

SBC IV Annual Report- Year 5 (2022-2023)

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LTER: Environmental drivers and ecological consequences of kelp forest dynamics (SBV IV)

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Robert J Miller

Accomplishments

* What are the major goals of the project?

The Santa Barbara Coastal LTER (SBC LTER) is an interdisciplinary research and education program established in April 2000 with the goal of developing a predictive understanding of how environmental drivers interact with terrestrial and oceanic processes to alter material flows and influence the ecology of coastal ecosystems. SBC LTER's principal study domain is the semi-arid coast and nearshore waters of the Santa Barbara Channel in southern California, and its diverse and productive marine forests of giant kelp (*Macrocystis pyrifera*) serve as the focal

study ecosystem. Analyses of our long-term data have identified many of the environmental drivers and ecological processes underlying the production and community dynamics of kelp forests. Still to be determined are the ecosystem consequences of wave disturbance and fishing that alter the area and architecture of giant kelp forests, the processes that sustain kelp growth during warm, low nitrate conditions, the ecological and evolutionary consequences of kelp-induced changes in pH and dissolved oxygen, and the degree to which climate variability influences forest persistence and trophic subsidies to and from kelp forests. These and other unknowns form the basis of the overarching question that motivates our proposed research: “How do natural and human drivers influence giant kelp dynamics and alter the long-term structure and function of kelp forest ecosystems?”. The research proposed to address this question is integrated in a conceptual framework that focuses on the causes and ecological consequences of the dynamics of a relatively short-lived foundation species in a setting of long-term climate change and human use, and is organized in three inter-related themes:

Theme 1 - Environmental drivers of kelp persistence and community structure

Theme 2 - Dynamic biophysical coupling in kelp forest ecosystems

Theme 3 - Spatial dynamics and connectivity of kelp forests and adjacent ecosystems.

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

Major Activities:

Theme 1. Environmental drivers of kelp persistence and community structure

Theme 1a. Community and ecosystem consequences of climate variability, disturbance and pathways of recovery

In 2021 we initiated a finer-scale long-term experiment to quantify the role of competition for space as a key process governing community structure and recovery in kelp forests. The experiment is designed to measure the effects of giant kelp in mediating competition between sessile invertebrates and understory macroalgae at 10 kelp forest sites using paired circular plots (8 m radius) of two treatments: kelp removal and control. Smaller paired plots (~0.5 m²) with and without understory algae removed have been nested within the larger kelp control and kelp removal plots to isolate the effects of giant kelp on competition between understory macroalgae and sessile invertebrates. This year we have continued that experiment, which involves quarterly maintenance of the kelp and macroalgal removal treatments, and measurements of recruitment rates of sessile and mobile species.

Theme 1b. Ecological consequences of fishing

In 2012 we initiated a new time series on lobster abundance, size and fishing effort in response to the designation of the MPAs. We have continued this dataset as well as used

landings data obtained from the CA Dept of Fish and Wildlife (CDFW) to show that the MPAs have resulted in an increase in spiny lobster within the MPAs which has benefited the commercial lobster fishery outside of the MPAs through spillover, an often asserted but seldom documented phenomenon. We are also analyzing the diet and isotope values of fished and unfished species of fishes to examine potential indirect effects of fishing on kelp forest food webs.

Theme 1c. Sources and utilization of recycled nitrogen

To evaluate the variability in the supply of nitrate and recycled nitrogen species to giant kelp, we mined our monthly time-series of dried kelp samples going back to 2001 to analyze nitrogen stable isotope values of kelp. This analysis is ongoing.

Theme 2. Dynamic biophysical coupling in kelp forest ecosystems

Theme 2a. Effects of kelp on physical and chemical fluxes

To address this aim, we augmented our long-term kelp forest sites at Mohawk (MK) and Arroyo Quemado (AQ) with additional physical and chemical sensors to quantify the residence time and carbonate chemistry of water within the kelp forest. MK and AQ are well suited for this purpose because many SBC core measurements are made at these sites. Moreover, the difference in size between these two kelp forests (AQ is ~5 times larger than MK) coupled with high seasonal and inter-annual variability in kelp abundance allows us to examine how residence time varies with kelp forest architecture and alongshore current speed. This year we will be scaling back this campaign and analyzing the data.

Theme 2b. Effects of kelp on the processing and fate of dissolved organic matter

Quantifying remineralization rates of kelp-derived DOM and its accumulation along a spatial gradient from within the kelp forest to the waters outside of it will provide an estimate of kelp DOM available to kelp forest food webs via the microbial loop vs DOM exported from the kelp ecosystem. Microbial remineralization experiments are being conducted seasonally on DOM released directly from kelp, and on DOM that accumulates in the surface waters (within the kelp forest and up to 1000 m offshore) to determine degradation rates and bioavailability. We have begun using a new high-throughput system for measuring microbial respiration that has made these experiments much more tractable.

Theme 2c. Ecological and evolutionary consequences of kelp-induced changes in seawater chemistry

The massive and dense biomass of giant kelp forests has the potential to significantly alter water chemistry via photosynthesis and respiration. We are investigating the potential for giant kelp to influence the eco-evolutionary dynamics of kelp forest metazoans by examining the consequences of kelp forests as modifiers of seawater

properties including DO, pCO₂, and pH in a warmer future, using calcifying sea urchins as model species. This year we began a new incubation experiment of purple sea urchins inside and outside the kelp forest at AQ to evaluate the role of paternal effects in adaptation of larvae to temperature, pH, and dissolved oxygen levels. This experiment is being led by Leeza-Marie Rodriguez, a PhD student in the Hofmann lab.

Theme 3. Spatial dynamics and connectivity of kelp forests and adjacent ecosystems

Theme 3a. Demographic connectivity and metapopulation dynamics of giant kelp

To characterize canopy dynamics on sub-meter scales, identify small-scale extinction events and relate local patterns of recolonization to connectivity and environmental factors, we initiated high-resolution monitoring of select kelp forests along the Santa Barbara coastline using small unoccupied aerial systems (sUAS; quadcopter drones). Starting in February 2021, we began monthly timeseries of 10-band multispectral imagersUAS flights at the Mohawk and Arroyo Quemado kelp forests to examine the dynamics of canopy biomass and physiological condition and relate these changes to demographic and environmental processes. Last year and this year, we collaborated with a group from the NASA Jet Propulsion Laboratory to include these sites in several high-altitude flights by the Surface Biology and Geology High-Frequency Time Series (SHIFT) campaign, using the AVIRIS-NG (Airborne Visible/Infrared Imaging Spectrometer-Next Generation) instrument. In addition, we collected biweekly samples of kelp at Arroyo Quemada for pigment and nitrogen content during the campaign. These data will be compared with AVIRIS and our sUAS data to groundtruth future remote sensing products focused on giant kelp physiological condition.

Theme 3b. Trophic connectivity between kelp forests and beaches

To evaluate connectivity and synchrony between beaches and kelp forests, we are collecting detailed data on the abundance of kelp wrack at our five study beaches, quantifying smaller blades and fronds as well as whole plants. We are also developing methods to use sUAS imagery to get a more spatially comprehensive and rapid estimate of wrack abundance that could be collected in tandem with the kelp forest imagery in Theme 2a used to assess the level of synchrony between kelp standing biomass and kelp wrack abundance and flux, and subsequent connectivity between subtidal kelp forests and intertidal beaches. Kyle Emery, a former SBC LTER Ph.D. student and now an NSF Bio-OCE Postdoctoral Fellow based at UCLA, is leading this effort. Birds and wrack consumers are also surveyed at our sites.

Theme 3c. Trophic connectivity between the coastal ocean and kelp forests

In spring 2021 we began a focused research campaign to better understand the linkage between phytoplankton and reef suspension feeders, that ended in Spring 2023. Over 2-week periods each season, we collected concurrent field measurements at MK and AQ, along with measurements offshore, using SBC's Teledyne Webb G2 glider to quantify cross-shelf fluxes and onshore delivery of phytoplankton to kelp forests and reef

suspension feeders that will be contextualized at larger spatial scales through analysis of available satellite data. On the reefs, investigated the response of suspension-feeding invertebrates to the supply and taxonomic composition of phytoplankton. Three days per week during each two-week period each season, water samples for chlorophyll, POC, and phytoplankton community composition were collected in the kelp forest, augmented by near-continuous chlorophyll measurements by moored in situ fluorometers. Suspension feeders were also sampled for gut contents to evaluate feeding selectivity as compared with available phytoplankton assemblages. To supplement microscope counts of phytoplankton, we are now analyzing water and gut content samples using DNA metabarcoding techniques.

Specific Objectives:

Theme 1a. Community and ecosystem consequences of climate variability, disturbance and pathways of recovery

Changes in temperature can fundamentally transform how species interact, causing wholesale shifts in ecosystem dynamics and stability. For predator-prey interactions, theory predicts that increases in temperature drive increases in metabolism and that animals respond to this increased energy expenditure by ramping up their food consumption to meet their metabolic demand. We tested the hypothesis that increases in temperature cause more rapid increases in metabolism than increases in consumption using the California spiny lobster (*Panulirus interruptus*) as a model system (Csik et al. 2023). We showed positive effects of temperature on metabolism and predation, but in contrast to our hypothesis, rising temperature caused lobster consumption rates to increase at a faster rate than increases in metabolic demand, suggesting that for the mid-range of temperatures, lobsters are capable of ramping up consumption rates to increase their caloric demand. However, at the extreme ends of the simulated temperatures, lobster biology broke down. At the coldest temperature, lobsters had almost no metabolic activity and at the highest temperature, 33% of lobsters died. Our results suggest that temperature plays a key role in driving the geographic range of spiny lobsters and that spatial and temporal shifts in temperature can play a critical role in driving the strength of species interactions for a key predator in temperate reef ecosystems.

Theme 1b. Ecological consequences of fishing

We are using data from other research and monitoring programs in the region as well as our own data to address questions about effects of fishing in kelp forest ecosystems and the interactions between fishers and marine protected areas (MPAs). Although model simulations show that a network of marine reserves can enhance yield in depleted fisheries by protecting populations, the ability of marine reserves to enhance sustainable fisheries is much less evident. We found empirical evidence of a marine reserve network improving yield for the sustainable spiny lobster fishery, apparently through the spillover of adult lobsters and behavioral adaptation by the fishing fleet (Lenihan et al. In Press). Our results highlight the value of collaborative research and education programs

involving diverse stakeholders for preparing fisheries to operate productively within a seascape that includes a large marine reserve network.

Theme 1c. Sources and utilization of recycled nitrogen

To integrate past work on sources and sinks of recycled N in coastal kelp forests, an SBC LTER working group is formulating a comprehensive N budget for the coastal ecosystem. Led by SBC investigators Alyson Santoro and Nick Nidzieko, this analysis will include a full 20-year comparison of along- and cross-shelf motions relevant to transport to and from the kelp forest.

Theme 2a. Effects of kelp on physical and chemical fluxes

We are working to develop residence time estimates that are a function of stratification, kelp forest area, and kelp density. In prior research we estimated water residence time in the kelp forest at Mohawk Reef to be ~1 hour based on mean velocities and forest area, but more recent estimates derived from observed changes in dissolved oxygen were several times longer. Our ongoing research on this topic strives to quantify spatial and temporal scales of variation in seawater properties (i.e., temperature, salinity, and dissolved oxygen) inside, outside and offshore of the kelp forest as it varies naturally through time in its footprint area and kelp density. We have completed 3 years of data collection at two sites, with which we are able to resolve both spatial and temporal variations in residence time. On-going work involves normalizing these changes to variable strength in stratification that affects the internal wave speed at which these temperature variations propagate.

Theme 2b. Effects of kelp on the processing and fate of dissolved organic matter

The microbial community living on kelp itself may use kelp DOM and influence kelp physiology and condition. In marine microbial communities, assembly order can shape the rate of organic matter processing, especially when pioneer taxa “unlock” substrates for subsequent arrivals. To address such phenomena SBC graduate students Sevan Esaian and An Bui are investigating community assembly of the kelp microbiome through time and over depth. Their results suggest that deeper blade communities do assemble over time, while surface blades tend to track ambient conditions. In-progress analysis is identifying taxa that drive these shifts in community composition.

Theme 2c. Ecological and evolutionary consequences of kelp-induced changes in seawater chemistry

Marine heatwave (MHW) events are emerging as dominant and disruptive extreme disturbance events on the Pacific coast. Effects on key kelp forest species, especially at vulnerable early life stages, are poorly understood. We assessed the effect of high temperature stress that resembled local MHW conditions on the influence of MHW-like temperatures on the early development of the California purple sea urchin, *Strongylocentrotus purpuratus*, in the context of paternal thermal history (Leach

and Hofmann 2023). Exposure to elevated temperatures during early development resulted in larger, more thermally tolerant larvae, with further influences of paternal identity and thermal history, respectively. As the highest recorded temperatures within past MHW events have occurred during the gametogenesis of many kelp forest benthic marine invertebrate species, such as the purple sea urchin, such parental mediated impacts may represent important drivers of future recruitment and population composition for these species.

Theme 3a. Demographic connectivity and metapopulation dynamics of giant kelp

Spatial synchrony, the tendency for populations across space to show correlated fluctuations, is a fundamental feature of population dynamics. A common mechanism of spatial synchrony is the Moran effect, whereby spatially synchronized environmental signals drive population dynamics and hence induce population synchrony. We reviewed recent progress in understanding Moran effects, and elaborate a general theory of how Moran effects of different environmental drivers acting on the same populations can interact (Reuman et al. 2023). We applied our theory to California populations of giant kelp as measured using SBC's Landsat dataset. Our theory and analysis explain an important new aspect of a fundamental feature of spatiotemporal population dynamics.

Theme 3b. Trophic connectivity between kelp forests and beaches

We recently demonstrated a cross-ecosystem cascade of synchrony in which offshore kelp synchrony transferred to synchrony in kelp wrack on beaches and was mediated by fluctuations in kelp supply, waves, and beach width (Walter et al. In Revision). Subsequently, wrack depositions synchronized local abundances of shorebirds. The finding that synchrony due to subsidies propagates across trophic levels in recipient ecosystems is an important contribution our understanding of connectivity.

Theme 3c. Trophic connectivity between the coastal ocean and kelp forests

Quantifying phytoplankton composition is critical to predicting marine ecosystem structure and function. We integrated DNA meta-barcoding and HPLC pigment observations to determine eukaryotic phytoplankton composition in the Santa Barbara Channel, California. Covariation network analysis revealed that diverse assemblages of phytoplankton and other protists covary with distinct suites of biomarker pigments. We suggest a path to monitor eukaryotic plankton communities on unprecedented spatiotemporal scales based on the covariation of unique phytoplankton and protistan assemblages with remotely sensible phytoplankton pigment concentrations (Catlett et al. 2023).

Significant Results:

Theme 1a. Community and ecosystem consequences of climate variability, disturbance and pathways of recovery

Giant kelp and bull kelp forests are increasingly at risk from marine heatwave events and herbivore outbreaks. The dynamic floating canopy of these kelps is well-suited to study via satellite imagery, and SBC investigators have developed a high temporal and spatial resolution dataset on floating kelp canopy across the western United States and Mexico. To increase accessibility of this rich dataset, we created Kelpwatch, a web-based visualization and analysis tool (Bell et al. 2023). We demonstrated how Kelpwatch can be used to analyze long-term trends in kelp canopy across regions, and quantify spatial variability in the response to and recovery from the 2014 to 2016 marine heatwave events. We found that 18.6% of regional sites displayed a significant trend in kelp canopy area over the past 38 years and that there was a latitudinal response to heatwave events. Recovery from heatwave events was more variable across space, with some local areas like Bahía Tortugas in Baja California Sur showing high recovery while kelp canopies around the Monterey Peninsula continued a slow decline and patchy recovery compared to the rest of the Central California region. Kelpwatch provides near real time spatial data and analysis support and makes complex earth observation data actionable for scientists and managers, which can help identify areas for research, monitoring, and management efforts.

Theme 1b. Ecological consequences of fishing

Fishing can strongly impact the abundance and body size of top predators, causing indirect effects on ecosystems. Across taxa, interaction strength is strongly related to predator size, prey size and prey density, suggesting that general cross-taxonomic relationships could be used to predict how strongly individual species interact. We quantified the size and density dependence of the functional response of the heavily fished California spiny lobster *Panulirus interruptus*, foraging on a key ecosystem engineer, the purple sea urchin *Strongylocentrotus purpuratus*, in experimental mesocosms to ask how accurately do general size-scaling relationships predict variation in interaction strength between specific species that vary in size and density across space and time (DiFiore and Stier 2023). Our results revealed that predator and prey body size has the greatest effect on interaction strength when prey abundance is high. Due to consistently high urchin densities in the field, our simulations suggest that body size—relative to density—accounted for up to 87% of the spatio-temporal variation in interaction strength. Our work suggests that species-specific estimates for the scaling of interaction strength with body size, rather than general size-scaling relationships, are necessary to quantitatively predict how reductions in body size will alter interaction strength.

Theme 2c. Ecological and evolutionary consequences of kelp-induced changes in seawater chemistry

Kelp forests of the California Current System have experienced prolonged marine heatwave (MHW) events that overlap in time with the phenology of life history events (e.g., gametogenesis and spawning) of many benthic marine invertebrates. To study the effect of thermal stress from MHWs during gametogenesis in the purple sea urchin (*Strongylocentrotus purpuratus*) and whether MHWs might induce transgenerational

plasticity (TGP) in thermal tolerance of progeny, adult urchins were acclimated to two conditions in the laboratory – a MHW temperature of 18°C and a non-MHW temperature of 13°C. Following a four-month long acclimation period (October–January), adults were spawned and offspring from each parental condition were reared at MHW (18°C) and non-MHW temperatures (13°C), creating a total of four embryo treatment groups. To assess transgenerational effects for each of the four groups, we measured thermal tolerance of hatched blastula embryos in acute thermal tolerance trials. Embryos from MHW-acclimated females were more thermally tolerant with higher LT50 values as compared to progeny from non-MHW-acclimated females. MHW-acclimated females had eggs with higher protein concentrations, while egg size and lipid content showed no differences. Our results indicate that TGP plays a role in altering the performance of progeny as a function of the thermal history of the female, especially when thermal stress coincides with gametogenesis (Chamorro et al. 2023). In addition, the data on egg provisioning show that maternal experience can influence embryo traits via egg protein content. Although this was a laboratory-based study, the results suggest that TGP may play a role in the resistance and tolerance of *S. purpuratus* early stages in the natural kelp forest setting and we are following up with more field-based research.

Theme 3a. Demographic connectivity and metapopulation dynamics of giant kelp

Macrocystis pyrifera (giant kelp), is a brown macroalga of great ecological importance as a primary producer and structure-forming foundational species that is a major focus of SBC research. One of the limitations to exploring population- and regional-level patterns of selection and adaptation in giant kelp and assisting in giant kelp conservation efforts is a lack of genomic tools like a high quality, contiguous reference genome with accurate gene annotations. To rectify this, we assembled the giant kelp genome of a haploid female gametophyte de novo (Diesel et al. 2023), and found the genome to be 537 MB. Annotation of the giant kelp genome revealed 25,919 genes. This work resulted in a high-quality giant kelp genome that greatly increases the genetic knowledge of this ecologically and economically vital species.

Theme 3b. Trophic connectivity between kelp forests and beaches

Coastal dunes are globally recognized as natural features that can be important adaptation approaches for climate change along urban and natural shores. We evaluated recovery of coastal dunes on an intensively groomed urban beach in southern California over six years after grooming was discontinued (Johnston et al. 2023). After six years, large volumes of sand had accreted in the restoration site and a vegetated foredune formed while groomed control areas remained flat and uniform. Vegetation increased over time at the restoration site while no vegetation was observed on the groomed control site. Native plant species formed distinct zones across the restoration site beginning in year two and zone definition increased over time. Other ecological functions observed in the restoration site included presence of dune invertebrates, shorebird roosting, and use by a breeding federally threatened shorebird, the western snowy plover. Our findings illuminate opportunities and expectations for restoring dunes on urban shorelines.

Theme 3c. Trophic connectivity between the coastal ocean and kelp forests

Production of particulate organic carbon (POC) in nutrient-rich coastal waters over continental shelves, its export to depth, and its transport to deeper ocean waters is a poorly quantified component of the global carbon cycle. A critical step in quantifying this vertical transport is identifying shelf processes that export phytoplankton out of the euphotic zone. During SBC LTER cruises to describe phytoplankton dynamics, we discovered substantial chlorophyll *a* below the euphotic zone in the Santa Barbara Channel (Washburn et al. 2023). Observations from towed, undulating vehicles revealed deep chlorophyll layers near fronts where upwelled waters from central California converged with lower-density waters from the Southern California Bight. Phytoplankton export out of the euphotic zone by subduction was indicated by spatial coherence between chl *a* and sloping density surfaces and other evidence. Our results emphasize the importance of subduction in the export of phytoplankton and POC out of the euphotic zone in coastal upwelling systems.

Key outcomes or Other achievements:

LTER Network cross site projects

SBC Associate Investigators Thomas Lamy (French National Research Institute), and Max Castorani (UVA) participated in a cross-site working group to synthesize the general relationships between metacommunity parameters and stability across a diverse range of ecosystems. Several products resulted, as reported in previous years. This year, the group published a synthesis on the variability of Diversity Stability Relationships (DSRs) (Wisnoski et al. 2023). Temporal variability in aggregate properties, like total biomass or abundance, is typically lower in communities with higher species diversity. At broader spatial extents, regional-scale aggregate variability is also lower with higher regional diversity (in plant systems) and with lower spatial synchrony. However, focusing exclusively on aggregate properties of communities may overlook potentially destabilizing compositional shifts. It is not yet clear how diversity is related to different components of variability across spatial scales, nor whether regional DSRs emerge across a broad range of organisms and ecosystem types. To test these questions, the group compiled a large collection of long-term metacommunity data spanning a wide range of taxonomic groups (e.g., birds, fish, plants, invertebrates) and ecosystem types (e.g., deserts, forests, oceans), and applied a newly developed quantitative framework for jointly analyzing aggregate and compositional variability across scales. At the local scale, more diverse communities were less variable, but this effect was stronger for aggregate than compositional properties. No stabilizing effect of γ -diversity on metacommunity variability was found, but β -diversity played a strong role in reducing compositional spatial synchrony, which reduced regional variability. Spatial synchrony differed among taxa, suggesting differences in stabilization by spatial processes. However, metacommunity variability was more strongly driven by local variability than by spatial synchrony. Across a broader range of taxa, these results suggest that high γ -diversity does not consistently stabilize aggregate properties at regional scales without sufficient spatial β -diversity to reduce spatial synchrony.

Margaret O'Brien, SBC's former lead Information manager and current IM advisor, is a co-PI helping to lead the EMERGENT synthesis working group, which is advancing efforts to harmonize molecular information for microbial taxa, streamlining their use in syntheses with related ecosystem level data and spurring future microbial ecology research at LTER sites.

Non-LTER cross-site and broader scale research

There is a growing interest in sequestering carbon dioxide via cultivation and sinking of seaweed, particularly kelp, in the ocean. Robust quantification of the viability of this marine carbon dioxide removal (mCDR) strategy requires deployment and interrogation of computer simulations that resolve coupling between turbulent oceanic circulation, biogeochemical fluxes, and cultivated seaweed with regional granularity, as well as detailed information on the factors affecting kelp sinking and remineralization. Several SBC Investigators are involved in a DOE-funded project led by David Siegel to investigate this for giant kelp. Thus far, we have written two white papers. The first describes considerations that inform the design of a virtual mCDR experiment in the Southern California Bight (SCB) that targets globally meaningful scales of CDR (Dauhajre et al. 2023). The second introduces four different techniques to convey kelp to the seafloor, plans for how each technique will be implemented at smaller scales, and describes how each conveyance method will be modeled (Krause et al. 2023). This project is using SBC LTER data and is producing results that are ecologically relevant to the fate of kelp NPP and its role in pelagic and deep-water communities, topics that we plan to build on in the future.

*** 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 5 of SBC IV), 5 postdoctoral fellows, 35 graduate students, 6 REU students, and 102 undergraduate students participated in SBC research and outreach activities. REU students work closely with SBC researchers on a wide range of topics and many choose to pursue an advanced degree following their undergraduate education. A number of SBC investigators, postdocs, and graduate students also mentored REU students in the Global Change Biology program at UCSB. UCSB undergraduates have a high propensity to get involved in sponsored research and SBC programs contribute substantially to this trend. In addition to gaining research experience, many undergraduates earn academic credit or receive monetary compensation for participating in SBC research as interns and honors students. This year 26 students participated in SBC's undergraduate research training program. Students in the program actively assist in the collection, processing and analysis of core data. In the first term, students read primary literature to gain a foundation in core research areas, key findings, current research objectives and methods of the SBC LTER. Next, students gain hands on laboratory and field research experience. Post-graduation, many SBC student participants are accepted into graduate studies, begin careers in their field or obtain highly competitive internships.

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.

SBC graduate student and postdoctoral training are coordinated with several 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 respect and appreciation across disciplines. SBC graduate students and postdocs were first authors on nine journal articles and gave 11 papers at national conferences this year. This year three SBC graduate students completed their PhD degrees. Seminars hosted by SBC faculty, the SBC Midterm Review and SBC workshops on key research themes served to engage SBC graduate students in the culture and diverse research offered by SBC.

Opportunities for training in public education and student mentoring arise from SBC's partnership with UCSB's teaching aquarium, the REEF, which is also designed to provide UCSB undergraduates majoring in Aquatic Biology with training in communicating their marine ecology knowledge. The REEF features SBC LTER research and provides a wide range of training and professional development opportunities. A total of 61 undergraduate interns were trained in this rigorous and pedagogically sound program this year. The REEF also serves as a 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 University, California State University Channel Islands, and local community colleges. 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 marine ecology and research. 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. SBC graduate students, research staff, and post-docs also train REEF interns, which, in turn, enhances their training as laboratory and field assistants and research divers for SBC research.

*** Have the results been disseminated to communities of interest? If so, please provide details.**

We are committed to sharing our research results with resource managers, decision makers, stakeholders, and the general public who are interested in applying our findings to policy issues concerning natural resources, coastal management, and land use. To this end SBC researchers

actively use their expertise and data to inform these entities to the betterment of society. Below are some examples of the broader benefits of SBC research in the past year of SBC IV.

- SBC LTER data and studies are showing the effects of marine reserves on ecosystems and fishing. New work showing spillover bolsters the case for marine reserves as management tools and may help improve the design of future reserves and networks.
- SBC LTER expertise and data on patterns and drivers of kelp productivity is informing the possibility of kelp farming for biofuels and carbon sequestration off the coast of CA. DOE is funding several projects on this topic; one is using SBC LTER data to develop a model for kelp farm siting.
- SBC investigators and students are collaborating with the Bureau of Ocean Energy Management, to assess factors affecting the spread and ecological impact of the invasive bryozoan *Watersipora subatra*, which is rapidly increasing at SBC study sites.
- SBC LTER is providing data on water parameters (salinity and temperature) to the City of Santa Barbara to assist with monitoring effects of a new desalination plant.
- SBC LTER investigators are assisting with Natural Resource Damage Assessment (NRDA) studies for the 2021 Huntington Beach oil spill using monitoring techniques developed for SBC.
- SBC developed and published a new quarterly newsletter, The Newsmatocyst, to highlight project activities and people with the first issue published in Spring 2023. The newsletter is open for subscription on the SBC LTER website: <https://sbclter.msi.ucsb.edu/community/events/>
- SBC investigators serve as science advisers for public and non-governmental agencies tasked with managing coastal resources, including the NOAA Channel Islands National Marine Sanctuary.
- SBC investigators and students regularly contribute to news articles and press releases on their research

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

Theme 1. Environmental drivers of kelp persistence and community structure

Theme 1a. Community and ecosystem consequences of climate variability, disturbance and pathways of recovery

In 2021 we initiated a finer-scale long-term experiment to quantify the role of competition for space as a key process governing community structure and recovery in kelp forests. This year we began analyzing initial results, and plan to publish those in the coming year.

Theme 1b. Ecological consequences of fishing

In the next year we plan to complete isotope analyses of time-series samples from inside and outside marine protected areas to inform on the indirect effects of fishing on kelp forest food webs.

Theme 1c. Sources and utilization of recycled nitrogen

We have been analyzing N stable isotope values of kelp samples collected for our NPP time series, supplemented with new samples. We are using these data to infer sources and species of N to kelp populations and how they vary with environmental conditions. An SBC graduate student, Natalie Dornan (Santoro lab), is leading this research.

Theme 2. Dynamic biophysical coupling in kelp forest ecosystems

Theme 2a. Effects of kelp on physical and chemical fluxes

In the next year we will continue working to develop residence time estimates that are a function of stratification, kelp forest area, and kelp density.

Theme 2b. Effects of kelp on the processing and fate of dissolved organic matter

The microbial assemblages in close proximity to kelp and associated DOM production may alter the bacterial community to one capable of turning over DOC at a higher rate regardless of its source. Future work will include the monitoring of initial microbial assemblages using 16s rRNA gene metabarcoding to identify the initial and responding community along transects and in experiments.

Theme 2c. Ecological and evolutionary consequences of kelp-induced changes in seawater chemistry

To continue testing whether kelp-induced changes in the environment influence the provisioning of offspring by sea urchins via parental effects, we are continuing in situ experiments using caged and fed adult purple sea urchins within and outside of the kelp forests at MK and AQ from late summer to early winter when adults undergo gametogenesis. Cages are co-located with pH and DO sensors in order to capture differential abiotic exposures during gametogenesis.

Theme 3. Spatial dynamics and connectivity of kelp forests and adjacent ecosystems

Theme 3a. Demographic connectivity and metapopulation dynamics of giant kelp

Starting in February 2021, we began monthly timeseries of 10-band sUAS flights at the Mohawk and Arroyo Quemado kelp forests to examine the dynamics of canopy biomass and physiological condition and relate these changes to demographic and environmental processes. These surveys will be continued over the coming year and augmented as needed to validate the use of additional sensors, and we will be analyzing the data to develop a kelp demographic model based on remotely sensed canopy data.

Theme 3b. Trophic connectivity between kelp forests and beaches

To evaluate connectivity and synchrony between beaches and kelp forests, we will continue collecting detailed data on the abundance of kelp wrack at our five study beaches, quantifying

smaller blades and fronds as well as whole plants. We have collected two years of concurrent sUAS imagery and will use this data to develop a convolutional neural network model to classify kelp wrack in these and future images in order to obtain more spatially comprehensive estimates of wrack cover and biomass. We will evaluate short-term temporal fluctuations in wrack inputs using imagery collected five days in a row, monthly, for one year combined with a long-term dataset of kelp inputs to beaches in the study region to determine at what spatial scales connectivity between the kelp forest and the beach is maximized. This information can therefore inform the scales at which a disturbance to the kelp forest will impact the recipient beach ecosystem. Along with long term datasets, these new approaches will be used to assess the level of connectivity between kelp standing biomass and kelp wrack abundance and evaluate how this connectivity varies across different spatial and temporal scales as well as informing potential impacts to intertidal sandy beach ecosystems following kelp forest disturbance.

Theme 3c. Trophic connectivity between the coastal ocean and kelp forests

In the coming year, to supplement microscope counts of phytoplankton, we will analyze water and gut content samples using DNA metabarcoding techniques. This campaign will begin to define whether kelp forest food webs rely on specific groups of phytoplankton more than others and the physical drivers and transport processes that deliver these crucial trophic resources to the reef.

Products

Books

Book Chapters

- Dugan, JE, L Airoidi, MG Chapman, KE Emery, DM Hubbard, E Jaramillo, TA Schlacher (). Estuarine and Coastal Structures: Environmental Effects: a focus on shore and nearshore structures.. *Human-induced Problems (Uses and Abuses) in Estuaries and Coasts, Treatise on Estuarine and Coastal Science 2nd.* 8. M. Kennish and M. Elliot. Elsevier. . Status = AWAITING_PUBLICATION; Acknowledgement of Federal Support = Yes ; Peer Reviewed = Yes
- REINA J. VEENHOF1,, CURTIS CHAMPION, SYMON A. DWORJANYN, THOMAS WERNBERG, ANTOINE J.P. MINNE, CAYNE LAYTON, JOHN J. BOLTON, DANIEL C. REED, & MELINDA A. COLEMAN (2022). Kelp Gametophytes in Changing Oceans. *Oceanography and Marine Biology: An Annual Review, 2022* 60. S. J. Hawkins, A. J. Lemasson, A. L. Allcock, A. E. Bates, M. Byrne, A. J. Evans, L. B. Firth, C. H. Lucas, E. M. Marzinelli, P. J. Mumby, B. D. Russell, J. Sharples, I. P. Smith, S. E. Swearer, and P. A. Todd,. Taylor and Francis. 335. Status = PUBLISHED; Acknowledgement of Federal Support = Yes ; Peer Reviewed = Yes ; DOI: DOI: 10.1201/9781003288602-7.

Inventions

Journals or Juried Conference Papers

View all journal publications currently available in the [NSF Public Access Repository](#) for this award.

The results in the NSF Public Access Repository will include a comprehensive listing of all journal publications recorded to date that are associated with this award.

- Sheppard, Emily J. and Hurd, Catriona L. and Britton, Damon D. and Reed, Daniel C. and Bach, Lennart T.. (2023). Seaweed biogeochemistry: Global assessment of C:N and C:P ratios and implications for ocean afforestation. *Journal of Phycology*. 59 (5) . Status = Added in NSF-PAR [doi: https://doi.org/10.1111/jpy.13381](https://doi.org/10.1111/jpy.13381)

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- Castorani, M.C.N., S.L. Harrer, R.J. Miller, and D.C. Reed (2022). *Disturbance structures canopy and understory productivity along an environmental gradient: evidence from a 10-year experiment at Santa Barbara Coastal LTE*. LTER All Scientists Meeting. Pacific Grove, CA. Status = OTHER; Acknowledgement of Federal Support = Yes
- Castorani, M.C.N., S.L. Harrer, R.J. Miller, and D.C. Reed. (2021). *Disturbance structures canopy and understory productivity along an environmental gradient: evidence from a 10-year experiment at Santa Barbara Coastal LTER*. 106th Annual Meeting of the Ecological Society of America.. Virtual. Status = OTHER; Acknowledgement of Federal Support = Yes
- Johnston, K.K., J.E. Dugan, D.M. Hubbard, and K.A. Emery (2022). *Dunes as a Coastal Resilience Approach*. California Dune Science Network Annual Workshop. Santa Barbara, CA. Status = OTHER; Acknowledgement of Federal Support = Yes
- Bell, T., D. Burkepile, M. Castorani, R. Detmer, B. DiFiore, J. Gallagher, T. Lamy, H. Lenihan, K. Malakhoff, K. Michaud, R. Miller, H. Moeller, J. Peters, A. Rassweiler, D. Reed, M. Rennick, and A. Stier (2022). *Ecological and socioeconomic effects of climate extremes and fishing on the foundational role of giant kelp*. LTER All Scientists Meeting. Sep. 19–23, 2022. Pacific Grove, CA. Status = OTHER; Acknowledgement of Federal Support = Yes
- Hofmann GE (2018). *Ecological-evolutionary dynamics in long-term ecological research in marine ecosystem*. LTER All Scientists' Meeting. Pacific Grove, CA. Status = OTHER; Acknowledgement of Federal Support = Yes

- Kozal, LC and U Hoshijima and GE Hofmann (2018). *Environmental Variability and Transgenerational Plasticity in the Santa Barbara Channel 2018 (poster)*. LTER All Scientists' Meeting. Pacific Grove, CA. Status = OTHER; Acknowledgement of Federal Support = Yes
- Dugan, JE, S Hamilton, K. Neumann, M. Colwell, D. Hubbard, D. Robinette, K. Lindquist, K. Nielsen, J. Marin-Jarrin, J. Madden, M. Ladd (2020). *Evaluating performance of California's MPA network through the lens of sandy beach and surf zone ecosystems. Talk.*. Western Society of Naturalists Meeting. Virtual. Status = OTHER; Acknowledgement of Federal Support = No
- M Strader, L Kozal, TS Leach, JM Wong, JD Chamorro, MJ Housh, G Hofmann (2020). *Examining the role of DNA methylation in transcriptomic plasticity of early stage sea urchins*. AGU Ocean Sciences Meeting. Virtual. Status = OTHER; Acknowledgement of Federal Support = Yes
- Chamorro, J, L Kozal, G Hofmann (2020). *Exploring Plasticity-Associated Traits Across an Intertidal Gradient: Variation in Adult DNA Methylation and Maternal Effects in California Mussels (Mytilus californianus)*. AGU Ocean Sciences Meeting. Virtual. Status = OTHER; Acknowledgement of Federal Support = Yes
- Chamorro, J. and L.C. Kozal and G.E. Hofmann (2018). *Exploring mechanisms of TGP in California mussels (Mytilus californianus)*. LTER All Scientists' Meeting. Pacific Grove, CA. Status = OTHER; Acknowledgement of Federal Support = Yes
- McDonald, A, J Chamorro, G.E Hofmann (2023). *Exposure to marine heatwaves during Strongylocentrotus purpuratus gametogenesis impact life history traits and performance.*. Western Society for Naturalists Annual Meeting. Oxnard, CA. Status = OTHER; Acknowledgement of Federal Support = Yes
- Bogan, SN, ME Strader, GE Hofmann (2021). *Gene regulatory roles of DNA methylation during transgenerational plasticity in the sea urchin Strongylocentrotus purpuratus*. Society for Integrative and Comparative Biology Meeting. Virtual. Status = OTHER; Acknowledgement of Federal Support = Yes
- Reuman, D.C., M.C.N. Castorani, K.C. Cavanaugh, L.W. Sheppard, J.A. Walter, and T.W. Bell (2023). *How environmental drivers of spatial synchrony interact*. 108th Annual Meeting of the Ecological Society of America. Portland, OR. Status = OTHER; Acknowledgement of Federal Support = Yes
- Washburn, L., B Emery, C Ohlmann, A Kirincich, and D Iglesias-Rodriguez (2022). *Improvements and new applications of high-frequency radar for coastal ocean observing systems*. Ocean Sciences Meeting. Virtual. Status = OTHER; Acknowledgement of Federal Support = Yes
- Libe Washburn and Paul Matson and Chris Gotschalk and David Siegel and Debra Iglesias-Rodriguez (2018). *Interpreting phytoplankton bloom development using high-frequency radar and satellite ocean color imagery (Poster)*. American Geophysical Union. Washington, D.C., US. Status = OTHER; Acknowledgement of Federal Support = Yes
- Strader, M.E. and G.E. Hofmann (2019). *Intra- and transgenerational plasticity of DNA methylation in the purple sea urchin, Strongylocentrotus purpuratus*. ASLO 2019 Aquatic Sciences Meeting. San Juan, Puerto Rico. Status = OTHER; Acknowledgement of Federal Support = Yes

- Leach TS and GE Hofmann (2019). *Investigating the role of maternal conditioning on offspring performance and DNA methylation patterns in the purple sea urchin*. ASLO 2019 Aquatic Sciences Meeting. San Juan, Puerto Rico. Status = OTHER; Acknowledgement of Federal Support = Yes
- Rodriguez, LM, G. E. Hofmann (2022). *It's getting hot in here: urchin righting behavior under marine heatwave conditions*. Western Society for Naturalists Annual Meeting. Oxnard, CA. Status = OTHER; Acknowledgement of Federal Support = Yes
- L Kozal, MJ Housh, C Nelson, TS Leach, JM Wong, M Yamamoto, G Hofmann (2020). *Kelp Associated Changes in Seawater Chemistry Connect to Transgenerational Effects in the Purple Urchin, *Strongylocentrotus purpuratus**. Ocean Sciences Meeting. Virtual. Status = OTHER; Acknowledgement of Federal Support = Yes
- Jenifer E Dugan (2018). *Life on a sandy edge: conserving beach ecosystems in the face of rising seas*. 9th National Summit on Coastal and Estuarine Restoration and Management. Long Beach, CA. Status = OTHER; Acknowledgement of Federal Support = Yes
- Johnston, KK (2022). *Living Shorelines in Southern California: Coastal Adaptation in Urban Communities*. American Shore and Beach Preservation Association National Conference. Long Beach, CA. Status = OTHER; Acknowledgement of Federal Support = Yes
- Castorani, M.C.N. and Reed, D.C. and Miller, R.J (2018). *Loss of foundation species: disturbance frequency outweighs severity for kelp forest biodiversity*. LTER All Scientists' Meeting. Pacific Grove, CA. Status = OTHER; Acknowledgement of Federal Support = Yes
- Castorani, M.C.N. and Reed, D.C. and Miller, R.J (2019). *Loss of foundation species: disturbance frequency outweighs severity in structuring kelp forest communities*. 12th International Temperate Reef Symposium. Hong Kong. Status = OTHER; Acknowledgement of Federal Support = Yes
- Cavanaugh, K.C, K.C. Cavanaugh, C.C Pawlak, T.W. Bell. (2020). *Mapping bull kelp refugia and the environmental drivers of their resilience along the north coast of California..* Western Society of Naturalists Annual Meeting. Virtual. Status = OTHER; Acknowledgement of Federal Support = Yes
- Lowman, H., M. Hirsch, M. Brzezinski, J. Melack (2021). *Marine Sediments Surrounding Giant Kelp Forests Supply Recycled Nutrients to the Overlying Water Column*. Coastal and Estuarine Research Federation Conference. Virtual. Status = OTHER; Acknowledgement of Federal Support = Yes
- Gonzalez, J., T. Leach, GE Hofmann, KYK Chan (2023). *Marine heatwaves reduce gamete quality of the sea urchin, *Strongylocentrotus purpuratus**. Society for Integrative and Comparative Biology Meeting. Austin, TX. Status = OTHER; Acknowledgement of Federal Support = Yes
- Hofmann, GE M. Guillen, X Clare (2022). *Mentoring the Mentors: A workshop to building inclusive mentoring skills in environmental science..* LTER All Scientists Meeting. Pacific Grove, CA. Status = OTHER; Acknowledgement of Federal Support = Yes
- Detmer A. R., B. P. DiFiore, R. J. Miller, D. C. Reed, T. W. Bell, A. C. Stier, and H. V. Moeller (2022). *Modeling the effects of variable disturbance regimes on kelp forest*

- community dynamics*. Ecological Society of America Meeting (ESA). Montreal, Quebec, Canada. Status = OTHER; Acknowledgement of Federal Support = Yes
- Libe Washburn and Brian Emery and A. Kirincich and Chris Gotschalk (2019). *Near-shore eddies detected by HF radar and their effects on kelp forest ecosystems*. Radiowave Oceanography Workshop. Victoria, BC, Canada. Status = OTHER; Acknowledgement of Federal Support = Yes
 - Emery, KA (2022). *New approaches to drone-based research in CA intertidal ecosystems*. DroneCamp 2022. Virtual. Status = OTHER; Acknowledgement of Federal Support = Yes
 - Dugan, JE and DM Hubbard and B Joab and NK Schooler and KE Emery and B Duke (2018). *Oil Spills on Sandy Beaches: Population responses of intertidal talitrid amphipods to the Refugio Beach Oil Spill, Santa Barbara County 2015*. SETAC North America 39th Annual Meeting. Sacramento, CA. Status = OTHER; Acknowledgement of Federal Support = Yes
 - Castorani, M.C.N., and E. Kadiyala (2022). *Patterns of ecological dominance in kelp forest communities at Santa Barbara Coastal LTER*. LTER All Scientists Meeting. Pacific Grove, CA. Status = OTHER; Acknowledgement of Federal Support = Yes
 - Joab, B and JE Dugan and DM Hubbard and B Duke and R Donohoe and G Baker (2018). *Polycyclic aromatic hydrocarbon uptake in three sandy beach invertebrate tissue types and porewater with corresponding forensic matches to source oil following the Refugio Beach Oil Spill, Santa Barbara County, 2015*. SETAC North America 39th Annual Meeting. Sacramento, CA. Status = OTHER; Acknowledgement of Federal Support = Yes
 - Lowman, H (2023). *Quantifying Interactive Effects of Fire and Precipitation Regimes on Catchment Biogeochemistry of Arid Lands*. Workshop. NCEAS Workshop. Santa Barbara, CA. Status = OTHER; Acknowledgement of Federal Support = Yes
 - Dugan JE and DM Hubbard and KE Emery and R Miller and C Ohlmann and J. Madden (2018). *Quantifying ecological responses to trophic connectivity between sandy beaches and kelp forests (poster)*. LTER All Scientists' Meeting. Pacific Grove, CA. Status = OTHER; Acknowledgement of Federal Support = Yes
 - Okamoto, D.K. (2021). *Recruitment and mortality in dynamic sea urchin barrens..* Western Society of Naturalists. Virtual. Status = OTHER; Acknowledgement of Federal Support = Yes
 - Emery, K., J. Dugan, K. Johnston, D. Hubbard, K. Cavanaugh, K. Cavanaugh (2023). *Remote sensing of California's kelp forest and sandy beach ecosystems*. Coastal Imaging Research Network Meeting. Duck, NC. Status = OTHER; Acknowledgement of Federal Support = Yes
 - Kadiyala, E., J.A. Walter, and M.C.N. Castorani (2023). *Sand dynamics drive kelp forest community structure and stability..* 108th Annual Meeting of the Ecological Society of America. Portland, OR. Status = OTHER; Acknowledgement of Federal Support = Yes
 - Dugan, JE (2022). *Sandy Beach and Surf Zone Ecosystems*. Ask the Researcher Marine Protected Area Monitoring Series. Virtual. Status = OTHER; Acknowledgement of Federal Support = Yes
 - Dugan, JE, DM Hubbard, KE Emery (2021). *Sandy beach ecosystems: long term studies of life on the edge*. Invited presentation,. First International Symposium on Coastal

Ecosystems and Global Change,. Xiamen, China & Virtual. Status = OTHER; Acknowledgement of Federal Support = Yes

- Jenifer E Dugan (2018). *Santa Barbara Coastal LTER and Climate Change*. LTER All Scientists' Meeting. Pacific Grove, CA. Status = OTHER; Acknowledgement of Federal Support = Yes
- Jenifer E Dugan (2018). *Santa Barbara Coastal LTER: Organic Matter at the Sea & Sand Interface*. LTER All Scientists' Meeting. Pacific Grove, CA. Status = OTHER; Acknowledgement of Federal Support = Yes
- Siegel, D.A (2022). *Seaweed Sinking MRV: What is Needed??*. ARPA-E Marine Carbon Sensing Workshop,. Boston, MA. Status = OTHER; Acknowledgement of Federal Support = Yes
- Clare, X. and G.E. Hofmann (2019). *Snails on the menu? Using long-term ecological data to contextualize performance of a California kelp forest predator and emerging fishery species, K. kelletii..* World Congress of Malacology. Monterey, CA. Status = OTHER; Acknowledgement of Federal Support = Yes
- Emery, K., K. Cavanaugh, D. Hubbard, R. Miller, J. Madden, J. Dugan (2023). *Spatial Scales of connectivity in subsidy dependent coastal ecosystems*. ASLO Aquatic Sciences. Palma de Majorca, Spain. Status = OTHER; Acknowledgement of Federal Support = Yes
- Castorani, M., K. Cavanaugh, T. Bell, R. Brokaw, L. Carberry, N. Dornan, N. Eegholm, K. Emery, H. Goss, K. Michaud, M. Brzezinski, K. Cavanaugh, J. Dugan, R. Miller, M. Page, D. Siegel, and L. Washburn (2022). *Spatial dynamics and connectivity of SBC kelp forests and adjacent ecosystems: ECS highlights*. LTER All Scientists Meeting. Sep. 19–23, 2022. Pacific Grove, CA. Status = OTHER; Acknowledgement of Federal Support = Yes
- Bisson, K. and S. Kramer and A. Fischer and D. Catlett and J. Allen and D. Siegel (2018). *Spatial patterns and optical analysis of wildfire-derived ash in the Santa Barbara Channel (poster)*. XXIV Ocean Optics Conference . Dubrovnik, Croatia. Status = OTHER; Acknowledgement of Federal Support = Yes
- Emery, K., K. Cavanaugh, D. Hubbard, R. Miller, J. Madden, J. Dugan (2022). *Spatial scales of connectivity in subsidy dependent coastal ecosystems*. Western Society of Naturalists Meeting. Oxnard, CA. Status = OTHER; Acknowledgement of Federal Support = Yes
- Walter, J.A., K.E. Emery, J.E. Dugan, D.M. Hubbard, T.W. Bell, L.W. Sheppard, V.A. Karatayev, K.C. Cavanaugh, D.C. Reuman, and M.C.N. Castorani (). *Spatial synchrony cascades across ecosystem boundaries and up food webs via resource subsidies*. 108th Annual Meeting of the Ecological Society of America. Portland, OR. Status = OTHER; Acknowledgement of Federal Support = Yes
- Castorani, M.C.N. and T.W. Bell and L.W. Sheppard and J.A. Walter and D.C. Reuman (2019). *Spatial synchrony in giant kelp metapopulations: patterns, scales, and drivers*. 104th Annual Meeting of the Ecological Society of America. Louisville, KY. Status = OTHER; Acknowledgement of Federal Support = Yes
- Reed, D., S. Schroeter, K. Beheshti, and R. Smith (2023). *Spatial-temporal scales of kelp colonization on a large artificial reef: implications for kelp restoration*. 13th International Temperate Reef Symposium. Hobart, Tasmania, Australia. Status = OTHER; Acknowledgement of Federal Support = Yes

- Brokaw, R.J., D.A. Siegel, and L. Washburn (2022). *Surface flow and primary productivity in the Santa Barbara Channel*, LTER All Scientists Meeting. LTER All Scientists Meeting. Sep. 19–23, 2022.. Pacific Grove, CA. Status = OTHER; Acknowledgement of Federal Support = Yes
- Emery, K.A., M. Reidenbach, K.K. Johnston, and J.E. Dugan (2022). *Synthesizing the Use of Long Term Data to Inform and Monitor Ecological Restoration Projects*. ASM Workshop. LTER All Scientists Meeting. Pacific Grove, CA. Status = OTHER; Acknowledgement of Federal Support = Yes
- Kraskura, K (2022). *TEMPERATURE INFLUENCES INTRA-SPECIFIC SCALING OF METABOLIC AND HEART PERFORMANCE IN AN INDICATOR BEACH ZONE SPECIES, BARRED SURFPERCH*. International Congress on the Biology of Fishes. Montpellier, France. Status = OTHER; Acknowledgement of Federal Support = Yes
- Lowman, H, Emery KA (2022). *Temporal Trends in Nutritional Content of Primary Production*. Workshop. LTER All Scientists Meeting. Pacific Grove, CA. Status = OTHER; Acknowledgement of Federal Support = Yes
- Michaud, K.M., D. C. Reed, R. J. Miller (2022). *The Blob marine heatwave alters sessile suspension feeder community structure in California kelp forests*. Western Society for Naturalists Annual Meeting. Oxnard, CA. Status = OTHER; Acknowledgement of Federal Support = Yes
- Libe Washburn (2019). *The evolving role of surface-current measuring radar in coastal oceanography: New observations and technology developments*. Gordon Research Conference on Coastal Ocean Dynamics. Manchester NH. Status = OTHER; Acknowledgement of Federal Support = Yes
- Emery, KA, JE Dugan, T Lenihan, RJ Miller, NK Schooler, DM Hubbard. (2021). *The role of cross-ecosystem subsidies and consumer populations in sandy beach ecosystem CO2 fluxes*. Coastal Estuarine Research Foundation. Virtual. Status = OTHER; Acknowledgement of Federal Support = Yes
- Brokaw, R.J., D.A. Siegel, and L. Washburn (2022). *The role of surface circulation on spatial patterns and temporal variability of productivity in the Santa Barbara Channel*. Ocean Sciences Meeting. Virtual. Status = OTHER; Acknowledgement of Federal Support = Yes
- Hardison, E (2022). *The roles of diet in determining thermal acclimation rate and capacity for maximum heart rate in a marine ectotherm (Girella nigricans)*. Society for Experimental Biology Meeting. Montpellier, France. Status = OTHER; Acknowledgement of Federal Support = Yes
- Cavanaugh, K.C., K.C. Cavanaugh, M. Leung, E. Villa (2022). *The status of kelp forests in California, 7 years after the marine heatwaves of 2014-2016*. Western Society of Naturalists Meeting. Oxnard, CA. Status = OTHER; Acknowledgement of Federal Support = Yes
- Reed, D. (2023). *The value of long-term, spatially expansive research to kelp forest management*.. Invited Seminar, Pontificia Universidad Católica de Chile. Santiago, Chile. Status = OTHER; Acknowledgement of Federal Support = Yes
- Cavanaugh, K.C. and Bell, T. W. and J.G. Allen and D.A. Siegel (2018). *Three decades of variability in California's giant kelp forests from the Landsat satellites (poster)*. AGU

Fall Meeting. Washington DC. Status = OTHER; Acknowledgement of Federal Support = Yes

- Eegholm, N.H., T.W. Bell, and D.A. Siegel (2022). *Towards a demographic model of giant kelp: using long-term data to constrain parameters.* LTER All Scientists Meeting. Pacific Grove, CA. Status = OTHER; Acknowledgement of Federal Support = Yes
- Johnston, K.K., J.E. Dugan, D.M. Hubbard, K.A. Emery, and M. Grubbs (2023). *Using Dune Restoration on an Urban Beach as a Coastal Resilience Approach.* Southern California Academy of Sciences. Santa Barbara, CA. Status = OTHER; Acknowledgement of Federal Support = Yes
- Johnston, K.K., J.E. Dugan, D.M. Hubbard, K.A. Emery, and M. Grubbs (2023). *Using Dune Restoration on an Urban Beach as a Coastal Resilience Approach: Case Study at Santa Monica Beach.* California Dune Restoration Conference. Virtual. Status = OTHER; Acknowledgement of Federal Support = Yes
- Emery, K., K. Cavanaugh, J. Dugan, D. Hubbard (2022). *Validating drone-based measurements of cross-ecosystem subsidies.* LTER All Scientists Meeting. Pacific Grove, CA. Status = OTHER; Acknowledgement of Federal Support = Yes
- Karatayev, V.A., D.C. Reuman, K.C. Cavanaugh, T.W. Bell, M.C.N. Castorani, N. Coombs, and J.A. Walter (2023). *Warmer climates promote ecosystem collapse by shifting tipping points in giant kelp forests.* 108th Annual Meeting of the Ecological Society of America. Portland, OR. Status = OTHER; Acknowledgement of Federal Support = Yes

Other Products

Other Publications

Patent Applications

Technologies or Techniques

Thesis/Dissertations

- Kraskura, K. *Causes and consequences of body size-specific vulnerability to warming in fishes.* (2022). University of California, Santa Barbara. Acknowledgement of Federal Support = Yes
- Emery, KA. *Coastal connectivity: structure and function of recipient beach ecosystems respond to variation in kelp subsidies.* (2021). University of California, Santa Barbara. Acknowledgement of Federal Support = Yes
- Peters, Joseph. *Consumer-mediated nutrient dynamics of kelp forests in the wake of global change.* (2023). University of California, Santa Barbara. Acknowledgement of Federal Support = Yes
- Wanner, Miriam. *Dispersal structures the geography of kelp synchrony Undergraduate thesis.* (2023). University of Kansas. Acknowledgement of Federal Support = Yes

- Catlett, Dylan. *Phytoplankton community determinations and dynamics in the Santa Barbara Channel, CA.* (2021). University of California, Santa Barbara. Acknowledgement of Federal Support = Yes
- Madden, Jessica. *Temporal variation and ontogenetic shifts in the diet of a surf zone fish, the barred surfperch, *Amphistichus argenteus*.* (2023). University of California, Santa Barbara. Acknowledgement of Federal Support = Yes
- Bogan, Samuel N.. *The Evolution of Plastic Responses to Global Change: Studies in Two Species of Coastal Marine Invertebrates.* (2023). University of California, Santa Barbara. Acknowledgement of Federal Support = Yes
- Leach, TS. *The Role of Pre-and Post-Spawning Temperature Stress on Fertilization Dynamics within Santa Barbara Channel Sea Urchin Species.* (2022). University of California, Santa Barbara. Acknowledgement of Federal Support = Yes
- Clare, Xochitl. *Understanding Relationships Between Human and Marine Communities via Experimentation, Long-Term Data and Education.* (2023). University of California, Santa Barbara. Acknowledgement of Federal Support = Yes

Websites or Other Internet Sites

Supporting Files

	Filename	Description	Uploaded By	Uploaded On
(Download)	SBCLTER_2022-23_Annual Report_Additional_publications.pdf	This file contains six journal publications that are shared and listed with other NSF awards. NSF-PAR was not able to successfully add the SBC award to these entries during annual report preparation.	Daniel Reed	10/16/2023

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Participants/Organizations

Research Experience for Undergraduates (REU) funding

Form of REU funding support:

REU supplement

How many REU applications were received during this reporting period?

10

How many REU applicants were selected and agreed to participate during this reporting period?

3

REU Comments:

What individuals have worked on the project?

Name	Most Senior Project Role	Nearest Person Month Worked
Miller, Robert	PD/PI	6
Hofmann, Gretchen	Co PD/PI	2
Reed, Daniel	Co PD/PI	2
Siegel, David	Co PD/PI	2
Stier, Adrian	Co PD/PI	2
Bell, Tom	Co-Investigator	2
Brzezinski, Mark	Co-Investigator	1
Burkepile, Deron	Co-Investigator	1
Carlson, Craig	Co-Investigator	1
Castorani, Max	Co-Investigator	2
Cavanaugh, Kyle	Co-Investigator	2
Dugan, Jenifer	Co-Investigator	4
Eliason, Erika	Co-Investigator	1
Guerrini, Anita	Co-Investigator	0
Iglesias-Rodriguez, Debora	Co-Investigator	1
Lamy, Thomas	Co-Investigator	1
Lenihan, Hunter	Co-Investigator	1
MacIntyre, Sally	Co-Investigator	1
Melack, John	Co-Investigator	1
Moeller, Holly	Co-Investigator	1
Nidzieko, Nicholas	Co-Investigator	1
Ohlmann, J Carter	Co-Investigator	0
Okamoto, Daniel	Co-Investigator	1
Page, Henry	Co-Investigator	1
Rassweiler, Andrew	Co-Investigator	1
Santoro, Alyson	Co-Investigator	1
Schroeter, Stephen	Co-Investigator	0
Washburn, Libe	Co-Investigator	2
Wilbanks, Elizabeth	Co-Investigator	1
Benitez-Nelson, Claudia	Faculty	0
Strader, Marie	Faculty	0
Dauhajre, Daniel	Postdoctoral (scholar, fellow or other postdoctoral position)	1

Name	Most Senior Project Role	Nearest Person Month Worked
Donham, Emily	Postdoctoral (scholar, fellow or other postdoctoral position)	2
Emery, Kyle	Postdoctoral (scholar, fellow or other postdoctoral position)	6
Herman, Gema	Postdoctoral (scholar, fellow or other postdoctoral position)	0
James, Anna	Postdoctoral (scholar, fellow or other postdoctoral position)	0
Liang, Maowei	Postdoctoral (scholar, fellow or other postdoctoral position)	0
Lowman, Heili	Postdoctoral (scholar, fellow or other postdoctoral position)	2
Payandeh, Ali Reza	Postdoctoral (scholar, fellow or other postdoctoral position)	3
Gotschalk, Chris	Other Professional	1
Hubbard, David	Other Professional	1
O'Brien, Margaret	Other Professional	2
Simon, Scott	Other Professional	2
Ambat, Darrin	Technician	12
Beresford, Laura	Technician	0
Callahan, Maxmilian	Technician	1
Clarke, Scott	Technician	7
Doheney, Brandon	Technician	0
Dubel, Alexandra	Technician	0
Guillocheau, Nathalie	Technician	1
Halewood, Eliza	Technician	2
Halewood, Stuart	Technician	3
Harrer, Shannon	Technician	1
Johnson, Kaitlin	Technician	0
Jones, Janet	Technician	1
Kim, Sylvia	Technician	0
Meyerhof, Matthew	Technician	0
Moran, Christopher	Technician	0
Nelson, Clint	Technician	12
Ogawa, Jacob	Technician	3
Opalk, Keri	Technician	3
Purzer, Frankie	Technician	3

Name	Most Senior Project Role	Nearest Person Month Worked
Romero, Eduardo	Technician	1
Salazar, David	Technician	3
Shea, Briette	Technician	0
Kui, Li	Staff Scientist (doctoral level)	12
Yorke, Christie	Staff Scientist (doctoral level)	0
Beckley, Billie	Graduate Student (research assistant)	6
Bogan, Samuel	Graduate Student (research assistant)	6
Brokaw, Ricky	Graduate Student (research assistant)	6
Bui, An	Graduate Student (research assistant)	3
Carberry, Luke	Graduate Student (research assistant)	6
Catlett, Dylan	Graduate Student (research assistant)	3
Cavanaugh, Katherine	Graduate Student (research assistant)	6
Chamorro, Jannine	Graduate Student (research assistant)	2
Clare, Xochitl	Graduate Student (research assistant)	6
de Leon Sanchez, Erin	Graduate Student (research assistant)	3
Detmer, Raine	Graduate Student (research assistant)	5
Difiore, Bart	Graduate Student (research assistant)	2
Dornan, Natalie	Graduate Student (research assistant)	1
Eegholm, Nathalie	Graduate Student (research assistant)	4
English, Chance	Graduate Student (research assistant)	3
Esaian, Sevan	Graduate Student (research assistant)	1
Goss, Hayley	Graduate Student (research assistant)	6
Hardison, Emily	Graduate Student (research assistant)	3
Huynh, Nicholas	Graduate Student (research assistant)	0
Johnston, Karina	Graduate Student (research assistant)	3
Kadiyala, Ethan	Graduate Student (research assistant)	1
Kozal, Logan	Graduate Student (research assistant)	0
Kraskura, Krista	Graduate Student (research assistant)	0
Leach, Terence	Graduate Student (research assistant)	0
Madden, Jessica	Graduate Student (research assistant)	1
Malakhoff, Katrina	Graduate Student (research assistant)	6
Mangino, Inez	Graduate Student (research assistant)	6
McDonald, Adriane	Graduate Student (research assistant)	4
Michaud, Kristen	Graduate Student (research assistant)	6
Peters, Joey	Graduate Student (research assistant)	3
Ritger, Amelia	Graduate Student (research assistant)	6

Name	Most Senior Project Role	Nearest Person Month Worked
Sainz, Jade	Graduate Student (research assistant)	1
Schuelke, Taruna	Graduate Student (research assistant)	0
Snyder, Jordan	Graduate Student (research assistant)	3
Sugano, Cailan	Graduate Student (research assistant)	2
Tye, Cecily	Graduate Student (research assistant)	6
VanderZee, David	Graduate Student (research assistant)	0
Welch, Zoe	Graduate Student (research assistant)	2
Wong, Juliet	Graduate Student (research assistant)	0
Zenteno, Jose	Graduate Student (research assistant)	2
Adamson, Carter	Undergraduate Student	0
Aguila, Zoe	Undergraduate Student	0
Aguilar, Antonio	Undergraduate Student	0
Aguilera, Andrea	Undergraduate Student	0
Ajina, Alia	Undergraduate Student	0
Amundsen, William	Undergraduate Student	0
Anderson, Ellyse	Undergraduate Student	0
Anderson, Claire	Undergraduate Student	0
Andrada, Nico	Undergraduate Student	0
Anujarerat, Stephanie	Undergraduate Student	0
Aplin, Ally	Undergraduate Student	0
Bagla, Anshika	Undergraduate Student	0
Bakhdanyan, Alex	Undergraduate Student	0
Baldwin, Daniel	Undergraduate Student	0
Ballard, Cassidy	Undergraduate Student	0
Barton, Tyler	Undergraduate Student	0
Bawa, Simran	Undergraduate Student	0
Bechtel, Jacob	Undergraduate Student	2
Becker, Megan	Undergraduate Student	0
Beltran, Nelson	Undergraduate Student	0
Bernstein, Maya	Undergraduate Student	1
Blasco, Gordon	Undergraduate Student	0
Boborci, Madigan	Undergraduate Student	1
Bond, Valeria	Undergraduate Student	1
Boyle, Sarah	Undergraduate Student	0
Bradley, Tori	Undergraduate Student	0
Brock, Bowen	Undergraduate Student	1

Name	Most Senior Project Role	Nearest Person Month Worked
Brody, Rachel	Undergraduate Student	1
Brown , Maddie	Undergraduate Student	1
Bruggemann, Thea	Undergraduate Student	0
Bryant Williams, Dominique	Undergraduate Student	0
Brydson, Kat	Undergraduate Student	3
Buyalos, Lauren	Undergraduate Student	1
Cabral, Sophia	Undergraduate Student	1
Cajilig-McDonald, Lauren	Undergraduate Student	0
Cam, Jefferson	Undergraduate Student	0
Campbell, Chandler	Undergraduate Student	0
Cantrell, Zach	Undergraduate Student	0
Capittifentun, Fern	Undergraduate Student	2
Chamberlin, Mia	Undergraduate Student	0
Chan, Iris	Undergraduate Student	0
Check, Isabelle	Undergraduate Student	1
Chen, Jamie	Undergraduate Student	0
Childs, Jeffrey	Undergraduate Student	0
Clarke, Madison	Undergraduate Student	0
Colucci, Makenna	Undergraduate Student	2
Combs, Annie	Undergraduate Student	0
Cook, Kassandra	Undergraduate Student	0
Cowan, Sarah	Undergraduate Student	0
Culpepper, Peter	Undergraduate Student	0
Curry, Stephen	Undergraduate Student	0
Cuthbert, Daisy	Undergraduate Student	1
Daniel, Tyler	Undergraduate Student	0
Deardorff, Ella	Undergraduate Student	0
Deas, Evan	Undergraduate Student	0
Deng, Junyu	Undergraduate Student	0
Deyana, Gorman	Undergraduate Student	0
Dezzani, Alecia	Undergraduate Student	0
Diskin, Fiona	Undergraduate Student	1
Ditzler, Hannah	Undergraduate Student	0
Dohn, Will	Undergraduate Student	1
Dorji, Shey	Undergraduate Student	0

Name	Most Senior Project Role	Nearest Person Month Worked
Dugan, Emmaline	Undergraduate Student	0
Dungan, Kylee	Undergraduate Student	1
Dyck, Taylor	Undergraduate Student	0
Ear, Jenny	Undergraduate Student	0
Elbayar, Samantha	Undergraduate Student	0
Ellman, Samantha	Undergraduate Student	0
English, Torreyann	Undergraduate Student	0
Evans, Thomas	Undergraduate Student	0
Ewing, Kirsten	Undergraduate Student	1
Fakult, Veronica	Undergraduate Student	0
Fields, Ashton	Undergraduate Student	0
Foon, Samantha	Undergraduate Student	1
Fuentes, Amelia	Undergraduate Student	1
Fyfe, Caroline	Undergraduate Student	0
Gallagher, Jordan	Undergraduate Student	0
Galles, Charlie	Undergraduate Student	0
Galvan, Journ	Undergraduate Student	0
Garcia, Luis	Undergraduate Student	0
Garoufalias, Nikko	Undergraduate Student	3
Gebhard, Madchen	Undergraduate Student	0
Godzik, Mikolai	Undergraduate Student	0
Goldston, Aiko	Undergraduate Student	0
Golenchenko, Daniil	Undergraduate Student	2
Gonzales, Elise	Undergraduate Student	0
Gording, Tess	Undergraduate Student	0
Gordon, Marea	Undergraduate Student	0
Gorgas, Maya	Undergraduate Student	0
Gray, Ciara	Undergraduate Student	0
Greene, Finley	Undergraduate Student	1
Greenslade, Annie	Undergraduate Student	0
Gunther, Michela	Undergraduate Student	1
Gupta, Simren	Undergraduate Student	1
Hakanson, Alexander	Undergraduate Student	0
Hampton, Madison	Undergraduate Student	1
Hargrove, Lindsey	Undergraduate Student	0
He, Rebecca	Undergraduate Student	0

Name	Most Senior Project Role	Nearest Person Month Worked
Hernandez, Marisol	Undergraduate Student	0
Hill, Allison	Undergraduate Student	0
Holbrook, Jack	Undergraduate Student	0
Huang, Paul	Undergraduate Student	0
Hyles, Kendra	Undergraduate Student	1
Iskander, Joshua	Undergraduate Student	0
Jackson, Sabrina	Undergraduate Student	1
Jaeger, Stu	Undergraduate Student	0
Jankowski, Aspen	Undergraduate Student	1
Jarymowycz, Nick	Undergraduate Student	1
Jawetz, Sean	Undergraduate Student	0
Jenniches, Chloe	Undergraduate Student	1
Jennings, Lauren	Undergraduate Student	1
Johnson, Lucy	Undergraduate Student	0
Johnson, Morgan	Undergraduate Student	1
Jolish, Coby	Undergraduate Student	0
Jones, Steven	Undergraduate Student	0
Jonie, Garcia	Undergraduate Student	0
Juengling Bean, Eva	Undergraduate Student	2
Katsioularis, Dimitri	Undergraduate Student	0
Katsiovleris, Dimitri	Undergraduate Student	0
Kaur, Sami	Undergraduate Student	0
Keaton, Hannah	Undergraduate Student	1
Keeling, Lukas	Undergraduate Student	0
Kelton, Allison	Undergraduate Student	0
Kern, Iris	Undergraduate Student	0
Kernkamp, Charles	Undergraduate Student	0
Killam, Cadence	Undergraduate Student	1
Kirby, Timothy	Undergraduate Student	0
Koolmees, Wyatt	Undergraduate Student	0
Krebs, Karina	Undergraduate Student	0
Krotine, Kimberly	Undergraduate Student	0
Lai, Maggie	Undergraduate Student	1
Lam, Rachel	Undergraduate Student	0
LaManna, Renee	Undergraduate Student	0
Lao, Chihei	Undergraduate Student	0

Name	Most Senior Project Role	Nearest Person Month Worked
Lawrence, Catherine	Undergraduate Student	0
Lazarevich, Lauren	Undergraduate Student	1
Le, Katherine	Undergraduate Student	0
LeDonne, Tasi	Undergraduate Student	0
Lee, Jessilin	Undergraduate Student	1
Lin, Forest	Undergraduate Student	0
Lin, Michelle	Undergraduate Student	1
Listori, Mykala	Undergraduate Student	0
Litton, Fiona	Undergraduate Student	1
Lombardo, Mia	Undergraduate Student	0
Loo, Emmaline	Undergraduate Student	0
Loomis, Allen	Undergraduate Student	1
Lopez, Jamie	Undergraduate Student	2
Lucchesi, Gianna	Undergraduate Student	2
Lupien, Tao	Undergraduate Student	1
Lyter, Leigh	Undergraduate Student	0
Malhotra, Parker	Undergraduate Student	1
Manalo, Zoe	Undergraduate Student	0
Martinka, Arielle	Undergraduate Student	0
Mayne, Noah	Undergraduate Student	0
McEligot, Elizabeth	Undergraduate Student	3
McNeill, David	Undergraduate Student	0
Meoni, Mirabella	Undergraduate Student	0
Mills, Lucy	Undergraduate Student	0
Mita, Stephane	Undergraduate Student	0
Mitchem, Tyrese	Undergraduate Student	1
Moes, Lyla	Undergraduate Student	1
Moran, Tristen	Undergraduate Student	0
Morant, Isabella	Undergraduate Student	1
Moreno, Luiza	Undergraduate Student	0
Moreno, Alethia	Undergraduate Student	1
Morrison, Seamus	Undergraduate Student	0
Naum, Kuba	Undergraduate Student	0
Ng, Jordan	Undergraduate Student	1
Ngo, Katie	Undergraduate Student	0
Nortier-Tilly, Cassiel	Undergraduate Student	0

Name	Most Senior Project Role	Nearest Person Month Worked
O'Brien, Alex	Undergraduate Student	0
Ochoa, Jacob	Undergraduate Student	0
Oda, Kai	Undergraduate Student	0
Packard, Ian	Undergraduate Student	0
Pampeyan, Kristin	Undergraduate Student	0
Parks, Emily	Undergraduate Student	0
Patil, Ashwini	Undergraduate Student	0
Penn, Cameron	Undergraduate Student	1
Pereyra, Hailey	Undergraduate Student	1
Perez, Yanelyn	Undergraduate Student	0
Petry, Jared	Undergraduate Student	1
Pettijohn, Lauren	Undergraduate Student	1
Phan, Elise	Undergraduate Student	1
Piozet, Tim	Undergraduate Student	0
Plewe, Gabi	Undergraduate Student	0
Plouffe, Kyler	Undergraduate Student	0
Powers, James	Undergraduate Student	0
Price , Sean	Undergraduate Student	0
Prinz, Erica	Undergraduate Student	0
Puchkova, Isabella	Undergraduate Student	1
Pyle, Brenden	Undergraduate Student	0
Ramirez, Isabella	Undergraduate Student	1
Ramirez, Cheyenne	Undergraduate Student	0
Rappa, Lauren	Undergraduate Student	1
Rathle, Shane	Undergraduate Student	0
Reamey, Maya	Undergraduate Student	0
Reitman, Fred	Undergraduate Student	0
Riley, Katie	Undergraduate Student	1
Roberts, Claire	Undergraduate Student	0
Robles, Melanee	Undergraduate Student	0
Rohr, Orion von	Undergraduate Student	1
Rollins, Sophia	Undergraduate Student	0
Rosenberg, Lex	Undergraduate Student	1
Ross, Vivian	Undergraduate Student	0
Ruggles, Logan	Undergraduate Student	0
Rupprecht, Andie	Undergraduate Student	0

Name	Most Senior Project Role	Nearest Person Month Worked
Sajjad, Mehran	Undergraduate Student	1
Salmon, Abigail	Undergraduate Student	1
Salsbury, Lauren	Undergraduate Student	0
Salyapongse, Zoe	Undergraduate Student	1
Sandoval, Rebecca	Undergraduate Student	1
Santamaria, Kenya	Undergraduate Student	1
Schauerman, Eileen	Undergraduate Student	0
Searles, Ellie	Undergraduate Student	1
Sheen, Esther	Undergraduate Student	0
Shei, Jessica	Undergraduate Student	0
Shelby, Ben	Undergraduate Student	0
Sibley, Jordan	Undergraduate Student	1
Singh, Siao	Undergraduate Student	1
Singleton, Hana	Undergraduate Student	0
Siu, Daniel	Undergraduate Student	0
Sloan, Katie	Undergraduate Student	0
Sloan, Megan	Undergraduate Student	0
Soglin, Tatiana	Undergraduate Student	0
Solvay, Margot	Undergraduate Student	0
Soto, Abraham	Undergraduate Student	0
Spiegelman, Josie	Undergraduate Student	2
Springer, Hailey	Undergraduate Student	1
St. Pierre, Zoe	Undergraduate Student	0
Stead, Courtney	Undergraduate Student	0
Stidger, Andres	Undergraduate Student	1
Tang, Irvin	Undergraduate Student	0
Tewari, Rishima	Undergraduate Student	1
Toni, Jasmine	Undergraduate Student	1
Tsang, Evelyn	Undergraduate Student	1
Ulloa, Gabbie	Undergraduate Student	0
Ulloa Gutierrez, Imanol	Undergraduate Student	0
Van de Wyngaerde, Kylie	Undergraduate Student	0
Van Gieson, Amir	Undergraduate Student	0
Van Horn, Andie	Undergraduate Student	3
Vargas, Jennifer	Undergraduate Student	0

Name	Most Senior Project Role	Nearest Person Month Worked
Vasquez, Jennifer	Undergraduate Student	0
Vega, Jessica	Undergraduate Student	0
Venkatachalam, Divyaa	Undergraduate Student	0
Vick, Kathleen	Undergraduate Student	1
Wachtell, Lauren	Undergraduate Student	0
Wagner, Theresa	Undergraduate Student	0
Wagner, Noah	Undergraduate Student	0
Wagner, Kiara	Undergraduate Student	1
Walsh, Julia	Undergraduate Student	1
Walton, Miette	Undergraduate Student	0
Wanner, Miriam	Undergraduate Student	2
Weaver, Jackson	Undergraduate Student	1
Wellington, Bethlehem	Undergraduate Student	0
Whightsil, Lauren	Undergraduate Student	0
Wilds, Gabi	Undergraduate Student	0
Williams, Jonathan	Undergraduate Student	0
Wilmot, Talula	Undergraduate Student	1
Witonsky, Lilly	Undergraduate Student	0
Wloczynski, Marine	Undergraduate Student	1
Works, Kelsey	Undergraduate Student	1
Wriston, Abigail	Undergraduate Student	1
Yang, Victoria	Undergraduate Student	0
Yeung, Sammi	Undergraduate Student	1
Yocom, Mira	Undergraduate Student	0
Banks, Molly	Research Experience for Undergraduates (REU) Participant	1
Davis, Rachel	Research Experience for Undergraduates (REU) Participant	4
Gerigk, Matthew	Research Experience for Undergraduates (REU) Participant	2
Grant, Sabrina	Research Experience for Undergraduates (REU) Participant	1
Keeling, Lukas	Research Experience for Undergraduates (REU) Participant	0
Rivera, Samuel	Research Experience for Undergraduates (REU) Participant	3

Name	Most Senior Project Role	Nearest Person Month Worked
Sandoval, Joaquin	Research Experience for Undergraduates (REU) Participant	1
Zahedi, Elika	Research Experience for Undergraduates (REU) Participant	4

Full details of individuals who have worked on the project:

Robert J Miller

Email: miller@msi.ucsb.edu

Most Senior Project Role: PD/PI

Nearest Person Month Worked: 6

Contribution to the Project: Overall project leader, Leads research on kelp forest ecology and biology

Funding Support: Federal, State

Change in active other support: No

International Collaboration: No

International Travel: No

Gretchen E Hofmann

Email: hofmann@lifesci.ucsb.edu

Most Senior Project Role: Co PD/PI

Nearest Person Month Worked: 2

Contribution to the Project: Leads research on effects of ocean warming and climate change on kelp forest consumers

Funding Support: State, Federal

Change in active other support: No

International Collaboration: No

International Travel: No

Daniel C Reed

Email: reed@lifesci.ucsb.edu

Most Senior Project Role: Co PD/PI

Nearest Person Month Worked: 2

Contribution to the Project: Co-leads research on kelp forest ecosystems

Funding Support: Private, state

Change in active other support: No

International Collaboration: No

International Travel: Yes, australia - 0 years, 0 months, 14 days

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 research on remote sensing of kelp forests and ocean conditions

Funding Support: State, Federal

Change in active other support: No

International Collaboration: No

International Travel: No

Adrian C Stier

Email: adrian.stier@lifesci.ucsb.edu

Most Senior Project Role: Co PD/PI

Nearest Person Month Worked: 2

Contribution to the Project: Co-leads research on kelp forest ecosystems

Funding Support: State, Federal

Change in active other support: No

International Collaboration: No

International Travel: No

Tom Bell

Email: thomas.bell@lifesci.ucsb.edu

Most Senior Project Role: Co-Investigator

Nearest Person Month Worked: 2

Contribution to the Project: Investigates biomass dynamics in kelp forests, remote sensing

Funding Support: State

International Collaboration: No

International Travel: No

Mark Brzezinski

Email: brzezins@lifesci.ucsb.edu

Most Senior Project Role: Co-Investigator

Nearest Person Month Worked: 1

Contribution to the Project: Leads research on recycled nitrogen in kelp forests, Direct monthly monitoring of water chemistry at core kelp forests

Funding Support: State

International Collaboration: No

International Travel: No

Deron Burkepile

Email: deron.berkepile@lifesci.ucsb.edu

Most Senior Project Role: Co-Investigator

Nearest Person Month Worked: 1

Contribution to the Project: Recycled nitrogen in kelp forests

Funding Support: State

International Collaboration: No

International Travel: No

Craig Carlson

Email: carlson@lifesci.ucsb.edu

Most Senior Project Role: Co-Investigator

Nearest Person Month Worked: 1

Contribution to the Project: Leads research on organic matter dynamics in kelp forests

Funding Support: State

International Collaboration: No

International Travel: No

Max Castorani

Email: castorani@virginia.edu

Most Senior Project Role: Co-Investigator

Nearest Person Month Worked: 2

Contribution to the Project: Community and disturbance ecology of kelp forests, metapopulation dynamics

Funding Support: State

International Collaboration: Yes, mexico

International Travel: No

Kyle Cavanaugh

Email: kcavanaugh@geog.ucla.edu

Most Senior Project Role: Co-Investigator

Nearest Person Month Worked: 2

Contribution to the Project: Population dynamics of giant kelp and trophic connectivity between kelp forests and beaches

Funding Support: State

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: Trophic connectivity between kelp forests and beaches, project coordinator

Funding Support: NSF, Federal state

International Collaboration: Yes, australia, chile

International Travel: No

Erika Eliason

Email: erika.eliason@lifesci.ucsb.edu

Most Senior Project Role: Co-Investigator

Nearest Person Month Worked: 1

Contribution to the Project: Ecological physiology and fishing

Funding Support: State

International Collaboration: No

International Travel: No

Anita Guerrini

Email: anita.guerrini@oregonstate.edu

Most Senior Project Role: Co-Investigator

Nearest Person Month Worked: 0

Contribution to the Project: environmental and landscape history

Funding Support: none

International Collaboration: No

International Travel: No

Debora Iglesias-Rodriguez

Email: iglesias@lifesci.ucsb.edu

Most Senior Project Role: Co-Investigator

Nearest Person Month Worked: 1

Contribution to the Project: Coastal ocean and kelp forest connectivity

Funding Support: State

International Collaboration: No

International Travel: No

Thomas Lamy

Email: thomas.lamy27@gmail.com

Most Senior Project Role: Co-Investigator

Nearest Person Month Worked: 1

Contribution to the Project: Kelp forest ecology and biology

Funding Support: Federal

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: Fisheries biology, ecology and management

Funding Support: State

International Collaboration: No

International Travel: No

Sally MacIntyre

Email: sally@eri.ucsb.edu

Most Senior Project Role: Co-Investigator

Nearest Person Month Worked: 1

Contribution to the Project: Physical -biological coupling in kelp forests

Funding Support: State

International Collaboration: No

International Travel: No

John Melack

Email: john.melack@lifesci.ucsb.edu

Most Senior Project Role: Co-Investigator

Nearest Person Month Worked: 1

Contribution to the Project: Recycled nitrogen in kelp forests and trophic connectivity

Funding Support: State

International Collaboration: No

International Travel: No

Holly Moeller

Email: holly.moeller@lifesci.ucsb.edu

Most Senior Project Role: Co-Investigator

Nearest Person Month Worked: 1

Contribution to the Project: Modeling; supervision of graduate students

Funding Support: State

International Collaboration: No

International Travel: No

Nicholas Nidziko

Email: nidziko@ucsb.edu

Most Senior Project Role: Co-Investigator

Nearest Person Month Worked: 1

Contribution to the Project: Leads research on effects of kelp on physical and chemical fluxes

Funding Support: State

International Collaboration: No

International Travel: No

J Carter Ohlmann

Email: carter@eri.ucsb.edu

Most Senior Project Role: Co-Investigator

Nearest Person Month Worked: 0

Contribution to the Project: Trophic connectivity between kelp forests and beaches

Funding Support: Federal

International Collaboration: No

International Travel: No

Daniel Okamoto

Email: dokamoto@bio.fsu.edu,

Most Senior Project Role: Co-Investigator

Nearest Person Month Worked: 1

Contribution to the Project: Urchin settlement studies

Funding Support: none

International Collaboration: No

International Travel: No

Henry Page

Email: page@lifesci.ucsb.edu

Most Senior Project Role: Co-Investigator

Nearest Person Month Worked: 1

Contribution to the Project: Trophic connectivity between kelp forests and beaches and the coastal ocean

Funding Support: Private, Federal

International Collaboration: No

International Travel: No

Andrew Rassweiler

Email: rassweiler@bio.fsu.edu

Most Senior Project Role: Co-Investigator

Nearest Person Month Worked: 1

Contribution to the Project: Ecological consequences of fishing in kelp forests and kelp forest community and disturbance ecology

Funding Support: State

International Collaboration: No

International Travel: No

Alyson Santoro

Email: asantoro@ucsb.edu

Most Senior Project Role: Co-Investigator

Nearest Person Month Worked: 1

Contribution to the Project: Oversight of nitrogen research, experimental design

Funding Support: State

International Collaboration: No

International Travel: No

Stephen Schroeter

Email: schroete@ucsb.edu

Most Senior Project Role: Co-Investigator

Nearest Person Month Worked: 0

Contribution to the Project: Urchin settlement studies

Funding Support: State

International Collaboration: No

International Travel: No

Libe Washburn

Email: libe.washburn@ucsb.edu

Most Senior Project Role: Co-Investigator

Nearest Person Month Worked: 2

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

Funding Support: State

International Collaboration: No

International Travel: No

Elizabeth Wilbanks

Email: elizabeth.wilbanks@lifesci.ucsb.edu

Most Senior Project Role: Co-Investigator

Nearest Person Month Worked: 1

Contribution to the Project: Microbial metabolism and biogeochemistry

Funding Support: State

International Collaboration: No

International Travel: No

Claudia Benitez-Nelson

Email: benitezn@mailbox.sc.edu

Most Senior Project Role: Faculty
Nearest Person Month Worked: 0

Contribution to the Project: Dr. Benitez-Nelson maintains a deep sediment trap in the Santa Barbara Channel and collaborates with SBC LTER investigators regularly on topics relevant to phytoplankton and carbon cycling.

Funding Support: SBC LTER does not currently receive support from the project, although we have supported maintaining her trap in past years.

International Collaboration: No
International Travel: No

Marie Strader
Email: stradermarie@gmail.com
Most Senior Project Role: Faculty
Nearest Person Month Worked: 0

Contribution to the Project: Urchin epigenetics

Funding Support: NSF

International Collaboration: No
International Travel: No

Daniel Dauhajre
Email: ddauhajre@atmos.ucla.edu
Most Senior Project Role: Postdoctoral (scholar, fellow or other postdoctoral position)
Nearest Person Month Worked: 1

Contribution to the Project: Ocean circulation and modeling

Funding Support: Federal

International Collaboration: No
International Travel: No

Emily Donham
Email: edonham@ucsb.edu
Most Senior Project Role: Postdoctoral (scholar, fellow or other postdoctoral position)
Nearest Person Month Worked: 2

Contribution to the Project: research on factors controlling kelp biomass inside and outside of California's marine protected areas.

Funding Support: Federal

International Collaboration: No

International Travel: No

Kyle Emery

Email: kyle.emery@ucsb.edu

Most Senior Project Role: Postdoctoral (scholar, fellow or other postdoctoral position)

Nearest Person Month Worked: 6

Contribution to the Project: Beach ecosystem responses to kelp subsidies

Funding Support: NSF, state

International Collaboration: No

International Travel: No

Gema Herman

Email: gemahmbio@gmail.com

Most Senior Project Role: Postdoctoral (scholar, fellow or other postdoctoral position)

Nearest Person Month Worked: 0

Contribution to the Project: Lead data analyses and papers

Funding Support: Federal

International Collaboration: No

International Travel: No

Anna James

Email: ajames@lifesci.ucsb.edu

Most Senior Project Role: Postdoctoral (scholar, fellow or other postdoctoral position)

Nearest Person Month Worked: 0

Contribution to the Project: Dissolved organic matter dynamics in kelp forests

Funding Support: Federal

International Collaboration: No

International Travel: No

Maowei Liang

Email: maowei.liang@virginia.edu

Most Senior Project Role: Postdoctoral (scholar, fellow or other postdoctoral position)

Nearest Person Month Worked: 0

Contribution to the Project: analysed LTER kelp forest data

Funding Support: NSF

International Collaboration: No

International Travel: No

Heili Lowman

Email: Heili.lowman@ucsb.edu

Most Senior Project Role: Postdoctoral (scholar, fellow or other postdoctoral position)

Nearest Person Month Worked: 2

Contribution to the Project: Coastal biogeochemistry, nutrient cycling, transport and processing of organic matter.

Funding Support: NSF, state

International Collaboration: Yes, canada

International Travel: No

Ali Reza Payandeh

Email: alip@ucsb.edu

Most Senior Project Role: Postdoctoral (scholar, fellow or other postdoctoral position)

Nearest Person Month Worked: 3

Contribution to the Project: Physical Oceanography

Funding Support: Federal

International Collaboration: No

International Travel: No

Chris Gotschalk

Email: gots@lifesci.ucsb.edu

Most Senior Project Role: Other Professional

Nearest Person Month Worked: 1

Contribution to the Project: Processed data from moorings and monthly water sampling. Maintained databases. Assisted investigators with data analysis issues and programming questions. Advised and consulted with information technology staff.

Funding Support: NSF, Federal

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: Federal, state

International Collaboration: Yes, australia, chile

International Travel: No

Margaret O'Brien

Email: mob@msi.ucsb.edu

Most Senior Project Role: Other Professional

Nearest Person Month Worked: 2

Contribution to the Project: data and information management for project

Funding Support: Federal

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: Coordinate SBC education and outreach activities, develop and maintain relevant partnerships, train undergraduate outreach support

Funding Support: State

International Collaboration: No

International Travel: No

Darrin Ambat

Email: dambat@ucsb.edu

Most Senior Project Role: Technician

Nearest Person Month Worked: 12

Contribution to the Project: Assisted with LTER kelp forest fieldwork, and trained LTER students in research activities and data entry

Funding Support: NSF

International Collaboration: No

International Travel: No

Laura Beresford

Email: lauraberesford@ucsb.edu

Most Senior Project Role: Technician

Nearest Person Month Worked: 0

Contribution to the Project: Assisted with field research and sample processing for sandy beaches

Funding Support: Federal, state

International Collaboration: No

International Travel: No

Maxmilian Callahan

Email: maxcally327@g.ucla.edu

Most Senior Project Role: Technician

Nearest Person Month Worked: 1

Contribution to the Project: Data collection and analysis

Funding Support: Other

International Collaboration: No

International Travel: No

Scott Clarke

Email: scott.clark@ucsb.edu

Most Senior Project Role: Technician

Nearest Person Month Worked: 7

Contribution to the Project: Conducted LTER field and lab work

Funding Support: NSF

International Collaboration: No

International Travel: No

Brandon Doheney

Email: bdoheny13@gmail.com

Most Senior Project Role: Technician

Nearest Person Month Worked: 0

Contribution to the Project: Assist with field research and diving surveys for kelp forests and reefs

Funding Support: Federal

International Collaboration: No

International Travel: No

Alexandra Dubel

Email: adubel@bio.fsu.edu

Most Senior Project Role: Technician
Nearest Person Month Worked: 0

Contribution to the Project: data analysis

Funding Support: Federal

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: data collection and analysis

Funding Support: Federal

International Collaboration: No
International Travel: No

Eliza Halewood

Email: wallner@lifesci.ucsb.edu

Most Senior Project Role: Technician
Nearest Person Month Worked: 2

Contribution to the Project: Manage DOM samples and lab processing

Funding Support: Federal

International Collaboration: No
International Travel: No

Stuart Halewood

Email: halewood@eri.ucsb.edu

Most Senior Project Role: Technician
Nearest Person Month Worked: 3

Contribution to the Project: assist with oceanographic instruments and moorings

Funding Support: Federal

International Collaboration: No
International Travel: No

Shannon Harrer

Email: harrer@msi.ucsb.edu

Most Senior Project Role: Technician
Nearest Person Month Worked: 1

Contribution to the Project: Assist with data analyses

Funding Support: NSF

International Collaboration: No
International Travel: No

Kaitlin Johnson

Email: kaitlin_johnson@ucsb.edu

Most Senior Project Role: Technician
Nearest Person Month Worked: 0

Contribution to the Project: Kelp forest ecology and biology

Funding Support: federal

International Collaboration: No
International Travel: No

Janet Jones

Email: ja_jones@lifesci.ucsb.edu

Most Senior Project Role: Technician
Nearest Person Month Worked: 1

Contribution to the Project: Data Collection/Analysis of seawater samples

Funding Support: Federal

International Collaboration: No
International Travel: No

Sylvia Kim

Email: sylvia_m_kim@ucsb.edu

Most Senior Project Role: Technician
Nearest Person Month Worked: 0

Contribution to the Project: Phytoplankton ecology

Funding Support: federal

International Collaboration: No
International Travel: No

Matthew Meyerhof

Email: mmeyerhof@bren.ucsb.edu

Most Senior Project Role: Technician
Nearest Person Month Worked: 0

Contribution to the Project: data collection; equipment/instrument maintenance; data analysis

Funding Support: NSF

International Collaboration: No
International Travel: No

Christopher Moran
Email: christophermoran@ucsb.edu
Most Senior Project Role: Technician
Nearest Person Month Worked: 0

Contribution to the Project: Marine instrumentation and sensors

Funding Support: federal

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 for kelp forests and nearshore ocean

Funding Support: NSF

International Collaboration: No
International Travel: No

Jacob Ogawa
Email: jacobogawa@gmail.com
Most Senior Project Role: Technician
Nearest Person Month Worked: 3

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

Funding Support: NSF

International Collaboration: No
International Travel: No

Keri Opalk
Email: kerilynno@gmail.com

Most Senior Project Role: Technician
Nearest Person Month Worked: 3

Contribution to the Project: Phytoplankton and Carbon Cycling Sampling and Analysis, Optimized TCO₂ system

Funding Support: Federal

International Collaboration: No
International Travel: No

Frankie Purzer

Email: fpuerzer7412@gmail.com

Most Senior Project Role: Technician
Nearest Person Month Worked: 3

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

Funding Support: Federal

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: Designed and fabricated parts used on components of moorings. Assisted Salazar and Washburn in coordinating field sampling. Assisted with preparation of instruments for field deployments. Participated in SCUBA diving to deploy instruments. Assisted with instrument repairs. Participated in monthly water sampling

Funding Support: Federal

International Collaboration: No
International Travel: No

David Salazar

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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 database. Operated research launch for mooring deployments and other field sampling. Kept

project records, and oversaw instrument calibrations, and arranged instrument servicing.
Participated in monthly water sampling

Funding Support: Federal

International Collaboration: No

International Travel: No

Briette Shea

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Most Senior Project Role: Technician

Nearest Person Month Worked: 0

Contribution to the Project: data analysis for seawater nutrients

Funding Support: NSF

International Collaboration: No

International Travel: No

Li Kui

Email: li.kui@ucsb.edu

Most Senior Project Role: Staff Scientist (doctoral level)

Nearest Person Month Worked: 12

Contribution to the Project: serves as information manager for project

Funding Support: NSF, Federal

International Collaboration: No

International Travel: No

Christie Yorke

Email: ceyorke@gmail.com

Most Senior Project Role: Staff Scientist (doctoral level)

Nearest Person Month Worked: 0

Contribution to the Project: Kelp forest ecology and biology

Funding Support: State

International Collaboration: No

International Travel: No

Billie Beckley

Email: billiebeckley@ucsb.edu

Most Senior Project Role: Graduate Student (research assistant)

Nearest Person Month Worked: 6

Contribution to the Project: disturbance ecology, kelp forests

Funding Support: federal

International Collaboration: No

International Travel: No

Samuel Bogan

Email: snbogan@ucsb.edu

Most Senior Project Role: Graduate Student (research assistant)

Nearest Person Month Worked: 6

Contribution to the Project: processing seawater samples from field study

Funding Support: NSF

International Collaboration: No

International Travel: No

Ricky Brokaw

Email: rbrokaw@ucsb.edu

Most Senior Project Role: Graduate Student (research assistant)

Nearest Person Month Worked: 6

Contribution to the Project: Ocean transport of materials to kelp forests

Funding Support: federal

International Collaboration: No

International Travel: No

An Bui

Email: an.bui@ucsb.edu

Most Senior Project Role: Graduate Student (research assistant)

Nearest Person Month Worked: 3

Contribution to the Project: Trait-based surveys and modeling of macroalgae

Funding Support: Federal, NSF, state

International Collaboration: No

International Travel: No

Luke Carberry

Email: lcarberry@ucsb.edu

Most Senior Project Role: Graduate Student (research assistant)

Nearest Person Month Worked: 6

Contribution to the Project: Physical oceanography and phytoplankton

Funding Support: federal

International Collaboration: No

International Travel: No

Dylan Catlett

Email: dsc@ucsb.edu

Most Senior Project Role: Graduate Student (research assistant)

Nearest Person Month Worked: 3

Contribution to the Project: coastal phytoplankton ecology

Funding Support: federal

International Collaboration: No

International Travel: No

Katherine Cavanaugh

Email: kccavanaugh@ucla.edu

Most Senior Project Role: Graduate Student (research assistant)

Nearest Person Month Worked: 6

Contribution to the Project: Remote sensing of kelp forests

Funding Support: NSF

International Collaboration: No

International Travel: No

Jannine Chamorro

Email: jdchamorro@ucsb.edu

Most Senior Project Role: Graduate Student (research assistant)

Nearest Person Month Worked: 2

Contribution to the Project: Physiological response to ocean climate

Funding Support: State

International Collaboration: No

International Travel: No

Xochitl Clare

Email: xochitl.clare@lifesci.ucsb.edu

Most Senior Project Role: Graduate Student (research assistant)

Nearest Person Month Worked: 6

Contribution to the Project: Physiological responses to ocean climate

Funding Support: federal, NSF

International Collaboration: No

International Travel: No

Erin de Leon Sanchez

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Most Senior Project Role: Graduate Student (research assistant)

Nearest Person Month Worked: 3

Contribution to the Project: marine invertebrate ecology Theme 2C

Funding Support: federal

International Collaboration: No

International Travel: No

Raine Detmer

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Most Senior Project Role: Graduate Student (research assistant)

Nearest Person Month Worked: 5

Contribution to the Project: Modelling and data analyses

Funding Support: NSF

International Collaboration: No

International Travel: No

Bart Difiore

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Most Senior Project Role: Graduate Student (research assistant)

Nearest Person Month Worked: 2

Contribution to the Project: Kelp forest ecology and biology

Funding Support: state, Federal

International Collaboration: No

International Travel: No

Natalie Dornan

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Most Senior Project Role: Graduate Student (research assistant)

Nearest Person Month Worked: 1

Contribution to the Project: Conducted nutrient analyses

Funding Support: State UCSB, NSF

International Collaboration: No

International Travel: No

Nathalie Eegholm

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Most Senior Project Role: Graduate Student (research assistant)

Nearest Person Month Worked: 4

Contribution to the Project: Assisted with oceanographic modeling

Funding Support: NSF

International Collaboration: No

International Travel: No

Chance English

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Most Senior Project Role: Graduate Student (research assistant)

Nearest Person Month Worked: 3

Contribution to the Project: help forest DOM and microbial ecology

Funding Support: Federal, state

International Collaboration: No

International Travel: No

Sevan Esaian

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Most Senior Project Role: Graduate Student (research assistant)

Nearest Person Month Worked: 1

Contribution to the Project: help microbiome and ecosystem drivers

Funding Support: NSF

International Collaboration: No

International Travel: No

Hayley Goss

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Most Senior Project Role: Graduate Student (research assistant)

Nearest Person Month Worked: 6

Contribution to the Project: Ecological connectivity

Funding Support: federal

International Collaboration: No

International Travel: No

Emily Hardison

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Most Senior Project Role: Graduate Student (research assistant)

Nearest Person Month Worked: 3

Contribution to the Project: Physiological responses of fish to ocean climate

Funding Support: NSF

International Collaboration: No

International Travel: No

Nicholas Huynh

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Most Senior Project Role: Graduate Student (research assistant)

Nearest Person Month Worked: 0

Contribution to the Project: kelp forest DOM and microbial ecology

Funding Support: state, federal

International Collaboration: No

International Travel: No

Karina Johnston

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Most Senior Project Role: Graduate Student (research assistant)

Nearest Person Month Worked: 3

Contribution to the Project: Beach ecosystems and restoration, climate adaptation

Funding Support: federal

International Collaboration: No

International Travel: No

Ethan Kadiyala

Email: ekadiyala@virginia.edu

Most Senior Project Role: Graduate Student (research assistant)

Nearest Person Month Worked: 1

Contribution to the Project: analysed LTER kelp forest data

Funding Support: NSF

International Collaboration: No

International Travel: No

Logan Kozal

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Most Senior Project Role: Graduate Student (research assistant)

Nearest Person Month Worked: 0

Contribution to the Project: Physiological responses to ocean climate

Funding Support: federal, NSF , State

International Collaboration: No

International Travel: No

Krista Kraskura

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Most Senior Project Role: Graduate Student (research assistant)

Nearest Person Month Worked: 0

Contribution to the Project: Physiological responses to ocean climate, body size effects on metabolism and thermal tolerance in fish

Funding Support: NSF

International Collaboration: No

International Travel: No

Terence Leach

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Most Senior Project Role: Graduate Student (research assistant)

Nearest Person Month Worked: 0

Contribution to the Project: Physiological responses to ocean climate

Funding Support: state, federal

International Collaboration: No

International Travel: No

Jessica Madden

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Most Senior Project Role: Graduate Student (research assistant)

Nearest Person Month Worked: 1

Contribution to the Project: Assisted with field research and sample processing for sandy beaches

Funding Support: NSF, Federal, State

International Collaboration: No

International Travel: No

Katrina Malakhoff

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Most Senior Project Role: Graduate Student (research assistant)

Nearest Person Month Worked: 6

Contribution to the Project: Effects of marine management on sea urchins

Funding Support: NSF

International Collaboration: No

International Travel: No

Inez Mangino

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Most Senior Project Role: Graduate Student (research assistant)

Nearest Person Month Worked: 6

Contribution to the Project: Assisted with field sampling, trained interns and processed biotic samples

Funding Support: State

International Collaboration: No

International Travel: No

Adriane McDonald

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Most Senior Project Role: Graduate Student (research assistant)

Nearest Person Month Worked: 4

Contribution to the Project: processing seawater samples from field study

Funding Support: NSF

International Collaboration: No

International Travel: No

Kristen Michaud

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

Contribution to the Project: Invasive species in kelp forests

Funding Support: NSF

International Collaboration: No

International Travel: No

Joey Peters

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Most Senior Project Role: Graduate Student (research assistant)

Nearest Person Month Worked: 3

Contribution to the Project: consumer mediated nutrient cycling in kelp forests

Funding Support: NSF

International Collaboration: No

International Travel: No

Amelia Ritger

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Most Senior Project Role: Graduate Student (research assistant)

Nearest Person Month Worked: 6

Contribution to the Project: Community and population ecology

Funding Support: federal

International Collaboration: No

International Travel: No

Jade Sainz

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Most Senior Project Role: Graduate Student (research assistant)

Nearest Person Month Worked: 1

Contribution to the Project: Marine aquaculture

Funding Support: federal

International Collaboration: No

International Travel: No

Taruna Schuelke

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Most Senior Project Role: Graduate Student (research assistant)
Nearest Person Month Worked: 0

Contribution to the Project: microbiology and genomics

Funding Support: NSF

International Collaboration: No

International Travel: No

Jordan Snyder

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Most Senior Project Role: Graduate Student (research assistant)

Nearest Person Month Worked: 3

Contribution to the Project: Remote sensing of kelp forests

Funding Support: Federal

International Collaboration: No

International Travel: No

Cailan Sugano

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Most Senior Project Role: Graduate Student (research assistant)

Nearest Person Month Worked: 2

Contribution to the Project: Physiological responses to ocean climate

Funding Support: Federal

International Collaboration: No

International Travel: No

Cecily Tye

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Most Senior Project Role: Graduate Student (research assistant)

Nearest Person Month Worked: 6

Contribution to the Project: Coastal physical oceanography

Funding Support: federal

International Collaboration: No

International Travel: No

David VanderZee

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Most Senior Project Role: Graduate Student (research assistant)
Nearest Person Month Worked: 0

Contribution to the Project: Sandy beach and surf zone ecology

Funding Support: State UCSB

International Collaboration: No
International Travel: No

Zoe Welch

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Most Senior Project Role: Graduate Student (research assistant)
Nearest Person Month Worked: 2

Contribution to the Project: marine plankton physiology and biogeochemistry

Funding Support: NSF

International Collaboration: No
International Travel: No

Juliet Wong

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Most Senior Project Role: Graduate Student (research assistant)
Nearest Person Month Worked: 0

Contribution to the Project: impacts of ocean acidification and ocean warming on the early developmental stages of marine invertebrates

Funding Support: NSF

International Collaboration: No
International Travel: No

Jose Zenteno

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Most Senior Project Role: Graduate Student (research assistant)
Nearest Person Month Worked: 2

Contribution to the Project: Fishery biology and aquaculture

Funding Support: none

International Collaboration: No
International Travel: No

Carter Adamson

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Most Senior Project Role: Undergraduate Student
Nearest Person Month Worked: 0

Contribution to the Project: Outreach activities

Funding Support: Coastal Fund, NOAA BWET

International Collaboration: No

International Travel: No

Zoe Aguila

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Most Senior Project Role: Undergraduate Student

Nearest Person Month Worked: 0

Contribution to the Project: Outreach activities

Funding Support: Coastal Fund, NOAA BWET

International Collaboration: No

International Travel: No

Antonio Aguilar

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Most Senior Project Role: Undergraduate Student

Nearest Person Month Worked: 0

Contribution to the Project: Outreach activities

Funding Support: MSI, Private Donation

International Collaboration: No

International Travel: No

Andrea Aguilera

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Most Senior Project Role: Undergraduate Student

Nearest Person Month Worked: 0

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

Funding Support: None

International Collaboration: No

International Travel: No

Alia Ajina

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Most Senior Project Role: Undergraduate Student
Nearest Person Month Worked: 0

Contribution to the Project: Outreach activities

Funding Support: Coastal Fund, NOAA BWET

International Collaboration: No

International Travel: No

William Amundsen

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Most Senior Project Role: Undergraduate Student

Nearest Person Month Worked: 0

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

Funding Support: none

International Collaboration: No

International Travel: No

Ellyse Anderson

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Most Senior Project Role: Undergraduate Student

Nearest Person Month Worked: 0

Contribution to the Project: Outreach activities

Funding Support: Coastal Fund, NOAA BWET

International Collaboration: No

International Travel: No

Claire Anderson

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Most Senior Project Role: Undergraduate Student

Nearest Person Month Worked: 0

Contribution to the Project: Outreach activities

Funding Support: MSI, Private Donation

International Collaboration: No

International Travel: No

Nico Andrada

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Most Senior Project Role: Undergraduate Student
Nearest Person Month Worked: 0

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

Funding Support: none

International Collaboration: No
International Travel: No

Stephanie Anujararat
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Most Senior Project Role: Undergraduate Student
Nearest Person Month Worked: 0

Contribution to the Project: Outreach activities

Funding Support: Coastal Fund, NOAA BWET

International Collaboration: No
International Travel: No

Ally Aplin
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Most Senior Project Role: Undergraduate Student
Nearest Person Month Worked: 0

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

Funding Support: Coastal Fund, NOAA BWET

International Collaboration: No
International Travel: No

Anshika Bagla
Email: bagla.anshika@gmail.com
Most Senior Project Role: Undergraduate Student
Nearest Person Month Worked: 0

Contribution to the Project: Outreach activities

Funding Support: Coastal Fund, NOAA BWET

International Collaboration: No
International Travel: No

Alex Bakhdanyan
Email: abakhdanyan@ucsb.edu

Most Senior Project Role: Undergraduate Student
Nearest Person Month Worked: 0

Contribution to the Project: Processed samples in the laboratory

Funding Support: none

International Collaboration: No
International Travel: No

Daniel Baldwin

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Most Senior Project Role: Undergraduate Student
Nearest Person Month Worked: 0

Contribution to the Project: Outreach activities

Funding Support: Coastal Fund, NOAA BWET

International Collaboration: No
International Travel: No

Cassidy Ballard

Email: cassidyballard@ucsb.edu

Most Senior Project Role: Undergraduate Student
Nearest Person Month Worked: 0

Contribution to the Project: analysed LTER kelp forest data

Funding Support: NSF

International Collaboration: No
International Travel: No

Tyler Barton

Email: tylerbarton@umail.ucsb.edu

Most Senior Project Role: Undergraduate Student
Nearest Person Month Worked: 0

Contribution to the Project: Processed samples in the laboratory

Funding Support: none

International Collaboration: No
International Travel: No

Simran Bawa

Email: bawa@ucsb.edu

Most Senior Project Role: Undergraduate Student
Nearest Person Month Worked: 0

Contribution to the Project: Outreach activities

Funding Support: Coastal Fund, NOAA BWET

International Collaboration: No

International Travel: No

Jacob Bechtel

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Most Senior Project Role: Undergraduate Student

Nearest Person Month Worked: 2

Contribution to the Project: Processed samples in the laboratory, conducted independent research

Funding Support: none

International Collaboration: No

International Travel: No

Megan Becker

Email: meganbecker@ucsb.edu

Most Senior Project Role: Undergraduate Student

Nearest Person Month Worked: 0

Contribution to the Project: Outreach activities

Funding Support: Coastal Fund, NOAA BWET

International Collaboration: No

International Travel: No

Nelson Beltran

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Most Senior Project Role: Undergraduate Student

Nearest Person Month Worked: 0

Contribution to the Project: Outreach activities

Funding Support: Coastal Fund, NOAA BWET

International Collaboration: No

International Travel: No

Maya Bernstein

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

Contribution to the Project: Outreach activities

Funding Support: MSI, Private Donation

International Collaboration: No

International Travel: No

Gordon Blasco

Email: gordonblasco@gmail.com

Most Senior Project Role: Undergraduate Student

Nearest Person Month Worked: 0

Contribution to the Project: Study of kelp nitrogen sources

Funding Support: none

International Collaboration: No

International Travel: No

Madigan Boborci

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Most Senior Project Role: Undergraduate Student

Nearest Person Month Worked: 1

Contribution to the Project: Outreach activities

Funding Support: MSI, Private Donation

International Collaboration: No

International Travel: No

Valeria Bond

Email: valeriab007@gmail.com

Most Senior Project Role: Undergraduate Student

Nearest Person Month Worked: 1

Contribution to the Project: Assisted in LTER lab work & data collection

Funding Support: none

International Collaboration: No

International Travel: No

Sarah Boyle

Email: sarahboyle@umail.ucsb.edu

Most Senior Project Role: Undergraduate Student
Nearest Person Month Worked: 0

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

Funding Support: none

International Collaboration: No
International Travel: No

Tori Bradley

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Most Senior Project Role: Undergraduate Student
Nearest Person Month Worked: 0

Contribution to the Project: Outreach activities

Funding Support: Coastal Fund, NOAA BWET

International Collaboration: No
International Travel: No

Bowen Brock

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

Contribution to the Project: Assisted with LTER field and laboratory research

Funding Support: NSF

International Collaboration: No
International Travel: No

Rachel Brody

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

Contribution to the Project: Assisted in LTER lab work & data collection

Funding Support: none

International Collaboration: No
International Travel: No

Maddie Brown

Email: m_brown@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: NSF

International Collaboration: No
International Travel: No

Thea Bruggemann

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Most Senior Project Role: Undergraduate Student
Nearest Person Month Worked: 0

Contribution to the Project: Outreach activities

Funding Support: Coastal Fund, NOAA BWET

International Collaboration: No
International Travel: No

Dominique Bryant Williams

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Most Senior Project Role: Undergraduate Student
Nearest Person Month Worked: 0

Contribution to the Project: Outreach activities

Funding Support: Coastal Fund, NOAA BWET

International Collaboration: No
International Travel: No

Kat Brydson

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Most Senior Project Role: Undergraduate Student
Nearest Person Month Worked: 3

Contribution to the Project: Assisted with LTER field and laboratory research

Funding Support: NSF

International Collaboration: No
International Travel: No

Lauren Buyalos

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

Contribution to the Project: Outreach activities

Funding Support: MSI, Private Donation

International Collaboration: No

International Travel: No

Sophia Cabral

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Most Senior Project Role: Undergraduate Student

Nearest Person Month Worked: 1

Contribution to the Project: Outreach activities

Funding Support: MSI, Private Donation

International Collaboration: No

International Travel: No

Lauren Cajilig-McDonald

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Most Senior Project Role: Undergraduate Student

Nearest Person Month Worked: 0

Contribution to the Project: Outreach activities

Funding Support: Coastal Fund, NOAA BWET

International Collaboration: No

International Travel: No

Jefferson Cam

Email: j_cam@ucsb.edu

Most Senior Project Role: Undergraduate Student

Nearest Person Month Worked: 0

Contribution to the Project: Assisted with oceanographic field data collection. Worked on design, fabrication, and assembly tasks for various lab development projects. Participated in field tests of drone research vehicles.

Funding Support: none

International Collaboration: No

International Travel: No

Chandler Campbell

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Most Senior Project Role: Undergraduate Student

Nearest Person Month Worked: 0

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

Funding Support: none

International Collaboration: No

International Travel: No

Zach Cantrell

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Most Senior Project Role: Undergraduate Student

Nearest Person Month Worked: 0

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

Funding Support: None

International Collaboration: No

International Travel: No

Fern Capittifenton

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Most Senior Project Role: Undergraduate Student

Nearest Person Month Worked: 2

Contribution to the Project: Processed samples in the laboratory, outreach activities

Funding Support: MSI, State

International Collaboration: No

International Travel: No

Mia Chamberlin

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Most Senior Project Role: Undergraduate Student

Nearest Person Month Worked: 0

Contribution to the Project: Outreach activities

Funding Support: MSI, Private Donation

International Collaboration: No

International Travel: No

Iris Jane Chan

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Most Senior Project Role: Undergraduate Student

Nearest Person Month Worked: 0

Contribution to the Project: Outreach activities

Funding Support: Coastal Fund, NOAA BWET

International Collaboration: No

International Travel: No

Isabelle Check

Email: isabellacheck@ucsb.edu

Most Senior Project Role: Undergraduate Student

Nearest Person Month Worked: 1

Contribution to the Project: Outreach activities

Funding Support: None

International Collaboration: No

International Travel: No

Jamie Chen

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Most Senior Project Role: Undergraduate Student

Nearest Person Month Worked: 0

Contribution to the Project: Processed samples in the laboratory

Funding Support: none

International Collaboration: No

International Travel: No

Jeffrey Childs

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Most Senior Project Role: Undergraduate Student

Nearest Person Month Worked: 0

Contribution to the Project: Outreach activities

Funding Support: Coastal Fund, NOAA BWET

International Collaboration: No

International Travel: No

Madison Clarke

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Most Senior Project Role: Undergraduate Student

Nearest Person Month Worked: 0

Contribution to the Project: Outreach activities

Funding Support: Coastal Fund, NOAA BWET

International Collaboration: No

International Travel: No

Makenna Colucci

Email: makennacolucci@ucsb.edu

Most Senior Project Role: Undergraduate Student

Nearest Person Month Worked: 2

Contribution to the Project: Analysis of LTER images

Funding Support: none

International Collaboration: No

International Travel: No

Annie Combs

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Most Senior Project Role: Undergraduate Student

Nearest Person Month Worked: 0

Contribution to the Project: Outreach activities

Funding Support: Coastal Fund, NOAA BWET

International Collaboration: No

International Travel: No

Kassandra Cook

Email: kcook@ucsb.edu

Most Senior Project Role: Undergraduate Student

Nearest Person Month Worked: 0

Contribution to the Project: Outreach activities

Funding Support: Coastal Fund, NOAA BWET

International Collaboration: No

International Travel: No

Sarah Cowan

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Most Senior Project Role: Undergraduate Student

Nearest Person Month Worked: 0

Contribution to the Project: Analysis of LTER images

Funding Support: none

International Collaboration: No

International Travel: No

Peter Culpepper

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Most Senior Project Role: Undergraduate Student

Nearest Person Month Worked: 0

Contribution to the Project: Outreach activities

Funding Support: Coastal Fund, NOAA BWET

International Collaboration: No

International Travel: No

Stephen Curry

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Most Senior Project Role: Undergraduate Student

Nearest Person Month Worked: 0

Contribution to the Project: Outreach activities

Funding Support: Coastal Fund, NOAA BWET

International Collaboration: No

International Travel: No

Daisy Cuthbert

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Most Senior Project Role: Undergraduate Student

Nearest Person Month Worked: 1

Contribution to the Project: Outreach activities

Funding Support: None

International Collaboration: No

International Travel: No

Tyler Daniel

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Most Senior Project Role: Undergraduate Student

Nearest Person Month Worked: 0

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

Funding Support: NSF

International Collaboration: No

International Travel: No

Ella Deardorff

Email: elladeardorff@gmail.com

Most Senior Project Role: Undergraduate Student

Nearest Person Month Worked: 0

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

Funding Support: none

International Collaboration: No

International Travel: No

Evan Deas

Email: evandear@ucsb.edu

Most Senior Project Role: Undergraduate Student

Nearest Person Month Worked: 0

Contribution to the Project: Outreach activities

Funding Support: Coastal Fund, NOAA BWET

International Collaboration: No

International Travel: No

Junyu Deng

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Most Senior Project Role: Undergraduate Student

Nearest Person Month Worked: 0

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

Funding Support: None

International Collaboration: No

International Travel: No

Gorman Deyana

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Most Senior Project Role: Undergraduate Student

Nearest Person Month Worked: 0

Contribution to the Project: Outreach activities

Funding Support: Coastal Fund, NOAA BWET

International Collaboration: No

International Travel: No

Alecia Dezzani

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Most Senior Project Role: Undergraduate Student

Nearest Person Month Worked: 0

Contribution to the Project: Outreach activities

Funding Support: Coastal Fund, NOAA BWET

International Collaboration: No

International Travel: No

Fiona Diskin

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Most Senior Project Role: Undergraduate Student

Nearest Person Month Worked: 1

Contribution to the Project: Outreach activities

Funding Support: MSI, Private Donation

International Collaboration: No

International Travel: No

Hannah Ditzler

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Most Senior Project Role: Undergraduate Student

Nearest Person Month Worked: 0

Contribution to the Project: Invert Settlement Project, Scientific Scuba Diver, Assisted with kelp forest laboratory, field and data activities. Outreach

Funding Support: NSF

International Collaboration: No

International Travel: No

Will Dohn

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Most Senior Project Role: Undergraduate Student

Nearest Person Month Worked: 1

Contribution to the Project: Outreach activities

Funding Support: None

International Collaboration: No

International Travel: No

Shey Dorji

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Most Senior Project Role: Undergraduate Student

Nearest Person Month Worked: 0

Contribution to the Project: Outreach activities

Funding Support: Coastal Fund, NOAA BWET

International Collaboration: No

International Travel: No

Emmaline Dugan

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Most Senior Project Role: Undergraduate Student

Nearest Person Month Worked: 0

Contribution to the Project: Assisted with field sampling and processed biotic samples

Funding Support: none

International Collaboration: No

International Travel: No

Kylee Dungan

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Most Senior Project Role: Undergraduate Student

Nearest Person Month Worked: 1

Contribution to the Project: Outreach activities

Funding Support: MSI, Private Donation

International Collaboration: No

International Travel: No

Taylor Dyck

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Most Senior Project Role: Undergraduate Student

Nearest Person Month Worked: 0

Contribution to the Project: Outreach activities

Funding Support: Coastal Fund, NOAA BWET

International Collaboration: No

International Travel: No

Jenny Ear

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Most Senior Project Role: Undergraduate Student

Nearest Person Month Worked: 0

Contribution to the Project: Outreach activities

Funding Support: Coastal Fund, NOAA BWET

International Collaboration: No

International Travel: No

Samantha Elbayer

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Most Senior Project Role: Undergraduate Student

Nearest Person Month Worked: 0

Contribution to the Project: Outreach activities

Funding Support: Coastal Fund, NOAA BWET

International Collaboration: No

International Travel: No

Samantha Ellman

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Most Senior Project Role: Undergraduate Student

Nearest Person Month Worked: 0

Contribution to the Project: Outreach activities

Funding Support: Coastal Fund, NOAA BWET

International Collaboration: No

International Travel: No

Torreyann English

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Most Senior Project Role: Undergraduate Student

Nearest Person Month Worked: 0

Contribution to the Project: Processed samples in the laboratory

Funding Support: none

International Collaboration: No

International Travel: No

Thomas Evans

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Most Senior Project Role: Undergraduate Student

Nearest Person Month Worked: 0

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

Funding Support: None

International Collaboration: No

International Travel: No

Kirsten Ewing

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Most Senior Project Role: Undergraduate Student

Nearest Person Month Worked: 1

Contribution to the Project: Outreach activities

Funding Support: None

International Collaboration: No

International Travel: No

Veronica Fakult

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Most Senior Project Role: Undergraduate Student

Nearest Person Month Worked: 0

Contribution to the Project: Assisted with LTER field and laboratory research

Funding Support: none

International Collaboration: No

International Travel: No

Ashton Fields

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Most Senior Project Role: Undergraduate Student
Nearest Person Month Worked: 0

Contribution to the Project: Assisted with field sampling and processed biotic samples

Funding Support: none

International Collaboration: No
International Travel: No

Samantha Foon

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

Contribution to the Project: Processed biotic samples in the laboratory

Funding Support: none

International Collaboration: No
International Travel: No

Amelia Fuentes

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

Contribution to the Project: Outreach activities

Funding Support: MSI, Private Donation

International Collaboration: No
International Travel: No

Caroline Fyfe

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Most Senior Project Role: Undergraduate Student
Nearest Person Month Worked: 0

Contribution to the Project: Outreach activities

Funding Support: Coastal Fund, NOAA BWET

International Collaboration: No
International Travel: No

Jordan Gallagher

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Most Senior Project Role: Undergraduate Student

Nearest Person Month Worked: 0

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

Funding Support: NSF

International Collaboration: No

International Travel: No

Charlie Galles

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Most Senior Project Role: Undergraduate Student

Nearest Person Month Worked: 0

Contribution to the Project: Outreach activities

Funding Support: Coastal Fund, NOAA BWET

International Collaboration: No

International Travel: No

Journ Galvan

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Most Senior Project Role: Undergraduate Student

Nearest Person Month Worked: 0

Contribution to the Project: Assisted with field sampling and processed biotic samples

Funding Support: none

International Collaboration: No

International Travel: No

Luis Garcia

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Most Senior Project Role: Undergraduate Student

Nearest Person Month Worked: 0

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

Funding Support: none

International Collaboration: No

International Travel: No

Nikko Garoufalias

Email: nhgaroufalias@ucsb.edu

Most Senior Project Role: Undergraduate Student

Nearest Person Month Worked: 3

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

Funding Support: NSF

International Collaboration: No

International Travel: No

Madchen Gebhard

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Most Senior Project Role: Undergraduate Student

Nearest Person Month Worked: 0

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

Funding Support: none

International Collaboration: No

International Travel: No

Mikolai Godzik

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Most Senior Project Role: Undergraduate Student

Nearest Person Month Worked: 0

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

Funding Support: none

International Collaboration: No

International Travel: No

Aiko Goldston

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Most Senior Project Role: Undergraduate Student

Nearest Person Month Worked: 0

Contribution to the Project: Assisted with field sampling and processed biotic samples

Funding Support: none

International Collaboration: No

International Travel: No

Daniil Golenchenko

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Most Senior Project Role: Undergraduate Student

Nearest Person Month Worked: 2

Contribution to the Project: Assisted with design and modifications of robotic surface vehicle. Assisted with mooring maintenance.

Funding Support: None

International Collaboration: No

International Travel: No

Elise Gonzales

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Most Senior Project Role: Undergraduate Student

Nearest Person Month Worked: 0

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

Funding Support: NSF

International Collaboration: No

International Travel: No

Tess Gording

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Most Senior Project Role: Undergraduate Student

Nearest Person Month Worked: 0

Contribution to the Project: Analysis of LTER images

Funding Support: none

International Collaboration: No

International Travel: No

Marea Gordon

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Most Senior Project Role: Undergraduate Student

Nearest Person Month Worked: 0

Contribution to the Project: Assisted with analysis of DIN samples

Funding Support: NSF

International Collaboration: No

International Travel: No

Maya Gorgas

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Most Senior Project Role: Undergraduate Student

Nearest Person Month Worked: 0

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

Funding Support: NSF

International Collaboration: No

International Travel: No

Ciara Gray

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Most Senior Project Role: Undergraduate Student

Nearest Person Month Worked: 0

Contribution to the Project: Outreach activities

Funding Support: Coastal Fund, NOAA BWET

International Collaboration: No

International Travel: No

Finley Greene

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Most Senior Project Role: Undergraduate Student

Nearest Person Month Worked: 1

Contribution to the Project: Outreach activities

Funding Support: MSI, Private Donation

International Collaboration: No

International Travel: No

Annie Greenslade

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Most Senior Project Role: Undergraduate Student

Nearest Person Month Worked: 0

Contribution to the Project: Outreach activities

Funding Support: Coastal Fund, NOAA BWET

International Collaboration: No
International Travel: No
Michela Gunther
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Most Senior Project Role: Undergraduate Student
Nearest Person Month Worked: 1

Contribution to the Project: Outreach activities

Funding Support: MSI, Private Donation

International Collaboration: No
International Travel: No
Simren Gupta
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Most Senior Project Role: Undergraduate Student
Nearest Person Month Worked: 1

Contribution to the Project: Outreach activities

Funding Support: MSI, Private Donation

International Collaboration: No
International Travel: No
Alexander Hakanson
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Most Senior Project Role: Undergraduate Student
Nearest Person Month Worked: 0

Contribution to the Project: Analysis of LTER images

Funding Support: none

International Collaboration: No
International Travel: No
Madison Hampton
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Most Senior Project Role: Undergraduate Student
Nearest Person Month Worked: 1

Contribution to the Project: Outreach activities

Funding Support: MSI, Private Donation

International Collaboration: No
International Travel: No
Lindsey Hargrove
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Most Senior Project Role: Undergraduate Student
Nearest Person Month Worked: 0

Contribution to the Project: Outreach activities

Funding Support: Coastal Fund, NOAA BWET

International Collaboration: No
International Travel: No
Rebecca He
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Most Senior Project Role: Undergraduate Student
Nearest Person Month Worked: 0

Contribution to the Project: Assisted technicians with mooring related work and instrument preparation.

Funding Support: none

International Collaboration: No
International Travel: No
Marisol Hernandez
Email: myh@ucsb.edu
Most Senior Project Role: Undergraduate Student
Nearest Person Month Worked: 0

Contribution to the Project: Outreach activities

Funding Support: Coastal Fund, NOAA BWET

International Collaboration: No
International Travel: No
Allison Hill
Email: ahill2349@outlook.com
Most Senior Project Role: Undergraduate Student
Nearest Person Month Worked: 0

Contribution to the Project: Processed samples in the laboratory, entered and checked data

Funding Support: none

International Collaboration: No

International Travel: No

Jack Holbrook

Email: jrh@ucsb.edu

Most Senior Project Role: Undergraduate Student

Nearest Person Month Worked: 0

Contribution to the Project: Assisted with oceanographic field data collection. Participated in field tests of drone research vehicles.

Funding Support: none

International Collaboration: No

International Travel: No

Paul Huang

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Most Senior Project Role: Undergraduate Student

Nearest Person Month Worked: 0

Contribution to the Project: Outreach activities

Funding Support: MSI, Private Donation

International Collaboration: No

International Travel: No

Kendra Hyles

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Most Senior Project Role: Undergraduate Student

Nearest Person Month Worked: 1

Contribution to the Project: Outreach activities

Funding Support: MSI, Private Donation

International Collaboration: No

International Travel: No

Joshua Iskander

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Most Senior Project Role: Undergraduate Student

Nearest Person Month Worked: 0

Contribution to the Project: Processed biotic samples in the laboratory

Funding Support: none

International Collaboration: No

International Travel: No

Sabrina Jackson

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Most Senior Project Role: Undergraduate Student

Nearest Person Month Worked: 1

Contribution to the Project: Paid undergraduate assisting with LTER laboratory and field research and data management

Funding Support: NSF

International Collaboration: No

International Travel: No

Stu Jaeger

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Most Senior Project Role: Undergraduate Student

Nearest Person Month Worked: 0

Contribution to the Project: Outreach activities

Funding Support: MSI, Private Donation

International Collaboration: No

International Travel: No

Aspen Jankowski

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Most Senior Project Role: Undergraduate Student

Nearest Person Month Worked: 1

Contribution to the Project: Assisted in LTER lab work & data collection

Funding Support: none

International Collaboration: No

International Travel: No

Nick Jarymowycz

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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

Sean Jawetz

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Most Senior Project Role: Undergraduate Student

Nearest Person Month Worked: 0

Contribution to the Project: Assisted with oceanographic field data collection. Worked on design, fabrication, and assembly tasks for various lab development projects. Participated in field tests of drone research vehicles.

Funding Support: NSF

International Collaboration: No

International Travel: No

Chloe Jenniches

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Most Senior Project Role: Undergraduate Student

Nearest Person Month Worked: 1

Contribution to the Project: Outreach activities

Funding Support: MSI, Private Donation

International Collaboration: No

International Travel: No

Lauren Jennings

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Most Senior Project Role: Undergraduate Student

Nearest Person Month Worked: 1

Contribution to the Project: Outreach activities

Funding Support: MSI, Private Donation

International Collaboration: No

International Travel: No

Lucy Johnson

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Most Senior Project Role: Undergraduate Student

Nearest Person Month Worked: 0

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

Funding Support: none

International Collaboration: No

International Travel: No

Morgan Johnson

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Most Senior Project Role: Undergraduate Student

Nearest Person Month Worked: 1

Contribution to the Project: Outreach activities

Funding Support: MSI, Private Donation

International Collaboration: No

International Travel: No

Coby Jolish

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Most Senior Project Role: Undergraduate Student

Nearest Person Month Worked: 0

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

Funding Support: NSF

International Collaboration: No

International Travel: No

Steven Jones

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Most Senior Project Role: Undergraduate Student

Nearest Person Month Worked: 0

Contribution to the Project: Processed biotic samples in the laboratory

Funding Support: none

International Collaboration: No

International Travel: No

Garcia Jonie

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Most Senior Project Role: Undergraduate Student

Nearest Person Month Worked: 0

Contribution to the Project: Outreach activities

Funding Support: Coastal Fund, NOAA BWET

International Collaboration: No

International Travel: No

Eva Juengling Bean

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Most Senior Project Role: Undergraduate Student

Nearest Person Month Worked: 2

Contribution to the Project: Outreach activities

Funding Support: Coastal Fund, NOAA BWET

International Collaboration: No

International Travel: No

Dimitri Katsioularis

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Most Senior Project Role: Undergraduate Student

Nearest Person Month Worked: 0

Contribution to the Project: Analysis of LTER images

Funding Support: none

International Collaboration: No

International Travel: No

Dimitri Katsiovleris

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Most Senior Project Role: Undergraduate Student

Nearest Person Month Worked: 0

Contribution to the Project: Outreach activities

Funding Support: Coastal Fund, NOAA BWET

International Collaboration: No

International Travel: No

Sami Kaur

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Most Senior Project Role: Undergraduate Student

Nearest Person Month Worked: 0

Contribution to the Project: Assisted with field sampling and processed biotic samples

Funding Support: none

International Collaboration: No

International Travel: No

Hannah Keaton

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Most Senior Project Role: Undergraduate Student

Nearest Person Month Worked: 1

Contribution to the Project: Outreach activities

Funding Support: MSI, Private Donation

International Collaboration: No

International Travel: No

Lukas Keeling

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Most Senior Project Role: Undergraduate Student

Nearest Person Month Worked: 0

Contribution to the Project: Assisted with oceanographic field data collection. Participated in field tests of drone research vehicles.

Funding Support: none

International Collaboration: No

International Travel: No

Allison Kelton

Email: akelton@ucsb.edu

Most Senior Project Role: Undergraduate Student

Nearest Person Month Worked: 0

Contribution to the Project: Outreach activities

Funding Support: Coastal Fund, NOAA BWET

International Collaboration: No

International Travel: No

Iris Kern

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Most Senior Project Role: Undergraduate Student

Nearest Person Month Worked: 0

Contribution to the Project: Outreach activities

Funding Support: Coastal Fund, NOAA BWET

International Collaboration: No

International Travel: No

Charles Kernkamp

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Most Senior Project Role: Undergraduate Student

Nearest Person Month Worked: 0

Contribution to the Project: Outreach activities

Funding Support: Coastal Fund, NOAA BWET

International Collaboration: No

International Travel: No

Cadence Killam

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Most Senior Project Role: Undergraduate Student

Nearest Person Month Worked: 1

Contribution to the Project: Assisted in LTER lab work & data collection

Funding Support: none

International Collaboration: No

International Travel: No

Timothy Kirby

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Most Senior Project Role: Undergraduate Student

Nearest Person Month Worked: 0

Contribution to the Project: Processed samples in the laboratory

Funding Support: none

International Collaboration: No

International Travel: No

Wyatt Koolmees

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Most Senior Project Role: Undergraduate Student

Nearest Person Month Worked: 0

Contribution to the Project: Assisted with field sampling and processed biotic samples

Funding Support: none

International Collaboration: No

International Travel: No

Karina Krebs

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Most Senior Project Role: Undergraduate Student

Nearest Person Month Worked: 0

Contribution to the Project: data collection; sample analysis; equipment/instrument maintenance

Funding Support: NSF

International Collaboration: No

International Travel: No

Kimberly Krotine

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Most Senior Project Role: Undergraduate Student

Nearest Person Month Worked: 0

Contribution to the Project: Outreach activities

Funding Support: Coastal Fund, NOAA BWET

International Collaboration: No

International Travel: No

Maggie Lai

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Most Senior Project Role: Undergraduate Student

Nearest Person Month Worked: 1

Contribution to the Project: Outreach activities

Funding Support: None

International Collaboration: No

International Travel: No

Rachel Lam

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Most Senior Project Role: Undergraduate Student

Nearest Person Month Worked: 0

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

Funding Support: None

International Collaboration: No

International Travel: No

Renee LaManna

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Most Senior Project Role: Undergraduate Student

Nearest Person Month Worked: 0

Contribution to the Project: Scientific Scuba diver, Fish Gut Content Analysis Project, Assisted with kelp forest laboratory, field and data activities.

Funding Support: NSF

International Collaboration: No

International Travel: No

Chihei Lao

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Most Senior Project Role: Undergraduate Student

Nearest Person Month Worked: 0

Contribution to the Project: Assisted with field sampling and processed biotic samples, volunteered at outreach events

Funding Support: none

International Collaboration: No

International Travel: No

Catherine Lawrence

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Most Senior Project Role: Undergraduate Student

Nearest Person Month Worked: 0

Contribution to the Project: Assisted with field sampling and processed samples in the laboratory

Funding Support: none

International Collaboration: No

International Travel: No

Lauren Lazarevich

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Most Senior Project Role: Undergraduate Student

Nearest Person Month Worked: 1

Contribution to the Project: Outreach activities

Funding Support: MSI, Private Donation

International Collaboration: No

International Travel: No

Katherine Le

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Most Senior Project Role: Undergraduate Student

Nearest Person Month Worked: 0

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

Funding Support: State UCSB

International Collaboration: No

International Travel: No

Tasi LeDonne

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Most Senior Project Role: Undergraduate Student

Nearest Person Month Worked: 0

Contribution to the Project: Outreach activities

Funding Support: Coastal Fund, NOAA BWET

International Collaboration: No

International Travel: No

Jessilin Lee

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Most Senior Project Role: Undergraduate Student

Nearest Person Month Worked: 1

Contribution to the Project: Outreach activities

Funding Support: None

International Collaboration: No

International Travel: No

Forest Lin

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Most Senior Project Role: Undergraduate Student

Nearest Person Month Worked: 0

Contribution to the Project: Processed samples in the laboratory

Funding Support: none

International Collaboration: No

International Travel: No

Michelle Lin

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Most Senior Project Role: Undergraduate Student

Nearest Person Month Worked: 1

Contribution to the Project: Outreach activities

Funding Support: None

International Collaboration: No

International Travel: No

Mykala Listori

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Most Senior Project Role: Undergraduate Student

Nearest Person Month Worked: 0

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

Funding Support: MSI, Private Donation

International Collaboration: No

International Travel: No

Fiona Litton

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Most Senior Project Role: Undergraduate Student

Nearest Person Month Worked: 1

Contribution to the Project: Assisted in LTER lab work & data collection

Funding Support: none

International Collaboration: No

International Travel: No

Mia Lombardo

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Most Senior Project Role: Undergraduate Student

Nearest Person Month Worked: 0

Contribution to the Project: Outreach activities

Funding Support: Coastal Fund, NOAA BWET

International Collaboration: No

International Travel: No

Emmaline Loo

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Most Senior Project Role: Undergraduate Student

Nearest Person Month Worked: 0

Contribution to the Project: Assisted with field sampling and processed biotic samples

Funding Support: none

International Collaboration: No

International Travel: No

Allen Loomis

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Most Senior Project Role: Undergraduate Student

Nearest Person Month Worked: 1

Contribution to the Project: Outreach activities

Funding Support: MSI, Private Donation

International Collaboration: No

International Travel: No

Jamie Lopez

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Most Senior Project Role: Undergraduate Student

Nearest Person Month Worked: 2

Contribution to the Project: Assisted in LTER lab work & data collection

Funding Support: NSF

International Collaboration: No

International Travel: No

Gianna Lucchesi

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Most Senior Project Role: Undergraduate Student

Nearest Person Month Worked: 2

Contribution to the Project: Outreach activities

Funding Support: MSI, Private Donation

International Collaboration: No

International Travel: No

Tao Lupien

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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

Leigh Lyter

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Most Senior Project Role: Undergraduate Student

Nearest Person Month Worked: 0

Contribution to the Project: Outreach activities

Funding Support: MSI, Private Donation

International Collaboration: No

International Travel: No

Parker Malhotra

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Most Senior Project Role: Undergraduate Student

Nearest Person Month Worked: 1

Contribution to the Project: Outreach activities

Funding Support: MSI, Private Donation

International Collaboration: No

International Travel: No

Zoe Manalo

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Most Senior Project Role: Undergraduate Student

Nearest Person Month Worked: 0

Contribution to the Project: Outreach activities

Funding Support: MSI, Private Donation

International Collaboration: No

International Travel: No

Arielle Martinka

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Most Senior Project Role: Undergraduate Student

Nearest Person Month Worked: 0

Contribution to the Project: Outreach activities

Funding Support: Coastal Fund, NOAA BWET

International Collaboration: No

International Travel: No

Noah Mayne

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Most Senior Project Role: Undergraduate Student

Nearest Person Month Worked: 0

Contribution to the Project: Outreach activities

Funding Support: Coastal Fund, NOAA BWET

International Collaboration: No

International Travel: No

Elizabeth McEligot

Email: elizabethmceligot@ucsb.edu

Most Senior Project Role: Undergraduate Student

Nearest Person Month Worked: 3

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

Funding Support: None

International Collaboration: No

International Travel: No

David McNeill

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Most Senior Project Role: Undergraduate Student

Nearest Person Month Worked: 0

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

Funding Support: None

International Collaboration: No

International Travel: No

Mirabella Meoni

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Most Senior Project Role: Undergraduate Student

Nearest Person Month Worked: 0

Contribution to the Project: Processed samples in the laboratory

Funding Support: none

International Collaboration: No

International Travel: No

Lucy Mills

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Most Senior Project Role: Undergraduate Student

Nearest Person Month Worked: 0

Contribution to the Project: Processed samples in the laboratory

Funding Support: none

International Collaboration: No

International Travel: No

Stephane Mita

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Most Senior Project Role: Undergraduate Student

Nearest Person Month Worked: 0

Contribution to the Project: Processed samples in the laboratory

Funding Support: none

International Collaboration: No

International Travel: No

Tyrese Mitchem

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Most Senior Project Role: Undergraduate Student

Nearest Person Month Worked: 1

Contribution to the Project: Outreach activities

Funding Support: MSI, Private Donation

International Collaboration: No

International Travel: No

Lyla Moes

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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

Tristen Moran

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Most Senior Project Role: Undergraduate Student

Nearest Person Month Worked: 0

Contribution to the Project: Processed samples in the laboratory

Funding Support: none

International Collaboration: No

International Travel: No

Isabella Morant

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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

Luiza Moreno

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Most Senior Project Role: Undergraduate Student

Nearest Person Month Worked: 0

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

Funding Support: NSF

International Collaboration: No

International Travel: No

Alethia Moreno

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Most Senior Project Role: Undergraduate Student

Nearest Person Month Worked: 1

Contribution to the Project: Outreach activities

Funding Support: MSI, Private Donation

International Collaboration: No

International Travel: No

Seamus Morrison

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Most Senior Project Role: Undergraduate Student

Nearest Person Month Worked: 0

Contribution to the Project: Outreach activities

Funding Support: Coastal Fund, NOAA BWET

International Collaboration: No

International Travel: No

Kuba Naum

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Most Senior Project Role: Undergraduate Student

Nearest Person Month Worked: 0

Contribution to the Project: Outreach activities

Funding Support: MSI, Private Donation

International Collaboration: No

International Travel: No

Jordan Ng

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Most Senior Project Role: Undergraduate Student

Nearest Person Month Worked: 1

Contribution to the Project: Outreach activities

Funding Support: MSI, Private Donation

International Collaboration: No

International Travel: No

Katie Ngo

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Most Senior Project Role: Undergraduate Student

Nearest Person Month Worked: 0

Contribution to the Project: Processed samples in the laboratory

Funding Support: none

International Collaboration: No

International Travel: No

Cassiel Nortier-Tilly

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Most Senior Project Role: Undergraduate Student

Nearest Person Month Worked: 0

Contribution to the Project: Processed samples in the laboratory

Funding Support: none

International Collaboration: No

International Travel: No

Alex O'Brien

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Most Senior Project Role: Undergraduate Student

Nearest Person Month Worked: 0

Contribution to the Project: Assisted with oceanographic field data collection. Participated in field tests of drone research vehicles.

Funding Support: none

International Collaboration: No

International Travel: No

Jacob Ochoa

Email: jakeochoa97@gmail.com

Most Senior Project Role: Undergraduate Student

Nearest Person Month Worked: 0

Contribution to the Project: Outreach activities

Funding Support: Coastal Fund, NOAA BWET

International Collaboration: No

International Travel: No

Kai Oda

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Most Senior Project Role: Undergraduate Student

Nearest Person Month Worked: 0

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

Funding Support: NSF

International Collaboration: No

International Travel: No

Ian Packard

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Most Senior Project Role: Undergraduate Student

Nearest Person Month Worked: 0

Contribution to the Project: Outreach activities

Funding Support: Coastal Fund, NOAA BWET

International Collaboration: No

International Travel: No

Kristin Pampeyan

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Most Senior Project Role: Undergraduate Student

Nearest Person Month Worked: 0

Contribution to the Project: Outreach activities

Funding Support: Coastal Fund, NOAA BWET

International Collaboration: No

International Travel: No

Emily Parks

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Most Senior Project Role: Undergraduate Student

Nearest Person Month Worked: 0

Contribution to the Project: Assisted with field sampling and processed biotic samples

Funding Support: none

International Collaboration: No

International Travel: No

Ashwini Patil

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Most Senior Project Role: Undergraduate Student

Nearest Person Month Worked: 0

Contribution to the Project: Assisted with field sampling and processed biotic samples

Funding Support: none

International Collaboration: No

International Travel: No

Cameron Penn

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Most Senior Project Role: Undergraduate Student

Nearest Person Month Worked: 1

Contribution to the Project: Paid undergraduate assisting with LTER field and laboratory research

Funding Support: NSF

International Collaboration: No

International Travel: No

Hailey Pereyra

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Most Senior Project Role: Undergraduate Student

Nearest Person Month Worked: 1

Contribution to the Project: Outreach activities

Funding Support: MSI, Private Donation

International Collaboration: No

International Travel: No

Yanelyn Perez

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Most Senior Project Role: Undergraduate Student

Nearest Person Month Worked: 0

Contribution to the Project: Outreach activities

Funding Support: Coastal Fund, NOAA BWET

International Collaboration: No

International Travel: No

Jared Petry

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Most Senior Project Role: Undergraduate Student

Nearest Person Month Worked: 1

Contribution to the Project: Assisted with kelp forest research

Funding Support: none

International Collaboration: No

International Travel: No

Lauren Pettijohn

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Most Senior Project Role: Undergraduate Student

Nearest Person Month Worked: 1

Contribution to the Project: Outreach activities

Funding Support: MSI, Private Donation

International Collaboration: No

International Travel: No

Elise Phan

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Most Senior Project Role: Undergraduate Student

Nearest Person Month Worked: 1

Contribution to the Project: Outreach activities

Funding Support: MSI

International Collaboration: No

International Travel: No

Tim Piozet

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Most Senior Project Role: Undergraduate Student

Nearest Person Month Worked: 0

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

Funding Support: none

International Collaboration: No

International Travel: No

Gabi Plewe

Email: gplewe@ucsb.edu

Most Senior Project Role: Undergraduate Student

Nearest Person Month Worked: 0

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

Funding Support: None

International Collaboration: No

International Travel: No

Kyler Plouffe

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Most Senior Project Role: Undergraduate Student

Nearest Person Month Worked: 0

Contribution to the Project: Outreach activities

Funding Support: Coastal Fund, NOAA BWET

International Collaboration: No

International Travel: No

James Powers

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Most Senior Project Role: Undergraduate Student

Nearest Person Month Worked: 0

Contribution to the Project: Assisted with field sampling and processed biotic samples

Funding Support: none

International Collaboration: No

International Travel: No

Sean Price

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Most Senior Project Role: Undergraduate Student

Nearest Person Month Worked: 0

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

Funding Support: None

International Collaboration: No

International Travel: No

Erica Prinz

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Most Senior Project Role: Undergraduate Student

Nearest Person Month Worked: 0

Contribution to the Project: Assisted with LTER field and laboratory research

Funding Support: none

International Collaboration: No

International Travel: No

Isabella Puchkova

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Most Senior Project Role: Undergraduate Student

Nearest Person Month Worked: 1

Contribution to the Project: Processed samples in the laboratory

Funding Support: none

International Collaboration: No

International Travel: No

Brenden Pyle

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Most Senior Project Role: Undergraduate Student

Nearest Person Month Worked: 0

Contribution to the Project: Assisted with oceanographic field data collection. Worked on design, fabrication, and assembly tasks for various lab development projects. Participated in field tests of drone research vehicles.

Funding Support: none

International Collaboration: No

International Travel: No

Isabella Ramirez

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

Contribution to the Project: Outreach activities

Funding Support: MSI, Private Donation

International Collaboration: No

International Travel: No

Cheyenne Ramirez

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Most Senior Project Role: Undergraduate Student

Nearest Person Month Worked: 0

Contribution to the Project: Outreach activities

Funding Support: MSI, Private Donation

International Collaboration: No

International Travel: No

Lauren Rappa

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Most Senior Project Role: Undergraduate Student

Nearest Person Month Worked: 1

Contribution to the Project: Assisted with kelp forest research

Funding Support: NSF

International Collaboration: No

International Travel: No

Shane Rathle

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Most Senior Project Role: Undergraduate Student

Nearest Person Month Worked: 0

Contribution to the Project: Outreach activities

Funding Support: Coastal Fund, NOAA BWET

International Collaboration: No

International Travel: No

Maya Reamey

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Most Senior Project Role: Undergraduate Student
Nearest Person Month Worked: 0

Contribution to the Project: Outreach activities

Funding Support: Coastal Fund, NOAA BWET

International Collaboration: No

International Travel: No

Fred Reitman

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Most Senior Project Role: Undergraduate Student

Nearest Person Month Worked: 0

Contribution to the Project: Outreach activities

Funding Support: Coastal Fund, NOAA BWET

International Collaboration: No

International Travel: No

Katie Riley

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Most Senior Project Role: Undergraduate Student

Nearest Person Month Worked: 1

Contribution to the Project: Assisted in LTER lab work & data collection

Funding Support: none

International Collaboration: No

International Travel: No

Claire Roberts

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Most Senior Project Role: Undergraduate Student

Nearest Person Month Worked: 0

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

Funding Support: NSF

International Collaboration: No

International Travel: No

Melanee Robles

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Most Senior Project Role: Undergraduate Student
Nearest Person Month Worked: 0

Contribution to the Project: Assisted with field sampling and processed biotic samples

Funding Support: none

International Collaboration: No
International Travel: No

Orion von Rohr

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

Contribution to the Project: Assisted with LTER field and laboratory research

Funding Support: none

International Collaboration: No
International Travel: No

Sophia Rollins

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Most Senior Project Role: Undergraduate Student
Nearest Person Month Worked: 0

Contribution to the Project: Outreach activities

Funding Support: Coastal Fund, NOAA BWET

International Collaboration: No
International Travel: No

Lex Rosenberg

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

Contribution to the Project: Paid undergraduate assisting with LTER laboratory research and data management and outreach activities

Funding Support: NSF, MSI private

International Collaboration: No
International Travel: No

Vivian Ross

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Most Senior Project Role: Undergraduate Student
Nearest Person Month Worked: 0

Contribution to the Project: Outreach activities

Funding Support: Coastal Fund, NOAA BWET

International Collaboration: No

International Travel: No

Logan Ruggles

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Most Senior Project Role: Undergraduate Student

Nearest Person Month Worked: 0

Contribution to the Project: Outreach activities

Funding Support: Coastal Fund, NOAA BWET

International Collaboration: No

International Travel: No

Andie Rupprecht

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Most Senior Project Role: Undergraduate Student

Nearest Person Month Worked: 0

Contribution to the Project: Assisted with oceanographic field data collection. Worked on design, fabrication, and assembly tasks for various lab development projects. Participated in field tests of drone research vehicles.

Funding Support: NSF

International Collaboration: No

International Travel: No

Mehran Sajjad

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Most Senior Project Role: Undergraduate Student

Nearest Person Month Worked: 1

Contribution to the Project: Outreach activities

Funding Support: MSI, Private Donation

International Collaboration: No

International Travel: No

Abigail Salmon

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Most Senior Project Role: Undergraduate Student

Nearest Person Month Worked: 1

Contribution to the Project: Outreach activities

Funding Support: MSI, Private Donation

International Collaboration: No

International Travel: No

Lauren Salsbury

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Most Senior Project Role: Undergraduate Student

Nearest Person Month Worked: 0

Contribution to the Project: Outreach activities

Funding Support: Coastal Fund, NOAA BWET

International Collaboration: No

International Travel: No

Zoe Salyapongse

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Most Senior Project Role: Undergraduate Student

Nearest Person Month Worked: 1

Contribution to the Project: Outreach activities

Funding Support: MSI, Private Donation

International Collaboration: No

International Travel: No

Rebecca Sandoval

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Most Senior Project Role: Undergraduate Student

Nearest Person Month Worked: 1

Contribution to the Project: Outreach activities

Funding Support: None

International Collaboration: No

International Travel: No

Kenya Santamaria

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Most Senior Project Role: Undergraduate Student

Nearest Person Month Worked: 1

Contribution to the Project: Outreach activities

Funding Support: None

International Collaboration: No

International Travel: No

Eileen Schauerman

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Most Senior Project Role: Undergraduate Student

Nearest Person Month Worked: 0

Contribution to the Project: Outreach activities

Funding Support: Coastal Fund, NOAA BWET

International Collaboration: No

International Travel: No

Ellie Searles

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Most Senior Project Role: Undergraduate Student

Nearest Person Month Worked: 1

Contribution to the Project: Assisted in LTER lab work & data collection

Funding Support: none

International Collaboration: No

International Travel: No

Esther Sheen

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Most Senior Project Role: Undergraduate Student

Nearest Person Month Worked: 0

Contribution to the Project: Processed samples in the laboratory

Funding Support: none

International Collaboration: No

International Travel: No

Jessica Shei

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Most Senior Project Role: Undergraduate Student

Nearest Person Month Worked: 0

Contribution to the Project: Outreach activities

Funding Support: Coastal Fund, NOAA BWET

International Collaboration: No

International Travel: No

Ben Shelby

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Most Senior Project Role: Undergraduate Student

Nearest Person Month Worked: 0

Contribution to the Project: Outreach activities

Funding Support: Coastal Fund, NOAA BWET

International Collaboration: No

International Travel: No

Jordan Sibley

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Most Senior Project Role: Undergraduate Student

Nearest Person Month Worked: 1

Contribution to the Project: Processed samples in the laboratory

Funding Support: none

International Collaboration: No

International Travel: No

Siaa Singh

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Most Senior Project Role: Undergraduate Student

Nearest Person Month Worked: 1

Contribution to the Project: Outreach activities

Funding Support: MSI

International Collaboration: No

International Travel: No

Hana Singleton

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Most Senior Project Role: Undergraduate Student

Nearest Person Month Worked: 0

Contribution to the Project: Assisted with field sampling and processed biotic samples

Funding Support: none

International Collaboration: No

International Travel: No

Daniel Siu

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Most Senior Project Role: Undergraduate Student

Nearest Person Month Worked: 0

Contribution to the Project: Outreach activities

Funding Support: Coastal Fund, NOAA BWET

International Collaboration: No

International Travel: No

Katie Sloan

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Most Senior Project Role: Undergraduate Student

Nearest Person Month Worked: 0

Contribution to the Project: Outreach activities

Funding Support: Coastal Fund, NOAA BWET

International Collaboration: No

International Travel: No

Megan Sloan

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Most Senior Project Role: Undergraduate Student

Nearest Person Month Worked: 0

Contribution to the Project: Outreach activities

Funding Support: MSI, Private Donation

International Collaboration: No

International Travel: No

Tatiana Soglin

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Most Senior Project Role: Undergraduate Student

Nearest Person Month Worked: 0

Contribution to the Project: Outreach activities

Funding Support: Coastal Fund, NOAA BWET

International Collaboration: No

International Travel: No

Margot Solvay

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Most Senior Project Role: Undergraduate Student

Nearest Person Month Worked: 0

Contribution to the Project: Outreach activities

Funding Support: Coastal Fund, NOAA BWET

International Collaboration: No

International Travel: No

Abraham Soto

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Most Senior Project Role: Undergraduate Student

Nearest Person Month Worked: 0

Contribution to the Project: Outreach activities

Funding Support: Coastal Fund, NOAA BWET

International Collaboration: No

International Travel: No

Josie Spiegelman

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Most Senior Project Role: Undergraduate Student

Nearest Person Month Worked: 2

Contribution to the Project: Outreach activities

Funding Support: MSI, Private Donation

International Collaboration: No

International Travel: No

Hailey Springer

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Most Senior Project Role: Undergraduate Student

Nearest Person Month Worked: 1

Contribution to the Project: Assisted in LTER lab work & data collection

Funding Support: none

International Collaboration: No

International Travel: No

Zoe St. Pierre

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Most Senior Project Role: Undergraduate Student

Nearest Person Month Worked: 0

Contribution to the Project: Outreach activities

Funding Support: Coastal Fund, NOAA BWET

International Collaboration: No

International Travel: No

Courtney Stead

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Most Senior Project Role: Undergraduate Student

Nearest Person Month Worked: 0

Contribution to the Project: Outreach activities

Funding Support: Coastal Fund, NOAA BWET

International Collaboration: No

International Travel: No

Andres Stidger

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Most Senior Project Role: Undergraduate Student

Nearest Person Month Worked: 1

Contribution to the Project: Outreach activities

Funding Support: None

International Collaboration: No

International Travel: No

Irvin Tang

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Most Senior Project Role: Undergraduate Student

Nearest Person Month Worked: 0

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

Funding Support: NSF

International Collaboration: No

International Travel: No

Rishima Tewari

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Most Senior Project Role: Undergraduate Student

Nearest Person Month Worked: 1

Contribution to the Project: Outreach activities

Funding Support: MSI, Private Donation

International Collaboration: No

International Travel: No

Jasmine Toni

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Most Senior Project Role: Undergraduate Student

Nearest Person Month Worked: 1

Contribution to the Project: Assisted in LTER lab work & data collection

Funding Support: none

International Collaboration: No

International Travel: No

Evelyn Tsang

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Most Senior Project Role: Undergraduate Student

Nearest Person Month Worked: 1

Contribution to the Project: Outreach activities

Funding Support: None

International Collaboration: No

International Travel: No

Gabbie Ulloa

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Most Senior Project Role: Undergraduate Student

Nearest Person Month Worked: 0

Contribution to the Project: Outreach activities

Funding Support: Coastal Fund, NOAA BWET

International Collaboration: No

International Travel: No

Imanol Ulloa Gutierrez

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Most Senior Project Role: Undergraduate Student

Nearest Person Month Worked: 0

Contribution to the Project: Outreach activities

Funding Support: Coastal Fund, NOAA BWET

International Collaboration: No

International Travel: No

Kylie Van de Wyngaerde

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Most Senior Project Role: Undergraduate Student

Nearest Person Month Worked: 0

Contribution to the Project: implanted heart rate loggers into lobsters and outplanted them inside and outside the kelp forest, outreach activities

Funding Support: NSF

International Collaboration: No

International Travel: No

Amir Van Gieson

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Most Senior Project Role: Undergraduate Student

Nearest Person Month Worked: 0

Contribution to the Project: Outreach activities

Funding Support: Coastal Fund, NOAA BWET

International Collaboration: No

International Travel: No

Andie Van Horn

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Most Senior Project Role: Undergraduate Student

Nearest Person Month Worked: 3

Contribution to the Project: Outreach activities and SBC Newsletter

Funding Support: MSI, Private Donation

International Collaboration: No

International Travel: No

Jennifer Vargas

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Most Senior Project Role: Undergraduate Student

Nearest Person Month Worked: 0

Contribution to the Project: Outreach activities

Funding Support: Coastal Fund, NOAA BWET

International Collaboration: No

International Travel: No

Jennifer Vasquez

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Most Senior Project Role: Undergraduate Student

Nearest Person Month Worked: 0

Contribution to the Project: Outreach activities

Funding Support: Coastal Fund, NOAA BWET

International Collaboration: No

International Travel: No

Jessica Vega

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Most Senior Project Role: Undergraduate Student

Nearest Person Month Worked: 0

Contribution to the Project: Outreach activities

Funding Support: Coastal Fund, NOAA BWET

International Collaboration: No

International Travel: No

Divyaa Venkatachalam

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Most Senior Project Role: Undergraduate Student

Nearest Person Month Worked: 0

Contribution to the Project: Assisted with oceanographic field data collection. Participated in field tests of drone research vehicles.

Funding Support: none

International Collaboration: No

International Travel: No

Kathleen Vick

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Most Senior Project Role: Undergraduate Student

Nearest Person Month Worked: 1

Contribution to the Project: Outreach activities

Funding Support: MSI, Private Donation

International Collaboration: No

International Travel: No

Lauren Wachtell

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Most Senior Project Role: Undergraduate Student

Nearest Person Month Worked: 0

Contribution to the Project: Processed samples in the laboratory, outreach activities

Funding Support: Coastal Fund, NOAA BWET

International Collaboration: No

International Travel: No

Theresa Wagner

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Most Senior Project Role: Undergraduate Student

Nearest Person Month Worked: 0

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

Funding Support: none

International Collaboration: No

International Travel: No

Noah Wagner

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Most Senior Project Role: Undergraduate Student

Nearest Person Month Worked: 0

Contribution to the Project: Outreach activities

Funding Support: Coastal Fund, NOAA BWET

International Collaboration: No

International Travel: No

Kiara Wagner

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Most Senior Project Role: Undergraduate Student

Nearest Person Month Worked: 1

Contribution to the Project: Paid undergraduate assisting with LTER laboratory research and data management

Funding Support: NSF

International Collaboration: No

International Travel: No

Julia Walsh

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Most Senior Project Role: Undergraduate Student

Nearest Person Month Worked: 1

Contribution to the Project: Outreach activities

Funding Support: None

International Collaboration: No

International Travel: No

Miette Walton

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Most Senior Project Role: Undergraduate Student

Nearest Person Month Worked: 0

Contribution to the Project: Outreach activities

Funding Support: Coastal Fund, NOAA BWET

International Collaboration: No

International Travel: No

Miriam Wanner

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Most Senior Project Role: Undergraduate Student

Nearest Person Month Worked: 2

Contribution to the Project: analysed LTER kelp forest data

Funding Support: none

International Collaboration: No

International Travel: No

Jackson Weaver

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Most Senior Project Role: Undergraduate Student

Nearest Person Month Worked: 1

Contribution to the Project: Outreach activities

Funding Support: None

International Collaboration: No

International Travel: No

Bethlehem Wellington

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Most Senior Project Role: Undergraduate Student

Nearest Person Month Worked: 0

Contribution to the Project: Outreach activities

Funding Support: Coastal Fund, NOAA BWET

International Collaboration: No

International Travel: No

Lauren Whightsil

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Most Senior Project Role: Undergraduate Student

Nearest Person Month Worked: 0

Contribution to the Project: Outreach activities

Funding Support: Coastal Fund, NOAA BWET

International Collaboration: No

International Travel: No

Gabi Wilds

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Most Senior Project Role: Undergraduate Student

Nearest Person Month Worked: 0

Contribution to the Project: Processed samples in the laboratory

Funding Support: none

International Collaboration: No

International Travel: No

Jonathan Williams

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Most Senior Project Role: Undergraduate Student

Nearest Person Month Worked: 0

Contribution to the Project: Outreach activities

Funding Support: Coastal Fund, NOAA BWET

International Collaboration: No

International Travel: No

Talula Wilmot

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Most Senior Project Role: Undergraduate Student

Nearest Person Month Worked: 1

Contribution to the Project: Outreach activities

Funding Support: None

International Collaboration: No

International Travel: No

Lilly Witonsky

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Most Senior Project Role: Undergraduate Student

Nearest Person Month Worked: 0

Contribution to the Project: Outreach activities

Funding Support: Coastal Fund, NOAA BWET

International Collaboration: No

International Travel: No

Marine Wloczysiak

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Most Senior Project Role: Undergraduate Student

Nearest Person Month Worked: 1

Contribution to the Project: Paid undergraduate assisting with LTER laboratory research and data management and outreach activities

Funding Support: NSF, MSI private

International Collaboration: No

International Travel: No

Kelsey Works

Email: kelseyworks@ucsb.edu

Most Senior Project Role: Undergraduate Student

Nearest Person Month Worked: 1

Contribution to the Project: Outreach activities

Funding Support: None

International Collaboration: No

International Travel: No

Abigail Wriston

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Most Senior Project Role: Undergraduate Student

Nearest Person Month Worked: 1

Contribution to the Project: Outreach activities

Funding Support: None

International Collaboration: No

International Travel: No

Victoria Yang

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Most Senior Project Role: Undergraduate Student

Nearest Person Month Worked: 0

Contribution to the Project: Assisted with analysis of DIN samples

Funding Support: NSF

International Collaboration: No

International Travel: No

Sammi Yeung

Email: samiiyeung@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: NSF

International Collaboration: No

International Travel: No

Mira Yocom

Email: miralyna@ucsb.edu

Most Senior Project Role: Undergraduate Student

Nearest Person Month Worked: 0

Contribution to the Project: Assisted with field sampling and processed samples in the laboratory

Funding Support: none

International Collaboration: No

International Travel: No

Molly Banks

Email: mollybanks@ucsb.edu

Most Senior Project Role: Research Experience for Undergraduates (REU) Participant

Nearest Person Month Worked: 1

Contribution to the Project: Paid undergraduate assisting with LTER field and laboratory research

Funding Support: NSF, REU

International Collaboration: No

International Travel: No

Year of schooling completed: Junior

Home Institution: UCSB

Government fiscal year(s) was this REU participant supported:

Rachel Davis

Email: racheldavis@ucsb.edu

Most Senior Project Role: Research Experience for Undergraduates (REU) Participant

Nearest Person Month Worked: 4

Contribution to the Project: Paid undergraduate assisting with LTER laboratory and field research and data management

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:

Matthew Gerigk

Email: matthewgerigk@ucsb.edu

Most Senior Project Role: Research Experience for Undergraduates (REU) Participant

Nearest Person Month Worked: 2

Contribution to the Project: Assisted with design and modifications of robotic surface vehicle. Assisted with mooring maintenance.

Funding Support: none

International Collaboration: No

International Travel: No

Year of schooling completed: Junior

Home Institution: UCSB

Government fiscal year(s) was this REU participant supported:

Sabrina Grant

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Most Senior Project Role: Research Experience for Undergraduates (REU) Participant

Nearest Person Month Worked: 1

Contribution to the Project: Paid undergraduate assisting with LTER field and laboratory research

Funding Support: NSF

International Collaboration: No

International Travel: No

Year of schooling completed: Junior

Home Institution: UCSB

Government fiscal year(s) was this REU participant supported:

Lukas Keeling

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Most Senior Project Role: Research Experience for Undergraduates (REU) Participant

Nearest Person Month Worked: 0

Contribution to the Project: Assisted with oceanographic field data collection. Implemented drone-based video algorithm for measuring ocean currents

Funding Support: NSF

International Collaboration: No

International Travel: No

Year of schooling completed: Junior

Home Institution: UCSB

Government fiscal year(s) was this REU participant supported: 2021, 2020

Samuel Rivera

Email: samriver21@g.ucla.edu

Most Senior Project Role: Research Experience for Undergraduates (REU) Participant

Nearest Person Month Worked: 3

Contribution to the Project: conducted research project on beach consumers and remote sensing of wrack and beach features

Funding Support: NSF

International Collaboration: No

International Travel: No

Year of schooling completed:

Home Institution:

Government fiscal year(s) was this REU participant supported:

Joaquin Sandoval

Email: joaquinsandoval@ucsb.edu

Most Senior Project Role: Research Experience for Undergraduates (REU) Participant

Nearest Person Month Worked: 1

Contribution to the Project: Paid undergraduate assisting with LTER field and laboratory research

Funding Support: NSF, REU

International Collaboration: No

International Travel: No

Year of schooling completed: Junior

Home Institution: UCSB

Government fiscal year(s) was this REU participant supported:

Elika Zahedi

Email: ezahedi@ucsb.edu

Most Senior Project Role: Research Experience for Undergraduates (REU) Participant

Nearest Person Month Worked: 4

Contribution to the Project: Paid undergraduate assisting with LTER laboratory and field research and data management

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:

What other organizations have been involved as partners?

Name	Type of Partner Organization	Location
<u>American Assoc. University Women Tech Trek</u>	Other Nonprofits	Santa Barbara, CA
<u>California Dept of Fish and Wildlife</u>	State or Local Government	Sacramento, CA
<u>Point Blue</u>	Other Nonprofits	California
<u>Santa Barbara Unified School District</u>	School or School Systems	Santa Barbara, CA
<u>Scripps Institution of Oceanography</u>	Academic Institution	La Jolla, CA
<u>Southern California Coastal Ocean Observing System (SCCOOS)</u>	Other Organizations (foreign or domestic)	La Jolla, California
<u>The Bay Foundation</u>	Other Nonprofits	Santa Monica, CA
<u>The Nature Conservancy</u>	Other Nonprofits	California
<u>US Geological Survey</u>	Other Organizations (foreign or domestic)	Santa Cruz, CA
<u>University of Auckland</u>	Academic Institution	Auckland, New Zealand
<u>University of California, Davis</u>	Academic Institution	Bodega Bay, CA
<u>University of California, Los Angeles</u>	Academic Institution	Los Angeles, CA
<u>California Sea Grant Extension</u>	Academic Institution	La Jolla, CA
<u>University of California, Santa Cruz</u>	Academic Institution	Santa Cruz, CA
<u>University of Quebec a Montreal</u>	Academic Institution	Monteral, Quebeck Canada
<u>University of Wisconsin</u>	Academic Institution	Milwalkee, WI
<u>Channel Islands National Marine Sanctuary</u>	Other Organizations (foreign or domestic)	Santa Barbara, CA
<u>Channel Islands National Park</u>	Other Organizations (foreign or domestic)	Ventura, CA
<u>City of Santa Barbara</u>	State or Local Government	Santa Barbara, CA

Name	Type of Partner Organization	Location
County of Santa Barbara	State or Local Government	Santa Barbara, CA
Moss Landing Marine Laboratory	Academic Institution	Moss Landing, CA
Ocean Education Trust	Other Nonprofits	Kingston, RI
Pepperdine University	Academic Institution	California

Full details of organizations that have been involved as partners:

American Assoc. University 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.

California Dept of Fish and Wildlife

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

Partner's Contribution to the Project:
 Collaborative Research

More Detail on Partner and Contribution: Collaborate on fishery and oil spill studies

California Sea Grant Extension

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 climate change and fisheries research

Channel Islands National Marine Sanctuary

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: Collaborate 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:

Collaborative Research

More Detail on Partner and Contribution: Share and collaborate 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:

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:

Ocean Education Trust

Organization Type: Other Nonprofits

Organization Location: Kingston, RI

Partner's Contribution to the Project:

Facilities

Personnel Exchanges

More Detail on Partner and Contribution: NautilusLive! program, ; in-kind support, supply facilities and equipment, exchange personnel.

Pepperdine University

Organization Type: Academic Institution

Organization Location: California

Partner's Contribution to the Project:

Collaborative Research

More Detail on Partner and Contribution: Collaboration on proposals and working groups on sandy beach ecosystems

Point Blue

Organization Type: Other Nonprofits

Organization Location: California

Partner's Contribution to the Project:

Collaborative Research

More Detail on Partner and Contribution: Collaborate on beach ecosystem studies

Santa Barbara Unified School District

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 and educational outreach 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 climate assessment study and manuscripts

Southern California Coastal Ocean Observing System (SCCOOS)

Organization Type: Other Organizations (foreign or domestic)

Organization Location: La Jolla, 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

The Bay Foundation

Organization Type: Other Nonprofits

Organization Location: Santa Monica, CA

Partner's Contribution to the Project:

Collaborative Research

More Detail on Partner and Contribution: Collaborate on beach ecosystem research

The Nature Conservancy

Organization Type: Other Nonprofits

Organization Location: California

Partner's Contribution to the Project:

Collaborative Research

More Detail on Partner and Contribution: Collaboration on beach ecosystem research

US Geological Survey

Organization Type: Other Organizations (foreign or domestic)

Organization Location: Santa Cruz, CA

Partner's Contribution to the Project:

In-Kind Support
Collaborative Research

More Detail on Partner and Contribution: 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:

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:

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 oceanography and on kelp forest dynamics

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 population research

University of Quebec a Montreal

Organization Type: Academic Institution
Organization Location: Montral, Quebec Canada

Partner's Contribution to the Project:
Other: Performed analyses

More Detail on Partner and Contribution: benthic sediment analyses for lignin content
University of Wisconsin

Organization Type: Academic Institution
Organization Location: Milwalkee, WI

Partner's Contribution to the Project:
Collaborative Research

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

Were other collaborators or contacts involved? If so, please provide details.

Nothing to report

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Impacts

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

Project data and personnel contributed to a greater understanding of the general relationships between metacommunity parameters and stability and diversity and ecosystem function across a diverse range of ecosystems, key problems in contemporary ecology. In the past year, we quantified DSRs for composition and aggregate variability in local communities and metacommunities (Wisnoski et al. 2023). At the local scale, more diverse communities were less variable, but this effect was stronger for aggregate than compositional properties. We found no stabilizing effect of γ -diversity on metacommunity variability, but β -diversity played a strong role in reducing compositional spatial synchrony, which reduced regional variability. Spatial synchrony differed among taxa, suggesting differences in stabilization by spatial processes. However, metacommunity variability was more strongly driven by local variability than by spatial synchrony. Across a broader range of taxa, our results suggest that high γ -diversity does not consistently stabilize aggregate properties at regional scales without sufficient spatial β -diversity to reduce spatial synchrony.

What is the impact on other disciplines?

A key question in fisheries management is whether spatial management tools like marine protected areas (MPAs) are effective and benefit fisheries in addition to ecosystems. Model simulations show that a network of marine reserves can enhance yield in depleted fisheries by protecting populations, particularly large, old spawners that supply larvae for interspersed fishing grounds. The ability of marine reserves to enhance sustainable fisheries is much less evident. In 2003, a network of no-take marine reserves was established in the Northern Channel Islands (NCI) of southern California (CA) to conserve biodiversity and to eventually enhance local fisheries through spillover of larvae, juveniles, and adults. The reserve network impacted the local CA spiny lobster (*Panulirus interruptus*) fishery by removing about 20% of fishing grounds in the NCI. We found empirical evidence of a marine reserve network improving yield for the lobster fishery, apparently through the spillover of adult lobsters and behavioral adaptation by the fishing fleet. Results of a Before-After, Control-Impact analysis found catch, effort, and Catch-Per-Unit Effort increased after the establishment of marine reserves in the northern region of the fishery where fishers responded by fishing intensively at reserve borders, but declined in the southern region where they vacated once productive fishing grounds. Our results highlight the value of collaborative research and education programs involving diverse stakeholders for preparing fisheries to operate productively within a seascape that includes a large marine reserve network.

What is the impact on the development of human resources?

Efforts to increase the participation of under-represented groups are achieved through our ongoing Schoolyard program, which targets middle school students in traditionally underserved, low-achieving schools (see Section VII. Outreach, education, training and benefits to society). We also link with campus programs devoted to increasing educational opportunities for low-income students and groups underrepresented in higher education. Since 2001, the number of domestic Underrepresented Minority (URM) undergraduate students at UCSB has increased by 89%, and in fall 2014 UCSB was recognized as a Hispanic Serving Institution (HSI) for achieving 25% Latino undergraduate enrollment. It is the first HIS in the prestigious Association of American Universities, which is an association of 62 leading research universities in the United States and Canada. UCSB's Research Experience & Education Facility (REEF) hosted the 4th Annual REEFlections, which highlighted the science and creativity of 7 UCSB undergraduates who participate in research and work at The REEF. Women and URM students, post docs and faculty participating in SBC have access to professional development training and mentoring in team science leadership, management, and proposal writing. Last year, the Marine Science Institute started an annual scholarship program for underrepresented students interested in scientific diving, with the goal of supporting them through the prerequisites of open water certification and practice dives; as the most active local scientific diving program at UCSB. SBC LTER committed to incorporating these students into our field program to build their experience level. Diving is an important skill for doing fieldwork in shallow marine habitats. This year, in collaboration with the Moorea Coral Reef LTER, SBC received a supplement to jump-start this program and make it a sustainable pipeline to entrain underrepresented undergraduate students in scientific diving and subtidal research. Eight students are currently participating and we are rolling out a structured education program for them and other undergraduates involved in SBC this year.

What was the impact on teaching and educational experiences?

SBC partners with UCSB's Research Experience & Education Facility (REEF), a teaching aquarium and marine ecology educational facility for UCSB and K-12 schools and colleges in Santa Barbara and Ventura counties. SBC's Schoolyard LTER (sLTER) program is organized around a theme of kelp forest ecology and is developed around and delivered through the REEF's *Oceans-to-Classrooms* curricula. We focus on long-term connections with underserved, low-achieving schools that include year-round on- and off-campus programs. SBC sLTER curriculum is rich in STEM content, aligns with Next Generation Science Standards (NGSS), Common Core Standards, as well as NOAA's Climate and Ocean Literacy Principles.

As a result of meeting the challenges of the pandemic, the REEF now offers both in-person and virtual programming. In 2022, alone, the REEF served over 30 K-12 schools in the TriCounties (SLO/SB/Ventura). While many other California schools and communities also engage the REEF, our online presence has allowed us to reach students across the globe through the Virtual REEF. The REEF is now well equipped to meet the varied requests we receive from local educators for designing and offering in-person, distance, and/or online programs. Based on current requests, we estimate returning to pre-pandemic numbers of well over 20,000 K-12, college and general public visitors annually! A point of pride for UCSB, the REEF has partnerships with six campus divisions ranging from Academic Affairs to Student Affairs and Administrative Services to engage undergraduates at multiple levels. These efforts are highly successful, with pre-pandemic levels reaching nearly 4,000 undergraduates annually. With funding from the UCSB Coastal Fund, we provide the undergraduate heart and soul of the REEF and continue to support the Coastal Fund mission and help celebrate, explore and protect our coastal community and all of its inhabitants through education and outreach.

This year, sLTER continued to focus on partnership programs, 1) teacher professional development through our work with the SBC-LTER and the NSF-funded Authentic Research Experiences for Teachers (ARETs) in a cross-site project along with the Arctic (ARC) and Andrews Forest (AND) LTERs, and 2) the American Association of University Women's (AAUW): Tech Trek Program,

The REEF continued to provide teacher professional development through work with the UCSB Santa Barbara Coastal Long Term Ecological Research (SBC LTER) program and the NSF-funded Authentic Research Experiences for Teachers (ARET). This past Summer, two HS science teachers from Milwaukee, WI spent a month at UCSB working with Dr. Gretchen Hofmann's research team conducting an research project exploring the impacts of climate change and the purple sea urchin and how it might influence biodiversity in the kelp forest. Additionally, they worked with SBC EOC, Scott Simon, to develop lesson plans and activities, based on their research, to take back to their classrooms in Milwaukee.

In 2022-23 we resumed our annual summer collaboration with the American Association of University Women (AAUW) and their Tech Trek: Math & Science Camp for Girls. 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. Two groups of 80 girls each (160 TOTAL) 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 residency at UCSB, students participated in “core” science courses. These middle-school-aged girls spend a week at UC Santa Barbara living in the dorms, eating in the dining commons, and learning about science, technology, engineering, math, and medicine (STEM) content and careers. The content includes a boat trip to SBC field sites and includes activities developed around SBC research.

SBC LTER’s partnership with O₂C and the REEF completed another very successful year in teacher professional development, as well as academic support in participant classrooms. We remain committed to equipping educators with the tools they need to teach ocean and environmental science, foster science literacy, and cultivate the next generation of ocean stewards. UCSB began developing a significant relationship with the UCSB Learning Centers. We co-hosted a Summer Data Literacy workshop, in collaboration with Dataspire, that focused on the importance of place-specificity, the kelp forest (SBC), Temperate Rainforest (AND) Arctic ecosystems (ARC). We have continued developing a significant relationship with the UCSB Learning Centers to develop curricula that use SBC science. We continue to use our SBC LTER Schoolyard Series book, *The Golden Forest*, to broaden our K-12 outreach efforts. Our book highlights connections between giant kelp forest and sandy beach ecosystems and has been provided to hundreds of K-8 teachers as part of our partnership with the SBCEO to enhance science content knowledge. Other programmatic outreach efforts include: (1) developing SBC’s [Subtidal Field Guide](#) and (2) annually hosting a booth at the Santa Barbara Earth Day Festival, to raise public awareness about LTER research. Our popular booth features a model of a kelp forest in which SBC students and staff act as 'dive buddies' for children who tour the forest and collect data on kelp forest species using underwater dive slates, and a kelp holdfast dissection activity. In 2023, SBC students participated in the Santa Barbara Earth Day festival hosting a booth on kelp forest ecosystems.

This year SBC LTER started a quarterly newsletter, the *Newsmatocyst*, with the help of SBC undergraduate Andie Van Horn, who designed and executed the newsletter. In it are updates on student projects, new papers, field activities, and other current events. This was part of an effort to keep everyone connected.

SBC Investigators, postdocs and students contributed to stories in the press.

A Changing Sea Floor: Six years after ‘the Blob’ rolled through the Santa Barbara Channel, researchers find lasting effects in the kelp forest communities.
<https://news.ucsb.edu/2022/020774/changing-sea-floor>

The Value of Information: Gathering just the right amount of information is key to proper resource management <https://news.ucsb.edu/2023/020821/value-information>

Facing the Heat: Evaluating the danger that marine heatwaves pose to early life stages of marine life. <https://news.ucsb.edu/2022/020789/facing-heat>

Restoring Dunes on Urban Beaches: Dune restoration could increase the resilience of Southern California's urban beaches to sea level rise. <https://news.ucsb.edu/2023/021127/dune-restoration-could-increase-resilience-southern-californias-urban-beaches-sea-level>

What is the impact on physical resources that form infrastructure?

Research facilities on campus extensively used by SBC researchers also include a flow-through seawater system, small boat and diving operations, analytical chemistry instrumentation, and computational resources provided by MSI and the [Earth Research Institute](#). Our research activities contribute significantly to justifying the continued support of this infrastructure by the University, which benefits students and other research and education endeavors. This year, SBC Investigators led a successful NSF MRI proposal to expand the analytical capability of the University of California, Santa Barbara Marine Science Institute (MSI) to include nitrous oxide (N₂O) isotopomer and compound-specific isotope analyses (CSIA) through the acquisition of a stable isotope ratio mass spectrometer and three supporting peripherals. CSIA has largely replaced bulk measurements at the forefront of isotope ecology and biogeochemistry, yet these analyses remain isolated in relatively few laboratories. UCSB has tremendous research strength in the environmental sciences, particularly marine science, including multiple researchers with deep expertise in isotope approaches. This acquisition will catalyze cross-department interactions by facilitating a space where faculty and students from across campus using similar methods can interact without being siloed by departments.

What is the impact on institutional resources that form infrastructure?

SBC's research and education programs greatly benefit from and support infrastructure provided by UCSB's [Marine Science Institute](#) (MSI), which offers SBC participants efficient and friendly service in contracts and grants, personnel, budgets, purchasing, and travel, and expert analytical chemistry services via MSI's Analytical Laboratory. Our research activities contribute significantly to justifying the continued support of this infrastructure by the University, which benefits students and other research and education endeavors.

What is the impact on information resources that form infrastructure?

Among the total of 249 SBC's publicly available datasets published in the repository of the Environmental Data Initiative (EDI), fifteen new datasets were added since Oct 2022. This notable growth in data contribution make this year as one of the most prolific years for dataset additions in this grant cycle. Among these recent additions, five are characterized as ongoing time series datasets. They encompass three distinct datasets related to the rock circle project, covering benthic community dynamics, organism recruitment patterns, and irradiation data. Additionally, data on sea surface temperatures obtained from NASA satellites and wind speed and direction measurements in the Channel Islands and on land were also included. The remainder of the newly incorporated data packages were specifically curated to align with the growing demand from academic journals, which increasingly require researchers to make their data publicly available alongside their research papers. Among the ongoing time series data packages, eight of them related to the kelp removal project have been reclassified as completed time series datasets. This reclassification occurred due to the termination of the kelp removal

project earlier in 2023. All other ongoing time series datasets have received at least one update since October 2022.

It is important to note that all datasets come with detailed metadata, available in the XML specification known as Ecological Metadata Language (EML). These datasets are accessible through various platforms, including the SBC LTER data catalog, the EDI repository, the BCO-DMO data page, and DataOne. Over the period spanning from October 2022 to September 2023, these SBC LTER data packages collectively garnered a total of 7,418 public downloads, reflecting a significant level of interest and engagement within the scientific community.

Recent IM accomplishments and progress

Over the last year, SBC information manager, Li Kui, has significant achievements that have not only expanded the scope of data services but have also enhanced users' comprehension of SBC datasets. Key collaborations with graduate students and researchers have proven instrumental in accelerating research data processes and expediting the completion of dissertations and theses. Here are some of the primary projects and initiatives:

1. **Drafting Data Management Plans:** Li Kui has been actively involved in crafting data management plans for proposals submitted to the California Sea Grant and the California Ocean Protection Council. These plans are crucial in ensuring the effective handling and utilization of research data.
2. **Data Liaison for Synthesis Groups:** Li Kui has taken on the role of a data liaison for the synthesis group, focusing on consumer-mediated nutrient dynamics in marine ecosystems and their responses to disturbance events. This involves facilitating seamless data sharing and collaboration among researchers.
3. **Programming Coding Support:** Li Kui has provided invaluable assistance to graduate students by aiding them in solving data wrangling issues through programming coding. This support streamlines data analysis and research endeavors.
4. **GIS Mapping:** Li Kui has been instrumental in producing GIS maps for researchers, which serve as valuable tools for presentations and proposals, aiding in visualizing and conveying research findings effectively.
5. **Data Analysis for several manuscripts:** Li Kui has actively participated in the data analysis of manuscripts that focusing on the marine heatwave and water vertical flux in the Santa Barbara Channel, contributing insights into this critical environmental phenomenon.
6. **Project collection in SBC GitHub:** the SBC has undertaken the task of collecting GitHub repositories related to the SBC and forking them under the SBC GitHub account. This initiative has not only increased the discoverability of graduate student projects within the LTER network but has also provided a centralized hub for managing various ongoing SBC projects.
7. **LTER IM executive board:** Li Kui has been recognized through a nomination to serve as a member of the LTER Information Management Committee Executive Board. In this role, Kui helps to organize monthly meetings and acts as a liaison for various working groups, contributing to the overall improvement and coordination of information management within the LTER network.

What is the impact on technology transfer?

SBC's IM manager, Li Kui has organized and plans to start a series of graduate student workshops. The workshop topics covered a range of crucial data-related areas:

1. **Data Organization Workshop:** This workshop focused on instructing participants on designing datasheets, structuring data folders, conducting data entry checks, and comprehensive metadata documentation. It also introduced attendees to the SBC Data Catalog.
2. **Data Visualization Workshop:** The second workshop centered around the utilization of R for creating time series figures using SBC's extensive long-term datasets.
3. **Data Publication Workshop:** The third workshop delved into topics related to data formats, metadata submission, the acquisition of data DOIs, and provided an overview of the SBC data publication workflow.

There are plans in motion to further expand the workshop topics, incorporating sessions on creating data management plans for proposals and advanced data visualization using interactive apps.

In another noteworthy development, the SBC website has introduced a dedicated webpage showcasing visualizations of time series figures for the majority of long-term time series datasets. This feature serves a dual purpose: it allows researchers to explore the datasets, sparking research questions, and it provides the public with insights into the diversity of organisms in the Santa Barbara Channel and the evolving physical conditions of the ocean over the past two decades. These time-series figures have also found valuable application in K-12 education classrooms, promoting scientific understanding and engagement among students.

What is the impact on society beyond science and technology?

- SBC LTER data and studies are showing the effects of marine reserves on ecosystems and fishing. New work showing spillover bolsters the case for marine reserves as management tools and may help improve the design of future reserves and networks.
- SBC LTER expertise and data on patterns and drivers of kelp productivity is informing the possibility of kelp farming for biofuels off the coast of CA. DOE is funding several projects on this topic; one is using SBC LTER data to develop a model for kelp farm siting.
- SBC investigators and students responded to the Refugio Beach oil spill in May 2015 and more recently to the 2021 Huntington Beach Oil Spill. For the Refugio Beach oil spill, they worked with agencies to determine the impacts and advise on restoration. SBC LTER data was critical in documenting natural communities at impacted sites to calculate the Natural Resource Damage Assessment (NRDA) settlement finalized in 2020 and dispersed last year and this year for the Refugio Beach oil spill. They are currently assisting with NRDA studies for the 2021 Huntington oil spill.
- SBC investigators and students are collaborating with the Bureau of Ocean Energy Management, to assess factors affecting the spread and ecological impact of the invasive bryozoan *Watersipora subtorquata*, which is rapidly increasing at SBC study sites.

SBC investigators serve as science advisers for public and non-governmental agencies tasked with managing coastal resources.

What percentage of the award's budget was spent in a foreign country?

We spent \$2,523.00 for co-PI Daniel Reed to attend the International Temperate Reef Symposium in Hobart Tasmania, Australia, where he presented on SBC results. This represented ~0.2% of the budget for this year.

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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.

Change in primary performance site location

Nothing to report.

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