CALIFORNIA SEA GRANT STRATEGIC PLAN

2018

2021

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Sea Grant is a unique partnership of public and private sectors, combining research, extension, education, and outreach for public service. It is a national network of universities meeting changing environmental, social and economic needs of people in our coastal, ocean, and Great Lakes regions.

A searchable database of publications from all Sea Grant programs is available at the National Sea Grant Library: http://nsgl.gso.uri.edu

cover image by Dr. John Butler, NOAA NMFS SWFSC
Striped fish is a juvenile yelloweye rockfish with rosy rockfish in foreground.

interior illustrations by Deborah Seiler, California Sea Grant

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INTRODUCTION

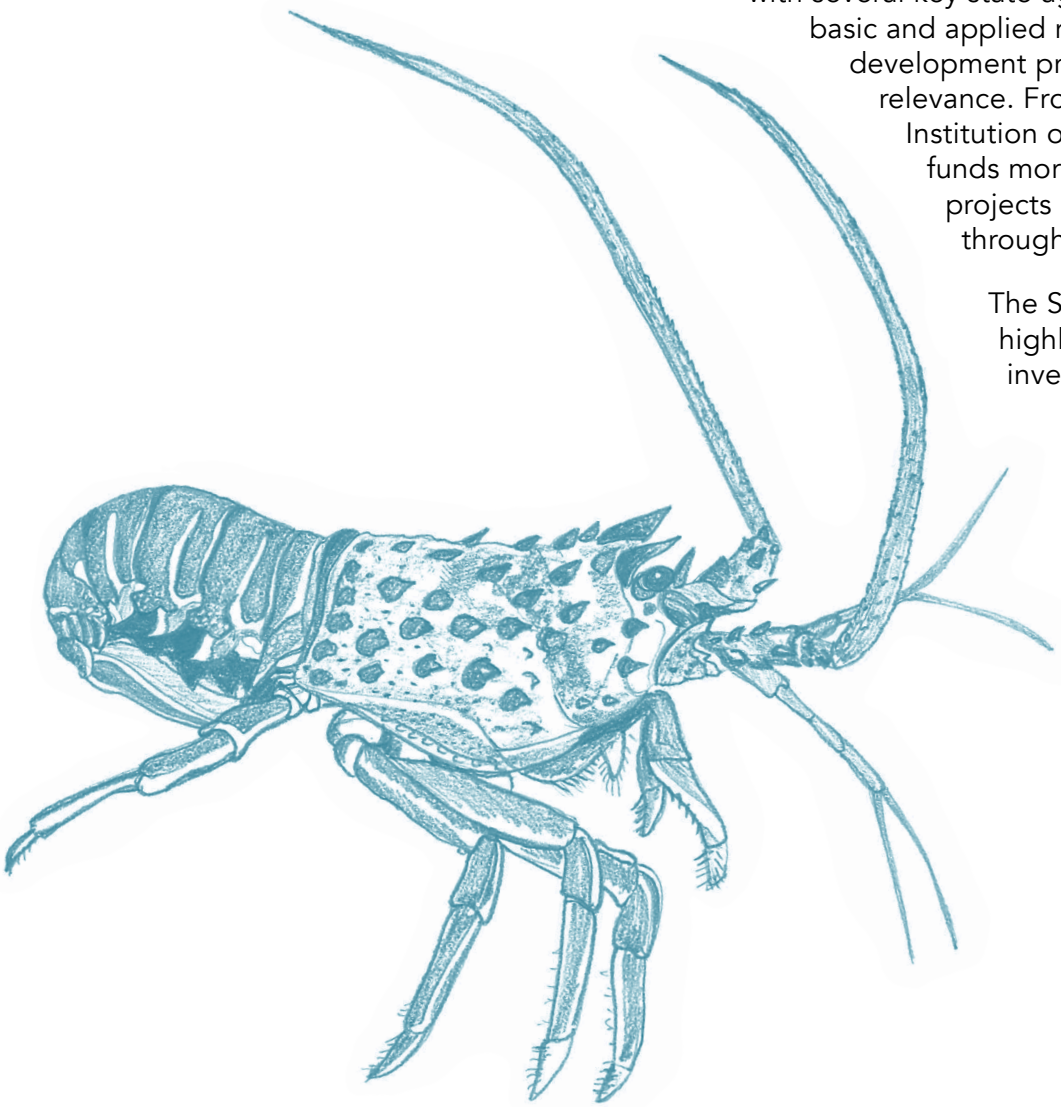
CALIFORNIA SEA GRANT SERVES THE COMMUNITIES, INDUSTRIES, AND PEOPLE OF CALIFORNIA.

By identifying important and emerging coastal and marine issues and supporting research, extension, and outreach efforts on these issues, we strive to provide better natural and social scientific information to promote the sustainable use of coastal and marine resources.

First funded by the National Oceanic and Atmospheric Administration (NOAA) in 1968, California Sea Grant (CASG) began as a pilot project at Scripps Institution of Oceanography to create a graduate marine science education program for California. Since then, CASG has grown and diversified to the point that it manages an average of $9 million annually in federal and state funds to support research, extension, outreach, and education.

CASG aligns its strategic foci with those of the National Sea Grant College Program (NSGCP) to develop programmatic areas for investment. CASG also partners with several key state agencies in California to support basic and applied research and workforce development programs with direct state relevance. From its headquarters at Scripps Institution of Oceanography, CASG annually funds more than 75 research and outreach projects at public and private institutions throughout the state and nation.

The Strategic Plan described below highlights our vision, mission, goals, investment arenas, and approach in light of the position of CASG within the nation and the state of California. It identifies key partners, audiences, stakeholders, and constituents who were consulted in producing this plan.



OUR VISION

The California Sea Grant College Program envisions a future in which people live in balance with coastal and marine habitats and resources, noting that the well-being of Californians is closely tied to the quality of our environment and our natural resources. We envision an educated and engaged public that makes decisions based on sound, scientific information, resulting in sustainable, thriving human communities, and natural ecosystems.

OUR MISSION

CASG's mission is to provide integrated research, extension, outreach, and education to help Californians balance diverse interests that intersect with the coastal and marine environments, and adapt to changing conditions and needs. We accomplish this by collaborating with a range of local, state, regional, national, and international partners to further the acquisition and application of relevant scientific knowledge.

PROGRAM SETTING

The priorities and activities of CASG and the National Sea Grant College Program are supported by recommendations made by the National Sea Grant Advisory Board and the national Sea Grant Strategic Planning Steering Committee. We share a commitment to a collectively developed set of core values that guide the activities of us all:

- ***Innovation*** – Advance innovative solutions to emerging challenges.
- ***Engagement*** – Be responsive and accessible, respecting partners, maintaining scientific neutrality, and integrating diverse expertise and support to provide the necessary science and knowledge to inform stakeholders and decision-making.
- ***Collaboration*** – Develop and maintain relationships that leverage our strengths and capacities, promote and value efficiency, and share successes.
- ***Sustainability*** – Communicate the importance of good stewardship and the value of services provided by coastal, ocean, and Great Lakes ecosystems to the nation.

Our work is guided by these core values, and it has led the CASG program to develop important partnerships with a wide array of state and federal agencies that are charged with protecting and responsibly managing California's diverse coastal and estuarine resources. CASG consults with these agencies along with California's diverse coastal- and marine-oriented communities to develop and modify its own priorities for research and outreach, and we collaborate to create research and extension programs of mutual interest.

The setting of CASG's program, its alliances with national, regional, state, and local programs, and its strategy for science outreach are briefly summarized next, in sequence.

NATIONAL SEA GRANT

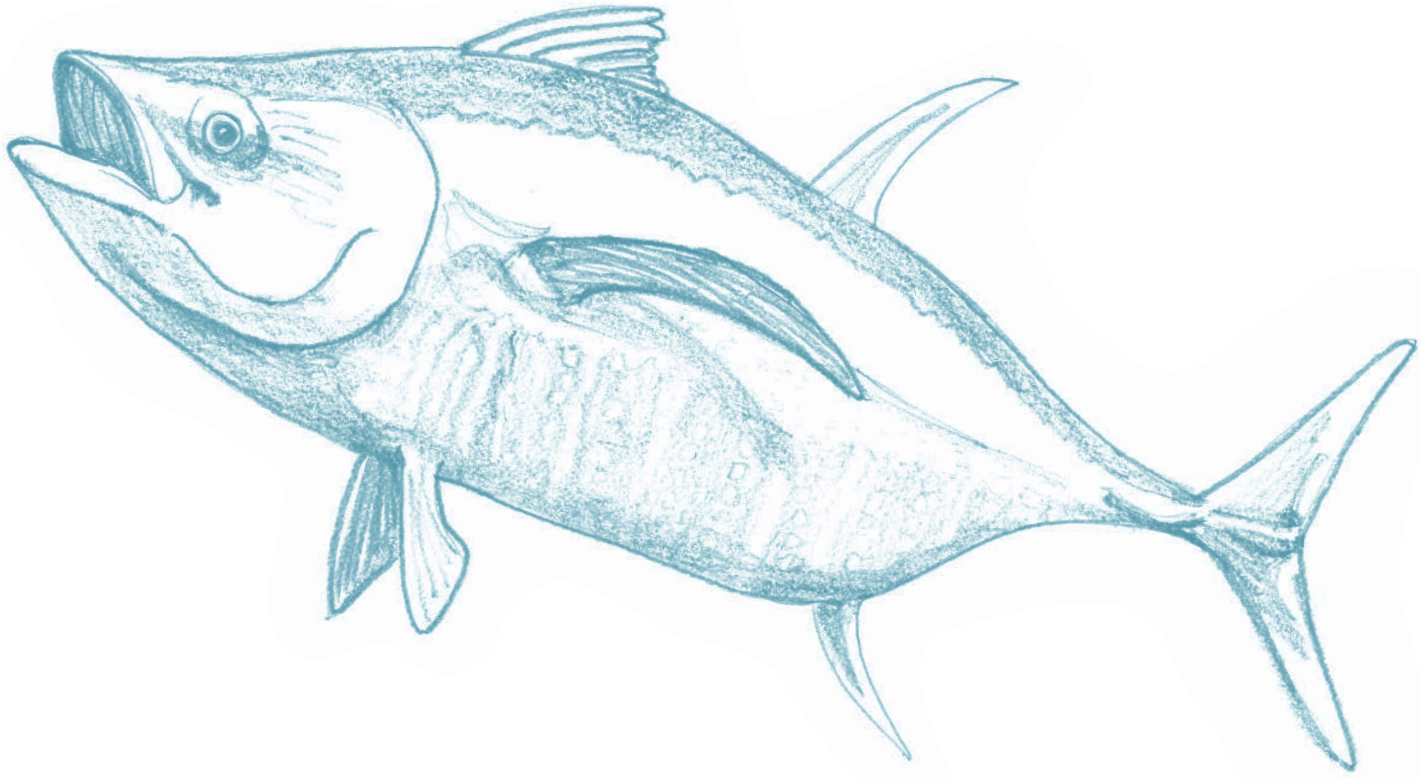
CASG functions as part of a national network of 33 programs under the National Sea Grant College Program (NSGCP) within NOAA. NSGCP provides core federal funds to support CASG research, extension, outreach, and education activities and requires the individual Sea Grant programs to support the national goals and objectives with a significant amount of individual program resources. In its 2018–2021 strategic plan (http://seagrant.noaa.gov/WhoWeAre/StrategicPlan.aspx), the NSGCP identified the following Focus Areas:

- Healthy Coastal Ecosystems
- Sustainable Fisheries and Aquaculture
- Resilient Communities and Economies
- Environmental Literacy and Workforce Development

The broad activities of CASG will align significantly with the Focus Areas identified by the NSGCP, as outlined below.

WEST COAST REGION

CASG collaborates substantively with the other West Coast Sea Grant Programs (the Washington, Oregon and University of Southern California Sea Grant Programs), as well as the NSGCP and other NOAA agencies, to promote and support regionally focused research and outreach programs. Recent examples of collaborative activities among programs include outreach on aquatic invasive species, joint support of workshops focused on eastern North Pacific ocean conditions and ecosystems, and mutual support of regional social science research related to national Sea Grant goals. Regional activities of this type are expected to grow in number and scope given the breadth of issues the West Coast faces (e.g., ocean acidification, exposure of coastal communities and habitats to storm events, and sea-level rise) and given that coastal problems are not delimited by political boundaries.



CALIFORNIA

California is the most populous U.S. state, with more than 39 million residents, and the largest ocean-based economy in the country. The state occupies nearly two-thirds of the contiguous U.S. West Coast. Including the perimeter of the San Francisco Bay estuary, California's coast stretches more than 1,100 miles from the Mexican border to Oregon.

The highly urbanized, industrialized and arid south coast contrasts sharply with the redwood groves along the rural and agricultural north coast. There are three distinct oceanographic regions along the California coast—the Southern California Bight, defined by the region south of Point Conception; a central coastal region; and the waters north of Cape Mendocino, which are oceanographically more linked to the colder waters of the coastal Pacific Northwest. Each region of California has challenges and opportunities in coastal and marine resource conservation and management that surpass the state and federal resources available to them. The size and diversity of California and its population create special challenges for statewide and regional policy development.

California is home to six major seaports, more than 200 marinas and harbors—including fishing communities—and more than 1,000 coastal recreation areas that receive about 100 million visitors a year. This level of activity in the coastal zone places immense pressure on natural resources, poses opportunities and challenges, and creates a need for science-based information and novel approaches to resource management and conservation.

California and its citizens contend with many issues and risks relating to the marine environment, as we strive to create and take advantage of opportunities to benefit our society. These include:

- coping with the demands of continued population growth that increasingly stress our marine and coastal resources;
- minimizing the social, economic, and environmental costs of energy production and freshwater supply;
- understanding and addressing the effects of climate change such as sea-level rise, rising temperatures, ocean acidification, and increasing hypoxia in coastal waters;
- understanding human contributions to harmful algal blooms, and controlling them;
- reducing the impacts of shoreline development and beach erosion;
- sustaining harbor infrastructure, fishing communities, and fisheries;
- balancing the need for healthy marine resource populations while meeting seafood demand; and
- restoring degraded habitats.

STATE AND FEDERAL AGENCY PARTNERS

For more than 40 years, CASG has successfully applied its unique capability to combine coastal and marine research, extension, outreach, and education to benefit the communities, industries, and people of California. The CASG program has collaborated, and continues to collaborate, with many state agencies to administer research programs of mutual interest that are designed to meet specific state priorities using designated funds.

CALIFORNIA OCEAN PROTECTION COUNCIL

The California Ocean Protection Council (OPC) was created in 2004 to ensure California maintains healthy, resilient, and productive ocean and coastal ecosystems for the benefit of current and future generations. The Governor-appointed council is charged with providing leadership and coordinating the activities of ocean-related state agencies to better manage ocean resources. Since 2006, CASG has worked with the OPC as one of its state partners and has administered dedicated OPC funds to assist the state in implementing a coordinated program of applied interdisciplinary research and training, linked to management needs and uses. CASG has managed OPC investments in excess of $16M in total to address focused research and outreach initiatives to:

- study the extent and effects of ocean acidification on California shelf ecosystems;
- study factors influencing California chinook salmon declines and restoration options;
- forecast harmful algal blooms (HABs) in California's coastal waters; and
- develop new ways to manage California's nearshore fisheries using catch data from marine protected area monitoring.

The OPC continues to operate under its Strategic Plan for FY 2012–2017, which identifies five areas as the focus of its efforts:

1. science-based decision-making;
2. climate change;
3. sustainable fisheries and marine ecosystems;
4. coastal and ocean impacts from land-based sources; and
5. existing and emerging ocean uses.

These foci clearly overlap with the focus areas identified by the NSGCP and CASG, and indicate the need for continued collaboration and partnership.

CALIFORNIA DEPARTMENT OF FISH AND WILDLIFE

CASG collaborates with the California Department of Fish and Wildlife (CDFW), the California Ocean Science Trust, and the OPC on a cutting-edge monitoring initiative, the Marine Protected Areas (MPA) Baseline Programs. These regional programs have collected data to provide an initial assessment of ecological and socioeconomic conditions in each MPA study region at or near the time of implementation, and to measure initial ecological changes and socioeconomic impacts to consumptive and non-consumptive user groups following implementation. CASG oversaw the Request-For-Proposals (RFP) process, and has handled grant administration for fieldwork and data acquisition and socioeconomic research, for the designated MPAs in five study regions.

CASG is partnering with CDFW to conduct a thorough external review of the operation and efficacy of a 30+ year-old fisheries enhancement program—the Ocean Resources Enhancement Hatchery Program (OREHP). The goal of this program is to use cultured white seabass to enhance natural populations of this popular and commercially and recreationally valued fish in southern California coastal waters.

SAN FRANCISCO BAY AND OUTER COAST SENTINEL SITE COOPERATIVE

Both federal and state agencies that focus on San Francisco Bay and its Outer Coast are partnering with CASG to help ensure that vulnerable communities and ecosystems in the region are made more resilient in the face of rising sea level and coastal flooding. CASG supports coordination of the efforts of this multi-agency group, the San Francisco Bay and Outer Coast Sentinel Site Cooperative, that, in addition to CASG, includes as partners NOAA's Office of Coastal Management and the Greater Farallones National Marine Sanctuary, the San Francisco Bay National Estuarine Reserve, and the San Francisco Bay Conservation and Development Commission. The focus of the Cooperative's work includes three main areas:

1. bridging natural and built adaptation planning;
2. supporting development of a regional network for early detection and forecasting of marsh ecosystem changes; and
3. fostering resilience efforts that incorporate connections between the ocean/outer coast and bay.

FELLOWSHIPS

Another significant area of collaboration for CASG with state constituents has been through the creation and administration of our highly successful Fellows Programs.

DELTA SCIENCE FELLOWSHIP PROGRAM

Beginning in 2003, CASG partnered with the Delta Science Program to establish the Delta Science Fellows Program (previously known as the CALFED Science Fellows Program). This program pairs graduate students and postdoctoral researchers with Bay-Delta agency scientists and senior research mentors. Fellows work on collaborative data analysis and research projects applicable to the California Bay-

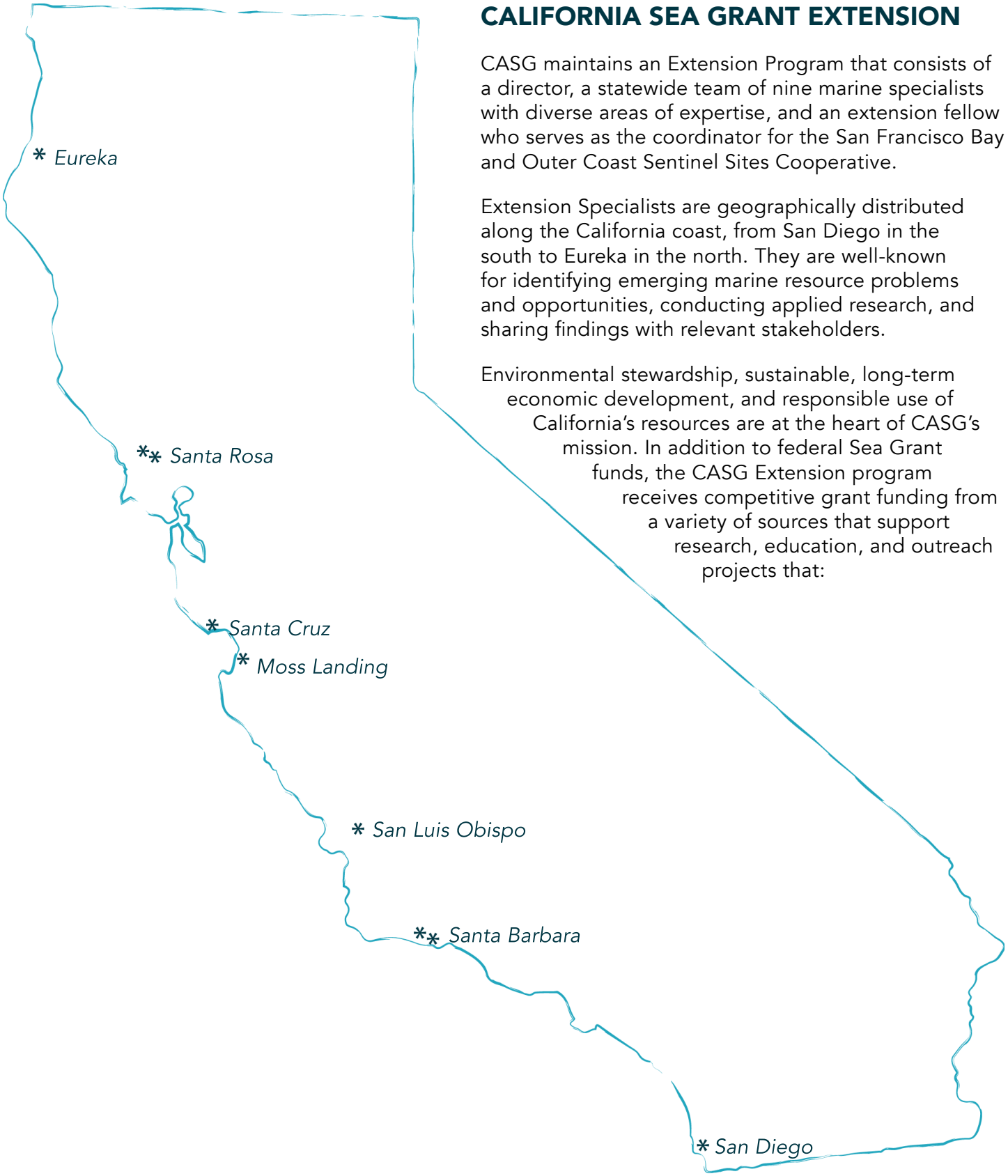
Delta system under the mentorship of these senior scientists. The program's goals are to invest in knowledge that will fundamentally advance the understanding of the complex environments and systems within the Bay-Delta system, to aid policy-makers and managers and to train the next generation of research scientists to help tackle the state's complex water issues. To date, the Delta Science Program has funded 80 Fellows, providing support totaling over $11 million dollars.

CALIFORNIA SEA GRANT STATE FELLOWSHIP PROGRAM

Many agencies in California are involved in management and planning related to coastal resources, and in the future, these agencies will need a large number of trained, politically-astute individuals to manage ocean and coastal environments to effectively address problems and opportunities. Recognizing the need for educating the next generation of marine and coastal policy makers, the California Sea Grant State Fellowship Program was established in 1987. Modeled after the highly successful federal Knauss Marine Policy Fellowship Program, our State Fellowship Program provides recent graduates awarded advanced degrees from California universities an opportunity to acquire "on-the-job" experience in the planning and implementation of marine and coastal resource policies and programs in the State. The program has grown to include approximately 15 agencies and offers some 23 fellowships annually through host agencies including:

- California Coastal Commission
- California Coastal Conservancy
- California Department of Fish and Wildlife
- California Natural Resources Agency
- California Ocean Protection Council
- California Ocean Science Trust
- California State Lands Commission
- California State Parks
- Delta Science Program
- NOAA Channel Islands National Marine Sanctuary Program
- San Francisco Bay Conservation and Development Commission
- State Water Resources Control Board
- Port of San Diego
- NOAA Southwest Fisheries Science Center

The State Fellowship Program will continue to strive to meet the objective of facilitating the training and development of the next generation of ocean and coastal leaders.



CALIFORNIA SEA GRANT EXTENSION

CASG maintains an Extension Program that consists of a director, a statewide team of nine marine specialists with diverse areas of expertise, and an extension fellow who serves as the coordinator for the San Francisco Bay and Outer Coast Sentinel Sites Cooperative.

Extension Specialists are geographically distributed along the California coast, from San Diego in the south to Eureka in the north. They are well-known for identifying emerging marine resource problems and opportunities, conducting applied research, and sharing findings with relevant stakeholders.

Environmental stewardship, sustainable, long-term economic development, and responsible use of California's resources are at the heart of CASG's mission. In addition to federal Sea Grant funds, the CASG Extension program receives competitive grant funding from a variety of sources that support research, education, and outreach projects that:

- protect water quality, including effects of fresh water inputs;
- ensure safe and sustainable seafood, including expanding the state's aquaculture industries;
- recover endangered salmon, restore watersheds, and protect marine habitats;
- study socioeconomic factors affecting fisheries and fishing communities;
- assess functioning of marine protected areas;
- create partnerships to address critical needs in aquaculture, coastal community development, and fisheries management, among others;
- assess seagrass impacts on water quality in local bays; and
- assess changes in critical marine habitats, including seagrass, to understand restoration potential, and causes and consequences of loss.

More detailed descriptions of our diverse Extension Program can be found at:
https://caseagrant.ucsd.edu/extension-outreach

STRATEGIC FOCUS AREAS

As the preceding pages make clear, the opportunities for investment by CASG are extremely broad, necessitating that we establish a deliberate plan for wisely allocating available funds and personnel. Our current Strategic Plan (like those that preceded it) defined broad themes of activity that have built on the incredible strengths of California's scientists and extension specialists, the needs of state regulators, managers, and citizens, and have served CASG well to this point. Upon consultation with our Advisory Board, we were encouraged to continue with this strategy. We then solicited additional advice from our Extension Program specialists, stakeholders and partners distributed throughout California, and released our draft plan for public comment and input. The result, presented here, identifies CASG's priority focus areas, goals, and strategies for the years 2018–2021, plus at least one projected key outcome for each goal. The projected outcomes represent example benchmarks from which Sea Grant can track progress toward achieving each goal. For this four-year time period, CASG will concentrate its research, extension, and outreach efforts within the following three strategic Focus Areas, which echo focus areas highlighted by the National Sea Grant Office:

- ***Healthy Coastal Ecosystems***
- ***Sustainable Fisheries and Aquaculture***
- ***Resilient Coastal Communities and Economies***

Below we describe our interests and approach to addressing these Focus Areas. It is worth noting that embedded in each is a strong interest in understanding and helping to plan for effective responses to the myriad effects of climate change including ocean acidification, hypoxia, rising temperatures, sea level rise, and changes in storm frequency/intensity, and their impacts on the people, property, and living organisms in the coastal and marine environment.

HEALTHY COASTAL ECOSYSTEMS (HCE)

Healthy coastal and marine ecosystems are critical to life along the West Coast. They have intrinsic ecological and aesthetic value, and are essential for sustaining the diversity of coastal and marine life that draws people to the coast and supports many coastal communities. The health of California's coastal ecosystems is under assault from multiple stressors, many of which are of anthropogenic origin, including nutrient and pollutant discharge, harmful algal blooms, changes in water turbidity, coastal erosion and sediment transport, species invasions, and climate change (resulting in ocean acidification and hypoxia). CASG is committed to providing scientific evidence of the driving forces and connectedness within ecosystems that define their productivity, sensitivity, and health. Our goal is to be a leader in regional approaches to understanding and maintaining healthy ecosystems to identify information gaps, set research priorities, and coordinate information and technology transfer to those who need it. For 2018–2021, CASG will focus on the following goals and strategies.

HCE GOAL 1

Support research and provide information to understand the dynamics and functioning of coastal and marine ecosystems. Prioritize obtaining information valuable to the conservation, restoration, and management of these ecosystems to ensure their long-term health and productivity.

- Strategy 1–1: Evaluate interactions between coastal and marine living resources and their physical and chemical environment. Determine how these relationships vary over time, especially as driven by climate change, changes in fisheries management, establishment and/or management of aquaculture, water quality, and establishment of marine protected areas.

- Strategy 1–2: Identify habitats that support areas of high biodiversity or provide key "nursery areas." Assess the vulnerability of these habitats to natural and anthropogenic drivers.

- Strategy 1-3: Identify and measure deleterious impacts of human activity on ecosystems and provide information that enables managers to identify and evaluate scientifically sound options to reduce or eliminate these impacts.

- Strategy 1–4: Assess watershed processes as they impact coastal and marine ecosystems and provide science-based information that contributes significantly to management of these ecosystems and habitats.

- Strategy 1–5: Evaluate impacts of policy and governance decisions on coastal and marine ecosystems.

- Strategy 1–6: Evaluate potential new strategies for coastal and marine conservation.

Outcome: Stakeholders have access to data, models, and policy information that support effective planning, decision-making, and management of coastal habitats and ecosystems.

HCE GOAL 2

Understand sources and sinks of, and help reduce, water and sediment contamination, and their impacts, on the coastal and marine environments.

- Strategy 2–1: Study sources of contamination and the transport, fate and implications of contaminants for coastal and marine life, and public health.

- Strategy 2–2: Develop new tools for rapidly and accurately detecting natural and anthropogenic contamination. Support the application of technology to improve water quality and coastal and marine toxin testing systems.

- Strategy 2-3: Provide information and help managers develop and implement cost-effective strategies for minimizing anthropogenic impacts on water quality and sediments affecting coastal and marine ecosystems.

Outcome: Water and sediment quality improves in the coastal and marine environment.

HCE GOAL 3

Support research to understand the impacts of climate change on coastal and marine species and environments.

- Strategy 3–1: Identify coastal and marine ecosystems, communities and resources that are at particular risk from climate change impacts, including sea level rise, ocean acidification, hypoxia, rising temperatures, and changing frequencies and intensities of storm events.

- Strategy 3–2: Support research to understand, and develop models and tools to evaluate and forecast the ecological and socioeconomic impacts of climate change on coastal and marine species, environments, and related communities.

Outcome: Residents and decision-makers are aware of and understand the hazards of climate change, and the implications of those hazards to their communities.

HCE GOAL 4

Support research to understand and forecast harmful algal blooms (HABs) and their impacts on coastal ecosystems and coastal communities.

- Strategy 4-1: Understand and distinguish between natural and anthropogenic processes driving the occurrence and intensity of HABs.
- Strategy 4-2: Develop and evaluate models that will improve the forecasting of HAB occurrence and intensity in coastal environments.
- Strategy 4-3: Provide information to help coastal managers and policy makers improve decisions related to HAB impacts on fisheries and fishing communities.

Outcome: Coastal residents and policy makers are aware of and make the best possible decisions regarding HABs, their prevention, and their impacts on local communities.

HCE GOAL 5

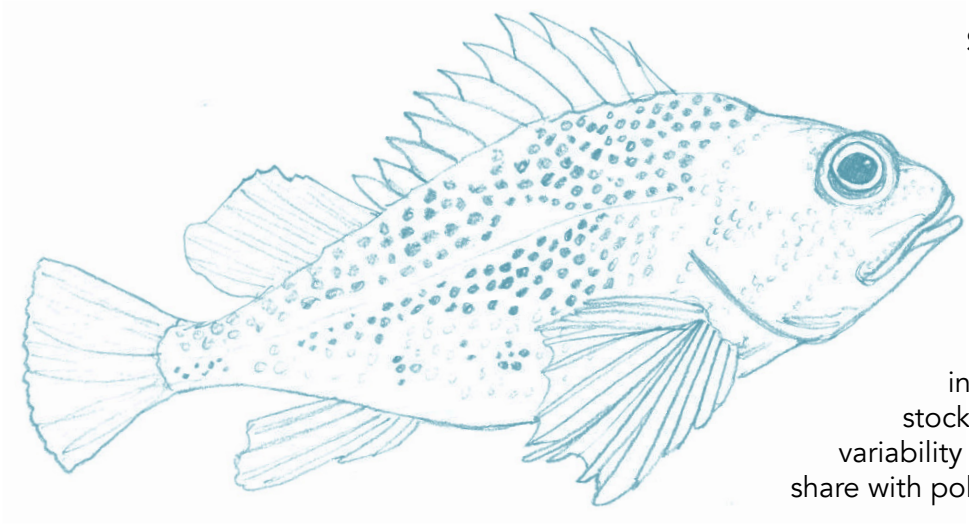
Document the introduction and spread of invasive, non-native plants and animals in estuarine and coastal marine environments, their impacts on local ecosystems, and help manage established invading populations.

- Strategy 5–1: Improve the basic biological understanding of non-native species and their dispersal, including natural and anthropogenic controls on introduction and spread.
- Strategy 5–2: Evaluate the relative social, economic, and ecological consequences of established and invading non-native species to better prioritize and coordinate management strategies.
- Strategy 5–3: Develop and test the efficacy of methods to minimize the spread of invasive species, and assess the consequences of controlling methods.
- Strategy 5–4: Evaluate the effectiveness of invasive species eradication and management practices, including ecosystem recovery and vulnerability to re-infestation.

Outcome: Scientists develop technologies and approaches to restore degraded ecosystems and eradicate or manage invasive species.

SUSTAINABLE FISHERIES AND AQUACULTURE (SFA)

Fish and shellfish provide an important source of protein to many citizens, and many species are enjoyed recreationally, and used artisinally and commercially. The state of California is well positioned to help supply the growing demand for seafood through commercial fisheries and aquaculture. California's location on the Pacific Rim also makes it an excellent candidate for developing improved marine aquaculture techniques, expanding the state's aquaculture industries, and enhancing marine fish stocks. California's long coastline and rich coastal waters produce a wide variety of seafood. Some of the recreationally, artisinally, and commercially important fisheries within the California Current have been sustainably harvested and thus remain at comparatively low levels of exploitation. Many others, however, have suffered fishing closures in recent years due to over-exploitation or the episodic buildup of toxins from harmful algal blooms. CASG has key roles to play in advancing public understanding of the nature of problems and opportunities related to fisheries sustainability and aquaculture. Through the use of its research, extension, and education capacities, CASG will provide information to support the kind of informed public and private decision making that will lead to a sustainable supply of seafood long into the future. With this challenge in mind, CASG has identified the following goals for this focus area.



SFA GOAL 1

Provide information to promote the sustainable use of living coastal and marine resources and associated communities.

- Strategy 1–1: Collect basic scientific, socio-economic, and social scientific information on fisheries, including species essential life history and stock information, environmental factors driving variability in stocks, their use and management, and share with policy makers and other stakeholders.

- Strategy 1–2: Work with managers and stakeholders to identify and build information to encourage the social and ecological sustainability of the state's fisheries and fishing communities.

- Strategy 1–3: Evaluate impacts of current fisheries and potential new policies on fishing communities and marine species, to inform managers, fishery participants, and other stakeholders.

Outcomes:

1. Fishery managers and fishermen have increased understanding of the ecological, socioeconomic and regulatory factors that affect fisheries and fishing communities (as social-ecological systems).

2. Commercial fishery participants have increased awareness and understanding of seafood marketing alternatives for enhancing market value, local access to

California seafood, and public understanding of the state's fisheries.

3. Fishermen apply techniques to reduce negative impacts on depleted, threatened, or endangered species and associated ecosystems.

SFA GOAL 2

Provide science-based information to support and grow a sustainable California aquaculture industry to help meet the growing demand for seafood, and minimize negative environmental impacts of aquaculture.

- Strategy 2–1: Study interactions between cultured and wild species and ecosystems, including implications for disease transmission, genetic diversity, and water quality.
- Strategy 2–2: Improve the economic and environmental viability of aquaculture operations and animal health through research on the performance of culturing systems and cultured species.
- Strategy 2–3: Identify new species potentially suitable for culture.
- Strategy 2–4: Apply culturing technologies to further conservation goals, including the recovery of rare species and restocking.
- Strategy 2–5: Identify the ecological and socioeconomic synergies and conflicts between capture and culture fisheries as they affect coastal communities and working waterfronts.

Outcome:

1. There is an expansion of the sustainable California aquaculture industry.
2. Fishery participants, aquaculturists, and managers collaborate to further integrate capture and culture fisheries to enhance our domestic seafood supply.

SFA GOAL 3

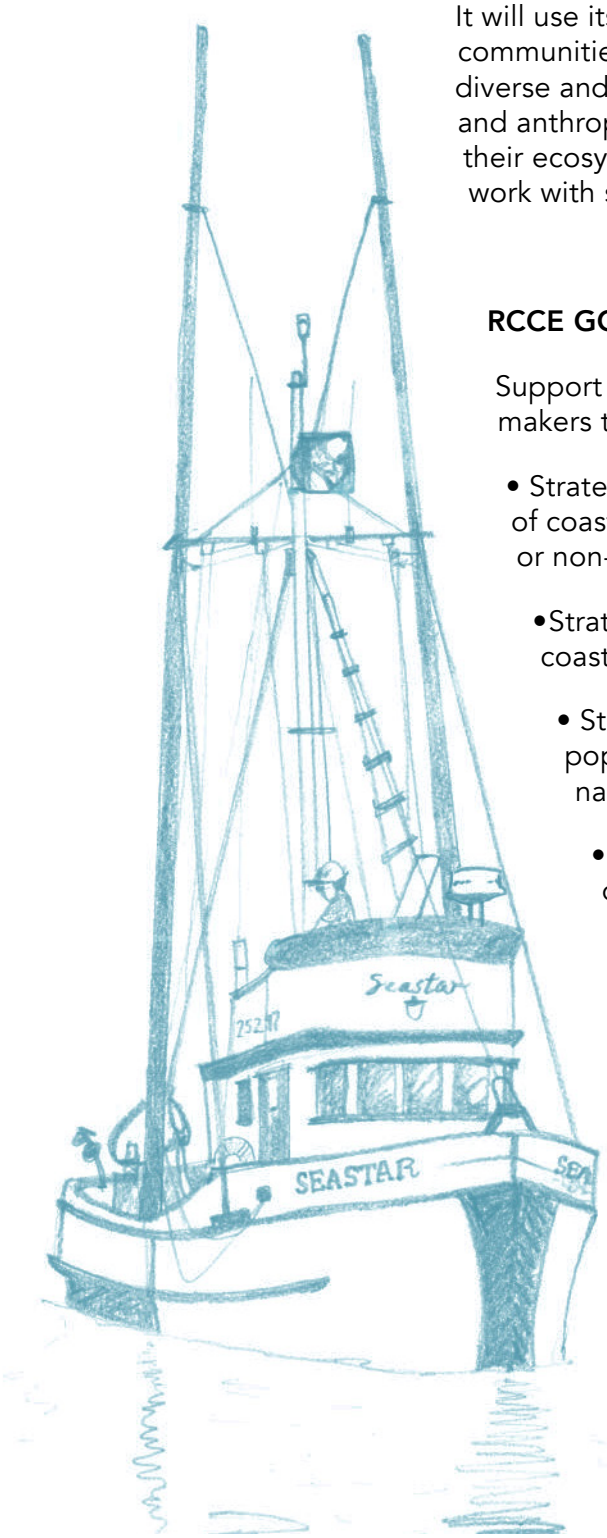
Obtain and provide science-based information on probable anthropogenic impacts—including climate change—on key commercial and recreational fish and shellfish populations, and associated human communities.

- Strategy 3–1: Examine impacts of harmful algal blooms and human-contributed toxins on key fishery species, and develop an ability to forecast such impacts.
- Strategy 3–2: Studies the roles of climate-related stressors (e.g. temperature, hypoxia, ocean acidification) on the physiology and reproductive success of key fishery species.
- Strategy 3-3: Convey information on anthropogenic impacts on key fishery species to policy-makers to support timely and scientifically sound fishery management decisions.

Outcome: Commercial and recreational fisheries are managed sustainably with the best-possible policies, taking into account realized and likely future human impacts on fish populations.

RESILIENT COASTAL COMMUNITIES AND ECONOMIES (RCCE)

Coastal communities throughout California face a multitude of opportunities and challenges. From rural towns to mega-cities, predicting impacts of sea-level rise, managing population growth, resolving competing uses for natural resources, maintaining and siting new infrastructure, managing freshwater supplies, and developing local responses to regional issues are among the state's needs. CASG is committed to help acquire and provide the best available science-based knowledge to engage and support a diverse and growing coastal population. It will use its capabilities to support the development of resilient coastal communities that are economically and socially inclusive, are supported by diverse and vibrant economies, mitigate and respond effectively to natural and anthropogenic hazards, and function within the carrying capacities of their ecosystems. With this commitment in mind, CASG will focus effort and work with strategic partners toward the following goals.



RCCE GOAL 1

Support communities and stakeholders to sustainably use, and policy makers to effectively manage, coastal, and marine resources.

- Strategy 1–1: Identify and measure social, cultural, and economic values of coastal resources and communities, and the value of the consumptive or non-consumptive use of resources.
- Strategy 1–2 Facilitate, community, and stakeholder involvement in coastal resource management.
- Strategy 1–3: Document and quantify the cumulative impacts of population growth, coastal development, and increased beach use on natural resources and harbor communities.
- Strategy 1–4: Work cooperatively with community leaders and other partners to improve the social, economic, and ecological sustainability of coastal communities.
- Outcome: Communities understand the connection between planning and natural resource management issues, and make management decisions that minimize conflicts, improve resource conservation efforts, and identify new opportunities for sustainable management.

RCCE GOAL 2

Work with communities to improve coastal environmental quality and the quality of human life on coasts.

- Strategy 2-1: Evaluate how anthropogenic impacts on coastal waters and ecosystems affect human activities and public health.
- Strategy 2–2: Develop and assess novel tools to improve coastal conditions for public and environmental health.
- Strategy 2–3: Develop and assess novel approaches to help individuals and organizations meet environmental needs and regulations.

Outcome: The public, community leaders, and businesses work together to develop and implement plans to balance multiple uses and values of coastal areas.

RCCE GOAL 3

Assist communities in reducing vulnerability to coastal hazards.

- Strategy 3–1: Assess the vulnerability of coastal communities to shoreline erosion, along-shore transport of sediments, sea level rise, tsunamis, and other natural and anthropogenic marine hazards to safety, property, and quality of life.
- Strategy 3–2: Test the effectiveness of available science-based information in making land-use decisions, development, emergency planning, and other relevant activities.

Outcome: Residents and decision-makers are aware of and understand the processes that produce safety and public health hazards, and the implications of those processes for them and their communities.

RCCE GOAL 4

Work with communities and partners to plan for and adapt to the effects of climate change, including changes in the frequency and intensity of storms and waves, sea-level rise, ocean acidification, and hypoxia.

- Strategy 4–1: Evaluate climate change impacts likely to affect coastal communities, and provide pertinent information to communities and policy makers.
- Strategy 4–2: Assess public understanding of and responses to climate change.

Outcome: Decision-makers are aware of existing and available hazard- and climate-related data and resources and have access to information and skills to assess local risk vulnerability.

CROSS-CUTTING THEMES

EDUCATION, TRAINING AND PUBLIC INFORMATION

CASG embraces the ideals of promoting marine science literacy and educating the next generation of marine and coastal scientists and policy makers. As required by the federal legislation authorizing the Sea Grant programs, CASG makes the results of its publicly-funded projects widely available. We accomplish this by encouraging CASG-supported researchers to incorporate educational and outreach components into their Sea Grant-funded research, and to publish their work. In addition, we accomplish this through the activities of our Extension and Communications staff, who collaborate with a variety of partners.

Our program has chosen to invest the majority of its resources allocated to "education" in graduate research and policy traineeships. We are especially proud of our support of graduate-level students in marine science and policy. This is an area where CASG education and training dollars have demonstrated significant impacts in training new generations of marine scientists and policy makers. In addition, to promote work-force development directly we are proud to offer one-year policy fellowships to recent California-based graduates with Ph.D., Masters or J.D. degrees via our very successful California Sea Grant State Fellowship Program (see page 10).

Several factors have contributed to this programmatic approach to education. First, California is a large state with an immense number of students and a large education infrastructure. As such, it is unlikely that we would have significant impact at the K-12 level. Second, our sister program based in the Los Angeles area, the University of Southern California Sea Grant Program, employs a full-time Sea Grant educator and supports an education program that targets K–12 education in that area. Third, there already are a wide range of excellent informal marine science educational and outreach programs that target K–12 students throughout the state.

Our choice to invest in Education and Training as we do aligns directly with one of the primary Focus Areas identified by NSGCP: Environmental Literacy and Workforce Development. Our choice of how to invest in education and training ensures that these investments intersect with efforts within our other primary areas of interest, identified above as CASG's Strategic Focus Areas.

CASG's program-wide education, training, and public information strategies are designed to address the following goals:

- involve stakeholders in coastal and marine research projects and outreach efforts;
- study, evaluate, and use a variety of tools to disseminate and transfer scientific information;
- support graduate student stipends and fellowships to attract talent to coastal and marine disciplines;
- provide opportunities for students and post-graduates to study and gain on-

the-ground training in coastal and marine policy;

- translate technical scientific information into language appropriate for non-scientists;
- disseminate scientific research findings broadly;
- produce and distribute educational and training programs/materials targeting various publics; and
- facilitate and participate in conferences, discussions, workshops, and other events to exchange information and enhance its relevance to real-world issues.

Our efforts in this area are intended to lead to multiple outcomes, including:

- formal and informal education programs take advantage of the knowledge of Sea Grant-supported scientists and outreach professionals;
- a diverse and qualified pool of applicants pursues professional opportunities for career development in biological, natural, physical and social sciences and engineering;
- graduate students are trained in cutting edge research and outreach methodologies related to understanding and managing our coastal resources; and
- members of the public incorporate into personal decisions broad understandings of their actions and impacts on the environment.

LINKING SCIENCE TO STAKEHOLDERS

Another cross-cutting theme is the need to provide the best available scientific knowledge to stakeholders. CASG is committed to facilitating partnerships (among academics, resource managers, the public, etc.) that ensure the collection and sharing of relevant information obtained by research, extension, and outreach activities falling under all Focus Areas. Such collaborations support and cut across each of the Focus Areas.

CASG has developed or engages in several activities devoted to this cross-cutting theme. First, each of CASG's extension specialists (described above) holds this goal as fundamental to his/her professional activities. Each specialist maintains a network of constituent contacts and works with them to keep them apprised of and engaged in the most important scientific developments relevant to their interests.

In addition, CASG consults regularly with a state-chartered panel, the Resources Agency Sea Grant Advisory Panel (RASGAP), which is charged by state legislation with the responsibility to:

- identify state needs that might be met through Sea Grant research projects, including but not limited to such fields as living marine and estuarine resources, aquaculture, ocean engineering, marine minerals, public recreation, coastal physical processes, coastal and ocean resources planning and management, and ocean data acquisition and dissemination;

- establish state priorities concerning research needs; and
- periodically review progress of continuing research projects.

The RASGAP consists of one representative from:

- California Natural Resources Agency
- California Department of Boating and Waterways
- California Department of Conservation
- California Department of Fish and Game
- Office of Oil Spill Prevention and Response
- Office of Environmental Health and Hazard Assessment
- State Water Resources Control Board
- State Lands Commission
- California State Senate
- California State Assembly
- University of California
- University of Southern California
- California State University
- Fishing Industry
- Aquaculture Industry
- Ocean Engineering Industry

CASG's work with RASGAP ensures that there is healthy communication between researchers, state agencies and stakeholders, and advice is provided to CASG to help establish research priorities with these needs in mind.

Finally, the CASG Director and Extension Director regularly meet and talk with representatives of key state and federal agencies and other stakeholder groups, identified above. Maintaining open lines of communication between CASG and stakeholders is fundamental to ensuring CASG's science and outreach activities retain their high level of quality and relevance.

MANAGING FOR SUCCESS

LEADERSHIP – CASG is dedicated to playing a leadership role in coastal and marine resource conservation and management to benefit the state, the West Coast region, and the nation. This strategic plan is designed to take advantage of CASG's unique ability to combine coastal and marine research, extension, outreach, and education into effective program planning and implementation.

MANAGEMENT – The CASG management team (comprised of the CASG Director, Extension Director, Communications Coordinator, and Business Manager) meets regularly to review program progress and make decisions about new opportunities, such as short-term proposals submitted for program development funding. The balance of our investments among our Focus Areas also is discussed. Prospects for new partnerships and funding sources are regularly explored and evaluated. The program has been successful at attracting additional state funding in recent years and plans to continue seeking similar partnerships at the state, regional, and federal levels.

BALANCING PRIORITIES – The three Focus Areas described above, each with multiple Goals and Strategies, create a broad umbrella under which CASG will invest in research and extension efforts. Inevitably, we will not invest evenly among our Focus Areas and Goals. For example, historically the suite of scientists we support as a whole, based at multiple universities throughout the state, have greater interests and expertise in HCE than in SFA, and we have invested less still in topics related to RCCE. To help address this imbalance CASG is committed to identifying gaps in expertise within our extension program and exploring potential partnerships and funding streams that will allow us to fill these gaps. This will allow us to build upon the extension program's successes and current strengths, and to create a more diverse program with an expanded pool of experts.

Another important means by which we strive to increase the diversity of our portfolio is by managing our core research proposals and awards under an "alternating year plan." For proposals submitted in odd-numbered years, we solicit proposals for "Standard Core Awards" across the full spectrum of topics covered by our three Focus Areas. For proposals submitted in even-numbered years, we solicit requests only for one-year "Special Focus Awards." The Focus Areas and Goals targeted for "Special Focus Awards" can be restricted to those deemed to deserve special attention that year (e.g., due to under-investment), or from especially important and timely topics.

REPORTING – The program routinely reports progress and expenditures related to federal funds throughout the year through two online systems: NOAA's Grants Online database, and Sea Grant's Planning, Implementation and Evaluation Resources (PIER). The lead investigators of all funded projects are required to submit annual financial and progress reports to the program.

Each of other sources of funds provided by grants or agreements to CASG have their own unique reporting requirements. CASG maintains a project-management database to ensure timely progress and compliance with its many federal and state reporting requirements.

EVALUATION AND FEEDBACK

EVALUATING SUCCESS – Given that the value of knowledge unfolds and becomes apparent over a very long time horizon, CASG maintains a strong belief that the ultimate importance of our activities, including the research we support, cannot be measured solely by quantitative metrics that reflect the most immediate products of these activities. Nevertheless, recognizing that there is a need for evaluating performance at some level, CASG requires funded researchers to report annually on their activities. Researchers report quantitative data, including accomplishments and metrics of impact (such as numbers of: papers published in refereed literature, students supported, presentations delivered at conferences, and attendees). They also report project-specific metrics, such as numbers of:

- jobs and businesses created or sustained;
- acres of coastal habitat protected, enhanced, or restored;
- new tools, technology and information services that were developed;
- communities that implemented hazard resiliency practices to prepare for, respond to or minimize coastal hazardous events; and
- fishermen, seafood processors and aquaculture industry personnel who modify their practices using knowledge gained in fisheries sustainability and seafood safety.

These data, plus other data related to impacts and accomplishments more directly relevant to management products, are entered into databases maintained by the National Sea Grant Office. CASG adopts and reports on National Performance Measures as defined by the National Sea Grant Office in their Strategic Plan (http://seagrant.noaa.gov/WhoWeAre/StrategicPlan.aspx)

We also regularly publish and distribute summaries of key research findings, and include key stakeholders in our distributions. Feedback from our stakeholders regarding current research products is important in considering our future research directions.

PROGRAM REVIEW – CASG balances its obligation to wisely invest and account for the public funds it receives while also being alert to emerging trends and opportunities. The program is regularly evaluated by a national review panel assembled by NSGCP. This review solicits external comments from stakeholders and provides feedback to program management to encourage its continual improvement. This information also is incorporated into future program strategic plans and funded activities. In addition, CASG is reviewed annually by federal officials employed within NSGCP and related branches of NOAA.

CASG will regularly revisit this Strategic Plan and its priorities to ensure that it maintains its vision and focus, and continues to provide leadership in coastal and marine resource research, extension, outreach, and education to benefit California, the region, and the nation.

FEEDBACK – CASG welcomes input on this Strategic Plan and is open to suggestions regarding future program directions. Draft versions of this plan were distributed to members of our Advisory Board and key state and public stakeholders, as well as being made available for review by and comment from the general public. The Strategic Plan presented here was improved greatly as a result of comments received.

We welcome comment and suggestions by all interested parties for evolving this plan and on any dimension of our program.

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