

Ocean Studies Institute Annual Report 2021-2022

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Mission

The **Ocean Studies Institute** is a consortium of nine California State Universities who decided to pool their resources to explore the ocean and coastal regions more effectively. OSI currently consists of California State University Dominguez Hills, Fullerton, Long Beach, Los Angeles, Northridge, Pomona, San Bernardino, San Marcos, and Channel Islands. OSI became a founding member of larger consortium of the **Southern California Marine Institute (SCMI)** in 1994.

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.

About Us

The Ocean Studies Institute is a founding member of the Southern California Marine Institute (SCMI) which 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 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.

Carrie Wolfe OSI/SCMI's Research & Education and Operations Coordinator Retirement

Carrie Wolfe one of OSI/SCMI's longest standing staff members retired this year after 31 years of service. Carrie started at OSI/SCMI as a Demonstration Technician aboard the R/V Sea Watch. She quickly moved up the ranks and worked as our Education and Research coordinator sharing her joy of marine biology with countless students. As a NOAA Ship of Opportunity Program Coordinator Carrie was able to travel across the Pacific Ocean aboard commercial container ships conducting subsurface temperature and CO₂ studies. Carrie's work over the last 30 years has been instrumental in the running of SCMI's education, research, and vessel operations programs. We are happy that Carrie continues to support SCMI part-time as a rehired annuitant to assist with R/V Yellowfin scheduling.



COVID-19 Response

SCMI staff continue to work diligently to create a safe environment for our members and continue to provide support safety and remotely if necessary. Our staff follow all the safety procedures for our administrative campus, CSU Long Beach. Restrictions have eased coming into the Spring semester and we were able to increase to full capacity on the R/V Yellowfin research and educational cruises. Masks were required to be worn throughout the facility and on the R/V Yellowfin. We applaud the OSI/SCMI staff, OSI/SCMI members, students, faculty, and staff for their adaptation during the ups and downs of this year. Creating and following the COVID-19 Safety protocols allowed our facility to continue to run and provide needed research support for our members.



Service Goals

Facility Improvements

OSI/SCMI strives to advance our mission by maintaining and optimizing the physical resources and environments. The number one priority for our facilities is to create and maintain a clean, safe environment for member institutions, researchers, staff and students to learn and engage. We continually improve upon top industry practices in order to support the goal of providing the best possible services while also maintaining the best cost model. After the quiet lull of year's past, this was a year to ramp up and implement much needed upgrades. Following through with our implemented COVID-19 safety plan, many aspects of our landmark, harbor front structure received a facelift to reinvigorate their use of valuable square footage.

Early in the year, we moved forward with a push to reorganize several of our small storage spaces to identify parts and materials, to maximize use of items on hand for repairs and improvements desired to maximize funds already spent. Part of this process was to recycle non-essential items by coordinating with the CSULB campus resources and establishing more usable space within the Institute.

Completed several laboratory and office improvements. Three spaces (Office #103/#207 and Laboratory #210) received wall remediation from years of use complete with a fresh coat of paint. The new color scheme, neutral hue and accent, will be implemented as we upgrade additional spaces. Following suit, luxury vinyl plank flooring was installed to replace the degraded linoleum in 3 offices (#101, #102, #103) and adjoining hallway. Likewise, our entry foyer received a facelift with a coordinated signage plan, bulletin board, and paint.



A highlight of the year was the removal of the 820 parking lot asphalt, root remediation, repaving, and restriping. A barrier was installed around planters to prevent future root damage to protect our investment of new asphalt. A slurry coat with 100% coverage for all 820 lot asphalt, new and old, was laid to protect our outside spaces from the hot, California sun and saltwater for years to come; thus, lengthening the life of our 820 property. We added 3 electric/hybrid parking spaces and effectively marked the original spaces reserved for either SCMI Crew or Member. Adding a unique element to our refreshed and new lot is a wayfinding path of schooling yellowtail to guide our visitors to safely waiting in our harbor front courtyard and on their way to the vessels.



Additionally, we completed LED conversion of our lighting. Improvements continue for our Aquatic Life Support System. Continuous improvement towards refreshing indoor and outdoor spaces to increase efficiency and functionality to be highly conducive to learning and research.

OSI AAUS Research Dive and Boating Program

Dive Operations: We currently have 56 Scientific Divers on our roster, logging 2049 dives for the period 6/1/2021 – 6/1/2022. The June 2021 AAUS course was canceled to accommodate the need for more Motorboat Operator Training Courses (MOTC). One AAUS Scientific Diver course was conducted in August. The Winter AAUS course, halted mid-stream due to a COVID exposure, was completed in March. A total of sixteen new divers received training, the cohorts was comprised of candidates from CSUN, CSULB, CPP, and Occidental College. The June 2022 course has been cancelled due to low enrollment and consolidated into the July session.



Boat Operations: We secured renewed (post-lockdown) contracts with the California Department of Fish and Wildlife, and the Cabrillo Marine Aquarium for training of their personnel. We conducted five MOTCs during the summer of 2021 for a total of twenty-five participants. Cohorts were comprised of candidates from CSUN, CSULB, CPP, and Occidental College. In April of 2022, one MOTC was conducted for CMA, for three participants. The Spring MOTCs scheduled for OSI were cancelled – there were no applications submitted. Two courses were conducted for CDFW in May, for six candidates, with one more session scheduled for June. Two OSI sessions are planned for the summer of 2022.



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. We are excited that after 2 years, the Catalina semester is back for Fall 2022! There are a total of 18 students enrolled from four different CSUs. The semester is being instructed by CSUN professors Dr. Larry Allen and Dr. Mark Steele for Ecology of Marine Fishes, Dr. Nyssa Silbiger for Marine Ecology, and Dr. Kerry Nickols for Marine Conservation.

Demonstration CSU's R/V 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 handheld CTD. After being unable to offer cruises due to COVID-19 last year, we were able to offer demonstration cruises to college and university students this year. During the Fall 2021 semester we were approved to offer demonstration cruises at 75% capacity with a maximum of 30 students and were then able to operate at 100% capacity starting the Spring 2022 semester.



Research Goals

SCMI continues to provide outstanding vessel support, equipment, and expertise to researchers from member and non-member institutions in southern California. This year SCMI has assisted researchers from University of Southern California, Occidental College, California State University, Northridge, Long Beach, and Los Angeles, NOAA, California Department of Fish and Wildlife Oil Spill response, Ports of Los Angeles, and Los Angeles Natural History Museum.

The Bay Foundation Abalone Lab

The Bay Foundation (TBF) has gladly been an SCMI consortium member for over 7 years. SCMI's facilities and location have allowed TBF to continue culturing and propagating abalone, while simultaneously providing accessibility for kelp forest and eelgrass restoration efforts. They are grateful for the resources and support that SCMI has provided over the years, especially in the wake of the COVID-19 pandemic.

TBF's abalone restoration project aims to implement a multifaceted approach to restoring and developing abalone populations, and ultimately rocky reef habitats, throughout the Santa Monica Bay and greater coastal waters. TBF maintains two abalone aquaculture facilities at SCMI where they advance research on captive and wild abalone husbandry, spawning, and larval cultivation techniques. Since 2019, TBF and project partners (CDFW, NOAA, Paua Marine Research Group, UC Davis Bodega Bay Marine Lab, and the Aquarium of the Pacific) have outplanted over 4,000 federally endangered white abalone to the rocky reefs of Palos Verdes. Additionally, over 3,500 red abalone have been outplanted to these same reefs with another 7,000+ red and white abalone outplanted to the coastal waters of Point Loma in San Diego.

Moving forward, TBF and project partners will continue to perform scheduled outplanting and monitoring events, ultimately helping to inform the success of the project.

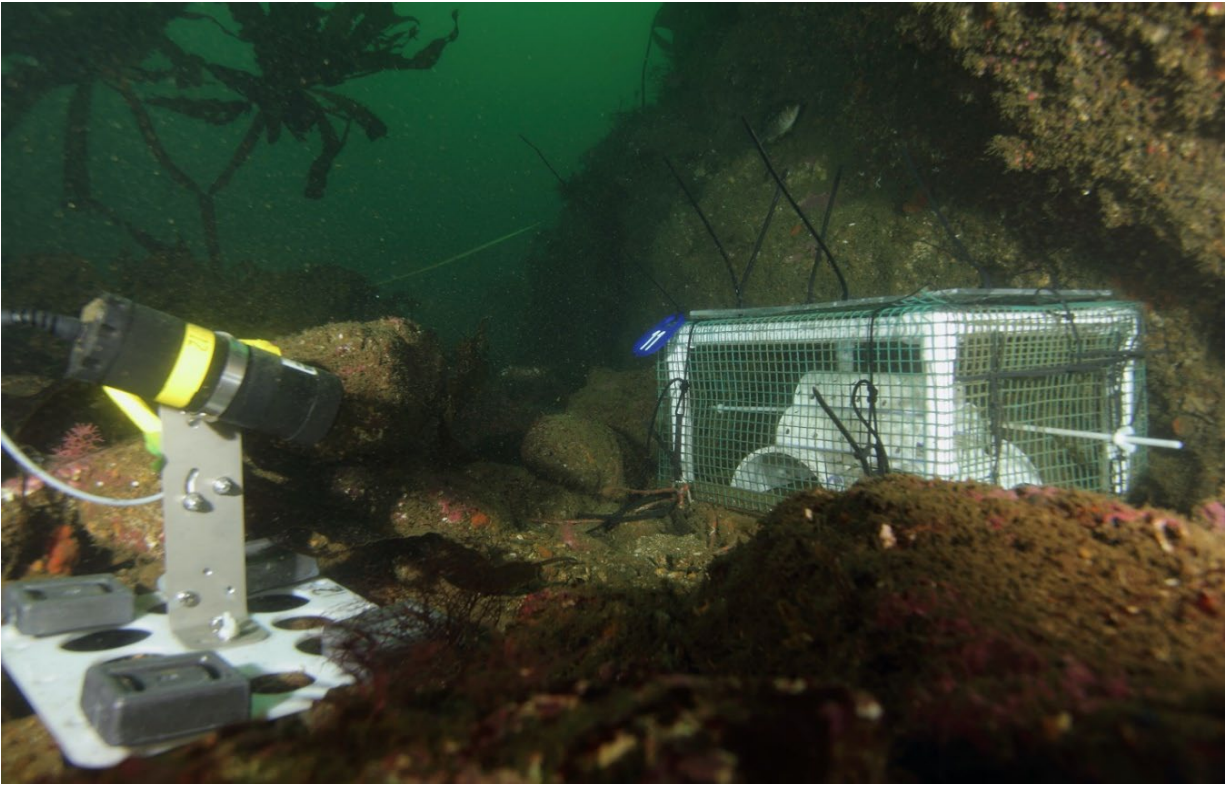


Figure 1: Time Lapse Cameras monitor outplanted abalone and predator movement. Photo Credit: Dave Witting (NOAA)

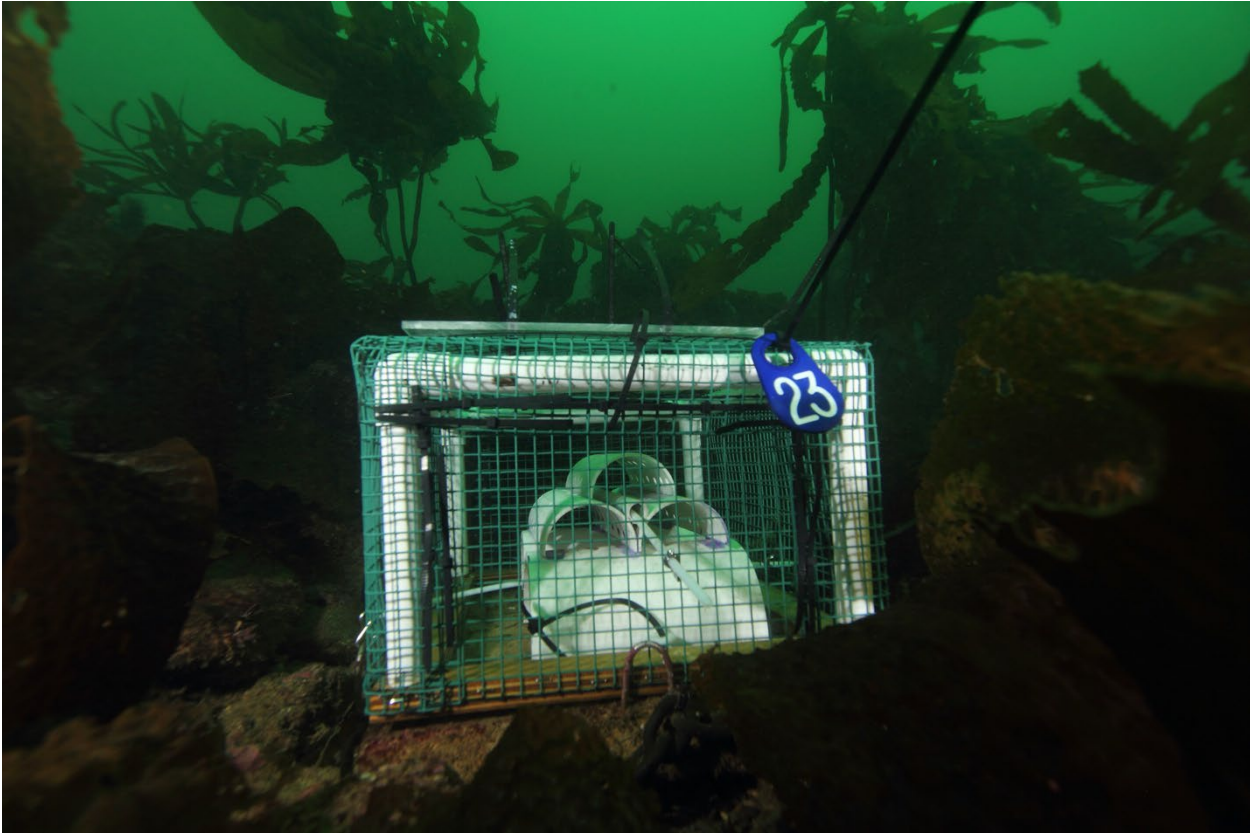


Figure 2: SAFE outplanting modules are used to house white abalone prior to abalone being released into wild. This allows abalone to acclimatize to ocean conditions free from predation. Photo Credit: Dave Witting (NOAA)

Eelgrass (*Zostera* spp.) is a marine flowering plant that is an economically and ecologically valuable marine habitat found in temperate regions throughout the world. It provides rearing habitat for juvenile fishes, filters nutrients, and reduces erosion, among myriad other functions. Eelgrass beds are highly productive systems, and the complex structure of seagrasses compared to unvegetated sediments greatly enhances biodiversity. Unfortunately, eelgrass beds are typically found near the coastline, and such, are more vulnerable to harmful impacts by human activities and climate change as well as natural disturbances, including wave action and light limitation. It is within this context that TBF transplanted *Zostera marina* to Button Shell Beach Cove on the leeward side of Catalina Island. Using applied methods from previously successful eelgrass transplants, TBF transplanted 8,400 turions to a 1,400 m² project area. This Catalina Island Eelgrass Restoration Project hopes to produce strategic partnerships, address key data gaps pertaining to offshore eelgrass beds, create ecologically significant habitat, and inform the efficacy of scalable eelgrass restoration efforts.



Figure 3: Photo of transplanted *Z. marina* at Button Shell Beach Cove one-month post-restoration.

Vesta Coastal Enhanced Weathering Project

Vesta is a USA-based company and research organization with a mission to remove billions of tons of excess atmospheric carbon dioxide through Coastal Enhanced Weathering (CEW) of the naturally occurring mineral olivine. CEW is a nature-based approach that accelerates the weathering rate of olivine, resulting in the removal of CO₂ from the atmosphere for thousands of years (a process known as Coastal Carbon Capture). We are conducting experiments at locations across the USA and internationally to determine if CEW can be a safe, effective, and affordable means of permanently sequestering excess atmospheric CO₂. At SCMI, Vesta has been conducting microcosm experiments with native biological communities to investigate weathering rates under realistic coastal conditions. These ongoing and future experiments will aid Vesta scientists to better understand the impacts of biological variability on coastal carbon capture, in addition to developing state of the art techniques and methods for precisely monitoring, recording, and verifying the amount of carbon captured. Vesta is grateful for the incredible support and expertise provided by SCMI to investigate these important research questions.

CROPS Project

CROPS Team conducted Carbon Dioxide Removal research this year in a cooperative effort with SCMI on the R/V Yellowfin. CROPS stands for Crop Residue Ocean Permanent Sequestration. To help mitigate climate change, due to high carbon dioxide levels in the atmosphere, several approaches are being explored. The CROPS approach utilizes crop residue to accelerate the natural carbon cycle by safely and permanently storing carbon in the deep ocean. The research performed this year helped validate safe and reliable methods for accomplishing these goals. The CROPS system is immediately available to make a meaningful contribution in mitigating climate change with strong social justice and sustainability benefits. CROPS solves the problem of safe, environmentally friendly, long-term (400+ years), guaranteed, verifiable storage of carbon. The SCMI project working with CROPS was straight-forward. Test bales of various crop residues were released and recovered from the ocean under carefully monitored conditions. The data collected from these sequestration trials will be used by CROPS to optimize the safety, efficiency, environmental impact, and costs of deep ocean sequestration including long-term socially responsible stewardship.



Palos Verdes Reef Restoration Project

Drone Observation

With the completion of Palos Verdes Reef Restoration project in 2020, the Southern California Marine Institute has begun monitoring the growth of kelp via drone flights since January 2021. Monthly drone missions are flown in coordination during low tide of each month to observe the progress of the blocks. This aerial monitoring is useful to visualize the progress of the reef and monitor the success of the restoration work. We have seen an abundance of growth from the start of our drone flights and continue to see block definition increase with each month.



The Palos Verdes Reef Restoration Project has become a multi-institutional collaboration with four universities currently conducting research. Dr. Kerry Nikols from CSU Northridge is studying spatial dynamics of kelp forest communities. Dr. Jeremy Claisse and graduate student James Sturges from Cal Poly Pomona are investigating fish habitat use patterns on the reef using stereo video surveys. At University of California Los Angeles Dr. Kyle Cavanaugh is studying remote sensing of giant kelp and kelp dynamics with his doctoral student Ariadne

Reynolds using drone and satellite data. Also, at UCLA Dr. Robert Eagle's doctoral student Elijah Catalan is working on eDNA studies on the reef.

Environmental Status of Artificial Structures Offshore California BOEM Grant

SCMI received a \$750,000 grant from the Bureau of Ocean Energy Management (BOEM) to study the status of artificial structures off California's coasts. The study is being conducted by our members Occidental College's Vantuna Research Group and Cal Poly Pomona. The main objectives of the study are to use ecological indicators to better understand how local factors influence the variation in environmental status artificial structures (i.e., de facto artificial reefs). The study looks to generate a set of environmental criteria to evaluate potential artificial reef in the future.

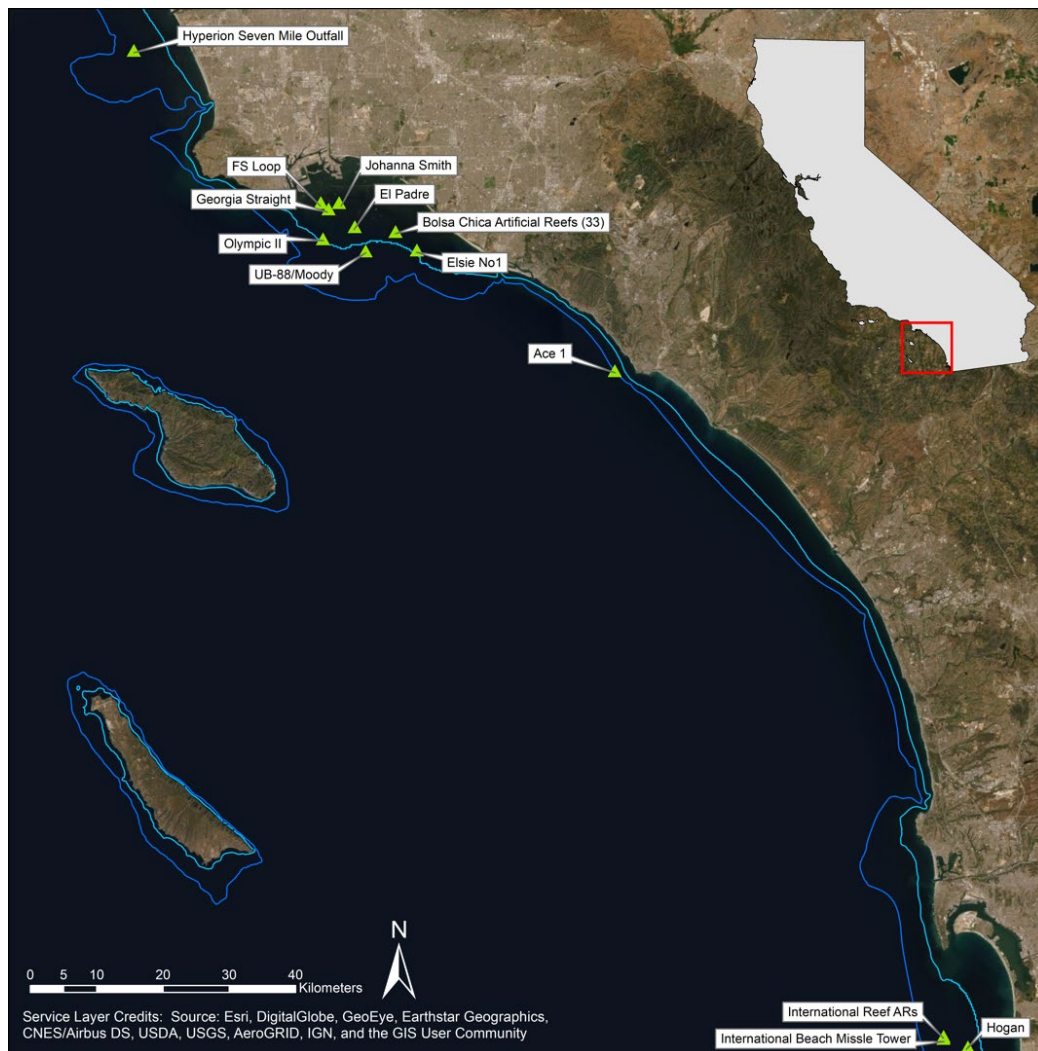


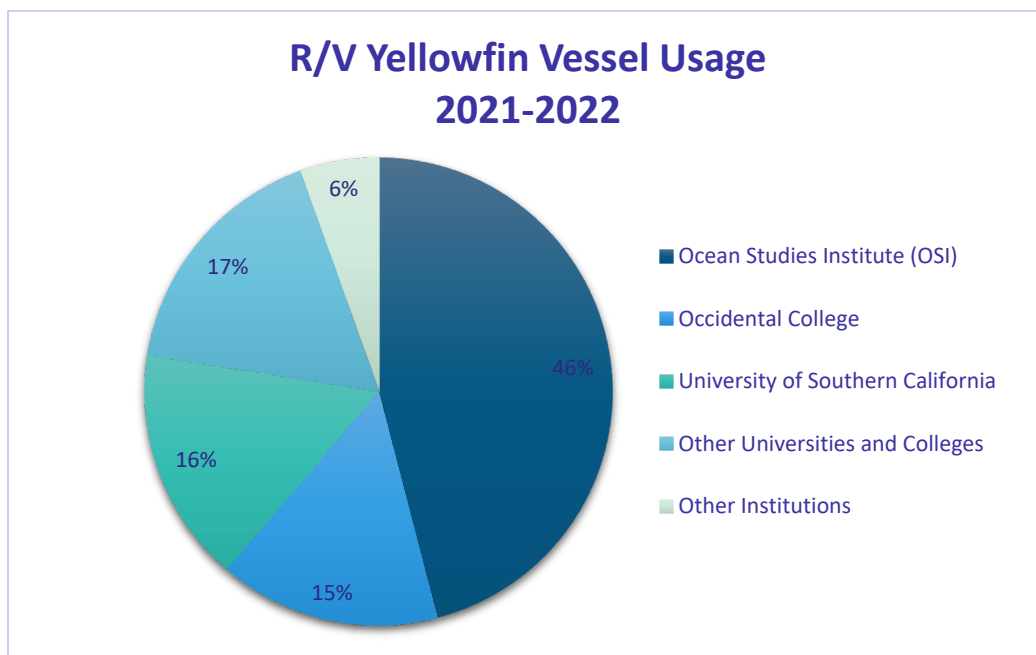
Figure 1. Map of proposed artificial reefs and shipwrecks in the Southern California Planning Area at depths appropriate for comparative studies with existing oil and gas infrastructure. Light blue line indicates the -30m isobath (max depth for diving) and dark blue line indicates the -100 m isobath (max depth for BlueROV2).

Vessel Use

OSI's R/V Yellowfin Usage by Institutions

This year, the R/V Yellowfin logged approximately 676.5 hours of vessel use for a total of 111 cruises. With COVID-19 regulations easing up during Fall 2021, we were able to accommodate more cruises and more students. SCMI continued to work with CSULB, our administrative campus, and developed safety protocols to continue college and university trips on the R/V Yellowfin. The trips consisted of a combination of class laboratories, graduate and university research, and contracted research. 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)	804	67	307	51
Occidental College	153	19	100	17
University of Southern California	95	24	147.5	18
Other Universities and Colleges	302	25	69	19
Other Institutions	6	28	53	6
Yearly Total	1360	163	677	111



Ocean Studies Institute Budget

Ocean Studies Institute: FY Budgets 2016/2017 through 2021-2022

Fund Description	FY 2016-17	FY 2017-18	FY 2018-19	FY 2019-20	FY 2020-21	FY 2021-22
Revenue						
Salaries and Wages	\$ 492,443	\$ 557,411	\$ 528,809	\$ 554,099	\$ 544,799	\$ 544,799
Benefits	\$ 250,093	\$ 321,836	\$ 317,532	\$ 320,305	\$ 284,865	\$ 286,313
OSI Member Contributions ⁽¹⁾	\$ 76,500	\$ 76,500	\$ 76,500	\$ 76,500	\$ 76,500	\$ 76,500
OE&E	\$ 88,324	\$ 116,702	\$ 48,233	\$ 63,481	\$ 84,524	\$ 109,761
Misc. Revenue and User Fees ⁽²⁾	\$ 82,265	\$ 48,756	\$ 77,436	\$ 50,891	\$ 26,268	\$ 33,090
Total	\$ 989,625	\$ 1,121,205	\$ 1,048,510	\$ 1,065,275	\$ 1,016,955	\$ 1,050,463
Expenditures						
Salaries and Wages	\$ 490,658	\$ 614,598	\$ 552,822	\$ 565,225	\$ 509,263	\$ 521,423
Benefits	\$ 256,605	\$ 321,905	\$ 317,532	\$ 320,305	\$ 284,865	\$ 286,313
Operating Expenses ⁽³⁾	\$ 194,857	\$ 165,549	\$ 121,621	\$ 93,957	\$ 144,505	\$ 139,391
Accounting Charges	\$ 2,106	\$ 1,799	\$ 3,609	\$ 1,044	\$ 53	\$ 1,293
Total	\$ 944,226	\$ 1,103,850	\$ 995,583	\$ 980,532	\$ 938,685	\$ 948,419
End-of-Year Balance	\$ 45,399	\$ 17,355	\$ 52,926	\$ 84,744	\$ 78,270	\$ 102,044

⁽¹⁾OSI Members contributions are received annually and vary among the nine OSI institutions based on historic patterns of facilities and service use

⁽²⁾ Miscellaneous OSI Revenue comes from indirect cost returns from external grants; user fees are associated with use of the R/V Yellowfin. This revenue source varies from year to year and include carryover from prior years

⁽³⁾ Operating Expenses include contractual services, supplies, minor boat repairs, and diving related expenses

SCMI Members



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Vice Chairperson: Steve Murray Ph.D.

Member at Large: Sean Anderson Ph. D.

Director-Coordinator: Daniel Pondella Ph.D.

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Curtis Bennett Ph.D. - CSULB

Daniel J. Pondella II Ph.D. – SCMI Director; Occidental College

Larry G. Allen Ph.D. – OSI Director/Chairperson; CSUN

Tina Treude Ph.D. – UCLA

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SCMI Staff 2021-2022

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Carrie Wolfe – Research & Education and Operations Coordinator

Adriana Stowell – Budget and Research Coordinator

Darrell Montague – OSI Dive/Boat Safety Officer

Julianne Steers – Marine Science Technician

Mark Loos – Aquarist & Instructional Support Technician

Dennis Dunn – Captain R/V Yellowfin

Denis Mahaffy – Vessel Engineer

Joel Ingram – Small Vessel Support Technician & Relief Captain

Erin Pierce – Demonstration Technician