2019–2020
ANNUAL REPORT

Marine Science Institute

UC SANTA BARBARA

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Mission Statement

The Marine Science Institute at the University of California, Santa Barbara, is committed to fostering innovative and significant research, to promoting effective stewardship, and to sharing exciting discoveries of the world's oceans.

From the Director

Overview

The Marine Science Institute, which celebrated its 50th anniversary this past academic year, was born as a campus response to the 1969 Santa Barbara oil spill, a local maritime accident that spawned the modern environmental movement. The modest beginning of MSI as a small research unit focused on better scientific understanding of the coastal marine environment has grown today to have a global reach and stellar reputation for cutting-edge research in broad areas of marine science. The growth and sustained success of MSI reflects the synergy created when world-class regular and research faculty are well supported by highly dedicated professionals in a culture that fosters cross-disciplinary collaboration. The institute brings together marine researchers from across the UCSB campus and supports both multi-investigator collaborative projects and individual research efforts. The scientific membership at MSI consists of both ladder rank faculty and professional researchers. In 2019-2020 MSI membership included 25 ladder rank faculty and 33 professional researchers/project scientists with 268 additional participants distributed across postdoctoral scholars, graduate students and undergraduates. Beyond research, MSI's Research Experience and Education Facility (REEF) educates UCSB undergraduates and the general public about MSI science.

MSI is housed in the Marine Science Research Building (MSRB) on the UCSB campus. The MSRB contains both MSI support services and research laboratories. Support services include the MSI administrative staff that support pre- and post- award activities, the MSI analytical facility that provides expertise in the chemical analysis of environmental samples from the marine environment, the Ocean O'Graphics unit that provides web and graphics services and the MSI information technology group who support scientific computing. Research space is allocated to individual ladder rank faculty and professional researchers and to collaborative research groups. MSI professional researchers are also housed within departmental spaces, at Devereux and off-campus leased space. MSI educational and outreach facilities are located at campus point.

The MSRB is also one of the few research buildings at UCSB plumbed into the campus seawater system. Researchers have access to over 1,600 ft^2 of seawater workroom space distributed across six seawater laboratories. MSI supports three walk-in environmental chambers which provide access to temperature controlled conditions simulating environments from the tropics to the poles. Other shared spaces provide access to common use scientific equipment including autoclaves, freeze dryers, centrifuges and refrigerator/freezer space. These common-use facilities serve the needs of individual research projects and collaborative efforts on an as needed basis.

MSI has a new business services officer, Carolyn Sheehan, who comes to us with years of experience from UCSD. Carolyn has successfully transitioned MSI to function effectively during the Covid-19 pandemic. She continues MSI's commitment to providing strong pre- and post- award administrative support to its investigators. This is also the year that my tenure as Director of MSI comes to an end. It has been a pleasure to serve as Director of MSI and to contribute what I could to the success of such a vibrant institute. Campus has approved an FTE to conduct an international search for a new director. As of July 1, 2020, the search for a new permanent director is on track. It is vital that campus complete this search in a timely way to ensure continued excellence in marine science across campus.

MSI staff have had another busy year. In 2019–2020 MSI submitted 121 proposals and managed 340 projects. Post award activities include accounting, personnel management, procurement and travel. Beyond pre- and post- award activities MSI staff are also responsible for MSRB management and maintenance, management and maintenance of common use scientific equipment, laboratory safety compliance, seawater system maintenance, room scheduling, serving as the interface between the Channel Island Marine Sanctuary offices and campus facilities and management offices. The MSI administrative staff are recognized as highly innovative with a history of bringing new systems to campus (GUS, Cayuse, Coupa, IT Works) that increase efficiencies quickly and at modest cost. MSI is currently updating its shadow system, IT Works, to an updated cloud version that will be tightly integrated into the campus central ledger (including Gateway procurement) increasing efficiency tremendously from current practices.

The MSI Analytical Laboratory provides investigators with analytical services for environmental samples from the marine environment. The purpose of the facility is to provide investigators access to instrumentation and analyses that would be too costly or too inefficient for individual PIs to maintain. In normal years the laboratory also serves a strong educational function supporting research of graduate students and postdoctoral scholars , the laboratory staff assist undergraduates conducting honors research and independent study projects. The laboratory routinely employs undergraduates to assist in sample preparation and in routine analyses providing vital real-world work experience. Moreover, laboratory personnel guide investigators in the development of new analytical methods to catalyze new avenues of research and to support new extramural proposals.

The MSI Information Technology group maintains the computational and data storage infrastructure supporting MSI researchers and staff. The IT group consists of a single half-time systems manager and an undergraduate student, covering approximately 215 individual devices for 80 end-users. The IT staff supports the audio-visual equipment in the three MSRB conference rooms and the auditorium. MSI IT provides desktop support, file sharing, web application hosting, database hosting, network monitoring, compute nodes, data backup, and data storage. The departmental Storage Area Network (SAN) hosts 72 TB of shared data, with an additional system providing 11TB of backup storage on premises. In an effort to reduce local hardware demands through a transition to cloud-based services, cloud storage providers host backups totaling about 30 TB of data. Currently MSI IT operates 30 virtual servers on five physical machines in support of the unit.

MSI's Educational and Outreach Program brings our discoveries to K-12 students, the general public and to UCSB students. A recent goal has been to engage more UCSB undergraduates. These efforts have been wildly successful. In an average year the REEF now serves nearly 4,000 UCSB undergraduates in activities ranging from laboratory classes to research training and other activities spanning six campus administrative divisions along with 18,000 visits by K-12 students and the general public. As described below the REEF had to reinvent itself during the pandemic.

MSI is led by the director who is advised by the business services officer and a deputy director. The MSI Advisory Committee, consisting of faculty and researchers from each of the participating campus departments and professional schools, serves an oversight role and reports on MSI needs and activities to the vice chancellor for research. Local governance is handled by the MSI Resources Committee that reviews requests for office and laboratory space with the MSRB and makes recommendations to the director. The MSI Computing Committee assesses the computer infrastructure necessary to support MSI research and makes policy and purchase recommendations to the director.

Executive Summary

MSI has had another highly successful year of scientific discovery with the institute PI's conducting nearly 243 research projects ranging from efforts to develop new policies for ocean management to developing new isotopic tools to understand ocean biogeochemistry. Here is a selection of projects, but remember this is only the tip of the iceberg relative to MSI's research activity.

- **Professor Craig Carlson** continues to lead the multi-university BIOS-SCOPE project that has been in place for several years. BIO-SCOPE is a cross-disciplinary program in microbial oceanography with a primary focus on the interactions between microbial processes and dissolved organic carbon (DOC) concentration and composition in the sea. As the reservoir of DOC in the oceans is equivalent in size to the amount of carbon dioxide in the atmosphere shifts in the ocean DOC inventory can feedback on climate. The overarching goal of BIOS-SCOPE is to form and foster collaborations of cross disciplinary science that utilizes a broad suite of genomic, ecological, oceanographic and biogeochemical approaches to evaluate microbial process, structure and function on various scales. Of particular interest to the BIOS-SCOPE team is better understanding the sources, sinks and transformation of DOC and the interaction between complex DOC substrates and how they are incorporated, oxidized and transformed by distinct microbial communities at the Bermuda Atlantic Time-series Study (BATS) site.
- **Professors Santoro, Carlson and Brzezinski** each have separate grants to participate in NASA's EXport Processes in the Ocean from Remote Sensing (EXPORTS) field study. This $72M project is led by UCSB by Professor David Siegel with additional participation by ERI Professional Researcher, Norman Nelson. EXPORTS is a large-scale NASA-led field campaign that will provide critical information for quantifying the export and fate of upper ocean net primary production (NPP) using satellite observations and state of the art ocean technologies. Over 30 principal investigators from around the nation are involved with UCSB being very well represented.
- **Associate Professor Douglas McCauley** continues to lead the Benioff Ocean Initiative (BOI). The BOI seeks to understand how science can both inform and solve problems affecting our oceans. Last year the BOI launched a new large initiative focused on ocean plastics. This particular effort seeks to design and deploy a pilot intervention strategy that both physically captures plastic waste in rivers before it reaches the ocean, and catalyzes policy-based, infrastructural, and/or societal change to reduce plastic waste in put rivers. It was anticipated that one project would be funded, however an additional $8M was raised to support eight outstanding proposals.
- Most people familiar with MSI know that the institute is the intellectual home of two of the nation's long-term ecological research programs: **The Santa Barbara Coastal (SBC) LTER** that focuses on kelp forest dynamics and the **Moorea Coral Reef (MCR) LTER** that studies the coral ecosystems of French Polynesia. Both programs have undergone leadership transitions. SBC leadership by Researcher Dan Reed has transitioned to Researcher Robert Miller and MCR is transitioning from being led by Professor Russell Schmitt to Professor Deron Burkepile. LTERs are designed to test ecological theory on timescales not approachable in short-term studies and to

evaluate how ecological communities respond to climate perturbations. These two studies bring together over 100 investigators from UCSB and elsewhere in a highly interdisciplinary effort to advance our understanding of these ecosystems.

- **Professor Alyson Santoro** is leading a project to characterize nitrogen cycling in the low oxygen region of the Eastern Pacific Ocean using genomics, proteomics, and stable isotope tracer experiments. Though scarce and largely insoluble, trace metals are key components of sophisticated enzymes (protein molecules that speed up biochemical reactions) involved in biogeochemical cycles in the dark ocean (below 1000m). Metalloenzymes are involved in nearly every reaction in the nitrogen cycle. Yet, despite direct connections between trace metal and nitrogen cycles, the relationship between trace metal distributions and biological nitrogen cycling processes in the dark ocean have rarely been explored. This research is an interdisciplinary chemistry, biology, and engineering effort to test the hypothesis that certain chemical reactions, such as nitrite oxidation, could become limited by metal availability within the upper mesopelagic and that trace metal demands for nitrite-oxidizing bacteria may be increased under low oxygen conditions

COVID-19 Impacts

This summary covers the period of July 1, 2019 – June 30, 2020 spanning the research shutdown and Phase 1 and Phase 2 research re-openings. I note that the impact of COVID-19 is ongoing. The MSI Director effectively handled all Phase 1 research requests coordinating with OR on their review. MSI formed a building committee for the MSRB for Phase 2 work which established a building safety plan and oversaw the development and review of research plans by investigators. All essential research was maintained with adjustments to ongoing research as the pandemic situation evolved.

The largest impact on MSI research was the shutdown. The impact due to the inability for individuals to perform laboratory analyses is obvious. However, this lost time turned into a permanent loss rather than a delay as PI's were instructed to maintain salary support from federal grants for students, post-doctoral scholars and technicians during the shutdown. Thus, these salary resources were no longer available once research resumed representing a permanent loss of productivity.

The MSI administrative staff adjusted to remote work very well. Most worked remotely although some essential services such as processing of checks and aspects of compliance with human resources paperwork require limited on campus work for a select few staff members. Our IT staff was strained initially to get the administrative staff set up for remote work as many had inadequate computers at home necessitating the purchase and configuration of several new laptops. Staff were encouraged to take home their office desks, chairs, computers and desktop monitors and other accessories to improve home ergonomics and productivity. Thus far the staff have adapted well and they are meeting all obligations.

The REEF has been significantly impacted by the pandemic and remains closed to on site activities. However, the REEF's director, Scott Simon, reinvented the REEF creating the virtual REEF online. With assistance from the undergraduate docents, and with all participants working remotely, he turned the REEF into a 100% virtual experience. For example, they have produced over 100 educational videos that run on the VirtualREEF YouTube Channel. This is an impressive success story and it is ongoing.

MSI's Analytical Laboratory was especially hard hit by the research closure as all income to this recharge facility ceased while salaries for analytical lab members continued to be paid through the recharge account following university policy. The lab manager filed for, and received, an exception to analyze critical perishable samples during the closure. Fortunately, the lab had been sufficiently productive that previous NUD earnings covered salaries during the shutdown and as of June 30, 2020 the laboratory's finances remain in the black. However, the planned use of the NUD for equipment repair and maintenance will be compromised in the future.

5-Year Plan

Looking to the future MSI has the following goals for the next 5 years. Foremost is the completion of the open search for a new permanent director as the current director's service ends July 1, 2020. This is a vital position for campus that will influence the quality of marine science research at UCSB for the next decade.

Over the past few years MSI has met its goal to broaden REEF programs to better serve the core mission of the university by increasing the number of UCSB undergraduates that the program serves. We have partnered with six campus divisions ranging from Academic Affairs to Student Affairs and Administrative Services to engage undergraduates at multiple levels. These efforts were highly successful with nearly 4,000 undergraduates having benefited from our programs the year before the pandemic. This success compliments the record number of 18,000 public visitors to the REEF in the year before the pandemic. This is an impressive achievement when one considers that the entire operation is managed and run by a single staff member with the assistance from undergraduate student docents.

A continuing goal at MSI is to capitalize on the untapped research potential of its investigators by creating a fund to catalyze new research endeavors that will provide seed money for turning new ideas into proposals. The goal is to fund collaborative groups to sponsor workshops, meetings with program managers and other activities that will position MSI researchers for success on new innovative projects. This is especially important for professional researchers who are not eligible for university research funds through the academic senate. MSI has reworked its budget to allow the new director this opportunity on a limited basis.

An unmet goal is financial support for professional researchers who rely on grants for 100% of their salaries. Professional researchers continue to account for over half of MSI's grant and research activity. MSI continues to work with OR to find ways of supporting this group. Beyond support for all researchers there is a subset of professional researchers that merit special attention. Professional researchers at MSI lead the largest of our collaborative group projects including the SBC LTER, the MBON and the SONGS project. These group projects are often leveraged by other investigators that bring in significant research funding beyond the original project. Leading one of these projects demands considerable time and effort which is often not covered by the project budget. A system that rewards researchers for taking on these leadership roles will ensure that MSI can continue to organize the teams necessary to compete for, manage and renew these and other large programs.

Future continued growth in marine research at UCSB will require MSI to seek additional research space. MSI is fortunate to have access to research space in the MSRB which is strategically deployed in support of collaborative projects and individual projects for both ladder rank faculty

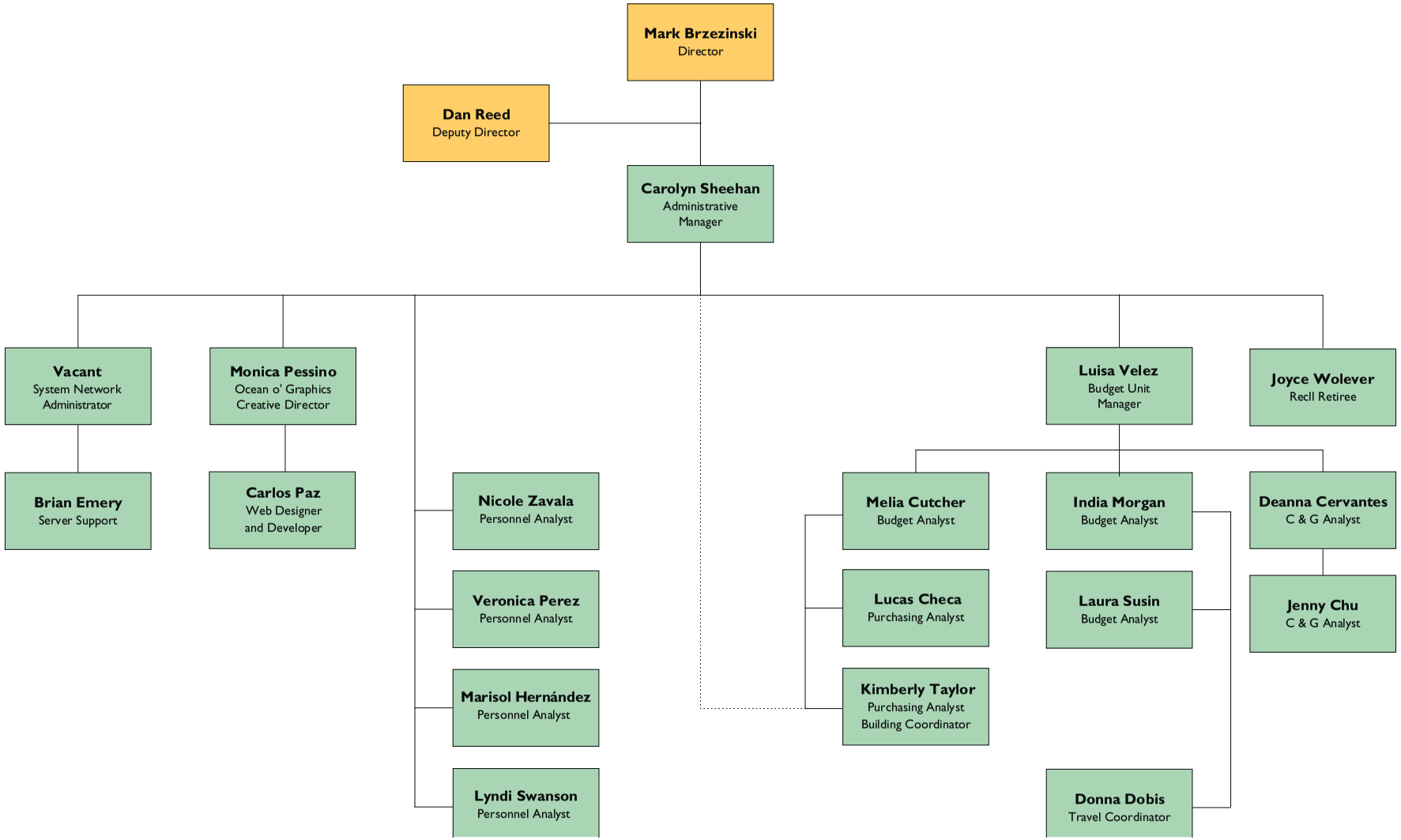
and professional researchers. Recently MSI lost thousands of square feet of research space with the demolition of building 408. Much of MSI's membership is from departments that are also experiencing space limitations. MSI is now working with departments to explore creative solutions for new research space. Our approach is to develop partnerships that will produce synergies to allow new space to meet multiple needs across campus. Efforts continue to be focused on replacing the "Old Marine Laboratory" at campus point which suffers from severe structural deficiencies which would offer the opportunity to construct a new expanded state-of-the-art facility. We also have researchers that are enthusiastic to move to Devereux should space be made available. Fitting out the shell of the former "OCTOS" outreach building as research space also remains a possibility.

For the past few years MSI has had the goal of working with the Office of Research to reorganize MSI's budget to simplify the institute's fragmented and confusing funding profile. The goal was to eliminate funding sources gained through short-term deals to support the analytical facility, the education and outreach program and the administrative unit and to incorporate those costs into MSI's base budget. This remains a goal for the future. MSI's current budget is sound and all recharge units have balanced budgets. However, gaps in our ability to support the director of the REEF are anticipated in 2021. Given the fact that the REEF serves 4000 undergraduates per year a solution based on contribution to UCSB's core educational mission is justified.

Organizational Charts

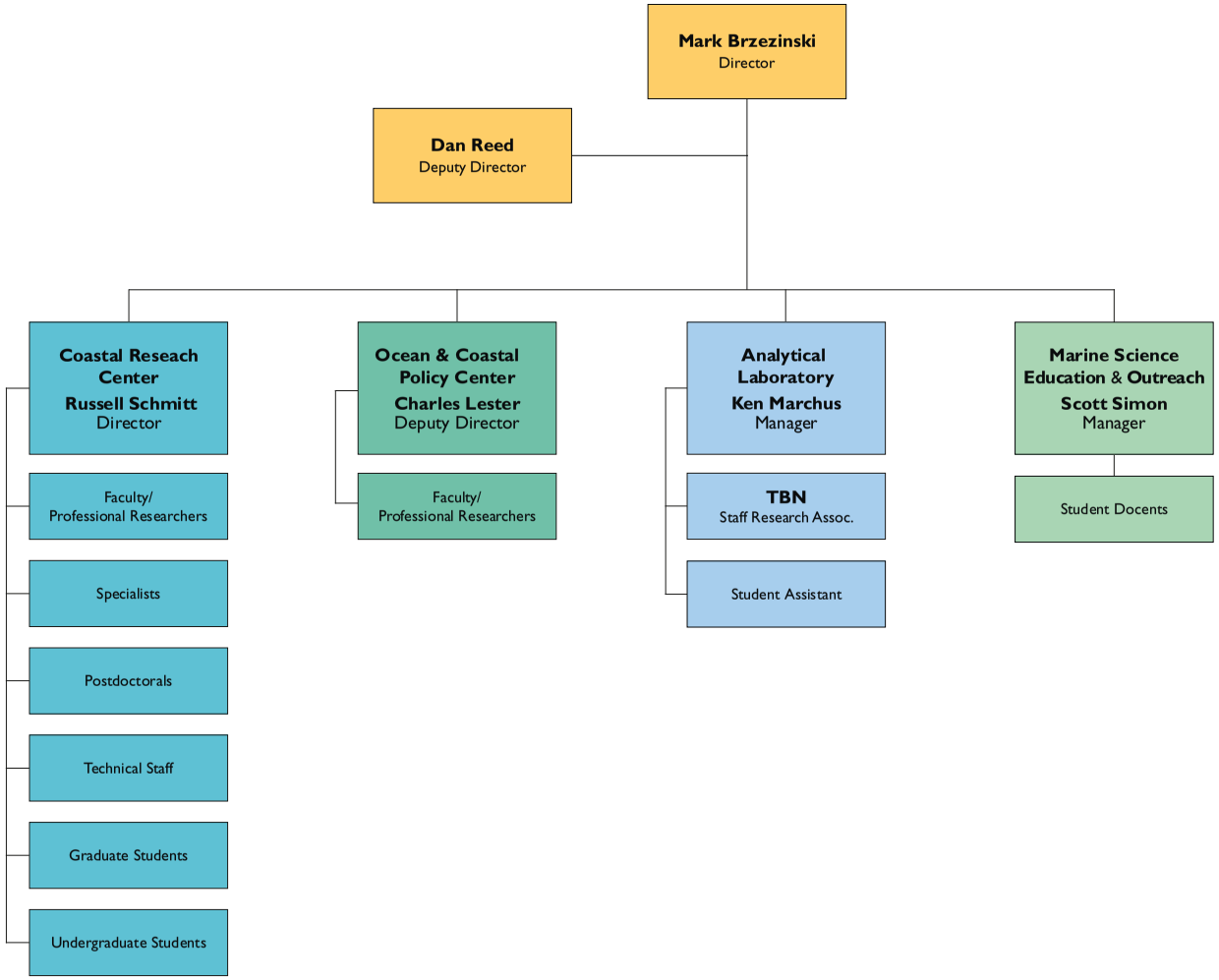
MARINE SCIENCE INSTITUTE

ORGANIZATIONAL CHART



MARINE SCIENCE INSTITUTE

2019–2020 ORGANIZATIONAL CHART



MSI Advisory Committee, Administrative, and Professional Technical Staff

Marine Science Institute
2019-2020

Chancellor	Henry T. Yang
Executive Vice Chancellor	David Marshall
Vice Chancellor For Research	Joe Incandela
Director	Mark A. Brzezinski
Deputy Director	Dan Reed

Advisory Committee

Jennifer Dugan, MSI
Erika Eliason, EEMB Adam Lambert, MSI
Adam Lambert, MSI
Lorraine Lisiecki, Earth Science
Holly Moeller, EEMB
Alyson Santoro, EEMB
Russell Schmitt, Commitee Chair, EEMB
David Siegel, Geography
Mark Torchin, MSI

Ex-Officio Members –

Mark Brzezinski, Director, MSI
Patricia Holden, Director, Natural Reserve System
Charles Lester, Director, Ocean Coastal Policy Center
Daniel Morse, Director, Marine Biotech Center
Dan Reed, Deputy Director, MSI
Carolyn Sheehan, Manager, MSI
Russell Schmitt, Director, Coastal Research Center

Marine Science Institute
Administrative, Professional and Technical Staff

Director, Mark Brzezinski

Deputy Director, Dan Reed

Management Services Officer, Carolyn Sheehan

Financial Manager, Luisa Velez

Budget Analyst, Melia Cutcher

Budget Analyst, India Morgan

Budget Analyst, Laura Susin

Contracts & Grants Officer, Jenny Chu

Contracts & Grants Officer, Deanna Cervantes

Development Officer, Matt Fratus

Education & Outreach, Scott Simon

Graphics Manager, Monica Pessino

Web Developer, Carlos Paz

IT & Server Support, Brian Emery

Personnel Analyst III, Nicole Zavala

Personnel Analyst III, Veronica Perez

Personnel Analyst, Marisol Hernandez

Personnel/Payroll Analyst, Lyndi Swanson

Purchasing Analyst, Lukas Checa

Purchasing Analyst/Building Coordinator, Kimberly Taylor

Travel Coordinator, Donna Dobis

Statistical Summary

Statistical Summary for the Marine Science Institute 2019-2020

	MSI
1. Academic personnel engaged in research	
Faculty	25
Professional Researchers (including Visiting)	19
Project Scientists	14
Specialists	43
Postdoctoral Scholars	32
Postgraduate Researchers	0
Academic Coordinators	5
TOTAL	**138**

2. Graduate Students	
Employed on contracts and grants	84
Employed on other sources of funds	0
Participating through assistantships	0
Participating through traineeships	0
Other (specify)	0
TOTAL	**84**

3. Undergraduate Students	
Employed on contracts and grants	96
Employed on other funds	2
Number of volunteers, & unpaid interns	32
TOTAL	**130**

4. Participation from outside UCSB: (optional)	
Academics (without Salary Academic Visitors)	0
Other (specify)	0
TOTAL	**0**

5. Staff (Univ. & Non-Univ. Funds):	
Technical	118
Administrative/Clerical	18
TOTAL	**136**

6. Seminars, symposia, workshops sponsored	
7. Proposals submitted	121
8. Number of different awarding agencies dealt with*	44
9. Number of extramural awards administered	243
10. Dollar value of extramural awards administered during year**	$100,303,290
11. Number of Principal Investigators***	33
12. Dollar value of other project awards ****	$15,584,290
13. Number of other projects administered	97
14. Total base budget for the year (as of June 30, 2018)	$1,893,426
15. Dollar value of intramural support	$803,420
16. Total assigned square footage in ORU	38,807
17. Dollar value of awards for year (2018 Total)	$23,114,739

* Count each agency only once (include agencies to which proposals have been submitted).
** If the award was open during the year, even if for only one month, please include in total.
*** Number of PIs, Co-PIs and Proposed PIs (count each person only once.)
**** Other projects - such as donation, presidential awards, fellowships, anything that isn't core budget, extramural, or intramural.

Five-Year Statistical Summary 2015-2019

	2015-16	2016-17	2017-18	2018-19	2019-20
1. Academic personnel engaged in research					
a. Faculty	25	30	29	25	25
b. Researchers/ Project Scientists	40	36	32	32	33
c. Visiting Researchers					
d. Specialists/ Academic Coord/ Academic Admin.	42	49	44	44	48
e. Postdoctorals/ Postgraduates	36	37	46	37	32
Total	**143**	**152**	**151**	**138**	**138**
2. Staff (Univ. & Non-Univ. Funds)					
a. Technical	158	143	161	154	118
b. Administrative/Clerical	37	32	26	18	18
Total	**195**	**175**	**187**	**172**	**136**
3 Graduate students employed by MSI	63	67	59	62	84
4. Undergraduate students employed by MSI	153	127	187	129	98
5. Publications	1**	1**	1**	N/A	N/A
6. Seminars, symposia, workshops, etc., sponsored by MSI					
7. Proposals submitted	156	192	171	158	121
8. Annual extramural awards	$21,780,363	$17,781,660	$22,614,258	$21,086,488	$23,114,739
9. Extramural awards administered	247	249	230	248	243
10. Other project awards	$4,524,827	$6,423,928	$8,443,613	$4,663,709	$15,584,290
11. Other projects administered	111	118	116	83	97
12. MSI base budget	$2,327,940	$2,849,823	$2,858,472	$1,828,535	$1,893,426
13. Intramural support	$124,543	$194,037	$339,162	$610,905	$803,420
14. Total Funds Administered	$87,991,153	$82,475,035	$86,460,197	$96,794,967	$100,794,967

** Only Departmental Publications

Marine Science Institute Principal Investigators 2019–2020

Marine Science Institute Principal Investigators 2019–2020

Adam, Thomas	Assistant Researcher	Marine Science Institute
Alagona, Peter	Associate Professor	History/Environmental Studies
Alldredge, Alice	Emeritus	Ecology, Evolution & Marine Biology
Bell, Thomas	Project Scientist	Earth Research Institute
Blanchette, Carol	Associate Researcher	Marine Science Institute
Bone, Jennifer	Associate Specialist	Marine Science Institute
Bradley, Darcy	Assistant Researcher	Marine Science Institute
Briggs, Cheryl	Professor	Ecology, Evolution & Marine Biology
Brooks, Andy	Project Scientist	Marine Science Institute
Brzezinski, Mark	Professor	Ecology, Evolution & Marine Biology
Bull, Ann	Visiting Researcher	Marine Science Institute
Burkepile, Deron	Associate Professor	Ecology, Evolution & Marine Biology
Cabral, Reniel	Assistant Researcher	Marine Science Institute
Caldow, Chris	Research Associate	Marine Science Institute
Carlson, Craig	Professor	Ecology, Evolution & Marine Biology
Caselle, Jennifer	Researcher	Marine Science Institute
Caylor, Kelly	Professor	Earth Science
Cooper, Scott	Emeritus Research Professor	Ecology, Evolution & Marine Biology
Costello, Christopher	Professor	Bren School of Envir. Sci. & Management
Couture, Jessica	Graduate Student	Bren School of Envir. Sci. & Management
Culver, Carrie	Research Scientist	Marine Science Institute
D'Antonio, Carla	Professor	Environmental Studies
De Tomaso, Tony	Professor	Molecular, Cellular & Devel. Biology
Deschenes, Olivier	Professor	Economics
Dudley, Tom	Researcher	Marine Science Institute
Dugan, Jenifer	Associate Researcher	Marine Science Institute
Eliason, Erika	Assistant Professor	Ecology, Evolution, and Marine Biology

Emery, Brian	Assistant Researcher	Marine Science Institute
Eurich, Jacob	Postdoctoral Researcher	Marine Science Institute
Fisher, Alexander	Postdoctoral Researcher	Geography
Foltz, Kathy	Professor	Molecular, Cellular & Devel. Biology
Froehlich, Halley	Assistant Professor	Environmental Studies/EEMB
Gaines, Steven	Dean, Bren School, Professor	Bren School of Envir. Sci. & Management
Geyer, Roland	Professor	Bren School of Envir. Sci. & Management
Herbst, David	Associate Researcher	Marine Science Institute
Hodges, Scott	Professor	Ecology, Evolution & Marine Biology
Hofmann, Gretchen	Professor	Ecology, Evolution & Marine Biology
Holbrook, Sally	Professor of Biology	Ecology, Evolution & Marine Biology
Iglesias-Rodriguez, Maria	Professor	Ecology, Evolution & Marine Biology
Ingeman, Kurt	Postdoctoral Researcher	Ecology, Evolution & Marine Biology
Jerde, Chris	Assistant Researcher	Marine Science Institute
Kennett, James	Emeritus Research Professor	Earth Science
Knapp, Roland	Researcher	Marine Science Institute
Kuczenski, Brandon	Associate Researcher	ISBER
Kuris, Armand	Professor of Biology	Ecology, Evolution & Marine Biology
Lafferty, Kevin	Research Biologist	Marine Science Institute
Lambert, Adam	Associate Research Biologist	Marine Science Institute
Lea, David	Professor	Earth Science
Lenihan, Hunter	Professor	Bren School of Envir. Sci. & Management
Lester, Charles	Researcher	Marine Science Institute
Libecap, Gary	Professor	Bren School of Envir. Sci & Management
Lisiecki, Lorraine	Professor	Earth Science
Lopez-Carr, David	Professor	Geography
Love, Milton	Researcher Emeritus	Marine Science Institute
MacIntyre, Sally	Professor	Ecology, Evolution & Marine Biology
Mazer, Susan	Professor	Ecology, Evolution & Marine Biology

McCauley, Douglas	Assistant Professor	Ecology, Evolution & Marine Biology
McClintock, William	Project Scientist	Marine Science Institute
Melack, John	Professor	Ecology, Evolution & Marine
Meng, Kyle	Assistant Professor	Bren School of Envir. Sci. & Management
Miller, Karly	Graduate Student	Ecology, Evolution & Marine Biology
Miller, Robert	Researcher	Marine Science Institute
Moeller, Holly	Assistant Professor	Ecology, Evolution & Marine Biology
Muller, Erik	Associate Researcher	Marine Science Institute
Myers, Monique	Associate Researcher	Marine Science Institute
Nelson, Craig	Associate Specialist	Marine Science Institute
Nguyen, Alice	Academic Coordinator	Ecology, Evolution & Marine Biology
Nicholson, Craig	Researcher	Marine Science Institute
Nidzieko, Nicholas	Assistant Professor	Geography
Nisbet, Roger	Professor	Ecology, Evolution & Marine Biology
Nishimoto, Mary	Assistant Researcher	Marine Science Institute
Oakley, Todd	Professor	Ecology, Evolution & Marine Biology
O'Brien, Margaret	Specialist	Marine Science Institute
Ohlmann, J. Carter	Researcher	Marine Science Institute
Page, Henry Mark	Researcher	Marine Science Institute
Pak, Dorothy	Academic Coordinator	Marine Science Institute
Passow, Uta	Researcher	Marine Science Institute
Park, Isaac	Assistant Project Scientist	Marine Science Institute
Peng, Xuefeng	Postdoctoral Researcher	Marine Science Institute
Plantinga, Andrew	Professor	Bren School of Envir. Sci. & Management
Pruitt, Jonathan	Assistant Professor	Ecology, Evolution & Marine Biology
Qin, Qianhui	Graduate Student	Earth Science
Rassweiler, Andrew	Assistant Researcher	Marine Science Institute
Reed, Daniel	Researcher	Marine Science Institute
Russak, Justin	Associate Specialist	Marine Science Institute
Santoro, Alyson	Assistant Professor	Ecology, Evolution & Marine Biology

Schmitt, Russell	Professor	Ecology, Evolution & Marine Biology
Schroeter, Stephen	Researcher	Marine Science Institute
Seltmann, Katja	Associate Researcher	Earth Research Institute
Siegel, David	Professor	Geography
Simon, Scott	REEF Manager	Marine Science Institute
Siple, Margaret	Postdoctoral Researcher	Ecology, Evolution & Marine Biology
Sokolow, Susanne	Postdoctoral Researcher	Marine Science Institute
Stears, Keenan	Postdoctoral Researcher	Ecology, Evolution & Marine Biology
Stier, Adrian	Associate Professor	Ecology, Evolution & Marine Biology
Szuwalski, Cody	Assistant Researcher	Marine Science Institute
Tao, Yun	Postdoctoral Researcher	Ecology, Evolution & Marine Biology
Torchin, Mark	Researcher	Marine Science Institute
Turner, Thomas	Associate Professor	Ecology, Evolution & Marine Biology
Valentine, David	Professor	Earth Sciences
Waite, J. Herbert	Professor	Molecular, Cellular & Devel. Biology
Warner, Robert	Professor	Ecology, Evolution & Marine Biology
Washburn, Libe	Professor	Geography
Wilbanks, Elizabeth	Assistant Professor	Ecology, Evolution & Marine Biology
Wilson, Douglas	Research Geologist	Earth Science
Wittmann, Marion	Executive Director	Natural Reserve System
Young, Hillary	Assistant Professor	Ecology, Evolution & Marine Biology
Young, Oran	Emeritus Research Professor	Bren School of Envir. Sci. & Management

Marine Science Institute Postdoctoral Researchers, Graduate and Undergraduate Students 2019–2020

Marine Science Institute Postdoctoral Researchers, Graduate and Undergraduate students 2019–2020

Postdoctoral Scholars

Bayer, Barbara

Brown,Alexandra L

Cabral, Reniel

Cannon, Johanna

Closset,Ivia M

Donovan,Mary K

Eule-Nashoba, Amber

Eurich,Jacob G

Ezzat,Leila

Fisher, Alexander

Free,Christopher

Goodheart, Jessica

Ingeman,Kurt E

James,Anna K

Kellom,Matthew A

Ladd, Mark

Larios, Eugenio

Little, Alexander

Liu,Shuting

Mahadevan,Meera

Mclaughlin,John Peter

Meyer-Gutbrod,Erin L

Peng,Xuefeng

Pfab,Franz Ferdinand

Schooler,Nicholas K

Siple,Margaret C

Strader, Marie

Stephens,Brandon M

Weber,Paige E

Wilber,Mark Quentin

Yorke,Christie E

Graduate Students

Arrington, Eleanor

Baetge, Nicholas

Bao, Ken

Beckley, Billie

Bennett, Michelle

Blomqvist, Linus

Bogan, Samuel

Bui, An

Carberry, Luke

Catlett, Dylan

Cavanaugh, Katherine

Cedeno, Tiffany

Chamorro, Jannine

Collie, Samuel

Comstock, Jacqueline

Couture, Jessica

Cox, Danielle

Csik, Samantha

De La Rosa, Gabriel

Dewees, Shane

Dillon, Erin

Dornan, Natalie

Dressler, Terra

Eegholm, Nathalie

Emery, Kyle

English, Chance

Esaian, Sevan

Fitch, Robert

Forbes, Elizabeth

Garcia, Alberto

Gately, James

Goss, Hayley

Gosselin, Kelsey

Grimes, Nathaniel

Hardesty Moore, Molly

Hensley, Nicholai

Hobart, Bethany

Honeycutt, Randi

Johns, Jason

Katz, Tatum

Kopecky, Kai

Kraskura, Krista

Ladd, Mark

Landfield, Kaitlyn

Leach, Terence

Liu, Na

Love, Connor

Lowman, Heili

Ma, Stephanie

Madden, Jessica

Malagutti, Flavio

Malakhoff, Katrina
Malloy, Christopher
Maniscalco, Michael
McDonald, Adriane
Mcelroy, Mary
Mesrop, Lisa
Michaud, Kristen
Miller, Karly
Morse, Marisa
Morton, Dana
Munsterman, Katrina
Nolan, Madeline
Ohlwiler, Mercette
Peters, Joseph
Picciani De Souza, Natasha
Qin, Qianhui
Racine, Phoebe
Ramirez Parada, Tadeo
Rand, Devin
Romine, Jeffrey
Russell, Imani
Speare, Kelly
Stroud, Ashley
Sugano, Cailan
Sum, Yoke Ching
Tang, Joanna
Tarn, Jonathan
Thivierge, Vincent
Titcomb, Georgia
Tye, Cecily
Uppal, Anagha
Villasenor Derbez, Juan Carlos
Zenteno, Jose

Undergraduate Students

Acosta-Hernandez, Alejandra
Ajina, Alia
Anderson, Claire
Anderson, Ellyse
Aplin, Allison
Bakhdanyan, Alex
Bannister, Indigo
Barron, Marco
Beltran, Nelson
Boyle, Sarah
Brewster, Chase
Bruggemann, Thea
Chan, Iris
Chen, Wei Tung
Collado, Nestor
Daniel, Tyler
De La Rosa, Gabriel
Della Colleta Vianna, Caio
Delmarsh, Ila
Dezzani, Alecia
Ditzler, Hannah
Dorji, Shey
Duncan, Nicholas
Eisaguirre, Jacob
Elbayar, Samantha
Flores, Jose
Galvan, Journ
Garcia Wickstrum, Hannah
Girling, Ivan
Guerra, Mia
Guerrero, Eric
Hunt, Abigail
Jennings, Lauren
Juengling Bean, Eva
Krotine, Kimberly
Lamanna, Renee
Landfield, Kaitlyn
Lopez, Kalissa
Lowry, Megan
Luong, Vanessa
Marley, Annaclaire
Marrero, Eva
Martin, Cecilia
Mason, Margot
Matthews, George
McComb, Sofie
McCracken, Kaelen
McGill, Rebecca
Mendoza, Sandra
Methot, Nils
Miyashiro, Robert
Monper, Kyle
Moreno, Luiza
Nguyen, Marie
Oda, Kai
Ogawa, Jacob
Packard, Ian
Parcell, Theresa
Park, Charin
Perez, Yanelyn
Plouffe, Kyler
Prewitt, James
Primavera, Skylar
Qiu, Siya
Racine, Phoebe

Ramirez Negron, Adriana
Rathle, Shane
Reamey, Maya
Saccomanno, Vienna
Shei, Jessica
Shelby, Benjamin
Silva, Juan
Sorrentino, Celest
Spelius-Olave, Chiloe
St Pierre, Zoe
Stead, Courtney
Steffen, Callie
Tang, Irvin
Tapia Lewin, Sebastian
Trebesch Heberlein, Evan
Van De Wyngaerde, Kylie
Van Gieson, Amir
VanBrocklin, Seth
Vega, Jessica
Villasenor Derbez, Juan Carlos
Vu, Kelly
Wagner, Noah
Walton, Miette
Wang, Alena
Warham, Matthew
Wei, Sophia
Winslow, Erin
Witonsky, Lilly
Youlton, Michelle
Zhang, Hefan
Zounes, Jade

Other Projects and Activities

Coastal Research Center

The Coastal Research Center is an organizational unit within the Marine Science Institute at UCSB. The central theme of the Center is to develop scientific knowledge to gain a more complete understanding of coastal and island ecosystems, which is necessary for sound management of the natural resources within coastal and island regions. The Center links academic scientists from a wide variety of disciplines, enhancing the ability to address marine environmental issues.

While CRC scientists work in marine environments throughout the world, much effort is focused on coastal reefs found in the Santa Barbara Channel region and the coral reefs surrounding the island of Moorea, French Polynesia. These two locations provide excellent model systems for the scientific exploration of a wide range of marine issues and scientists at UCSB have long valued these environments as natural laboratories for scientific study. Both areas are enjoyed by those seeking recreation, support important local fisheries and are faced with growing conflicts amongst different user groups as human population pressures increase, a trend that is common for many marine environments. The nearshore marine environments of California and the islands of French Polynesia are used increasingly as a disposal site for waste products. Renewed exploitation of oil and natural gas reserves has augmented the number of conflicting demands placed upon the Channel resources, while issues related to global climate change have increased concerns about the sustainability of coral reef ecosystems. Local issues related to the sustainability of commercial and sport fisheries in both regions mirror global concerns regarding management of exploited stocks. The cumulative effects of human activities on the natural resources of both of these regions are just beginning to be understood. It is imperative that we learn how to balance the multiple uses of nearshore ocean waters in an environmentally sound manner. Lessons learned by scientists in the Coastal Research Center have wide implications for understanding and resolving present and future problems, and will help local, regional and national regulators develop better management policies.

Development of sound management plans for areas such as the Santa Barbara Channel or the islands of French Polynesia is hampered by scientific uncertainty about the consequences of human activities. To understand and predict natural and anthropogenic disturbances, synthesis of new and existing knowledge of many scientific aspects of coastal marine systems - including biology, ecology, genetics, geology, chemistry and oceanography - will be necessary. Further, the development of new approaches and the use of emerging technologies are needed to resolve fundamental questions, some of which have remained unanswered for many years. Only with these advances will it be possible to make reliable predictions about the consequences of various activities, to develop the ability to restore degraded habitats and conserve valuable resources, and to foster development of environmentally sound policies for use of coastal or island regions in general.

The Center has four major objectives:

- To facilitate and promote interdisciplinary research initiatives
- To act as a center for production and integration of basic scientific information to more fully understand coastal and island ecosystems and their natural and exploited populations.
- To evaluate and predict effects of human activities on the marine environment, and to develop measures to ameliorate lost or degraded natural resources.
- To train students in basic research on marine environmental issues that may be applicable to decision-makers.
- To facilitate and promote interdisciplinary research initiatives.

Ocean and Coastal Policy Center

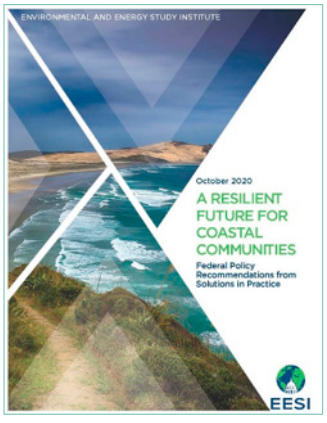
The coast is a place of profound beauty, complex ecology, and immense social value. It is also a place where we struggle with increasing human use, pollution, and development impacts. And with global climate change upon us, our desire to protect the coast now frames a more fundamental, existential question: *how can we live sustainably, and equitably, along our coastlines in the face of unprecedented environmental change?*

UC Santa Barbara's Ocean and Coastal Policy Center (OCPC) is engaging in some of our most pressing coastal policy challenges: adapting to sea level rise, assuring universal shoreline access, and protecting the coast's unique ecology. Working at the intersection of coastal stewardship, governance, and justice, OCPC offers expert policy analysis and problem-solving for government, NGOs, and citizens working for our coasts. The Center also seeks to leverage the extensive expertise of the University's marine and coastal science faculty and programs, including the Bren School of Environmental Management and UCSB's Environmental Studies Program, one of the nation's first undergraduate programs in interdisciplinary environmental studies.

With the appointment of Dr. Charles Lester as OCPC Director, the Center is focusing on these major issues:

- **Coastal Resilience.** We need solutions to help communities adapt to global sea level rise.
- **Environmental Justice & the Public Trust.** How can we assure citizen rights to access the coast?
- **The Future of the Coast.** Can we learn from the past to improve future governance of the coast?
- **Global Conservation Exchange.** OCPC is collaborating with practitioners in other countries, including researchers in Chile working to improve the conservation of Chile's incredible coast.

2019-2020: OCPC Director Dr. Lester is currently working on a policy research project for the State of California, examining the issues related to the sea level rise and protection public trust coastal resources. He also continued his work on coastal resilience, including collaborating with an interdisciplinary, multi-institution group of researchers to produce two articles about shoreline management strategies and managed retreat in California:



Anderson, R., Patsch, K., Lester C. F., and Griggs, G. 2020. *Adapting to Shoreline Retreat: Finding a Path Forward*, Shore and Beach (in press);

Griggs, G., Patsch, K., Lester, C. F., Anderson, R. 2020. *Groins, Sand Retention, and the Future of Southern California Beaches*. Shore & Beach. 88(2).

He also participated in a national effort led by EESI to produce recommendations for federal actions to address coastal hazards and community resilience, including conducting a Congressional briefing in Washington, D.C. on Resilience Along the West Coast (video).

Dr. Lester expanded OCPC's presence in the community through participation as a member of an expert national task force convened by the Surfrider Foundation that produced guidance addressing public beach access and management challenges presented by the COVID-19 pandemic. He was also invited to chair the sea-level rise adaptation subcommittee of Santa Barbara County's Regional Climate Collaborative and appointed to the Science Advisory Committee of the Beach Erosion Authority for Clean Oceans and Nourishment (BEACON) in Santa Barbara and Ventura Counties. Dr. Lester also continued to speak about coastal resilience, planning and regulation in California, including presenting to various non-governmental environmental organizations and the Western Australia Local Government Association (Surfrider talk).

OCPC continues to participate in the Chile California Conservation Exchange. Dr. Lester participated in the Fall 2019 conference in Marin County, speaking about the California coastal management experience and moderating a discussion on developing a comprehensive coastal assessment for the Chilean coast. He also helped produce a bilingual brochure about California's coastal program and issues for Chile to consider.

The Chile CaliforniaConservation Exchange

Closer to home (literally), Dr. Lester developed a short video about sea level rise and Santa Barbara's local marshlands with colleague Andrew Brooks, the Director of the Carpinteria Salt Marsh in the UC Natural Reserve System. The socially-distanced media presentation was produced by Isaac Hernández and Mercury Press International as part of the UCSB Reads 2020 program, which focused on Elizabeth Rush's book, "Rising: Dispatches from the New American Shore".

OCPC In the News

- Los Angeles Times: https://www.latimes.com/projects/la-me-sea-level-rise-california-coast/
- New York Times: https://www.nytimes.com/interactive/2020/02/13/climate/manila-san-francisco-sea-level-rise.html
- CBS News: https://www.cbsnews.com/news/erosion-threatens-california-coastline-as-soil-and-water-ravage-the-coast/
- Scientific American: https://www.scientificamerican.com/article/coastal-city-refuses-to-retreat/

About the Director

Dr. Charles Lester has been working for coastal protection for more than 25 years in the fields of law, policy and integrated coastal management. From 2011 to 2016 he served as the fourth executive director of the California Coastal Commission, and was the principal architect of California's first comprehensive sea level rise land use planning guidance. Dr. Lester brings a deep passion and knowledge to his work, and is committed to the preservation of shorelines as public goods, shared by all. Currently, Dr. Lester is working on a book about California's 50-year battle to protect public access, and the existential threat to beaches from sea level rise. He regularly speaks to the media and advises on coastal policy and management. Dr. Lester began his career as a professor at the University of Colorado at Boulder, teaching environmental and public policy, and public lands governance. He has a Ph.D. in Jurisprudence and Social Policy, and a J.D., from UC Berkeley, where he studied environmental and administrative law. His doctoral thesis examined the U.S. federal offshore oil program. He also holds a BA in geochemistry from Columbia University in New York City. For more information please contact: Dr. Charles Lester, Director of the Ocean and Coastal Policy Center: charleslester@ucsb.edu or phone: 831-706-8280.

Analytical Laboratory

The MSI Analytical Lab is a professionally managed chemical analysis facility with the objectives of improving the quality and efficiency of marine-related research efforts, and of providing advanced capabilities for new and expanded research programs. Originally established in 1977 to serve the needs of UCSB marine researchers, the facility is now recognized campus wide as well as nationally as a resource for high-quality analytical services. The major capabilities of the lab include wt% elemental analysis of carbon, hydrogen and nitrogen (CHN) by combustion and automated determination of dissolved nutrients in natural waters using a 5-channel Flow Injection Analyzer. The lab also provides a stable isotope facility for UCSB researchers. The facility includes maintained instrumentation and training for the determination of stable isotopes of carbon and nitrogen in biological and geological materials using continuous-flow Isotope Ratio Mass Spectrometry. Most of the Lab's current instrumentation was obtained with extramural funding from grants acquired by the Lab manager in conjunction with interested faculty and researchers. The Lab operation is supported largely through user fees. There are currently two full time staff members employed in the Analytical Laboratory. The covid-19 pandemic halted operation for four months and has continued to slow down operation, but we have still been able to meet researcher needs in a safe and timely manner. Please visit our website at msi.ucsb.edu/services/analytical-lab for more information.

MSI Education and Outreach

Prior to the pandemic, the 2019-2020 year for MSI Oceans-To-Classrooms (O2C) Education/Outreach Programs was headed for a record year with over 400 classes, courses, programs and visits scheduled, for an estimated total of 32,710 visitors. While we saw many changes due to the COVID-19 pandemic and our overall numbers were down, up until the shutdown in March, we had served over 11,000 K-12, college and general public visitors. Since the shutdown, we were able to respond to teachers and course needs through the design and development of distance teaching strategies and online resources, including the VirtualREEF YouTube Channel. Through these changes we were able to provide marine science education and awareness to over 2,000 people. While we continued to support schools and programs within the Tri-Counties (SLO/SB/Ventura), as well as other communities from California, because of our online presence, we reached students in San Francisco, Chicago and SOUTH AMERICA! Exposure included live, on-line meetings in the Research Experience & Education Facility (REEF), as well as UCSB outreach events through Orientation and Visitor Center programs. Additionally, we were able to adapt and conduct a very successful synchronous teacher professional development workshop in collaboration with the Santa Barbara County Education Office (SBCEO). University of California Santa Barbara (UCSB), as well as other Colleges, continued to include the REEF as part of their curriculum, albeit through a live on-line presence. None of this would have been possible without the continued support and collaborations from groups both on- and off-campus. This includes the Office of Education Partnerships, The Gevirtz Graduate School of Education (GGSE), The AS Coastal Fund, Santa Barbara Channel Islands National Marine Sanctuary (CINMS) and many more. One partnership of note is with the American Association of University Women (AAUW) and the Tech Trek Math & Science Camp for Girls, which brings 160 middle school girls from SB, Ventura, SLO, LA and Kern Counties to UCSB for a week-long residential experience. Though the campus was closed due to the pandemic, we were still able to support almost 65 girls through a virtual camp experience. Another project, The Young Authors Grant, in collaboration with GGSE and Harding University Partnership School (HUPS), produced and published a grades 4-6 student anthology, "The Hawks and the Sea: An Anthology!".