
Sea Grant

National Sea Grant Office

# NOAA Sea Grant Strategic Plan for FY2003-2008 and Beyond

*Science for Sustainability in the 21st Century*

U.S. Department of Commerce
National Oceanic and Atmospheric Administration
NOAA Sea Grant
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## NOAA Sea Grant for the 21st Century

The expanding urbanization and development of coastal environments represent immense management challenges for the U.S. Currently, our nation's capability and capacity to manage coastal resources is inadequate and solutions are urgently needed. The understanding and conservation of coastal resources will require a broad commitment and intense, sustained involvement on the part of the Federal Government in partnerships with state/local governments, industry and universities. This will be an immense undertaking—one that will severely strain the cultural fabric of this country. Coastal development promises to be one of the most dramatic and dynamic engine of human alteration to associated ecosystems and a primary challenge of the 21st century.

The assets and strengths of NOAA's National Sea Grant College Program are well positioned to help address the transition to sustainability and ecosystem-based management that this new century will demand of us as a nation. Sea Grant's management paradigm, legislative mandate, and strong performance against exacting criteria, have shaped an innovative program that has developed efficient, effective mechanisms for getting scarce resources to problems—the right problems—as defined by NOAA priorities and urgent local/regional needs.

Sound planning is critical to effective performance. To that end, NOAA Sea Grant has produced its first strategic plan that focuses specifically on the needs of the new century—a plan that is consistent with the mission of its parent agency, NOAA, yet tailored to the program's unique strengths. This plan is the result of numerous retreats/workshops and input from many stakeholders, especially our university partners and National Review Panel.

### What is Sea Grant?

Sea Grant's legislative charge (PL107-299) is to "increase the understanding, assessment, development, utilization, and conservation of the nation's ocean and coastal resources by providing assistance to promote a strong education base, responsive research and training activities, and broad and prompt dissemination of knowledge and techniques."

Sea Grant is a national organization headquartered in NOAA comprising 30 university-based colleges or centers located in coastal and Great Lake states and Puerto Rico. These programs form a dynamic, national network of over 300 participating institutions involving more than 3,000 scientists, engineers, educators, students and outreach experts. Sea Grant's organizational paradigm of national programming and local implementation is a powerful mechanism for broad engagement of multiple nationwide issues.

Sea Grant engages the capabilities of our finest research universities in addressing coastal/Great Lakes resource management issues consistent with NOAA's mission. Sea Grant is a partnership among the federal government, universities, and state/local governments that creates, through federal matching funds, considerable financial leverage and local participation.

Through integration of peer-reviewed research, outreach, and education, and by employing multi-disciplinary teams working with broad stakeholder participation, Sea Grant's infrastructure is a national resource that distinguishes it from most other federal programs. The result is a powerful mechanism for building capacity for 21st century challenges.

**Why Sea Grant in the 21st Century?**

Ecosystem-based management is well short of realization. Continued coastal degradation and urgent timelines demand appropriate action now. Recent reports from the National Council for Science and the Environment list the following elements for achieving sustainability: communities, stakeholders, science/technology, conflict resolution, timelines, cost, integration of science/society/governance, education, information dissemination, long-term focus, place-based activism, and collaborative governance. The recent report from the U.S. Commission on Ocean Policy contains similar language. The report specifically recommends that Sea Grant's role be expanded to address urgent capacity building needs, and the infrastructure is seen as an essential link to the academic community for applied research. Sea Grant provides the commitment and proven vehicle for the federal government to work with state and local governments, private industry, universities, organizations and individuals concerned with or impacted by our oceans, coasts and Great Lakes.

This plan identifies priorities and charts directions for NOAA Sea Grant for 2003-2008 in accordance with the imperatives identified above. It relies on both the NOAA strategic planning process and that of the 30 participating programs. The plan describes what Sea Grant does and will do for NOAA's mission and for the nation's welfare in the 21st century and beyond.

Ronald Baird
Director
NOAA Sea Grant

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**This strategic plan identifies priorities and directions for the National Sea Grant College Program for FY2003-2008 and beyond. The plan outlines how Sea Grant contributes to NOAA's mission goals, and describes the issues and opportunities that require Sea Grant attention in the 21st century. This strategic plan provides a framework for priority-setting, decision-making, and action by Sea Grant.**

## NOAA Sea Grant's Vision

Sea Grant will, in the 21st Century, serve as the nation's primary network to engage universities, governments, citizens, and industries in achieving the sustainable use of ocean, coastal and Great Lakes resources through integrated university-based programs of research, outreach, education, and technology assistance.

## NOAA Sea Grant's Mission

To enhance the sustainable use and conservation of ocean, coastal, and Great Lakes resources to benefit the economy and the environment.

## Major Strengths and Benefits of NOAA Sea Grant to the Nation

1. Mission Congruence: Sea Grant has a legislative mandate to address resource management issues within NOAA through strong university-based programs.

2. Continuity: Sea Grant provides the long-term infrastructure and resource base necessary for significant progress in sound science and ecosystem-based management.

3. Adaptability: Sea Grant is flexible and can adapt to a broad spectrum of local cultures, institutions of governance, and regional socio-economic conditions.

4. Efficacy: Sea Grant is a proven, effective network that combines research, education, and extension to provide real solutions to real challenges.

5. Engagement: Sea Grant has a long history of engaging disparate societal elements in order to accomplish its objectives.

6. Objectivity: Sea Grant is nonregulatory with a focus on scientific expertise; it serves as an "objective broker" of information to a wide range of constituencies.

7. Efficiency: Sea Grant's unique financial and flexible management structure provides leverage for quick resource deployment to high priority and emerging challenges.

8. Scope: Sea Grant is national in scope and yet locally implemented. Consequently, the Sea Grant network can engage the best scientific minds to address local, regional, and national problems.

9. Networked Organization: Sea Grant is a geographically diverse network of immense, collective scientific capability on the "cutting edge" of virtually every facet of coastal resource management.

10. Capacity Building: Sea Grant is a national leader in providing educational opportunities, promoting environmental literacy, and developing a highly trained workforce necessary to build our national capacity for sustainable ecosystem-based resource management.

## NOAA MISSION GOALS AND MISSION STRATEGIES

NOAA has adopted four overarching Mission Goals that will drive the organization from FY2003 through FY 2008 and beyond. These are described in detail in the NOAA Strategic Plan (http://www.spo.noaa.gov/strplan.htm ) and are listed below:

1. Protect, Restore, and Manage the Use of Coastal and Ocean Resources through Ecosystem-based Management
2. Understand Climate Variability and Change to Enhance Society's Ability to Plan and Respond
3. Serve Society's Needs for Weather and Water Information
4. Support the Nation's Commerce with Information for Safe, Efficient and Environmentally Sound Transportation

Each of the Mission Goals is organized on an outline of common Strategies. The strategies are:

***1. Monitor and Observe*** the land, sea, atmosphere, and space and create a data collection network to track Earth's changing systems.
***2. Understand and Describe*** how natural systems work together through investigation and interpretation of information.
***3. Assess and Predict*** the changes of natural systems and provide information about the future.
***4. Engage, Advise, and Inform*** individuals, partners, communities and industries to facilitate information flow, assure coordination and cooperation, and provide assistance in the use, evaluation, and application of information.
***5. Manage*** coastal and ocean resources to optimize benefits to the environment, economy, and public safety.

This plan outlines how NOAA Sea Grant contributes to the four NOAA Mission goals. The **Performance Measures** and **Measures of Success** included in this plan include those listed in the NOAA strategic plan to which Sea Grant contributes.

## NOAA SEA GRANT'S THEME AREAS AND NATIONAL PRIORITIES

Eleven Sea Grant thematic areas have been identified as critical areas of focus for sustainable resource management in the next decade. Investment of Sea Grant resources towards these themes will make a significant contribution nationwide. All are consistent with NOAA's mission and strategic plan, and are described below.

Sea Grant priority activities organized under these 11 thematic areas directly relate to one or more of the NOAA mission goals. Results from theme-based projects contribute to a national pool of cutting edge knowledge and capabilities. Each of Sea Grant's theme-based areas fits within one (or more) of the NOAA mission goals and strategies as indicated in the following matrix.

| **Matrix of Sea Grant Theme Areas and NOAA Mission Goals and Strategies** | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | **NOAA Sea Grant Theme Areas** | | | | | | | | | | |
| | Aquaculture | Biotechnology | Coastal Communities | Coastal Hazards | Digital Ocean | Ecosystems & Habitats | Fisheries | Urban Coasts | Marine Science Literacy | Seafood Science | Invasive Species |
| **NOAA Mission Goals** | | | | | | | | | | | |
| Ecosystems | √ | √ | √ | | √ | √ | √ | | cross-cutting NOAA priority | √ | √ |
| Climate | | | | √ | √ | | | | | | |
| Weather and Water | | | | | | | | | | | |
| Commerce and Transportation | | | | √ | √ | | | √ | | | √ |
| **NOAA Mission Strategies** | | | | | | | | | | | |
| Monitor and Observe | | | | | √ | √ | | | | | √ |
| Understand and Describe | √ | √ | √ | √ | √ | √ | √ | √ | | √ | √ |
| Assess and Predict | √ | √ | √ | √ | √ | √ | √ | √ | | √ | √ |
| Engage, Advise, and Inform | √ | √ | √ | √ | √ | √ | √ | √ | | √ | √ |
| Manage | √ | √ | | | | | √ | √ | | | √ |

The mission of each of the eleven Sea Grant Theme Areas is provided below. Detailed information about each Theme Area appears in the appendix including a listing of the NOAA Performance Measures to which each Theme Area contributes.

Sea Grant Theme Area #1: **AQUACULTURE**
http://www.seagrant.noaa.gov/themesnpa/pdf/aquaculture_main.pdf

The mission of the Aquaculture Theme Area is to identify the most pressing research needs in aquaculture related to the coastal, marine and Great Lakes waters of the United States, and to develop a research and outreach agenda aimed at prioritizing and addressing those needs.

Sea Grant will continue to be at the forefront of efforts to grow a sustainable U. S. marine aquaculture industry through an integrated program of research, education, and technology transfer that is focused on key scientific, engineering, environmental and socioeconomic issues that currently constrain this emerging industry.

Sea Grant Theme Area #2: **BIOTECHNOLOGY**
http://www.seagrant.noaa.gov/themesnpa/pdf/biotechnology_main.pdf

The mission of the Biotechnology Theme Area is to identify and catalyze research applying new marine biotechnologies to improve and protect human and environmental health in coastal America, and to create economic benefits nationwide by fostering the development of novel industrial processes and products.

Sea Grant will invest in biotechnology to catalyze advances in marine and coastal science. These investments will be coordinated with outreach and communication efforts designed to generate an understanding of the potential of marine biotechnology and develop links between scientists and stakeholders, including managers, industry, and the public.

Sea Grant Theme Area #3: **COASTAL COMMUNITIES & ECONOMIES**
http://www.seagrant.noaa.gov/themesnpa/pdf/coastalcomm_main.pdf

The mission of the Coastal Communities and Economies Theme Area is to design and implement comprehensive research and outreach programs promoting sustainable communities that achieve a complementary integration of economic, environmental, and social values.

Sea Grant research and outreach will provide coastal communities with the best available science-based information for sustainable community decision-making, coupled with the knowledge, experience and tools needed to bring diverse coastal interests together. The Sea Grant network will expand its efforts to

improve coastal community leadership and planning capabilities to jointly address economic, environmental, and social issues.

Sea Grant Theme Area #4: **COASTAL NATURAL HAZARDS**
http://www.seagrant.noaa.gov/themesnpa/pdf/coastalhazards_main.pdf

The mission of the Coastal Natural Hazards Theme Area is to identify the most pressing needs regarding coastal, marine, and Great Lakes natural hazards, and to develop and implement an integrated research and outreach agenda aimed at prioritizing and addressing those needs.

Risks associated with coastal natural hazards are compounded by sea level rise, land subsidence, unfamiliarity of coastal residents with local hazards, and an increasingly valuable building stock along the nation's coastline. These observations underscore the need for a dedicated national effort to reduce the economic, social, and environmental costs of natural hazards. Research and outreach programs are needed to help states and localities create an aware and prepared citizenry capable of employing the most effective means to reduce these risks.

Sea Grant Theme Area #5: **DIGITAL OCEAN**
http://www.seagrant.noaa.gov/themesnpa/pdf/digitaloceans_main.pdf

The mission of the Digital Ocean Theme Area is to build on work pioneered by Sea Grant to develop methods for creating digital representations, or models, of ocean resources and phenomena. By gathering, analyzing, and making data widely available, Sea Grant will help provide essential tools for ensuring the health and sustainability of our marine resources and economy.

Models will be created to enable the translation of chemical, biological, and physical data into tools that will help the Nation learn how best to use and tend its marine resources. The Digital Ocean Theme Area builds on work pioneered by Sea Grant in the areas of autonomous underwater vehicles (AUVs), modeling, mobile platforms, robots, sensors, and more. Sea Grant is also participating in the National Oceanographic Partnership Program's Ocean.US to develop an integrated and sustained ocean observing system for the United States. These existing technologies coupled with developing others to gather, analyze and make data widely available hold much promise.

Sea Grant Theme Area #6: **ECOSYSTEMS AND HABITATS**
http://www.seagrant.noaa.gov/themesnpa/pdf/ecosystems_main.pdf

The Ecosystems and Habitats Theme Area identifies priority actions to sustain and renew America's coastal and Great Lakes ecosystems and habitats for this and future generations. Sea Grant will draw upon the talents and expertise of researchers, educators and outreach specialists to identify the highest priority research, education, and extension needs for an expanded national effort in coastal ecosystems and habitats, and to transfer these findings to coastal stakeholders.

Sea Grant offers an integrated program of education, research, and technical assistance that promotes the judicious use of coastal resources. Sea Grant's interest in coastal ecosystems is primarily focused on two broad areas:

- minimizing the negative impacts of human-induced changes to coastal ecosystems, and
- developing and implementing methods of restoring damaged coastal habitats.

## Sea Grant Theme Area #7: **FISHERIES**

http://www.seagrant.noaa.gov/themesnpa/pdf/fisheries_main.pdf

The mission of the Fisheries Theme Area is to identify the most pressing research needs in fisheries science related to the coastal, marine, and Great Lakes waters of the United States and to develop a research and outreach agenda aimed at prioritizing and addressing those needs.

Many of our Nation's marine and Great Lakes fisheries are in trouble. Sea Grant researchers and outreach specialists are part of the solution--they identify, analyze and help solve problems in fisheries. Sea Grant has identified the following research and outreach actions as top priorities to revitalize and maintain our fisheries. Sea Grant will work on these problems in collaboration with NOAA Fisheries, state and regional fisheries agencies, and the recreational fishing sector.

## Sea Grant Theme Area #8: **MARINE AND AQUATIC SCIENCE LITERACY**

http://www.seagrant.noaa.gov/themesnpa/pdf/marineaqualit_main.pdf

The mission of the Marine and Aquatic Science Literacy Theme Area is to identify critical influences on marine and aquatic sciences literacy and to determine ways in which Sea Grant educators can effect the most positive change in support of a scientifically literate U. S. population.

Educating the 21st century workforce in marine and aquatic sciences is integral to both the educational and scientific missions of Sea Grant. Sea Grant educators provide valuable leadership in marine and aquatic science education

activities at the local, regional, and national levels throughout the U.S. Sea Grant's educational efforts contribute to improving marine and aquatic science literacy by facilitating the delivery of science-based information, programming, and resources to the formal and informal education communities.

Sea Grant Theme Area #9: **SEAFOOD SCIENCE & TECHNOLOGY**
http://www.seagrant.noaa.gov/themesnpa/pdf/seafoodtech_main.pdf

The mission of the Seafood Science and Technology Theme Area is to identify and initiate priority research, outreach, and education activities to ensure the global competitiveness of the U. S. seafood industry. Sea Grant seafood scientists and technologists are uniquely qualified to provide the research, education, extension, and technology transfer needed to help the seafood industry increase quality and safety, add value, lower costs, and expand seafood supplies and markets.

Sea Grant Theme Area #10: **URBAN COASTS**
http://www.seagrant.noaa.gov/themesnpa/pdf/urbancoasts_main.pdf

The mission of the Urban Coasts Theme Area is to identify the most pressing research needs related to urban coasts along U. S. marine and Great Lakes waters, and to develop a research and outreach agenda that prioritizes and addresses those needs.

Sea Grant combines research and outreach to help residents, business leaders, and government officials cope with urban issues in coastal settings. Sea Grant outreach facilitates the rapid transfer of research and new technologies valuable to densely populated coastal communities.

Sea Grant Theme Area #11: **INVASIVE SPECIES**
http://www.seagrant.noaa.gov/themesnpa/pdf/inv.spp.pdf

The mission of the Invasive Species Theme Area is to identify the research, education, outreach, and other activities necessary to meet the invasive species challenge, and to support the implementation of these activities by appropriate agencies, universities, and communities. Aquatic invasive species may constitute the largest single threat to our coastal ecosystem, our coastal economy and human health in the coastal region. All four coasts—East, West, Gulf and Great Lakes—and the majority of the interior of this country have been severely impacted by aquatic invasive species. Since 1990, an average of one new

invader has been entering the Great Lakes region annually and all other coasts are experiencing similar problems. The National Sea Grant College Program is unsurpassed in its efforts to address this problem.

The invasive species problem requires a breadth of scope that only Sea Grant can provide—research, education and outreach on all coasts; for all age groups; for government, private businesses and private citizens; and on issues ranging from biology to economics to the physical sciences. Research alone will not solve this problem, yet we must develop a better arsenal of weapons than currently exists, and ensure that these tools are available to those who need them.

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In addition to the 11 Theme Areas, the National Sea Grant College Program Act Amendments of 2002 identify and authorize three priority activities for fiscal years 2003 through 2008 (in addition to the general appropriation). These three priorities (Oyster Research and Restoration, Harmful Algal Blooms, and Enhanced Fisheries Extension) represent national issues and are incorporated into Sea Grant Theme Areas described above. NOAA Sea Grant's network-wide capabilities in research and development, education, extension, and outreach are intended to be focused on these issues. Projects related to or focused on these priorities are typically selected through annual national competitions.

## NOAA'S CROSS-CUTTING PRIORITIES

Six Cross-Cutting Priorities are identified in the NOAA Strategic Plan to support the NOAA mission goals. These priorities describe the programmatic and managerial underpinnings that facilitate NOAA's delivery of services and enable effective operations. Descriptions of Sea Grant engagement with each priority are provided below.

The NOAA cross-cutting priorities are:

NOAA Cross-Cutting Priority #1

### SOUND, RELIABLE, STATE-OF-THE-ART RESEARCH

Sea Grant is a national network embedded in the best research universities in the country. This enables Sea Grant to harness unparalleled intellectual capital to address problems and opportunities. Sea Grant can also use its network to help broker conversations between local interests and researchers to ensure that the most pressing applied research questions are addressed.

Sea Grant will continue to support high quality, peer-reviewed science directed toward resource management critical issues. One of Sea Grant's major strengths is that the research it supports can be directed on a rapid response schedule to address priority problems identified by NOAA, state government, constituents, and others. Sea Grant participates fully in NOAA's research enterprise, engaging in numerous matrix-managed programs including habitat restoration, coral reef research, ecosystem research, and other Administration priorities. Research supported by Sea Grant will advance the state of marine resource management, encourage the creation of new businesses, lead to innovative technologies, and improve our understanding of the coastal environment.

***NOAA measures of success to which Sea Grant contributes:***

- *Recognized high standards by researchers and decision makers for utility, objectivity, and integrity.*
- *Increased number of recognized new discoveries, findings, or applications.*
- *Increased accuracy in predictions and assessments.*
- *Increased interactions among NOAA researchers, operations, and resource managers to identify operational and policy needs.*
- *Increased use of models and assessments among scientists, economists, social scientists, operations, and ecosystem managers inside and outside NOAA.*
- *Increased transfer of NOAA models, forecasts, products, and services from research into operations and ecosystem management.*

- *Increased innovation and diversity of talent in NOAA-related research and development.*
- *Increased number of research students trained on NOAA-related research.*

NOAA Cross-Cutting Priority #2

## INTEGRATED GLOBAL ENVIRONMENTAL OBSERVATION AND DATA MANAGEMENT SYSTEM

NOAA will develop an Integrated Global Environmental Observation and Data Management System based on user requirements and an integrated architecture. Sea Grant will support and participate in technology research and development of an integrated and sustained ocean observing system.

***NOAA measures of success to which Sea Grant contributes:***

- *Decreased uncertainty in observational measures and elimination of observation gaps, redundancies, and losses to achieve better coverage, timeliness, and reliability, and maintainability of observations for users*
- *Increased number of partnerships that promote international cooperation in global observations and data management programs.*

NOAA Cross-Cutting Priority #3

## HOMELAND SECURITY

Sea Grant supports research in marine science and related environmental sciences issues. Using these results, researchers can develop models of ocean resources and phenomena. By gathering, analyzing, and making data widely available, Sea Grant will provide essential tools for ensuring the health and sustainability of our marine resources and economy in support of homeland security. In addition, aquaculture production and seafood processing within the Hazard Analysis Critical Control Point (HACCP) guidelines has the potential to contribute to food security,

***NOAA measures of success to which Sea Grant contributes:***

- *Increased forecast capabilities for atmospheric and waterborne dispersion*
- *Increased number of communities with improved capacity to respond to a terrorist-related incident using NOAA information and products.*

NOAA Cross-Cutting Priority #4

## ENVIRONMENTAL LITERACY, OUTREACH, AND EDUCATION

Sea Grant uses an integrated program of education, outreach, and technical assistance to link the high quality science-based information it develops with local management structures to provide real solutions to real problems. Sea Grant has longstanding relationships with a broad spectrum of constituents and stakeholders in every coastal state. The combination of a university-based program with a fully developed extension component means Sea Grant can identify issues as they emerge at the local level and bring the best scientific minds to bear on these problems. Sea Grant's extensive state/local network provides NOAA with valuable access to grassroots constituencies who can apply these science-based recommendations to those who need them. The efforts of Sea Grant educators, who work with K–12 educators to increase marine and aquatic sciences literacy and coastal environmental awareness, will assist and ultimately prepare the next generation of scientists and help create an environmentally literate public.

Sea Grant has many constituents, from state governments and coastal environmental managers, to local fishing industries and tourists. Sea Grant serves as a clearinghouse for the latest research results related to Great Lakes and marine sciences, and serves as a neutral broker on marine and Great Lakes issues. Sea Grant's wide range of programs ensures that all constituencies have access to information to help make policy and business decisions. Sea Grant provides educational briefings and seminars for federal and state policymakers, as well as for the public at large. Sea Grant helps local government officials, planners, and developers integrate scientific information into practical decision making in ways that promote sound land use and sustainable development. Sea Grant's extension programs provide technical assistance to the full spectrum of coastal dependent industries—aquaculture, marinas, commercial and recreational fishing—to help them with product and market development.

Sea Grant recruits, trains, and supports graduate students, postdoctoral students, scientists, and professionals. These individuals contribute a wealth of data, research findings, and applications that Sea Grant constituents can use to deal with economic and environmental challenges and opportunities in the coastal arena.

***NOAA measures of success to which this Theme Area contributes:***

- *Increased number and diversity of college students graduating each year in fields related to ocean, climate, atmospheric, and social sciences.*
- *Increased number of M.S. and Ph.D. level environmental scientists receiving degrees from minority-serving institutions.*

***Additional measures of success to which Sea Grant will contribute:***

- *Increased opportunities for interaction and collaboration among marine and aquatic scientists and educators.*
- *Increased number of educators who use Sea Grant's science-based educational materials in their teaching.*
- *Increased opportunities for pre-service educators to obtain training and/or teaching resources with marine and aquatic sciences content.*
- *Increased number of NOAA Sea Grant professionals serving as leaders or key partners in federally funded marine and aquatic sciences literacy grant programs (e.g., COSEE, National Oceanographic Partnership Program, Ocean Exploration).*
- *Increased participation with national efforts to identify key marine and aquatic sciences concepts for inclusion in teaching and in national standardized tests.*
- *Increased number of marine science professional development opportunities and resource materials offered to K–12 educators.*

NOAA Cross-Cutting Priority #5

## INTERNATIONAL COOPERATION AND COLLABORATION

The Sea Grant model, which couples university-based research with the transfer of science-based knowledge to user constituencies, has proven to be adaptable to a number of international infrastructures. Sea Grant will continue to develop new, and expand existing, strategic international partnerships with national and international organizations to promote programs in aquatic research and extension/outreach.

***NOAA measures of success to which Sea Grant contributes:***

- *Increased number of NOAA technical assistance initiatives and capacity-building transfers implemented.*
- *Increased number of organizational objectives achieved through multilateral conferences or bilateral relationships.*

NOAA Cross-Cutting Priority #6

## ORGANIZATIONAL EXCELLENCE: Leadership, Human Capital, Facilities, Information Technology, And Administrative Products And Services

The Sea Grant Program is both NOAA and university-based, giving it strong national and state/local foundations. There is considerable variety in the state/university location of Sea Grant Programs, with some programs located in an individual institution and some designed as true consortia.

Sea Grant gains strength from serving a diverse set of masters, but it is a challenge to bring the interests and priorities of these national, state, and local entities into alignment. Sea Grant allows for and encourages collaboration across its individual programs. There are geographic regional initiatives among programs, as well as "intellectual" regional initiatives on issues, where interest, not geographic location, is the common bond. This collaborative work is highly valued.

***NOAA measures of success to which Sea Grant contributes:***

- *Increased use of information technology to improve internal and external services.*
- *Improved customer satisfaction with administrative services (e.g., management of human resources, grants, procurement, and financial operations) as determined through customer surveys.*
- *Improved performance and accountability in management of administrative services, including financial and human resources, electronic government, competitive outsourcing, grants management, and budget and performance integration.*

## PARTNERSHIPS WITHIN NOAA

As with the NOAA Matrix Programs, Sea Grant will establish liaisons with all NOAA line offices. This will also enable the sharing of abilities and research results as well as provide opportunities to work collaboratively and synergistically. The Sea Grant liaisons will seek input on research and education priorities from their counterparts in NESDIS, NMFS, NOS, NWS, and OAR.

## ASSESSING NOAA SEA GRANT PERFORMANCE

In addition to the rigorous standards that NOAA requires of its programs, the Sea Grant network has a far-reaching evaluation process that relies upon annual reports and a program assessment (PA) conducted every four years by a team of external reviewers. There are 14 criteria within four general headings addressed in the PA. The headings and criteria are:

1. Organizing and Managing the Program
    a. Leadership of the program
    b. Institutional setting
    c. Project selection
    d. Recruiting talent
    e. Integrated program components
2. Connecting Sea Grant with Users

a. Engagement with appropriate user communities
b. Partnerships

3. Effective and Aggressive Long-Range Planning
    a. Strategic planning process
    b. Strategic plan quality
    c. Implementation plan
4. Producing Significant Results
    a. Contributions to science and technology
    b. Contributions to education and outreach
    c. Impact on society, the economy, and the environment
    d. Success in achieving planned program outcomes

Each criterion above has a Performance Benchmark and associated Performance Indicators. Based on material provided by the individual Sea Grant College Program and presentations/discussions conducted during the on-site PA, a consensus rating for each criterion is made by the PA team and a PA report is prepared. In the year following the PA, the National Sea Grant Office conducts a final evaluation of the program. The final evaluation relies heavily on the ratings, report, and recommendations of the PA.

## PATHWAY TO 2008 AND BEYOND: BUILDING ON NOAA SEA GRANT'S INFRASTRUCTURE AND LEADERSHIP

The Sea Grant network represents one of the Nation's most effective mechanisms for transferring objective, science-based information and technology on the sustainable use of marine resources, protection of coastal environments, and economic development of the coastal zone to a variety of constituencies.

Over the next five years, funding permitting, Sea Grant will embark on the following major improvements in products and services.

1. **Enhance Sea Grant's Research, Outreach, And Education Capabilities**. (Each of these three elements is critical to the success of Sea Grant activities, and it is the combination and integration of the three elements that makes Sea Grant unique.)

(a) Credible science is essential to inform public policy. Sea Grant research will continue to meet the needs of NOAA and the nation. Sea Grant-supported research is currently oversubscribed with only about 20% of the proposals funded. This has a detrimental effect on critical areas of science and constrains efforts on emerging issues and problems. Increasing the number, average grant size, and duration of research projects will enable Sea Grant to greatly enhance the benefits of its research portfolio. Funding in support of the traditional link between

research and education is critical in order to secure the next generation of scientists.

(b) Sea Grant's extension network is uniquely positioned to deliver science-based information to coastal constituents. At present, there are many geographic areas with only minimal coverage in terms of personnel and expertise. As problems grow more complex, many more specialists with diverse backgrounds will be needed.

(c) Sea Grant plays a leadership role in science education, outreach, and the promotion of environmental literacy. Opportunities to expand partnerships abound. Enhancing teacher training, improving access to curriculum materials, and enlarging fellowship programs are a priority for Sea Grant.

2. **Augment Regional Programs**. It is clear that many contemporary problems in coastal resource management involve multi-state or regional issues. There is a critical need for regional research planning and federal coordination at that level. Sea Grant has regional infrastructure well positioned to take a leadership role in cooperative regional efforts.

3. **Expand The Sea Grant Network**. The addition of new Sea Grant programs in geographic areas not currently served is envisioned in the authorizing legislation.

APPENDIX

Sea Grant Theme Area #1: **AQUACULTURE**
http://www.seagrant.noaa.gov/SG_Themes/aquaculture.pdf

*Priorities for NOAA Sea Grant action:*

**Culture system technology development**: Marine aquaculture operations will involve three distinct environments:

- the nearshore/coastal region;
- the Exclusive Economic Zone seafloor; and
- the open ocean surface and water column.

Utilization of each environment presents unique system engineering, technological and security challenges.

**Nutrition and feeds:** Research and development efforts will evaluate feed components in relation to:

- organism growth and final product quality,
- the stability of formulated rations, and
- alternative protein sources.

**Genetics of cultured species:** So that state-of-the-art genetic manipulations can be applied to marine species, research will identify gene complexes responsible for:

- reproduction,
- growth,
- disease resistance, and
- other desirable traits.

**Health and disease:** A better understanding of the immune systems of marine organisms and the potential for the production of vaccines in finfish and shellfish is required. A great need exists for:

- improved diagnostic capabilities for aquatic pathogens and parasites,
- new therapeutic treatments, and
- streamlining the approval process for applying therapeutics in aquaculture.

**Stock enhancement:** The potential for rebuilding collapsed wild fish stocks through the use of cultured fish will be fully explored, including a solid scientific understanding of the impacts of hatchery-produced fish.

**Public policy and law:** Agencies involved in developing, implementing and enforcing aquaculture policies will partner with environmental organizations, universities, industry and citizens in a comprehensive program to establish a viable coastal and offshore marine aquaculture industry based upon a sound understanding of the ecosystem, the economy and the particular needs of marine aquaculture. Using its access to university-based intellectual capital, plus its

strong links to coastal communities, Sea Grant will assemble expertise to address:

- conflicts among all users of coastal and marine resources potentially impacted by marine aquaculture;
- needs for environmentally sensitive and science-based regulation, including the careful siting, operation and monitoring of coastal and offshore facilities;
- uses of exotic species in aquaculture and protection from undesired introductions of these species into local waters;
- leasing requirements and fees for such new business ventures; and
- navigational considerations regarding existing shipping lanes and the needs of public security and safety.

**Socioeconomic Issues:** Marine aquaculture has been hampered by the lack of a coordinated effort among stakeholders to achieve successful commercial development in a socially and environmentally sensitive manner. Sea Grant will integrate expertise from universities, agencies and the private sector to:

- address scientific, engineering and socioeconomic needs;
- assess and propose technologies and practices to protect the environment;
- form partnerships with private industry to transfer technology, design market strategies and develop spin-off industries;
- provide marketing and technical expertise for new or prospective entrepreneurs, and;
- enhance scientific literacy in the nation's schools by using aquaculture as a teaching tool.

***NOAA Performance Measures to which this Theme Area contributes:***

- *Increased number of marine resources potentially available for commercial use (e.g., pharmaceuticals, aquaculture species for human uses).*
- *Increased ocean fisheries production through environmentally sound aquaculture technology*
- *Increased number of NOAA technologies and techniques that have been transferred for appropriate resource use and managed species conservation to state and local managers, as well as to the public.*

Sea Grant Theme Area #2: **BIOTECHNOLOGY**
http://www.seagrant.noaa.gov/SG_Themes/biotechnology.pdf

*Priorities for NOAA Sea Grant action:*

**Marine natural products:**

- The tools of molecular and cellular biology, chemistry, pharmacology and ecology will be used to discover, evaluate and possibly synthesize innovative natural products found in marine organisms.
- Attention will be focused upon unique coastal and marine environments, such as anaerobic regions of estuaries and lakes, deep-sea vents, coral reefs and arctic waters.
- Marshes, wetlands and even contaminant-stressed environments provide fertile grounds for novel organisms and their products.
- Projects will develop technologies to assure production of sufficient material for use as pharmaceuticals and in industrial applications.

**Biomolecular processes discovery:**

- Research focused on the unique mechanisms used by marine organisms to generate elaborate mineralized and biomolecular structures is essential.
- Understanding the emerging areas of chemical signaling and signal transduction are important to enhance our knowledge of bioluminescence, biofouling, biocorrosion, biofilm function and symbiosis.
- The results of such research will be used to develop antifouling and anticorrosion materials as well as create an understanding of how microbes colonize surfaces.

**Marine environmental biotechnology:** Sensitive and accurate means of predicting impacts of stressors on marine organisms are needed to strengthen indices of coastal ecosystem health.

- Sea Grant will encourage the development of: novel biosensors, genome-enabled technologies (such as microarrays) and their application to real-time monitoring technologies to complement engineering and remote sensing initiatives.
- Sea Grant will conduct research that will lead to the development of effective bioremediation strategies.
- These bioremediation strategies will be supported by the use of molecular biology as well as innovative green technologies that employ biological systems engineering focused upon remediating polluted sites.

**Marine resource management:** New tools to characterize various economically important species at the molecular-genetic level are essential for fisheries managers.

- Sea Grant will promote studies that identify larvae or provide fine-scale delineation of key stocks, and support applications of molecular techniques to help understand and quantify ecosystem processes.

- Sea Grant research will spur the identification and treatment of emerging diseases in economically important stocks and ecosystems, thus improving options available to resource managers.

**Seafood safety and processing:** The development of molecular assays for human pathogens and aquatic organisms is vital, as is research offering new ways to identify public health issues in seafood processing.

- Sea Grant will help scientists and others identify clear linkages between technology development and seafood safety guidelines.
- Sea Grant will promote the application of biological and biochemical technologies to develop value-added products and economically viable uses for wastes.

***NOAA Performance Measures to which this Theme Area contributes:***

- *Increased number of marine resources potentially available for commercial use (e.g., pharmaceuticals, aquaculture species for human uses).*
- *Shortened cycle times from research (government and academic) to operations (e.g., models, technology, and techniques) through the use of testbeds and other methods.*
- *Increased number of NOAA technologies and techniques that have been transferred for appropriate resource use and managed species conservation to state and local managers, as well as to the public.*

Sea Grant Theme Area #3: **COASTAL COMMUNITIES & ECONOMIES**
http://www.seagrant.noaa.gov/SG_Themes/coastal%20communities.pdf

*Priorities for NOAA Sea Grant action:*

**Strengthening coastal planning:**

- Sea Grant is building on its extensive science-based outreach experience to increase assistance to community officials and the coastal public in sustainable development, coastal growth management, land use planning, watershed planning and the socioeconomic and environmental problems associated with sprawl.
- This targeted assistance to coastal communities by Sea Grant is expected to result in community revitalization, implementation of growth management strategies, and the protection and restoration of coastal resources.

**Resource valuation:** Sound coastal planning requires the systematic valuation of coastal resources and amenities, often understood broadly as natural capital.

- Sustainable coastal ecosystems provide a variety of goods and services, including fisheries, recreation, waste assimilation, erosion and flood control, and biological diversity.
- Placing an economic value on natural capital will be a critical component of coastal planning.
- Sea Grant will help communities examine their natural resources and support research to quantify economic values derived from coastal natural resources.

**Constructing indicators of sustainable development:**

- Planners and decision makers need an integrated set of economic, environmental and social indicators that track progress toward achieving the goal of sustainable coastal development.
- Sea Grant is committed to working with coastal communities to assist them in developing indicators that represent key components of their sustainable development strategies.

**Educating coastal planners:**

- Sea Grant will focus on expanding scientific understanding of the function, biodiversity and economic importance of our coasts.
- Sea Grant is working to transfer this rapidly growing body of knowledge to coastal decision makers and to train coastal leaders in the use of science-based tools for improved management of coastal and estuarine areas.

**Building leadership:**

- Sea Grant is training community planners, business leaders and citizens to use science-based tools more effectively in the decision making process.
- Sea Grant is building the capacity of leaders in government, industry and academia to understand the economic and environmental consequences of their choices in land use, energy and water use, and coastal building design.

**Developing decision support systems:**

- Sea Grant will continue to provide decision-support tools to help decision makers utilize the vast array of information available to communities.
- In tourism-dependent communities, decision support systems and education programs are critical to Sea Grant's efforts to help the marine trades industry manage boat-congested waterways, design small-harbor dredging strategies, and maintain a quality recreational environment.

**Revitalizing communities:** Smaller coastal communities have endured declines in their economic bases, especially in such resource-dependent industries as fisheries. Coastal communities have also had to adapt to complex environmental regulation.

- Sea Grant will work to help communities make smart choices that unite economic development with protection of the quality of coastal life.
- Sea Grant's tourism program will help communities develop tourism and nature-based recreation to offset economic declines in other areas.

***NOAA Performance Measures to which this Theme Area contributes:***

- *Increased percentage of coastal communities and coastal inhabitants aware of, and acting appropriately to minimize, their impacts on coastal, ocean, and Great Lakes resources.*
- *Increased number of new instances where NOAA information is integrated into decision-support and management systems, including fishery management plans.*
- *Increased user satisfaction, determined through surveys.*
- *Increased number of impacted communities where sufficient data exist to analyze and understand the economic and social benefits, costs, and impacts of management decisions.*

## Sea Grant Theme Area #4: **COASTAL NATURAL HAZARDS**

http://www.seagrant.noaa.gov/SG_Themes/hazards.pdf

*Priorities for NOAA Sea Grant action:*

**Reducing the loss of life and property:** Sea Grant is united in this priority with many public and private interests, including NOAA's National Ocean Service and National Weather Service, the Federal Emergency Management Agency, U. S. Geological Survey, the Institute for Business and Home Safety, and the U. S. Army Corps of Engineers. Overall, Sea Grant will foster efforts to:

- create new technologies for remediation and disaster prevention;
- develop methodologies and techniques for risk assessment and cost-benefit analysis;
- generate methods for restoration of natural habitats (e. g., barrier islands, dunes, beaches, marshes) that play an important role in minimizing damage from coastal hazards;
- maintain a clearinghouse of university-generated information on coastal hazard events and mitigation strategies;
- transfer information and technologies to coastal constituents on the predicted risks, expected impacts and effective methods for pre-event preparation and post-event recovery;
- develop and transfer economic evaluation techniques to state and local officials seeking to develop more effective mitigation, evacuation and recovery plans; and
- enhance rip current forecast methods and raise public awareness of rip current dangers by providing a uniform, national level public safety message to reduce the number of drownings.

**Weather-related hazards:** Sea Grant will support efforts to:

- o develop hazard-resistant retrofit alternatives for existing buildings and structures;
- o evaluate and improve mitigation tools and techniques related to building construction and land use;
- o develop, refine and demonstrate community risk and vulnerability assessment methods and standards, leading to improved methods for cost-benefit analysis for use by local officials;
- o provide information for use in developing more effective building codes, and
- o improve hurricane management for ports and harbors.

**Earthquakes and tsunamis:** Sea Grant, through public and private partnerships, will:

- o reconstruct historical earthquake/tsunami events and impacts through examination of the geological record;
- o contribute to more timely and accurate tsunami warnings and prediction of post-event flooding potential;
- o evaluate potential economic, social and environmental impacts and costs of earthquakes, tsunamis and other co-seismic hazards, and of evacuation and recovery strategies, and
- o develop tools to assist port and harbor communities in assessing earthquake/tsunami risk, vulnerability, and mitigation options.

**Shoreline change:** Sea Grant activities will:

- o improve shoreline mapping and coastal change analysis methodologies;
- o document and evaluate the influence of the regional and local geological framework on current sedimentary processes;
- o examine beach and coastal ocean processes, particularly to establish sand budgets;
- o identify and evaluate sustainable erosion control techniques and technologies that take into account environmental considerations;
- o improve understanding and assessments of the relationship between shoreline change and environmental effects, and
- o assist local governments and developers in incorporating water availability limitations, erosion rates and setbacks, and coastal building codes into development activities.

***NOAA Performance Measures to which this Theme Area contributes:***

- *Increased volume of NOAA climate data and information used.*
- *Increased number of new instances where NOAA information is integrated into decision-support and management systems, including fishery management plans.*
- *Increased use of observation data for verification of and assimilated into weather, ocean, water, and climate prediction models.*

- *Increased number of communities with plans in place to act on weather warnings and to reduce the impacts of coastal hazards*

Sea Grant Theme Area #5: **DIGITAL OCEAN**
http://www.seagrant.noaa.gov/SG_Themes/digital%20oceans.pdf

*Priorities for NOAA Sea Grant action:*

**Focusing on coastal areas:**
- Sea Grant's success with the Autonomous Ocean Sampling Network demonstrates that a network of AUVs working with distributed acoustic and point sensors can achieve spatially adaptive sampling.
- Tools will be developed by Sea Grant to assimilate data from distributed observatories, or even individual networked ocean sensors. Assimilated data will be connected with various existing computer models of ocean processes.

**Preparing for extreme events:**
- One of the most exciting anticipated applications of the Digital Ocean Theme Area is in the monitoring and models for extreme events, particularly hurricanes.
- Ocean-based hurricane observation systems will greatly increase forecasting abilities and significantly decrease human fatalities and economic losses worldwide.
- The coupled nature of the ocean and the atmosphere provides further rationale for increasing the ocean-based study of hurricanes.

**Passive acoustics in fisheries:**
- Because of their non-invasive nature, passive acoustic technologies hold special promise in helping to resolve many current fisheries issues.
- Passive acoustics offers a unique tool for studying fishes, which often live in dark and turbid waters, and are difficult to observe by other means.
- Passive acoustic techniques will be used to locate concentrations of particular species, especially during their vulnerable spawning period.
- In turn, spawning habitat will be identified, mapped and protected and fish numbers accurately assessed.
- Passive acoustics can also be used to gain a better understanding of fish behavior, including migration patterns.
- These techniques will be used simultaneously to monitor sources of noise pollution and evaluate the impact of human activities on marine communities.

**Supporting offshore industry:**

- The trend toward subsea wells illustrates industry expansion into deepwater and suggests the timeliness of supporting deepwater oil exploration, maintenance, and safety.
- Two specific applications in this area include exploration and survey, and inspection and intervention.
- With improved AUV endurance and telemetry capabilities, researchers will deploy a small fleet of survey vehicles from one support ship and collect data more efficiently.
- Such data will be funneled into a comprehensive Digital Ocean database that the offshore oil industry can use to make critical decisions on pipeline routes and platform locations, providing increased safety, decreased environmental impact, and substantial cost savings.
- In the area of inspection and intervention, important technologies will be sensors, telemetry, and management and control software focused on the region immediately surrounding an offshore structure or pipeline.

***NOAA Performance Measures to which this Theme Area contributes:***

- *Increased area covered and number of ecological conditions monitored by state-of-the-art observation systems and platforms that provide necessary information for NOAA's stewardship responsibilities.*
- *Increased number of long-term observations collected, archived, available, and accessible where random errors and time-dependent biases have been assessed and minimized.*
- *Increased number, accuracy, and regional specificity of U.S. climate, water, and coastal resource products.*
- *Improved effectiveness of NOAA's observing systems.*

Sea Grant Theme Area #6: **ECOSYSTEMS AND HABITATS**
http://www.seagrant.noaa.gov/SG_Themes/ecosystems.pdf

*Priorities for NOAA Sea Grant action:*

**Reducing stresses on coastal ecosystems:** Sea Grant will continue to be a leader in research and outreach dealing with:

- public health and economic impacts of *Pfiesteria*, brown tides, and other harmful algal blooms;
- the root causes of the Gulf of Mexico Dead Zone;
- the impacts of metropolitan sewage outflows on coastal waters; and
- the causes and effects of toxic chemical contamination of oysters, mussels, and Great Lakes fishes.

**Coastal watersheds:**

- Human uses of land and water upland from the coast play major roles in determining the quality of coastal ecosystems and habitats.
- Effective management of coastal ecosystems requires a better understanding of the complex set of mechanisms and pathways by which upland activities influence coastal waters.
- Sea Grant will continue to develop integrated watershed approaches that engage researchers and coastal communities throughout the United States to pursue the common goal of sustainable watersheds.
- Sea Grant is developing science-based information needed to predict changes in coastal ecosystems and habitats arising from land and water use in watersheds.
- Sea Grant has developed innovative applications of remote sensing, Geographic Information Systems, and other novel technologies needed for a comprehensive national system to monitor and predict impacts in coastal watersheds. Sea Grant will continue to lead the transfer of these technologies to local communities.

**Conserving and restoring coastal habitats:**

- Sea Grant empowers coastal communities to undertake well-planned coastal development that preserves and helps restore coastal habitats.
- Sea Grant partners with private and public entities to promote wetlands banking, rehabilitate brownfields, stabilize and restore beaches, establish marine protected areas and use dredged materials to enhance fish and wildlife habitat.

***NOAA Performance Measures to which this Theme Area contributes:***

- *Increased number of regional ecosystems identified and monitored with agreed-to indicators of ecosystem health*
- *Increased number of ecosystems where ecological functions and linkage to human activities and impacts are adequately understood for management purposes*
- *Increased number of models linking climate/weather/atmosphere with ecosystem/hydrology made operational to assess and predict natural and human-induced changes in the coastal and ocean environment.*
- *Increased coastal, ocean and Great Lakes areas explored, mapped, characterized, and inventoried.*
- *Increased number of impacted human communities where sufficient data exist to analyze and understand the economic and social benefits, costs, and impacts of management decisions.*
- *Increased number of techniques and tools that can be used to restore and protect ocean, coastal and Great Lakes resources.*
- *Development of viable alternatives to ballast water exchange to prevent the introduction of exotic species to U.S. coastal waters.*

- *Increased number of invasive species under control.*

Sea Grant Theme Area #7: **FISHERIES**
http://www.seagrant.noaa.gov/SG_Themes/fisheries.pdf

*Priorities for NOAA Sea Grant action:*

**Partnering to improve fisheries management:**
- Sea Grant will promote cooperative research on subjects critical to decisions being made by fisheries managers.
- Topics will include stock assessment, habitat and ecosystem health, environmental contamination, area management strategies, fish biology and behavior, climate change, management institutions, and conflict resolution.

**Caring for people**:
- Fisheries managers must understand how their decisions might affect people who depend on fishery resources. When changes affect people, it is equally important to help them cope.
- Working cooperatively with government agencies and stakeholders, Sea Grant will provide fisheries managers with the socioeconomic data and insight into social and management institutions that are necessary to manage fisheries in a way that minimizes the negative effects their decisions will have on fishers and fishing communities.
- Through career training guidance, outreach personnel will help people adjust to changes that profoundly affect their lives.

**Better understanding of fish biology and behavior:** Sea Grant researchers and outreach specialists will work with fishermen and other concerned parties to:
- test new sampling technologies and pioneer analytical procedures that will lead to more accurate estimates of distribution and abundance of fish and invertebrates, and
- broaden understanding of how the animals interact with their environments and what habitats are best for different species, and how changes in the environment affect fisheries.

**Balancing needs with technology:**
- Through well-informed decision-making, fisheries managers will strive to conserve stocks, reduce waste, and extract more value from the harvest.
- Sea Grant scientists and outreach specialists will work with fishermen and managers to invent tools and techniques that reduce unintentional capture of sea life during fishing activities and develop new seafood products from target species to maximize value and yield, and reduce waste.

- Sea Grant also will conduct research to discover how fishing gear affects habitat.

**Predicting effects:**

- Sea Grant researchers will partner with government scientists to develop techniques to detect and forecast climate and ecosystem (regime) changes that occur in ocean basins over decades. They will examine how these changes affect all levels of sea life, from marine bacteria at the bottom of the food chain, to marine mammals near the top of the food chain.
- Sea Grant researchers will construct ecosystem models to improve Great Lakes management techniques; develop strategies to deal with aquatic nuisance species; monitor and mitigate effects of contaminants and educate the public about them; and assess and identify ways to prevent loss of habitat.

***NOAA Performance Measures to which this Theme Area contributes:***

- *Increased number and accuracy of models to understand and predict the interactions of species and their environment.*
- *Increased number of fish species where the biological and ecological factors related to population abundance are adequately understood for management purposes.*
- *Increased number of fish species whose habitat or other environmental conditions are adequately understood for management purposes.*
- *Increased number or adequacy of techniques and tools that can be used to restore and conserve fish species.*

Sea Grant Theme Area #8: **MARINE AND AQUATIC SCIENCE LITERACY**
http://www.seagrant.noaa.gov/SG_Themes/education%20.pdf

*Priorities for NOAA Sea Grant action:*

**Create and sustain effective marine and aquatic science-based educational programs:**

- Sea Grant will develop, offer, and evaluate new and existing programs that increase public knowledge and understanding of scientific processes and marine and aquatic sciences issues.
- Effective programs—and lessons learned—will be made available to all formal and informal constituencies.
- Diverse instructional strategies will facilitate effective programs that complement and align with appropriate education standards. Programs should include collaboration with the science research community.

**Cultivate Sea Grant leadership in marine and aquatic sciences education communities:**

- Sea Grant representatives will make their voices heard and perspectives known on national and local science education initiatives in the promotion and support of effective ongoing and new marine and aquatic sciences education programming.

**Support the use of marine and aquatic sciences content and examples in science and mathematics teaching and standardized testing:**

- Sea Grant will support national efforts, led by organizations such as the National Marine Educators Association (NMEA) and the Centers for Ocean Science Education Excellence (COSEE) Network to strengthen science education by defining marine and aquatic sciences literacy concepts and establishing linkages between these concepts and the National Science Education Standards (NSES) and state science education standards or benchmarks.
- Sea Grant will make every effort to influence the content on national and statewide standardized science testing to increase the number and improve the types of items relating to marine and aquatic sciences presented on these tests.

**Expand professional development opportunities for all educators:**

- Sea Grant will continue to provide exemplary marine and aquatic sciences professional development opportunities for pre-service and in-service teachers and other education professionals. These opportunities will prepare educators to better teach marine and aquatic sciences and will help them meet accountability requirements (including assessment, licensure, standards, and evaluation).

**Engage underrepresented populations in Sea Grant efforts:**

- Sea Grant will provide programming and opportunities specifically targeted toward local constituencies who have been historically underrepresented in the marine and aquatic sciences.

***NOAA measures of success to which this Theme Area contributes:***

- *Increased number and diversity of college students graduating each year in fields related to ocean, climate, atmospheric, and social sciences.*
- *Increased number of M.S. and Ph.D. level environmental scientists receiving degrees from minority-serving institutions.*

***Additional measures of success to which Sea Grant will contribute:***

- *Increased opportunities for interaction and collaboration among marine and aquatic scientists and educators.*

- *Increased number of educators who use Sea Grant's science-based educational materials in their teaching.*
- *Increased opportunities for pre-service teachers to obtain training and/or teaching resources with marine and aquatic sciences content.*
- *Increased number of NOAA Sea Grant professionals serving as leaders or key partners in federally funded marine and aquatic sciences literacy grant programs (e.g., COSEE, National Oceanographic Partnership Program, Ocean Exploration).*
- *Increased participation with national efforts to identify key marine and aquatic sciences concepts for inclusion in teaching and in national standardized tests.*
- *Increased number of marine science professional development opportunities and resource materials offered to K–12 educators.*

Sea Grant Theme Area #9: **SEAFOOD SCIENCE & TECHNOLOGY**
http://www.seagrant.noaa.gov/SG_Themes/seafood%20tech.pdf

*Priorities for NOAA Sea Grant action:*

**Ensuring seafood safety:**
- Sea Grant will help the industry to improve its use of innovative processing technologies, such as microwave, ohmic and inductive heating; pulsed electric field; e-beam radiation; ultraviolet and pulsed light, and ultrasound treatments.
- Sea Grant will seek improvements in many conventional technologies, such as depuration, hot-water pasteurization, anti-microbial additives and treatments, traditional thermal processes, and reduced-oxygen packaging.

**Ensuring seafood quality:** Sea Grant will assist the seafood processing industry in:
- developing new technologies to enhance quality, detect decomposition, and extend product shelf life at minimal additional cost, and
- improving quality-control techniques and enhancing the ability to trace seafood through the distribution chain.

**Improving processing technology:** Sea Grant will assist the seafood processing industry in:
- addressing the problem of solid waste disposal by developing enzymatic and microbial methods of hydrolysate manufacture for feed and fertilizer production, and
- improving manufacturing methods and uses of dried meals.

**Expanding supplies and markets:** New communication technologies, such as videoconferencing and the Internet, will be pursued in order to provide the means for Sea Grant to expand scientific exchange programs to benefit the U. S. seafood processing industry and consumers.

***NOAA Performance Measures to which this Theme Area contributes:***

- *Shortened cycle times from research (government and academic) to operations (e.g., models, technology, and techniques) through the use of testbeds and other methods.*
- *Increased number of NOAA technologies and techniques that have been transferred for appropriate resource use and managed species conservation to state and local managers, as well as to the public.*

Sea Grant Theme Area #10: **URBAN COASTS**
http://www.seagrant.noaa.gov/SG_Themes/urban%20coasts.pdf

*Priorities for NOAA Sea Grant action:*

**Reducing nonpoint-source pollution:**

- Sea Grant uses credible scientific information to encourage cooperation within watersheds among business/ industry leaders, local government officials, and landowners, enabling them to collaborate on comprehensive strategies to reduce runoff.
- Models to assess the impacts and effectiveness of proposed mitigation efforts will be developed by Sea Grant.

**Enhancing port and harbor operations:**

- Sea Grant will continue to assess the risks of contaminants in dredged materials and identify disposal options.
- To improve infrastructure while preserving coastal resources, Sea Grant scientists are evaluating marine ecology and water quality in major urban ports to assess cumulative effects.

**Managing coastal operations:** Environmental policymakers and resource managers nationwide face increasing conflicts over existing and proposed uses of limited space and resources in coastal zones; Sea Grant will provide accurate, unbiased scientific data to help them prioritize the allocation of these scarce resources.

***NOAA Performance Measures to which this Theme Area contributes:***

- *Increased number of ports with plans, procedures, policies, and best management practices that minimize the environmental consequences of port operations and development.*

Sea Grant Theme Area #11: **INVASIVE SPECIES**
http://www.sga.seagrant.org/pdf/tt_invasive.pdf

*Priorities for NOAA Sea Grant action:*

**Invasive species:**

- A major threat to the health and survival of all coastal ecosystems arises from the introduction of exotic species via the ballast water of ocean-going ships; intentional and accidental releases of aquaculture species, aquarium specimens or bait, and other means.
- With respect to aquatic nuisance species that are transported from one region to another when ships take on ballast water in one port and discharge in another, Sea Grant research and outreach efforts are developing education and remediation strategies for this worldwide problem.
- Sea Grant will continue to respond to these threats with integrated, multi-state programs of research, outreach and education.

***NOAA Performance Measures to which this Theme Area contributes:***

- *Increased number of NOAA technologies and techniques that have been transferred for appropriate resource use and managed species conservation to state and local managers, as well as to the public.*
- *Increased number of invasive species under control.*
- *Development of viable alternatives to ballast water exchange to prevent the introduction of exotic species to U.S. coastal waters.*