Sea Grant
CALIFORNIA

2018-2023
BRIEFING BOOK

Sea Grant CALIFORNIA

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UC San Diego | SCRIPPS INSTITUTION OF OCEANOGRAPHY

PROGRAM MANAGEMENT AND ORGANIZATION

LEADERSHIP

California Sea Grant unites the resources of the federal government, the State of California and leading universities to drive innovation that benefits California's economy, environment and communities. The program integrates research, extension services, education and communication to address critical coastal issues. It is at the forefront of science-based decision-making in the nation's most populous and diverse coastal state.

DIRECTOR, SHAUNA OH leads the overall execution of the program. She supervises Management Team members, administers annual awards from NOAA and serves as the principal investigator for leveraged and matching fund awards from diverse state sources. As the department chair for California Sea Grant at Scripps Institution of Oceanography, Oh facilitates the academic review of extension specialists, many of whom hold academic titles. She is a delegate for the National Sea Grant Association and promotes the program at state, national and international levels. Oh also facilitates collaborations with California universities, state and federal agencies and other stakeholders who contribute financially to the program.

FISCAL/CHIEF ADMINISTRATIVE OFFICER, CHRISTINE GRIFFIN joined the program in July 2023, succeeding the previous Fiscal/Chief Administrative Officer. Griffin manages the day-to-day administrative and fiscal operations of California Sea Grant. She supervises and leads support staff who carry out the program's operational activities and ensures compliance with all applicable federal, state and university policies, regulations and laws.

EXTENSION DIRECTOR, THERESA TALLEY served the program in this role from 2019-2023, leading and coordinating the remote extension team, spearheading improvements to processes and tools and implementing strategies to ensure program sustainability and effectiveness. Talley liaised with other functional units of the program, Scripps Institution of Oceanography and entities in California and across the Sea Grant network to fulfill program-level responsibilities and requirements. She convened monthly virtual meetings and organized two annual in-person retreats to facilitate collaborations among extension specialists and their staff research associates.

ADVISORY BODIES

Two principal advisory bodies provide guidance to the program. The California Sea Grant Advisory Board offers overall policy advice and strategic planning guidance to the Vice Chancellor for Marine Science at University of California, San Diego (UCSD) and to the California Sea Grant Director. Additionally, the State of California interacts with the program through the Resources Agency Sea Grant Advisory Panel (RASGAP), which provides guidance on state priorities and research needs.

CALIFORNIA SEA GRANT ADVISORY BOARD

The advisory board helps guide the leadership team's decision making about program operations and direction. Its members include senior officials and leaders from business and industry, state university systems, state and federal government and NGOs, thereby supplying broad expertise, experience, advice and perspectives. Advisory board members serve a three-year term and are eligible for re-appointment for one additional term. The board meets as frequently as necessary, typically once a year.

Noelle Bowlin	Research Fishery Biologist, NOAA Southwest Fisheries Center (La Jolla), 2020-
Mike Conroy	Executive Director, Pacific Coast Federation of Fishermen's Associations (San Francisco) 2020-2022 West Coast Director, Responsible Offshore Development Alliance, Southern California 2022-2023 Principal, West Coast Fisheries Consultants, 2020-
Jenn Eckerle	Executive Director, California Ocean Protection Council (Sacramento), 2023-
Jeff Gee (Chair)	Professor, Scripps Institution of Oceanography at the University of California, San Diego (La Jolla), 2020-2024
Mark Gold	Executive Director, California Ocean Protection Council (Sacramento), 2020-2022
Yvonne Harris	Associate VP, Office of Research, Innovation and Economic Development, California State University-Sacramento (Sacramento), 2020-2023
Nuin-Tara Key	Deputy Director, Climate Resilience, Governor's Office of Planning and Research (Sacramento), 2020-2022
Amber Mace	Executive Director, California Council on Science and Technology (Sacramento), 2020-2023 Managing Director/Chief of Strategic Partnerships, California Academy of Sciences (San Francisco), 2023-
Barbara Page	Co-Founder & Vice President of Operations, Anthropocene Institute (Menlo Park), 2020-
Corey Ridings	Manager of Fish Conservation, Ocean Conservancy (Santa Cruz), 2020-
Terry Sawyer	Owner, Hog Island Oyster Company (Marshall), 2020-
Rebecca Smyth	West Coast Director, Regional Director, Chief, NOAA Office of Coastal Management (Oakland), 2020-
Valerie Termini	Chief Deputy Director, California Department of Fish and Wildlife (Sacramento), 2020-
Ron Tjeerdema	Executive Associate Dean and Distinguished Professor, University of California, Davis Bodega Marine Laboratory (Bodega Bay), 2020-
Steve Weisberg	Executive Director, Southern California Coastal Water Research Project (Costa Mesa), 2020-

RESOURCES AGENCY SEA GRANT ADVISORY PANEL

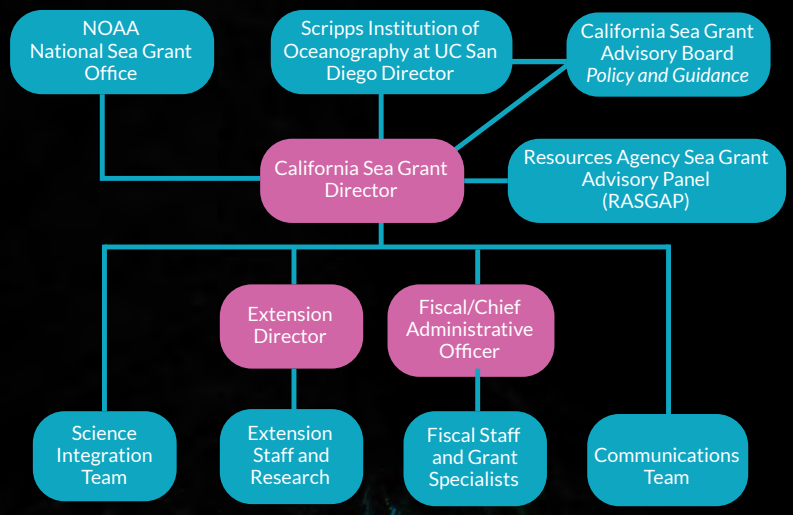
RASGAP is charged by state law to identify and meet priorities for funding for the two Sea Grant programs in California according to the needs of the state resource protection and management agencies. Per the statute, RASGAP consists of representatives from the:

- California Natural Resources Agency
- California Division of Boating and Waterways
- California Department of Conservation
- California Department of Fish and Wildlife
- Office of Oil Spill Prevention and Response
- Office of Environmental Health and Hazard Assessment
- State Water Resources Control Board
- State Lands Commission
- California Coastal Commission

PROGRAM SETTING

California Sea Grant is headquartered at Scripps Institution of Oceanography at the University of California, San Diego. The program director reports to Margaret Leinen, Vice Chancellor of Marine Sciences and the Director of Scripps Institution of Oceanography. Administrative, fiscal and communication staff are based in offices on the Scripps Institution of Oceanography campus. Sea Grant Extension Program personnel (Specialists and Staff Research Associates) are strategically located at or near coastal and marine science or policy institutions throughout the state in Eureka, Bodega Bay, Santa Rosa, Sacramento, San Francisco, Santa Cruz, Moss Landing, San Luis Obispo, Santa Barbara and San Diego. Research, fellowship and reporting coordination are led by the Science Integration Team (SIT), comprised of administrative staff who report to the Director and are integrated with all functional areas of the program. The Chief Administrative Officer and fiscal staff work closely with SIT, Extension Specialists and Scripps Institution of Oceanography to administer awards and projects on an annual basis.

2018-2023 ORGANIZATION CHART



Note: Pink designates managerial team

PROGRAM FUNDING

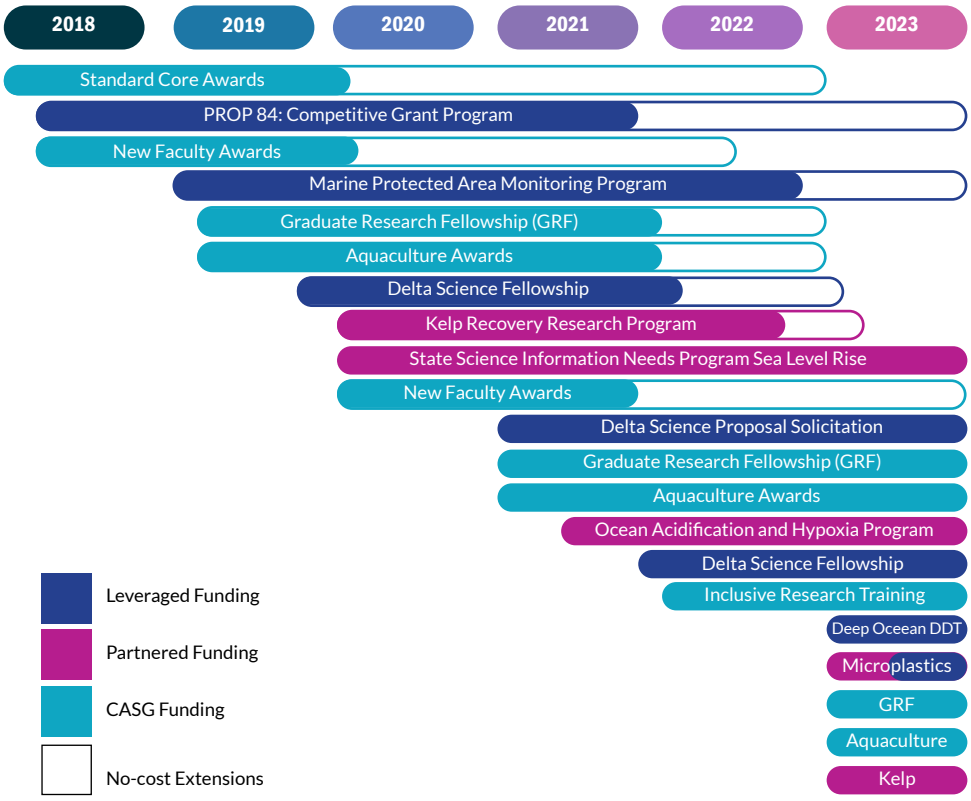
California Sea Grant funding is comprised of federal, state of California and other external sponsored research funds. On average, California Sea Grant managed $15.7 million per year for a six-year total of $94 million dollars. Our core NOAA Omnibus dollars were just over $4.5 million per year, distributed largely between research and extension efforts. Funded research also included funding for graduate research fellowships and traineeships separate from our education efforts. A unique aspect of our funding program is our partnerships with state and federal agencies to host California Sea Grant Fellows. In the last six years, we managed 13 separate agreements with state host agencies totaling just under $15 million with an additional $1 million from four NOAA partner organizations. Through our competitive research and extension programs, California Sea Grant supports research efforts across the state with 90% of our funding distributed to fund research efforts at other University of California and California State University campuses. Our funding has supported 9 of the 10 UC sister campuses and 11 of the 23 CSU campuses. Our yearly average is 28 unique campus entities per year with multiple projects supported at each entity.

PROPOSAL SOLICITATION AND SELECTION

California Sea Grant maintains a robust competitive research funding program, administering on average three competitions per year. California Sea Grant determines priorities for core-funded Requests for Proposals (RFPs) through two pathways. When California Sea Grant is the sole funder, RFP priorities are grounded in the program's Strategic Plan goals, particularly as they complement the Extension Program and our other research investments. The 2018-2023 Strategic Plan, developed through a community-engaged process, reflects the needs of the California communities the program serves, ensuring that RFPs attract highly relevant and applied projects. Since 2019, California Sea Grant has adopted a targeted approach to meet strategic research objectives. For proposals submitted in odd-numbered years, the program solicits proposals for two-year "core" awards addressing topics aligned with the Strategic Plan or strategic objectives underrepresented in the reporting metrics, impacts and accomplishments. These proposals may also leverage supplemental aquaculture funding from the National Sea Grant office. For proposals submitted in even years, the program solicits one-year proposals aimed at providing seed funding to new faculty and researchers or at increasing the participation of underrepresented minority undergraduate students in research. In 2019 and 2021, the program supported early-career faculty members across state universities. The 2021 cycle also funded six California Sea Grant Undergraduate Research Experience students as part of the Kelp Recovery Research Program. In 2023, California Sea Grant introduced the Pathways to Inclusive Research Training awards, funding eight one-year projects that supported inclusive research programs across California Sea Grant's focus areas.

When working with funding partners, California Sea Grant co-develops RFP priorities. This process involves identifying co-equal goals from both organizations to shape the RFP language, components and evaluation criteria. This collaborative approach has yielded several focused RFPs where partner funding can be claimed as cost-share (match), including the Kelp Recovery and Restoration Program, the Ocean Acidification and Hypoxia Program and the Sea Level Rise State Science Information Needs Program. California Sea Grant also leverages funding partners by administering research competitions and awards on their behalf, directly supporting state management priorities and broadening our network of funded researchers.

2018-2023 COMPETITIVE RESEARCH



California Sea Grant's review process prioritizes transparency, fairness and holistic evaluation. The review and selection process, including all criteria, are described in detail in the RFP. These evaluation and selection criteria are crafted to ensure all priorities will be met, including management relevancy, community engagement and scientific merit. Upon receiving letters of intent or pre-proposals, the staff invites relevant reviewers based on subject matter expertise, geographic diversity and demographic representation. While predominantly academic, reviewers also come from state and federal agencies, other Sea Grant programs and tribal organizations. The reviewer onboarding process begins with email invitations outlining funding priorities, workload, timeline and honoraria. Once a review panel has been finalized, a panel memorandum further details funding opportunities, evaluation processes and guidance on conflicts of interest and implicit bias.

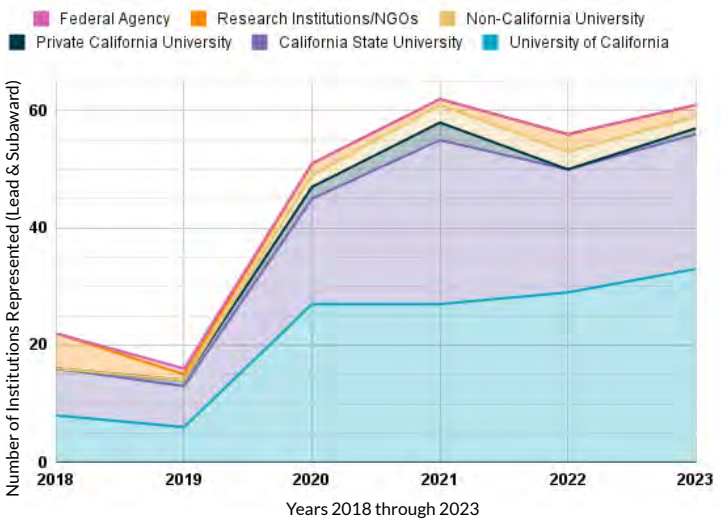
Reviewers identify any proposals with potential conflicts of interest or those they feel uncomfortable reviewing, which are then reassigned as needed. Review instructions and access to proposals are provided through the eSeagrant review portal. An optional orientation is offered to familiarize reviewers with Sea Grant research competitions. A full listing of funded projects is available on the California Sea Grant website.

For the 2018–2023 period, California Sea Grant solicited research calls based on identified regional and statewide needs which is reflected in the varying number of proposal submissions. See the breakdown of preliminary proposals, full proposals and funded proposals by year and by institution type in the table and chart below.

CORE-FUNDED RESEARCH RESULTS

	2018	2019	2020	2021	2022	2023	2018-23 6-Yr Total
Number of preliminary proposals	0	67	101	18	117	68	371
Number of institutions (for PIs and Co-PIs)	0	22	56	13	51	45	187
Number of "from home institutions" (for PIs and Co-PIs)	0	2	7	0	9	4	22
Number of full proposals	17	43	66	16	65	37	244
Number of institutions (for PIs and Co-PIs)	15	14	38	12	45	30	154
Number of "from home institutions" (for PIs and Co-PIs)	0	2	4	0	4	2	12
Number of proposals funded	4	19	25	7	25	11	91
Number of institutions (for PIs and Co-PIs)	3	10	20	4	20	10	67
Number of "from home institutions" (for PIs and Co-PIs)	0	1	1	0	0	0	2

2018-2023 CORE-FUNDED RESEARCH PROJECTS BY INSTITUTION TYPE



ENGAGEMENT

ENGAGEMENT BY THE NUMBERS: KEY PARTNERSHIPS & STAKEHOLDER INVOLVEMENT

2018-2023 HIGHLIGHTS

485 UNIQUE PARTNERS

202 LOCAL AND REGIONAL PARTNERS

134 GOVERNMENT PARTNERS
including 42 federal or national partners, 6 state estuarine reserves, 5 marine sanctuaries, 15 California cities and 39 other local or regional government partners

98 ACADEMIC PARTNERS
across more than 20 states, including 9 UC schools and 11 CSU schools

15 CALIFORNIA CITIES
and 39 other local/regional government partners

99 NGOS
from the local to the international scale

23 OTHER SEA GRANT PROGRAMS
including Gyeonggi-Incheon Sea Grant (Korea), USC Sea Grant, Louisiana Sea Grant, Alaska Sea Grant and Guam Sea Grant (see table on page 7)

10 TRIBAL ORGANIZATIONS
including the Cher-Ae Heights Indian Community of the Trinidad Rancheria, Kashia Band of the Stewarts Point Rancheria, Klamath Tribes, Tolowa Dee-Ni' Nation, Wiyot Tribe, Yurok Tribe and three tribal consortiums

87 INDUSTRY ORGANIZATIONS
including the Alaska Longline Fishermen's Association and San Diego Gas & Electric

For a full list of California Sea Grant's partners, see Appendix C.a - *Collaborative Network Activities - List of Program Partners* of the SRT PIER Report.

ENGAGING OUR COMMUNITY

California Sea Grant Extension Specialist Kevin Marquez-Johnson showcasing his research on clams and oysters that help make shellfish aquaculture resilient in the face of climate change.

Foundational to all of California Sea Grant's efforts are cross-sector partnerships with federal and state agencies, California tribal nations, non-governmental organizations, businesses, universities and community organizations. Connections and relationships with organizations and communities throughout California are built and strengthened by targeted research investments, locally and regionally based extension, communications and fellowship efforts. California Sea Grant's Extension team is embedded in communities across the state where its members engage with communities to identify and fulfill informational, technical and research needs and priorities. Extension activities include collaborative applied research and tailored outreach that provide timely and relevant information for pressing management questions. Through outreach and communications in digital and print platforms, our program promotes environmental literacy and transparency of the work that our Extension program and funded researchers accomplish. California Sea Grant's fellowships and training programs have helped hundreds of students and recent graduates launch their careers as coastal professionals who implement innovative resource management solutions to address environmental challenges.

Examples of how California Sea Grant establishes priorities, includes diverse voices, collaborates on projects of mutual interest and ensures effective knowledge generation and utilization through engagement and relationships are highlighted in the narratives under each focus area.

LOCATION OF EXTENSION SPECIALISTS THROUGHOUT CALIFORNIA

California Sea Grant Extension Director Theresa Talley educating kids at a "Meet Your Meal" event hosted at the Tuna Harbor Dockside Market.

COLLABORATIVE NETWORK

California Sea Grant values strong and diverse partnerships with organizations and stakeholders whose missions and interests align. The narratives in the following pages (10-22), highlight the program's impacts and accomplishments over the past six years, demonstrating how our program has collaborated with key partners and engaged stakeholders to address issues critical to California's environment and economy.

STATE AND NOAA AGENCY PARTNERS

CALIFORNIA OCEAN PROTECTION COUNCIL

The California Ocean Protection Council (OPC) is a cabinet-level state policy body nested within the California Natural Resources Agency (CNRA) that advances the Governor's priorities for coastal and ocean policy and sets the state marine research and conservation goals. OPC is led by an Executive Director who also serves as the Deputy Secretary for Oceans and Coastal Policy for the California Natural Resources Agency. California Sea Grant has partnered with OPC since its establishment in 2004, collaborating and coordinating on programs of applied research, science synthesis and training linked to resource management needs and application.

DELTA STEWARDSHIP COUNCIL- DELTA SCIENCE PROGRAM

The San Francisco Bay and Sacramento-San Joaquin River Delta (Bay-Delta) are part of one of the largest estuaries in North America, supplying water used by more than 25 million Californians. The Delta Stewardship Council is the California State agency tasked with managing the Delta to ensure a reliable water supply while protecting and enhancing the Delta's ecosystem. The Delta Science Program was established to provide information and syntheses of scientific knowledge on issues critical for managing the Bay-Delta system. California Sea Grant has partnered with the Delta Science Program since the early 2000s to train the next generation of science and policy leaders, and more recently, to administer larger research awards; coordinate independent scientific peer review, science communication and synthesis; and promote the application of social science in decision-making about the Delta.

NOAA PARTNERSHIPS

California Sea Grant partners with various NOAA agencies including the NOAA Fisheries- Southwest Fisheries Science Center, NOAA Fisheries- Office of Aquaculture, Office for Coastal Management (OCM), Office of Response and Restoration, the NOAA Marine Debris Program and three of the National Marine Sanctuaries (NMS) in California. It also collaborates with NOAA partners including California's National Estuarine Research Reserve (NERR) programs in San Francisco, Elkhorn Slough and Tijuana River and the two U.S. Integrated Ocean Observing System Regional Associations in California — CeNCOOS and SCCOOS. A notable example not addressed in the narratives during this period included the San Francisco Bay and Outer Coast Sentinel Site Cooperative.

The San Francisco Bay and Outer Coast Sentinel Site Cooperative, one of five NOAA-funded pilot programs, was a collaborative effort to build resilience to sea-level rise in the San Francisco Bay area. It involved California Sea Grant, OCM, San Francisco Bay NERR, Greater Farallones NMS and Bay Conservation and Development Commission. As part of the California Sea Grant Extension team, the San Francisco Bay Sentinel Site Coordinator connected state and federal resources to local communities preparing for sea-level rise. In May 2019, the Cooperative hosted a site visit, consisting of multiple workshops, which engaged 23 stakeholders for the Sentinel Site Program Review. Despite positive reviews highlighting its value, the pilot was discontinued in 2020 with partial funding provided by NOAA for two years to transition the Sentinel Site Coordinator to a more Sea Grant-centric role.

The California Sea Grant State Fellows Program (see description on page 20) further links our program to many other key decision- and policy-making agencies and organizations in California.

STATE FELLOWSHIP HOST ORGANIZATIONS

California Coastal Commission
California Department of Parks and Recreation
California Department of Transportation
California Energy Commission
California Fish and Game Commission
California State Coastal Conservancy
Delta Stewardship Council
Monterey Bay Aquarium
NOAA Channels Islands National Marine Sanctuary
NOAA Monterey Bay National Marine Sanctuary
NOAA National Marine Protected Areas
NOAA Office of Coastal Management
NOAA Southwest Fisheries Science Center
NOAA Tijuana River National Estuarine Research Reserve
Ocean Protection Council
Ocean Science Trust
Port of San Diego
San Francisco Bay Conservation and Development Commission
San Francisco Estuary Partnership
State Controller's Office
State Lands Commission
State Water Resources Control Board

REGIONAL MULTI-PROGRAM PROJECTS

California Sea Grant collaborates extensively within the Sea Grant network, partnering with over two-thirds of the programs between 2018-23. These collaborations span research, extension and other program collaborations, many of which are detailed in the focus area narratives.

HEALTHY COASTAL ECOSYSTEMS

- Advancing Equitable Resources to Marine Debris Solutions through California's Ocean Litter Strategy, 2023- (USC)
- Southern California DDT+ Needs Assessment Workshop, 2022 (USC)
- US-Korea Sea Grant Collaboration on Marine Debris, 2023 (GU) (HI)

SUSTAINABLE FISHERIES & AQUACULTURE

- National Seaweed Hub: Nurturing the Successful Growth and Maturation of a Domestic Aquaculture Industry, 2019- (AK) (CT) (HI) (ME) (NH) (NY) (OR) (RI) (WA) (WH)
- West Coast Aquaculture Collaborative, 2019- (OR) (WA)
- Addressing COVID-19 Impacts to Seafood Resources, 2020- (AK) (OR) (WA)
- Food from the Sea Careers Program, 2021-2022 (OR) (WA)
- Connecting Sea Grant, National Centers for Coastal Ocean Science, and Coastal Stakeholders to Improve Sustainable Aquaculture Siting and Development, 2021-2025 (AK) (FL) (HI) (MD) (ME)

RESILIENT COASTAL COMMUNITIES & ECONOMIES

- San Francisco Bay and Outer Coast Sentinel Site Cooperative, 2018-2020 (HI) (MD) (MS-AL) (NC)
- California Dunes Network, 2019- (USC)
- Application Guide for the 2022 Sea Level Rise Technical Report, 2022 (GA) (FL) (MS-AL) (WA) (HI)
- NASA Science Activation Program Integration, 2021- (GA) (MS-AL)
- Department of Energy West Coast Energy Extension, 2023 (OR)

EDUCATION TRAINING & PUBLIC INFORMATION

- Reef Friendly Aquarium, 2018 (FL) (GA) (HI)
- US-Korea Sea Grant Collaboration on Communicating Adaptation to Sea Level Rise, 2020-2021 (GU) (HI)
- Stronger Together: Empowering Students in Aquatic Sciences at SACNAS, 2023 (OR) (WA)

NATIONAL SEA GRANT NETWORK

- Participatory Science Visioning Subteam and Liaison, 2018 (LA) (LC) (ME) (MIT) (NH)
- Developing Best Practices to Ensure that Current Sea Grant Funding Structures Sustainably Strengthen (and Minimally Strain) Sea Grant Programs, 2023 (GA) (HI) (MS-AL) (USC)
- Sea Grant Extension Network Meeting, San Diego, 2023 (CT) (GA) (HI) (MS-AL) (NC) (NH) (NY) (ME) (USC)

SUCCESS IN SEA GRANT NATIONAL COMPETITIONS

Notice of Funding Opportunities 2018-2023	Number of Competitions	Applications Received	Fellows Selected
Knauss Fellowship	6	131	23
NMFS-SG Fellowship	6	42	9
Digital Coast & Coastal Management	5	32	5

Notice of Funding Opportunities 2018-2023	Number of Competitions	Proposals Submitted	Proposals Selected
Marine Debris	3	5	3
Workshop & Visioning	4	6	4
Workforce Development	3	3	2
Aquaculture & Seafood	11	29	9
USCRP Coastal Resilience	1	3	1

During her year working under Democratic U.S. Congressman Jared Huffman, California Sea Grant Knauss Fellow Rachael DeWitt introduced four bills and advanced legislation on three additional bills — all related to the environment.

PERFORMANCE

LEADERSHIP BY STAFF ON BOARDS, WORKING GROUPS AND COMMITTEES

California Sea Grant staff members are leaders in the state's research, policy and education communities and serve valuable roles as advisors to local, state and federal government agencies and community planning groups. California Sea Grant staff are also involved in leadership within the Sea Grant Network. Below is a sampling of their involvement during the 2018–2023 period:

Alex Harper	California Current Acidification Network (C-CAN) NSF OCB Marine Carbon Dioxide (mCDR) - California Current Node, Co-Lead PICES North Pacific Coastal Ocean Observation Systems Monitoring Expert Group West Coast Ocean Alliance/Ocean Data Portal, HABs/OA Working Group
Ashleigh Palinkas	Scripps Institution of Oceanography Certified Scientific Divers
Carolynn Culver	North Coast Seafood Marketing Advisor (Del Norte Sea to Market Saltonstall Kennedy Project) California Department of Fish and Wildlife, Electronic Monitoring Working Group Western Regional Panel for Aquatic Invasive Species, Coastal Committee United Water Conservation District, Quagga Mussel Technical Advisory Committee
Emily Miller	Creating Marketing Opportunities for San Diego Fishermen: USDA Project Advisory Board Fishful Future Advisory Panel Local Fish Initiative Community Advisory Board (Saraspe Seafoods-led effort supported by NOAA Saltonstall Kennedy)
Erin Satterthwaite	Federation of Earth Science Information Partners (ESIP) Biological Data Standards, Co-Chair Interagency Ocean Observation Committee (IOOC) Ocean Societal Indicators Task Team, Co-Chair PICES Early Career Ocean Professional Expert Group The Oceanography Society Advisory Councilmember UN Decade of Ocean Science for Sustainable Development Planning Group & Early Career Professional Informal Working Group
Kevin Johnson	Native Olympia Oyster Collaborative Steering Committee New Hampshire Sea Grant Aquaculture Academy Advisory Committee NOAA OAP West Coast Community Vulnerability to OA Advisory Board Western Society of Naturalists Secretariat
Laura Engeman	California Adaptation Forum Program Advisory Committee California Governor's Office of Planning and Research, Technical Advisory Committee of Climate Adaptation and Resilience California Sea Level Rise Science Task Force San Diego Regional Sea Level Rise Working Group UN Environment Programme, Sustainable Blue Economy Finance Initiative Working Group
Laurie Richmond	California Kelp Restoration & Management Plan Science Advisory Committee California Ocean Protection Council Science Advisory Committee Member Humboldt Waterkeeper Community Advisory Committee Technical Advisory Committee - Highway 101 Comprehensive Climate Adaptation Implementation Plan (Eureka-Arcata Corridor)
Lian Guo	Equal Opportunities Section of the American Fisheries Society, Executive Committee Governing Board of the American Fisheries Society Sea Grant DEIJA Community of Practice DEIJA Evaluation Committee
Luke Gardner	Santa Monica College Aquaculture Certificate Program Advisory Board California Fish and Game Commission Aquaculture Development Committee US/Japan Cooperative Program in Natural Resources Western Regional Aquaculture Center Executive Committee Ocean Resources Enhancement Advisory Panel
Mariska Obedzinski	Coast Range Watershed Institute Board Coho Water Resources Partnership Technical Advisory Committee North Coast Salmon Project Advisory Board Russian River Coho Salmon Captive Broodstock Program Technical Advisory Committee Willow Creek Technical Advisory Committee
Shauna Oh	National Sea Grant Aquaculture Liaison Advisory Group Executive Steering Committee, Southern California Coastal Ocean Observing System (SCCOOS) NOAA Southern California Offshore Aquaculture Interagency Working Group NOAA West Regional Collaborations Team Member Scripps Institution of Oceanography StartBlue Accelerator Program Advisory Committee
Tanya Torres	Water Quality Monitoring Council Microplastics Workgroup National Sea Grant BIL Marine Debris Syposium Steering Committee (2023)
Theresa Talley	California Estuarine Research Society Board Environmental and Ocean Sciences, University of San Diego Graduate Student Faculty Member Ocean Discovery Institute Scientific Advisory Board Sea Grant Extension Assembly Conference Planning Committee Tijuana River National Estuarine Research Reserve Technical Advisory Committees

SUMMARY OF THE PROGRAM'S PROGRESS TOWARD THE NATIONAL PERFORMANCE MEASURES AND METRICS

California Sea Grant achieved substantial progress toward its 2018-2023 strategic plan and national metrics and performance measures through extension, research and outreach work. Despite challenges posed by COVID-19, California Sea Grant reached nearly four times the number of individuals through informal education programs than during the 2014-2017 omnibus.

See section *B.a - Number of SG-Sponsored/Organized Meetings, Workshops and Conferences with Attendees* of the SRT PIER Report for more performance measures and metrics data.

454 UNDERGRADUATE AND GRADUATE STUDENTS SUPPORTED

107,733 VOLUNTEER HOURS LOGGED

331 EDUCATORS
who participated in Sea Grant education programs

913 RESOURCE MANAGERS
who use ecosystem-based approaches in the management of land, water and living resources as a result of Sea Grant activities

43,125 INDIVIDUALS REACHED
through informal education programs

80,643 MEMBERS OF THE PUBLIC REACHED
through 284 Sea Grant sponsored or organized events and 854 public or professional presentations

116 TOOLS, TECHNOLOGIES AND PRODUCTS
used to improve ecosystem-based management by resource managers and increase environmental literacy and workforce development

102 GRADUATE STUDENTS
who completed degree programs while working on California Sea Grant projects

441,184
ACRES OF COASTAL HABITAT PROTECTED, ENHANCED OR RESTORED AS A RESULT OF CALIFORNIA SEA GRANT ACTIVITIES

PROGRESS TOWARD STATE STRATEGIC FOCUS AREAS

California Sea Grant's 2018-2023 strategic plan concentrated efforts into three strategic focus areas, aligning with those defined by the National Sea Grant Office: Healthy Coastal Ecosystems; Resilient Coastal Communities & Economies; and Sustainable Fisheries and Aquaculture. Additionally, the program incorporated two cross-cutting themes: Education, Training & Public Information and Linking Science to Stakeholders. These themes were woven through California Sea Grant's activities and connect with other focus areas.

Through research, education and outreach, the program has made impressive progress toward each focus area's goals and outcomes, with many projects cutting across themes and disciplines to address multiple facets. The following pages highlight some of California Sea Grant's recent successes in each of its strategic focus areas as well as key projects and programs that bring together more than one focus area. See *Appendix D.c - Detailed National Performance Measures by Focus Area* of the SRT PIER Report for more information.

HEALTHY COASTAL ECOSYSTEMS

ACCELERATING KELP RECOVERY AND RESTORATION IN CALIFORNIA

Over the past decade, marine heat waves have caused drastic losses in kelp forests along California's northern coast, with up to 95 percent of former populations now gone. This biodiversity crisis led California Sea Grant, the California Ocean Protection Council (OPC), and the California Department of Fish and Wildlife (CDFW) to form a multifaceted partnership to fund kelp restoration research projects and develop a statewide, ecosystem-based Kelp Restoration and Management Plan for California.

In 2020, California Sea Grant dedicated $1.3M matched by $750K from the OPC to launch an ambitious state-wide Kelp Recovery Research Program (KRRP). Six solutions-oriented research projects addressed key knowledge gaps and informed management approaches for protecting and restoring California kelp ecosystems. Researchers studied how to raise and outplant kelp and how to deal with the overgrowth of urchin, which feed on kelp, thereby putting pressures on kelp populations. Scientists also identified and cultivated resilient strains of kelp and created a spore bank to preserve genetic diversity.

California Sea Grant provided an additional $81K for KRRP researchers to train and provide mentorship to undergraduate students from underrepresented backgrounds. Eight students completed year-long internships focused on kelp recovery research.

California Sea Grant directly supported the CDFW's management of kelp forests by co-funding a two-year Statewide Kelp Management Extension Fellow who synthesized funded research and identified information gaps for an Enhanced Status Report for state managers.

In 2023, California Sea Grant began providing key extension and coordination services for the Kelp Restoration and Management Plan (KRMP), which when completed in 2026 will guide approaches for managing, protecting and restoring kelp forests amid changing ocean conditions. California Sea Grant's role in this project include: coordinating a Science Advisory Committee; synthesizing biological and socioeconomic data and information; and integrating the scientific information and other forms of knowledge into varied documents, including a management decision framework, a California-specific restoration tool kit, a science needs assessment and other supporting products. California Sea Grant will also coordinate the peer review of the KRMP.

While the Kelp Recovery Research Program filled critical knowledge gaps, significant scientific, policy and management questions remain. In 2023, the OPC, the CDFW and California Sea Grant launched a new $5.8M round of research grants. The five supported projects will identify strategies to help kelp recover, explore climate resilience in key kelp and understory algal species and build tribal capacity for kelp ecosystem monitoring and restoration. Once again, these new research projects will provide opportunities for undergraduate students from underrepresented groups to gain experience in marine and coastal science.

MONITORING SALMON AND STEELHEAD IN CALIFORNIA'S RUSSIAN RIVER

California Sea Grant's Russian River Salmon and Steelhead Monitoring Program (RRSSMP) is a hub of information about salmon in coastal California streams and plays a crucial role in conserving imperiled fish populations in the Russian River watershed. Remarkably, coho salmon populations in the Russian River, which at one point had dwindled to fewer than ten adults, have now returned to the hundreds. Still, there is progress to be made.

The last six years were marked by intense winter storms, wildfires and extreme drought. Drought in particular poses a threat to salmonid recovery and became a focus of the RRSSMP's research and outreach. In response to stakeholder requests, California Sea Grant Specialists expanded their monitoring efforts to document how stream drying impacts juvenile salmon and developed public mapping dashboards that track in-season fish distribution and stream drying conditions. These dashboards have been instrumental in allowing real-time decision-making about collecting broodstock, rescuing fish from drying pools and timing flow augmentations from off-channel storage ponds.

With droughts becoming more frequent and intense, the RRSSMP also collaborated with graduate students and postdoctoral scholars to conduct, publish and present research on the effects of low streamflow on coho salmon survival, movement and growth. Additional research focused on evaluating strategies to enhance streamflow and a new hatchery release technique that is now being used in the state.

Recognizing the importance of sharing data and information with a diverse community, the RRSSMP has worked to disseminate its findings through various channels. This includes participating in technical workgroups, providing community updates, presenting to public, classroom and scientific audiences, developing social media materials, creating story maps and web-mapping tools and engaging with hundreds of streamside landowners. The program has also hosted workshops and conference sessions on salmon and low streamflow, facilitating exchange between academia, resource managers and restoration practitioners. Additionally, it has provided training opportunities for early-career scientists and resource managers. The RRSSMP's success demonstrates that sound science and solid partnerships with landowners and agencies at the local, state and federal level can pave the way toward species recovery.

California Sea Grant staff, Sarah Nossaman and Troy Cameron, with intern Dillon Henderson, capturing juvenile coho for Broodstock collection.

CATALYZING DEEP OCEAN DDT RESEARCH AND OUTREACH

Southern California has a complicated history with Dichlorodiphenyltrichloroethane, or DDT, an insecticide widely used in the mid-twentieth century. DDT use in the U.S. ended in 1972, after it was banned due to its harmful impacts on wildlife and potential carcinogenic effects on humans. Montrose Chemical Corporation in Torrance, California, the nation's largest DDT producer, routinely disposed of large amounts of DDT waste into the ocean near Los Angeles. Some was piped through sewers; other waste was transported by barge and dumped into deeper offshore basins.

Recent studies and media coverage have reignited concern about deep ocean DDT contamination in the Southern California Bight, which features highly productive ecosystems and essential fish habitats. The region includes two marine protected areas and supports a vibrant coastal tourism industry, a nascent aquaculture industry and established fishing communities. We know very little about how this deep ocean DDT pollution is spreading and what dangers it may pose to ecosystems, which has caused growing worry among citizens, researchers and California policymakers.

In 2022, California Sea Grant and USC Sea Grant (USCSG) used rapid response funds from National Sea Grant to organize the California DDT Research Needs Workshop, where experts as well as local, regional and state stakeholders mapped out key research questions. Sea Grant utilized best practice facilitation approaches and tools to foster an engaging, collaborative workshop on a controversial topic, engaging both management agencies and communities. This resulted in a StoryMap (1,510 views as of 1/31/24) and a report that detailed a deep ocean DDT research agenda (2,011 views) to inform future California DDT research investments.

Through the development of the deep ocean DDT research needs assessment, California Sea Grant and USCSG developed a deep ocean DDT community of practice (430 listserv members) and became trusted convenors on this issue. The two Sea Grant programs were asked by the State Water Resources Control Board to administer a $5.2M California Deep Ocean DDT Research Program prioritizing projects that improve understanding of where DDT is located and how it is breaking down in the Southern California Bight environment and assess the risk of deep ocean DDT+ chemicals to public health and wildlife. Sea Grant also facilitates a community outreach program in partnership with the Sacred Places Institute for Indigenous Peoples, Heal the Bay and Southern California Coastal Ocean Observing System, primarily through hosting community meetings to share research updates and connect community members with researchers. Sea Grant has launched four research projects addressing top DDT priorities and hosted two community meetings with over 286 community members.

Thomas Morales shares how Dr. Eunha Hoh's research team collected Southern California fish samples to test for DDT compounds, including California halibut as a culturally-important species for California Native Americans.

Soxhlet extraction is the first step for extraction of organic contaminants from fish tissues. Specific solvents are used that allow contaminants to move from the tissues to the extract, which will be further purified before analysis.

MONITORING AND MANAGEMENT OF CALIFORNIA'S MARINE PROTECTED AREAS

Dirk Rosen (pilot) and Sam Parker (navigation) working together to fly the ROV Beagle along a transect, observing mid-depth rocky reef ecosystems.

Established in 2012, California's network of 124 marine protected areas (MPAs) spans 1,110 miles of coastline from Mexico to the Oregon border and protects 16% of state waters, from estuaries to deep sea canyons. California Sea Grant has collaborated closely with the Ocean Protection Council (OPC) and the California Department of Fish and Wildlife (CDFW) to administer research funding and review policy documents for the MPA Network. These state partners relied on California Sea Grant to apply its scientific, independent peer review process to ensure the integrity of baseline and long-term monitoring projects. In addition to its work administering funding, California Sea Grant helped integrate the monitoring results into the adaptive management process, including reviewing the Action Plan for Long Term Monitoring.

After the Action Plan's publication in 2018, the State of California continued to rely on California Sea Grant's expertise in grant administration to implement the next phase of MPA Network long-term monitoring, which included $9 million in funding for projects through 2021. In 2021 and 2023, the OPC augmented funding by $5 million and $3 million, respectively, for continued ecological monitoring of four key habitats: sandy beach/surf zone, rocky intertidal, kelp forest/shallow rocky reef and deep rocky reef. The OPC and the CDFW have plans to continue working with California Sea Grant to administer monitoring projects into 2027 and potentially beyond.

UNDERSTANDING THE CALIFORNIA CURRENT ECOSYSTEM THROUGH CalCOFI

Since 1949, the California Cooperative Oceanic Fisheries Investigations (CalCOFI) has been at the forefront of marine ecosystem research. As the world's longest integrated marine ecosystem observing program, CalCOFI undertakes four quarterly cruises a year and collects an extensive array of physical, chemical and biological data across the California Current Ecosystem. The program's comprehensive data collection encompasses over 50 datasets spanning 126 different physical and chemical parameters and nearly 800 biological parameters and data includes genetic analysis of approximately 80,000 taxa. Since 2019, nearly 1,500 publications have referenced CalCOFI fisheries-independent data. It has been essential for fisheries management plans and enhanced status reports for both state and federally managed species, such as the State of the Ecosystem Report (used by the Pacific Fisheries Management Council) and the State of the California Current Report.

Historically, CalCOFI coordination was supported by NOAA Fisheries and the California Department of Fish and Wildlife (CDFW), with the Scripps Institution of Oceanography serving as a part-time contractor appointment. In 2019, California Sea Grant partnered with CalCOFI to expand its influence and effectiveness. This partnership includes co-funding a full-time CalCOFI Coordinator within the California Sea Grant Extension Program, who engages stakeholders and supports research on sustainable marine resources amid climate change. The CalCOFI Coordinator supports data collection and analysis and actively engages with stakeholders through annual events, including conferences and brought together over 1,000 ocean professionals over the past three years.

A key focus has been mentorship for students across academic levels. The program has co-led experiences such as the CalCOFI Hackathon, engaging 51 students and professionals in data visualization projects. The California Sea Grant CalCOFI Coordinator regularly mentors Sea Grant Extension Fellows, undergraduate researchers and marine biology master's students while developing educational resources for K-12 students. The Coordinator has also organized panels at conferences such as the World Conference on Marine Biodiversity and the CalCOFI Conference, addressing topics such as navigating early careers in marine science.

Ichthyoplankton samples collected during CalCOFI surveys are processed in La Jolla to study the population biology of major coastal pelagic fishes in the California Current System.

POLLUTION SOLUTIONS THROUGH COLLABORATIVE RESEARCH AND COMMUNITY ENGAGEMENT

Ocean pollution is a pervasive problem, impacting the environment and economy at local, regional and global scales. To confront these multifaceted issues, California Sea Grant has adopted a collaborative, multi-pronged approach that leverages applied research, community engagement and cross-sector partnerships.

Since 2018, California Sea Grant has assisted state and federal partners in updating the California Ocean Litter Prevention Strategy (OLS). The OLS outlines actions that stakeholders and the California Ocean Protection Council can take from 2018 through 2024 to prevent and reduce ocean litter in California. California Sea Grant and the NOAA Marine Debris Program co-sponsored a two-year Marine Debris Extension Fellow to advance specific OLS action items and sustain momentum and community dialogue throughout the implementation period. Virtual gatherings brought together more than 50 local, state and federal agencies, nonprofit organizations, universities, local businesses, industry representatives and coastal community members. This partnership led to a successful Marine Debris Community Action Coalition project in partnership with USC Sea Grant that will strengthen future iterations of the OLS by engaging environmental justice communities and Indigenous organizations in developing more accessible, equitable and just litter pollution solutions in California.

California Sea Grant collaborated with researchers to assess contamination risks to coastal communities, as well as to reduce agricultural plastics. California Sea Grant partnered with the State Water Board, social science and public health colleagues, interns from a science education nonprofit and a private analytical lab to assess contamination risks in understudied urban, recreational harvested shellfish. These studies revealed potential widespread health risks resulting from concerning levels of contaminants such as PCBs and PBDEs. They also highlighted the demographic diversity of shellfish harvesters which calls for inclusive risk communication. This led to a collaboration with Scripps Institution of Oceanography and NOAA Fisheries to secure funding and relaunch an Ocean and Human Health Community Engagement Center to support safe and sustainable seafood outreach efforts. Furthermore, California Sea Grant helped secure $2 million in marine debris funding to support a unique collaboration between marine sanctuaries and industry partners — including agriculture, recycling and engineering — to research and develop prototypes and best practices for a technology that will collect and dry-recycle agricultural plastic films.

California Sea Grant also facilitated participatory science projects to engage local residents and students in monitoring trash pollution and restoring urban waterways. Extension staff and two community based non-profit partners, Ocean Discovery Institute and San Diego Canyonlands, engaged an underserved San Diego community in quantifying trash pollution in urban waterways and in environmental stewardship activities such as removing trash, planting native plants and removing invasive species. Over two years, thousands of residents participated, improving their understanding of trash pollution sources and dynamics and restoring several acres of urban ecosystems. Community members involvement catalyzed city assistance and new outreach teams. The participatory science project also served as the focus of an award-winning education research study that resulted in a new conceptual model and best practices for engaging and retaining diverse communities in science. Another extension project, "Taking it to the Streets," developed street trash monitoring protocols and education curricula on the science of pollution. In total, hundreds of primary and secondary students engaged with the curricula, including through a winter camp that taught students about the impacts of and solutions to trash pollution while also redefining who can be a scientist.

SUSTAINABLE FISHERIES AND AQUACULTURE

EXPANDING CALIFORNIA'S SEAFOOD OPPORTUNITIES

Developing new ocean-based seafood products, both fished and farmed, can help stabilize coastal California businesses through diversification and increase the supply of healthy, local food for consumers. In best-case scenarios, these products would also benefit the environment through restorative aquaculture practices and the development of new fisheries. California Sea Grant facilitated collaborative projects that evaluated and supported several potential new sustainable fisheries and farmed species.

For example, when fishermen expressed interest in opening a deepwater brown box crab fishery, extension staff helped gather biological information needed to assess its potential and develop management strategies, as well as trained fishermen and resource managers to assist with data collection. California Sea Grant also developed a machine learning tool that identifies crab sex and measures crab size from photographs, streamlining the data collection process. The resulting data informed the state's decisions about the experimental fishery and will guide its development if the fishery is approved.

Addressing concerns from growers and others about the lack of options for culturing native California seafood, California Sea Grant also produced information sheets on five California native aquaculture candidate species. For rock scallop, a particularly promising species, Extension Specialists wrote a peer-reviewed technical report on recent advancements and remaining research needs. Collaborating with industry leaders, Extension Specialists identified key culture techniques for raising emerging native aquaculture species, including growout methods that produce promising growth rates for native rock scallops and venus clams. Research supported by California Sea Grant found that growing venus clams, sea cucumbers and red or green seaweed in integrated multi-trophic aquaculture systems shows promise for commercial use by reducing system maintenance and allowing growers to produce three seafood species using the same space and resources. Research also demonstrated how peak sunlight and periodic air exposure can increase the production of bromoform in seaweeds, a natural element that is believed to significantly reduce methane production in cattle (by 80% or more) when added to their feed. This could provide a market for culturing additional seaweed products that may help address climate change.

These activities created research opportunities for a diverse group of students. Funded researchers and Extension Specialists engaged more than five graduate and 16 undergraduate students, supporting and overseeing three master's projects and five undergraduate student presentations and posters.

COLLABORATION BOOSTS CONSERVATION EFFORT FOR ENDANGERED WHITE ABALONE

White abalone was overfished to the brink of extinction. Now, thanks in part to the work of California Sea Grant and its collaborators, the species has a chance at recovery. California Sea Grant has worked with commercial and conservation aquaculturists to raise white abalone in captivity before releasing them into the wild to bolster populations and increase their resilience to extinction. Collaborating with a host of commercial farms, universities and public aquaria along the coast, Extension successfully released into the wild several thousand juvenile white abalone (>2 inches) that were spawned and reared in aquaculture systems. It is estimated that this still young program has already produced more aquacultured white abalone than live in the wild.

California Sea Grant Extension Specialist, Kristin Aquilino, working to rescue white abalone from the brink of extinction.

URCHIN RANCHING: A VIABLE SOLUTION FOR RESTORING KELP FORESTS

Kelp forests are an extremely important habitat in California, supporting a great diversity of species as well as ecosystem services such as carbon sequestration. With kelp forests in Northern and Central California being decimated —in some areas by as much as 95% — coastal communities have lost biodiversity and income from fisheries dependent on these ecosystems. The grazing of urchins prevents kelp from regrowing; and with so little kelp to feed on, the urchins do not produce enough roe (uni) to become commercially harvestable. The resulting landscape is known as an "urchin barren."

Reducing urchin populations to levels that will allow kelp to regrow is essential to restoration efforts. But it is crucial for both communities and agencies that urchin removal can be done in economically feasible ways that avoid wanton waste of resources. California Sea Grant has contributed to a newly emerging industry for ranching sea urchins: collecting empty "zombie" urchins from barrens and using aquaculture to fatten them and restore their economic value. These efforts allow commercial urchin fishermen, aquaculturists and environmental organizations to work together toward the common goal of restoring California's valuable kelp ecosystems by providing an economic benefit to urchin removal.

California Sea Grant, collaborating with Moss Landing Marine Labs, the Monterey Institute of International Studies, commercial urchin divers, aquaculturists and seafood distributors, have tested three ranching systems and developed an engaged community of practice. Urchin ranching appears to be financially viable, and the project has led to at least two farms actively ranching and selling urchins. California Sea Grant continues to highlight the value of this new industry through outreach videos.

REVIVING CALIFORNIA'S NATIVE OLYMPIA OYSTERS THROUGH RESTORATIVE AQUACULTURE

The Olympia oyster, the only oyster native to the West Coast, has struggled to rebound from overfishing and habitat degradation, leaving populations in several California estuaries imperiled. California Sea Grant, Moss Landing Marine Labs, California Polytechnic State University, San Luis Obispo, the Elkhorn Slough National Estuarine Research Reserve and the Nature Conservancy have collaborated on a promising solution: applying commercial aquaculture technology to raise Olympia oysters at a scale that can support restoration efforts in both the Elkhorn Slough and Morro Bay estuary.

Initial estimates put the number of native oysters in each estuary at around 1,000. Today, through conservation aquaculture, over 100,000 oysters have been introduced into the Elkhorn Slough estuary and 5,000 into Morro Bay, helping the populations become self-reliant again. The team of partners also studied the conditions that maximize success while minimizing costs. In 2023, the team generated more oysters than in the previous five years combined by rearing hatchery oysters in downweller/upweller silos prior to field outplanting. The team's research showed that oysters are more likely to survive their first year if they are grown in captivity for at least 15 weeks before outplanting and are then placed in cages instead of on uncaged substrates.

Cal Poly graduate students Shannon Baldwin and Skylar Wuelfing monitoring growth, survivorship and reproductive activity of native Olympia oysters.

SUSTAINING LOCAL SEAFOOD IN THE FACE OF COVID-19 DISRUPTIONS

Throughout the COVID-19 pandemic, the seafood industry faced immense challenges. Supply chains, already strained by tariffs, had to be quickly restructured. Because the specific challenges varied across products and markets, researchers had to identify the needs of different players before effective support systems could be developed. California Sea Grant surveyed the industry, identified priorities and summarized them in a **report**, as well as in **infographics** that were easy to interpret and share by partner groups.

Because the pandemic also turned seafood direct marketing from a niche interest into a necessity, California Sea Grant focused on connecting producers and consumers, establishing eight different options. For example, Extension Specialists collaborated with the California Conference of Directors of Environmental Health to create guidance documents for operating Fishermen's Markets, a seafood version of a Farmers' Market. Specialists then linked seafood consumers to these direct-sale outlets through a **California Producer-to-Consumer Interactive Map**. Extension Specialists also worked with Washington and Oregon Sea Grant to convene a panel and present information to Pacific Coast harbor managers about supporting seafood sales through harbor-based direct markets (off-the-boat sales and Fishermen's Markets) at the managers' annual professional conference.

A collaboration with Alaska Sea Grant led to the publication of an invited FAO article about assisting fishing communities with seafood direct marketing. The technical report, which reached a global audience, supported small-scale fisheries and food security while highlighting Sea Grant's role and program approach to helping fishermen and others make well-informed decisions about seafood direct marketing.

Another initiative was the "Fish to Families Program", which distributed locally caught seafood meals to food-insecure communities. Between the summer 2020 to the end of 2023, this fishermen and chef-led effort purchased catch from 40 San Diego commercial fishing crews and prepared and distributed over 44,000 healthy, sustainable meals, thus also providing income for hospitality workers impacted by pandemic-related closures. California Sea Grant advised on the program, tracked impacts and created educational materials that helped participants — including chefs and consumers — better understand San Diego's fishing community and sustainable seafood. These materials included videos, handouts, posters, blog posts, graphics of fishing gear types and a report and story map documenting the program's influences on local chefs.

California Sea Grant furthermore joined local fishers and a PR firm to design and launch the California spiny lobster campaign, which introduced local chefs and consumers to this valuable fishery. Spiny lobster fishers had relied on an export market before COVID-19 shutdowns and therefore struggled during the shutdowns with nowhere to sell product. The campaign included a blog post; logos and graphics; a Facebook community connecting over 1,700 San Diego spiny lobster fans; and the 2020 inaugural Spiny Lobsterfest — a Fishermen's Market where San Diego fishing families could sell their spiny lobster catch directly to the public. This has become an annual event that hosts between 800 and 1,000 attendees.

California Sea Grant has also been leading a project that engages NOAA Fisheries, chefs, fishermen, historians and Sunbelt Publications to create a charitable, community-contributed cookbook called San Diego Seafood: Then and Now. The book aims to demystify the diversity of San Diego's responsibly-sourced seafood through recipes and stories that celebrate the region's rich fishing history and cultural diversity, raising awareness for it. It will be complemented by digital resources with nutritional facts, species information and spotlights on participating chefs and fishermen.

Working waterfronts are a mandated feature of California coastal communities, but much of the harbor infrastructure supporting fishing and ocean farming is in disrepair. To help identify state needs for such infrastructure, California Sea Grant surveyed harbor managers about the status of the infrastructure critical to seafood production. The information will be compiled into a statewide database and interactive map to support recommendations and direct funds toward addressing this infrastructure issue.

Local fishermen, chefs and the San Diego Fishermen's Working Group collaborated to create Fish to Families. From left to right, Phil Esteban, Pete Halmay and Marcus Twilegar.

ANALYZING AND ASSISTING WITH THE STATE SEABASS HATCHERY PROGRAM

California Sea Grant has long served as an unbiased arbiter of scientific information that is essential to the state's management plans. Between 2015 and 2017, the California Department of Fish and Wildlife (CDFW) contracted with California Sea Grant to facilitate an independent comprehensive review of the roughly 30-year long Ocean Resources Enhancement and Hatchery Program (OREHP) to determine how well its original goals had been met. The OREHP primarily focused on spawning, rearing and releasing white seabass (*Atractoscion nobilis*) and assessing the impacts of these releases on the wild stock and fishery throughout much of the species' range off the coast of Southern California.

The California Sea Grant-facilitated review determined that the OREHP has contributed important hatchery methods and research discoveries, including successfully evaluating the post-release survival of hatchery fish and their contribution to the white seabass stock. The review recommended that CDFW engage with the public to understand their perceptions, values and thoughts on the future of the program. Subsequently, CDFW contracted with California Sea Grant to host three town hall meetings in 2018 and collect public input via phone, mail and e-mail. In 2020, the legislation underlying the OREHP was revised in part to implement some of the recommendations in the California Sea Grant evaluation report. This included a requirement to collect input from Ocean Enhancement Validation holders, the program's main funding source, and update the composition of the Advisory Panel. The State legislated that California Sea Grant would fill one non-voting seat on the Panel to ensure a neutral expert voice.

From 2022 to 2024, the CDFW again contracted California Sea Grant, in collaboration with the University of Florida, Gainesville, to design a public participation process that would collect more in-depth input from a wider range of participants. This resulted in strategic focus groups targeting current and potential stakeholders and a survey of Ocean Enhancement Validation holders to develop acceptable goals, evaluation criteria and next steps for the OREHP.

A genetics-based study shows a higher contribution from Southern California's Ocean Resources Enhancement and Hatchery Program for white sea bass than previous estimates. Photo courtesy of Hubbs SeaWorld Research Institute.

Underwater photograph taken at a cage facility at Catalina Island. Adult white seabass in an open-ocean pen off Catalina Islands. These adults serve as a reserve population from which the hatchery can supplement its existing broodstock. Photo courtesy of Hubbs SeaWorld Research Institute.

TRAINING THE NEXT GENERATION OF FISHERS AND AQUACULTURISTS

Seafood production can provide a sustainable and secure source of healthy food and jobs, and California's extensive coastline offers access to a diversity of productive waters. Nonetheless, fishing and even more so aquaculture remain small industries in the state with uncertain futures. The median age of practicing fishers has been increasing, aquacalture remains nascent while poised for growth and there are few to no programs to train new entrants for either industry.

Responding to community requests, California Sea Grant collaborated with fishing and aquaculture partners to create workforce development programs. The "California Commercial Fishing Apprenticeship Program," the first of its kind in the state, provides entrants with 120 hours of shore-based training followed by 1,000 hours of paid on-the-job training under veteran fishers. The training covers technical topics (including engine repair, boat handling, safety and survival skills), the science, policy and practice of fishing (including fisheries-related oceanography, engagement in the management process and California fisheries and fishing gear) and business and marketing (including planning, branding and seafood handling).

Launched in January 2020 in San Diego, the program was paused throughout the COVID-19 shutdowns, then relaunched in January 2024 with a new emphasis on resilience, soft skills and cross-training. Through diverse, personalized recruitment strategies, tuition-free workshops that lower barriers of entry, careful matching of apprentices with sponsors and one-on-one progress checks, the program has shown strong rates of retention, with four of the six original trainees continuing to fish and market their catch. Safety-specific training, meanwhile, provided 28 new and veteran fishers with drill emergency guidance and 32 with maritime first aid training across two regions. Planning is underway to launch the full training program or safety-specific training in five more regions in California, as well as to develop a comprehensive, hands-on community college-based aquaculture training program in partnership with educators and industry.

California Sea Grant Staff Research Associate Emily Miller teaches how to judge seafood quality as part of the California Commercial Fishing Apprenticeship Program.

RESILIENT COASTAL COMMUNITIES AND ECONOMIES

BUILDING COASTAL RESILIENCE THROUGH DUNE RESTORATION

Coastal communities in California are increasingly threatened by shoreline erosion and flooding due to rising sea levels. Restoring coastal dunes can potentially enhance resilience by naturally buffering the shoreline. California Sea Grant established the California Dune Network in 2019 to address critical gaps in coastal science and restoration practices, collaborating with partners at USC Sea Grant, UC Santa Barbara, UCLA, Point Blue Conservation Science, Humboldt Bay National Wildlife Refuge and the Southern California Coastal Water Research Project.

The Network brings together researchers, coastal managers and non-profits, fostering collaboration and knowledge exchange among experts in dune management, research and restoration ecology. In its first year, the Network developed a website showcasing 19 dune restoration projects and created a database of relevant research publications. In 2021, California Sea Grant sponsored a virtual Network workshop for sharing dune restoration techniques and discussing resilience goals related to dunes, attracting 144 attendees and featuring 12 video case studies.

Through collaborative efforts, in 2023 the Network secured a $2 million grant from the University of California Climate Action Research Initiative to create a statewide dune inventory, evaluate dune vulnerability to future sea level rise and develop decision-making tools to assist in restoration site design and management. With this funding, the Network has expanded its research capacity by recruiting postdoctoral scholars and graduate students to work on ambitious projects. Extension staff spearheading the Network have played a pivotal role in engaging with Indigenous tribes, local and state coastal managers, community groups and agencies to ensure that diverse perspectives and voices are integrated into decision-making processes. The Network's interdisciplinary approach, which combines research, community engagement and knowledge dissemination, is vital for addressing the complex challenges faced by California's coastal communities.

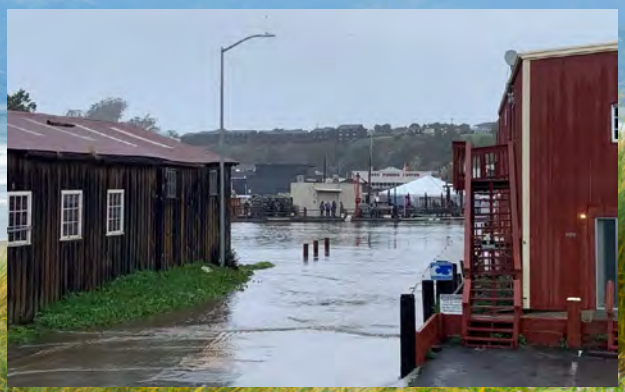
ENHANCING COASTAL RESILIENCE IN CALIFORNIA'S REMOTE AND UNDERSERVED NORTH COAST REGION

The California North Coast region faces unique challenges. This rural and remote area is relatively low income and has less access to resources and expertise than California's more urban coastal communities. The region grapples with numerous ocean and coastal issues, including navigating climate impacts on coastal and marine resources. Notably, Humboldt Bay is experiencing the fastest rate of sea-level rise on the West coast.

In response, California Sea Grant developed a network focused on sea-level rise knowledge-sharing, planning and research. This effort, known as the Cal Poly Humboldt Sea Level Rise Institute (SLRI), has brought together over 60 members, including representatives from tribes, academia, government agencies, NGOs and private consulting firms. California Sea Grant has also fostered direct partnerships and collaborations with three North Coast tribes — the Wiyot Tribe, Blue Lake Rancheria and Trinidad Rancheria — specifically addressing coastal resilience issues.

Recognizing the importance of workforce development, California Sea Grant has created opportunities for students and tribal youth in its coastal resilience activities. Over the course of two summers, 15 Indigenous students and tribal members gained culturally relevant workforce skills related to coastal restoration through the Ecocultural Restoration Summer Program at Mouralherwaqh, a 46-acre stretch of culturally important coastal land acquired by the Wiyot Tribe in partnership with California Sea Grant. The impacts of these efforts have been far-reaching. The SLRI network has helped secure $3.7 million in grants for projects related to sea-level rise in the North Coast region. Additionally, SLRI has maintained a sea-level rise document repository, helping make key resources easily accessible to the general public. The network has also co-produced a joint publication on inclusive sea-level rise planning, incorporating tribal knowledge and leadership.

As the potential development of offshore wind energy (OSW) adds a layer of complexity to the region's coastal resilience efforts, California Sea Grant has created a California North Coast offshore wind extension program in partnership with CalPoly Humboldt's Schatz Energy Research Center to explore economic and workforce issues associated with potential OSW development in the region.



Flooding at Noyo Harbor in 2023 due to sea-level rise. Photo courtesy of the Mendocino Voice.

ENGAGING COMMUNITIES IN COASTAL MONITORING FOR CLIMATE CHANGE

Aaron Howard, former CoAST SB Program Manager, teaches students about measuring changes at a local beach.

Volunteers align the measuring sticks with the horizon.

Climate change is bringing more extreme weather events to California's coast. Managing these events requires a clear picture of where and how they unfold, but continuously monitoring the coastline is expensive and time-consuming. To address this challenge, California Sea Grant developed and coordinated the Community Alliance for Surveying the Topography of Sandy Beaches (CoAST SB), a public participatory science program that for more than five years has collected key data.

Adapted from a successful Maine Sea Grant initiative, CoAST SB engages a diverse group of volunteers who measure beaches monthly across two counties using simple tools and techniques. The resulting data have proven invaluable to local and federal agencies, clarifying the impacts of extreme events, including the devastating California debris flow in Santa Barbara County, numerous atmospheric river-related flooding events and large surfs and tides. The data also helps ground-truth climate models.

When two new similar participatory science programs (SandSnap and CoastSnap) were launched, Extension staff modified CoAST SB to ensure its data contributed to both. California Sea Grant also developed an interactive inventory tool documenting beach monitoring efforts in the region, allowing users to view these efforts individually or by category (ecological, physical, socio-economic). The tool has been utilized by local counties to improve management as well as by the Beach Erosion Authority for Clean Oceans and Nourishment, an organization that addresses coastal erosion, beach nourishment and clean oceans along the Central California Coast.

Through such efforts, CoAST SB enhances climate change literacy while empowering community members to monitor local beaches and generate data useful for assessing climate related impacts. From 2018 through 2022, the California Sea Grant team engaged volunteers from 14 groups, including universities, community colleges, high schools and non-profit organizations. On average, 31 volunteers monitored 16 beaches annually, completing 76 surveys per year. The team also worked with a high school computer programming club to develop a CoAST SB data collection app, with one student creating graphic data displays that are used on the website.

INTEGRATING SOCIAL SCIENCE INTO BAY-DELTA RESEARCH

The San Francisco Bay along with its upstream delta — formed by the Sacramento and San Joaquin rivers — is the largest estuary on North America's west coast and supports a biodiverse ecosystem that is now heavily threatened. The estuary, known as the California Bay-Delta, is also a key resource for humans, as it is the focus of multiple commercial fisheries as well as a major freshwater transport system that supplies over 25 million Californians and millions of acres of irrigated agriculture. While this region has been extensively studied, much of this research has centered on biophysical dimensions, without major contributions from the social sciences — which means that the views of the people who live, work and recreate in the Bay-Delta and depend on it are not always robustly considered in policy and management. A California Sea Grant Extension Specialist, co-funded and working in partnership with the state agency Delta Stewardship Council, launched a multifaceted program to integrate social science into the research and resource management efforts of multiple state and federal governing agencies.

Through this effort, California Sea Grant trained Council staff on social science approaches, including data collection methods. With the Extension Specialist's support, the Council integrated social science into its regional climate adaptation plan and an issue paper focused on environmental justice. Pilot projects were launched to demonstrate how social sciences can be combined with biophysical and natural sciences to inform ecosystem-based management and natural resource decision making. The Extension Specialist also built a collaborative social science community of practice, including approximately 85 members from various agencies, organizations and universities, who now meet quarterly to discuss social science's role in the Bay-Delta management. One key project was the Delta Residents Survey, which was distributed to over 80,000 households in early 2023 to measure what residents think about key Delta social and environmental issues. Over 2,000 responses were received, which is higher than typical for public surveys. The analyzed data have been presented to the Council and many community partners and utilized as a resource by the social science community of practice and Delta Science Program research calls.

Dutch Slough restoration project tour. The restoration project implemented by the California Department of Water Resources will restore 1,187 acres into a tidal marsh to provide habitat for salmon and other native fish and wildlife, by transforming a stretch of land east of Antioch back into tidal marsh.

Discovery Bay was established in the early 1970s as a mostly weekend and summer resort community. Today, Discovery Bay has evolved into a thriving year-round home for over 14,000 residents who enjoy small-town living against the backdrop of over 1,200 miles of Delta waterways. Photo courtesy of California Department of Water Resources.

EDUCATION TRAINING AND PUBLIC INFORMATION AND LINKING SCIENCE TO STAKEHOLDERS

MAKING SEA-LEVEL RISE SCIENCE ACCESSIBLE

As coastal communities in California face the urgent threat of rising seas, there is a critical need for effective communication and education strategies. To fill that gap, California Sea Grant developed a multi-pronged approach, focusing on expanding accessible content, providing technical guidance and fostering meaningful community engagement.

With Extension and Education staff at Georgia and Mississippi-Alabama Sea Grant, California Sea Grant secured a multi-year NASA Science Activation grant to create educational resources on sea-level rise that will be accessible to diverse California audiences such as Spanish speakers, Indigenous communities and informal marine educators. Through articles and lectures, California Sea Grant also collaborated with science communicators at Scripps Institution of Oceanography to increase awareness about sea-level rise among the general public, educators and the media.

Extension staff from California, Georgia, Mississippi-Alabama, Hawaii and Washington Sea Grant partnered to author a national guidance for coastal managers on how to utilize the latest federal sea-level rise science reports. This led to the California Sea Grant Extension Specialist being invited to serve as co-chair of the California Sea Level Rise Science Task Force, guiding the State of California's update to its sea-level rise report and policy guidance, and providing briefings to coastal planners and managers.

Additionally, California Sea Grant targeted sea-level rise outreach and technical assistance to smaller, diverse and less-resourced coastal communities. In a show of support for this work, the San Diego Foundation co-funded the first-ever Binational Climate Extension Fellowship. The Fellow is developing research and community coastal resilience collaborations within the San Diego-Baja California border region, integrating these ideas into a binational strategic plan. Extension staff also trained community managers in Oxnard and Fort Bragg on new sea level rise projections and assisted them with integrating this science into risk assessments and adaptation planning.

CATALYZING A SUSTAINABLE BLUE ECONOMY IN FORT BRAGG

The City of Fort Bragg and Mendocino County face economic vulnerabilities after declines in major industries such as fisheries and forestry. While the region has benefited from tourism, the COVID-19 pandemic temporarily dampened visitation, thereby amplifying local economic challenges.

Seeking to increase both their economic and environmental resilience, members of the local community asked California Sea Grant Aquaculture Extensions Specialists to organize a Blue Economy Symposium with the City of Fort Bragg. The symposium, held in May 2022, explored alternative economic drivers for the region, and in particular the potential for a "blue economy" — which stewards the ocean as a sustainable resource. The symposium incorporated discussions of education, job training and infrastructure needs in Fort Bragg and the neighboring Noyo Harbor District. Attendees included city leaders, fishing community members, port directors, aquaculture leaders, state and federal government officials and Indigenous stakeholders.

Urchin diver Grant Downie is part of a collaborative effort to restore local kelp forests off the coast of Fort Bragg.

One major outcome was the formation of the "Noyo Ocean Collective," a partnership between the City of Fort Bragg, Noyo Harbor District, Sherwood Valley Band of Pomo Indians, Mendocino Coast College, West Business Development Center and the Noyo Center for Marine Science. This regional coalition aims to advance a sustainable blue economy and members have successfully acquired substantial funding for new projects. The City of Fort Bragg was awarded $898,990 from the California Coastal Commission, which will support a visioning analysis to inform decision-making for blue economy opportunities, resiliency implementation plans and developing a Local Coastal Program for coastal development. The analysis will provide baseline data, identify opportunities and limitations and develop site-specific adaptation strategies, potential projects, partners and funding sources for blue economy investments. Additionally, the Noyo Center for Marine Science received an $825,230 grant from the U.S. Department of Commerce that will support a design and business plan for a proposed Ocean Science Center featuring seawater systems, commercial aquaculture and research facilities on the Noyo Headlands. To coordinate these efforts, California Sea Grant has partnered with Fort Bragg to co-fund a two-year Coastal Mendocino Extension Fellow hosted by the City.

FOSTERING A SUSTAINABLE AQUACULTURE COMMUNITY IN CALIFORNIA

Aquaculture development in California has faced challenges, including a lack of coordination and negative public perceptions. Adressing the need to chart a path forward, California Sea Grant Aquaculture Extension Specialists convened the inaugural "Pathways Towards Responsible Aquaculture in California" forum in 2018, followed by a second forum in 2023. These first-of-their-kinds events focused on both freshwater and marine aquaculture and brought together farmers, regulators, policymakers, scientists and other stakeholders.

The forums became a platform for networking, community-building and developing strategies for sustainable aquaculture growth in the state. They covered a variety of topics critical to the industry's future, including workforce development, biosecurity, disaster relief and funding opportunities. Speakers provided updates on state and federal policy, including the U.S. Department of Agriculture's emergency livestock assistance program for aquaculture. Other topics included community college aquaculture programs, private-public partnerships and how to best build social license for aquaculture.

Subsequently, the State of California (via the Ocean Protection Council) contracted California Sea Grant to help develop the state's Aquaculture Action Plan. This first-ever plan aims to improve the management of existing and future aquaculture operations, serving as an initial step toward building a more sustainable, equitable and profitable aquaculture industry in California.

High school students from the Central Valley at the Cal Poly Pier in Avila, CA are helping to measure seaweed (*Gracilleria*) Biomass.

INCREASING FISHERIES AND AQUACULTURE LITERACY

While the majority of California residents inhabit coastal areas, they are often unaware of the ocean activities and resources that influence their local and global environments. This is particularly true for fisheries and aquaculture. California Sea Grant developed materials to increase local knowledge and awareness of the state's fishing and ocean farming activities.

In an already busy ocean, it is also important to understand how aquaculture can expand production without significantly impacting ongoing fishing activities. Through discussions with agency staff, fishermen and mariculturists, California Sea Grant identified information gaps, needs and solutions for aquaculture development in California to support the state's goals to better integrate fishing and aquaculture, particularly in the development of offshore aquaculture. The findings and "Sharing the Ocean to Enhance Seafood Production" ArcGIS StoryMap that highlights issues and potential solutions were shared with agencies and other stakeholders.

In another example, California leads the U.S. in the importation of wild-caught tropical marine animals, which are often harvested using unsustainable methods. California Sea Grant Specialists created the "Reef Friendly Aquariums" website, a series of business cards and a flyer about what factors to consider when choosing aquarium pets, including the purchase of cultured animals as an alternative. These resources were distributed to local pet stores and aquariums to educate aquarium hobbyists. To extend the materials' usefulness across the Sea Grant network, Florida and Georgia Sea Grant also reviewed the content.

California Sea Grant also responded to requests by a fishing non-profit, Central Coast Women for Fisheries, to assist in their efforts to educate the public about local fisheries. Working together, the partners developed a series of five educational signs summarizing key facts about fisheries along the Central Coast, including typical season and size of catch, species life cycle, commercial regulations, common vessel and gear types and vulnerability of the species. The signs were installed along a local harbor, Morro Bay Embarcadero, in view of the commercial fishing docks, allowing the public to identify vessel types with the information provided on each sign. The signs shed light on the core operations that drive the local economy while ensuring long-term conservation of critical marine resources. The public was also educated about local fisheries and seafood products through interactive, in-person "Meet your Meal" outreach activities at a dockside Saturday Market. To achieve a broader reach, Specialists produced a series of online seafood profiles that provide information about species that are commonly offered, including biological, nutritional and culinary characteristics. The top five most popular profiles have amassed more than 66,000 views during the 2018-2023 Omnibus.

Five interpretive signs about major local fisheries installed on Morro Bay's waterfront. Topics include salmon, albacore, crab, near shore fish and deep water groundfish.

CULTIVATING THE NEXT GENERATION OF COASTAL LEADERS IN CALIFORNIA

In 1987, California Sea Grant developed the State Fellowship Program to meet the high demand for workforce training and hands-on opportunities for recent graduates, thereby fostering the next generation of leaders in coastal and marine policy.

Modeled after the prestigious Knauss Marine Policy Fellowship Program, the California Sea Grant State Fellowship Program provides a 12-month paid fellowship that matches recent graduate students with host organizations across California. Fellows gain hands-on experience in planning, implementing and managing marine, coastal and watershed resource policies and programs in the state. Since its launch in 1987, over 300 fellows have been matched with more than 40 unique hosts, including municipal, state and federal agencies as well as research and conservation organizations. In any given year, around 80% of fellows go on to careers in policy or resource management.

During the 2018-2023 Omnibus, the State Fellowship Program grew to its largest size yet, hosting 28 fellows with 17 hosts in 2020. California Sea Grant also prioritized increasing the program's diversity through targeted efforts to attract an applicant pool that better reflects coastal California's demographics — an initiative that will help diversify the host agencies as well. This is done by tracking the demographics and academic institutions of applicants, identifying potential barriers of entry, increasing accessibility through application workshops and informational webinars and revising application and review requirements to highlight the program's commitment to diversity, equity, inclusion and accessibility.

California Sea Grant also added opportunities for Fellows to become more integrated with the program and develop new skills by collaborating with Extension Specialists on extension projects. In the spring, State Fellows explore extension project opportunities aligned with their roles or interests. They coordinate with the Specialists to determine commitment levels and timelines, with the flexibility to design enriching engagements. These interactions are designed to provide additional opportunities for Fellows to explore topics of interest, expand their network and increase the diversity of projects they are exposed to while further strengthening the connection between our Extension program and state and federal agencies. First implemented in 2021, this new approach allowed 58 State Fellows from three cohorts to gain valuable insights, experience and training on extension programming.

California Sea Grant's pioneering model has inspired marine policy fellowships at eight other Sea Grant programs nationwide. Programs share best practices through the Fellowship Coordinators Network and jointly provide trainings that build transferable skills while connecting fellows across the network.

Catie Thow de Garcia, a 2022 California Sea Grant State Fellow hosted by the California State Coastal Conservancy, working on shoreline restoration.

2020 state fellow Claire Nasr was matched with NOAA Channel Islands National Marine Sanctuary, where she assisted in the development of their updated management plan, advisory council meetings, and contributed to outreach and education efforts.

TRACKING ENVIRONMENTAL JUSTICE CONFLICTS IN CALIFORNIA

Though California is known as a leader in environmental protection, problems persist. Exposure to such threats as climate change and pollution varies widely across race and socioeconomic lines, as does access to environmental resources like parks and beaches. Consequently, conflicts over environmental justice (EJ) are still unfolding in California. State agencies and other organizations developing new EJ initiatives and policies need better documentation of the spatial distribution of injustices, as well as information about how the conflicts vary across the state.

Recognizing this fact, a team of California Sea Grant Specialists, State Fellows and a Community Engagement Intern (funded by National Sea Grant) partnered with academic researchers to build an open-access Coastal California EJ Conflicts Database and interactive mapping tool. The database was populated through interviews, archival review and systematic web-scraping that targeted state agency reports and permits, local newspaper archives and open-access legal documents. The database now includes 87 conflicts in coastal counties, documenting the impacted communities, the environmental resources, the actors and strategies involved and the latest outcomes.

Analysis of the database has revealed that in coastal California, EJ conflicts are most commonly driven by water and energy issues. Comparing EJ conflicts across California illuminates patterns of similarity in how conflicts emerge and how tactics are shared across geographies. These tools will help organizations mobilize more effective campaigns and policies, helping to move beyond just "procedural" justice toward outcomes that restore and repair relationships in communities.

DIVERSITY OF TRAINING OPPORTUNITIES FOR STUDENTS AND EARLY-CAREER PROFESSIONALS

California's coastline faces ever-changing and complex challenges, necessitating an ocean workforce that is prepared to think creatively and develop innovative strategies. Recognizing that many different types of professionals will be needed to support California's ecosystems and human communities, California Sea Grant offers training opportunities for undergraduates, graduate students and early-career professionals spanning research, policy, extension and communications.

California Sea Grant's research fellowships include the Graduate Research Fellowship, Delta Science Fellowship (funded by the Delta Stewardship Council) and the NOAA National Marine Fisheries Service-Sea Grant Fellowship. Each Fellow receives funding to conduct a research project that addresses the priorities of the fellowship, with the support of a research mentor and a community or agency mentor. California Sea Grant also provides professional development opportunities for Fellows, such as the Delta Science Fellowships's Early Career Leadership Workshop, where Fellows learn about applying science to management, hone their science communication skills through research pitches and network with their cohort and Delta professionals. Additionally, California Sea Grant provides support to funded researchers to create inclusive undergraduate training programs within their research projects, such as through the Pathways to Inclusive Research Training Program.

While funding for research is widely available, there are relatively few opportunities for students to learn about and gain experience in coastal policy and management. California Sea Grant provides several policy-focused fellowships to address this gap, including the California Sea Grant State Fellows Program, the John A. Knauss Fellowship and the Coastal Management & Digital Coast Fellowship. Through partnerships with state and federal agencies, industry, NGOs and academic institutions, Fellows gain on-the-job experience in project management, stakeholder engagement, policy brief writing, data analysis and science communication. California Sea Grant Policy Fellows often go on to be environmental leaders in California state agencies, federal agencies and other impactful environmental organizations.

Extension Fellowships have become a new way for California Sea Grant to partner with other organizations to offer training opportunities and build capacity. These have included the Kelp Management Extension Fellow, the Marine Debris Extension Fellow, the Fort Bragg Coastal Mendocino Extension Fellow and the Binational Climate Extension Fellow. Extension Fellows work closely with California Sea Grant and host agencies on specific projects, such as producing synthesis reports, implementing strategic plans and engaging communities. California Sea Grant also hosts science communication fellows or interns, such as the Climate Change Impacts and Adaptation and the Delta Science Communication Fellow, who learn how to develop effective communication deliverables to share the work and impacts of funded researchers and extension.

California Sea Grant has developed robust programming to facilitate the professional growth of all of its fellows as individual leaders and as members of a cohesive network. This includes facilitating career panels featuring program alumni across private, public, nonprofit and academic sectors. Collaborations with other Sea Grant programs through the Research and Fellowship Coordinator Network increased the number and diversity of training opportunities for California Sea Grant Fellows. Training titles included "Addressing Professional Identity"; "Networking 101: How to Get The Most Out Of A Conference"; "Accessibility 101"; and "Mentor Maps."

Outside of fellowships, California Sea Grant supports early-career professional growth through formal mentorship and training programs. A California Sea Grant Extension Specialist was instrumental in establishing the U.S. Early Career Ocean Professionals Node, a community of over 500 professionals. This initiative, aligned with the UN Decade of Ocean Science, offers networking, workshops and mentorship opportunities. California Sea Grant also facilitates capacity-building workshops, such as the North Pacific Marine Science Organization (PICES) Early Career Ocean Professional Workshop, and organizes panels at major conferences addressing early-career challenges in marine science.

California Sea Grant's first-ever Binational Climate Extension Fellow Meliza Le Alvarado forges coastal collaborations.

The 2022 cohort of Delta Science Fellows visited the Yolo Bypass in Sacramento, California during their Early Career Leadership Workshop to learn more about the science and management needs of the Sacramento–San Joaquin River Delta.

50 YEARS OF SERVING CALIFORNIA THROUGH COASTAL SCIENCE

Established in 1973, California Sea Grant celebrated its golden anniversary — 50 years of serving California's marine environment, economy and people — in 2023.

Our 50th anniversary served as a moment for reflection on our past achievements and a springboard for addressing future challenges. To commemorate this milestone, we crafted 11 stories that bridge our history with our present endeavors. The narratives evoked California Sea Grant's rich heritage but also showcased our current initiatives and ongoing commitment to innovation.

STORY TOPICS INCLUDED:

- How 50 Years of California Sea Grant Kept Abalone on the Menu
- California Sea Grant's Role in Creating the MPA Network
- Q&A with Former California Seafood Specialist Pamela Tom
- Fisherman's Perspective - 'Everybody Thinks the Ocean is Limitless'
- The Unassuming Device that Maps California's Fish Eggs
- Roe Crops: How Sacramento Became the Caviar Capital of the U.S.
- How California Sea Grant State Fellows Influence Good Policymaking Everywhere
- Sharing the Sea - California Sea Grant's Role in Forty Years of Navigating Ocean Space Use
- The Birth of C-CAN
- How a California Sea Grant Program Helped Shed Light on Salmon Recovery
- Charting a Course for Coastal Coexistence: An Interview with California Sea Grant's First Extension Agent

Prominent Scripps and Sea Grant administrators admiring the plaque designating the University of California as a Sea Grant College. Scripps Director William Nierenberg's support was instrumental in creating this formal designation by the NOAA in 1973. From left to right: Jeffery D Frautschy. George G. Shor, John D Isaacs, Scripps Director William A. Nierenberg and James J. Sullivan.

EVENTS HELD:

- **March 15**: MPA Day Management Review Forum, Monterey
- **April 20-21**: California Estuarine Research Society (CAERS) Conference, Costa Mesa
- **June 28-29**: CalCOFI & The California Current Integrated Ecosystem Assessment Workshop, La Jolla
- **August 15**: Anniversary Celebration with State Fellows, Sacramento
- **October 27-28**: Pathways Toward Responsible Aquaculture in California Forum, Moss Landing
- **November 9-12**: Western Society of Naturalists (WSN) Symposium, Monterey

PROGRAM ADVANCEMENTS

The 2019 Site Review Team provided three recommendations and nine suggestions that were considered and implemented by the Management Team.

RECOMMENDATIONS

Items the Program Must Consider

CONTINUE TO WORK WITH SCRIPPS AND UC SAN DIEGO LEADERSHIP TO FIND CREATIVE WAYS TO GROW FINANCIAL SUPPORT FOR THE PROGRAM

Along with state and federal resource agencies, more academic centers, institutes and programs are committed to and invested in outreach and engagement. California Sea Grant has cultivated partnerships with academic units within Scripps Institution of Oceanography (Scripps) to expand and diversify extension programming. Key partners include:

- The Center for Climate Change Impacts and Adaptation, which provides 50% support for a Coastal Resilience Extension Specialist (since 2019) and 50% support for a Science Communication Fellow (2020-2021)
- California Cooperative Fisheries Investigation (CalCOFI), which provides 25% support for a Marine Ecology and Sustainability Extension Specialist (since 2020)
- The Biology Division, which provides 25% support for an Aquaculture Specialist (since 2022)

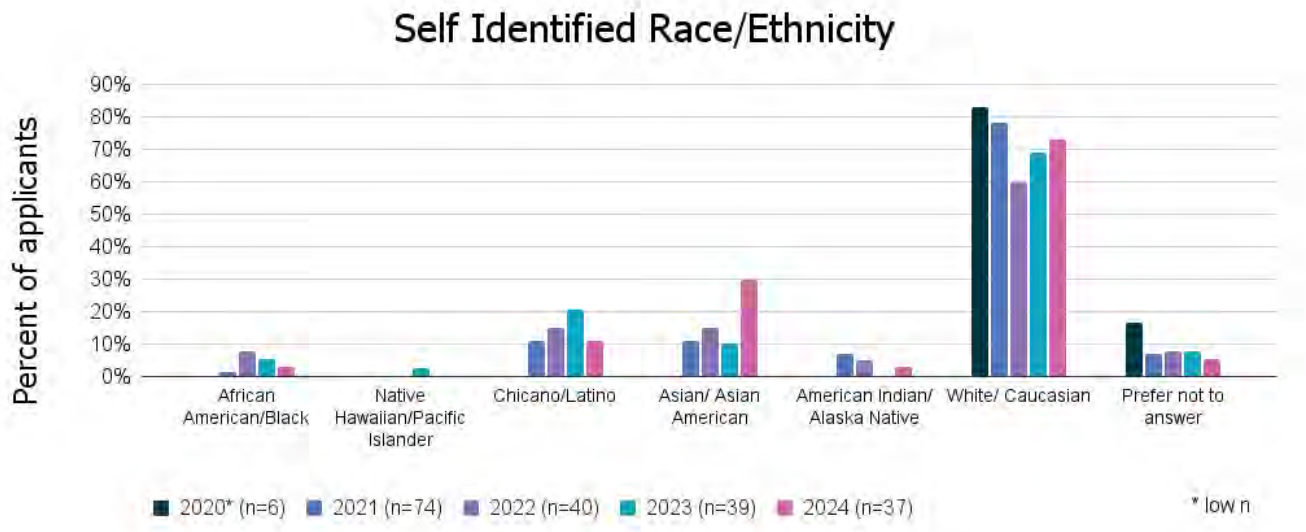
Additionally, in 2021, Vice Chancellor Margaret Leinen increased Scripp's support by another $50,000 per year for a total of $250,000, acknowledging California Sea Grants' growing impact on the Scripps community.

THE CALIFORNIA SEA GRANT ADVISORY BOARD SHOULD BE RECONSTITUTED TO REPRESENT A GREATER DIVERSITY OF CALIFORNIA SEA GRANT STAKEHOLDERS THROUGHOUT THE STATE OF CALIFORNIA

Prior to 2020, nearly half of the Advisory Board members represented academic institutions in California. In 2020, the board was reconstituted to include a broader representation of stakeholders relevant to the state's marine science, education and outreach interests. The current board includes leaders from public universities (2), research organizations (2), an education organization (1), industries (2), the state (2) and federal (2) governments and non-governmental organizations (2). Board members bring representation from across a variety of career stages and experiences.

WORK WITH THE UNIVERSITY OFFICE TO FIND WAYS TO MEASURE AND TRACK THE DIVERSITY OF THEIR FELLOWS

California Sea Grant began tracking applicant demographics for the State Fellowship Program in 2020, collaborating with UC San Diego and Scripps Institution of Oceanography's Diversity Office to develop an effective approach. Applicants may complete an optional questionnaire alongside their application, providing information on age, gender identification, disability status, military service and family educational background. This demographic data, maintained separately from the application, plays no role in the selection process. California Sea Grant has since expanded demographic data collection to all fellowships and research competitions and will be using the data from 28 competitions to better understand who applies to our funding opportunities and what barriers may be present in the pre-award process.



Beyond tracking demographics, California Sea Grant has also revised application requirements and the review process to recognize individual circumstances and reduce implicit bias. The Request for Applications now explicitly asks applicants to: 1) "Describe their experience collaborating or engaging with people from diverse, including underserved, cultural, ethnic, and socioeconomic backgrounds," and 2) "Explain how they would incorporate principles of diversity, equity, inclusion, justice, and/or accessibility into their fellowship." These changes have prompted applicants to consider diversity, equity, inclusion and environmental justice more deeply throughout the application and matching process.

SUGGESTIONS

Ideas the Program May Want to Consider

THE CALIFORNIA SEA GRANT COMMITTEE'S ROLE IN THE REVIEW PROCESS SHOULD BE REPLACED WITH MORE TARGETED PANELS THAT PROVIDE EXPERTISE SPECIFICALLY TAILORED TO THE INDIVIDUAL COMPETITIONS.

In 2019, California Sea Grant restructured its review process. The general committee was replaced with specialized panels tailored to each Request for Proposal (RFP), whether funded by California Sea Grant or other California-based partners. When selecting reviewers, California Sea Grant prioritizes subject matter expertise relevant to the RFP's topic and priorities but also geographic and demographic diversity.

EXPLORE MODELS TO ENGAGE OTHER UNIVERSITIES IN THE STATE TO GROW THE PROGRAM'S SUPPORT. AN EXAMPLE FROM OTHER PROGRAMS IS A SEA GRANT CONSORTIUM-MODEL TO ENHANCE PROGRAMMATIC SUPPORT. AN EXAMPLE OF THIS IS NEW JERSEY SEA GRANT, WHERE MEMBERS PROVIDE MEMBERSHIP DUES.

California Sea Grant has expanded its extension programming through partnerships with three universities, mirroring the program's collaboration with Scripps. These partnerships include:

- California Polytechnic University San Luis Obispo, College of Science and Mathematics, Department of Biology, which provides 50% support for an Aquaculture Extension Specialist (since 2020)
- California Polytechnic University Humboldt, Schatz Energy Research Center, which provides 33% support for an Offshore Wind Energy Extension Specialist (since 2023)
- University of California Davis, Bodega Marine Laboratory, which provided 75% support for a White Abalone Captive Breeding Program Lead and an Extension Specialist (2019-2022)

CONSIDER REQUIRING SOME LEVEL OF OUTREACH AND ENGAGEMENT BY CALIFORNIA SEA GRANT GRANTEES AS A PART OF THEIR FUNDING

California Sea Grant core-funded and many co-funded RFPs now require outreach and extension activities from all proposers, including student researchers. It is standard for community engagement and broader impacts to be considered in the review of proposals (~20% weight), as stated in the RFPs.

For non-student research awarded grants in 2020, California Sea Grant allocated additional funding (up to $20,000 per grantee) for specific outreach or communications components. Applicants were encouraged to consult Extension Specialists early in the development of the proposal for feedback or advice and potentially partner on the project. In 2022, Aquaculture Research Awards mandated that grantees collaborate with at least one aquaculture practitioner and secure a commitment letter detailing the research's value to the practitioner. The apparent or demonstrated depth of the proposed collaboration with the aquaculture practitioner(s) was an important factor in the selection process.

In 2020 and 2022, California Sea Grant required that Graduate Research Fellowships were supported by both a research mentor and a community mentor to ensure that Fellows' research results were useful to and used by communities. In addition to the typical project narrative, applicants also needed to provide an Outreach and Engagement Plan that described how the project team would interact with the community mentor and relevant community and management groups throughout the project.

CALIFORNIA SEA GRANT AND THE USC SEA GRANT SHOULD BE SURE TO EXPLORE AND TAKE ADVANTAGE OF ALL AREAS WHERE THEY COULD WORK TOGETHER MORE EFFECTIVELY TOWARD MEETING THE EXTENSIVE OPPORTUNITIES THEIR LARGE STATE PRESENTS.

California Sea Grant and USC Sea Grant have partnered on several programs since 2018, including the California Deep Ocean DDT Research Needs Assessment and Request for Proposals, Marine Debris Community Action Coalition Project and California's Coastal Dune Science Network. For more information, see highlights in the "Performance" section under each focus area.

CALIFORNIA SEA GRANT SHOULD EXPLORE AND DEVELOP RELATIONSHIPS FURTHER WITH CALIFORNIA'S TRIBAL ENTITIES.

Since 2018, California Sea Grant has expanded its work with tribal entities. The resulting collaborations range, from ensuring tribal perspectives are represented in extension work to developing tribal youth training programs and co-developing research and outreach programs. For more information, see highlights in the "Performance" section.

ON A BROADER LEVEL, CALIFORNIA SEA GRANT SHOULD CONTINUE TO INVEST IN RECRUITMENT, MENTORING AND RETENTION OF A BROADER ASSEMBLAGE OF THE HUMAN CULTURES THAT EXIST IN THE STATE OF CALIFORNIA, PERHAPS BY ENGAGING WITH STATE AGENCIES AND UNIVERSITY INITIATIVES THAT WORK IN THESE AREAS.

California Sea Grant aims to create a more diverse, equitable and inclusive organization. Our program utilizes trainings and internal working groups to empower our staff with the knowledge and skills needed to effectively serve a diversity of communities. Through this investment of time and the professional development of our staff, we have implemented new protocols and programs to 1) proactively recruit, retain and advance a diverse California coastal and marine sciences workforce by reducing barriers to accessing Sea Grant opportunities and 2) increase co-production and partnerships between extension and communication staff with a diversity of communities, particularly Indigenous, underserved and underrepresented peoples.

The Science Integration Team critically reviewed and revised many aspects of our competitive grant and fellowships, such as funding solicitation language, evaluation criteria, implicit bias training, application workshops, etc, to reduce barriers for applicants and reviewers. California Sea Grant's leadership in equitable grantmaking has been formalized through creating the Equitable Grantmaking Working Group, in partnership with Hawaii Sea Grant and funded by National Sea Grant, wherein Sea Grant staff from all functional areas will learn best practices in equitable grantmaking and envision a more equitable approach to competitive funding for the Sea Grant network.

California Sea Grant also invested over $740,000 in inclusive research training programs for undergraduates from underrepresented backgrounds through the kelp research Undergraduate Research Experience (CA-SURE), Pathways to Inclusive Research Training Program and Stronger Together Program. These programs utilize evidence-based approaches, such as mentorship, cohort building, hands-on learning experiences and co-production with underserved communities, to engage undergraduates in research addressing California Sea Grant science priorities. Outcomes from these programs have included increased awareness of career paths in ocean sciences, higher self-confidence and fostering a sense of belonging to ocean science. These initiatives have enabled California Sea Grant to achieve our education and training goals by providing education opportunities for students and researchers from diverse and underrepresented backgrounds, as well as engaging underserved communities throughout California in research and education programs.

CALIFORNIA SEA GRANT SHOULD SEEK OPPORTUNITIES TO CONTINUE TO GROW THE CALIFORNIA STATE FELLOWS PROGRAM.

CALIFORNIA SEA GRANT SHOULD DELIBERATELY LEVERAGE THE NETWORK OF CALIFORNIA STATE FELLOW ALUMNI TO INFORM CALIFORNIA SEA GRANT INVESTMENTS AND STRATEGIES.

To address suggestions for the State Fellowship Program, the new director restructured staffing to create a Science Integration Team (SIT). The SIT is composed of three members, a Research Coordinator, a Fellowship Program Coordinator and a Program Analyst. The team helps State Fellows engage with state and stakeholder priorities, while facilitating integration between research, outreach and training. It coordinates the collaboration between the State Fellows cohort and the Extension Program. This approach leverages the network of current fellows and alumni, enhancing the fellowship experience — a necessary step before expanding the program.

The California Sea Grant State Fellowship's financial model was also restructured to require higher host contributions, including dedicated administrative fees for California Sea Grant. This restructuring offset the administrative burden (pre- and post-award) that grows with cohort size and enabled the hiring of a Fellowship Program Coordinator and Fellowship Fund Manager.

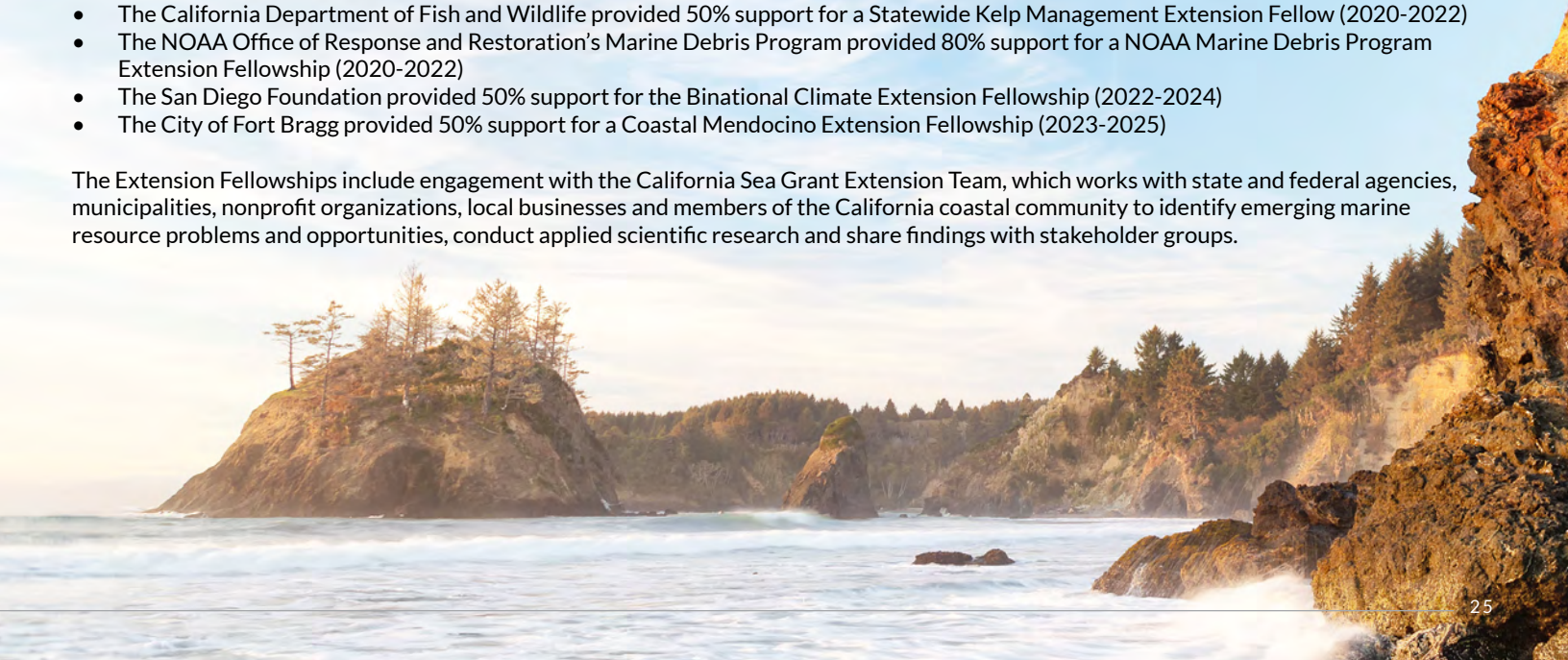
Implementing the SIT approach helps California Sea Grant develop a new generation of leaders who bridge coastal and marine science with policy while maintaining relevance to state and regional priorities. The SIT has improved communication across all four of California Sea Grant's functions, leading to a better-managed State Fellowship Program; increased capacity for growing research opportunities; expanded extension programming in coastal resilience, aquaculture and water quality; and improved program reporting.

CALIFORNIA SEA GRANT SHOULD WORK WITH ITS PARTNER AGENCIES TO INCREASE RESOURCES TO THE EXTENSION FUNCTION. THESE RESOURCES SHOULD NOT COME FROM THE OTHER AREAS OF THE CALIFORNIA SEA GRANT PROGRAM.

California Sea Grant collaborated with several partner organizations to support extension functions, mirroring its academic partnerships:

- Southern California Ocean Observing System provided 50% support for an Marine Protected Areas Integrated Ocean Observing Postdoc (2020-2021)
- Southwest Fisheries Science Center, NOAA Fisheries and the California Department of Fish and Wildlife provides 25% support each for a Marine Ecology and Sustainability Extension Specialist/ California Cooperative Oceanic Fisheries Investigations (CalCOFI) Coordinator (since 2020)
- The Delta Stewardship Council provides 80% support for a Social Science Extension Specialist (2021-2023; recruiting in 2024 to refill position)
- The California Department of Fish and Wildlife provided 50% support for a Statewide Kelp Management Extension Fellow (2020-2022)
- The NOAA Office of Response and Restoration's Marine Debris Program provided 80% support for a NOAA Marine Debris Program Extension Fellowship (2020-2022)
- The San Diego Foundation provided 50% support for the Binational Climate Extension Fellowship (2022-2024)
- The City of Fort Bragg provided 50% support for a Coastal Mendocino Extension Fellowship (2023-2025)

The Extension Fellowships include engagement with the California Sea Grant Extension Team, which works with state and federal agencies, municipalities, nonprofit organizations, local businesses and members of the California coastal community to identify emerging marine resource problems and opportunities, conduct applied scientific research and share findings with stakeholder groups.



California Sea Grant
Scripps Institution of Oceanography
UC San Diego
9500 Gilman Drive
La Jolla, CA 92093-0232
caseagrant.ucsd.edu