

Implementing the Sea Grant Network Plan 1995 - 2005

*A Guide for Developing Implementation Plans
for Institutional Sea Grant Programs*

July 1996



National Sea Grant College Program

THE PROGRAM

SEA GRANT is a partnership of academia, government and industry focusing on coastal, Great Lakes and marine resources. It operates through a university-based network to meet environmental and economic needs.

THE MISSION

SEA GRANT conducts Research, Education and Outreach to use and conserve coastal, Great Lakes and marine resources for a sustainable economy and environment.

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INTRODUCTION

The Sea Grant Strategic Plan Implementation Committee assembled and reviewed all of the reports resulting from the Sea Grant Week '95 planning meeting in Puerto Rico and met in December 1995 in Washington, D.C., to craft an implementation plan that it hoped would be of use to everyone in the Sea Grant Network — individual Sea Grant programs, the National Sea Grant Office (NSGO) and the National Review Panel.

Prior to Sea Grant Week '95, the Sea Grant community received documents that contained background information for implementation planning and were divided into subcommittees that addressed four areas of interest: Economic Leadership, Coastal Ecosystem Health and Public Safety, Education and Human Resources, and Sea Grant in the 21st Century. These areas of interest basically followed those that previously had been presented in *Sea Grant's Strategic Plan 1995-2005* (April 1995 draft) and subsequently were published as the *Sea Grant Network Plan 1995-2005* (see outline summary on pp. x-xi). Each subcommittee was then asked to submit its recommendations to the Strategic Plan Implementation Committee for integration into a single document.

After considerable discussion, the committee decided that it would be impractical to write an implementation plan for the entire network, particularly one based on its discussions and documents from the Puerto Rico meeting. To effectively represent all Sea Grant programs, such a document would have to be very broad in its coverage; a resulting plan would also most likely be of limited value to everyone.

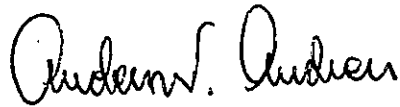
We also felt that it was presumptuous for the committee to prescribe implementation elements that were very important to a particular program, yet of only local or regional interest. Such plans are best developed either at the individual program level, or regionally.

The committee did feel strongly, however, that it would be desirable for every program to develop an implementation plan. We also felt that a reasonably uniform approach by all programs, as well as for the NSGO, would be desirable. These implementation plans are meant to serve as a management tool for each program, as a means of planning cooperative ventures among programs and as a framework for the NSGO to assist in the coordination of activities among the national programs. Furthermore, the NSGO could then use these plans, together with the research subcommittee in the new Sea Grant Association structure, to develop new initiatives.

With these caveats in mind, the committee developed a set of guiding principles and an implementation plan outline that provides a framework for each program to use in its planning activities. The intended audiences include: (1) individual Sea Grant programs; (2) the National Oceanographic and Atmospheric Administration (NOAA), specifically the NSGO and NOAA's Office of Oceanic and Atmospheric Research; (3) the Sea Grant network and other Sea Grant partners; (4) other science agencies; and (5) Sea Grant constituency groups.

I extend my personal thanks to everyone who participated at Sea Grant Week '95 and helped to shape and formulate this implementation plan, and to the Wisconsin Sea Grant Communications staff for producing this document for us.

In closing, I'd like to emphasize that the intent of the committee was that this implementation plan outline should serve only as a framework — clearly, each individual program may add its own “spin” in developing a plan. I hope this outline will assist all of us as we plan for the 21st century.



Anders W. Andren
Chair, Strategic Plan Implementation Committee

GUIDING PRINCIPLES

- Implementation of the national strategic plan at the program level is an institutional Sea Grant responsibility. Therefore, implementation plans must be prepared and promulgated by each institution. Each program will have its mix of local, regional and national priorities.
- Sea Grant is a science-based, issue-oriented program. Therefore, each implementation plan, based on good strategic planning, must integrate policy, planning, outreach, research, education and management.
- Strategy must be translated to action in a priority-directed fashion.
- Each program must develop how, what, when and who shall be the players in the implementation of its plan.
- Each program needs to establish mechanisms for allowing creativity and imagination to rise up from its institutional faculty.

In developing implementation plans, it is important to:

- Demonstrate mechanisms for achieving objectives.
- Develop mechanisms for program evaluation.
- Set goals and objectives — and to discern the difference between these.
- Make maximum use of resources.
- Provide guidelines, not directions.

OUTLINE FOR INSTITUTIONAL SEA GRANT PROGRAM IMPLEMENTATION PLANS

I. Review of Institutional Strategic Plan in Context of the NOAA and National Sea Grant College Program (NSGCP) Strategic Plans

1. Describe the mechanisms for establishing program strategic planning.
2. Detail how the program strategic plan relates to NSGCP plan.
3. Show the context of institutional and territorial characteristics.
4. Explain the involvement of all levels of faculty, staff and constituents.

II. Development of Implementation Plan

1. Describe the process for selection of priorities (how, who and when).
2. Identify milestones for implementation of priorities.
3. Identify program elements and personnel needed.
4. Show the time frame for implementation.

III. Implementation of the Program

1. Identify program elements and their context.
2. Show how program elements will be integrated.
3. Describe how the program will move toward implementation.
4. Describe the evaluation process and how it will measure success or the lack thereof.
5. Describe the degree of interaction and integration with other programs (both outside and inside the network).

IV. Review, Revision and Returns

1. Describe the timing and mechanisms for review of program's progress and results.
2. Describe the mechanisms for revising the program during the implementation phase.
3. Show how the results will be synthesized, packaged and disseminated.

V. Nationalization of the Implementation Plan

1. Identify the elements that have national and regional application.
2. Relate the implementation plans to national needs and show how it reaches users.
3. Suggest national or regional efforts to implement results.

OUTLINE FOR NATIONAL IMPLEMENTATION MECHANISMS

I. Identify Priorities

1. Sort and compare institutional implementation plans.
2. Determine the points of commonality.
3. Agree on priorities.
4. Develop mechanisms for reaching consensus.

II. Development of Plan for Establishing National Initiatives

1. Establish national target issues for priority attention.
2. Establish an outside review committee to evaluate the priorities. (Such a committee might include national science, policy and technology leaders, and senior scientists from other agencies).
3. Work with review committee to establish priority targets.

SEA GRANT NETWORK PLAN 1995-2005

The National Sea Grant College Program strategic plan for the next decade includes the following vision statements and areas of emphasis:

ECONOMIC LEADERSHIP

The National Sea Grant College Program's investment in the nation's future will stimulate a stream of scientific knowledge and new technology that will strengthen U.S. leadership in ocean and marine-related industries and enhance the social and economic well-being of coastal communities.

Advanced Technology for Commercial Products and Processes

- Commercial Biotechnology
- Environmental Technology

Seafood Production

- Revitalize Commercial Fisheries
- Develop Sustainable U.S. Aquaculture
- Advances in Seafood Technology

Coastal Economic Development

- Coastal Business Development
- Coastal Community Development
- Revitalizing Marine Infrastructure

COASTAL ECOSYSTEM HEALTH AND PUBLIC SAFETY

This vision includes: (1) healthier coastal and Great Lakes ecosystems through greatly improved water quality; (2) increased high-quality habitats for living marine resources; (3) a prosperous and growing seafood production and processing sector operating in harmony with the coastal environment; and (4) the complete integration of the physical and biological sciences with economics and the social sciences in the development of resource management policies.

Coastal Ecosystem Health

- Coastal Ecosystems
- Coastal and Great Lakes Habitat
- Sustainable Development

Public Safety

- Coastal Hazards
- Safety at Sea

EDUCATION AND HUMAN RESOURCES

Sea Grant visualizes a higher quality of life by developing an informed citizenry and producing highly qualified professionals. Cultivation of marine environmental awareness and expertise in the nation's work force will facilitate integration of environmental criteria into engineering and business decisions and support diffusion of environmental technologies. Directed flow of research-based information is central to innovation and sustainable development.

A Highly Trained Workforce

- Scientists and Engineers
- Resource Managers
- Technical Training

Environmentally and Scientifically Informed Citizens

- Formal Pre-College Education
- Informal Education

ECONOMIC LEADERSHIP

“The National Sea Grant College Program’s strategies for economic leadership will help contribute to a robust and growing economy, sustainable coastal communities ... and a stream of goods and services based on the development and application of advanced technologies.”

ECONOMIC LEADERSHIP

Sea Grant envisions that the application of advanced technologies, including biotechnology, to the development of products and processes for medical, industrial and environmental applications will result in an expanded economy, improved public health and a cleaner environment. Sea Grant's mission, as expressed in its authorizing legislation, is to increase the understanding, assessment, development, utilization and conservation of the nation's coastal, ocean and Great Lakes resources. Sea Grant accomplishes its mission by utilizing the nation's university-based research, education and outreach capabilities.

THE CHALLENGE

The goal of the National Sea Grant College Program is to focus the talents and resources of the nation's university-based marine and coastal research, education and outreach capabilities on the problem of applying advanced technologies to enhance economic growth and development while maintaining and improving the health of the coastal environment. The challenge is to integrate these university-based Sea Grant programs with those of the National Oceanic and Atmospheric Administration (NOAA), other federal agencies, state and local governments, and the private sector so that results of the Sea Grant effort are rapidly and effectively transferred to the appropriate users.

THE SETTING

There are critical needs for information and improved human resources capabilities to further develop the marine sector of the national economy and to strengthen coastal community infrastructures. Some appropriate "problems" are:

- Over the last few years, molecular biology and genetic engineering have made enormous contributions to modern biotechnology, to economic development and to human well-being. Traditional biotechnologies are becoming major sectors of the economy. A very large portion of the growth potential lies in the great biodiversity harbored in the marine environment. The economic and public health benefits of pharmaceuticals, pesticides, hormones, enzymes and polymers derived from marine organisms hold great potential and are largely unexploited.
- Solving major problems in effective monitoring, pollution control and pollution remediation requires new environmental technologies. New instrumentation technology, robotics and satellite sensing/Geographic Information Systems (GIS) have the potential to provide cost-effective assessment and monitoring capabilities.
- The nation faces an enormous challenge in remediating its many contaminated areas. A strong need exists for the development of effective remediation technology focused on coastal and Great lakes waters and sediments.

- Seafood and aquaculture industries are having difficulty complying with regulations that present formidable barriers to the initiation of new businesses. These regulations threaten the viability and hinder the expansion of existing seafood processing and aquaculture firms.
- The nation's seafood industry is a complex enterprise made up of capture fisheries. The industry faces great constraints due to declining fisheries, expanding regulations and increased international competition.
- Consumer demand for seafood is at a record high and increasing. The seafood industry needs innovative methods to assure the safety and quality of its products and to compete in global markets. It needs better technology to face escalating costs from waste disposal and the requirements to meet increasingly stringent standards.
- The United States must look to aquaculture to enhance supplies of high-quality seafood. To prosper, fish farming will need new and advanced technology.
- Coastal areas are the most densely populated areas in the United States: more than half of the nation's population lives on 11 percent of the land. Traditional coastal industries are very significant economically. As large as this economic sector may be, the intangible benefits derived from coastal resources, aesthetics and environmental quality are highly prized. If the idea of sustainable economic development is to be realized, all of this must be considered in its totality.
- Traditional coastal industries — such as manufacturing, commercial fishing and seafood processing — are declining, and many coastal communities are hoping to diversify their economies and improve their civilian marine infrastructure systems. The fundamental challenge is to meet the employment and economic development needs of coastal communities while maintaining or enhancing the environmental health and cultural heritage of the coastal regions.
- The transportation structure in the United States is falling behind that of other nations. Transportation is a very important basis for economic development.
- A business structure to support community development is needed. Ecotourism needs technological advances.

KEY ACTION ITEMS

COMMERCIAL BIOTECHNOLOGY - KEY ACTION ITEM

Molecular Genetics

- Develop genetically engineered species for use in producing chemical products or industrial processing.

Natural Products

- Develop biologically active compounds for medical use, control processes, biopolymers, natural adhesives, biofouling control, emulsifiers, synthesized compounds, etc.

ENVIRONMENTAL TECHNOLOGY - KEY ACTION ITEM

Enhancement of Environmental Monitoring and Assessment

- Develop high-resolution, cost-effective measurement technology, systems for combining satellite imagery with environmental data and technology for monitoring environmental impacts.

Pollution Control and Prevention

- Develop new technology for minimizing waste streams from aquaculture and seafood processing operations.

Remediation

- Develop biological and chemical remediation technology.

REVITALIZE THE NATION'S FISHERIES - KEY ACTION ITEM

Ecosystem-Based Management

- Develop ecosystem models and improved fishery forecasts.

Anticipating Social and Economic Impacts

- Assist fisheries managers, industry and coastal communities to understand the social, economic and legal impacts resulting from new management strategies.

Minimizing Bycatch

- Develop and evaluate gear and techniques to reduce bycatch, assess the impact of bycatch on stock recruitment, analyze effects of bycatch reduction on food chains, and educate the industry on alternative practices, gear and impacts.

Enhancing Wild Stocks Through Aquaculture

- Develop technology for enhancing stocks.

SUSTAINABLE U.S. AQUACULTURE - KEY ACTION ITEM**Administration and Coordination**

- Assist in the development of approaches to policy, regulation and financing of aquaculture.

Grow-Out Systems

- Develop technology for water management and pond culture, intensive production systems, offshore culture, and polyculture.

Improving Husbandry

- Increase fundamental knowledge of reproduction, hatchery production, growth, nutrition, disease diagnosis and control, system management, selection, and development of vaccines and vaccine delivery systems.

Enhancing Aquaculture Through Biotechnology

- Develop understanding at the molecular and organismal levels of the processes of reproduction, development, growth, pathology and immunology.

ADVANCES IN SEAFOOD TECHNOLOGY - KEY ACTION ITEM**Product Quality and Safety**

- Develop technology to implement good manufacturing practices, pathogen detection and control, toxin removal, and rapid response to harmful algal blooms.

Coastal Businesses

- Develop information to help small businesses increase their efficiency, increase public and

private access, implement education programs to reduce liability risks, and develop stewardship education.

Marine Trades Industry

- Develop technology to improve business management, retain waterfront sites, comply with environmental regulations, and improve safety and vessel design.

COASTAL COMMUNITY DEVELOPMENT - KEY ACTION ITEM

Coastal Tourism Development

- Evaluate the potentials of tourism and its impact on the environment, assess its socioeconomic benefits, design planning processes, and provide mechanisms to resolve user conflicts.

Communities in Transitions

- Develop technology and criteria for managing the cumulative and secondary impacts of development, and for providing an understanding of the impacts of growth and economic restructuring.

Coastal and Waterfront Redevelopment

- Assess socioeconomic effects of waterfront revitalization, and design zoning and land use planning processes.

Ports and Harbors

- Develop technology to reduce navigational risks, improve operations, initiate better planning and increase multi-purpose uses.

Planning and Decision-Making Aids

- Quantify values associated with use and preservation of coastal assets.

REVITALIZING MARINE INFRASTRUCTURE - KEY ACTION ITEM

Inspection and Condition Surveys

- Develop safe and effective inspection and underwater survey mechanisms.

Environmental and Operational Loadings

- Develop technology to improve analytic procedures, to assess loading and load management, and to quantify levels of uncertainty.

Structure Performance Assessments

- Develop analytical capabilities to predict performance of deteriorating and rehabilitated structures.

Rehabilitation, Repair and Recycling Procedures

- Assess load deformation behavior, develop rehabilitation methods, provide mechanisms for structure removal, and provide procedures for use and reuse evaluations.

BENEFITS TO THE NATION

Scientific knowledge is most valuable when entrepreneurs apply it in commercial enterprise and when people reap the benefits of marine resource wealth. The National Sea Grant College Program's economic leadership strategies will contribute to a robust and growing economy; sustainable coastal communities; a viable and modern marine infrastructure; healthy, wholesome seafood products, and a stream of goods and services based on the development and application of advanced technologies.

The \$2.9 billion in annual sales from U.S. seafood production provide an economic benefit of about \$25 billion, including an \$8 billion impact on the U.S. Gross National Product and the creation of 300,000 jobs. Rebuilding sustainable fisheries promises tremendous economic and social returns on investment.

Sea Grant efforts in coastal communities will advance the economic and social well-being of coastal residents in every state bordered by the nation's seacoasts and Great Lakes. Sea Grant will help stabilize, strengthen and revitalize several hundred coastal communities undergoing rapid change and save millions of dollars in construction and maintenance costs for essential marine facilities.

IMPLEMENTATION

Commercial Biotechnology

- *Immediate* — Focus on the development of new technology to be used by companies, businesses and others. Develop effective outreach mechanisms for getting results into the marketplace. Educate users and consumers about technologies.
- *Out-Years* — Conduct basic research on natural and genetically engineered products. Develop effective university relationships between researchers and companies.

Environmental Technology

- *Immediate* — Focus on new technology research and development to improve environmental remediation and ameliorate environmental damages. Develop effective outreach mechanisms for getting results into the marketplace. Educate users and consumers about technology use.
- *Out-Years* — Conduct basic research on biofilters and pollution abatement mechanisms. Develop effective university relationships among researchers and companies.

Revitalize the Nation's Fisheries

- *Immediate* — Develop alternative fisheries management models, including ecosystem-based approaches. Improve the scientific basis for fisheries management and allocations. Determine the impact of fishing operations, including environmental and non-targeted catch impacts. Identify economic impacts. Develop information databases to analyze commercial and recreational fishing businesses. Maintain effective outreach to introduce new technology and information to the industry.

Sustainable U.S. Aquaculture

- *Immediate* — Develop hatchery and nursery technology. Bring new species and hybrids online. Develop economic and marketing demand analyses and evaluations. Provide methodology and education for business plan development. Maintain effective outreach mechanisms for technology transfer.
- *Out-Years* — Develop biotechnology mechanisms to improve grow-out efficiencies and streamline seed stock production. Identify environmental impacts, including interactions, enhancement and control.

Advances in Seafood Technology

- *Immediate* — Integrate research, outreach and education to develop technology to implement good manufacturing practices, pathogen detection and control, and toxin removal in aquatic food products. Develop means to improve energy and processing efficiencies, storage and transportation technology, and product quality. Develop technology to conserve water and control effluent, improve waste management, interpret regulations, and recover such byproducts as enzymes, hormones and aquacultural feeds. Develop technology to produce high-quality and value-added products. Assess economic feasibility.

Coastal Business Development

- *Immediate* — Develop mechanisms to reduce conflict among users, to reduce risk via better business practices, to evaluate need for future facilities, and to provide for improved public health and safety.
- *Out-Years* — Develop information to help small businesses increase their efficiency, increase public and private access, implement education programs to reduce liability risks, and develop stewardship education. Develop technology to improve business management, retention of waterfront sites, compliance with environmental regulations, and vessel design and safety.

Coastal Community Development

- *Out-Years* — Develop mechanisms to evaluate potentials for tourism and its impact on the environment. Develop technology and criteria for managing cumulative and secondary impacts of development in communities in transition. Assess socioeconomic effects and provide an information base for communities making decisions about waterfront revitalization, zoning and land use planning processes. Develop technology to use in decision making.

Revitalizing Marine Infrastructure

- *Out-Years* — Develop the engineering information needed for decision making, training programs for new technicians and outreach programs for information transfer.

PERFORMANCE MEASURES

Commercial Biotechnology

- Number of new licenses issued for new products.
- Number of outreach partnerships to advise on technology.
- Number of new introductions of biotechnology into a variety of industries.

Environmental Technology

- Have five states introduce new technology into environmental monitoring.
- Introduce new seafood processing and aquaculture technology to reduce water quality impacts.

Revitalize the Nation's Fisheries

- Revise state and federal agency management approaches.
- Reduce the amount of non-targeted catch by 50 percent.
- Reduce over-capitalization.

Sustainable U.S. Aquaculture

- Increase the number of species in aquaculture.
- Establish the economic feasibility of alternative systems.
- Increase grow-out efficiency by 10 percent.

Advances in Seafood Technology

- Increase the value of traditional and new seafood products.
- Increase seafood safety by introducing new technology.
- Increase profit margins with new technology.
- Have quality rewarded by price increases.

Coastal Business Development

- Have five states include coastal community development improvements in state policy.
- Increase the number of jobs in ecotourism.

Coastal Community Development

- Help organize five communities and five businesses to address collective problems.

Revitalizing Marine Infrastructure

- Increase the number of graduate students trained to address re-engineering.

PRIORITIES

Level 1: Address the processes of linking coastal community development with fisheries, allocations of resources, aquaculture, etc.

Level 2: Address the products and services needed for biotechnology, seafood products and value-added outputs.

Level 3: Deal with marine infrastructure, ports and training to revitalize waterfronts, increase ecotourism and support community development.

COASTAL ECOSYSTEM HEALTH AND PUBLIC SAFETY

“Sea Grant’s relatively small investment in coastal hazards work has resulted in significant prevention of loss of life and property in the coastal zone.”

COASTAL ECOSYSTEM HEALTH AND PUBLIC SAFETY

WATER QUALITY

The subcommittee felt that *Sea Grant's Strategic Plan 1995-2005* (April 1995 draft) contained significant holes in its coverage of water quality issues, and they amended the list of strategic plan issues to include the following:

- **Biological Contaminants**
- **Biotoxins/Harmful Algal Blooms**
- **Nutrients**
- **Sedimentation**
- **Oil & Chemical Spills**
- **Toxins/Toxic Contaminants**

The subcommittee's work in developing an implementation plan for water quality issues follows this revised list of topics. For each topic (i.e., biological contaminants, biotoxins, etc.), a revised set of issues is presented, followed by the appropriate Sea Grant role, research needs, milestones for the near term (<1-5 years) and long term (5-10 years), and (in limited cases) specific performance measures.

BIOLOGICAL CONTAMINANTS - KEY ACTION ITEM

Changes/Additions to Sea Grant's Strategic Plan

- Seafood contamination, bathing beaches water quality and closures, potable water quality.
- Linkages of water quality to finfish and shellfish diseases.
- Loss of resources, overlap with nonindigenous species concerns.
- Effects on aquaculture as well as effects of aquaculture.
- Public perception of effects.
- Measurement, detection, survival of pathogens.
- Storm water inputs.

Sea Grant's Role

- Education (e.g., preventing the introduction of biocontaminants and nonindigenous species via ballast water).
- Technology transfer.
- Identification of moments of opportunity; rapid response.
- Nonadvocate information providers; address issues at regional/national state level; facilitate problem-solving and conflict resolution.

Research Needs

- Pathogen indicators.
- Aquaculture impacts.
- Novel approaches to detection, molecular probes, biosensors, etc.
- Survivability of pathogens.

Five-Year Milestones

- Address public perception.
- Effects on aquaculture, and effects of aquaculture.

Five- to 10-Year Milestones

- Measurement techniques.
- Biosensors.
- Novel approaches.

PERFORMANCE MEASURES

Public Perception

- *Sources and Risks Associated with Biological Contaminants* — Increase public awareness by developing appropriate materials (publications, fact sheets, workshops, etc.) for Sea Grant outreach/education programs.

Numerical Performance Measure — Five Sea Grant programs have biological contaminant programs in first year; 10 in second year; 15 in third year, etc.

Demonstration Projects

- *Puerto Rico* — Citizens' monitoring program involves low-income community, monitors sources and levels of fecal coliforms, increases public awareness, and obtains useful data.

Numerical Performance Measure — One such program in developing area in first year; two programs in second year; four programs in third year, etc.

- *Gulf of Mexico* — Outreach to individuals at risk for *Vibrio* infection from consuming raw shellfish.

Numerical Performance Measure — 100 high-risk people reached first year; 500 reached second year; 1,000 reached third year; etc.

Research

- Develop biosensors for specific viruses and bacteria in seafood and seawater; trace sources of contamination for better detection and control.

Numerical Performance Measure — One new biosensor developed in first year; two new biosensors developed in second year; one new sensor in routine use in third year, etc.

- Characterize and prevent pathogenic organisms in aquaculture operations to decrease economic losses and the spread of disease to wild populations.

Numerical Performance Measure — A new pathogen identified in first year; one new pathogen identified on second coast in second year; etc.

BIOTOXINS/HARMFUL ALGAL BLOOMS - KEY ACTION ITEM

Changes/Additions to Sea Grant's Strategic Plan

- Food chain disruptions in ecosystems (dystrophy).
- Public perception; effects on recreation, tourism and seafood.
- Consumption.
- Early detection.
- Forcing functions of blooms.
- Impediments to, consequences of aquaculture.
- Identification of species.
- Food web impacts.
- Tainting of seafood.

Sea Grant's Role

- Research on causes of blooms, theories of bloom initiation.
- Conceptual model development.
- Experimental studies.
- Plankton dynamics.
- Seed money development.

Five-Year Milestones

- Public perception.
- Measures of dystrophy in certain ecosystems.
- Identification, taxonomy and improved detection.
- Impediments to aquaculture.

Five- to 10-Year Milestones

- Public perception.
- Early detection.

PERFORMANCE MEASURES

Public Perception

- *Sources and Risks Associated with Biotoxins/harmful Algal Blooms* — Increase public awareness by developing appropriate materials (publications, fact sheets, workshops, etc.) for Sea Grant outreach/education programs.

Numerical Performance Measures — Three Sea Grant programs have programs in first year; six in second year; 12 in third year, etc.

Research

- *Understanding Bloom Dynamics and Predictive Capabilities for Toxic Blooms* — Develop and test theory of bloom initiation, duration and termination.

Numerical Performance Measures — One pilot project to study bloom initiation involving inter-disciplinary group of scientists in first year, larger-scale study in second year (in same location), second study in different region in third year, etc.

NUTRIENTS -KEY ACTION ITEM

Changes/Additions to Sea Grant's Strategic Plan

- Point and nonpoint source of nutrients, watershed issues.
- Land use practices.
- Compliance with regulations.
- Amelioration of impacts.
- Nutrient removal.
- Nutrient dynamics: sources and sinks.
- Predictive models.
- Public perception: point and nonpoint sources, land use practices, septic systems, alternative treatment technologies.
- Storm water (source of nutrients, characterization, transport).

Sea Grant's Role

- Socioeconomic and engineering issues.
- Development of alternative technologies.
- Cost-benefit analysis.
- Nutrient removal studies.
- Nutrient dynamics, predictive models.

Five-Year Milestones

- Point and nonpoint source outreach.
- Land use practices, better management practices, outreach.
- Socioeconomic studies of compliance with regulations.
- Public perception.

Five- to 10-Year Milestones

- Nutrient dynamics.
- Predictive models.
- Septic systems, alternative technologies.

SEDIMENTATION- KEY ACTION ITEM

Changes/Additions to the Sea Grant Strategic Plan

- Agricultural runoff.
- Land use practices.
- Construction.
- Earthquakes and fire.
- Changes in marina structure.
- Erosion.
- Ecosystem alteration from multiple sources.
- Dredging and disposal of dredged materials.
- Deforestation and forest practices.

Sea Grant's Role

- Sedimentation as a water quality issue.
- Multiple stressors.
- Education, public perception, technology transfer.
- Rapid response to natural disasters.
- Research on effects of sedimentation.

Five-Year Milestones

- Public perception on how to deal with sedimentation sources.
- Cost-benefit analysis of dredging/disposal methods.

Five- to 10-Year Milestones

- Multiple stressors.
- New dredging techniques.

OIL AND CHEMICAL SPILLS - KEY ACTION ITEM

Changes/Additions to Sea Grant's Strategic Plan

- Public perception.
- Economic impacts.
- Sociological impacts.
- Prediction of drift trajectories.
- Bioremediation.
- Habitat impacts.
- Prevention, recovery from oil spills.
- Research partnerships.
- Shipping transportation.
- Multiple stressors.
- Damage assessment/compensation schedules.

Sea Grant's Role

- All of the above, some in partnership with others.

Five-Year Milestones

- Public and scientific perception.
- Habitat impacts.
- Research partnerships with industry and agencies.
- Damage assessment/compensation schedules.

Five- to 10-Year Milestones

- Bioremediation.
- Short-term (three-hour) prediction of drift trajectory in small estuaries, embayments.

TOXINS/TOXIC CONTAMINANTS - KEY ACTION ITEM**Changes/Additions to Sea Grant's Strategic Plan**

- Fate, effects, transport.
- Food chain dynamics and transfer.
- Multiple stressors on ecosystem alterations
- Sources and sinks.
- Seafood safety, risk characterization.
- Public perception.
- Research partnership with industry and agencies.
- Detection, sensitive bioassays, bioavailability.
- Biosensors, environmental technologies, environmental sensors.
- Biomarkers.
- Population level impacts, effects on reproduction, developmental abnormalities.
- Source control, bioremediation, outreach.
- Causes of biological effects, acute and chronic assessment.

Sea Grant's Role

- All of the above, some in partnership with industry and agencies.

Five-Year Milestones

- Public and scientific perceptions.
- Seafood safety.
- Source control.
- Improved detection.
- Burial rates and resuspension.

Five- to 10-Year Milestones

- Fate, transport and effects.
- Biogeochemical processes.
- Multiple stressors.
- Improved detection.
- Biomarkers.
- Environmental technologies for remediation.

COASTAL HAZARDS

SEA GRANT'S ROLE

Fundamental goals of the National Sea Grant College Program include contributing to improved scientific understanding of severe storms, earthquakes and tsunamis, and the effective mitigation of associated hazards. Although it has invested only a small proportion of its research, outreach and communications dollars in coastal natural hazards work, Sea Grant's collective efforts have resulted in significant, well-integrated advances in coastal science, engineering and public education.

Sea Grant's relatively small investment in coastal hazards work has resulted in significant prevention of loss of life and property in the coastal zone. Accelerated growth and increased public and private investment in the coastal region, coupled with predictions of greater numbers of increasingly severe storms and other hazards, suggest that Sea Grant should give high priority to work in coastal natural hazards. Sea Grant's role in natural hazards research and mitigation, however, has always been that of a "niche player." Its strengths are the capacity to draw on its universities' top scientists to address complex basic research questions, to conduct innovative applied research and demonstration projects, and to serve as a convener, facilitator and trainer through its national network of marine advisors. No other federal, state or private organization has this unique combination of assets.

The potential economic and social benefits of continuing or expanding Sea Grant's role in this area is great, particularly in getting new knowledge into the hands of those who can directly apply it: planners, emergency managers, building contractors, the insurance industry and policy-makers.

GENERAL PRIORITIES

- Sea Grant should continue to strengthen partnerships among its university-based researchers, outreach professionals and communicators, addressing regional and national needs with specific, well-targeted products.
- Sea Grant's outreach and communications staff should collaborate to assess the coastal natural hazards information needs of targeted audiences (e.g., long-time coastal residents, newcomers to coastal land and home ownership, builders, the insurance industry).
- Network researchers and outreach professionals should make greater efforts to collaborate with and draw upon the expertise of its NOAA partner agencies.
- Sea Grant should promote and participate in inter-governmental and public-private partnership efforts, drawing on its strengths to:

- Serve as a neutral convener and facilitator on complex hazards issues in order to build capacity and vertical as well as horizontal networks.
- Initiate basic scientific research in critical, neglected or future-oriented questions.
- Conduct innovative applied science and demonstration projects and training.
- Sea Grant research and outreach efforts in hazards mitigation should take advantage of private sector, market-driven interest in long-term hazards mitigation strategies.
- Sea Grant's outreach and communications staff should collaborate to assess the coastal natural hazards information needs of targeted audiences (e.g., long-time coastal residents, newcomers to coastal land and home ownership, builders, the insurance industry).
- Sea Grant should have a major role at all governmental levels. At the federal level, hazards mitigation philosophy has shifted to long-term strategies, which is consistent with Sea Grant research and outreach directions. However, it is difficult to "sell" the benefits of this shift to the emergency-response community.

SPECIFIC PRIORITIES FOR STRATEGIC PLAN IMPLEMENTATION

The implementation priorities (high, medium or low) and time frames for achieving results (five years, 5-10 years or both) are listed in parentheses for each of the strategic plan action items.

SEVERE STORMS - KEY ACTION ITEM

- Improve the prediction of the time, location and severity of coastal storms (low Sea Grant priority, as this is covered by the National Weather Service) and understanding of the relationship between storm intensity and hazards (high-priority research; 5-10 years).
- Evaluate potential for hazards reduction (high priority for research and outreach; five years).
- Investigate tidal inlet hydrodynamic and sediment transport to improve predictive numerical models; improve technology for cross-inlet sediment movements (high-priority research; 5-10 years).
- Expand outreach efforts and training, including links with emergency agencies as well as the construction and insurance industries (high-priority outreach; five years/long-term).
- Develop improved methodologies and models for predicting tropical and extra-tropical storms and impacts (high priority; 5-10 years).
- Develop a better understanding of the effects of global phenomena, such as El Niño, and long-

term sea level rise associated with global warming on storm tracks, intensity and direction (medium priority for research; 5-10 years).

EARTHQUAKES AND TSUNAMIS - KEY ACTION ITEM

- Improve tsunami warning systems (National Weather Service has this covered for ocean warning systems and problems onshore once messages are received; a high priority, but more an emergency services role; 5-10 years).
- Develop and demonstrate improved methodologies and numerical models for estimating tsunami inundation associated with seabed earthquakes and other tsunamic events (high priority, but more for other NOAA agencies; 5-10 years).
- Apply tsunami inundation modeling and related techniques to assist communities in developing inundation maps for evacuation and planning (high priority for Sea Grant outreach on West Coast and in Caribbean; five years and 5-10 years, respectively).
- Transfer earthquake and tsunami hazards information and appropriate mitigation and response strategies to private industry and businesses, ports, local governments, emergency managers and the public, emphasizing locally generated events (high priority for outreach on West Coast and Caribbean; five years).

COASTAL PLANNING AND BUILDING CONSTRUCTION - KEY ACTION ITEM

- Act as a neutral convener and facilitator for complex hazards management issues that affect diverse public and private sector interests. Build capacity and vertical and horizontal networks for improved hazards management and problem solving is a principal goal of such efforts (high priority for outreach; five years and ongoing).
- Work with partners in private industry and local, state and federal governments to develop, demonstrate, implement and evaluate building materials and methods to reduce the loss of life and property from coastal natural hazards (high priority for outreach; five years and ongoing).
- Plan in advance for post-disaster damage assessment, including evaluation of current and recommended building practices, mitigation planning and other strategies (medium priority; five years).
- Develop an improved understanding of public perceptions of risk and of the social and economic impacts of coastal natural hazards and mitigation strategies (medium priority; 5-10 years).

SHORELINE PROCESSES AND EROSION - KEY ACTION ITEM

- Develop, refine and apply existing wave, tide, current, sediment transport and shoreline erosion models to hazards mitigation (medium priority; five years and ongoing).
- Explore cost-effective techniques for sedimentation control, navigation maintenance, circulation enhancement and beach nourishment (medium priority; 5-10 years).
- Design and evaluate nonstructural methods to manage shoreline erosion and protection (high priority; five years).
- Transfer research findings to designers, planners, managers, regulators and decision-makers in forms useful for immediate application (high priority; five years and ongoing).
- Develop a better understanding in the Great Lakes of the effects of nearshore lakebed erosion during low water levels and its effects on shoreline change during high water levels (medium priority; 5-10 years).
- Develop a better understanding of coastal sediment budgets and processes and their implications for shoreline development and hazards mitigation (high priority; five years).
- Develop an improved understanding of public perceptions of risk and of the social and economic impacts of shoreline processes and erosion strategies (high priority; five years and ongoing).

CURRENT EFFORTS IN COASTAL HAZARDS

All U.S. Regions

- Federal Emergency Management Agency (FEMA) Long-Term Mitigation Initiative (an opportunity for Sea Grant collaboration and project funding).
- Coastal Zone Management (CZM) Section 309 Coastal Hazards Initiatives (Office of Ocean and Coastal Resources Management).

New England

- *University of Rhode Island* — Integration of state and local policy for long-term hazards mitigation (not emergency response-oriented). Rhode Island Sea Grant is very active in Northeast; some activity by other Sea Grant programs, but principal partners are states and FEMA.

- *International Marina Institute* — Hurricane hazard mitigation planning for major marinas (little follow-up support).

Southeast/Caribbean

- *North Carolina Sea Grant* — Long-term work on effects of storm waters, waves and surges on buildings and the need for breakaway walls; also researching corrosion and the weakening of building connections.
- *South Carolina Sea Grant* — Research on wind effects on buildings in different environments. Insurance loss analyses of hurricanes Hugo and Andrew showed minor wind-induced roof damage contributed to 80 percent of overall interior losses.
- *FEMA and insurance, construction and retail industries* — Sea Grant and Southern Shores, N.C., community partnership for improved building practices; Sea Grant serving as “export agent” for transferring this information to other areas.
- *Florida Sea Grant* — Emergency response planning for live-aboards (houseboats); post-disaster location and hazard assessment of damaged boats.
- *Puerto Rico* — Work on landslides and flash floods.
- *South Carolina Sea Grant and the Insurance Institute for Property Loss Reduction* — Proposing national coastal hazards conference with insurance industry and all Sea Grant programs.
- *University of North Carolina* — State mitigation plans evaluation.
- *University of Massachusetts* — Hazards management and private/public lands issues.

West Coast

- *Long-term Sea Grant research, communications and outreach programs* — Focussing on beach processes and engineering responses, legal issues/liability.
- *Oregon Sea Grant* — Collaborating with CZM as well as other agencies and interest groups on all-hazards (storm erosion, geologic, earthquake/tsunami) policy evaluation and development.
- *Tsunami education* — Network development.
- *California Sea Grant collaboration* — Humboldt Earthquake Education Center/Northern California subduction zone earthquake scenario.

- *State agency, U.S. Geological Survey and university (Sea Grant) research* — Earthquake hazards, tsunami modeling.

Hawaii/Pacific Islands

- *FEMA and Sea Grant* — Collaborating with Civil Defense on coastal currents studies.
- *University of Hawaii* — Inundation area mapping as a basis for evacuation planning.
- *Kauai* — Surveying post-hurricane changes in emergency policies and procedures.
- Work with boat owners on emergency preparedness.

Great Lakes

- *Wisconsin Sea Grant* — Ongoing coastal engineering outreach; updating *Coastal Processes Manual/Workbook* guide to evaluating the risks of flooding, erosion and bluff recession to lakeshore properties. Assisting Wisconsin Coastal Management Program in updating and expanding its Natural Hazards Program.
- *Ohio Sea Grant* — Developing a three-dimensional model of Lake Erie's physical environment (temperature, water level, current, wind and turbidity) for a Great Lakes Forecasting System that will also provide hindcasts and "nowcasts" of lake conditions and storm impacts. Models for Lakes Michigan and Ontario to be completed within a year.

SAFETY AT SEA AND THE GREAT LAKES

KEY PROBLEMS

Loss of life is the fundamental problem plaguing both the Fishing Vessel Safety and Diving Safety program areas. Commercial fishing is considered the most hazardous industrial occupation in the United States; the annual fatality rate is 61 deaths per 100,000 crew members (2.5 times the average for the inspected fleet). This industry constitutes 50 percent of the total employment in the maritime industry. The nation's estimated two million to three million recreational scuba divers average 90 deaths and 800-900 accidents per year. Besides recreational divers, some commercial divers working in fishing operations also use scuba equipment. These operations include the sea urchin fishery in Maine, the abalone and urchin industry in California, and the quahogs industry in Rhode Island. Problems associated with each area include:

Fishing Vessel Safety

- Fishers' attitudes toward risk taking.
- Minimal regulations concerning training.
- No economic incentive for private sector involvement.
- Fisheries management-induced.
- Subject (e.g., stability) is too complicated.
- The industry is fragmented; it is difficult to communicate information.

Scuba Diving Safety

- Lack of adequate training, especially in the fishing community.
- Not enough medical information concerning diving physiology.
- Not enough technical information concerning new diving techniques.
- A general lack of regulations concerning chartered diving operations.

ORGANIZATIONS INVOLVED IN SAFETY AT SEA AND ON THE GREAT LAKES

Sea Grant is not alone in its concern in these areas. Several government and private sector agencies are involved in some capacity. Sea Grant has been able to effectively fill many gaps in coordination with the following agencies.

Fishing Vessel Safety

- *U.S. Coast Guard (USCG)* — regulations and enforcement
- *USCG Auxiliary and yacht clubs* — recreational training
- *State agencies, Standards of Care, Emergency Medical Technicians (EMT) training* — recreational training, regulations and enforcement

- *Private Organizations* — gear development, marketing, sales coordination, additional training

Scuba Diving Safety

- *Occupational Safety Health Administration (OSHA)* — regulations and enforcement
- *National Association of Underwater Instructors (NASI), Professional Association of Diving Instructors (PADI)* — recreational training
- *State emergency services* — recreational training, regulations and enforcement
- *Private Organizations, dive shops, charter boats* — gear development, marketing, sales coordination, additional training
- *Divers Alert Network (DAN)* — medical advice, coordinates hyperbaric chamber access in event of accidents, advanced training, divers insurance

SEA GRANT'S PAST/PRESENT AND FUTURE ROLES

Many Sea Grant programs have been involved in these safety issues. The Michigan and Wisconsin Sea Grant programs have been leaders in scuba diving research; the Rhode Island and Texas A&M Sea Grant programs have been leaders in fishing vessel safety. Relationships with the other organizations involved in these areas have been excellent; they include cost-sharing and information/communications activities. Ample opportunity exists for regional and national cooperation, since many activities are applicable to all fishing vessels and situations. Because not all programs have the expertise to carry out these activities, several inter- and intra-regional workshops and joint projects have been conducted.

Past/Present Roles in Research

- Human Factor
 - Perception of risk
- Stability
 - Small vessel design
- Impacts
- Diving Physiology Decompression Table Development

Future Research

- Human Factor
 - Risk taking: how do you change this behavior?
- Stability
 - Effects of gear changes on vessel stability
 - Small vessel stability

- Impacts
 - Effect of fishery management on safety
 - Effect of safety regulations on the industry
 - Effect of training
 - Effect of possible licensing
 - Economic impacts of safety
- Diving Physiology Decompression Table Development
 - Physiology/medical aspects
 - Diving mixtures
 - Table development (NITROX)
 - Effect of pollutants on divers

Past/Present Roles in Education and Outreach

- Training and Education
 - Fishing vessel safety manuals
 - Videos
 - Training workshops
 - Curriculum development
- Personal Level Cooperation among Agencies
- Diving Accident/Fatality Statistics
- Field Management for Scuba-Related Injuries
 - Workshops for EMTs, divers and hospitals

Future Education and Outreach

- Training and Education
 - Development of stability workshop
 - Drill training
 - Safety at sea
 - Expand into sub-chapter tugboats
- Agency Level Cooperation (Cooperative Agreements)
- Transferred to Divers Alert Network:
 - Curriculum development for divers and EMTs
 - Charter dive boat education
 - Workshops
 - Agency cooperation
 - Dissemination of information (i.e., placards, etc.)

OUTCOME AND PERFORMANCE MEASURES

Five-Year Goals

- Reduce property loss, deaths and injuries associated with commercial fishing by 10-20 percent.
- Improve safety of commercial fishing, changing ranking from "most hazardous" to a safer ranking that is halfway towards the median of all industrial occupations.
- Cooperate with the tugboat industry to prevent major passenger vessel losses.
- Reduce the number of deaths/disabilities due to inadequate medical treatment in scuba injuries by 10-12 percent.
- Reduce the number of fishing-related scuba accidents by 10-20 percent.

Ten-Year Goal

- Transfer this effort to the private sector, making it profitable by creating a demand for the training and knowledge.

EDUCATION AND HUMAN RESOURCES

“Sea Grant can enhance formal education by infusing marine science in pre-college education primarily through teacher training.”

EDUCATION AND HUMAN RESOURCES

The implementation strategies for each long-range goal and key action item in the Education and Human Resources area are based on multidisciplinary approaches through partnerships among universities, government, businesses, foundations and the community.

EDUCATION PERSPECTIVE

LONG-RANGE GOALS

- Reflect demographic changes in the increasing coastal population and in the workforce.
- Use emerging science and electronic information technologies to provide new knowledge to target audiences.
- Improve the formal education system (K-12 plus higher education) by infusing marine science information in precollege education, essentially through teacher training, and by increasing the number and diversity of marine scientists and engineers in undergraduate and graduate programs.
- Develop opportunities to train and retrain resource managers, planners and policy-makers to deal with the issues created by multiple and conflicting uses of coastal and marine resources.
- Increase the public understanding of science and technology by using innovative media technologies to reach informal education groups.

KEY ACTION ITEMS

ENHANCE FORMAL EDUCATION - KEY ACTION ITEM

Enhance formal education (pre-college/K-12 and continuing education) by infusing marine science — based on local, state and/or national standards — into pre-college education primarily through teacher training:

- Focus on teacher education through in-service programs.
- Promote career-long professional development where scientists work in partnership with practicing teachers.
- Make special efforts to include minority teachers, teachers of minority students and students from economically challenged backgrounds.

- Establish training programs for Sea Grant faculty and staff to be current in educational communications technologies.

SCIENTISTS AND ENGINEERS - KEY ACTION ITEM

Augment the supply, quality and diversity of marine and coastal scientists and engineers:

- Enhance and expand Sea Grant's Industrial Fellowships and the John Knauss Marine Policy Fellowship Program.
- Increase the numbers and diversity of undergraduate and graduate assistantships/traineeships.
- Provide career enhancement programs for mid-career and senior management levels (decision-makers and industry representatives).
- Implement in-service training in conflict resolution for Sea Grant staff.

TECHNICAL TRAINING - KEY ACTION ITEM

Expand the technically trained workforce:

- Increase the opportunities for marine technical training and access to applied research related to coastal commerce.
- Retrain displaced workers in marine-related industries.
- Develop partnerships between Sea Grant and specific marine-related industries to train people to enter the job market.

INCREASE PUBLIC UNDERSTANDING OF MARINE ISSUES - KEY ACTION ITEM

Increase public understanding (via outreach/public service) of science and technology about marine and coastal issues by using innovative media mechanisms, informal education, public facilities and electronic highways:

- Identify relevant Sea Grant research (products and information) with perceived value by the public, and develop and implement promotional strategies for distribution.
- Produce education/communications materials using electronic technology.

- Provide collaboration between Sea Grant and interpretive facilities; increase partnerships with the tourism industry.
- Reach culturally and economically diverse audiences through specifically designed products or communications strategies.

IMPLEMENTATION AND EVALUATION

These key action items will be implemented based on appropriate fiscal support — both in the near- and long-term — in the context of benefits to the nation. Evaluation and assessment should be an ongoing effort in each of these four action item categories.

MARINE ADVISORY SERVICE PERSPECTIVE

In 1992, Sea Grant's Marine Advisory Service (MAS) developed a national network prospectus entitled *Sea Grant Marine Advisory Service: The Nation's Coastal Technology Transfer Program for the 21st Century*. This report, also known as the "MAS 2000 Report," was systematically developed by the Sea Grant network and provides a 10-year vision of how the MAS should look in the year 2000 and beyond. In addition, MAS program leaders met in November 1994 and identified priorities with national implications for further long-term action. The recommendations of these two long-range planning efforts were discussed and re-affirmed at Sea Grant Week '95, where they were determined to be consistent with National Sea Grant College Program long-range goals as outlined in *Sea Grant's Strategic Plan 1995-2005* (April 1995 draft). Presented here is a condensed version of the MAS long-range goals and the action items required to meet those goals.

LONG-RANGE GOALS

- Maximize program flexibility and responsiveness.
- Utilize and educate clientele groups about emerging communications and information technology.
- Enhance Sea Grant's relationship with marine industries.
- Increase MAS capabilities to conduct applied research and demonstration projects.

KEY ACTION ITEMS

ENHANCE COMMUNICATIONS - KEY ACTION ITEM

Enhance internal and external communications through expanded use of communications technology:

- Develop subject matter for electronic discussion groups.
- Increase utilization of teleconferencing for regional and national programs.
- Expand the use of the World Wide Web to more efficiently distribute information.
- Stimulate greater use of World Wide Web information services through education of clientele groups.

EVALUATE PROGRAM AREAS - KEY ACTION ITEM

Critically evaluate program areas in order to adapt to change:

- Create a network committee to evaluate MAS fisheries programming.
- Organize a national symposium to define the MAS role in the biotechnology area.
- Establish a network of marine biotechnology research faculty to assist in MAS programs.

COASTAL ECOSYSTEMS HEALTH OUTREACH PLAN - KEY ACTION ITEM

Implement the outreach recommendations of the Coastal Ecosystems Health strategic plan:

- Create network of coastal ecosystem outreach personnel and programs.
- Coordinate the program nationally and regionally.
- Enhance the educational component of NOAA's estuarine research reserve system.
- Increase Sea Grant-funded applied research.

EXPAND PROGRAMMING - KEY ACTION ITEM

Expand programming through innovative staffing and talent sharing:

- Increase the number of regional and national MAS network activities.
- Encourage sabbaticals and exchanges among programs as a mechanism to meet transitory program needs.
- Increase talent-sharing among Sea Grant MAS staff on a regional and national basis.
- Pursue increased utilization of industry expertise in programming.
- Expand the use of volunteers for the delivery of some educational products.

COMMUNICATIONS PERSPECTIVE

In 1993, the National Sea Grant Communicators Steering Committee organized a strategic planning meeting involving representatives of 16 Sea Grant programs. The resulting report, *A Strategic National Sea Grant Communications Plan*, identified four major goals and under each recommended several broad objectives with a wide range of specific short- and long-term action items for making Sea Grant communications more effective at the national level. In 1994, the plan was amended to include the strategic plans of five newly created national communications task groups — Electronic Information; Exhibits, Conferences & Special Events; Publications & Graphics; Radio, and Video & Television. Since that time, most of the specific short-range action items have been implemented or completed, and implementation of many of the long-range action items has commenced as well.

During Sea Grant Week '95, the relevance of the four long-range goals of the national strategic communications plan was re-affirmed. The means of achieving these goals are highly adaptable and easily redirected toward addressing almost any issue and supporting the implementation of a wide range of key action items in the *Sea Grant Network Plan 1995-2005*.

LONG-RANGE GOALS

- Develop a strong national network identity (including a single network graphic identity).
- Create greater national visibility for Sea Grant.
- Increase national availability and access to Sea Grant information.
- Enhance networking through better internal and external communication.

SHORT-TERM KEY ACTION ITEMS (1-5 Years)

ENHANCE COMMUNICATIONS PROCESSES - KEY ACTION ITEM

Enhance internal communications processes and infrastructure for greater efficiency and effectiveness.

- Identify and catalog what has already been done and who is doing what now.

- Establish a Sea Grant network presence on the World Wide Web; all programs on-line within two years.
- Establish on-line information about and access to all Sea Grant publications, projects and people.
- Emphasize the application of new information transfer technology, especially electronic multimedia.
- Provide training for creating and accessing World Wide Web information and for applying new communications technology.

NATIONAL VISIBILITY - KEY ACTION ITEM

Establish a national identity and national visibility for Sea Grant Network:

- Complete the adoption and use of the new network graphic identity by all programs.
- Sponsor annual Sea Grant national issues forums and national/regional conferences.
- Place increased emphasis on getting Sea Grant information into broadcast and other electronic mass media (radio, television, cable TV, etc.).

NEW PARTNERSHIPS - KEY ACTION ITEM

Seek partners, sponsors and donors for producing and delivering Sea Grant information (e.g., U.S. Coast Guard partnership for marine safety materials; IBM or Apple donations of computer equipment for multimedia/World Wide Web projects, etc.).

LONG-TERM KEY ACTION ITEMS (5-10 Years)

NATIONAL MARKETING AND DISTRIBUTION SYSTEM - KEY ACTION ITEM

Create a national Sea Grant information marketing and distribution system:

- Develop a self-supporting, income-generating Sea Grant information marketing system.
- Double/quadruple the distribution of Sea Grant information by 2005.

JOINT OUTREACH PLANNING - KEY ACTION ITEM

Advocate joint outreach planning at state, regional and national levels:

- Encourage integrated, inter-program collaboration among communications staff, MAS staff and educators.
- Increase the integration of outreach into Sea Grant research projects.

GREATER PUBLIC AWARENESS OF ISSUES - KEY ACTION ITEM

Create greater public appreciation for and awareness of current issues affecting coastal, ocean and Great Lakes resources:

- Increase Sea Grant's use of public service announcements on radio and television, particularly with regard to addressing such issues as marine safety, coastal ecosystem health issues, socioeconomic values and public marine science literacy.

PERFORMANCE MEASURES

- Conduct regular evaluations of major network-wide communications efforts, including the National Sea Grant Depository, Sea Grant Abstracts, National Media Relations Office, the network brochure and the national issues forum series.

ACCOUNTABILITY

- Invite outside experts/consultants to serve on Communicators Steering Committee and National Media Relations Advisory Committee.
- Form a national communications advisory committee or review panel.
- Provide annual reports to the Sea Grant Association and National Sea Grant Office on progress toward implementing strategic plan action items and achieving communications goals.