

The Southern California Marine Institute



Annual Report 2019-2020

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Mission

The mission of the Southern California Marine Institute (SCMI) is to foster marine research and education, focusing on urban impacts of the greater Los Angeles region on the coastal ocean. We seek to improve scientific understanding and the development of solutions that will enable coastal waters and watersheds to thrive, adapt and become resilient to ongoing environmental stressors.

Who We Are

SCMI is a consortium representing a strategic alliance of 23 major universities, colleges, and foundations in Southern California. This includes nine universities from the California State University system representing the Ocean Studies Institute: Channel Islands, Dominguez Hills, Fullerton, Long Beach, Los Angeles, Northridge, Pomona, San Bernardino, and San Marcos. SCMI also comprises the combined marine resources of the University of Southern California, Wrigley Institute for Environmental Studies, University of California Los Angeles, Occidental College, Los Angeles Community College District, The Bay Foundation, and NOAA National Marine Fisheries Service West Coast Region.

The consortium structure of SCMI allows us to engage in specialized marine research that would not otherwise be possible through independent organizations, and to maximize the use of resources as well as collaborate on projects. SCMI is located in the heart of the Port of Los Angeles on Terminal Island. Our facility is a full functioning marine research institute equipped with offices, laboratories, classrooms, a seawater filtration system, machine and wood shops, and a warehouse. There is ample docking space for small boats from various universities and organizations, as well as the research vessel R/V Yellowfin.

Director's Message

Wow! What a crazy year. As you'll see in this report, despite the unprecedented circumstances, SCMI is doing very well. During the height of the pandemic, we completed the construction phase, permitting and monitoring of the largest project in our history. SCMI is now the proud lease holder of 31.5 acres of newly restored rocky reef habitat on the Palos Verdes Peninsula. Our researchers have already begun a variety of in-depth studies on this new restoration habitat. None of this would have happened without the dedication of our staff and consortium teams that quickly adapted to the new Covid protocols. As you know, we have always been committed to safety and I am happy to report that we have continued to support essential services at the facility and the R/V Yellowfin while keeping everyone healthy. SCMI is fully prepared to address the challenges of the pandemic. When the virus rates start easing, we are ready to scale up our operations. We will continue to

provide the support for the exceptional research and educational activities you have been accustomed to having. Stay safe and healthy, we will see you in 2021!

Introduction

The Southern California Marine Institute (SCMI) has had a unique and unprecedented year. The year started off strong with a busy research season over the summer that utilized our small vessel fleet. SCMI assisted in research collaborations with Wood Environmental & Infrastructure Solutions, USC Earth Sciences, CSU Northridge, and CPP graduate research. CSUN's Dr. Larry Allen's Giant Sea Bass Acoustic Study had a successful release of the three giant sea bass. The fish were tagged by Dr. Chris Lowe's Shark Lab and can be tracked as they swim up and down the coastline. Construction on the Palos Verdes Restoration reef began this year and SCMI staff got a first-row seat to the construction stationed on the rock barge as Marine Mammal Observers. This Fall 2019 saw a successful CSU Marine Biology Semester on Catalina Island with five CSU participating and 12 students attending. Before the COVID-19 shutdowns in March 2020 the R/V Yellowfin was booked solid during the Fall semester with educational cruises supporting over 1200 students and researchers. The R/V Yellowfin had its regularly scheduled haul out this year in January, and she continues to be in tip top shape. SCMI was fortunate to have a busy fall semester that helped weather the storm of the coronavirus shutdown and move to remote learning. Safety has always been SCMI's highest priority and we are thankful for the guidance of our member campuses and institutions to safely provide services under these unprecedented times. Although there are a lot of unknowns coming into the next fiscal year SCMI is prepared to offer the same level of support to all our members and continued to fulfill our mission to foster marine research and education.



What's New?

COVID-19 Response

In the wake of the novel coronavirus pandemic SCMI staff worked diligently to create a safe environment for our members and continue to provide support safety and remotely. Starting in mid-March a majority of the SCMI staff began working remotely to reduce the number of people at the facility. We have a key group of staff working on site to maintain the seawater aquarium animals and support operations. The staff that work on site follow all the safety procedures for CSULB. Masks are required to be worn throughout the facility and all visitors and staff must fill out a COVID-19 symptom questionnaire before arriving at the facility. We developed COVID-19 safety protocols for the facility, vessels, dive locker, and dive and boat safety programs. We added hand sanitizer dispensers throughout the facility and stencils ground markers for students/researcher to line up and social distance while waiting to board their vessel. We applaud the SCMI staff for their fast action and adaptation to this new work environment. Creating and following the COVID-19 Safety protocols allowed our facility to continue to run and provide needed research support for our members. No one in our community has been infected.

SCMI's Cat Update

If you have been on the R/V Yellowfin or visiting SCMI's labs the last few years you have probably met our duo of kitties Bud and Chicken. These loveable felines play an important role on the SCMI team helping to prevent mice from eating the nets and trawls. They are also great for keeping up staff morale and eating left over bait. Unfortunately, our ambitious Bud bit off more than he could chew and ended up with a fishhook lodged in his stomach. The SCMI staff took him to the vet and he had emergency surgery to remove the hook. SCMI set up a fundraiser on GoFundMe to cover some of the surgery cost. We have been blown away by everyone's generosity and support for our sweet Bud. We are happy to report that Bud is hook free and back to full health enjoying all the benefits of life at SCMI. If you would like to donate to Bud's emergency surgery fund, please find the page on our website. Thank you so much for all your support helping our dear Bud, it would not be SCMI without our feline friends



Service Goals

Facility Improvements

This year SCMI has worked hard to meet the service goal to provide and grow the facility for our member institutions to carry out their educational and research activities. Safety has been our highest priority for our staff and visiting members. Along with the safety improvements for COVID-19 SCMI has continued to improve the building and repair the parking lot surfaces.

The R/V Yellowfin had its regular scheduled maintenance haul out this year. The hull was hydro blasted to remove any marine growth and the bottom paint was redone. The crew widened and adjusted the aft deck hatch for easier access out of the below cabins during an emergency. Denis Mahaffy, SCMI's Vessel Engineer worked diligently to add an additional hand washing station on the deck to ensure researchers and students have access to frequent hand washing facilities. Safety is always our highest priority on the R/V Yellowfin and the crew worked hard to create a safe environment on the R/V Yellowfin during these unprecedented times.

This year SCMI added a drone to our fleet of scientific equipment. The DJI Mavic 2 Pro drone is a compact drone that has a 30-minute flight time and high-resolution video recording capabilities. This drone will be a valuable tool for recording educational and researcher cruises on the R/V Yellowfin. We hope to record many of the educational cruises for use in remote learning.

SCMI's SeaBird CTD 25 Sea logger had its regular scheduled calibration and maintenance midway through the year. The Seabird 25 CTD is now in tip top shaped and is being used regularly on the USC SPOT cruises each month. The CTD is reaching its 25 years in operations and we will continue to maintain the CTD while working on getting a replacement.

The Bay Foundation Abalone Lab Update

The Bay Foundation (TBF) has been an SCMI consortium member for over 5 years! Joining the SCMI team has provided TBF with lab space to culture abalone and convenient access to the local rocky reefs where they manage and monitor their kelp forest and abalone restoration projects.

TBF's abalone restoration project implements a multifaceted approach to research and development with the ultimate goal of restoring abalone populations to Santa Monica Bay. Currently, TBF maintains two abalone aquaculture facilities located at the Southern California Marine Institute (SCMI), where they advance research on captive and wild abalone care, spawning, and larval cultivation techniques. Since November 2019, TBF and project partners (CDFW, NOAA, Paua Marine Research Group, Bodega Bay Marine Lab, and Aquarium of the Pacific) have outplanted over 2,000 federally endangered white abalone to the rocky reefs of Palos Verdes. This marks the first time this

species has ever been outplanted to the wild. Scheduled monitoring and outplanting events will continue to inform the success of this project moving forward.

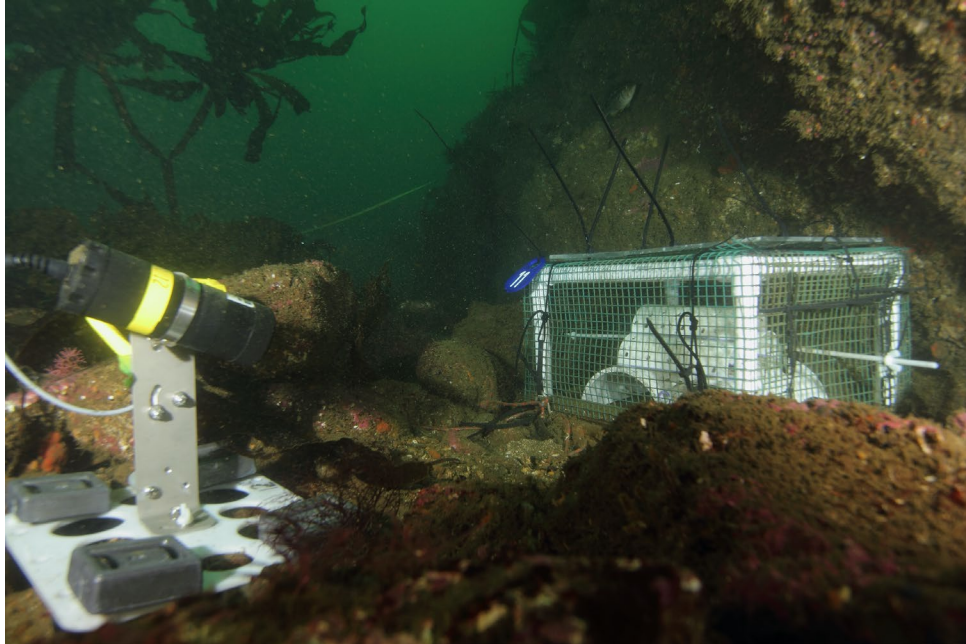


Figure 1: (Left) Time Lapse Cameras monitor outplanted abalone and predator movement. (Right) SAFE outplanting modules are used to house abalone prior to being released into the wild allowing abalone to acclimatize to ocean conditions free from predation. Photo Credit: Dave Witting (NOAA)

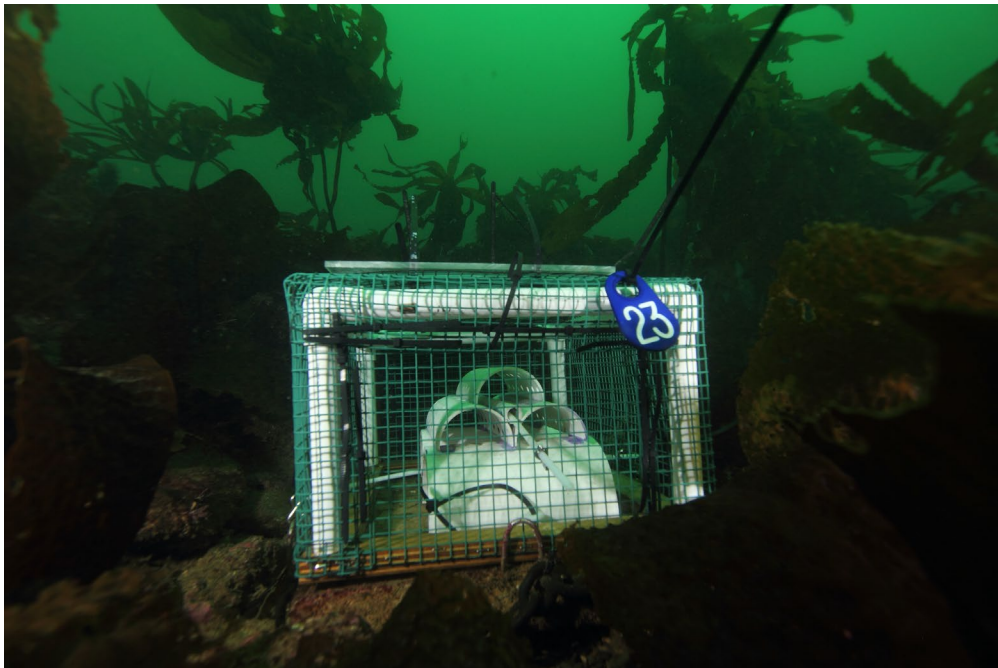


Figure 2: SAFE outplanting modules are used to house white abalone prior to abalone being released into wild. This allows abalone to acclimatize to ocean conditions free from predation. Photo Credit: Dave Witting (NOAA)

OSI AAUS Research Dive/Boating Program

Dive Operations: We currently have 102 Scientific Divers on our roster. 62 logged dives totaling 1736 dives for fiscal 2019/2020. Two AAUS Scientific Diver courses were offered – one during the Winter and one during the Summer – the Summer course, normally conducted during June was canceled due to COVID lockdown. A total of twelve new divers received training, and cohorts were comprised of candidates from CSUN, CSULB, OSU, and Pitt. AAUS Scientific Diver courses remain on-hold for the foreseeable future. COVID mitigation protocols that would allow us to resume diving and emergency response courses are still awaiting administrative approval.



Boat Operations: We secured contracts with the California Department of Fish and Wildlife, and the Cabrillo Marine Aquarium for training of their personnel. We conducted four Motorboat Operator Training Courses (MOTC) for a total of twenty-two participants. Cohorts were comprised of candidates from CSULB, CSUF, CSUN, CPP, CDFW and CMA. Four more courses scheduled through May of 2020 were canceled due to COVID lockdown. Over the past year we have continued to build our inventory of PFDs, exposure suits, rescue dummies and safety gear required to teach the course. MOTC courses remain on-hold for the foreseeable future. COVID mitigation protocols that would allow us to resume the courses are still awaiting administrative approval.



Educational Goals

CSU Marine Biology Semester on Catalina Island

The Catalina Semester provides a unique opportunity for CSU students to experience hands-on marine biology and guide them to careers in marine science. The 15-week program is based at the Wrigley Marine Science Center (WMSC), located on Santa Catalina Island, 26 miles from Los Angeles, CA. The CSU Marine Biology Semester on Catalina fall 2019 was hosted by CSU Long Beach and taught by CSULB professors: Dr. Chris Lowe and Dr. Bengt Allen and CPP professor Dr. Jayson Smith. There was a total of 12 students from 4 different CSU's and one non-CSU university. The Fall 2020 semester was going to be hosted by CSU Northridge. Unfortunately, the Fall 2020 semester was canceled due to the COVID-19 pandemic. There was a total of 17 students that applied from four different CSUs. The semester was going to be instructed by CSUN professors. Dr. Peter Edmunds was going to instruct Marine Invertebrate Zoology, Dr. Nyssa Silbiger and Dr. Larry Allen were going to instruct Marine Ecology, and Dr. Kerry Nickols was going to instruct Marine Conservation Biology. Despite the dynamic COVID-19 situation SCMI is working with USC Wrigley and the CSUs to develop a safety protocol and layout for the next 2021 Fall Catalina Semester.



CSU Marine Biology Semester on Catalina Fall 2019			
University	# Students	Professors	Courses
CSU Fullerton	1	Dr. Jayson Smith	Marine Phycology
CSU Long Beach	6	Dr. Christopher Lowe	Marine Ichthyology
CSU Northridge	1	Dr. Bengt Allen	Marine Ecological Processes
Cal Poly Pomona	2		
CSU Channel Islands	1		
Non-CSU (Oberlin College)	1		
Total # Students	12		
Total # Schools	5		

Demonstration Yellowfin Cruises

Our Yellowfin demonstration cruises have continued to be a valuable resource for students to experience hands on marine science. With the help of our Captain, Vessel Engineer, and the on-board Demonstration Techs we can offer classes a unique experience using real-world equipment and techniques such as VanVeen grabs, plankton tows, biological dredges, otter trawls, and our new handheld CTD. This year we were only able to operate cruises up till March 9th due to the COVID-19 shutdown. There were 82 demonstration cruises on the R/V Yellowfin that supported over 1148 students from southern California colleges and universities this year. Some of the highlighted trips include the IKMT with Dr. Franklin from CSUN, multicore with Dr. Berelson from USC, and rock dredge with Dr. Pernet from CSULB.





Research Goals

SCMI has provided vessel support, equipment, and expertise to researchers from member and non-member institutions. This year SCMI has assisted researchers from University of Southern California, Occidental College, University California Los Angeles, California State University, Northridge, Long Beach, and Los Angeles, NOAA, Ports of Los Angeles, and Woods Environmental & Infrastructure Solutions.

Giant Sea Bass Acoustic Study Update

Dr. Larry Allen's Giant Sea Bass Acoustic study is still on going at SCMI. The three Giant Sea Bass were successfully released back to the ocean on September 25, 2019. Before their release Dr. Chris Lowe's Shark Lab at CSULB tagged the three fish and are tracking their journey as they swim up and down the coastline.

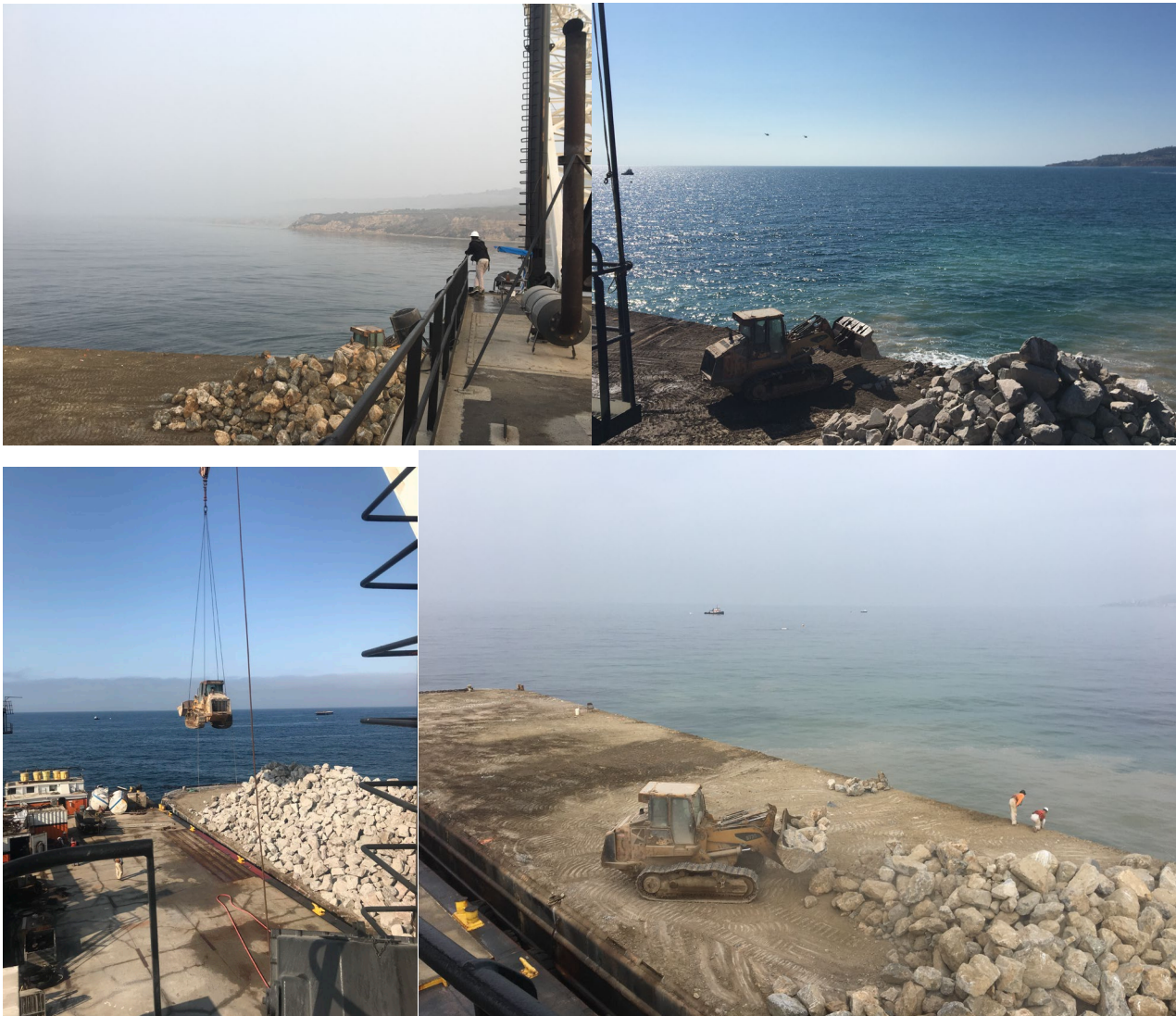
SCMI has had the pleasure of helping to raise some of the juvenile Giant Sea Bass from the spawning events that occurred last year at SCMI. It is a real sight to see these tiny fish grow and into little giants. We currently have six juveniles that are roughly 2-3 inches in length. These lively little predators are all doing very well, displaying normal behavior, and growing at a healthy rate. These fish could be used for potential future research or released by CDFW to help rebound the Giant Sea Bass population in our local waters.



Palos Verdes Restoration Reef

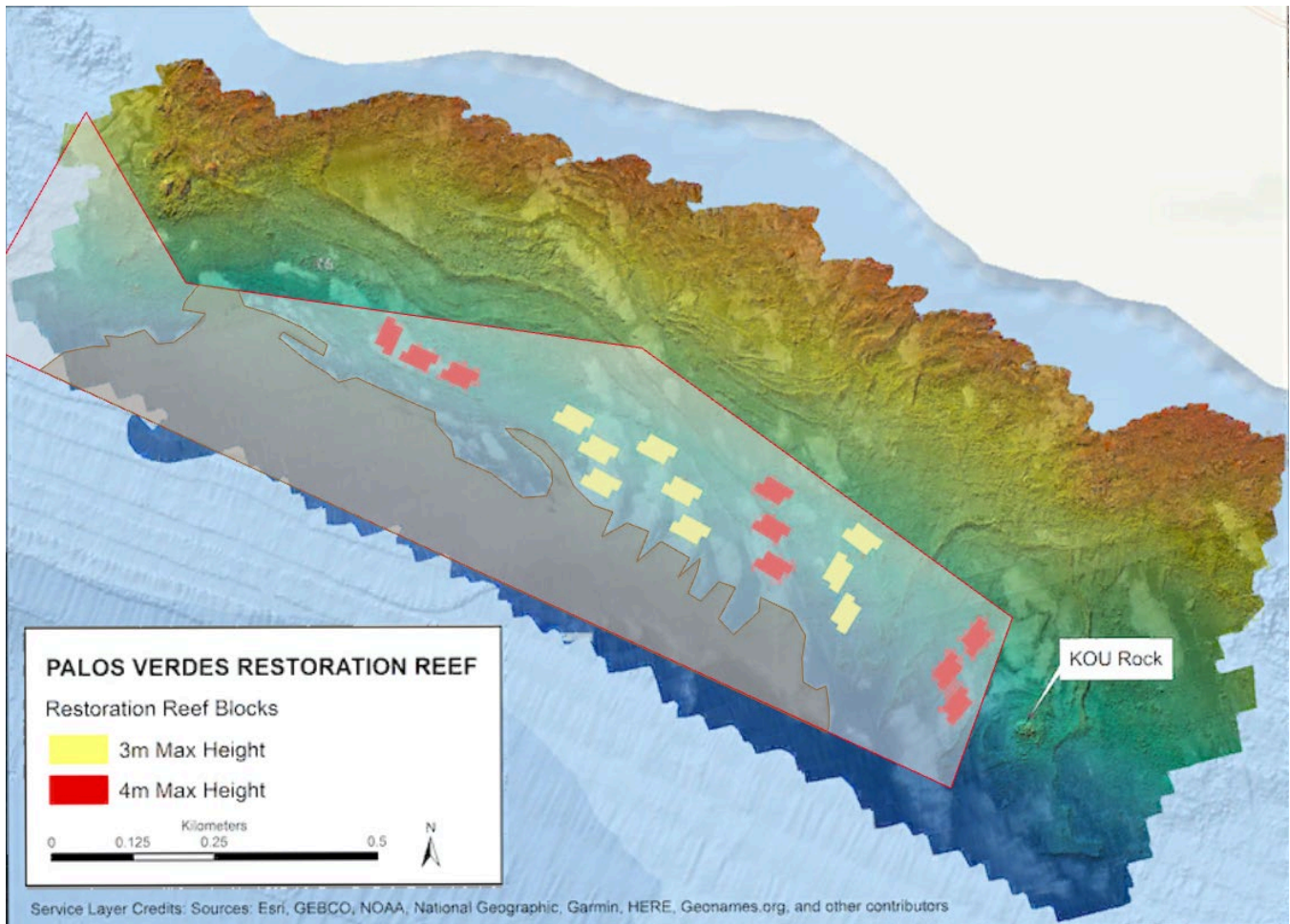
Construction on the Palos Verdes restoration reef began in late April 2020. Four of SCMI's staff completed certifications in marine mammal observation and were stationed marine mammal observers on the rock barge during construction. Marine Mammal Observation is yet another skill we can provide our members to support their research endeavors. SCMI staff also conducted weekly water quality monitoring around the reef construction using our handheld CTD and small vessels. It was quite a sight to see the large 250-foot work barge with a crew of 12 operating anchor cables, bulldozers, cranes, and tugboats to construct the 24 modules of the reef. Construction was conducted in two phases over the spring and summer. The last day of construction was September 22, 2020.

Fortunately for the construction there were not many marine mammal sightings that halted operations. The Marine Mammal Observers saw a few curious sealions and small pods of dolphins feeding along the kelp beds near the coast.



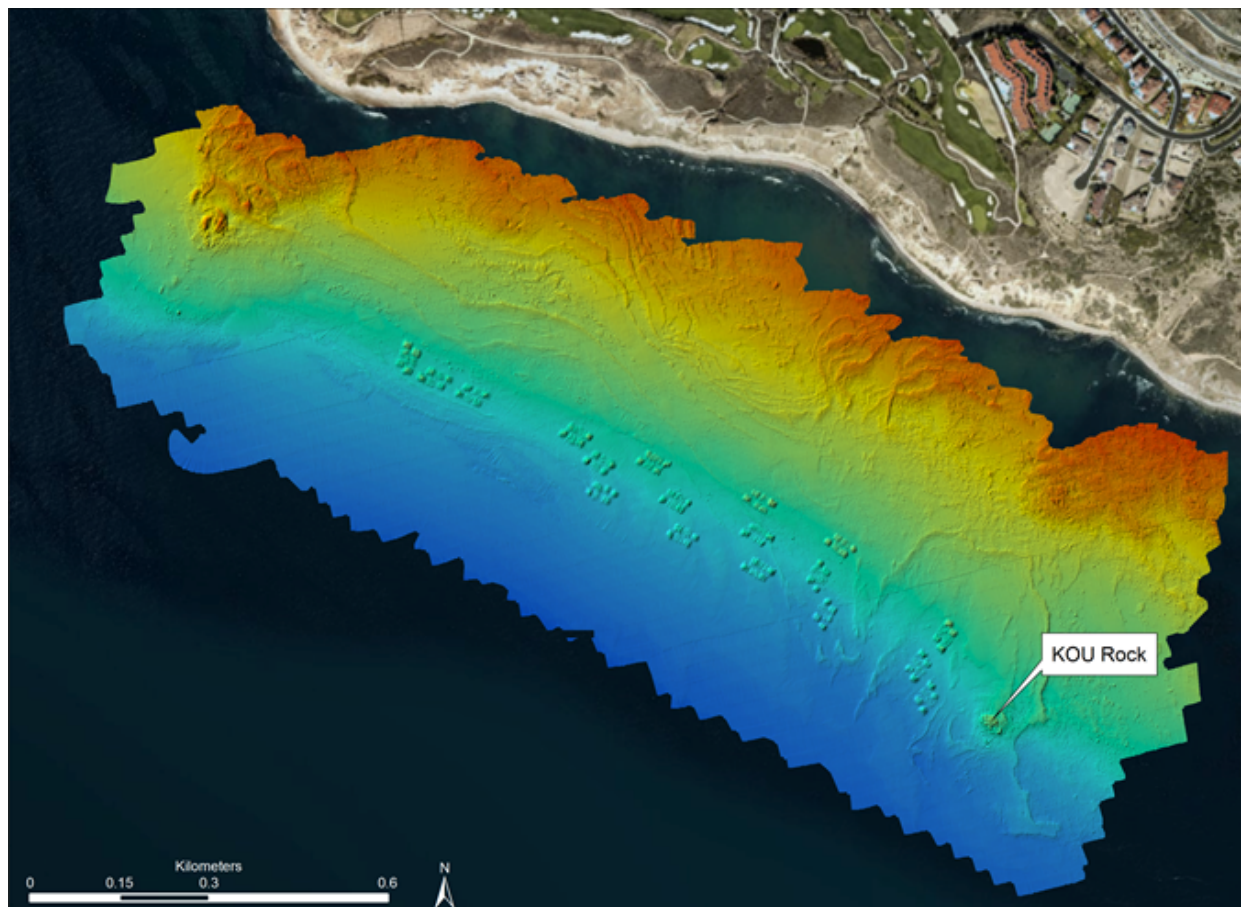
SCMI working with the Vantuna Research Group at Occidental College has permitted and is the lease holder for the construction of the first offshore restoration rocky reef in California's history (Figure 1). The peninsula has suffered from historic anthropogenic stressors that have resulted in significant and well documented losses and of rocky-reef and kelp bed habitat. This loss of habitat and associated ecosystem services has reduced socioeconomic benefits to the region. This project will restore critical habitat for important fish and invertebrate fishery species that have been impacted from historical watershed mismanagement. Stretches of the rocky reefs and kelp forests that surround the Palos Verdes Peninsula in Los Angeles County have been impacted from chronic sedimentation that are at least partially the result of human caused landslides and urban runoff over the past 70 years. While many of the sources of the sedimentation have been ameliorated, over 200 acres of reef habitat have been lost to sedimentation, continued reef scour and burial. However, some smaller areas of reef

along this coastline that are naturally high relief (extend vertically up from the seafloor) remain some of the most productive in southern California for commercially and recreationally important fish and invertebrates. This restoration project will use a peer reviewed published design based on the best available science that mimics the productive characteristics of these existing natural reefs to restore the productivity of these sediment impacted areas by creating high relief quarry rock reef modules that will extend up from the seafloor above the moving sediment.



The restoration reef is designed as set of six “blocks”. Each block contains three modules (A, B, C). Each module consists of a 3 x 2 set of six “piles”. The three piles on each side of the module are offset by 1/2 of the pile width (8 m). Each pile is a 16 m x 16 m square pyramid of quarry rock with an overall height of 1 m, 2 m, 3 m, or 4 m. The blocks will be in two designs, either with a 3 m overall pile height or a 4 m overall pile height. There is a 10 to 20 m wide sand channel between modules and at least 50 m of space between blocks. These distances were chosen due to the previously described ‘halo’ effect around reef of ~30 m. Reef modules that are separated by < 30 m are more likely to operate as a single

reef for many species, while blocks separated by > 30 m operate more independently. In our design criteria reef blocks are spaced at least 50 m apart. By separating the blocks and modules by the appropriate distances we can restore a greater amount of reef perimeter sand-rock ecotone habitat and we can increase the independence of replicate reef blocks. The overall approach is to try to balance scientific study design considerations with maximizing the potential for an effective restoration effort across the range of important species, and kelp forest biodiversity. Major motivations included incorporating heterogeneity throughout the restoration reef design both within (e.g., varying pile heights within blocks) and amongst (e.g., varying block orientation across blocks) the reef blocks.



Not only will this project restore an enormous amount of lost reef habitat, we have embedded into it a repeated statistical design that will allow a variety of research project to be conducted in a replicated manner. As you can imagine, this unique opportunity has sparked a lot of interest. Please contact Dr. Pondella if you have any questions.

Cal Poly Pomona Masters Student Austin Pyles Research

Austin received his B.S in Environmental Biology from Cal Poly Pomona, and as an undergraduate he assisted with the lab's California native abalone aquaculture development and wild population restoration project with The Southern California Marine Institute (SCMI). He is currently a third-year master's student at California State Polytechnic University, Pomona, studying marine ecology. Austin received his Motorboat Operator Training Course qualifications and AAUS Scientific Diver Certifications at SCMI in 2017. He uses these qualifications for his research to safely operate Boston whalers from SCMI and to perform dives on the Los Angeles harbor break walls. Austin's thesis research focuses on habitat use and [nesting patterns of the California state marine fish, the Garibaldi \(*Hypsypops rubicundus*\)](#) on artificial reefs in southern California and potential implications on reproductive success. He uses hand-held stereo-video cameras systems to measure fish sizes, densities, and habitat characteristics at depth-specific patterns found along the harbor break walls.

University of Southern California Department of Earth Sciences Novel Techniques for Measuring Seafloor Carbonate Dissolution *In Situ*

University of Southern California Ph.D. student Jaclyn Pittman and Professor William Berelson have been studying a novel technique for measuring seafloor carbonate dissolution *in situ* with their device that is deployed off the R/V Yellowfin this year. Ms. Pittman described how they are building a robotic device that collects sediment porewater to understand more about carbonate dissolution that occurs on the seafloor. The device is strapped onto a standard Tri-pod Multi-Corer and lowered to the seafloor, where a series of automated computer-controlled actions extract porewater directly from the mud. When the device is brought back to the surface, we have isolated porewater samples that we can then test for pH, alkalinity, and dissolved inorganic carbon to then decipher how much carbonate has dissolved. Our method differs from the traditional process of extracting porewater from sediment cores: as cores are pulled up through the water column, encountering lower pressure and often warmer temperatures, the sediment interacts with the porewater and speeds up or slows down chemical reactions relevant to carbonate chemistry. By extracting the porewater at the seafloor *in situ*, we avoid this problem and maintain a higher degree of accuracy in our sampling. In addition to natural porewater sampling, our device is also equipped to conduct carbonate dissolution experiments *in situ*. Previously, the potential for carbonate to dissolve at the seafloor has only been calculated based on thermodynamic principles. Our device can provide direct measurements of carbonate dissolution occurrence, at what depth, and at what rate, providing a real-world comparison to calculation-based predictions. Our device will help us better understand how, where, and how fast carbonate is dissolving on the seafloor, and inform on how the deep sea is responding to anthropogenic climate change.

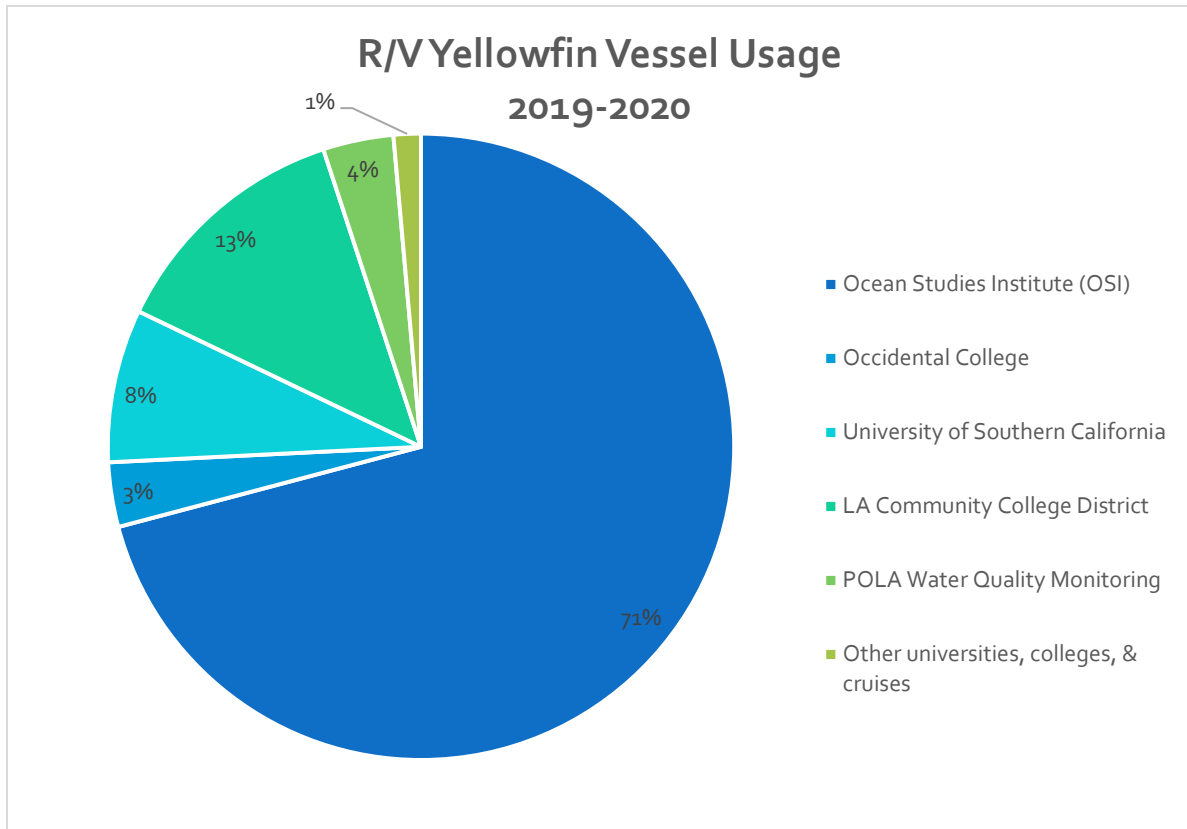


Vessel Use

R/V Yellowfin Usage by Institutions

This year, the R/V Yellowfin logged approximately 572 hours of vessel use. The trips were significantly reduced due to the COVID-19 pandemic. The trips consisted of a combination of class laboratories, graduate and university research, and contracted research. SCMI will continue to work CSULB, our administrative campus, to develop safety protocols to implement when it is safe to resume college and university trips on the R/V Yellowfin. SCMI's goal is to continue increasing vessel usage among SCMI member institutions and to broaden vessel usage to other institutions and disciplines.

Institute Name	Total # of Students	Total # of Faculty/Researchers	Total Hours of Vessel Use	Total # of Cruises
Ocean Studies Institute (OSI)	677	52	241	40
Occidental College	143	22	62	10
Port of Los Angeles	0	17	67	8
University of Southern California	76	26	146	19
Other Universities and Colleges	31	3	14	2
Los Angeles Community College District	221	11	42	11
Yearly Total	1148	131	572	90





Southern California Marine Institute Members

Southern California Marine Institute Staff 2019-2020

Dr. Daniel Pondella
Director

Adriana Stowell
Budget & Research Coordinator

Carrie Wolfe
Research & Education &
Operations Coordinator

Darrell Montague
OSI Dive/Boat Safety Officer

Dennis Dunn
Captain
R/V Yellowfin

Bill Fike
Facilities &
Seawater Coordinator

Jim Cvitanovich
OSI Dive Safety Officer

Denis Mahaffy
Vessel Engineer

Mark Loos
Aquarist & Instructional
Support Technician

Joel Ingram
Small Vessel Support
Technician & Relief Captain

Sam Corder Lee
Demonstration Technician

Ben Grime
Instructional Support
Technician

Sam Soule
Demonstration Technician

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Vice President: Tom Ford
Secretary: Douglas E. Hammond Ph.D.

USC

John Heidelberg Ph.D.
Douglas Hammond Ph.D.
James Moffett Ph.D.
(Alternate)

OSI

Larry Allen Ph.D.
Curtis Bennett Ph.D.
Christopher Lowe Ph.D.
Steve Murray Ph.D.

Occidental

Daniel Pondella Ph.D.

UCLA

Tina Treude Ph.D.



Ocean Studies Institute Board of Governors 2019-2020

Chairperson: Larry Allen, Ph.D.

Vice Chairperson: Steve Murray Ph.D.

Member at Large: Sean Anderson Ph. D.

Director-Coordinator: Daniel Pondella Ph.D.

CSU Dominguez Hills

Academic

Charlene McCord Ph.D.

Administrative

Philip LaPolt Ph.D.

CSU Channel Islands

Academic

Sean Anderson Ph.D.

CSU Long Beach

Academic

Christopher Lowe Ph.D.

Administrative

Curtis Bennett Ph.D.

CSU Los Angeles

Academic

Elizabeth Torres Ph.D.

Administrative

Pamela Scott-Johnson Ph.D.

CSU Northridge

Academic

Larry Allen Ph.D.

Administrative

Jerry Stinner Ph.D.

CSU Pomona

Academic

Jeremy Claisse Ph.D.

Administrative

Alison A. Baski Ph.D.

CSU San Bernardino

Academic

Britt Leatham Ph.D.

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Jeff Thompson Ph. D.

CSU Fullerton

Academic

Danielle Zacherl Ph.D.

Administrative

Marie Johnson Ph.D.

Chancellor's Office Liaison

Steve Murray Ph.D.

CSU San Marcos

Academic

James Jancovich Ph.D.

Administrative

P. Wesley Schultz Ph.D.

Consortium Members

