Sea Grant
Oregon

Coastal Science
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OREGON SEA GRANT 2010-2013

Implementation Plan

A Companion to the Oregon Sea Grant Strategic Plan 2010–2013

Introduction

This Implementation Plan is a companion to the Oregon Sea Grant Strategic Plan for 2010–2013. The process for developing this plan is detailed in the primary document. This plan will be carried out by a combination of players in communications, extension, and education, often alongside Oregon Sea Grant-funded researchers and other partners. All work will be supported by our administrative and management structure. The structure of this plan is intended to complement and contribute to the National Sea Grant Strategic and Implementation plans as well as the state of Oregon and our host, Oregon State University. An earlier draft of this implementation plan has be aligned with the National Sea Grant Program Strategic Plan and Implementation Plan and approved by a National Sea Grant panel. This document is very similar to the aligned draft, but the language has been updated for clarity. This is a living document that will be updated periodically to adapt to changes in national, state, and regional priorities and to address emerging issues in Oregon.

The objectives, methods, anticipated outcomes, and measures for success are listed below and organized by each of six key issue areas that are particularly relevant to the Oregon coast and the region. Each objective, method, outcome, and measure is also linked to one of our strategic goals or cross-cutting goals. We recognize that these issue areas and goals are interdependent. Overviews of each issue area and detailed descriptions of our program strategic and cross-cutting goals are contained in the Oregon Sea Grant Strategic Plan 2010–2013.

Key issue areas:

- Multiple Uses and Spatial Planning
- Oceans and Human Health
- Watersheds and Water Resources
- Community Resilience to Coastal Hazards and Climate Change
- Fisheries and Seafood
- Coastal Learning and Decision Making

Strategic goals:

- Improving Human Health and Safety Related to Ocean and Coastal Use
- Promoting Social Progress and Economic Vitality
- Enhancing the Sustainability of Coastal Ecosystems

Cross-cutting goals:

- Creating an Informed and Engaged Society
- Investment in and Use of Sound Science

Multiple Uses and Spatial Planning

Goal	Objectives	Methods	Anticipated Outcomes	Measures
Informed and Engaged Society	I. Improve understanding and collaboration among researchers, developers, ocean users, coastal communities, and decision makers.	A. Develop and implement an outreach strategy in partnership with the Oregon Ocean Policy Advisory Council, Department of Land Conservation and Development, Department of Fish and Wildlife, and other state and federal agencies, local governments, NGOS, and academic institutions. B. Facilitate organization of community groups and build their capacity to meaningfully engage in planning and decision making.	1. Improved access to and utilization of spatial planning and multiple-use information, especially with regard to ocean energy and marine reserves. 2. Improved functioning of existing community groups and development of new groups.	a. Number of people participating in workshops and educational events. (300) b. Number of new community/user groups formed and engaged in spatial planning. (3)
	II. Provide outreach and education to stakeholders about marine policy decision processes related to multiple uses and spatial planning.	A. Facilitate communication toward building consensus between stakeholder groups, such as the Scientists and Fishermen Exchange program and other venues.	1. Stakeholders are engaged in decision-making processes related to allocation and use of ocean space.	a. Percentage coastal counties with community/user groups involved in spatial planning. (60%, 4 of 7)
Sound Science	I. Support multidisciplinary investigations to fill critical knowledge gaps and improve management and decision-making capabilities related to multiple uses and spatial planning.	A. Invest in research of high scientific merit that addresses multiple uses and spatial planning with multidisciplinary and collaborative approaches. B. Invest in sound research that identifies, estimates, and evaluates costs and benefits associated with the use of marine reserves. C. Serve the West Coast Governors' Agreement in an advisory capacity, and in collaboration with regional Sea Grant programs, to recommend priority research and facilitate initiation of regional-scale projects that inform decision makers. D. Serve on the Oregon Nearshore Task Force and Governor's Scientific and Technical Advisory Committee to help coordinate statewide research.	1. Increase in the number of research proposals that address multiple uses and spatial planning through multidisciplinary and collaborative approaches. 2. Improved ability of decision makers to consider ecosystem services in decision making. 3. Expanded regional capabilities and collaborations to conduct multiple-uses research.	a. Increase in research proposals submitted that address multiple uses and spatial planning challenges. (50%, 4 to 6) b. Number of publications and presentations. (5)

Human Health and Safety	I. Maintain the safety of existing ocean users and expand to include new ocean users and the potential conflicts between users.	A. Conduct safety trainings and facilitate communication between fishermen, researchers, and the ocean energy industry to ensure that sites, energy-generating hardware, and transmission cables do not increase risks to user. B. Invest in research that improves predictions of coastal wave action.	1. Fishermen and researchers are able to continue ocean use with no unnecessary safety risks. 2. New ocean users such as the ocean energy industry are not exposed to unnecessary safety risk.	a. Number of new safety risks posed by the wave energy industry, and number of wave energy related injuries or deaths. (0) b. Percentage of ocean energy facility plans that include user safety precautions. (100%, ~3)
Social Progress and Economic Vitality	I. Promote inclusion of social and economic sciences, alongside natural sciences, in spatial planning.	A. Conduct workshops and facilitate collaborations that bring together resource economists to address spatial planning. B. Engage coastal communities in research to understand the social and economic benefits and consequences of marine reserves and other ocean uses.	1. Current knowledge about spatial planning and balancing multiple ocean uses is synthesized and social and economic research priorities are identified and used by ocean user communities and decision makers.	a. Increase number of economists and social scientists involved in state spatial planning processes advisors and employees. (400%, from 0 to 4)
	II. Seek and facilitate innovative and practical solutions for ocean use conflicts.	A. Develop capacity of community-based advisory groups to perform as partners in spatial planning. B. Work one-on-one with community/user group leadership in providing training on leadership and partnership skills. C. Develop a manual for community-based assessment of marine reserves that highlights ecosystem services costs/benefits and tradeoff analysis.	1. Community leaders are significantly involved in spatial planning. 2. Stakeholders have access to and utilize maps of ocean uses and economic activity to make decisions.	a. Percentage coastal counties with community/user groups involved in spatial planning and or mapping. (60%, 4 of 7)
Sustainability of Coastal Ecosystems	I. Maintain/enhance sustainability of coastal ecosystems through well-designed, science-based spatial management.	A. Work with state and local partners to facilitate multiple user groups in devising innovative and practical solutions to ocean use conflicts/competition. B. Promote the use of sound natural and social sciences in spatial planning.	1. Spatial planning reduces (rather than exacerbates) ocean use conflicts. 2. Spatial planning improves the sustainability of coastal and ocean uses.	2. Number of scientific experts and experienced ocean users in Oregon who use the science for improved management. (8)

Oceans and Human Health

Goal	Objectives	Methods	Anticipated Outcomes	Measures
Informed and Engaged Society	I. Improve the capacity of communities to use information to reduce risks to human health and safety.	A. Develop and distribute publications that inform stakeholders about contamination and provide training workshops to citizens on how to reduce impacts from known sources of pollution.	1. Beaches with high levels of contamination will have improved water quality.	a. Percentage of water quality samples that show reduced bacterial contamination entering waterways from known sources. (15%, 30 of 200)
	II. Improve public understanding of health benefits of the ocean including the potential for life-saving drug development.	A. Create an interpretive display at the Hatfield Marine Science Center highlighting the unique ecosystems that are being investigated for bioactive products, and use that interpretive display as an invitation for in-school education about the role of natural products.	1. Increased awareness about unique and difficult-to-access ocean ecosystems and the benefits they may yield.	a. Number of schools that invite researchers to do in-school programs. (3)
Sound Science	I. Support research to expand knowledge about biophysical processes that drive ecological conditions affecting human health and safety to improve forecasting of conditions or events that pose a human health risk.	A. Invest research dollars in this endeavor and foster investments of other organizations. B. Serve the West Coast Governors' Agreement in an advisory capacity, and in collaboration with regional Sea Grant programs, to recommend priority research and facilitate initiation of regional-scale projects that inform decision makers.	1. Increased knowledge of biophysical forces that drive risk conditions, and increased capacity to forecast risks. 2. Improved capacity to investigate regional-scale issues affecting human health.	a. Number of peer-reviewed publications and development of models that forecast risk conditions or events. (2)
	II. Support studies that identify sources of bacterial contamination in coastal waterways.	A. Conduct collaborative studies that engage stakeholder knowledge and hydrologic science to identify sources and contribute bacterial pollution to streams, rivers, and beaches.	1. Increased knowledge about sources of contamination and ability to prioritize mitigation or regulatory actions.	a. Number of publications highlighting new knowledge. (2) b. Number of presentations and trainings. (4)
	III. Support research and discovery of bioactive natural products beneficial to human health.	A. Invest in biomedical research that evaluates deep-sea vent organisms for use in pharmaceuticals.	1. Increased knowledge of deep-sea vent organisms, bioactive compounds, pharmacology molecular tools, and cell biology. 2. Discovery of beneficial compounds and new drug leads.	a. Number of peer-reviewed publications and presentations. (3) b. Number of patents. (1, may take longer than 4 years)

Human Health and Safety	I. Connect results of human health-risk forecasting with rapid public notification and response.	A. Work with local, state, and federal agencies to develop new, and improve existing, notification and response plans. B. Work with agency partners to educate the public as to risks and appropriate responses to notification.	1. The public is exposed to fewer risks related to ocean and coastal resource use. 2. Coastal residents and visitors are aware of risks and know how to respond in a way that reduces their personal risk.	a. Percentage of coastal communities that implement notification systems. (40%, 14 of 36) b. Percentage of coastal communities in which risk-response education occurs. (40%, 14 of 36)
	II. Reduce bacterial contamination on beaches and coastal streams.	A. Work with industry, municipalities, and individuals to prevent contamination of water sources and waterways.	1. Citizens enjoy coastal resources and drinking water without risk of illness from bacterial contamination.	a. Percentage of beach counties that adopt new practices that reduce contamination. (40%, 3 of 7)
	III. Improve understanding and increase capacity of the ornamental fish sector to address emerging diseases and health-management issues, including zoonotic diseases that can transfer from animals to humans.	A. Increase research and monitoring of the ornamental fish trade to characterize current health status of ornamental fish and diseases carried by these fish and identify high-risk species and practices. B. Evaluate biosecurity practices and private-sector knowledge of biosecurity techniques.	1. Ornamental fish industry and managers are better able to reduce risk of zoonotic disease transmission.	a. Number of new publications or technical documents. (5) b. Number of domestic and international organizations that seek biosecurity information from Oregon Sea Grant (OSG). (6) c. Number of ornamental trade facilities that initiate disease screening. (8)
Social Progress and Economic Vitality	I. Reduce beach closures and coastal hazards to human health to maintain and enhance recreational and tourism opportunities.	A. Monitor beach and nearshore water quality in partnership with state agencies and local governments. B. Evaluate changes in contamination related to seasonal variability, storm events, and other conditions to determine whether beaches are safe for recreation. C. Disseminate information on current beach conditions and how to prevent health effects while visiting or recreating at Oregon beaches.	1. Reduced unnecessary beach closures. 2. Residents and visitors can enjoy beach recreation without health concerns.	a. Percent reduction of beach closures. (15%, from 25 to 21)
Sustainability of Coastal Ecosystems	II. Improve water quality of nearshore and estuarine systems.	A. Work with stakeholder groups to develop strategies to reduce inputs of pollutants that have negative effects on human and ecosystem health. B. Work with regional, state, and local partners such as the West Coast Governors' Agreement, Oregon Health District, and Oregon Parks and Recreation to formulate recommendations that will improve water quality.	1. Coastal ecosystems have improved water quality. 2. Decision makers utilize recommendations and institute policies or regulations that improve water quality.	

Watersheds and Water Resources

Goal	Objectives	Methods	Anticipated Outcomes	Measures
Informed and Engaged Society	I. Improve stakeholder and decision-maker understanding of watershed health, watershed restoration, and freshwater resources.	A. Facilitate needs assessments and focus groups to identify water and watershed education needs. B. Create and provide water and watershed education curriculum through written, online, and face-to-face instruction to schools, communities, and municipalities. C. Publish and distribute materials to a diverse audience, including home gardeners, policy makers, recreationalists, educators, natural-resource professionals, watershed councils, and the private sector. D. Recruit, train, and support volunteers, trainers, and students for aquatic invasive species prevention and early detection/rapid-response programs through traditional means as well as social networking portals. E. Work with Oregon Public Broadcasting and other partners to build on the successful "Stop the Invasion" education and engagement campaign.	1. Individuals and groups make informed decisions based on expanded knowledge and perspectives. 2. Individuals, watershed councils, academic institutions, and related groups take leadership roles in community watershed and water resource education. 3. An active network of citizen scientists and students engaged in invasive species prevention, early detection, and rapid response.	a. Number of individuals utilizing on-line watershed education materials. (150) b. Number of stakeholders partnering with OSG faculty in the delivery of water resource and watershed education. (20) c. Number of individuals participating in Oregon Water Schools. (120) d. Percentage of program participants that demonstrate increased knowledge and awareness through evaluation. (70%, 190 of 270) e. Number of trainers trained. (150) f. Number of graduate degrees affiliated with OSG faculty focused on watershed health. (4)
Sound Science	I. Advance the science of watershed and freshwater resource health with regard to the roles of natural hydrology, aquatic invasive species, riparian area ecology, and land use and development.	A. Provide and promote access and use of sound watershed science and water-resource planning tools. B. Identify and rank the relative risks of invasive species pathways. C. Invest in multidisciplinary research that seeks to prevent the introduction and spread of aquatic invasive species through economic effects modeling. D. Invest in citizen science model research that engages K–12 and college students and seeks to understand the relationship between marsh invertebrates and dike removal. E. Serve the West Coast Governors' Agreement in an advisory capacity, and in collaboration with regional Sea Grant programs, to recommend priority research and facilitate initiation of regional-scale	1. Public decision makers incorporate best-available science in their decisions governing watershed health and freshwater resources. 2. Regional managers are better able to prioritize invasive species management and prevent and respond to invasions. 3. Improved invasive species management tools and prevention protocols. 4. Improved capacity to investigate regional-scale issues that affect the sustainability of coastal ecosystems.	a. Percentage of Oregon coastal communities that utilize OSG watershed health and water resource planning tools. (35%, 12 of 36) b. Number of management and predictive invasive species tools developed. (2) c. Number of peer-reviewed publications or technical documents. (3) d. Number of presentations to managers. (3)

		projects that inform decision makers.		
Human Health and Safety	I. Increase capacity of communities to improve water quality in watersheds.	A. Develop and distribute publications and other media that inform stakeholders about contamination. B. Provide training workshops to citizens on how to reduce impacts from known sources of pollution.	1. Rivers and streams with high levels of contamination will have improved water quality, and risk to users is reduced.	a. Number of training workshops. (6) b. Number of new publications and other media pieces developed. (2)
	II. Increase capacity of communities to preserve clean freshwater resources.	A. Conduct trainings and workshops to increase the knowledge, skills, and awareness of rural residents and community well users on basic groundwater hydrology and groundwater protection. B. Work with municipalities and rural community water suppliers to develop and apply strategies to protect the safety and availability of freshwater supplies. C. Create and provide educational materials and programs that assist water users in reducing their demand.	1. Rural communities have reliable access to clean and safe freshwater. 2. Municipalities and small water districts are capable of providing consistent clean water supplies to meet demand.	a. Number of well users attending workshops and trainings. (25) b. Percentage of water districts that participate in OSG programs. (20%, 4/20)
Social Progress and Economic Vitality	I. Improve the understanding of and protection of community watersheds and water resources through collaborative efforts with managers and users.	A. Design and implement Oregon Water Schools (1- to 3-day mini-colleges) to address identified local needs through classroom and field sessions. B. Facilitate the organization of stakeholder groups to build their capacity for watershed and water resource planning and decision making. C. Create or strengthen local- to regional-scale partnerships among residents, local organizations, businesses, agencies, and higher-education institutions to collectively address priority watershed and water resource issues. D. Conduct research on the economic impacts of aquatic invasive species and train managers to use invasive species models to prioritize management actions and minimize economic impacts.	1. Residents and businesses will adapt existing practices to use less water and match our climatic conditions. 2. Increased public knowledge, skills, and awareness about our role in watershed health and water resource conservation. 3. Improved capacity to avoid negative economic effects of aquatic invasive species.	a. Number of individuals participating in Oregon Water Schools. (120) b. Increase in Oregon Water School participants that demonstrate increased knowledge and awareness through evaluation. (70%, 84/120) c. Percentage of Oregon Water School participants that express an intention to change behavior based on evaluation. (40%, 48/120)

Sustainability of Coastal Ecosystems	I. Improve collaboration toward the restoration and preservation of ecosystem services within watersheds.	A. Design programs to provide skill-building education and support on-the-ground implementation of actions to improve or retain watershed health. B. Increase the knowledge and skills of those utilizing watershed assessment data to prioritize on-the-ground watershed-restoration activities.	1. Individuals, watershed councils, academic institutions, and related groups take leadership roles in restoration and preservation efforts.	a. Number of volunteer hours spent on watershed-restoration efforts. (400) b. Number of new "Master Watershed Stewards" certifications. (15) c. Number of previously certified "Master Watershed Stewards" seeking education in advanced topics. (75)
	II. Promote a more-natural hydrologic cycle and healthy waterways and coastal ecosystems.	A. Work with cities, counties, builders, and homeowners to increase adoption of low impact development and best-management practices. B. Increases the knowledge, skills, and awareness of those who design or implement riparian planting projects or manage riparian vegetation.	1. Low impact development practices are widely used and contribute to a more-natural hydrologic cycle. 2. Riparian planting, revegetation, and restoration skills are easy to obtain and are utilized at priority restoration sites.	a. Percentage of coastal communities that implement low impact development practices. (50%, 18 of 36) b. Number of high-priority restoration sites where restoration is initiated. (5) c. Percentage of previously certified “Master Watershed Stewards” seeking education in advanced topics. (75)
	III. Prevent the introduction and increase the effectiveness of early detection and rapid response to riparian and aquatic invasive species.	A. Apply the best-available science to determine the most-effective management practices for invasive species prevention and biosecurity protection. B. Participate in, facilitate, and take a leadership role in the Oregon Invasive Species Council and other regional and national collaboration efforts.	1. Increased collaboration and capacity to incorporate invasive species prevention and early detection/rapid response protocols into management entities and organizational activities.	a. Number of extension programs and hobby groups throughout the region that incorporate invasive species prevention, detection, or response activities. (8) b. Number of requests to develop new protocols for invasive species management tools and protocol development. (4)

Community Resilience to Coastal Hazards and Climate Change

Goal	Objectives	Methods	Anticipated Outcomes	Measures
Informed and Engaged Society	I. Increase individual, family, organization, and community understanding of coastal hazards such as tsunamis, coastal storms, and the effects of climate change.	A. Develop and expand on partnerships with the Oregon Department of Geology and Minerals Industry, Oregon Department of Land Conservation and Development, NOAA, and other state and local agencies to assist them in informing and engaging their constituents about coastal hazards and climate change. B. Develop consistent and accurate messages that are easy to understand, and deliver them through technical workshops, public meetings, radio, and other media outlets. C. Develop public education materials to communicate the drivers and risks associated with climate change and coastal hazards. D. Develop and maintain interactive educational displays at the Hatfield Marine Science Center (HMSC) Visitors Center and other venues. E. Use multiple media approached to inform the public about risks and adaptation strategies related to coastal hazards.	1. Higher level of public discourse on topics of climate change and coastal hazards. 2. Residents and visitors have access to more information about hazards.	a. Percentage of HMSC visitors that express learning behavior at interactive displays through evaluation studies. (60%, 240 or 400) b. Number of new educational publications or multimedia materials produced. (4)
	II. Engage people to apply new understanding so they can be more resilient.	A. Work with individuals and groups to directly integrate and apply information on hazard resilience and climate change adaptation into their daily lives. B. Conduct workshops during which stakeholders use maps to identify their own level of risk and demonstrate their understanding of coastal hazards, including the effects of climate change.	1. Workshop participants establish preparedness groups that organize business, neighborhoods, and organizations that prepare for hazards. 2. Coastal residents can describe the potential risk to their own property and can identify ways to reduce that risk.	a. Number of coastal counties with new preparedness groups. (4) b. Number of new, local-scale documents that present preparedness plans. (8) c. Number of coastal residents that participate in mapping workshops. (60)
Sound Science	I. Expand knowledge about the drivers and effects of hazards and climate change and enhance capabilities to predict climate change and coastal hazards.	A. Invest in research efforts that examine possible effects of, and increase predictive capacity around, climate change and coastal hazards. B. Invest in research that seeks to improve tsunami-inundation models and improve predictions.	1. Increased knowledge about drivers and dynamics of coastal hazards; agencies will have access to timely science related to climate change and coastal hazards to improve planning and decision	a. Number of peer-reviewed publication or technical documents. (2) b. Citations of OSG-supported research in agency planning or technical documents. (3)

		C. Invest in research that seeks to improve nearshore wave modeling to improve emergency management and land-use planning. D. Conduct research to understand the barriers to climate change adaptation and the best methods for communicating about climate change. E. Serve the West Coast Governors' Agreement in an advisory capacity, and in collaboration with regional Sea Grant programs, to recommend priority research and facilitate initiation of regional-scale projects that inform decision makers.	making. 2. Increased capacity for regional collaboration and scientific capacity to predict coastal hazards and the effects of climate change.	
	II. Expand knowledge of the key factors and social and economic barriers to preparing for hazards and adapting to change.	A. Work with agencies to incorporate OSG research and other timely science into planning and decision making related to climate change and coastal hazards. B. Work with the West Coast Governors' Agreement to facilitate regional-scale social science inquiry.	1. Agency planning and decisions will address barriers to hazards preparation and climate-change adaptation.	b. Number of relevant state agencies that incorporate recent research into planning or decision making. (4)
Human Health and Safety	I. Increase community capacity to prepare for and adapt to the impacts of climate change and coastal hazards.	A. Work with state and local agencies to provide engagement and training on adaptive planning for climate change. B. Assist state and local entities in developing plans and strategies to prepare for a Cascadian earthquake and tsunami. C. Work with NANOOS and other partners to increase the availability and usability of ocean and atmospheric data and decision-support tools.	1. Individuals and agencies change behavior and become more resilient in the face of climate change and coastal hazards.	a. Percentage of coastal residents know what to do in case of an earthquake or tsunami. (10%) b. Percentage of coastal counties that initiate or expand coastal hazards or climate change planning. (40%, 3 of 7) c. Percentage of coastal counties using Web-available data. (40%, 3 of 7)
Social Progress and Economic Vitality	I. Increase capacity of the most-vulnerable individuals and groups to adapt to the effects of climate change and hazards.	A. Identify and include most vulnerable individuals in OSG programs focused on adaptation to the effects of climate change and hazards. B. Develop new tools to support individual and community decision making, planning, and training. C. Apply results of new research to assist public decision makers in overcoming the barriers to addressing climate-change adaptation.	1. Most-vulnerable individuals and groups understand and respond appropriately to hazards and climate change, reducing risk. 2. Public agencies are aware of barriers to addressing climate-change adaptation and are able to apply strategies to overcome those barriers.	a. Percentage of invitations extended to most-vulnerable groups. (30%, 240 of 800)

	II. Increase capacity of local communities to improve their economic stability and resilience to hazards.	A. Assist communities in identifying and implementing adaptation plans and strategies that increase resilience and prevent interruption of important economic activities.	1. Communities are more resilient to the effects of coastal hazards and climate change and experience minimal interruption of economic activity after an event.	a. Percentage of coastal counties that implement plans to adapt to hazards. (70%, 5 of 7) b. Percentage of coastal counties that initiate use of hazard resilience practices. (40%, 3 of 7)
Sustainability of Coastal Ecosystems	I. Expand understanding and capacity of managers and coastal communities to predict the effects of climate change on coastal ecosystems.	A. Support research that emphasizes the influence of climate change on coastal ecosystems. B. Work with researchers to incorporate climate-change impacts into ecosystem studies and extend their results to natural-resource managers.	1. Managers will be better able to account for the effects of climate change in planning and decision making. 2. Coastal communities institute policies and procedures to enhance the natural ability of coastal ecosystems to buffer extreme events.	a. Number of peer-reviewed publications, technical documents, and articles published. (3) b. Percentage of coastal communities that adopt new policies. (40%, 3 of 7)

Fisheries and Seafood

Goal	Objectives	Methods	Anticipated Outcomes	Measures
Informed and Engaged Society	I. Increase engagement of multiple types of stakeholders in fisheries planning and decision making.	A. Work with coastal stakeholders to determine barriers in communication and understanding and develop practices that overcome those barriers.	1. Mutual respect between groups and increased accurate understanding of fisheries and seafood issues.	a. Number of fishing groups that effectively communicate and collaborate with non-fishing groups. (5)
	II. Educate residents and visitors on ecological, economic, social, and cultural aspects of regional fisheries.	A. Create and place interpretive information about fishing industries at interpretive centers, tourism attractions, and port facilities. B. Develop an educational display at the Hatfield Marine Science Center and a documentary using the charismatic giant squid (a new invader in Oregon waters) to educate the public on ecological aspects of fisheries and predator-prey relationships.	1. Visitors and residents will have an improved understanding of fishing industries and how changes in habitat affect fisheries.	a. Increase in number of locations that provide OSG-produced materials about fishing industries. (50%, from 4 to 6)
Sound Science	I. Support sound research to provide critical information for improved fisheries management.	A. Invest in research that focuses on providing the most-critical information for fisheries management and addresses emerging issues. B. Invest in collaborative research that incorporates experiential knowledge with fisheries science to track the invasion of Humboldt squid and evaluates the potential effect on commercially valuable stocks. C. Invest in collaborative research to determine the effects of hypoxia on fisheries and improve our ability to predict hypoxic events and disseminate results to management agencies. D. Invest in research that seeks to understand the effects of climate change on the health of commercially valuable fish stocks.	1. State and regional fisheries managers, including the Pacific Fisheries Management Council, have access to more information when making management and allocation decisions.	a. Number of peer-reviewed publications and technical documents produced and provided to fisheries managers. (5) b. Number of presentations given to managers or fishermen. (5)
Human Health and Safety	I. Improve safety related to harvest of commercial fish, recreational fishing, and fisheries research.	A. Conduct sea-safety training courses in collaboration with the U.S. Coast Guard.	1. Increased knowledge of how to avoid risk at sea; more practiced at survival techniques.	a. Number of sea-safety training students that successfully complete the course. (150)
	II. Broaden and improve information base about source, safety, and health benefits associated with Oregon and west coast	A. Develop and test in-market tools that improve consumer awareness about the source, health benefits, and risks associated with seafood consumption and assist consumers in making safe and healthy	1. Consumers are more knowledgeable and make choices to maximize health benefits and minimize risks.	a. Number of new marketing tools tested. (2)

	seafood.	choices.		
Social Progress and Economic Vitality	I. Support economically viable, efficient, and sustainable Oregon seafood industries.	A. Service on scientific and technical advisory committees at the state and national level to ensure use of economic metrics in fisheries management.	1. Improved fisheries management that matches market demand for sustainability.	a. Increase in economists and other social scientists working to improve regional fisheries management. (50%, from 10 to 15)
	II. Improve the value and increase product availability of Oregon and west coast safe, local, sustainable seafood products.	A. Work with capture and culture industries to develop new products and expand markets for new and existing Oregon and Northwest seafood products, especially in Oregon's Willamette Valley.	1. Increased availability of safe, local, sustainable seafood in urban markets. 2. Increased demand, value, and profits for Oregon-caught and -cultured seafood products.	a. Number of new distribution points for Oregon fish. (12) b. Number of new Oregon seafood products in markets. (3)
	III. Improve the value, quality, and sustainability of the ornamental fish trade in Oregon.	A. Work with the Oregon ornamental fish industry and its suppliers to improve the health management and quality control related to fish collection, exports, import, sales, and long-term health of ornamental fish.	1. Increased utilization of best-health practices within the ornamental fish industry. 2. Improved health/quality and increased survival and decreased disease among ornamental fish imported into Oregon. 3. Increased opportunities to market high-quality ornamental fish in Oregon.	a. Number of facilities that initiate use of best-health practices within the ornamental fish industry. (50) b. Reduced morbidity and mortality among ornamental fish imported into Oregon (evaluation of participating facilities). (10%, total unknown) c. Number of new or improved sources that provide healthy, sustainably produced/collected ornamental fish. (8)
	IV. Support sound research that seeks to improve capacity and efficiency of the aquaculture industry.	A. Invest in collaborative research that includes commercial shellfish growers and examines the effect of *Vibrio tubiashii* on cultured shellfish.	1. Aquaculture hatchery facilities are better able to avoid and mitigate risk to seed stock. 2. The potential for successful restoration of Olympia oysters is enhanced.	a. Number of publications and technical documents. (2) b. Number of presentations to or trainings with the aquaculture industry. (3)
Sustainability of Coastal Ecosystems	I. Improve decisions and support long-term sustainability of fishing by engaging fishermen, researchers, and managers in collaborative research efforts.	A. Work with Collaborative Research on Oregon Ocean Salmon (CROOS) and other partners to conduct genetic stock identification and link stocks to oceanographic conditions and fishery distribution, to improve fisheries management (salmon and other species).	1. Fisheries managers are capable of selective-management techniques that minimize impacts on stocks of critical concern.	a. Percentage of fishermen in fleet trained in at-sea genetic stock-identification techniques. (50%, 50 of 100)

	II. Advance understanding of fisheries and capabilities to predict changes in stock health and abundance across space and time.	A. Support research that address ecological aspects (competition, predation, disease) and genetic interactions between hatchery and cultured species with wild populations. B. Work with partners to apply results of fisheries research to management and decision making. C. Examine how changes in habitat (e.g., hypoxia, climate change, etc.) affect fish production.	1. Increased protection of weak stocks. 2. Improved sustainability of harvested species.	a. Number of management techniques adapted to utilize new knowledge. (2)

Coastal Learning and Decision Making

Goal	Objectives	Methods	Anticipated Outcomes	Measures
Informed and Engaged Society	I. Provide learning opportunities to youth and adults with diverse backgrounds to support OSG's mission and goals.	A. Conduct unique K–12 marine science education programs at HMSC and other venues. B. Develop and conduct professional trainings for teachers to improve science education in the classroom. C. Maintain and enhance the HMSC Visitor Center to provide superior free-choice learning and public-engagement opportunities. D. Work with the West Coast Governors' Agreement to implement the regional Ocean Literacy and Awareness work plan.	1. Increased K–12 student knowledge about marine sciences and careers. 2. Improved in-school science education. 3. Teachers are more capable of meeting science education standards. 4. Youth and adults are more ocean-literate.	a. Number of students participating in OSG K–12 education programs. (35,000) b. Percentage of trained teachers that use new science-education tools. (50%, 220 of 240) c. Increase in annual number of visitors to the HMSC Visitor Center. (10%, from 140,000 to 154,000)
	II. Provide graduate and undergraduate marine science, policy, education, outreach, and engagement professional development and academic opportunities.	A. Support undergraduate, graduate, and post-graduate development through research grants, fellowships, and scholarships. B. Establish and develop the OSG Scholars program, with a focus on building the capacity of students to conduct interdisciplinary work with effective outreach and public-engagement components.	1. Young professionals in marine science, policy, education, outreach, and engagement are better equipped to become leaders in the field.	a. Increase in number of OSG scholars active in a year. (20%, from 30 to 36) b. Number of peer-reviewed publications, technical documents, or presentations completed by OSG Scholars. (60) c. Percentage of OSG scholars using interdisciplinary approaches that include outreach and engagement. (60%, 80 of 133)
	III. Reach diverse audiences, including underserved populations, with OSG education and outreach programs.	A. Conduct research to identify ways in which OSG programs can reach a more-diverse audience and overcome barriers that limit access to OSG programs. B. Develop and implement programs that employ the most-effective tools to reach and engage newly identified audiences.	1. OSG programs are refocused and effectively reach more diverse audiences.	a. Number of new audience groups participating in OSG programs such as home schools, tribal communities, Spanish speakers, and others. (3)

Sound Science	I. Advance the science and application of free-choice learning and decision making.	A. Conduct research and evaluation studies using HMSC, the Oregon Coast Aquarium, coastal interpretive centers, and other facilities as social laboratories.	1. Increased knowledge of how to create and deliver education programs that effectively change behavior. 2. Improved impact of museums, aquaria, and coastal interpretive centers.	a. Number of graduate students affiliated with OSG faculty, fellowships, research grants, or scholarships that focus their research on learning science and evaluation. (24) b. Number of undergraduates affiliated with OSG faculty, fellowships, research grants, or scholarships that complete a learning-science or -evaluation project. (12) c. Number of peer-reviewed and technical publications authored by faculty affiliated with OSG researchers or supported students. (20)
	II. Advance the science and application of communications.	A. Conduct research and evaluation studies of the science communication that occurs through our published materials. B. Conduct research and evaluation studies of the science communication that occurs through in-person communication activities with stakeholders. C. Publish for professional audiences an ongoing series of print and digital materials, "Public Science Communication Research and Practice." D. Present results of research to Sea Grant faculty and students in seminars.	1. Increased knowledge of how to communicate science to nonspecialists that effectively influences their behavioral choices.	a. Number of new materials in our Public Science Communication series (6). b. Number of Sea Grant faculty and graduate students who participate in science communication seminars. (20) c. Number of seminars (3).
	III. Adapt and advance the current state of knowledge and practice concerning public and individual decision making and learning as it relates to coastal and ocean resources.	A. Organize and conduct a symposium or other meeting to gather key decision and learning scientists to focus public and individual decision making and learning as it relates to coastal and ocean resources.	1. A publication that reviews the state of knowledge and recommends priority research.	a. Number of copies distributed. (100)
Human Health and Safety	I. Increase safety of coastal residents and visitors through education and outreach that leads to reduction in risk behaviors.	A. Evaluate education and outreach activities to identify ways to improve the link between education and reduction in risk behaviors. B. Develop and employ new education and outreach methods to maximize risk-reduction	1. Residents reduce their exposure to health and safety hazards related to ocean and coastal resource use.	a. Percentage of participants in OSG heath and safety education programs that can identify risk-reduction strategies and report specific, intended risk-reduction behavior.

		behavior.		(70%, 105 of 150)
Social Progress and Economic Vitality	I. Advance coastal community capabilities to adapt to climate change.	A. Conduct research to identify barriers to adapting to climate change and test techniques designed to overcome those barriers.	1. Communities and individuals overcome barriers and are capable of adapting to the effects of climate change.	a. Percentage of coastal counties that can identify adaptation strategies. (60%, 4 of 7)
	II. Increase knowledge on effective design of public processes that encourage stakeholder engagement and enhance relationships between different types of stakeholders and between stakeholders and decision makers.	A. Evaluate the level and effectiveness of engagement in decision and planning processes to determine the best approaches. B. Apply best approaches in OSG programs.	1. Stakeholders are engaged and influence planning, decision making, and policy changes.	a. Number of coastal communities who report successful engagement in decision-making processes. (12 of 36)
Sustainability of Coastal Ecosystems	I. Establish links between education and OSG's mission and goals with desired behavior change.	A. Conduct evaluation studies of education, outreach, and engagement activities to identify ways to improve the link between education and behavior change. B. Develop and employ new education, outreach, and engagement methods to maximize impact on behavior.	1. Individuals participating in education and outreach programs can identify how their behaviors influence the environmental and alter their behavior to enhance sustainability of the coastal ecosystems they are part of.	a. Number of program participants who report anticipated or actual behavior change though evaluation. (40%, 200 of 500)