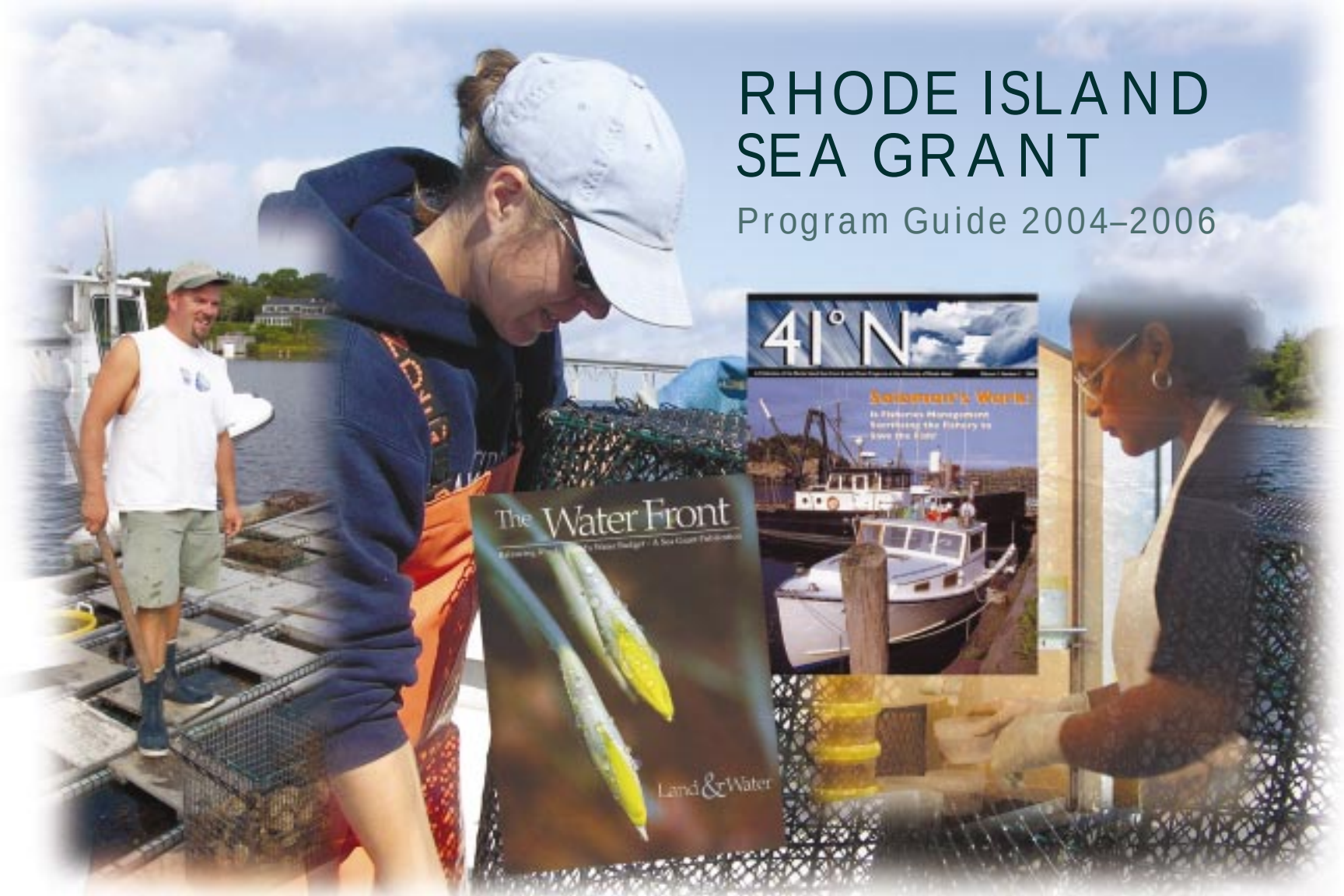
RHODE ISLAND SEA GRANT

Program Guide 2004–2006



The Rhode Island Sea Grant College Program is a federal-state partnership, based at the University of Rhode Island, that works to promote the wise use and conservation of marine resources for the public benefit through research, outreach, and education. Funding comes primarily from federal sources, with matching funds provided by the state of Rhode Island and private-sector groups. For more information about Rhode Island Sea Grant's research and outreach programs, publications, and news, please visit the Rhode Island Sea Grant Website at: http://seagrant.gso.uri.edu.

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Letter From the Director

Coastal population growth and development dominate America's coastal ocean management agenda. The impacts of population growth and development on the coastal ocean environment were not recognized by coastal managers some 30 years ago when Sea Grant was starting out. In the early '70s, the leading management concerns centered on controlling industrial and municipal wastewater pollutant discharges. With the passage of the landmark 1972 amendments to the Federal Water Pollution Control Act and the 1972 Coastal Zone Management Act, these discharges were clearly defined as point sources of pollution, and this country's first water quality and coastal management programs came into being, with a strong emphasis on engineering the control and management of such sources.

In the first decade of the 21st century, the most pressing coastal management problems now stem from cumulative impacts resulting from millions of Americans migrating permanently, or seasonally, to the coast. Failing or inadequate septic systems and other sources of nonpoint air and water pollution, such as lawn fertilizers and even pet wastes; overtaxed or poorly maintained land-based and maritime transportation systems; sprawl development; and intensifying recreational activities are now recognized as important sources of aquatic contamination and coastal habitat degradation and/or loss. Significantly complicating the handling of these coastal issues are global factors, such as invasive species and long-term oceanic and atmospheric perturbations arising from the rapid accumulation of atmospheric greenhouse gases.

Rhode Island Sea Grant recognizes that coastal ecosystems and resources are "human dominated." Human-dominated coastal ecosystems pose challenges unanticipated by our grandparents or the nascent environmental protection and regulatory programs of 30 years ago. They demand a smarter, more vigorous pursuit of scientific understanding of the coastal biological, hydrological, and nutrient cycles so powerfully influenced by humanity. We must maintain our commitment to greater scientific understanding of coastal ecosystems.

A vision of human-dominated coastal ecosystems being managed and sustained through research, education, and outreach guides Rhode Island Sea Grant in its pursuit to deliver science-based knowledge that is personally relevant, nationally pertinent, and locally responsive. Our 2004–2006 program guide reflects programming and investments that promote the conservation and sustainable use of marine resources for the benefit of Rhode Island, the region, and beyond.

Barry A. Costa-Pierce

Director, Rhode Island Sea Grant College Program

RHODE ISLAND SEA GRANT

Program Guide 2004–2006

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Introduction

Just as the resources of the oceans and the coasts belong to all of us, so does responsibility for the problems threatening these environments. Surging coastal population growth and the continued intensification of coastal resource development and use will continue to challenge our capacity to manage, conserve, and restore coastal oceans and watersheds worldwide.

Rhode Island Sea Grant's program agenda for 2004–2006 emphasizes community, collaboration, and commitment. Based upon an extensive constituent base, Rhode Island Sea Grant cultivates community awareness and committed stewardship. Collaborating with academia, government agencies, and nongovernmental organizations, Rhode Island Sea Grant seeks to harness the collective strengths and resources of public and private partners to develop feasible, broadly supported solutions to urgent coastal resource management problems. By addressing the interests and needs of managers, decision makers, and resource users alike, Sea Grant fosters commitment to policies and practices that ensure sustainable use of marine resources. Recognizing that coastal issues of local concern reverberate nationally and even globally, Rhode Island Sea Grant engages at state, regional, and local levels with research, outreach, and education programming that also can serve as national models for scientific advancement and enhanced management.

In 2004 and 2005, Rhode Island Sea Grant will receive about $2.1 million annually in federal funding from the U.S. Department of Commerce's National Oceanic and Atmospheric Administration (NOAA) and about $150,000 annually from the state of Rhode Island via the Graduate School of Oceanography. The 2004–2006 Rhode Island Sea Grant Omnibus Proposal, as submitted to NOAA, covers the period from March 1, 2004, to February 28, 2006.

Rhode Island Sea Grant must match every dollar of federal funding it receives with 50 cents of nonfederal support or funding dedicated entirely to Sea Grant–funded projects. As has been the case for many years, Rhode Island Sea Grant's match support continues to derive primarily from faculty-based salary match, as well as foundation, in-kind, and some additional state salary match. Steady progress has been made in recent years to increase state match support for Rhode Island Sea Grant via funds to be earmarked directly for Rhode Island Sea Grant by the state legislature in its annual appropriations bill. Rhode Island Sea Grant's current state funding, which must be dedicated to personnel costs, is used exclusively to underwrite program management staff costs.

In addition to its core federal funding, Rhode Island Sea Grant administers a number of pass-through grants that support expanded services and activities such as the Rhode Island Aquaculture Initiative.

Program Development

Unanticipated events—an oil spill, a severe coastal storm, an innovative collaborative opportunity—often present response opportunities or pressing needs entirely unanticipated by the project budgeting developed via the 2004–2006 omnibus. The Rhode Island Sea Grant director retains a small Program Development Fund that enables Rhode Island Sea Grant to respond quickly to an urgent event, or to take advantage of emerging research or other programming opportunities. Thus, the Program Development Fund strengthens Rhode Island Sea Grant's constituent support services and expands its capacity to seed-fund projects of clear local or regional interest. Unfortunately, increased personnel costs and flat federal and state funding over the past five years have com-

bined to shrink the amount of resources Rhode Island Sea Grant is able to hold in reserve for the fund.

For 2004–2006, Rhode Island Sea Grant builds on its 33-year history of focused science, energetic outreach, and practical education to safeguard the environmental and economic integrity of our coastal watersheds and oceans. Rhode Island Sea Grant's 2000–2005 Strategic Plan identifies several overarching goals that were important in selecting and refining the projects that Sea Grant will fund and implement in the 2004–2006 omnibus period:

- Preserve, manage, and restore coastal and marine habitats and ecosystems
- Achieve sustainable seafood production
- Foster sustainable coastal communities through integrated coastal management
- Promote communications, training, and human resources development in support of coastal and marine resources management

Projects and programs funded by Rhode Island Sea Grant in 2004–2006 are organized below according to the long-term goal to which they contribute. Although the 2004–2006 omnibus was developed in accordance with the 2000–2005 Strategic Plan and Rhode Island Sea Grant's 2003–2005 Implementation Plan, in late 2003 Rhode Island Sea Grant embarked on a major 12-month strategic planning process to cover the five-year period 2006–2010, identifying two basic organizational themes of sustainable fisheries and sustainable coastal communities and ecosystems.

We must maintain our commitment to greater scientific understanding of coastal ecosystems.

Strategic Goal I:

Preserve, Manage, and Restore Coastal and Marine Habitats and Ecosystems

Riparian sinks for mitigating septic system contamination in urbanizing coastal watersheds

Principal Investigator: Arthur Gold, URI Natural Resources Science

Co-Principal Investigators: Peter Groffman, Institute of Ecosystem Studies; Mark Stolt, URI Natural Resources Science

Project No. R/EG-041 Federal Funds: $131,111 Matching Funds: $71,976

Increased population density, especially along waterways, coupled with failing or overtaxed septic systems, has increased the amount of nitrogen and rate at which it enters coastal waters. Certain features of the coastal landscape have the capacity to function as "nitrogen sinks," absorbing and transforming nitrates into elemental nitrogen, which escapes harmlessly into the atmosphere, thus reducing the flow of nitrogen into coastal waters. Riparian areas (land on the banks of rivers or estuaries) are particularly effective nitrogen sinks because of their soil and chemical characteristics. Perturbation of riparian areas through filling or other landscaping alterations may limit the ability of these areas to function as nitrogen sinks. This project will conduct the investigations required to develop GIS-based maps that will depict precisely the soil-based denitrification capacity of selected shoreline and riparian locations in Narragansett Bay. These maps will help communities control their sources of nutrient pollution by prioritizing the protection of riparian zones demonstrated to possess substantial denitrification capacity.

Hydrogeological characterization and groundwater flow patterns in southern Rhode Island and implications for coastal lagoons: Numerical simulations and field observations

Principal Investigator: S. Bradley Moran, URI Graduate School of Oceanography

Co-Principal Investigators: Peter Weiskel and John Masterson, U.S. Geological Survey

Project No. R/EP-041 Federal Funds: $199,463 Matching Funds: $104,587

With commercial and residential development continuing along Rhode Island's southern coast, additional septic systems and other nonpoint sources are certain to contribute more nutrients and bacteria to the groundwater that enters coastal waters and seeps into aquifers, compromising ecologically and economically important coastal regions such as Rhode Island's coastal lagoons, locally called salt ponds. This project combines the resources of URI and the U.S. Geological Survey in a partnership to apply data collected from mapping efforts and from radium isotope tracer-based monitoring to develop a numerical model of groundwater flow in the salt pond region. By reviewing the geological makeup of this region and determining its influence on groundwater transport, the researchers hope to gauge accurately the cumulative effects from the input of contaminants into groundwater and coastal waters. The resulting model and maps will help assessment of the level of wastewater treatment required to achieve water quality objectives.

Temperature-nutrient interactions in coastal lagoons: A mesocosm experiment

Principal Investigators: Scott Nixon and Betty Buckley, URI Graduate School of Oceanography

Co-Principal Investigator: Stephen Granger, URI Graduate School of Oceanography

Project No. R/EE-041 Federal Funds: $205,844 Matching Funds: $105,474

The shallow coastal ecosystems of the U.S. Atlantic and Gulf coasts are undergoing important changes, one of which is rising water temperature. Because of the fundamental importance of water temperature in metabolism and animal behavior, changes of only a few degrees could affect plant community composition in the lagoons. Warming water temperatures—a probable result of global climate change—coupled with elevated nitrogen levels resulting from discharge of nutrients into groundwater from septic systems and other nonpoint sources, can seriously affect the habitat quality of coastal waters for eelgrass. This study will employ model ecosystems, known as mesocosms, to quantify the effects of elevated water temperatures and nitrogen inputs on the health and survival of eelgrass beds in the coastal lagoons of southern New England.

Diminishing water quality in Rhode Island coastal waters: Understanding the physical, biological, and chemical processes that lead to seasonal hypoxia in upper Narragansett Bay

Principal Investigator: Mary-Lynn Dickson, URI Graduate School of Oceanography

Co-Principal Investigators: David Ullman and David Hebert, URI Graduate School of Oceanography; Chris Deacutis, Narragansett Bay Estuary Program

Project No. R/EE-042 Federal Funds: $276,154 Matching Funds: $144,136

Recent observations show that extensive portions of upper Narragansett Bay experience summertime hypoxia (low oxygen), posing a significant threat to habitat quality and marine life in the Bay. A fairly recent and seasonal occurrence, upper Bay hypoxia may result from a specific combination of elements, including the seasonal makeup of the phytoplankton community, the imbalance between biological respiration and the production of oxygen through photosynthesis and exchange with the atmosphere, and the distribution of oxygen in the water column through vertical mixing. This project is investigating the various biological, chemical, and physical factors that govern the onset of summertime hypoxia in upper Narragansett Bay. The information generated by this research will help managers identify trends in hypoxic events and eutrophication (the overstimulation of plant growth in water resulting from excessive nutrients), design water quality management measures, and inform the concerned public of the causes and impacts of hypoxia on the Narragansett Bay ecosystem.

BayMap: A program to image the seafloor, map and groundtruth the habitats, and document the cultural landscape of Narragansett Bay and Rhode Island and Connecticut coastal environments

Principal Investigators: John King, URI Graduate School of Oceanography; Jon Boothroyd, URI Geosciences; Kathryn Moran, URI Ocean Engineering; Roderick Mather, URI History

Co-Principal Investigators: Robert Ballard[1], Dwight Coleman[1], Christopher Damon[1], Christopher Deacutis[2], John Jenson[3], Robert Pockalny[1], Sheldon Pratt[1], William Turnbaugh[1], Larry Mayer[4]
Affiliation: [1]URI; [2]R.I. Department of Environmental Management; [3]Mystic Seaport; [4]University of New Hampshire

Project No. R/ES-041 Federal Funds: $242,414
Matching Funds: $243,178

This project undertakes production of a comprehensive series of high-resolution seafloor maps and images of Narragansett Bay and adjacent Rhode Island and Connecticut coastal environments to create a complete picture of their geology, habitats, biological communities, and archaeology. Exploiting recent advances in acoustic and optical imaging technology, the project can supply both large-scale views of the benthic landscape and finer-scale detail. With data from previous studies superimposed on the new imagery in a GIS database, the seafloor map pinpoints sites appropriate for detailed study of impacts from pollution, hypoxia/anoxia, shipwrecks and other debris, and dredge spoils. This project can improve knowledge of various ecosystem dynamics, including the association of organisms and their environment and the impact of historic human behavior on coastal waters.

Elucidating the ecology of brackish and tidal freshwater marshes for their conservation and management

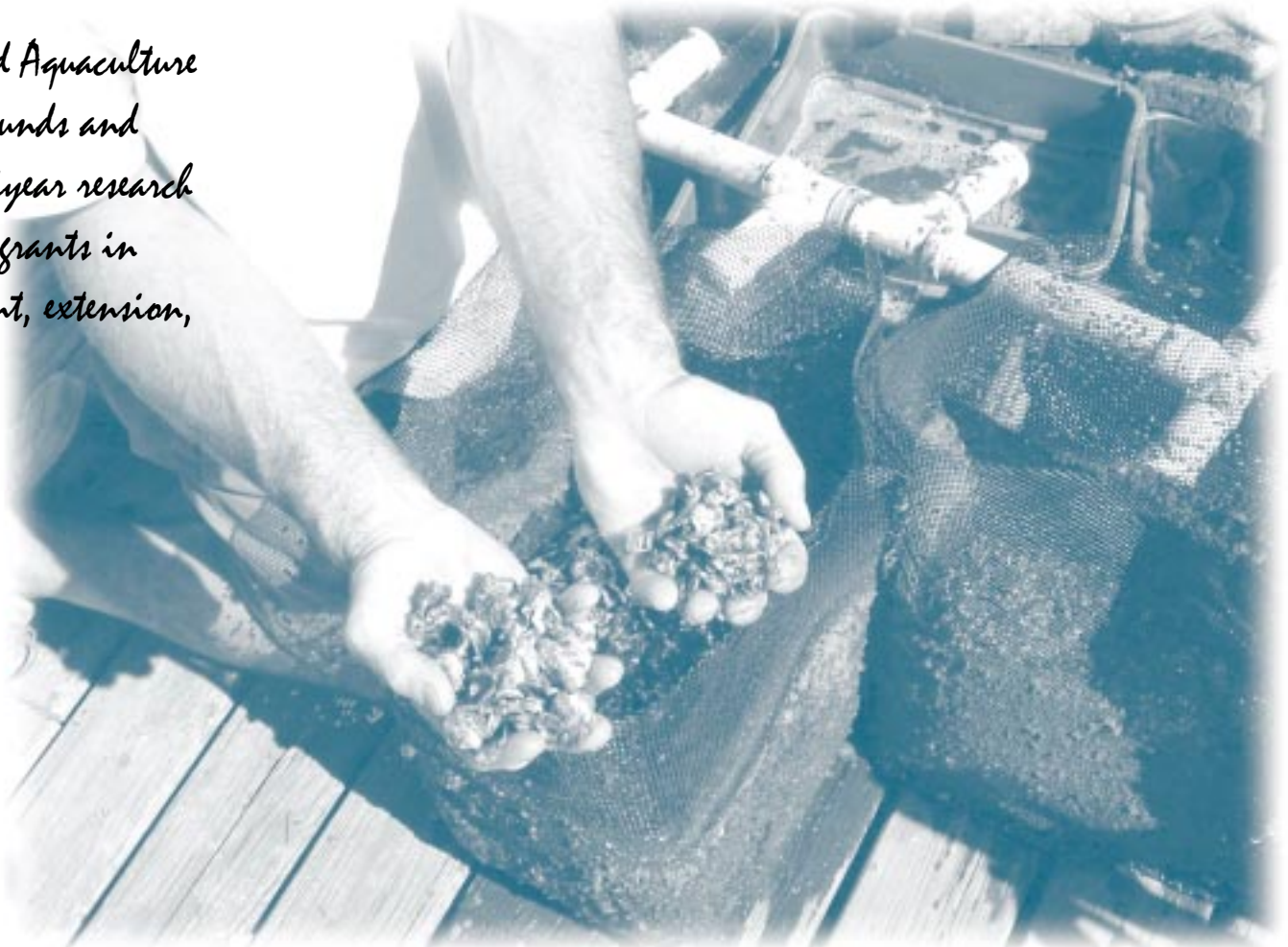
Principal Investigator: Mark Bertness, Brown University Ecology and Evolutionary Biology

Co-Principal Investigator: Caitlin Mullan-Crain, Brown University Ecology and Evolutionary Biology

Project No. R/EE-043 Federal Funds: $210,448 Matching Funds: $100,227

Despite their importance as environmental filters and wildlife habitat, upriver brackish and tidal freshwater marshes lining much of Narragansett Bay may be the least studied and least understood of all common wetlands. They are also the types of wetlands most vulnerable to degradation by coastal development and population growth. With development continuing in or adjacent to Narragansett Bay's brackish and tidal freshwater marshes, nitrogen inputs to these marshes will continue at a high rate or increase, and their soil salinities will decline. Such changes in these critical habitat characteristics will promote the growth and spread of less-desirable wetland species such as cordgrass, *Phragmites australis*, and other invasive species, leading to displacement of more valuable wetland flora (and fauna) and reduction in the diversity of marsh plant communities. The investigators will work with conservation groups and government to incorporate this project's findings into the conservation and management of Atlantic coastal estuarine marshes.

...the Rhode Island Aquaculture Initiative (RIAI) funds and implements multiyear research grants and mini-grants in project development, extension, and education.



Sea Grant
Rhode Island

Strategic Goal II:

Achieve Sustainable Seafood Production

Identification and analysis of multiple populations of longfin squid with respect to possible implications for management

Principal Investigator: William Macy, URI Graduate School of Oceanography

Co-Principal Investigators: Edward Durbin, URI Graduate School of Oceanography; Roger Hanlon, Woods Hole Marine Biological Laboratory

Project No. R/F-042 Federal Funds: $242,918 Matching Funds: $122,933

The longfin squid fishery is an economically important fishery in Rhode Island, but much remains unknown about the longfin squid's biology, ecology, and life history. This project proposes to determine, through DNA fingerprinting and other analyses, whether the longfin squid population is divided into subgroups that are biologically distinct. If so, the project will assess whether there is a dominant subgroup largely responsible for maintaining the overall population. Identification of population subgroups, and the potential importance of select subgroups in maintaining stock recruitment rates, would represent critical insights into the longfin squid fishery that would compel managers to refine stock assessments and determine if special techniques are required to protect longfin stocks.

Multispecies assessment models for fisheries management

Principal Investigator: Jeremy Collie, URI Graduate School of Oceanography

Co-Principal Investigator: Terrance Quinn, University of Alaska at Fairbanks

Project No. R/F-041 Federal Funds: $113,225 Matching Funds: $67,024

Fisheries managers require accurate estimates of fish populations and their growth rates to create equitable and effective stock management strategies. Reliable stock assessments have been difficult to obtain, in part because traditional population ecology models may not accurately account for important interactions among species. This research applies an ecosystem-based, multispecies model to stock abundance calculations, factoring in diet, predator-prey relationships, and size-age structures. A unique element of this new model is its forward calculation of stock abundance, starting with initial population abundances and tracking depletion through fishing, predation, and natural mortality. Intended to be customized for application to a variety of fish communities, this model seeks to improve the reliability and usefulness of multispecies statistical models as a viable tool for ecosystem-based fisheries management.

Sustainable Fisheries Extension Program

Principal Investigator: Kathleen Castro, URI Fisheries, Animal and Veterinary Science

Project No. A / F-041 Federal Funds: $512,756
Matching Funds: $248,298

The Rhode Island seafood industry represents a complex mix of local, regional, and national issues. Rhode Island fisheries managers continue to struggle with meeting the demands of national and international seafood markets and the market-driven demands of the fishing industry while seeking and maintaining sustainable levels of commercial and recreational fishing. Other priority issues include proper reutilization of recovering stocks, bycatch reduction, and ecosystem-based management. Management and governance reforms for U.S. marine fisheries are being considered regionally and nationally in light of the 2004 report of the U.S. Commission on Ocean Policy. Historically, U.S. and state fisheries law and policy have continued to shift, slowly but dramatically, from an expansion-and-development orientation inspired by the 1969 Stratton Commission Report, which was seminal in the formation of many current fisheries management systems, to a conservation focus required by the Sustainable Fisheries Act of 1996. Complicating this long-term evolution in fisheries policy are the multiple layers of regulation and overlapping jurisdictions that hinder and lengthen the public processes intended to help resolve fisheries issues and disputes across jurisdictions and interests.

The Rhode Island Sea Grant Sustainable Fisheries Extension Program (SFEP) works as an integrated extension, research, and education program with the harvest and processing industries, fisheries managers, scientists, the recreational fishing and environmental communities, and seafood consumers to clarify fisheries issues and to help devise solutions to fisheries problems. Through projects in fisheries science and technology and seafood safety and marketing, the SFEP balances the complex ecological, social, and economic factors affecting the seafood industry and the natural resources on which it depends. One important goal for the SFEP is to help develop neutral discussion and problem-solving opportunities for new institutions such as the URI-based Rhode Island Commercial Fisheries Center, the URI Fisheries Center, and a Fishermen-Scientist Working Group.

As a liaison among the fisheries constituencies, as an educational resource offering workshops and academic courses, and as a scientific presence on committees, councils, and working groups, the SFEP seeks to advance the management of natural and human resources to ensure the long-term availability and quality of seafood. Projects for 2004–2006 include:

- Assisting in the development of a Fisherman-Scientist Cooperative Research Group
- Convening a conference on public aquaculture through a program of invited speakers and break-out sessions to construct a white paper on the development of such programs in Rhode Island and the region
- Continuing HACCP (Hazard Analysis at Critical Control Points) and sanitation educational training for seafood processors and distributing the “Seafood Safety Savvy” HACCP newsletter

Sea Grant Fisheries Extension Regional Coordination

Principal Investigator: Kathleen Castro, URI Fisheries, Animal and Veterinary Science

Project No. A / F-032 Federal Funds: $66,659 Matching Funds: $41,675

In 2003, Congress mandated the National Sea Grant College Program to allocate a portion of its core funding to enhance fisheries extension efforts, particularly on a regional basis. The Northeast Sea Grant Region serves as a model for regional collaboration with the commercial fishing industry and NOAA's National Marine Fisheries Service (NMFS). The Northeast regional fisheries network, led by Rhode Island Sea Grant's SFEP, has forged partnerships with local, state, regional, and national agencies involved in Northeast fisheries issues. The fisheries network is broadening the visibility of Sea Grant as a regional network, which will likely foster future collaborative projects.

SFEP staff coordinate the Northeast Sea Grant Fisheries Extension Program, maintaining responsibility for organizing meetings in the region for Sea Grant, NMFS, fishery management councils and commissions as appropriate, providing educational opportunities, and maintaining the Northeast Fisheries Extension website. As coordinator for the regional network, Rhode Island Sea Grant is a central link among the Sea Grant programs and the other regional stakeholders in fisheries.

Rhode Island Aquaculture Initiative: 2002–2005

Principal Investigators: David Alves, R.I. Coastal Resources Management Council; Barry Costa-Pierce, Rhode Island Sea Grant

Federal Funds: $1,418,000

As a consortium of the R.I. Coastal Resources Management Council (CRMC), Rhode Island Sea Grant, URI, Roger Williams University (RWU), aquaculture industry representatives, and the R.I. Shellfishermen's Association, the Rhode Island Aquaculture Initiative (RIAI) funds and implements multiyear research grants and mini-grants in project development, extension, and education. Underwritten by a $1.4 million appropriation from the U.S. Congress secured in 2002 by Sen. Jack Reed of Rhode Island, the RIAI seeks to unite federal and state interests as well as academic, regulatory, and industry resources to develop technology; carry out research, extension, and education projects; and develop markets for Rhode Island–produced cultured seafood and ornamental fish. Determining priorities for projects to be funded is the task of the RIAI Executive Committee, composed of representatives of RIAI's partner institutions and the aquaculture industry. Recently funded projects include evaluation of the biological and operational repercussions of a parasite found in wild and farmed northern quahogs, development of hybrid wind-solar powered upweller technologies for remote-site culture operations, and shellfish aquaculture education programming for elementary- through college-level students. In order to continue the initiative beyond 2005, the RIAI Executive Committee is exploring establishment of a Rhode Island Aquaculture Universities Consortium.

Journal of Aquaculture

Rhode Island Sea Grant currently manages the Husbandry and Management section of the journal *Aquaculture*, produced by Elsevier Science. Rhode Island Sea Grant's efforts involve oversight for the review process for all scientific manuscripts submitted for publication in this section of *Aquaculture*—currently about 300 per year. Each manuscript is reviewed for applicability to the field of aquaculture and for its significance in providing new information to the field. The Husbandry and Management section of *Aquaculture* receives and publishes more manuscripts than any other section of the journal. Rhode Island Sea Grant receives annual funding directly from Elsevier to support its review and editing responsibilities.

Strategic Goal III:

Foster Sustainable Coastal Communities Through Integrated Coastal Management

Sustainable Coastal Communities and Ecosystems Extension Program

Principal Investigators: Virginia Lee and Stephen Olsen, URI Coastal Resources Center

Project No. A / CR-041 Federal Funds: $483,002 Matching Funds: $255,462

Locally as well as globally, humanity strains the bounds of sustainability. Development pressures, consumptive land-use patterns, wasteful water-use practices, and other consequences of contemporary life have produced a legacy of degraded coastal natural resources, limited freshwater supplies, loss of economic viability, and social stresses.

The Rhode Island Sea Grant Sustainable Coastal Communities and Ecosystems Extension Program (SCCE) approaches these issues via applied education, research, and extension services that promote multiple perspectives on difficult coastal management and planning issues based on both the natural and social sciences. By providing decision makers with reliable, high-quality scientific and technical information targeting policy formation, implementation, and evaluation, the SCCE fosters integrated approaches to coastal watershed and ocean management. By cultivating partnerships, comanagement, and community-based management of resources, the program strengthens governance of coastal ecosystems to accommodate societal change and to promote sustainability. Additionally, the SCCE emphasizes the ecological importance of estuarine habitats and addresses estuarine health by synthesizing and communicating scientific and technical information for watershed management and for determining the implications of changes in freshwater flows to estuaries.

Specific efforts for the 2004–2006 period include building on the creation of a Greenwich Bay Special Area Management Plan (SAMP) in partnership with the CRMC. The Greenwich Bay SAMP summarizes results of bay research and monitoring and addresses protection and restoration of habitat and water quality as well as economic, historic, and cultural resources. The SCCE will facilitate adoption of this plan and use it as a model for creating a SAMP for the harbor and tidal waters of the Providence metropolitan region. Additional work will entail linking the goals and objectives of these SAMPs to the goals and objectives for integrated management of Narragansett Bay and its watershed. The SCCE will continue to strengthen its partnership with CRMC by building that agency's capacity to promulgate land conservation policies that are consistent with municipal, state, and nongovernmental organization policies for coastal open space conservation and habitat protection.

Coastal Community Development Program

Principal Investigators: Virginia Lee and Stephen Olsen, URI Coastal Resources Center

Co-Principal Investigators: Jennifer McCann, URI Coastal Resources Center; Ames Colt, Rhode Island Sea Grant

Project No. A / CR-042 Federal Funds: $117,999 Matching Funds: $60,747

Rhode Island Sea Grant and the SCCE have promoted and facilitated planning for sustainable coastal communities through pilot projects on Aquidneck Island and in Washington County. Rhode Island Sea Grant's Coastal Community Development Program (CCDP) is funded by the National Sea Grant College Program at about $50,000 annually to underwrite the implementation of research and outreach projects that seek to support and enhance local decision making regarding coastal community development and land use. In 2004–2006, Rhode Island Sea Grant's CCDP will apply smart growth policies to Aquidneck Island's West Side master planning process in cooperation with the U.S. Navy, the Aquidneck Island Planning Commission, the island's three municipalities, state agencies, and private sector partners such as the Newport County Chamber of Commerce.

In addition, Rhode Island Sea Grant is partnering with the Narragansett Bay National Estuarine Research Reserve to create and deliver workshops explaining smart growth and green infrastructure concepts to local and regional decision makers. Developed initially for coastal communities in Rhode Island, these smart growth training workshops will be expanded to draw in other Northeast Sea Grant programs and estuarine research reserves.

One coastal environmental use garnering greater attention recently is recreational boating. The importance of recreational boating to the coastal economy in Rhode Island, the Northeast, and the nation is propelling development of a partnership connecting the Sea Grant network with national recreational boating and marina associations. Through these partnerships, Rhode Island Sea Grant will provide science synthesis and technical assistance for the recreational boating industry, marinas, and recreational boaters.

Strategic Goal IV:

Promote Communications, Training, and Human Resources Development in Support of Coastal and Marine Resources Management

Rhode Island Sea Grant Communications Program

Principal Investigator: Malia Schwartz-Cromarty, Rhode Island Sea Grant

Project No. A / I-041 Federal Funds: $512,291 Matching Funds: $21,721

User groups and individuals require extensive scientific and technical knowledge to make informed decisions about the use of marine resources. Reliable, comprehensive, and understandable information is necessary for everything from everyday issues, such as handling seafood safely and finding shoreline access, to broader concerns, such as evaluating marine resources management and restoring marine habitats. Rhode Island Sea Grant Communications provides such information through a variety of means. Taking advantage of print and Internet media, the Communications Program disseminates publications ranging from fact sheets to technical reports to popular products including full-color field guides, books, posters, and its magazine, *41˚N*. Tapping into popular media, Communications administers Sea Grant's presence on the Web by creating and maintaining the Rhode Island Sea Grant Website, as well as several general and topical websites. Today, our websites enjoy an audience of over 22,000 users per month. Relying on traditional communications outlets, the program distributes press releases and participates in public events. Extending its reach still further, Sea Grant Communications builds partnerships with agencies including URI Cooperative Extension, CRMC, and NMFS, among others.

Specific activities for the 2004–06 period include publication of the long-awaited revision of *Public Access to the Rhode Island Coast*, proceedings resulting from the Northeast Fisheries Extension Initiative, a pamphlet explaining a new method for defining essential fish habitat, an ecological history of the Providence River region in support of area SAMP planning, development of new specialty websites, publications in support of program management efforts, and several new partnership activities.

Rhode Island Sea Grant Environmental Literacy Initiative

Principal Investigators: Barry Costa-Pierce and Ames Colt, Rhode Island Sea Grant

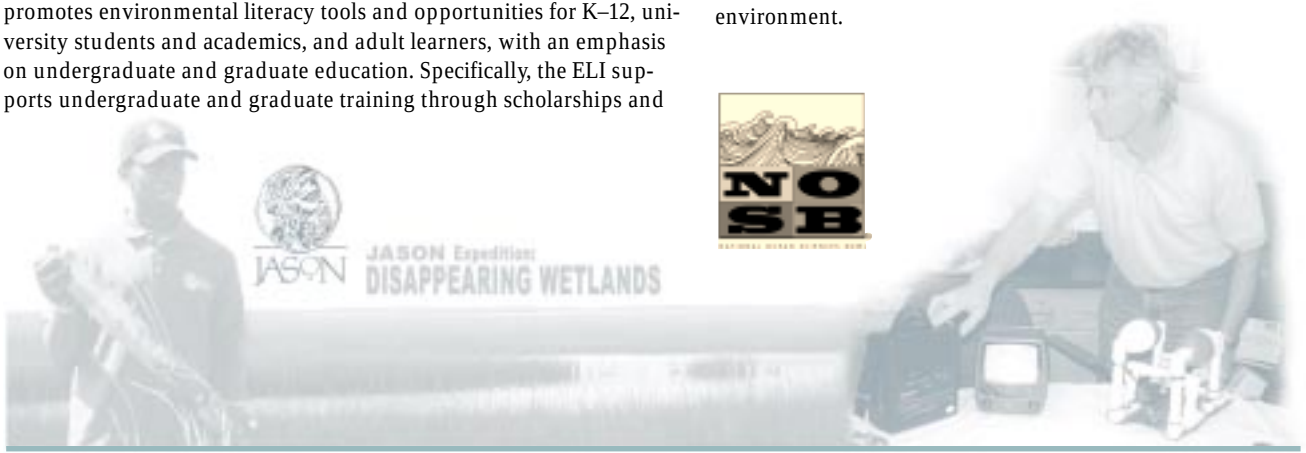
Project No. E / G-041 Federal Funds: $90,301 Matching Funds: $35,988

Greater public understanding of the scientific processes and issues related to oceans and marine and coastal areas is critical for cultivating public support and appreciation for the appropriate use of these resources. Cultivating public understanding calls for broad-based education, with increased collaboration between the educational and scientific communities. The combined resources of these disciplines help assure that teachers, their students, and the public have access to materials, experiences, and opportunities that reflect how good science is done and that model correct uses of scientific information.

By fostering lifelong learning and emphasizing the importance of a science-literate populace to the nation's competitive position worldwide, Rhode Island Sea Grant's Environmental Literacy Initiative (ELI) promotes environmental literacy tools and opportunities for K–12, university students and academics, and adult learners, with an emphasis on undergraduate and graduate education. Specifically, the ELI supports undergraduate and graduate training through scholarships and fellowships and strengthens public education through multiple outreach avenues, including publications and workshops.

Additionally, in 2004–2006, the ELI will provide support for Rhode Island's participation in the JASON Expedition and the National Ocean Sciences Bowl run by the Consortium for Oceanographic Research and Education. To leverage high-quality educational endeavors, the ELI partners with other programs at URI, other universities, high schools, and civic organizations. For instance, in 2004 the ELI is partnering with URI's ocean engineering department on ocean robotics to involve high school and college students in the development of autonomous underwater vehicles (AUVs).

Finally, the ELI annually underwrites a $3,000 fine arts competition via URI's art department. The Rhode Island Sea Grant Visual Arts Program was established in 1988 to encourage New England professional visual artists to engage in the ocean environment and coastal communities. The competitively awarded grants financially support a wide range of visual arts reflecting or influenced by the marine environment.



Rhode Island Sea Grant Legal Program

Principal Investigator: Kristen Fletcher, RWU Ralph R. Papitto School of Law

Federal Funds: $35,083 Matching Funds: $10,000

The complexity of coastal and marine issues and the social and environmental impacts of management activities add a legal dimension to ocean and coastal policy. The Sea Grant Legal Program, established in January 2004, is designed to provide objective legal analysis for state agencies and other constituents as well as for Sea Grant's extension programs. A partnership among Rhode Island Sea Grant, URI marine affairs, and the RWU Ralph R. Papitto School of Law, the program serves advisory, educational, and practical professional functions. The outreach element provides legal analysis for constituents requesting information on matters related to coastal zone management, fisheries, ports and harbors, and other areas of marine law. The educational component supports a joint-degree program through which students participate in related course work at both universities to earn juris doctor and master of marine affairs degrees in a concentrated program of study.

Grounded in marine law, coastal zone law, environmental regulation, fisheries management, international topics, and other aspects of marine law, students have the opportunity to apply their training to real-world ocean and coastal issues through internships in Sea Grant's outreach programs. The Legal Program's first class of Sea Grant Law Fellows is tackling questions related to fishing regulation conflicts, rights-of-way to the shore, and Coastal Zone Management Act consultation requirements. In conjunction with the RWU Marine Affairs Institute, the program also cosponsors symposia and speaker events focusing on interdisciplinary aspects of current marine policies.

Dean John A. Knauss Marine Policy Fellowship Program

Through the Knauss Fellowship Program, Rhode Island Sea Grant offers graduate students a unique opportunity to participate in national coastal and ocean policy. The Knauss Fellowship matches highly qualified graduate students to mentoring hosts in the legislative or executive branches of federal government or with federal agencies in Washington, D.C. During this one-year, $40,000 fellowship, students participate directly in projects ranging from reviewing environmental impact statements to designing computer models of the ocean environment to drafting legislation. Established in 1979 by John A. Knauss, former Rhode Island Sea Grant Program director and former dean of GSO, the Knauss Fellowship Program has hosted 42 students through Rhode Island Sea Grant. For nearly every year of the program's existence, Rhode Island Sea Grant has sponsored at least one Knauss fellow and in 2004 placed four of its five nominees in the 2005 fellowship class:

- Nancy Jamison, M.A. candidate, URI Marine Affairs
- Jesse Mechling, M.A. graduate, URI Marine Affairs
- Whitley Saumweber, Ph.D. candidate, GSO
- Gina Shamshak, Ph.D. candidate, URI Environmental and Natural Resource Economics

URI Coastal Fellowship Program

Hands-on experience with active research or management projects gives URI undergraduate students a structure for their academic, professional, and personal goals. Working with faculty or staff mentors, Coastal Fellows commit eight months of their time to real-world projects on community issues related to environmental sciences and management. Fellows earn a stipend for the summer employment portion of their terms as well as academic credit for their school-year participation and share the results of their work through a formal poster presentation and gathering. Rhode Island Sea Grant annually sponsors seven Coastal Fellows, who are placed in Rhode Island Sea Grant research and outreach projects. The seven fellows for 2004 are:

Coastal Fellow	Area of Study	Project	Mentor
Benjamin Bartley	Aquaculture and Fisheries	Temperature-nutrient interactions in coastal lagoons	Scott Nixon
David Hudson	Marine Biology	Habitat value of shellfish aquaculture gear	Graham Forrester
Jared Jackson	Marine Affairs	Role of local environmental organizations and civic associations in coastal and marine management in Rhode Island	Tracey Morin-Dalton
Tara Janosh	Marine Affairs	Building water resource protection into local land-use ordinances	Lorraine Joubert
Jared Lucia	Aquaculture and Fisheries	Diagnosis and quantification of QPX in Rhode Island clams	Marta Gomez-Chiarri
Emily Shumcheni	Marine Biology	Habitat mapping in Narragansett Bay and coastal salt ponds	John King
David Viola	Environmental Science	Evaluating agents for an interstate biological control program against intertidal grasses	Richard Casagrande

Other Education and Training Programs

Manager Training

The SAMP approach began in the 1970s as a strategy specific to management of Rhode Island's salt pond region and is now sufficiently mature to be applied on a larger scale. Contemporary SAMPs seek to incorporate economic as well as environmental policy considerations. Developing and implementing SAMPs widely will demand a generation of professionals with an unusual combination of skills, knowledge, and values. The SCCE implements training programs that feature SAMP development and implementation and training in other coastal governance strategies. One of the key benefits of the SCCE's educational efforts is the program's ability to link earlier generations of coastal management to emerging issues through trainers who bring decades of knowledge and experience to educating future coastal managers.

Law Internships

Increasingly, environmental issues involve a legal component. Questions of ownership, rights of way, acquisition, and liability percolate through contemporary coastal management. The SCCE is drawing on the resources of the Sea Grant Legal Program and is engaging marine law students in review of public access to the tidal waters of the Providence metropolitan region through a marine and environmental practice clinic and an internship program. This arrangement affords students practical experience in their field while providing valuable information for Sea Grant's SAMP for the tidal waters of Cranston, Pawtucket, Providence, and East Providence.

Undergraduate and Graduate Education

The fishing industry and its management increasingly demand specialized education grounded in science. The SFEP prepares students for careers in these areas through formal classroom instruction and active laboratory experience. In particular, the course titled "Contemporary Commercial Fisheries of Rhode Island" acquaints upper-level undergraduates with Rhode Island's current commercial fisheries. Featuring fishermen as guest presenters, the course offers students a practical examination of the big questions of valued commercial fisheries stocks, their status and outlooks, and the corresponding futures for Rhode Island's major fisheries.

Additional opportunities for career-directed learning are emerging through another course under development in conjunction with the R.I. Department of Environmental Management and NMFS Northeast Fisheries Science Center.

URI Marine Science Society

Fisheries sciences tend to focus on applied, practical issues rather than theoretical foundations. For a growing number of students in various fisheries-related majors, the Marine Science Society emphasizes a hands-on component as well as grounding in basic theory through classroom instruction. Expanding learning opportunities for motivated students, the society gives expression to skills and themes learned in class. SFEP staff advise the group and coordinate learning activities that range from digging clams for the evening's clambake to exploring the operations of a Russian factory freezer trawler.

Controls for Histamine Poisoning

Histamine poisoning, one of the most common seafood illnesses, is associated with consumption of fish that is not properly chilled after capture. Whether caught on a fishing boat for the market or on a charter boat for supper, fish have to be handled and stored properly to protect against histamine buildup. As part of Sea Grant's national Fisheries Extension Enhancement Initiative, Rhode Island Sea Grant is collaborating with university personnel from New York, Delaware, Virginia, North Carolina, Georgia, and Oregon—with coordination from Maryland—to implement a national training and education project in support of controls for histamine poisoning. This multiregional effort offers direction, technical support, and training in appropriate handling practices for both commercial and recreational—particularly charter boat—fishermen.

HACCP Training

Stringent federal mandates for food safety require processors and others who handle seafood to have programs in place for analyzing and controlling potential contamination hazards in their production activities. The system known as HACCP involves identification of points during the processing of seafood products where quality standards can be applied and measured. Since the U.S. Food and Drug Administration's HACCP regulations went into effect in 1997, Rhode Island Sea Grant has been a leader in facilitating and ensuring compliance with HACCP guidelines and requirements. Similarly promoting compliance with the related Sanitation Control Procedures for harvest and seafood processing industries, Rhode Island Sea Grant has developed training programs and distributed materials pertinent to each safety regimen. Because course offerings nationally are sporadic, Rhode Island Sea Grant and the SFEP extend their training offerings beyond the region through the Segment II Internet HACCP course offered through Cornell University. All of these HACCP offerings serve health agencies, professional organizations, and other trainers as well as processors, vendors, and stakeholders in the seafood industry.

International Sea Grant Initiative

Principal Investigator: Barry Costa-Pierce, Rhode Island Sea Grant; Stephen Olsen, URI Coastal Resources Center

Federal Funds: $52,500

Rhode Island Sea Grant, in partnership with the URI Coastal Resources Center, has begun to lay the foundation for adapting the Sea Grant model to selected developing nations to create a global network of institutions dedicated to applying knowledge, values, and technologies that support sustainable coastal development and conservation. The initiative's objective is assessment of the experiences of developing nations in creating institutions dedicated to integrated research, extension, and public education. In 2004, the initiative convened a meeting of international and national coastal leaders at NOAA's White Water to Blue Water Symposium to identify conditions essential for institutions participating in an international Sea Grant network and to discuss characteristics important to the initiative's long-term success.

In addition, the initiative generated two background papers pertinent to experiences in developing countries. The first paper explored factors most critical to long-term success, especially issues such as long-term financial stability; the second focused on the benefits of a Sea Grant model in resolving problems generated by the overuse and misuse of coastal and marine resources. Lastly, the initiative integrated the conclusions and recommendations that emerged from the background papers into a white paper that addressed the needs and expected benefits of an international Sea Grant network and adaptations of the U.S. model that will be required to meet conditions in developing nations.

Appendix I:
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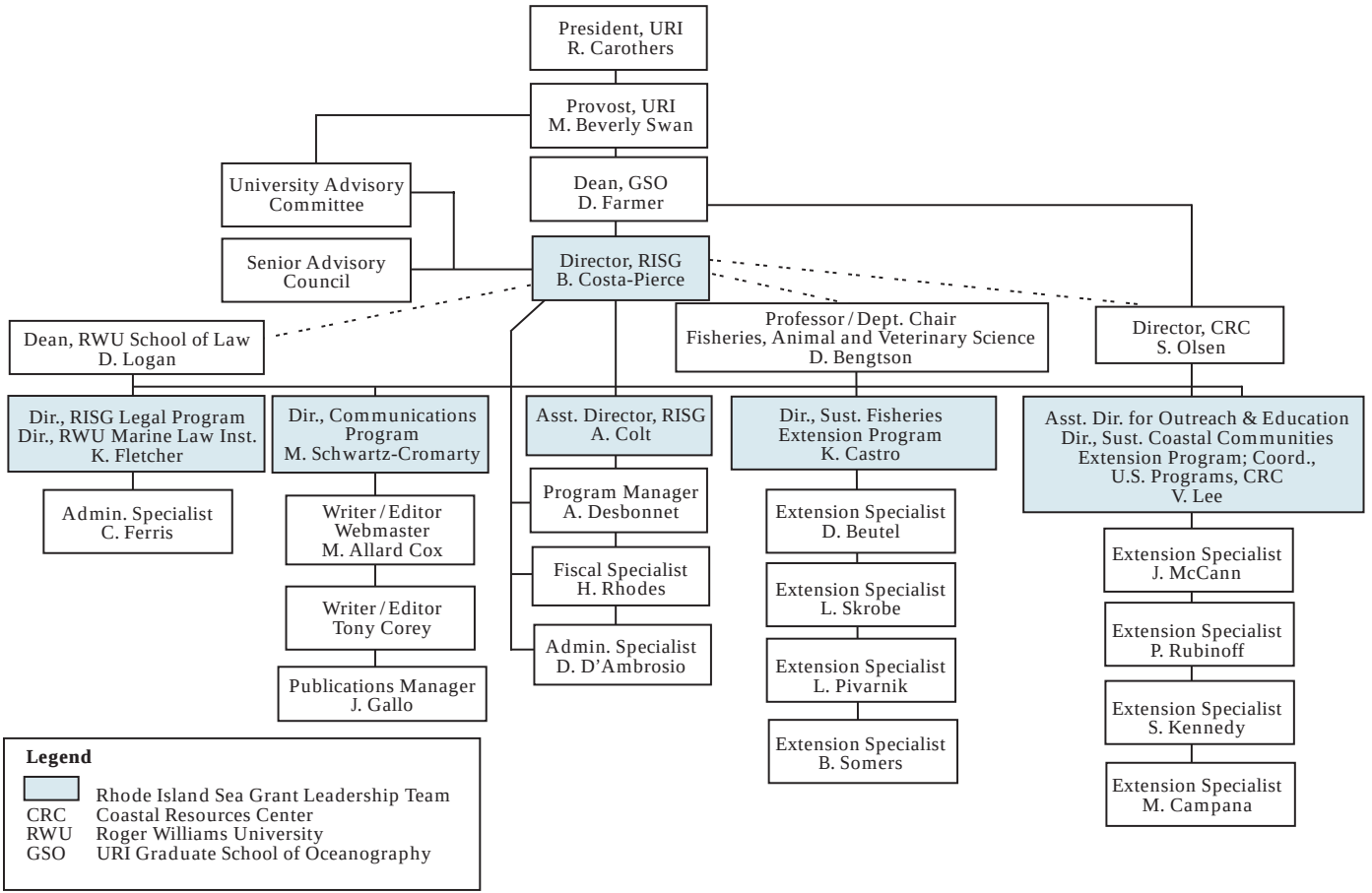
Appendix II: Organizational Structure of Rhode Island Sea Grant



Major Reporting and Evaluation Milestones: 2003–2007

In compliance with National Sea Grant and internal guidelines and requirements, Rhode Island Sea Grant publishes and extensively distributes documentation on its strategic and implementation planning efforts, along with annual progress reports and completion reports from funded investigators and programs. The following schedule summarizes Rhode Island Sea Grant's major reporting and evaluation milestones from January 2000 to the next comprehensive program assessment in mid-2007. Copies of any of the identified plans or reports are available from the Rhode Island Sea Grant Website (http://seagrant.gso.uri.edu), Rhode Island Sea Grant Communications, or the Program Management Office.

External Program Evaluation (covering 3/1/99 to 2/28/03) (June 2003)

2004–2006 (3/1/04–2/28/06) Omnibus Proposal submitted to NOAA (December 2003)

2004–2006 Program Guide issued (Winter 2004)

2003–2004 (3/1/03–2/29/04) Annual Report submitted to NOAA (November 2004)

FY 2005 Continuation Proposal submitted to NOAA (December 1, 2004)

2006–2010 Strategic Plan (3/1/06–2/28/11)

2003–2004 (1/1/03–12/31/04) Biennial Report issued (Spring 2005)

2004–2005 (3/1/04–2/28/05) Annual Report submitted to NOAA (September 2005)

2006–2008 (3/1/06–2/29/08) Omnibus Proposal submitted to NOAA (November 2005)

2006–2008 (3/1/06–2/29/08) Implementation Plan issued (Spring 2006)

2006–2008 Program Guide issued (Summer 2006)

2005–2006 (3/1/05–2/28/06) Annual Report submitted to NOAA (September 2006)

FY 2007 Continuation Proposal submitted to NOAA (December 2006)

2005–2006 (1/1/05–12/31/06) Biennial Report issued (Spring 2007)

Program Assessment 2003–2006 (covering 3/1/03 to 2/28/07) (June 2007)

Rhode Island Sea Grant's Advisory Groups

The Rhode Island Sea Grant Leadership Team is involved with many internal (URI) and external programmatic choices that could benefit, assist, or present possible obstacles to achieving programmatic excellence now and into the future. To provide stakeholders a structured, formalized means for providing advice and feedback to the Leadership Team, Rhode Island Sea Grant has established two major advisory groups, the Senior Advisory Council and the University Advisory Committee. The **Senior Advisory Council** (SAC) assists the program in defining focus and achieving excellence for resolving critical issues of the marine environment in Rhode Island, the Northeast, and the nation. Members represent a cross-section of private and public groups interested in marine research, education, and outreach services. Some memberships are permanent, meaning that they are available as representatives of select organizations with which Rhode Island Sea Grant interacts regularly. Other memberships are rotated, on a staggered basis, every two years, allowing opportunity for a variety of interactions over a diversity of issues and interest areas. Our program monitor from the National Sea Grant College Program Office, Fritz Schuler, is an ex-officio member, as are various Rhode Island Sea Grant staff members.

The **University Advisory Committee** (UAC) was established to address issues internal to URI. The purpose of the UAC is to discuss the activities, roles, opportunities, and challenges facing Rhode Island Sea Grant to develop better our program's dynamic relationships with URI. Appointments to the UAC are made by the provost in consultation with the Rhode Island Sea Grant director. The UAC convenes twice a year to discuss Sea Grant's university-related initiatives and potential collaboration or duplication. The UAC also hears about new or proposed activities in marine, coastal, and environmental research, education, and outreach in URI's international, national, regional, state, and local programs.

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Frederick Vincent
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Robert Billington
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Judith Swift
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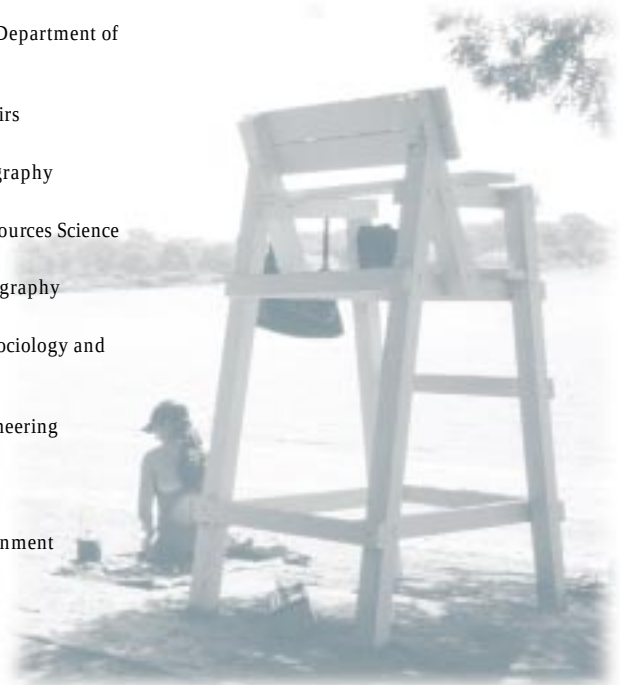

Financial Data

FY 2004 Federal and Matching Funds

	Federal $	Match $
Program Management	286,352	343,789
Program Development	27,874	0
Environmental Literacy Initiative	66,201	35,988
Sustainable Coastal Communities and Ecosystems Program	241,502	125,594
Coastal Community Development Program	61,500	31,623
Sustainable Fisheries Program	256,105	123,483
Communications Program	256,238	10,696

Research Portfolio

	Federal $	Match $
Nixon, Granger, Buckley "Temperature-nutrient interactions in coastal lagoons"	103,012	52,737
Moran, Weiskel, Masterson "Hydrogeologic characterization of groundwater flow patterns in southern Rhode Island's coastal lagoons"	99,372	51,268
Collie, Quinn "Multispecies assessment models for fisheries management"	54,381	32,936
Gold, Groffman, Stolt "Mitigating septic system contamination in urbanizing coastal watersheds"	123,859	61,258
Macy, Durbin "Identification and analysis of multiple populations of longfin squid"	108,556	57,809
Dickson, Ullman, Hebert, Deacutis "The physical, biological, and chemical processes underlying hypoxia in upper Narragansett Bay"	143,454	93,326
King, Moran, Mather, Boothroyd et al. "BayMap: Imaging and mapping the seafloor, habitats, and the cultural landscape of Narragansett Bay"	123,086	119,839
Bertness, Mullan Elucidating the ecology of brackish and tidal freshwater marshes	113,515	49,373
Totals	**2,065,007**	**1,189,719**

FY 2005 Federal and Matching Funds

	Federal $	Match $
Program Management	280,973	349,414
Program Development	22,000	0
Environmental Literacy Initiative	24,100	0
Legal Program	35,083	10,000
Sustainable Coastal Communities and Ecosystems Program	241,500	129,868
Coastal Community Development Program	50,000	29,124
Sustainable Fisheries Program	256,651	124,815
Fisheries Extension Enhancement Initiative	12,869	0
Communications Program	256,053	11,025

Research Portfolio

	Federal $	Match $
Nixon, Granger, Buckley "Temperature-nutrient interactions in coastal lagoons"	102,832	52,737
Moran, Weiskel, Masterson "Hydrogeologic characterization of groundwater flow patterns in southern Rhode Island's coastal lagoons"	100,091	53,319
Collie, Quinn "Multispecies assessment models for fisheries management"	58,844	34,089
Gold, Groffman, Stolt "Mitigating septic system contamination in urbanizing coastal watersheds"	127,288	63,117
Macy, Durbin "Identification and analysis of multiple populations of longfin squid"	134,362	65,124
Dickson, Ullman, Hebert, Deacutis "The physical, biological, and chemical processes underlying hypoxia in upper Narragansett Bay"	132,700	50,810
King, Moran, Mather, Boothroyd et al. "BayMap: Imaging and mapping the seafloor, habitats, and the cultural landscape of Narragansett Bay"	119,328	123,339
Bertness, Mullan "Elucidating the ecology of brackish and tidal freshwater marshes"	96,933	50,854

Hands-on experience with active research or management projects gives URI undergraduate students a structure for their academic, professional, and personal goals.

Sea Grant
Rhode Island

Rhode Island Sea Grant College Program Publications

To speak with someone about any of the projects funded by the Rhode Island Sea Grant College Program, please contact:

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