

2005-2010 Strategic Plan

Ohio Sea Grant

College Program



education outreach research

including
F.T. Stone Laboratory

the
Center for Lake Erie
Research (CLEAR)

and the
Great Lakes Aquatic
Ecosystem (GLAERC)




Ohio Sea Grant College Program

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UNIVERSITY

Ohio Sea Grant Staff

Ohio Sea Grant College Program

Dr. Jeffrey M. Reutter, Director, reutter.1@osu.edu
Eugene Braig, Assistant Director, braig.1@osu.edu
Jill Jentes Banicki, Communications Manager, jentes.1@osu.edu
Nancy Cruickshank, Publications Manager, cruickshank.3@osu.edu
Dr. Rosanne W. Fortner, Education Coordinator, fortner.2@osu.edu
John Tripp, Fiscal Manager, tripp.3@osu.edu
Greg Aylsworth, Graphic Designer, aylsworth.2@osu.edu
Bonita Cordi, Office Associate, cordi.2@osu.edu

Stone Laboratory

Dr. Jeffrey M. Reutter, Director, reutter.1@osu.edu
Dr. Rosanne W. Fortner, Associate Director, fortner.2@osu.edu
Eugene Braig, Assistant Director, braig.1@osu.edu
John Hageman, Laboratory Manager, hageman.2@osu.edu
Matt Thomas, Asst. Lab. Manager, thomas.347@osu.edu
Kelly Dress, Office Associate, dress.3@osu.edu
Art Boone, Manager of Housing and Food Services, boone.2@osu.edu
Arleen Pineda, Program Coordinator, pineda.2@osu.edu
Al Duff, Superintendent for Physical Facilities, duff.1@osu.edu

Ohio Sea Grant Extension Staff

Lake & Ashtabula Counties

Frank R. Lichtkoppler*, lichtkoppler.1@osu.edu
Lake County Extension Office, 99 E. Erie Street, Painesville, OH 44077
440.350.2582, Fax 440.350.5928

Ottawa County

Fred L. Snyder*, snyder.8@osu.edu
Camp Perry, Building 1, Port Clinton, OH 43452
419.635.1022, Fax 440.350.5928

Ottawa County

John R. Hageman, Jr., hageman.2@osu.edu
F.T. Stone Laboratory, P.O. 119, Put-in-Bay, OH 43456
419.285.2341 or 614.247.6502, Fax 614.247.6578

Erie & Lorain Counties

David O. Kelch, kelch.3@osu.edu
Lorain County Extension Office, 42110 Russia Road, Elyria, OH 44035
440.326.5851, Fax 440.326.5878

Lucas County

Joe Lucente, lucente.6@osu.edu
Lucas County Extension Office, One Gov. Ctr., Suite 550, Toledo, OH 43604
419.213.4254, Fax 419.213.4241

Cuyahoga County

Walter D. Williams, wwilliams@clevegrowth.com
Greater Cleveland Growth Association, 200 Tower City Center,
50 Public Square, Cleveland, OH 44113-2291
216.621.3300, Fax 216.621.6013

Sea Grant Fisheries Extension Program

Kelly Riesen, riesen.4@osu.edu
Lake Erie Nature & Science Center, 28728 Wolf Rd., Bay Village, OH 44140
440.808.5627, Fax 440.871.2901

Ohio Clean Marinas Program

Gary Comer, comer.29@osu.edu
Office of Coastal Management, 105 West Shoreline Drive, Sandusky, OH 44870
419.609.4120, Fax 419.609.4158

*Program Co-Coordinators



Ohio Sea Grant College Program

The Ohio State University
1314 Kinnear Rd.
Columbus, OH
43212-1194
Phone: 614.292.8949
Fax: 614.292.4364
www.sg.ohio-state.edu

F.T. Stone Laboratory (Field Station)

The Ohio State University
PO Box 119, Put-in-Bay, OH 43456
Phone: 419.285.2341, 614.247.6500
Fax: 614.247.6578
www.stonelab.ohio-state.edu

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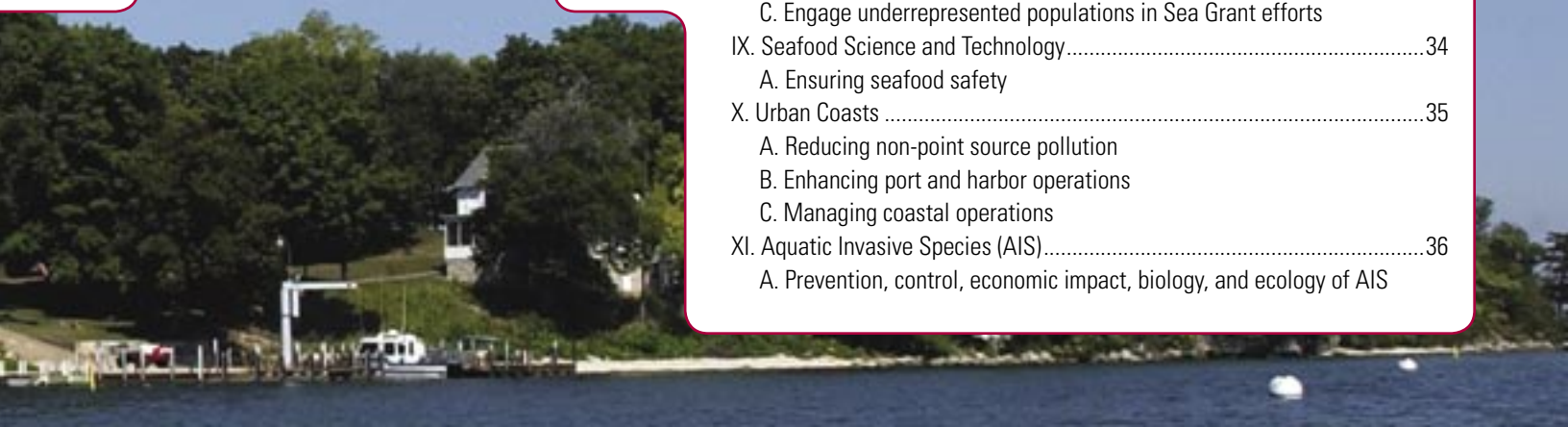


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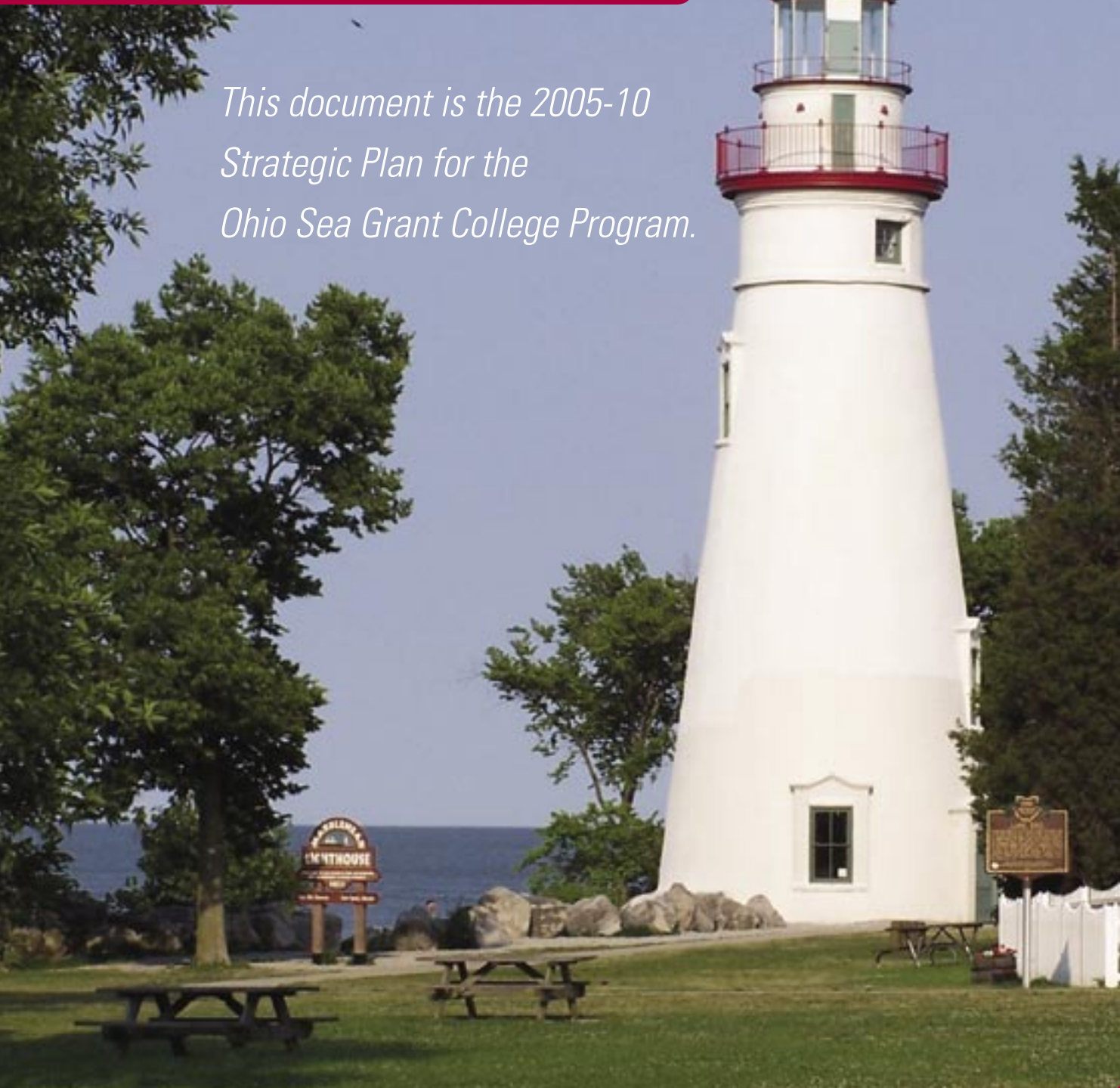
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Preface



*This document is the 2005-10
Strategic Plan for the
Ohio Sea Grant College Program.*





This document provides some very basic information about the Lake Erie ecosystem to establish the setting for our work. It also briefly describes the four programs (Stone Laboratory, Ohio Sea Grant, CLEAR, and GLAERC) and the strategic planning and priority setting activities that were used to create this document and that provide the basis for our strategic planning process. The categories used in this plan match the 11 thematic areas of the National Sea Grant College Program Strategic Plan for the period 2003-08, clearly demonstrating how Ohio Sea Grant can address local needs and national priorities. Additional background information used to develop this plan is available from the Ohio Sea Grant College Program.

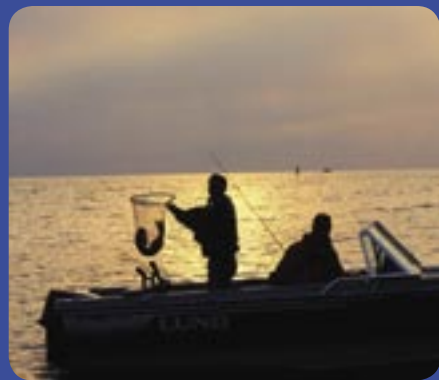


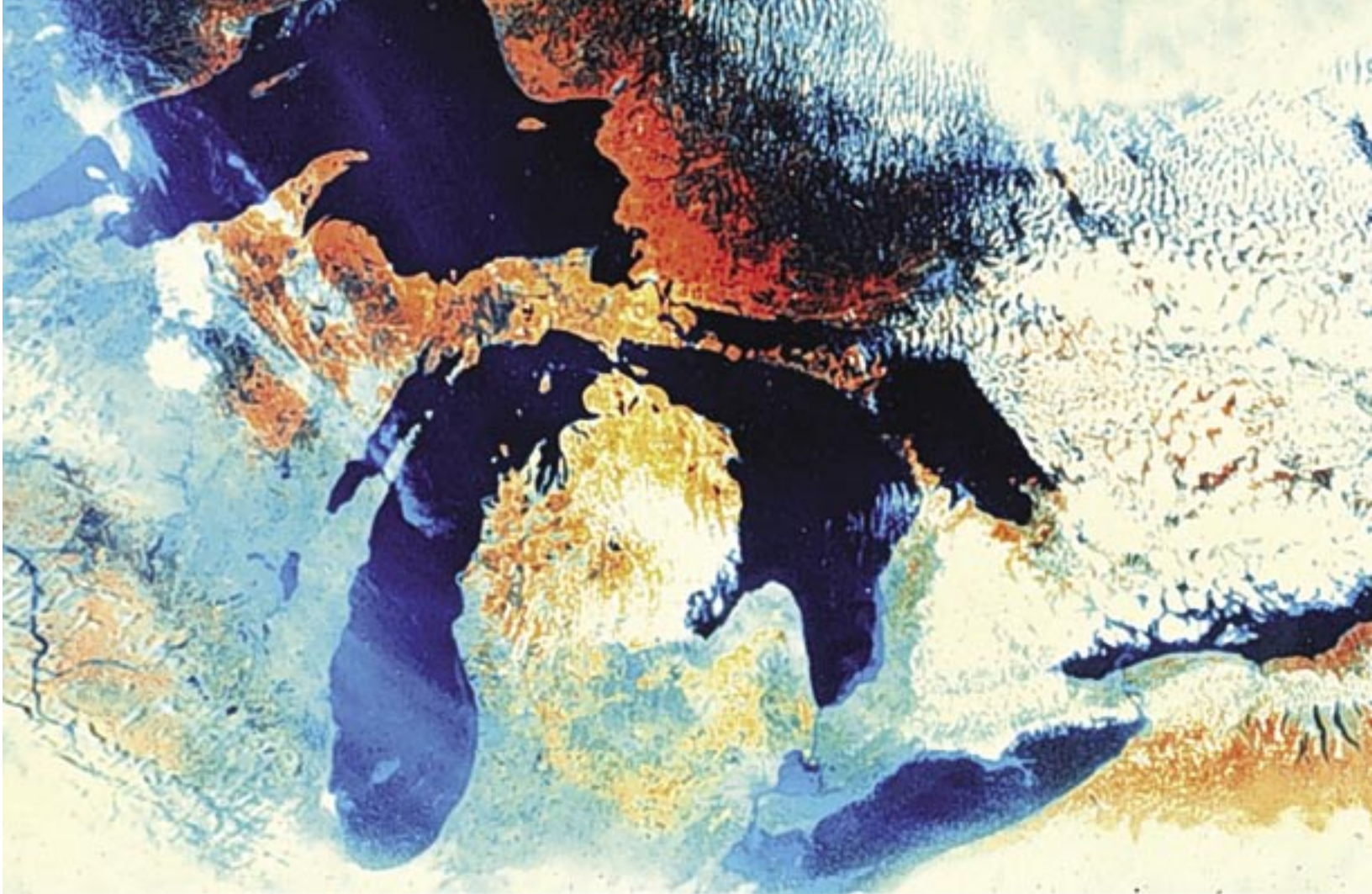


Introduction

The Great Lakes

hold approximately 20% of the world supply of freshwater and about 95% of the supply in the United States.





Lake Erie is the 12th largest freshwater lake in the world and has approximately 10,000 square miles of surface area making it larger than Lake Ontario, but much smaller than the other three Great Lakes. Many people believe Lake Erie is Ohio's most valuable natural resource and possibly the most important lake in the world. In summarizing our strategic planning efforts as we move into the new millennium, we need to examine Ohio's Great Lake and review some of the critical issues Ohio Sea Grant has been, and will be, addressing in the future.

Water Quality



Lake Erie is much cleaner than it was 35 years ago, and it has gone from being the nation's poster child for pollution problems (e.g., in 1969 the Cuyahoga River caught fire), to being one of the best examples of how to restore an ecosystem. However, we have seen a steady decline in water quality since 1995. The Lake provides drinking water to 11 million people each day. It also supports the largest sport fishery in the Great Lakes, the largest charter fishery in the Great Lakes, and the largest freshwater commercial fishery in the world. Lake Erie water quality protection is, and will continue to be, a major concern for Ohio Sea Grant.

Eutrophication

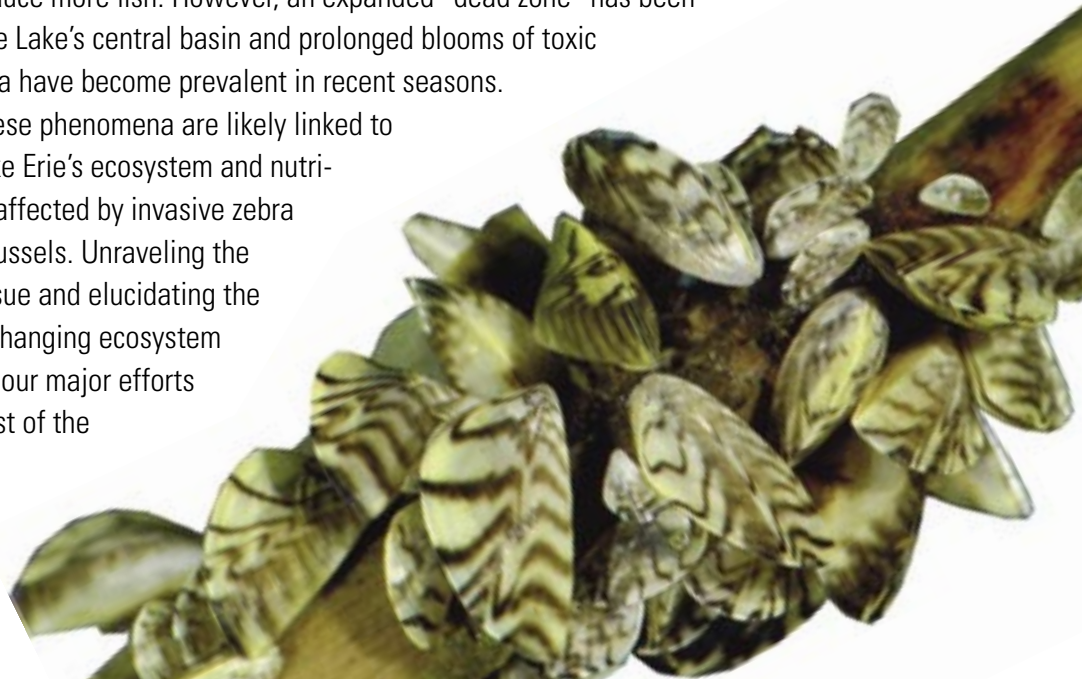
Eutrophication was the buzzword of the 1970s and describes the natural aging process of lakes, i.e., as lakes age, they become shallower, warmer, and often more productive—a eutrophic lake is the most biologically productive. In Lake Erie, eutrophic conditions caused over 90% of the bottom water [the water below the thermocline] in the central basin (the area between Sandusky and Erie) to become anoxic (devoid of oxygen) each summer. Lake Erie became eutrophic because it had become too productive. The oxygen in the water at the bottom of the lake



was completely consumed each year as the huge algal population died, sank to the bottom, and was decomposed by bacteria. Much of this eutrophication research was conducted by CLEAR at Stone Laboratory. Models showed that excess phosphorus was the culprit, i.e., phosphorus was the essential nutrient for algal production that was in the shortest supply. Therefore, if we reduced the amount of phosphorus entering the Lake, we would reduce the amount of algae being produced and the amount of oxygen being consumed. Management agencies have been remarkably successful in reducing the loading of phosphorus from approximately 29,000 metric tons in 1969 to the target of 11,000 metric tons. Recently, some people had asked if we had gone too far; i.e., would we have more walleye, perch, and smelt if we allowed more phosphorus to enter the Lake? The answer is not simple, but we led discussions within the scientific community on this question and believe that if dreissenid mussels had not invaded the Lake, then more phospho-

rus would produce more fish. However, an expanded “dead zone” has been observed in the Lake's central basin and prolonged blooms of toxic blue-green alga have become prevalent in recent seasons.

We believe these phenomena are likely linked to changes in Lake Erie's ecosystem and nutrient pathways affected by invasive zebra and quagga mussels. Unraveling the phosphorus issue and elucidating the nature of the changing ecosystem will be among our major efforts through the rest of the decade.



Contaminants

In the early 1970s there was a tremendous uproar when the allowable level of PCBs in fish for commercial sale was reduced from 5.0 ppm to 2.0 ppm. While in most cases the PCB level in Great Lakes fish continues to decline, and the current level in walleye is less than 0.2 ppm, we know it is still not good enough. We must work to remove and prevent persistent toxic substances from entering the Lake. Furthermore, for those substances already in the Lake, Sea Grant research has shown that zebra mussels and round gobies are changing the pathways by which contaminants move through the Lake ecosystem, thereby increasing the potential for human exposure. One exception to PCB declines in Erie's fish is that of the smallmouth bass. Average PCB concentrations in smallmouth bass tissue fell under 0.2 ppm in the early 1990s, shortly after goby invaded the Lake. More recently, the round goby has become a favored prey of smallmouth bass and the PCB concentration in bass tissue has increased to average almost 0.6 ppm in 2002 samples. Unraveling the contaminant puzzle will be a major issue.



Fisheries

Lake Erie is the southernmost, shallowest (max. depth = 212 feet; the other Great Lakes are all over 750 feet deep), and warmest of the Great Lakes. Lake Erie is also the only lake with a watershed that is not dominated by a forest ecosystem. The Lake Erie watershed is primarily agricultural and urban. As a result, Lake Erie receives more sediment and nutrients than the other Great Lakes and is the most productive, frequently producing more fish for human consumption than the other four Great Lakes combined. In fact, during 40 of the 55 years between 1915 and 1970—including 1969 when the Cuyahoga River caught fire and the media wrote articles declaring Lake Erie to be dead—Lake Erie produced more fish than the other Great Lakes. The cleanup of Lake Erie has paid huge dividends. The harvest of walleye by Ohio anglers was approximately 112,000 fish in 1976. Today, if we harvest 1 million walleye, we consider it a bad year. Lake Erie has become the “Walleye Capital of the World,” and it is also recognized as the nation's top destination for smallmouth bass anglers. Maintaining this fishery and assuring that people can safely eat the fish will continue to be a major effort for Ohio Sea Grant. This is also an area where we will seek opportunities to enhance cooperation with the Ohio Department of Natural Resources and the other agencies that cooperate in the management of this resource (four states, one province, and two countries). Most of our effort will be with these agencies and the sport fishing community because it appears that Ohio's commercial fishery is a vanishing industry. Around 20 licensed commercial shore seine and trap net fishermen remain in today's heavily regulated industry.

Aquatic Invasive Species and Ecosystem Changes

Over 180 aquatic invasive species have entered the Great Lakes with about 75% coming in since the St. Lawrence Seaway opened in 1959. Zebra mussels and sea lampreys cause damage costing millions of dollars each year and creating huge changes in the ecosystem of Lake Erie. Sea Grant has been successful in developing control strategies for zebra and quagga mussels at water intakes but not in the open Lake. Recently, round gobies have introduced direct competition with many benthic species of native fish and new pathways for bioaccumulation of toxins to the Lake's game fish populations. Increased biomass of unpalatable zooplankton has changed the availability of nutrition for native larval fish. We know that the Lake Erie ecosystem has changed drastically as a result of the invasion of these species, and the system is far from stable. We must do a better job of modeling and managing the Lake on an ecosystem basis and preventing the introduction of additional nonindigenous species.



Great Lakes Water Diversions

Demands for Great Lakes' water from outside of the basin will almost certainly increase in the future as a consequence of population increases and reductions in ground water resources. These concerns culminated in eight Great Lakes Governors and two Provincial Premiers working to generate a draft Great Lakes Water Resources Compact in the summer of 2004. This international compact is intended to create standards by which water withdrawals will be held. We must develop a better understanding of the implications for the loss of water, i.e., what are the benefits/costs of adding or losing an inch of water in Lake Erie. Ohio Sea Grant must continue to provide quality information to inform such decisions.

Economic Development/Impact and Marine Trades

When Ohio Sea Grant started in 1977, approximately 50 charter captains and just over 200 marine-related businesses operated on Lake Erie. In 2004, there were over 800 licensed charter captains and well over 400 marine-related businesses. Ohio Sea Grant has played a major role in these increases through its research, education, and outreach efforts. For example, we have hosted one of the largest charter fishing conferences in the country annually for over 20 years, through conflict resolution we were successful in opening the western basin artillery range to fishing, we have constructed eight artificial reefs in the central basin, we have taught marina management courses, we have conducted hundreds of seminars for anglers, and we have assisted county visitors bureaus in marketing their regions. In autumn 2004, we successfully launched new Clean Marinas and Clean Boater programs in collaboration with The Ohio Department of Natural Resources (ODNR), Ohio Environmental Protection Agency (OEPA), Ohio Department of Health, Ohio Department of Commerce, U.S. Coast Guard, and the Lake Erie Marine Trades Association.



Coastal Management Program

The Ohio Coastal Management Program (OCMP) is part of the Ohio Department of Natural Resources and the National Ocean Survey of NOAA. They are attempting to address a number of potentially contentious topics including issues related to erosion, pollution, and construction



within the coastal zone. Ohio Sea Grant is networking with the OCMP on the implementation of our new Clean Marinas and Clean Boaters Programs. We see a number of opportunities to be of assistance to this program and/or to assist with information dissemination between the OCMP and the private sector. In the next few years we anticipate a number of opportunities to collaborate the OCMP and with the third NOAA partner in Ohio, the Old Woman Creek National Estuarine Research Reserve (NERR), on research, education, and outreach programs.

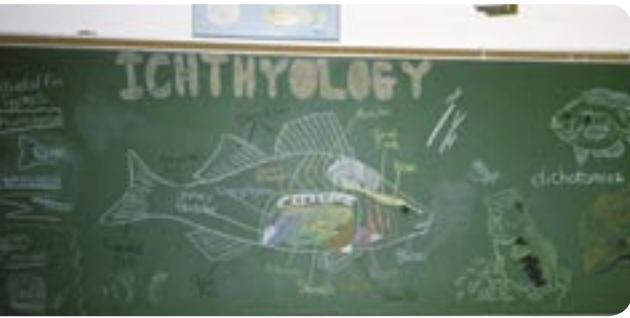


New Technology

It has been said that technology will be the driving force in the next decade and that four technologies in particular—biotechnology, communication technology, nanotechnology, and satellite technology—will lead the way. Ohio Sea Grant must strive to keep abreast of technology development in these areas, participate in that development, and incorporate new developments into the program as rapidly as possible. Consequently, staff training and upgrading technical capabilities, a current program priority, will be an even greater priority in the future.

Education

The performance of K-12 students in math and science remains below desired levels in Ohio and in this country. Ohio Sea Grant is well known for the development of outstanding curriculum materials for grades 4-12, for the training of science teachers, and for research contributions to the education profession. At Stone Laboratory, Ohio Sea Grant has developed courses specifically for teachers and high school students. Our efforts in these areas must continue and expand as Ohio K-12 students strive to improve performance on science proficiency tests. The aquatic sciences are very interesting to students and the public. While our workshop program at Stone Laboratory has grown by 500% in the last 15 years, we are still reaching a very small portion of Ohio students. Therefore, in the next five years, we must take advantage of new opportunities in communication technology to take the aquatic sciences and our Sea Grant educational materials to the students and the public in their schools and homes. To this end, with the help of a USEPA grant, we are now equipped with the technology to conduct distance learning sessions and have broadcast some lessons to several high school classes.



Outreach

The education and outreach components of the National Sea Grant College Program are extremely important elements because they are so unique within The National Oceanic and Atmospheric Administration (NOAA) and within government and scientific research programs in general. Ohio Sea Grant and the Great Lakes Sea Grant Network must work even harder to be the education and outreach program for the entire region, i.e., assisting with the dissemination of research results from Great Lakes Ecosystem Research Lab (GLERL), EPA, U.S. Geological Survey, etc., and bringing the needs of the public to the attention of these programs. These efforts will require communication, cooperation, and collaboration at levels much greater than we have experienced in the past. Linking more effectively to the private sector will be an equally important outreach challenge of the next decade. We must develop more effective mechanisms to get the information from the scientists to the users and take the needs of the private sector back to the scientific community. We must help universities and university scientists to become more engaged with local communities and the private sector. We must face the challenge of working with audiences that will diverge based on their technological capabilities.





Program Description, Vision and Mission



Program Relationships and Reporting Structure

Dr. Jeffrey M. Reutter is Director of the Lake Erie Programs at The Ohio State University: the Ohio Sea Grant College Program, F.T. Stone Laboratory, CLEAR, and GLAERC. Stone Laboratory is part of the School of Natural Resources within the College of Food, Agricultural and Environmental Sciences. The Director of Stone Laboratory reports to the Vice President for Agricultural Administration and University Outreach, Dr. Bobby D. Moser. CLEAR is part of The Ohio State University Office of Research and the Director reports to the Vice President for Research, Dr. Robert T. McGrath. Structurally, the Ohio Sea Grant College Program is part of CLEAR, and GLAERC is part of Sea Grant, but operationally, Sea Grant is the umbrella organization for the other three: Stone Laboratory, CLEAR, and GLAERC. This operational strategy takes advantage of Sea Grant's broader mission: research, education, and outreach. Stone Laboratory is the shared research facility for GLAERC and the base for many of Ohio Sea Grant's research, education, and outreach programs.

Franz Theodore Stone Laboratory, 1895

Franz Theodore Stone Laboratory, Ohio's Lake Erie laboratory, is this nation's oldest freshwater biological field station and the Island Campus of The Ohio State University. Stone Laboratory is also the research, education, and outreach facility for the Ohio Sea Grant College Program. Originally called the "Lake Laboratory," the Laboratory began when a second floor was built on the state fish hatchery in Sandusky in 1895. In 1929, the Laboratory moved to its current location on the 6.5-acre Gibraltar Island at Put-in-Bay.



Vision for the Future

Our vision is to be universally recognized as the premier freshwater education and research facility in the country. Our education and research programs will be unsurpassed. Our education programs will be models for science education in this country. Our research will solve Lake Erie environmental problems and enhance the value of the Lake.



Mission

The mission of the Franz Theodore Stone Laboratory is to serve The Ohio State University, the Ohio Sea Grant College Program, the State of Ohio, and the people of Ohio as their research, education, and outreach facility on Lake Erie. We must enhance the value and improve the management of our marine and coastal resources through the education, research, and outreach programs conducted at the Laboratory. The Laboratory's programs should address the needs of and create opportunities for the following audiences: students in grades 4-12, college undergraduate and graduate students, K-12 teachers, research scientists, decision-makers and elected officials, technical staff in state and federal agencies, and the general public. Within this mission we have several goals:

- Improve the quality of science education in Ohio by creating high-quality, hands-on science education opportunities for students in grade 4 through adults;
- Create opportunities for undergraduate and graduate research training;
- Create special educational opportunities for high school students and teachers;
- Foster more informed decision-making through education and training programs for decision-makers and elected officials; and
- Encourage and support research on critical issues and problems facing Lake Erie, the Great Lakes, and the environment, providing the science behind more informed management decisions.



Center for Lake Erie Area Research (CLEAR), 1970



When the Cuyahoga River caught fire in 1969, The Ohio State University, as the Land Grant College in Ohio, was expected to respond to the problem. Ohio State did so by creating CLEAR in 1970 to focus the expertise of the University's faculty on Lake Erie problems and issues. Much of the research within the Center was conducted at Stone Laboratory and addressed issues related to water quality, thermal pollution, nuclear power production, water intakes and discharges, the reduction of phosphorus inputs to the Lake, the lack of dissolved oxygen in the hypolimnetic waters of the central basin, and parasites in fish. CLEAR is now the home of the Ohio Sea Grant College Program.

Ohio Sea Grant College Program, 1977

In 1974 the governor's Lake Erie Task Force recommended that The Ohio State University develop a Sea Grant Program for Ohio by working closely with the Ohio Department of Natural Resources and a number of Lake Erie businesses. CLEAR was given lead responsibility to develop the proposal and host the Sea Grant program for Ohio. Our first Sea Grant project (a science education project) was funded in 1977. We became a "coherent program" with one education project, one research project, and one extension agent in 1978, and a "Sea Grant Institution" in 1983. Based on the program's subsequent accomplishments, The Ohio State University was designated this country's 24th Sea Grant College by the Secretary of Commerce in September 1988.

The Ohio Sea Grant College Program is one of 32 Sea Grant programs in the NOAA Sea Grant College Program of the [NOAA], U.S. Department of Commerce. Every coastal state and every Great Lakes State has a program.

Sea Grant is a matching funds program and requires at least \$0.50 of non-federal support for every federal dollar invested in the program. Matching funds for Ohio Sea Grant are provided by a line item in the budget of the Ohio Board of Regents, The Ohio State University, private businesses and individuals, and by the home institution of scientists receiving grants from Ohio Sea Grant.

Vision for the Future

Sea Grant is an investment in the health of the nation's marine, coastal, and Great Lakes resources. Sea Grant is an issue-based program for the 21st century—a partnership of the people, universities, government, and industry. Our vision is to be an exemplary Sea Grant Program and to be recognized for superior research, education, outreach, and administrative components. Within Ohio our vision is to be recognized for our outstanding science programs and leadership and integrity in solving problems related to the environment, education, and the economy.



Mission

The mission of the Ohio Sea Grant College Program is to increase understanding, assessment, utilization, development, conservation, and wise management (stewardship) of our Great Lakes and ocean resources, with particular emphasis on Lake Erie. Within this mission we have several significant goals:

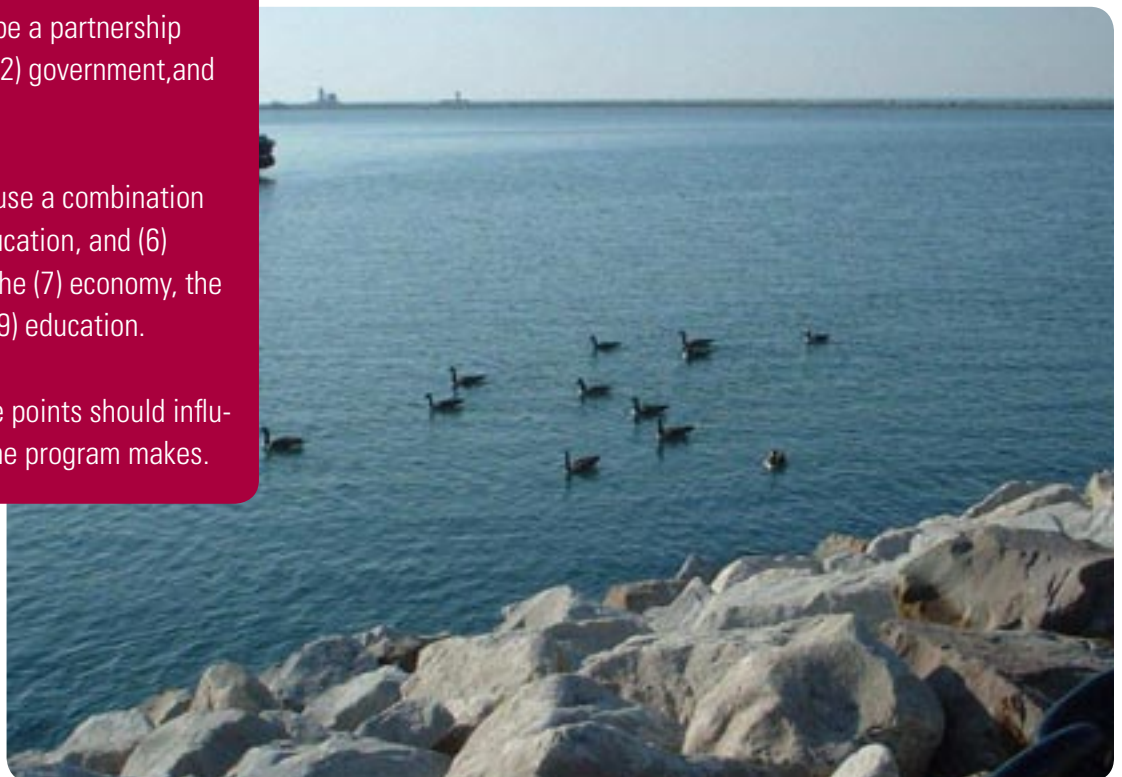
- Promote sustainable economic development on the Lake Erie coast and watershed by applying scientific knowledge to solve resource problems;
- Develop the critical knowledge and technology to enable coastal industries in Ohio to enhance profitability and establish economic leadership;
- Identify, protect, and conserve valuable coastal habitats and resources and improve environmental conditions in the Lake Erie and Great Lakes ecosystems;
- Enable coastal and Great Lakes communities to successfully adapt to changing social and economic conditions; and
- Improve the quality of marine and aquatic education in Ohio, develop a more informed citizenry, and thereby contribute to a higher quality of life for Ohioans.

Ohio Sea Grant's Nine Points

Ohio Sea Grant must be a partnership among (1) academia, (2) government, and the (3) private sector.

Ohio Sea Grant must use a combination of (4) research, (5) education, and (6) outreach to focus on the (7) economy, the (8) environment, and (9) education.

We believe these nine points should influence every decision the program makes.

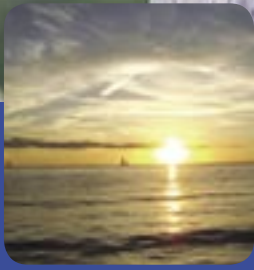


Great Lakes Aquatic Ecosystem Research Consortium (GLAERC), 1992

In 1992 Ohio Sea Grant formed GLAERC composed of approximately 40 of the top aquatic scientists at Ohio colleges and universities including Bowling Green State University, Case Western Reserve University, Cleveland State University, Heidelberg College, John Carroll University, Kent State University, Miami University, Mount Union College, The Ohio State University, Ohio University, University of Toledo, and Wright State University. The mission of GLAERC is to enhance collaboration, cooperation, communication, and sharing of equipment and facilities. This consortium makes Ohio's top scientists more effective and competitive for federal funding and allows them to better address the critical issues and problems affecting Ohio's surface waters. Stone Laboratory is the Consortium's shared research facility.

The Ohio State University Academic Plan

As a program of The Ohio State University, one of our challenges is to align our Strategic Plan with the 2000 Academic Plan of the University. Simply stated, the Academic Plan's overarching goal is that "The Ohio State University will be among the world's truly great universities." To accomplish this, the Academic Plan proposes 14 initiatives organized into six core strategies. Information on how we address each of those initiatives is available upon request. More recently the University has identified three major elements in its Leadership Agenda: 1) distinctive educational experiences and opportunities for students, 2) cutting edge interdisciplinary research for short- and long-term societal benefits, and 3) outreach and engagement initiatives that connect areas of academic excellence with societal needs. These three elements can be found throughout this plan and were a driving force in its development.



Planning Process

Self-Evaluation Activities

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.

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 investigators;
- 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.



Design Strategies and Strategies to Receive External Input

When 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 plan and 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.

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 Great Lakes hearing on NOAA 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, and the recommendations in the Ocean Commission Report. We partnered with the Great Lakes Commission, Ohio EPA, and the Ohio DNR 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 plan.

With regard to the Ocean Commission Report, we worked to ensure the report included Great Lakes issues and priorities. Dr. Reutter was invited to testify before the Commission when they met in Chicago in September 2002. As President of the National Association of Marine Laboratories (NAML), he developed the official NAML comments on the draft report. He also assisted the Governor's Office, our Sea Grant Advisory Committees, and the Friends of Stone Laboratory, in developing their comments, was asked to speak to the Great Lakes Commission about the report and assisted them with their comments (4 May 2004), and was invited to do Congressional Briefings on the report for the Ohio Congressional Delegation and the Great Lakes Congressional Delegation (18 May 2004). These briefings resulted in delegation letters being written to the Commission to improve their report.

Funding Priorities

This strategic 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 in 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. 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 eleven 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 under 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	



Ohio Sea Grant's Strategic Plan 2005-2010



I. Aquaculture



A. Culture system technology development

Goal: Support technological development to stimulate aquaculture in Ohio.

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

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

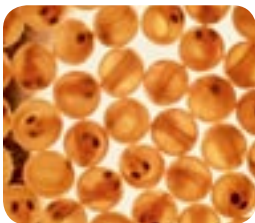
Objective: Increase Ohio's production of farm-raised crayfish and baitfish and assist producers in expanding markets for these products.



B. Nutrition and feeds

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

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



C. Genetics of cultured species

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

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

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



D. Health and disease

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.

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



E. Stock enhancement

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

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

B. Biomolecular processes discovery

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

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

C. Marine environmental biotechnology

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.

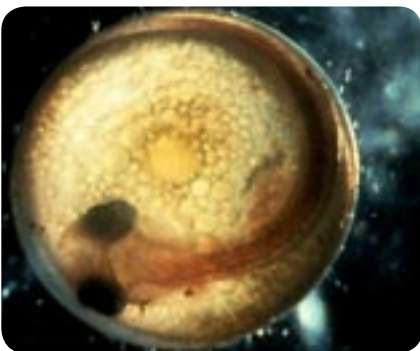
Objective: Use marine biotechnology to develop biosensors for biological and chemical monitoring.

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

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

D. Marine resource management

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" [page 35] 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

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

Objective: Increase recreational access to Lake Erie.

Objective: Collaborate/lead efforts with the ODNR, OEPA, Ohio Lake Erie Commission, Ohio State University Extension, and local communities to develop watershed management plans for every Lake Erie watershed in Ohio.

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 and management agencies.

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

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

Objective: Assist in the conduct of the Ohio Business Retention & Expansion Programs in coastal counties.

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.

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

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

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.

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



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.*

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

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.*

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

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

Objective: Enhance Lake Erie and Great Lakes regional tourism

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

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

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

Objective: Increase safety for recreational and scientific divers.



B. Resource valuation

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.*

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.



C. Constructing indicators of sustainable development

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

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

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



IV. Coastal Natural Hazards

A. Reducing the loss of life and property

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

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.

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

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

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

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



V. Digital Ocean

A. GEOSS, GOOS, IOOS, GLOS, and NFRA

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).

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

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.

Objective: Support the NFRA and other groups seeking federal funding for IOOS within the federal budgets of NOAA and ONR.

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.

Objective: Collaborate/lead efforts with GLERL and the International Joint Commission to develop a buoy system within the Great Lakes as part of GLOS.

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.

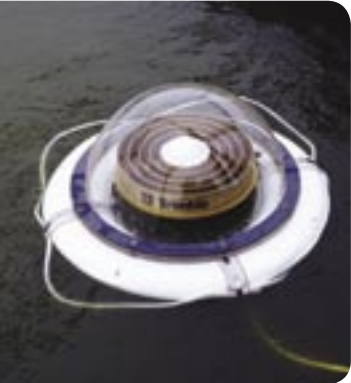
Objective: Develop an outreach program to identify potential users of GLOS, determine their needs, and help the general public and users understand the implications, uses, and values of an high-tech observation system for Lake Erie, the Great Lakes, and the oceans.

B. Climate and ecosystem forecasting

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.

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

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



VI. Ecosystems and Habitats

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

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.

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

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

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

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.



B. Coastal watersheds

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.

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

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.

C. Conserving and restoring coastal habitats

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

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

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

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

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.



VII. Fisheries



A. Partnering to improve fisheries management

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

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

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

B. Caring for people

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

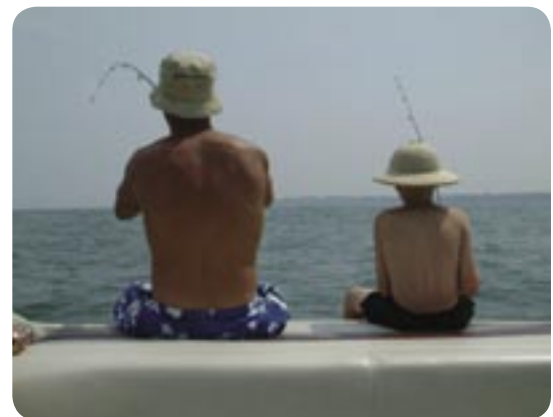
Objective: Reverse the decline in sport fishing participation, enable fishing businesses to retain clientele, and increase youth participation.

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.

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

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

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.



C. Contaminants and fish consumption

Goal: Reduce exposure to contaminants from eating fish.

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

VIII. Marine and Aquatic Science Literacy

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

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.*

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

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

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.

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

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

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

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

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.

Objective: Renovate Jay Cooke's Castle at Stone Laboratory for use as a conference center for Ohio Sea Grant's outreach/education program.

Objective: Strengthen coordination of Ohio Sea Grant Extension.

Objective: Increase communication between Sea Grant agents, their advisory committees, and researchers.

Objective: Maintain high quality and active advisory committees.

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

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



B. Expand professional development opportunities for all educators

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.

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

Objective: Expand opportunities for teacher education and development.

C. Engage underrepresented populations in Sea Grant efforts

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

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

Objective: Increase minority participation in Stone Lab activities.



IX. Seafood Science and Technology

A. Ensuring seafood safety

Goal: Improve seafood safety and Hazard Analysis Critical Control Point compliance within the Ohio seafood industry.



X. Urban Costs

(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 [number III above] 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

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

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

Objective: Decrease nonpoint source pollution from marinas and boaters through increased participation in the Ohio Clean Marinas and Clean Boaters programs.



B. Enhancing port and harbor operations

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.

Objective: Assist local Remedial Action Plan Councils and the Ohio Environmental Protection Agency in the Remedial Action Plan process for Ohio Areas of Concern.



C. Managing coastal operations

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.

Objective: Encourage business expansion and development on brownfield sites.

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

XI. Aquatic Invasive Species (AIS)

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

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

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

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

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

Objective: Reduce the possibility of future AIS introductions.

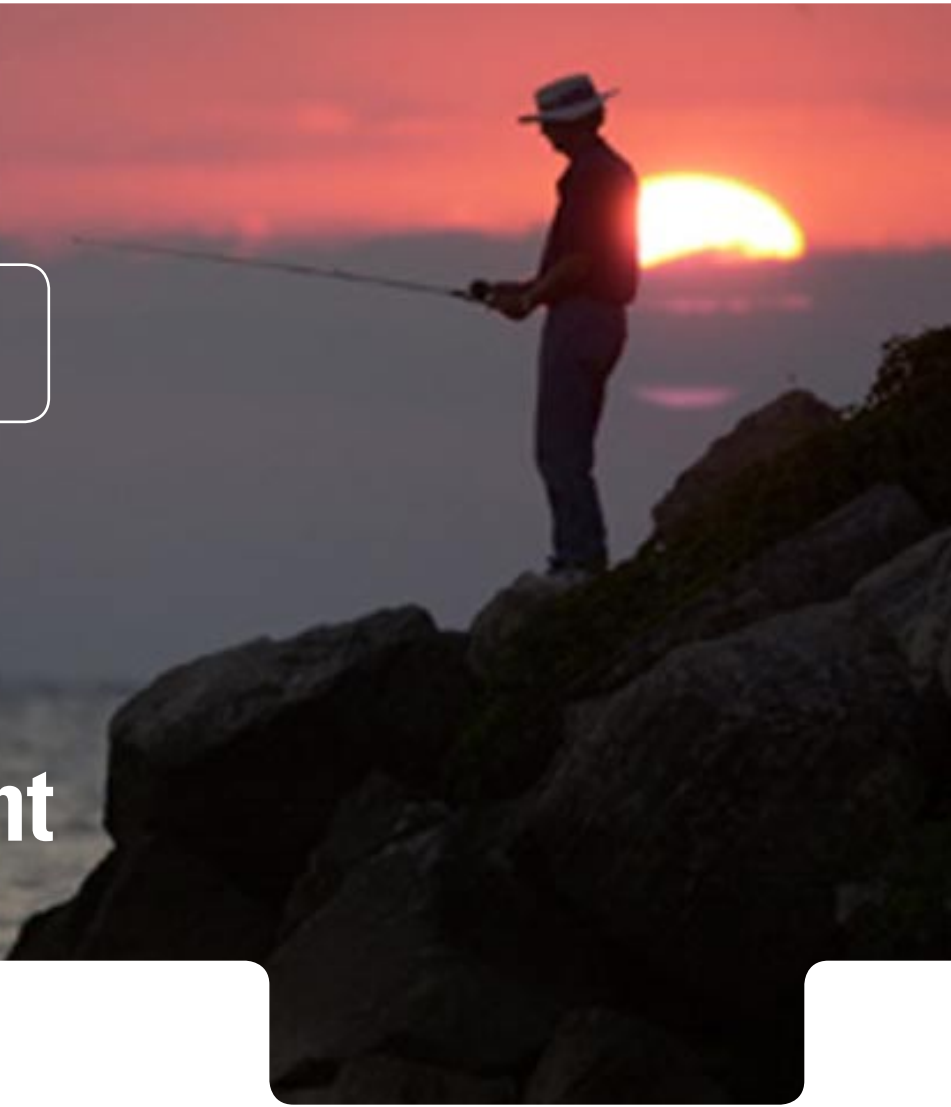
Objective: Prevent the spread of AIS.

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.

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







Ohio Sea Grant

2005-2010 Strategic Plan

