

2005-2007 Implementation Plan

Ohio Sea Grant

College Program

including
F.T. Stone Laboratory

the
Center for Lake Erie
Research (CLEAR)

and the
Great Lakes Aquatic
Ecosystem (GLAERC)

28 April 2005




Sea Grant
Ohio Sea Grant College Program

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**OHIO
STATE**
UNIVERSITY

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This document describes how the Ohio Sea Grant College Program intends to implement its Strategic Plan (2005-10) from 2005-07. The format follows the Strategic Plan which is available on our web site (www.sg.ohio-state.edu) showing each of the goals and objectives followed by the actions we will take to implement the plan. We have also inserted research, education, and outreach projects that will be funded by the program during the two year period following the appropriate goals and objectives to show how our projects will also implement our strategic plan. This is a living document that will be available on our web site where it can be quickly updated as new goals, objectives, actions, and projects are added during the life of the Strategic Plan.

Planning Process

In addition to focusing on priorities and actions for the future, our planning process included a number of self-evaluation activities designed to evaluate and improve the operation and effectiveness of the program. These activities included: focus group meetings with our Sea Grant Extension Advisory Committees, the Director's Advisory Council, the Great Lakes Aquatic Ecosystem Research Consortium, and the Friends of Stone Laboratory to review our efforts and priorities; one-on-one meetings between the director and each staff member to discuss their position and ideas; semi-annual meetings among the groups responsible for the program at Stone Laboratory (the academic program, Physical Facilities, and the Office of Student Affairs); and quarterly/monthly meetings of the Sea Grant Extension and Communication staff.

Funding Issues

The guidance we received from our Forum of Investigators (investigators who had been funded or submitted proposals to the program) and the Director's Advisory Council is summarized below and will be implemented.

We should continue to encourage and reward:

- Projects that address critical needs and current issues;
- Projects that support graduate and undergraduate students;
- Principal investigators who donate their time so that more students can be supported, but we should allow up to \$5,000 for investigator salaries;
- Collaboration and cooperation with management agencies to assure that research, education, and outreach efforts are addressing management needs;
- Collaboration with the private sector;
- Leadership of, and participation on, regional research, education, and outreach programs; and,
- Sea Grant Outreach involvement on research projects.
- Every proposal should include an outreach component, and we will also continue to require principal investigators to prepare at least one article for the popular press in addition to their normal scientific publications.

Strategies to Receive External Input

When the National Oceanic and Atmospheric Administration (NOAA) and NOAA Sea Grant developed new strategic plans for the period 2003-08, we felt it was important to revise and update our plans to reflect the format and logic of the national plans to show how national priorities were being addressed locally in Ohio. The major effort in this regard was to modify our structure so that our priorities fit into the 11 Sea Grant Thematic Areas. To this end, we worked with our private-sector advisory committees to develop a consensus-based ranking of NOAA Sea Grant's 11 thematic areas as they relate in importance to Ohioans and resource users within the Lake Erie watershed. It is no coincidence that the thematic areas that were ranked most highly by our advisory committees correlate to the greatest number of research projects funded through Ohio Sea Grant in our previous implementation plan—2004-06.

We also felt it was very important that the new NOAA Strategic Plan include Great Lakes priorities. In this regard, we were instrumental in having a NOAA hearing on Great Lakes priorities moved from Boulder, Colorado to Cleveland, Ohio. We then worked hard to be sure the hearing was well attended and assisted our Congressional Delegation in preparing comments on the plan. We also worked successfully to have Great Lakes issues incorporated into the NOAA Sea Grant Strategic Plan. Having done these things, it was very easy to mold our priorities into those of NOAA and NOAA Sea Grant.

In developing our new plans, we felt it was also important to address the nine priorities set by the Great Lakes Governors, the academic plan of The Ohio State University (OSU), and the recommendations in the Ocean Commission Report. We partnered with the Great Lakes Commission, Ohio Environmental Protection Agency (OEPA), and the Ohio Department of Natural Resources (ODNR) to host a public hearing in February 2004 at Cuyahoga County Community College to gather input to improve the Governors' priorities. To aid the process to evaluate the Governors' priorities, we also developed a survey on Ohio Sea Grant's web site and were very pleased to have 187 people complete the survey. Our conceptualization of the intersection of the Governors' priorities and NOAA Sea Grant's 11 thematic areas was mapped by Ohio Sea Grant extension agents, incorporating input from their advisory committees (Table 1). All of this information has been incorporated into our new strategic and implementation plans.

Funding Priorities

This implementation plan follows the 11 Sea Grant thematic areas: 1) aquaculture, 2) biotechnology, 3) coastal communities and economies, 4) coastal natural hazards, 5) digital ocean, 6) ecosystems and habitats, 7) fisheries, 8) marine and aquatic science literacy, 9) seafood science and technology, 10) urban coasts, and 11) aquatic invasive species. We consider all of these areas to be very important and will certainly support projects in all of them during the next five years. However, they are not all of equal importance to our situation in Ohio. As noted above, we used focus group sessions with each of our Sea Grant Extension Advisory Committees and the Director's Advisory Council (five meetings between 18 November 2004 and 10 January 2005) to gather input to assist us in prioritizing work in these 11 areas, and all members of our advisory committees were able to review the document at least twice during the editing process. The rankings that we developed for the 11 areas, and the rankings that will be used to prioritize our work for the next five years, are listed below in priority order. There is a considerable amount of overlap among the 11 thematic areas. Therefore, readers are encouraged to scan all of the thematic areas to fully understand our goals and objectives. For example, "reducing non-point source pollution" appears in the Urban Coasts thematic area, but it is an issue associated with any coastal community and an issue readers might expect to find in the Ecosystems and Habitats thematic area.

High-Priority Areas

- Ecosystems and Habitats
- Aquatic Invasive Species
- Fisheries
- Coastal Communities and Economies

Medium-Priority Areas

- Biotechnology
- Marine and Aquatic Science Literacy
- Urban Coasts
- Aquaculture

Low-Priority Areas

- Coastal Natural Hazards
- Digital Ocean
- Seafood Science and Technology

Table 1: Relationship Between Sea Grant’s Thematic Areas and Great Lakes Governors’ Priorities

Great Lakes Governors’ Priorities	Sea Grant Thematic Areas										
	Aquaculture	Biotechnology	Coastal Communities & Economies	Coastal Natural Hazards	Digital Ocean	Ecosystems & Habitats	Fisheries	Marine & Aquatic Science Literacy	Seafood Science & Technology	Urban Coasts	Aquatic Invasive Species
Ensure sustainable water use and diversions	X	X		X		X		X			
Protect human health		X	X			X		X	X	X	
Control pollution		X	X			X		X		X	
Reduce the introduction of toxins		X				X		X		X	
Stop aquatic invasive species	X					X	X	X			X
Restore/protect coastal habitat						X	X	X		X	
Restore Areas of Concern		X	X			X		X		X	
Standardize information management					X			X			
Adopt sustainable use practices	X		X			X	X	X		X	

Implementation Plan 2005-07

I. Aquaculture

A. Culture system technology development

1. Goal: Support technological development to stimulate aquaculture in Ohio.

a. Objective: Cooperate with OSU Piketon Aquaculture Research and Extension personnel to develop new technologies and inform the Ohio aquaculture industry to improve decision-making.

(1) Action: F. Snyder and will develop and maintain a working relationship with the OSU Piketon Research and Extension Center to assist in the production and dissemination of educational material and programs for aquaculturists in Ohio.

(2) Action: F. Snyder will serve as an advisor for the OSU Piketon Aquaculture Research and Extension Center's new Bowling Green aquaculture research facility and for projects developed by the OSU Lima Extension Center.

Research Project

Impact of Latitude on Freshwater Shrimp Culture in Ohio (project **R/A-17-PD**); Donald McFeeters, Laura Tiu, & Geoff Wallat, The Ohio State University Extension-South Centers; Jeffrey M. Reutter, Ohio Sea Grant; May 2003-February 2005.

b. Objective: Eliminate aquatic invasive species (AIS) in live fish shipments by educating the haulers, including aquaculturists and bait dealers.

(1) Action: F. Snyder will conduct AIS-Hazard Analysis Critical Control Point (HACCP) training workshops in Ohio and other states to promote the adoption of HACCP procedures in live fish transfer.

c. Objective: Increase Ohio's production of farm-raised crayfish and baitfish and assist producers in expanding markets for these products.

(1) Action: F. Snyder, D. Kelch, and F. Lichtkoppler will assist aquaculturists to obtain needed information and put them in contact with the Piketon Research and Extension Center.

B. Nutrition and feeds

1. Goal: Enhance Ohio aquaculture productivity by improving our understanding of fish nutrition and developing new feeds.

a. Objective: Support research to refine diets to optimize growth, survival, and egg production and quality of cultured animals.

Research Projects

Relationship Between Lake Erie Walleye Gamete Viability and Concentrations of Vitamins B1 in Eggs and Sperm (project **R/A-18-PD**); Konrad Dabrowski, Roy Stein, & Jacques Rinchar; The Ohio State University; March 2004-May 2005.

Effect of a Fishmeal-Free Diet on the Growth and PCB Levels of Freshwater Shrimp in Ohio (project **R/A-19-PD**); Donald J. McFeeters, Laura Tiu, & Geoff Wallat; The Ohio State University—Centers at Piketon; May 2004-April 2005.

C. Genetics of cultured species

1. Goal: *Improve production by applying state-of-the-art genetic manipulation to cultured aquatic species.*

a. Objective: Develop optimal strategies for transgenic research on cultured species.

b. Objective: Identify gene complexes responsible for reproduction, growth, disease resistance, and other desirable traits

D. Health and disease

1. Goal: *Develop healthier cultured stocks by improving our understanding of immune systems and by developing vaccines, improved diagnostics for aquatic pathogens and parasites, and new therapeutic treatments.*

a. Objective: Support research to develop and evaluate vaccines for fish and shellfish diseases.

Research Project

A combinatorial Approach to Vaccine Development for Fish (project **R/BT-7**), Richard Sayre, The Ohio State University, March 2003-February 2005.

E. Stock enhancement

1. Goal: *Investigate the use of cultured organisms to support or enhance wild stocks, and develop a solid understanding of the impacts of hatchery-produced fish on wild assemblages and ecosystems.*

II. Biotechnology

A. Marine natural products

1. Goal: *Support research to discover, evaluate, and synthesize innovative natural products from aquatic and coastal organisms.*

B. Biomolecular processes discovery

1. Goal: *Support research to enhance our understanding of bioluminescence, biofouling, biocorrosion, biofilm function, and symbiosis in order to develop antifouling and anticorrosion products.*

a. Objective: Develop and disseminate new technologies to safely and effectively deal with the adverse effects of biofouling.

(1) Action: Network with other Great Lakes Sea Grant programs to develop and disseminate new information on corrosion biofouling in the Great Lakes.

C. Marine environmental biotechnology

1. Goal: *Develop accurate means to predict the impacts of stressors on aquatic organisms and strengthen indices of coastal ecosystem health through the development of novel biosensors.*

a. Objective: Use marine biotechnology to develop biosensors for biological and chemical monitoring.

2. Goal: *Develop and disseminate new technologies that are safe and capable of detecting, removing, and/or detoxifying contaminants in a cost-effective manner.*

a. Objective: Use marine biotechnology to remove and/or recover valuable materials from industrial waste streams, disposal facilities, and lake sediments.

(1) Action: Encourage biotechnological research on *Chlamydomonas* for use in removing heavy metals from water and sediments, seek opportunities to commercialize this work, and develop partnerships and/or collaborative agreements with the private sector and state and federal agencies.

Research Project

Development of Fluorescent Biosensors for In Situ Trace-Metal Quantification and Biomonitoring (project **R/BT-8**), Richard Sayre, the Ohio State University, June 2003-May 2005.

D. Marine resource management

- 1. Goal:** *Develop new tools to characterize economically important fisheries at the molecular-genetic level by promoting research to identify fish larvae or provide fine-scale delineation of key stocks.*

III. Coastal Communities and Economies

(The National Sea Grant College Program considers "Urban Coasts" [P. 25] to be a separate thematic area. As a result, we have listed it that way in this plan. However, within Ohio Sea Grant, we consider this thematic area to be a subset of the "Coastal Communities and Economies" thematic area and the goals and objectives in each of these thematic areas are appropriate for both. In the future we expect the National Program to combine these areas.)

A. Improve coastal planning, educate planners, build leadership, and develop decision-support systems

- 1. Goal:** *Promote community revitalization, implementation of growth management strategies, sustainable development, land use planning, watershed planning, and the protection and restoration of coastal resources.*

a. Objective: Increase recreational access to Lake Erie.

- (1) Action:** Assist coastal communities with planning to upgrade coastal parks, beaches, and marina facilities; e.g., F. Snyder will assist the mayor of Port Clinton, Ohio in the planning and establishment of a municipal transient marina, and F. Lichtkoppler will assist the Lake County Coastal Planning Committee in implementing the Lake County Coastal Development Plan to increase public access to Lake Erie.

b. Objective: Collaborate/lead efforts with the Ohio Department of Natural Resources (ODNR), Ohio Environmental Protection Agency (OEPA), Ohio Lake Erie Commission (OLEC), OSU Extension, and local communities to develop watershed management plans for every Lake Erie watershed in Ohio.

- (1) Action:** Assist in developing collaborative funding options with state agencies to support research that evaluates the economic and environmental impact of a variety of developmental strategies within coastal watersheds.

c. Objective: Develop proactive strategies for wetland preservation, riparian stream buffer acquisition, and other programs for improving water quality in coastal watersheds and Lake Erie in collaboration with local watershed action groups.

- (1) Action:** Assist coastal advisory councils (Grand River Partners, Chagrin River Partners, Ashtabula River Foundation, Portage River Basin Council, Maumee River Remedial Action Plan [RAP], OLEC, Great Lakes Commission, et al.) working to protect and improve Lake Erie tributaries and their drainage basins.

- (2) Action:** F. Snyder will represent Ohio Sea Grant on the Ohio Lake Erie Buffer Team and will conduct public awareness programs regarding buffers in Ohio and other Great Lakes states.

(3) Action: J. Hageman will coordinate a cooperative arrangement between the State Council of Pheasants Forever and the Ohio Department of Transportation to manage state roadside right of ways by planting native prairie plant species and delaying mowing until after small game nesting seasons. This action will improve Lake Erie water quality by reducing non-point source run-off and erosion and decrease roadside maintenance costs for taxpayers.

d. Objective: Develop proactive strategies to improve water quality in Lake Erie.

(1) Action: All agents will disseminate information on land use planning and land use impacts on water quality to interested citizens and public officials.

e. Objective: Disseminate information on new technologies for energy production and assist communities in decision making regarding these technologies.

(1) Action: Participate in discussions regarding wind power in and around Lake Erie and the Great Lakes.

(2) Action: J. Lucente will serve as Ohio Sea Grant's representative in working with the Great Lakes Coastal Community Development Network to conduct a conference/symposium on emerging issues related to renewable energy resources in the Great Lakes.

f. Objective: Assist in conducting the Ohio Business Retention & Expansion (R&E) Programs in coastal counties.

(1) Action: J. Lucente and W. Williams will assist with the R&E programs conducted within their counties of responsibility.

(2) Action: J. Lucente will serve as a certified consultant in Business R&E to aid Ottawa County in conducting a retail, service, and tourism sector business retention and expansion survey of existing coastal businesses.

(3) Action: J. Lucente will collaborate with the Ohio Business R&E Initiative, University of Toledo, Bowling Green State University, and Toledo Botanical Garden in conducting a five-county greenhouse industry business retention and expansion survey to help coastal greenhouse growers pool resources, increase efficiency, and improve their competitiveness in the global marketplace.

(4) Action: J. Lucente will provide education and outreach to extension and other economic development professionals by providing instruction on conducting a business R&E program in their respective areas of Ohio.

(5) Action: W. Williams will work with neighborhood or area organizations and develop cluster groups, electronic surveys, and other tools for urban R&E program development.

2. Goal: *Support research to expand our understanding of the biological, physical and socio-economic importance of coastal Lake Erie (including biodiversity and biocomplexity) and train coastal decision-makers to use this science-based information to improve management.*

a. Objective: Support research and dissemination of information to enhance understanding of how land-use policies structure the demand for lakeshore and near-lakeshore development.

(1) Action: J. Lucente will partner with various agencies to develop a statewide conference that provides education for coastal planning and decision making related to sustainable development in the Lake Erie watershed and other Ohio communities.

(2) Action: All agents will work to help resolve user conflicts by providing research-based information to inform the public debate and aid in community decision making.

Research Projects

The Influence of Water Quality and Lake Amenities on the Demand for Residential Development around Lake Erie (project **R/ME-30**), Elena Irwin & Tim Haab, The Ohio State University, March 2004-February 2005.

Large Lake Ecosystems: Modeling Interactions Among Human, Biological, and Physical Processes (project **R/EM-27**); David A. Culver, Keith W. Bedford, Elena G. Irwin, & Alan Randall; The Ohio State University; & Jeffrey M. Reutter; Ohio Sea Grant; Sept. 2004-Aug. 2009.

b. Objective: Increase the awareness and knowledge level of elected officials about coastal Great Lakes and Lake Erie issues.

(1) Action: Develop and/or host educational seminars or field trips that focus on environmental problems facing Lake Erie and the State of Ohio as part of the Coastal Training Program: a partnership between the Ohio Coastal Management Program, Old Woman Creek National Estuarine Research Reserve, and Ohio Sea Grant.

(2) Action: Organize and host Ohio Sea Grant's State Legislature/Congressional Day on Lake Erie.

3. Goal: *Train community planners, business leaders, and citizens to use science-based tools more effectively in the decision making process, and help leaders in government, industry, and academia to understand the economic and environmental consequences of their choices in land use, energy and water use, and coastal building design.*

a. Objective: Provide training for local leaders to support the design of sustainable economic development strategies for coastal businesses.

(1) Action: Each Sea Grant Extension agent will initiate contact with county commissioners, mayors, township trustees, chambers of commerce, community improvement corporations, planning commissions, etc. to provide informal outreach education and to assist in providing formal outreach relating to coastal economic development.

(2) Action: J. Lucente will work with extension professionals and other pertinent organizations to develop a sustainable development training model to provide outreach and education to business, government, and citizen organizations.

(3) Action: W. Williams will provide leadership within the Small Business Excel team and conduct at least two Excel programs for coastal business each year. Excel teaches basic business management skills for small business managers.

(4) Action: J. Lucente will partner with the Great Lakes Sea Grant Network Coastal Community Development Specialist Team to develop training, education, and outreach activities related to sustainable development and decision making processes applicable to the Great Lakes.

(5) Action: J. Lucente will partner with the Greater Toledo Area Chamber of Commerce to continue the "Leadership Academy" for elected, appointed, and volunteer community leaders.

4. Goal: *Develop decision-support tools to help decision makers utilize the vast array of information available to communities and help the marine-trades industry in tourism-dependent communities manage boat-congested waterways, design small-harbor dredging strategies, and maintain a quality recreational environment.*

a. Objective: Increase the profitability of marine businesses through business and technology research, education, and outreach.

- (1) Action:** F. Lichtkoppler will work with OSU Extension, Lake Erie Marine Trades Association (LEMTA), and others to document and develop the ongoing boat sales report project with new OSU Extension, ODNR Division of Watercraft, and LEMTA personnel as retirements occur.
- (2) Action:** F. Lichtkoppler will partner with economic researchers to upgrade and refine figures on the economic impact of boating in Ohio and develop a summary paper of the boat title sales data project for the period 1993 to present in cooperation with the ODNR Division of Watercraft and LEMTA.

Research Project

Estimating the Spatial and Temporal Benefits of Recreational Boating and Angling in the Lake Erie Basin (project **R/ME-28**), Timothy C. Haab, The Ohio State University March 2002-February 2004.

Extension Projects

International Leadership Development for Coastal Decision Makers (project **A/EP-10-PD**), Joseph Lucente, Ohio Sea Grant, November 2004-January 2005.

Dike 14 Field Guide (project **A/P-7-PD**), Walter Williams, Ohio Sea Grant, April 2005-June 2005.

5. Goal: *Support communities in making smart choices that unite economic development with the protection of the quality of coastal life, e.g., developing tourism and nature-based recreation, to offset economic declines in other areas.*

a. Objective: Increase profitability in the charter fishing industry through business and technology development and education.

- (1) Action:** F. Snyder will conduct the Ohio Charter Captains Conference annually.
- (2) Action:** F. Snyder will assist charter fishing operators and other marine businesses to incorporate new technology.
- (3) Action:** F. Lichtkoppler will conduct business surveys of charter captains at 4-5 year intervals.
- (4) Action:** K. Riesen's new Ohio Sea Grant Fisheries Extension Advisory Committee will develop strategies to increase participation in angling and boating.

b. Objective: Improve the decision-making process regarding the development and retention of coastal recreation businesses.

- (1) Action:** K. Riesen will assist the charter fishing industry in developing new marketing strategies directed at underrepresented audiences.
- (2) Action:** Support research and outreach efforts to determine the economic and environmental impacts of various types of coastal recreation to assist resource managers.
- (3) Action:** F. Snyder and F. Lichtkoppler will continue to provide leadership and serve on the board of Lake Erie Coastal Ohio, Inc. and its mission to develop and advocate for resource-based tourism.
- (4) Action:** D. Kelch will continue to serve on the Lorain County Visitors Bureau Board of Directors.
- (5) Action:** D. Kelch and J. Lucente will work with the Maritime Archeological Survey Team (MAST), state agencies, and private dive organizations in the placement of tether buoys on shipwrecks for both shipwreck protection and diver safety.

c. Objective: Enhance Lake Erie and Great Lakes regional tourism.

(1) Action: F. Lichtkoppler and F. Snyder will participate on the leadership team to secure federal designation and implement a management plan for the Lake Erie Coastal Trail Scenic Byway.

d. Objective: Investigate opportunities for development of new recreational activities and businesses on Lake Erie.

(1) Action: D. Kelch and J. Lucente will develop a "Lake Erie Shipwreck Trails Guide" to be used by divers, students, and teachers.

(2) Action: D. Kelch and J. Lucente will coordinate efforts to enhance eco-tourism through the development of a Lake Erie Underwater Trailways educational program, focused on Lake Erie's maritime heritage and targeting both divers and non-divers.

(3) Action: J. Lucente and D. Kelch will explore the feasibility of helping local dive shop operations expand to provide services based on increased diver visitation as a result of the Lake Erie Underwater Trailways project.

(4) Action: D. Kelch and J. Lucente will explore the potential for Lake Erie charter captains to expand operations through scuba charters.

(5) Action: J. Hageman and J. Jentes will revise and refine an "Island Field Guide/Passport" to increase family-oriented tourism opportunities on the Lake Erie Islands.

(6) Action: F. Snyder will assist ODNR in transient marina development.

(7) Action: J. Hageman will coordinate efforts with Lake Erie Wing Watch to expand participation and economic benefits of bird watching.

e. Objective: Provide outreach education and assistance to county visitors bureaus in the marketing and development of tourism on Ohio's North Coast.

(1) Action: All Sea Grant Extension agents will develop formal linkages with the visitors' bureaus in their respective counties and assist the directors of these bureaus in the development of marketing strategies.

(2) Action: J. Lucente will assist the Toledo Area Convention and Visitors Bureau in the development and publication of the "Western Lake Erie Waterfront Guide."

f. Objective: Support the Lake Erie marine trades industry, and other tourism related businesses.

(1) Action: As part of the Ohio Clean Marinas Program, D. Kelch and F. Snyder will provide marina operators with current and appropriate in-water weed control procedures through personal contact and Clean Marinas publications and workshops, as appropriate.

(2) Action: As fishing activity decreases, D. Kelch, J. Lucente, and K. Riesen will assist fishing businesses to refocus on the development of new business activities focused on non-fishing such as dinner cruises, island cruises, scuba diving, snorkeling, etc.

g. Objective: Increase safety for recreational and scientific divers.

(1) Action: M. Thomas will supervise a Diving Safety Program for Stone Laboratory and all Ohio Sea Grant research.

B. Resource valuation

1. Goal: Assist coastal communities to examine their natural resources and support research to quantify the economic value of goods and services (including fisheries, recreation, waste assimilation, erosion/flood control, and biological diversity) derived from those resources as a critical component of coastal planning.

a. Objective: Generate databases of public opinions, attitudes, and values as they relate to marine and aquatic issues to guide future research, education, and outreach activities and to inform management decisions.

(1) Action: Conduct periodic socio-economic research with coastal recreational users.

(2) Action: F. Lichtkoppler will partner with others to help conduct applied socio-economic research on citizen (voter) willingness to pay for environmental amenities and environmental improvements such as green space preservation, recycling programs, and environmental cleanups as requested by local authorities and will share the results with citizens, local officials, resource managers, and the scientific community.

(3) Action: D. Kelch will continue to work with others in proposing and conducting socio-economic research efforts related to valuation of Lake Erie fisheries, specifically tributary stream steelhead.

(4) Action: D. Kelch will work with coastal visitor bureaus in developing programs to enhance off-season eco-tourism through promotion of tributary steelhead angling.

(5) Action: Ohio Sea Grant Extension, Communications, and Management will share research results with state and regional management agencies and professional associations and gather input from them to aid in prioritizing future research.

C. Constructing indicators of sustainable development

1. Goal: Develop an integrated set of economic, environmental, and social indicators that track progress toward sustainable development.

a. Objective: Develop models to predict the effects of land-use choices on coastal ecology.

(1) Action: J. Lucente will represent Ohio Sea Grant on the Ohio Balanced Growth Roundtable Steering Committee and work with the Great Lakes Commission, OLEC, and Cleveland State University to develop programmatic, land-use, and water quality indicators to measure the effectiveness of the Lake Erie Balanced Growth Initiative.

Research Project

Developing a Spatial Watershed Model to Predict the Effects of Watershed Policies on Coastal Water Quality and Habitat Change (project **R/EM-23**), Jay F. Martin, The Ohio State University, March 2003-February 2005.

b. Objective: Utilize specialists and educators from all program areas in Ohio State University Extension to create a comprehensive and functioning sustainable development outreach team.

(1) Action: F. Snyder and J. Lucente will develop a sustainable development outreach team through the OSU Extension Center at Lima with projects impacting audiences in Agriculture and Natural Resources, Food and Consumer Sciences, Community and Economic Development, Sea Grant, 4-H/Youth, and Horticulture.

IV. Coastal Natural Hazards

A. Reducing the loss of life and property

1. Goal: *Reduce the loss of life and property from coastal natural hazards.*

a. Objective: Improve the ability of local governments and emergency management agencies to alert citizens and businesses to threats stemming from storms and fluctuating water levels.

(1) Action: Provide news releases, alerts, web pages, and personal assistance to agencies and local officials on critical storm and water level information, including the Great Lakes Forecasting System.

(2) Action: Conduct workshops to inform local emergency response agencies and interested citizens about increased potential for flooding and erosion under high water conditions.

b. Objective: Support research to create new technologies for disaster remediation and prevention and develop techniques for risk assessment and cost benefit analysis.

B. Shoreline change

1. Goal: *Improve our ability to understand, measure, and predict lake level and shoreline change and their implications.*

a. Objective: Improve the ability of state and local governments to identify and remove coastal navigation hazards and to understand the impact of water-level fluctuations.

Research Project

Examining the Effects of Lake Water Level Variations on Sediment Resuspension (project **R/ES-7**), Diane L. Foster, The Ohio State University, March 2003-February 2005.

b. Objective: Increase boater awareness of navigation hazards associated with fluctuating lake levels.

(1) Action: All agents will provide information on lake levels, navigation hazards, and safe boating skills to the public.

(2) Action: D. Kelch will teach safe boating skills and identification of navigation hazards at 4-H Sea Camp.

V. Digital Ocean

A. GEOSS, GOOS, IOOS, GLOS, NFRA

1. Goal: *Provide support and leadership of national, regional and local efforts to develop the Global Earth Observation System of Systems (GEOSS), the Global Ocean Observation System (GOOS), the Integrated Ocean Observation System (IOOS), the Great Lakes Observation System (GLOS), and the National Federation of Regional Associations (NFRA).*

a. Objective: Encourage and lead National, Great Lakes, and Ohio Sea Grant involvement in GOOS, IOOS, GLOS, and the NFRA.

(1) Action: J. Reutter will develop and lead the NOAA Sea Grant IOOS Work Group.

(2) Action: J. Reutter will continue to serve on the National GOOS Steering Committee, the GLOS Steering Committee, and the NFRA.

2. Goal: *Implement IOOS as a national program funded by Congress and GLOS as the federally funded Great Lakes Regional Association within IOOS, and seek appropriate roles for Sea Grant within these systems.*

a. Objective: Support the NFRA and other groups seeking federal funding for IOOS within the federal budgets of NOAA and the Office of Naval Research.

b. Objective: Lead efforts to develop a leadership role for Sea Grant in GOOS, IOOS, and regional

association education and outreach programs and find the appropriate role for Sea Grant research within these programs.

(1) Action: J. Reutter will continue to lead national and regional efforts through the Sea Grant IOOS Work Group and the Great Lakes Sea Grant Network to see that Sea Grant's expertise is recognized and utilized.

c. Objective: Collaborate/lead efforts with NOAA's Great Lakes Environmental Research Lab (GLERL) and International Joint Commission (IJC) to develop a buoy system within the Great Lakes as part of GLOS.

(1) Action: J. Reutter will continue to lead efforts within the Council of Great Lakes Research Managers (CGLRM) of IJC to develop proposals and strategies to place monitoring buoys throughout the Great Lakes to improve our physical and biological monitoring and forecasting ability.

d. Objective: Support research to develop new technologies to remotely measure and forecast biological and physical variables within the Great Lakes, and to transmit this information to shoreline facilities, develop a regional repository for the data that is part of a national network, and develop the ability to transmit raw data and data products rapidly to users.

e. Objective: Develop an outreach program to identify potential users of GLOS, determine their needs, and help the general public and users understand the implications, uses, and values of a high-tech observation system for Lake Erie, the Great Lakes, and the oceans.

(1) Action: All agents will work with potential GLOS users to help determine client needs and desires for GLOS information.

B. Climate and ecosystem forecasting

1. Goal: Partner with agencies to develop techniques to detect and forecast climate and ecosystem changes that occur over decades, examine how these changes affect populations and communities, and construct ecosystem models that lead to forecasts to improve Great Lakes management.

a. Objective: Develop techniques to detect and forecast climate and ecosystem changes that occur over decades.

b. Objective: Develop improved fishery forecasts and management strategies in collaboration with management agencies.

(1) Action: Participate in the GLOS Steering Committee and assure that fishery forecasts are a part of GLOS.

VI. Ecosystems and Habitats

A. Understand the impact of and reduce stresses on coastal systems

1. Goal: Support research to improve our ability to understand and forecast ecosystem changes in Lake Erie caused by stresses to the system and reduce the impact of these stresses with particular emphasis on fisheries, harmful algal blooms, nutrient and contaminant loading, sewage outflows, and the Central Basin Dead Zone.

a. Objective: Unravel the Lake Erie food web and the trophic pathways of nutrients and contaminants in the system.

Research Projects

Modeling Smallmouth Bass Consumption of Round Goby in Lake Erie: Implications for Predator Growth and Contaminant Transfer (project **R/ER-55**); Roy Stein, Elizabeth Marschall, Susan W. Fisher, & Gene W. Kim; The Ohio State University; March 2000-February 2005.

Role of Detritivores in PCB Trophodynamics in the Western Basin of Lake Erie (project **R/PS-28**), Robert H. Findlay, Miami University, March 2002-February 2005.

Mercury in the Water and Phytoplankton of Western Lake Erie (project **R/PS-36**), W. Berry Lyons, The Ohio State University, March 2005-February 2007.

b. Objective: Develop and disseminate new technologies that are safe and capable of detecting, removing, and/or detoxifying contaminants in a cost-effective manner.

Research Projects

Heavy Metal Bioremediation Using Genetically Altered Biomass (project **R/BT-6**), Richard Sayre, The Ohio State University, March 2000-February 2006.

Sonochemical Desorption of Mercury Laden Sediments, (project **R/PS-26**); Linda K. Weavers, Samuel J. Traina, & Patrick G. Hatcher; The Ohio State University, March 2000-February 2005.

Advanced Treatment Process for the Removal of Cyanobacterial Toxins from Drinking Water (project **R/PS-31**), Harold W. Walker, The Ohio State University, March 2003-February 2006.

Preliminary Data to Evaluate the Use of Precursor 16S rRNA as an Indicator of Viable Water-borne Pathogens in the Environment (project **R/EM-26-PD**), Daniel B. Oerther, University of Cincinnati, April 2004-March 2005.

c. Objective: Develop and evaluate new technologies to remove and/or detoxify contaminants in Areas of Concern.

(1) Action: Continue to solicit and support research to develop and evaluate new technologies, e.g. sonication to remove metals from sediment.

Research Projects

Sonochemical Desorption and Destruction of Contaminant Mixtures from Sediments (project **R/PS-30**), Linda K. Weavers, The Ohio State University, March 2003-February 2005.

Evaluation of Dewatering Strategies for PCB-Contaminated Sediments in the Great Lakes Region (project **R/PS-34**); Patrick J. Fox, John J. Lenhart, & Linda K. Weavers; The Ohio State University; March 2004-February 2006.

d. Objective: Support and participate in regional efforts through the Great Lakes Commission, USEPA, and the Council of Great Lakes Governors to bring about restoration and recovery of the Great Lakes ecosystem.

(1) Action Ohio Sea Grant's Strategic and Implementation Plans will recognize and give priority to the nine priorities of the Council of Great Lakes Governors and the Lake Erie Restoration Plan of the Lake Erie Commission.

B. Coastal watersheds

1. Goal: *Develop integrated watershed approaches that engage researchers and coastal communities to pursue the common goal of managing watersheds in a sustainable fashion by developing the science-based information needed to predict changes in coastal ecosystems and habitats arising from changes in land and water use in watersheds.*

a. Objective: Develop the necessary scientific information to manage Lake Erie as an ecosystem.

(1) Action: J. Reutter will participate on the Lake Erie National Science Foundation-supported biocomplexity project to model biocomplexity within large lakes and will support and/or lead efforts within the IJC and other regional and state agencies/groups to understand and model the Lake Erie ecosystem to assist managers and improve management of the system.

Research Projects

Origin and Fate of the Organic Matter Exchanged Between Coastal Wetlands and the Great Lakes (project **R/EM-22**), Virginie Bouchard, The Ohio State University, March 2002-August 2005.

Importance of the Microbial Food Web in C-Transfers Through the Base of the Food Web in Great Lakes Plankton Communities (project **R/ER-60**), Robert T. Heath, Kent State University, March 2002-February 2005.

Distribution and Abundance of Fishes in Native and Non-native Macrophytes in Old Woman Creek Estuary (project **R/ER-29-PD**), D. Derek Aday, The Ohio State University, June 2003-May 2005.

Field and Laboratory Tests of the Microbial Shunt Hypothesis of Phosphorus Availability in the Great Lakes (project **R/ER-67**), Robert T. Heath, Kent Stat University, March 2005-February 2007.

Lake Erie Watersnake Recovery Plan Implementation (project **R/ER-69-PD**), Richard King, Northern Illinois University, March 2004-February 2005.

b. Objective: Quantify the impacts of human activities on the aquatic environment and transfer the information to managers to influence the decision-making process at the local community and watershed levels.

(1) Action: Collaborate with management agencies to identify and prioritize research efforts within the Ohio Sea Grant College Program that support watershed management plans.

(2) Action: Assist citizen advisory councils and resource managers with the interpretation of research/scientific information to develop watershed protection, best management practices, and tourism development programs.

C. Conserving and restoring coastal habitats

1. Goal: *Empower coastal communities to undertake well-planned coastal development that preserves, restores, and/or enhances coastal habitats by promoting wetland banking, rehabilitation of brown-fields, stabilization and restoration of beaches, and establishment of protected areas.*

a. Objective: Extend the results of artificial reef research to decision makers considering reef or near-shore construction.

(1) Action: D. Kelch will consolidate information from previous Ohio Sea Grant artificial reef publications into one updated publication, making reference to web site artificial reef sonar images.

b. Objective: Evaluate natural processes and alternative rejuvenation strategies (including wetland mitigation and biotechnology) to improve damaged ecosystems.

(1) Action: Support/encourage research to evaluate the impacts of dams, weirs, and other man-made modifications and the effects of their removal on fish spawning habitat and stream quality.

(2) Action: Define the desired characteristics of functional coastal wetlands.

(3) Action: F. Snyder will assist and facilitate efforts between the ODNR and the City of Fremont, Ohio to negotiate the removal of the Ballville Dam on the Sandusky River.

(4) Action: F. Lichtkoppler will work with the Mentor Marsh Board to improve the Mentor Marsh ecosystem function and values.

Research Projects

Photodegradation of Agricultural Herbicides in Lake Erie Coastal Wetlands (Project **R/PS-29**), Yu-Ping Chin, The Ohio State University, March 2003-February 2005.

Reduction of Agricultural Pesticides in the Sediments of a Coastal Lake Erie Wetland (project **R/PS-35**), Yu-Ping Chin, The Ohio State University, March 2005-February 2007.

c. Objective: Develop and implement Special Area Management Plans (SAMP) for coastal regions in collaboration with the Ohio Coastal Management Program.

(1) Action: F. Lichtkoppler will continue to network with the Mentor Area Regional Coalition (MARC) and continue work on the SAMP for the Mentor Area in cooperation with the ODNR Coastal Management Program.

d. Objective: Support research and outreach efforts on the role and value of wetlands as critical wildlife habitat and in nutrient/contaminant removal, and assist managers in developing appropriate strategies to mitigate wetland loss.

(1) Action: J. Hageman and D. Kelch will work with groups concerned with wetland management, including wildlife related issues, to identify optimum management approaches for coastal wetlands.

VII. Fisheries

A. Partnering to improve fisheries management

1. Goal: *Promote cooperative research between academic scientists and resource managers to improve the science behind the management of Lake Erie's fisheries.*

a. Objective: Support research and outreach efforts to develop and evaluate a variety of fisheries management strategies.

(1) Action: Assist management agencies with conflict resolution and gathering user input.

(2) Action: J. Hageman, as Chairman of the "Ohio Wetlands" executive committee of the Ohio chapter of the American Fisheries Society, will conduct a third, "Diked Wetlands and Fisheries" workshop to encourage the use of Lake Erie's coastal diked wetlands to enhance fish production where practical through the sharing of state-of-the-art management techniques.

b. Objective: Collaborate with ODNR Division of Wildlife on research and outreach efforts to evaluate management strategies, improve fisheries management, and disseminate results.

- (1) Action:** K. Riesen will establish a “Fisheries Extension Outreach Team” (FEOT) representing the ODNR, the Great Lakes Sport Fishing Council (GLSFC), the Recreational Boating and Fishing Foundation (RBFF), the Great Lakes Fishery Commission (GLFC), and others to identify fisheries information needs and opportunities and establish new initiatives to meet those needs and opportunities.

Research Projects

Genetic Structure of Smallmouth Bass Populations from Nuclear and Mitochondrial and Nuclear DNA (project **R/LR-5**), Carol A. Stepien, Cleveland State University, March 2001-February 2005.

Walleye and Yellow Perch Stock Structure in the Great Lakes: A High Resolution DNA Data Base for Fishery Management (project **R/LR-7**), Carol A. Stepien, University of Toledo, March 2004-February 2007.

Employing Trace Element Contents of Otoliths for Fish Stock Discrimination and Habitat Use (project **R/LR-8**), John R. Farver & Jeffrey G. Miner, Bowling Green State University, March 2005-February 2008.

B. Caring for people

1. Goal: *Increase the sale of fishing licenses in Ohio, participation in angling activities, and angler satisfaction, and reduce conflict between anglers and managers.*

a. Objective: Reverse the decline in sport fishing participation, enable fishing businesses to retain clientele, and increase youth participation.

- (1) Action:** K. Riesen will develop youth-oriented sport fishing education programs to be presented at the Lake Erie Nature and Science Center (LENSC), coastal counties and selected inland locations.
- (2) Action:** K. Riesen will conduct youth fishing education programs and coordinate these with related efforts by the RBFF, ODNR Division of Wildlife, the GLSFC, and 4-H.
- (3) Action:** Continue to write Twine Line articles and fact sheets of interest to sport anglers.
- (4) Action:** Conduct seminars about recent changes in Lake Erie and how these changes impact the fishery, fish behavior, and fishing techniques. Other potential topics include fishery biology, fishery management updates, exotic species impacts, and fish consumption advisories.
- (5) Action:** J. Jentes and extension agents will take the lead in organizing Sea Grant Extension displays at the Cleveland Boat Show, Cleveland Sport Show, etc.
- (6) Action:** Write and mail periodic news releases on Lake Erie issues and sport fisheries to key leaders, outdoor writers, and local media contacts.

Extension Project

Fisheries Extension Enhancement: Ohio Sea Grant Fisheries Extension Agent (project **A/EP-9**); Frederick L. Snyder, Frank R. Lichtkoppler, David O. Kelch, & Jeffrey M. Reutter; Ohio Sea Grant, May 2004-April 2006.

b. Objective: Increase the knowledge base and skills of fisheries professionals and help to develop the next generation through the education programs of F.T. Stone Laboratory.

(1) Action: As President-Elect and President of the Ohio Chapter of the American Fisheries Society, E. Braig will work to initiate a student chapter through the faculty of the School of Natural Resources' Forestry, Fisheries, and Wildlife Program at OSU.

(2) Action: J. Hageman and E. Braig will conduct special ichthyoplankton identification workshops to meet the new demand by agency and professional personnel for this skill in response to licensing requirements for power generating facilities to document impacts on the fishery through their water intakes.

(3) Action: Continue to offer undergraduate and graduate fisheries courses at Stone Laboratory and develop scholarships and fellowships to support students in these courses.

c. Objective: Help develop the next generation of private sector citizen fishery leaders through participation in the Great Lakes Fisheries Leadership Institute (GLFLI) and provide leadership of the Ohio and Lake Erie portions of the Institute.

(1) Action: K. Riesen will conduct at least one GLFLI program at F.T. Stone Laboratory annually (2005 program on 7-9 October).

d. Objective: Increase public understanding of science-based fisheries management and the sometimes-controversial fisheries harvest and management practices needed to ensure sustainability of fisheries resources.

(1) Action: K. Riesen will conduct public seminars in all shoreline counties and selected inland areas to keep fisheries resource users abreast of ecological and management information and initiatives.

(2) Action: In collaboration with ODNR Division of Wildlife and the GLFC, K. Riesen will produce printed and digital programs, fact sheets, news releases, presentations, and articles on fish ecology, scientific management principles, multi-state and bi-national management strategies, and related biological information. All materials will be available at the web sites of Ohio Sea Grant, ODNR Division of Wildlife, GLFC, and the GLSFC.

(3) Action: K. Riesen will serve as the LENSOC's resident Lake Erie expert and develop fisheries related educational displays and seminars for presentation at the Center and at other locations along the shoreline.

e. Objective: Increase proficiency among fisheries resource users in identifying and locating sources of fisheries and marine technology information and in using technical information in their own fishing operations.

(1) Action: K. Riesen will produce printed and digital programs, fact sheets, news releases, presentations, and articles on fishing technology, methodology, and related biological information.

(2) Action: K. Riesen will establish a visible presence at fisheries-related public events, sport and boat shows, and other venues to establish the fisheries agent as a well-known fisheries information source.

(3) Action: K. Riesen will work to increase awareness of Lake Erie fishing opportunities, fisheries issues, and technical information to audiences in both coastal and inland counties through news releases and seminars.

- (4) Action:** A web-based Lake Erie Discussion Board will be maintained and linked from the Ohio Sea Grant web site to provide timely answers to questions on Lake Erie topics. All agents will participate in answering questions as appropriate to their areas of specialization.

C. Contaminants and fish consumption

1. Goal: *Reduce exposure to contaminants from eating fish.*

a. Objective: Increase public awareness and understanding of contaminant issues related to Ohio's wild-caught and cultured fish.

- (1) Action:** D. Kelch will develop fact sheets, power point presentations, and other educational materials to inform consumers about fish contaminants and other seafood safety issues, including sport fish consumption advisories.

VIII. Marine Aquatic Science Literacy

A. Create and sustain effective marine and aquatic science-based educational programs

1. Goal: *Develop, offer, and evaluate programs that increase public knowledge and understanding of scientific processes and marine and aquatic science issues, make effective programs available to all formal and informal constituencies, and develop diverse instructional strategies to facilitate effective programs that complement and align with appropriate education standards.*

a. Objective: Provide educational and training opportunities for undergraduate and graduate students that address real-world problems, opportunities, and management needs.

- (1) Action:** Promote and encourage outstanding applicants to apply to fellowship programs, e.g., Knauss Fellowships.
- (2) Action:** As faculty co-advisor to the OSU student group TerrAqua, E. Braig will support their efforts to connect to an established professional society and become a student chapter of the Society for Ecological Restoration International in the 2005-06 school year. He will continue to serve in advisory capacity in future years.
- (3) Action:** Continue to recruit and provide support for undergraduate and graduate students on Sea Grant projects and at Stone Lab.
- (4) Action:** F. Snyder will develop a new undergraduate credit course in Lake Erie sport fishing within the OSU School of Physical Activity and Educational Services to be taught at Stone Lab.
- (5) Action:** Expand information technologies used at Stone Laboratory to include distance learning capability, video, and data sharing for teaching.
- (6) Action:** The Friends of Stone Lab (FOSL) will increase the value of their endowments to support scholarships and fellowships by at least \$1 million by 2010.
- (7) Action:** Provide teaching support on Lake Erie issues, environmental economics, and coastal geologic processes to college students and classes.
- (8) Action:** FOSL will develop new research endowments to support undergraduate and graduate student research with a value of at least \$1 million by 2010.

Management Projects

Ohio Sea Grant Ship Time 2003-06 (project **M/P-09**), Jeffrey M. Reutter, Ohio Sea Grant, August 2003-July 2006.

F.T. Stone Laboratory: A Proposal to Enhance Facilities and Equipment (project **M/P-10**), Jeffrey M. Reutter, Ohio Sea Grant, July 2002-June 2005.

Sea Grant Fellows

LeAnn Southward (E/I-17), February 2004-January 2005

Gene Wook Kim (E/I-18), February 2005-January 2006

b. Objective: Emphasize and reward undergraduate and graduate training on research projects.

(1) Action: Provide this information to investigators developing proposals for Ohio Sea Grant and use student training as a criterion in selecting projects for funding.

c. Objective: Enhance technical and management skills among agency and institution managers by developing education and outreach products and programs in the aquatic and social sciences and emerging coastal issues.

(1) Action: Increase the range of summer offerings at Stone Laboratory to include resource management topics.

(2) Action: Educate and inform resource managers and key decision makers of the most up-to-date research based information on Lake Erie through the use of research seminars, publications, workshops, and the Sea Grant extension services.

(3) Action: Develop and/or host educational seminars or field trips which focus on environmental problems facing Lake Erie and the State of Ohio, including partnering with the FOSL on their Annual Winter Program and summer Open House.

d. Objective: Educate and inform citizens of the most up-to-date research based technical information on Lake Erie.

(1) Action: All agents will help inform citizens on current Lake Erie technical issues, problems, and opportunities.

(2) Action: Research will continue to be highlighted within Twine Line.

(3) Action: E. Braig will continue to sit on the steering committee for OSU Extension's new Master Naturalist volunteer program to ensure that current Lake Erie issues are represented in aquatic curricula for volunteer training.

e. Objective: Create opportunities for exceptional students to participate in real-world aquatic research and educational experiences.

(1) Action: FOSL will continue to judge at State Science Day and award scholarships to at least six high school students per year.

f. Objective: Improve the facilities and capabilities of Stone Laboratory and increase scholarship support for students and teachers.

(1) Action: Utilize the Dunlap Fund for Education, Outreach and Development to enhance development activities for Stone Laboratory.

g. Objective: Increase knowledge levels and interest in aquatic science students.

(1) Action: J. Hageman will continue to provide a unique, exciting aquatic science workshop experience to over 5,000 grade 4-12 students, offering hands-on lessons about Lake Erie, the Great Lakes, and the oceans.

(2) Action: D. Kelch will conduct a survey of past Sea Camp participants to estimate long-term benefits of Sea Camp participation.

(3) Action: D. Kelch will continue to work with 4-H Sea Camp through teaching, resource acquisition, and support development.

(4) Action: Sea Grant will host an autumn, on-site open house for high school students, their parents, and teachers to foster an interest in summer science courses offered at Stone Laboratory.

- (5) Action:** Sea Grant will host an autumn, on-site Demonstration Saturday for teachers (grades 4-12) to foster an interest in Stone Laboratory's field trip/workshop programs.
- (6) Action:** K. Riesen will work with LENSC to periodically revise and update the permanent Sea Grant exhibit within their building. In addition, she will continue to conduct educational programs at the LENSC facility and assist with teacher education programs at the center.
- h. Objective:** Increase public knowledge and understanding about Lake Erie, the Great Lakes, the oceans, the aquatic sciences, and the mission of Sea Grant and our research, education, and outreach efforts.
 - (1) Action:** Collaborate with Lake Erie Coastal Ohio, Inc. in a partnership with WGTE (PBS station in Toledo) to produce an hour-long documentary on Lake Erie, its evolution, impact on our history, and future.
 - (2) Action:** Develop and update the Ohio Sea Grant exhibit for use at regional and local fishing and boating shows, staff the exhibit, and respond to Lake Erie user requests for information generated by the shows.
 - (3) Action:** FOSL will continue to collaborate with Sea Grant and the Lake Erie Commission to host their annual summer Open House at Gibraltar Island.
 - (4) Action:** Develop high-quality articles, ideas, and information for the Sea Grant newsletter, Twine Line.
 - (5) Action:** Continue to host Elder Hostel groups at Stone Laboratory.
 - (6) Action:** Expand and improve our web site as a major outreach element of the program.
- i. Objective:** Renovate Jay Cooke's Castle at Stone Laboratory for use as a conference center for Ohio Sea Grant's outreach/education program.
 - (1) Action:** Support fund raising efforts through the FOSL, private donors, and the State Legislature to complete interior renovation of the building.
- j. Objective:** Strengthen coordination of Ohio Sea Grant Extension.
 - (1) Action:** Quarterly meetings will be scheduled with the program leader, Sea Grant Extension agents, the communicator, and other appropriate personnel.
- k. Objective:** Increase communication between Sea Grant agents, their advisory committees, and researchers.
 - (1) Action:** All Sea Grant agents will continue to review research proposals and work with their advisory committees to identify research needs. Meetings with researchers will be fostered at the quarterly staff meetings.
 - (2) Action:** K. Riesen will assemble and hold regular meetings with a Sea Grant Fisheries Extension Advisory Committee (SGFEAC) that will include the ODNR Division of Wildlife, GLFC, U.S. Geological Survey, Lake Erie Biological Station, Lake Erie Charter Boat Association, LEMTA, and private sector fisheries stakeholder groups. Input from this committee will be provided to the research community and to management agencies.
- l. Objective:** Maintain high-quality and active advisory committees.
 - (1) Action:** Much of the strength and vitality of our program is due to our outstanding advisory committees. Sea Grant agents will continue to encourage and cultivate these groups. Membership of key people within local communities will be solicited.

m. Objective: Participate in the Great Lakes Sea Grant Network committees in all program areas and promote Great Lakes Sea Grant Extension agent professional development.

(1) Action: Ohio Sea Grant, including Extension agents, co-program leaders, and the Communicator, will be represented on as many of the Great Lakes theme team committees as practical.

n. Objective: Seek a replacement for Dr. Rosanne Fortner as our education coordinator.

B. Expand professional development opportunities for all educators

1. Goal: *Provide professional development opportunities for pre-service and in-service teachers and other education professionals to prepare them to better teach aquatic sciences and help them meet accountability requirements.*

a. Objective: Improve the technical training and capabilities of extension staff.

(1) Action: F. Lichtkoppler, F. Snyder, and D. Kelch will mentor and assist extension co-workers in the OSU promotion and tenure process.

(2) Action: K. Riesen will participate in new agent training in 2005, both Extension and new Sea Grant Agent training to be conducted in Virginia and Florida during 2005.

b. Objective: Expand opportunities for teacher education and development.

Education Projects

Expanding Delivery Modes for Education about Great Lakes Systems (project **E/TER-2**), Rosanne W. Fortner, The Ohio State University, March 2002-February 2006.

Great Lakes Teacher Education: High Tech/High Touch Learning (project **E/TER-3**), Rosanne W. Fortner, The Ohio State University, March 2005-February 2007.

C. Engage underrepresented populations in Sea Grant efforts

1. Goal: *Provide programming and opportunities specifically targeted toward local constituencies who have been historically underrepresented in the aquatic sciences.*

a. Objective: Increase participation in sport fishing and other outdoor activities by women.

(1) Action: K. Riesen will develop materials in support of and conduct programs to encourage female participation in these activities and increase marketing efforts to this demographic group.

b. Objective: Increase minority participation in Stone Lab activities.

(1) Action: Continue programming with the OSU Young Scholars Program and the Columbus "I Know I Can Program."

(2) Action: E. Braig will explore collaboration with the Columbus Afrocentric School to benefit their students pursuing the sciences and enhance Stone Lab's enrollment.

IX. Seafood Science and Technology

A. Ensuring seafood safety

1. Goal: *Improve seafood safety and HACCP compliance within the Ohio seafood industry.*

X. Urban Coasts

(The National Sea Grant College Program considers this to be a separate thematic area. As a result, we have listed it that way in this plan. However, within Ohio Sea Grant, we consider this thematic area to be a subset of the "Coastal Communities and Economies" thematic area, and the goals and objectives in each of these thematic areas are appropriate for both. In the future we expect the National Program to combine these areas.)

A. Reducing non-point source pollution

1. Goal: *Reduce non-point source pollution from urban areas.*

a. Objective: Develop and implement non-point source pollution control programs (including beach and underwater clean-up events) in cooperation with federal, state, and local governments.

(1) Action: J. Hageman will continue leadership of underwater cleanup efforts at Put-in-Bay.

b. Objective: Decrease non-point source pollution from marinas and boaters through increased participation in the Ohio Clean Marinas and Clean Boater programs.

(1) Action: D. Kelch, J. Reutter, L. Hushak, and J. Jentes will collaborate with the ODNR Divisions of Soil and Water Conservation, Office of Coastal Management, and Division of Watercraft; Ohio Department of Health; OEPA; Ohio Department of Commerce, State Fire Marshall Division; U.S. Coast Guard; U.S. Army Corps of Engineers; LEMTA; Greater Cleveland Boating Association; local health departments; local fire marshals; and private-sector stakeholders to conduct educational training/certification workshops, develop marina incentive programs, and coordinate marina certification site visits through the Ohio Clean Marinas and Clean Boater programs.

(2) Action: Gary Comer will be hired as the new Ohio Clean Marina Coordinator.

(3) Action: L. Hushak and J. Jentes will collaborate with the ODNR Division of Watercraft in developing an on-line Clean Boater Pledge Program in combination with on-line watercraft registration.

B. Enhancing port and harbor operations

1. Goal: *Assess the risks of contaminants in dredged materials and identify disposal options and evaluate the ecology and water quality of major urban ports to assess cumulative effects, preserve coastal resources, and improve infrastructure.*

a. Objective: Assist local RAP Councils and the OEPA in the RAP process for Ohio Areas of Concern.

(1) Action: All Sea Grant Extension agents will participate as appropriate with RAP Councils and provide council numbers with information that will advance the work of their councils.

(2) Action: F. Lichtkoppler will continue to assist the Ashtabula River Partnership in its effort to clean up (dredge) the Ashtabula River.

(3) Action: F. Lichtkoppler will work with the Ashtabula RAP, the Ashtabula River Partnership (ARP), and local citizens in identifying projects to help restore beneficial uses to the Ashtabula River and help identify restoration projects to meet Natural Resource Damage Assessment restoration for the Ashtabula River and Harbor.

- (4) Action:** F. Lichtkoppler will assist the Ohio Coastal Resource Management Project (OCRMP) in its educational work by providing up-to-date information on Lake Erie issues and natural resources.
- (5) Action:** F. Snyder and J. Lucente will support efforts in the Maumee RAP process.
- (6) Action:** W. Williams will support efforts in the Cuyahoga RAP process.
- (7) Action:** W. Williams will explore potential partnerships with other organizations in conducting waste-water minimization studies of several types of industries and disseminate the research results to these industries in order to interest them in water quality improvement and potential cost savings for businesses.

C. Managing coastal operations

1. Goal: *Provide accurate, unbiased scientific data to help policymakers and resource managers prioritize and manage conflicts resulting from the allocation of limited space and scarce coastal resources.*

a. Objective: Encourage business expansion and development on brownfield sites.

(1) Action: W. Williams and J. Lucente will continue efforts with the Greater Cleveland Partnership and economic development groups in Toledo to redevelop brownfield sites.

(2) Action: W. Williams will provide information on resources and linkages to assist existing businesses with expansion plans to reduce urban sprawl and prevent the development of new brownfield sites caused by business relocations.

b. Objective: Continue our successful outreach programs in Cleveland and Toledo emphasizing brownfield redevelopment and business retention and expansion within urban coastal communities.

(1) Action: W. Williams and J. Lucente will provide technical assistance to existing businesses having expansion plans aimed at reducing urban sprawl and preventing the development of new brownfield sites caused by business relocations.

(2) Action: J. Lucente and W. Williams will assist economic development professionals in their respective counties in developing procedures and/or providing resources for targeting businesses most able to use aging industrial and warehousing buildings.

XI. Aquatic Invasive Species

A. Prevention, control, economic impact, biology, and ecology of AIS

1. Goal: *Reduce the threat and impact of aquatic invasive species with integrated local, state, regional, and national research, outreach, and education programs.*

a. Objective: Lead and coordinate NOAA Sea Grant's research, education, and outreach efforts on AIS.

(1) Action: J. Reutter will co-chair the Sea Grant AIS Theme Team.

(2) Action: J. Jentes will complete a report summarizing NOAA Sea Grant's work on AIS.

(3) Action: J. Reutter will lead efforts to collaborate with GLERL and develop a project database and education/outreach strategic plan for the NOAA's National AIS Research Center at GLERL.

b. Objective: Support research efforts to understand the biology, ecology, and socio-economic impacts of AIS.

Research Project

The Effects of Round Goby on Yellow Perch-Amphipod Interactions Within Zebra Mussel Colonies and Macrophyte Beds (project **R/NIS-7**), Maria J. Gonzalez, Miami University of Ohio, March 2002-February 2005.

c. Objective: Develop methods to control and reduce the impact of AIS.

(1) Action: F. Snyder will coordinate development and revision of AIS fact sheets.

(2) Action: F. Snyder will produce new multi-media educational materials to increase awareness of AIS and their impacts on the Lake Erie watershed.

(3) Action: D. Kelch and G. Comer will conduct educational programming and will disseminate AIS educational materials to marinas involved in the Clean Marinas Program.

(4) Action: Agents will include AIS information within sport fishing presentations to reduce AIS spread by anglers.

d. Objective: Reduce the possibility of future AIS introductions.

(1) Action: Support research on new technologies to eliminate AIS introductions from ballast water.

(2) Action: Provide educational information to elected officials and decision makers considering AIS legislation to allow them to make more informed decisions.

(3) Action: F. Snyder will conduct AIS-HACCP training workshops in Ohio and other states to promote the adoption of HACCP procedures in live fish transfer.

(4) Action: F. Snyder will assist in the development of new knowledge about AIS introductions. He will take the lead in developing outreach education to train Ohio citizens to monitor inland waters for zebra mussels and all waters for the Eurasian ruffe and the round goby.

(5) Action: All Sea Grant agents will assist the research efforts of zebra mussel and other AIS researchers in data collection activities and transfer research findings to recreational and industrial clientele on the Great Lakes and on inland waters.

(6) Action: F. Lichtkoppler and F. Snyder will work with the Great Lakes Network, Pet Industry Joint Advisory Council, and others to develop a national campaign to reduce aquarium introductions of non-native organisms.

(7) Action: Agents will continue to work with the Great Lakes Sea Grant Network to develop AIS extension and outreach grant proposals and will network with other Sea Grant Program agents to implement AIS grant projects.

e. Objective: Prevent the spread of AIS.

(1) Action: Continue outreach/education programs for the live bait industry and angling public to prevent AIS spread.

f. Objective: Enable Ohio's live bait industry to comply with new and pending regulations designed to control the spread of AIS and help the industry implement a system for certifying bait shipments to be AIS-free.

(1) Action: Collaborate with ODNR Division of Wildlife and the Great Lakes Sea Grant Network to develop a HACCP-style live bait inspection and certification procedure that can be adopted by the live bait industry.

(2) Action: F. Snyder will coordinate efforts by the Ohio live bait industry to develop a statewide live bait dealers association to facilitate compliance with new AIS restrictions.

g. Objective: Develop education and outreach programs for all ages and audiences on AIS.

Outreach Project

Report on Sea Grant-Supported Nonindigenous Species Projects (project A/NIS-6), Jill Jentes and Jeffrey M. Reutter, Ohio Sea Grant, March 2003-February 2005.