project:
Collaborative Research

More Detail on Partner and Contribution:

University of Connecticut

Organization Type: Academic Institution
Organization Location: Groton, CT

Partner's Contribution to the Project:
Collaborative Research

More Detail on Partner and Contribution: collaborates on coastal physical oceanography including observational process studies of wind-, wave-, and tidally-driven circulation, heating and cooling of the shallow continental shelf, and coastal-trapped waves.

University of Girona

Organization Type: Academic Institution
Organization Location: Girona, Spain

Partner's Contribution to the Project:
Collaborative Research

More Detail on Partner and Contribution:

University of New Mexico

Organization Type: Academic Institution
Organization Location: Albuquerque, NM

Partner's Contribution to the Project:
Collaborative Research

More Detail on Partner and Contribution:

University of South Carolina

Organization Type: Academic Institution
Organization Location: Columbia, SC

Partner's Contribution to the Project:

Collaborative Research

More Detail on Partner and Contribution: Collaborate to maintain a sediment trap time-series in the Santa Barbara Basin designed to provide data on the composition and flux of particles sinking to the seafloor

University of Wisconsin

Organization Type: Academic Institution
Organization Location: Milwaukee, WI

Partner's Contribution to the Project:
Collaborative Research

More Detail on Partner and Contribution: collaborates on population genetics and metapopulation analyses of kelp forests

What other collaborators or contacts have been involved?

Nothing to report

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Impacts

What is the impact on the development of the principal discipline(s) of the project?

Results from SBC research are helping to address the growing need for understanding ecosystem level processes in coastal systems. Of particular significance are our unique time series data and findings pertaining to: (1) controls and fate of primary production, (2) the movement and utilization of different sources and forms of nutrients, (3) environmental drivers of nearshore food webs, and (4) exchange of organic and inorganic materials among ecosystems.

SBC's development of an ongoing time series of canopy biomass for giant kelp in California and Mexico from Landsat satellite imagery has provided an unprecedented opportunity to test ecological theory pertaining to patterns and drivers of population dynamics at unprecedented temporal resolution and spatial and temporal scales. The time series has generated considerable interest from the science community and contributed substantively to several collaborations this past year. Investigators Byrnes and Cavanaugh (both former post docs) partnered with Zooinverse to develop a web-based citizen science project (Floating Forests) that uses the efforts of volunteers to analyze Landsat imagery of giant kelp from across the world. Byrnes spearheaded the formation of Kelp Ecosystem Ecology Network (KEEN) to assess the impacts of environmental change on kelp forests globally. This recently formed network includes

members from > 20 bioregions and six continents who use standardized sampling methods and experimental protocols (based on those developed by SBC LTER) to create an unified open access dataset for assessing past and predicting future changes in kelp forests worldwide.

With funding from NASA, BOEM and NOAA SBC investigators, Miller, Carlson, Iglesias-Rodriquez, Rassweiler, Reed and Siegel, are developing a prototype marine Biodiversity Observation Network (BON) in the Santa Barbara Channel that is intimately linked with SBC LTER. Tracking biodiversity in marine habitats will improve capacity for science-based decision-making intended to protect natural ecosystems and sustain the services that they provide amid increasing threats of coastal development, invasive species and climate change. The concentration and wide array of biodiversity measurements already taking place in the Santa Barbara Channel, particularly by SBC LTER and Channel Islands National Park, make this area an ideal testing ground for this pioneering effort. Additionally, this new project builds strongly on SBC's Information management framework to manage the large amount of biodiversity data generated.

Ongoing analysis of the large volume of data collected during the SBC LTER UNOLS cruises is providing new insights into the fate and transport of phytoplankton. This will positively impact the principal discipline of biological oceanography. In particular, modeling efforts to understand the evolution of phytoplankton blooms, including harmful algal blooms, in the coastal ocean will improve as they incorporate effects of frontal process that lead to subduction of phytoplankton biomass.

SBC partnership with other research programs to maintain spatially extensive array of moored sensors is providing spatially comprehensive high frequency data on ocean properties including currents, temperature and pH. This year with help of supplemental funding we are adding measurements of oxygen, chlorophyll fluorescence, total alkalinity and total pCO_2.

Additional efforts and cross site collaborations that have broadened the reach of SBC research include:

- SBC is collaborating with CCE and scientists from the University of South Carolina to maintain a 20+ year sediment trap time series in the Santa Barbara Basin. Data from this novel time series are being used to address a variety of research topics including the transport and fate of harmful algal blooms, and the development of proxies that can be used to reconstruct changes in climate over the geologic past.
- Investigator Cooper is a member of an LTER working group conducting a meta-analysis of nutrient enrichment effects on stream ecosystems and, he serves on the STREON technical advisory committee, advises NEON personnel on stream ecology issues, and organizes workshops for the NSF Stream Resiliency Research Coordination Network, collectively dealing with the effects of nutrient loading, biodiversity loss, and extreme events on stream ecosystems.
- Investigator Cooper is also the co-organizer and co-editor for an upcoming special issue of Freshwater Science on "The Effects of Fire on Freshwater Ecosystems" (anticipated date of publication: Sept., 2015).

- Investigator Guerrini organized and led a cross site session on the use of history in the LTER network for ESA that included contributions from SBC, AND, CWT, BES, HFR, and MCM LTERs and then led a working group on history at the ASM.
- Investigator Dugan is a member of an LTER working group developing a new synthesis of the ecological responses of soft sediment ecosystems to armoring and coastal squeeze.
- SBC investigators co-authored several chapters on different ecosystems including Kelp Forests (Reed), Rocky Intertidal (Blanchette), Sandy Beaches (Dugan), Rivers (Cooper) and Lakes (Melack) in a new Ecosystems of California book edited by H. Mooney and E. Zavaleta that will be published by the University of California Press in 2015.

What is the impact on other disciplines?

The research mission of SBC LTER is very interdisciplinary in scope. As such, our research contributes to a wide range of disciplines including: terrestrial, aquatic and marine ecology, physical, biological and chemical oceanography, hydrology, geology, geography, environmental history, science education and informatics. Investigator Guerrini is working with other LTER sites to analyze and explore the history of LTER programs. The theme of history record-keeping and analysis is likely to become a more important feature of LTER programs as the first generation of LTER researchers move on. Guerrini and colleagues presented a session on the role of history in LTER science during the 2015 ESA centennial meeting in Baltimore, Maryland and led a working group on that topic at the 2015 ASM. The MSP Pathways to Environmental Literacy project continued to connect the research and education strengths of LTER sites with teacher professional development in science and mathematics. This program, which involves four LTER sites and their associated institutions and the LTER Network office, engaged teachers in learning progression research analysis and dissemination through workshops and curriculum development in 2014-15.

What is the impact on the development of human resources?

Our project provides significant opportunities for scientific training in research at multiple levels. During the past year 84 undergraduate students, 32 graduate students, 6 post doctoral fellows and 7 middle and high school students were trained through substantial involvement in SBC research. Additionally, SBC faculty investigators actively incorporate the activities and findings of SBC LTER research into their teaching and curriculum development, thereby extending the project's contributions to the broader student body. The active involvement of large numbers of undergraduate students in SBC research (typically >80 each year) not only provides valuable undergraduate training, but also affords SBC's graduate students and post docs with significant opportunities for mentorship training. The experience gained from such training has proven to be very important to SBC graduate students and postdoctoral fellows who routinely go on to academic positions where the training legacy from SBC LTER continues. During this reporting period former graduate student and current Associate Investigator Andrew Rassweiler and former graduate student Sarah Lester both accepted assistant professor positions at Florida State University starting in 2016.

Additional impacts on the development of human resources are achieved through SBC's extensive outreach programs (see Accomplishments), which primarily target K-12 students and

teachers. These outreach programs, particularly the REEF, provide large numbers of undergraduate student interns with a solid foundation in marine ecology and training in communicating their knowledge in an educational format. The REEF utilizes SBC graduate students, research staff, and post-docs to train REEF interns, which, in turn, enhances their training as laboratory and field assistants for SBC research. Several SBC investigators mentor middle and high school students in developing and executing science projects and conducting research each year. In 2014-15, mentoring included 2 middle school students and 4 high school students. One of the middle school students mentored by Investigator Washburn received first place fro their project in the La Colina Middle School science fair.

The success of SBC's outreach programs has led us to explore new methods for reaching larger audiences. To this end Investigator Blanchette is leading SBC's efforts on an LTER children's book that highlights the links between giant kelp forests and sandy beaches. The proposal for the book was approved by the editorial committee of the LTER Schoolyard Book Series and a revised draft is in progress. In addition, the SBC LTER Kelp Forest Field Guide has been developed into a free iPhone application available on iTunes. This interactive field guide provides information on >150 marine algae, plants, fish and invertebrates that inhabit the unique ecosystem of California nearshore kelp forests. An iPhone application is being prepared for sandy beach ecosystems with collaborative funding.

What is the impact on physical resources that form infrastructure?

NSF funds awarded to SBC are being used to maintain a custom 22' research vessel that was specifically designed for diving and oceanographic research and an autonomous ocean glider that is customized for coastal research. Both items were purchased with NSF funds awarded to SBC. Research groups collaborating with SBC have access to the vessel and glider for their research needs. SBC partners with other research programs (e.g. Southern California Ocean Observing System (SCOOS), Partnership for Interdisciplinary Study of Coastal Oceans (PISCO)) to maintain an extensive array of moored sensors that is providing spatially comprehensive high frequency data on ocean properties including currents, temperature salinity, chlorophyll, oxygen and pH.

What is the impact on institutional resources that form infrastructure?

Nothing to report.

What is the impact on information resources that form infrastructure?

SBC's publicly available data holdings increased by about 15% during the past year. Several new time series were added: pH from Durafet-based instruments plus manually collected benchmark samples for research on ocean acidification; isotope data from producers and consumers in multiple for food web studies; abundance of lobsters on the reef; and abundance of beach wrack consumers. Additionally, our rainfall sites were increased two-fold to accommodate fine-scale modeling in watersheds. An increasing number of new datasets represent data from students or postdoctoral scholars, and are often designed to meet journals' increasingly frequent requirement to post data along with research papers. All metadata are available in the XML

specification Ecological Metadata Language (EML), with data and metadata uploaded regularly to the LTER Network Information System catalog. SBC's own data catalog is based on this same corpus and organized into sampling collections, which are accessible from the website's research descriptions and sampling sites map. Our local infrastructure provides nightly back up for archival and work-in-progress.

We continue to upgrade all SBC protocols for handling data, sampling methods and protocols, and bibliographic material. SBC's data handling protocols are now more strictly defined and formalized, and are shared with the Santa Barbara Channel Marine Biodiversity Observation Network) led by SBC Investigators Miller, Carlson, Rassweiler, Reed and Siegel. Web display of dataset metadata was enhanced to include DOIs in data citations. Metadata handling protocols and DOI retrieval mechanisms were developed collaboratively with MCR and VCR LTER, and using web services maintained by LTER Network Office (also responsible for DOI maintenance). In 2014, bibliographic citations (also in EML) were imported to Metabase (the relational database ported from GCE LTER, adopted in 2012) to streamline record keeping and uploads to report.gov using BibTex.

SBC's information manager (O'Brien) continues to lead two LTER working groups: 1) to define a system of structural quality standards for data packages, and 2) to formalize data package design patterns for approximately 20 dataset categories. Her expertise in the design and use of the EML schema continues to be a resource for many other LTER sites. O'Brien also is co-Investigator on an NSF EAGER grant (with C. Gries, NTL and P. Tarrant, CAP) to examine and describe network-scale data management systems and potential collaborations between LTER and other environmental data collection efforts. She also continues to work two other NSF funded projects, DataONE (DataNet, ACI) and GeoLink (EarthCube, GEO), specifically in the areas of semantics and data discovery, which highlights the usability of SBC data, and increases the visibility of all LTER data in federated systems.

What is the impact on technology transfer?

Nothing to report.

What is the impact on society beyond science and technology?

SBC investigators actively apply their knowledge of coastal ecosystems to inform, develop and implement changes in local and regional policies. Investigators serve as advisors and committee and board members for a number of local and national groups concerned with conservation and management of natural resources.

Investigators Reed and Page work with the staff of the California Coastal Commission (CCC) on a large multi-dimensional program designed to mitigate for the loss of coastal marine resources caused by the operation of the San Onofre Nuclear Generating Station (SONGS), a coastal power plant located in north San Diego County. The major emphasis in this program is compensation for lost marine resources via wetland and kelp forest restoration. Reed and Page's primary responsibilities are to consult with the CCC and their staff, the employees of the power plant (Southern California Edison), and other resource agencies on ecological issues relating to the

design of the mitigation projects and to develop and implement monitoring programs capable of determining whether the biological and physical performance of these projects meet pre-determined standards. Much of the science done on these mitigation projects is very complementary to that done by SBC and there is considerable exchange of information and ideas between the two projects.

SBC investigators and students are contributing time and expertise to the ongoing NRDA (National Response Damage Assessment) investigation of the impacts of the May 2015 Refugio Oil Spill on the coastal ecosystems of the Santa Barbara Channel. Investigator Passow testified at the hearing on the oil spill organized by state legislators in Santa Barbara in June 2015. SBC time series data are providing much needed information on a number of coastal ecosystems affected by the oil spill.

SBC investigators and students are collaborating with the Bureau of Ocean Energy Management, National Marine Fisheries Service and the Channel Islands National Marine Sanctuary to assess factors affecting the spread and ecological consequences of two recent and rapidly spreading invasive species in southern California (the brown seaweed *Sargassum horneri* and the colonial bryozoan *Watersipora subtorquata*).

SBC researchers are also engaged in informing policy for local watershed issues. We have developed mutually beneficial, cooperative associations with local and national government agencies and departments, and NGOs. Our intensive sampling of nutrients and particulates during the entire hydrograph for most storms complements the agency data collection, and we cooperatively share data and interpretations. In 2014-15 we performed high quality nutrient chemistry analyses on water samples from local streams and rivers for Santa Barbara Channelkeeper. Investigator Melack chairs UCSB's committee on wetlands that is overseeing restoration of campus wetlands that is being used as mitigation for staff and student housing projects. Investigator Cooper regularly provides advice about stream environmental issues and the monitoring and management of southern California steelhead populations to personnel from the California Department of Fish and Wildlife (DFW), National Marine Fisheries Service (NMFS), U.S. Forest Service (USFS), the cities of Santa Barbara and Goleta, and the Environmental Defense Center and the Audubon Society's Conservation Committee.

Investigators Melack, Page, Dugan and Reed are co-investigators of an ongoing study of climate change vulnerability entitled ''Santa Barbara Area Coastal Ecosystem Vulnerability Assessment'. The study is funded by NOAA actively engages the cities of Santa Barbara, Goleta and Carpinteria in assessing and evaluating the responses of Santa Barbara County's wetlands, beaches and coastal watersheds to climatic forcing. This study relies largely on SBC core datasets and is fostering collaboration with climate scientists from Scripps Institution of Oceanography and coastal processes scientists from USGS. This study is actively engaging the cities of Santa Barbara, Goleta and Carpinteria in assessment and evaluation of the responses of local coastal ecosystems, including, wetlands, beaches and coastal watersheds to climatic forcing.

SBC research has led to a growing recognition of the unique biodiversity, functions and wildlife supported by beaches and the role of kelp and other macroalgal wrack as an ecological resource

by local and state agencies. SBC results are contributing to the development of new policies for beach conservation and management. Investigator Dugan plays an active advisory role with coastal consortiums, state agencies and groups concerned with improving the conservation and management of beach ecosystems, including the California Coastal Commission, California Dept, of Fish and Wildlife, and the Ocean Science Trust. In November 2014 Dugan led a webinar on Sandy Beach Ecosystems and Oil Spills for the NOAA oil spill response team and in August 2015 she gave an invited presentation and served as a panelist at a National Research Council workshop on monitoring restoration projects for the Deep Water Horizon Oil Spill in the Gulf of Mexico.

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Changes/Problems

Changes in approach and reason for change

Nothing to report.

Actual or Anticipated problems or delays and actions or plans to resolve them

Nothing to report.

Changes that have a significant impact on expenditures

Nothing to report.

Significant changes in use or care of human subjects

Nothing to report.

Significant changes in use or care of vertebrate animals

Nothing to report.

Significant changes in use or care of biohazards

Nothing to report.

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