

MICHU-Q-96-001



**PREPARING FOR  
THE TWENTY-FIRST CENTURY  
1995-1997  
Michigan Sea Grant Program Guide**

Sea Grant is an investment in the nation's Great Lakes, marine, and coastal resources. It is a problem-solving program for the twenty-first century, a partnership of people, universities, government, and industry. As the year 2000 approaches, Michigan Sea Grant is changing with the times to fulfill the national vision of Sea Grant: to foster long-term economic development, stewardship, and responsible use of the country's Great Lakes, marine, and coastal resources.

**PREPARING FOR  
THE TWENTY-FIRST CENTURY**

**1995-1997 Program Guide**



**Michigan Sea Grant College Program  
University of Michigan • Michigan State University**

**LONG-RANGE GOALS  
FOR MICHIGAN SEA GRANT**

1. Promote sustainable use and conservation of Great Lakes, marine, and coastal resources and environments.
2. Help solve the pressing problems assaulting stressed Great Lakes, marine, and coastal ecosystems.
3. Help Great Lakes and marine coastal communities adapt to changing social, economic, and environmental conditions.
4. Establish U.S. economic leadership in Great Lakes, marine, and coastal industries.
5. Contribute to a higher quality of life by informing citizens about Great Lakes, marine, and coastal issues and supporting relevant research.

## CONTENTS

|   |    |
|---|----|
| Long-Range Goals for Michigan Sea Grant | ii |
| Michigan Sea Grant—An Overview          | 1  |
| Preparing for a New Century             | 2  |
| Rising to the Challenge                 | 3  |
| Projects for the '90s                   | 5  |
| Integrated Research Program             | 5  |
| Remote Underwater Assessment            | 6  |
| Vessel-Based Education Model            | 8  |
| Fishery Management                      | 10 |
| Michigan Sea Grant Program Structure    | 12 |
| Staff Activities                        | 13 |
| Administration                          | 13 |
| Outreach                                | 13 |
| Extension                               | 14 |
| Communications                          | 15 |
| Zebra Mussel Outreach Program           | 15 |
| Recent and Ongoing Accomplishments      | 17 |
| Michigan Sea Grant Locations            | 19 |
| Personnel Directory                     | 20 |

## **MICHIGAN SEA GRANT—AN OVERVIEW**

The Michigan Sea Grant College Program is one of 29 programs across the nation established to promote the understanding and intelligent use of the Great Lakes and oceans. Established in 1969 at the University of Michigan, Michigan Sea Grant became a partnership with Michigan State University in 1972. Other state universities and colleges also participate in the program. Michigan Sea Grant is funded by the National Sea Grant College Program, a part of the National Oceanic and Atmospheric Administration (NOAA), U.S. Department of Commerce. These funds are supplemented by monies from the state of Michigan and partnerships with tribal communities, universities, businesses, and other non-federal sources.

In addition to the research and outreach activities described in this booklet, Michigan Sea Grant also contributes to the development of highly educated professionals who will play important roles in solving tomorrow's water resource issues. Sea Grant supports college undergraduate and graduate students involved in Sea Grant research. Michigan Sea Grant also participates in the National Sea Grant Fellows Program, which enables qualified graduate students to benefit from a year in Washington D.C. working for congressional offices or federal agencies. Many Sea Grant-supported students go on to productive careers in water resources research and policy.

## **PREPARING FOR A NEW CENTURY**

As the 1990s accelerate toward the dawn of a new century, predictions resolve into realities, trends ripen into explosions, and the unforeseen happens. In the context of Sea Grant, a rapidly globalizing economy is increasing demands on the U.S. to compete effectively, requiring the development of intellectual capital and new technologies. Technological innovations are reshaping American culture. Whether in communication/information, biotechnology, or remote sensing, rapidly evolving technologies affect our potential both to protect and damage Great Lakes and marine resources. Simultaneously, the political climate is trending toward reduced spending, causing all sectors of society to seriously re-examine how to generate and allocate financial resources.

In addition, rapidly increasing coastal populations are generating intensified development pressures and competing uses, threatening to aggravate and continue disruptions in the coastal environment. Soaring demand for seafood threatens the delicate balance of underwater ecosystems, as does lake-wide and ocean-wide pollution from shipping, offshore mining, and atmospheric deposition.

The Great Lakes region is experiencing these national changes as well as generating its own set of issues. The recent upward surge in exotic species invasions, imbalanced fish communities, controversial fish harvesting and stocking policies, and debate over zero discharge and virtual elimination of chemical contaminants are some of the issues calling for resolution.

## **RISING TO THE CHALLENGE**

In this climate of things-not-as-usual, Michigan Sea Grant has departed from business-as-usual to explore how it can best meet the practical challenges of today. The result: Michigan Sea Grant has placed new emphasis on technology transfer—developing research that directly addresses practical needs and transferring the research results to the private sector.

Building upon its successful tradition of fielding Sea Grant Extension agents to help people solve coastal problems, MSG has involved these agents in bringing Michigan's Great Lakes needs to the table, helping to ensure that all research projects address verified needs. Sea Grant outreach staff works with the researchers to develop and carry out the most effective methods for sharing research results with the intended users.

### **Research Criteria**

For the 1995-97 period, Michigan Sea Grant established the following criteria for prioritizing and selecting research projects:

- I. End Results of Maximum Practical Importance.* Projects must address issues of maximum importance and be designed to produce applicable, rather than theoretical, results.
- II. University Basic Research Required.* Projects must require basic university-level research for successful accomplishment.



*III. Applied Research, Development, and Implementation Required.* Projects must incorporate applied research and user implementation. Michigan Sea Grant field agents will be instrumental in helping Great Lakes resource users implement the research results. Sea Grant communicators will produce educational materials to support user implementation and will publicize accomplishments and progress.

*IV. User Participants Incorporated from the Outset.* Projects must identify and rely upon potential users throughout the project to provide guidance toward developing the most useful end product.

*V. User In-Kind Match Required.* User participants will provide at least in-kind matching funds through man-hour dedication, construction and testing of prototypes, concept demonstrations, etc.

*VI. Focused Financial Resources.* Michigan Sea Grant will maximize results with limited funds by concentrating on a small number of large, long-term, multi-year projects. The projects must be multidisciplinary, involving multiple researchers, developers, and applicators.

*VII. Do What We Can Do Best.* Michigan Sea Grant's team of agents, communicators, managers, researchers, and user/participants are collectively qualified, through experience, interest, and expertise, to address and solve problems in certain subject areas with great skill. For maximum return, projects are selected in those subject areas where these integrated skills are strongest.

## **PROJECTS FOR THE '90s**

### **Integrated Research Program**

The research projects described here were chosen from an initial slate of project ideas, based on the issues and problems troubling Michigan's coastal citizens and businesses. All MSG staff participated in selecting the projects to fund, according to the research criteria (see pp. 3–4). Researchers, agents, communicators, and administrators worked together to develop the research proposals.

The proposals incorporate strategies and funding for outreach activities. One Sea Grant Extension agent and one communicator are assigned to each project as project facilitators to monitor and manage the project's progress from inception to completion. In this manner, Sea Grant will maintain continuous awareness of project success and retain the flexibility to promptly redirect, accelerate, or discontinue the project as events warrant.

As the projects proceed into their latter years, with more emphasis on outreach, Michigan Sea Grant research dollars will be redirected toward the start-up of new projects designed to meet then-current needs and issues.

## **R/ROV-1**

## **REMOTE UNDERWATER ASSESSMENT**

### *A High Resolution, Remote Sensing System and Method for Assessment of Deep-Water Shipwrecks and Natural Environments*

Thousands of shipwrecks lie at the bottom of the Great Lakes. These archeological artifacts provide glimpses into our past and outdoor recreation for thousands of scuba divers. Increasing numbers of divers are creating a growing demand for shipwreck diving in both the Great Lakes and the oceans. Simultaneously, technological advances are extending human capabilities to reach deep-water wrecks.

Greater access to deep-water wrecks provides new opportunities for enjoying and learning about underwater archeology, but also can contribute to vandalism and unintentional damage. The time is right for more thorough inventory and assessment of deep-water wrecks and the development of management plans to ensure shipwreck preservation for the enjoyment and education of both present and future generations.

Fortunately, recent improvements in remote sensing technologies can greatly enhance the information available to archaeologists and resource managers. Sonar (acoustic) sensing methods show great potential for providing the precise information needed for shipwreck assessment.

#### **Project Goals**

The Remote Underwater Assessment project will develop sonar imaging systems for shipwrecks, using recent breakthroughs in radar imaging, and will develop standard criteria for assessing shipwrecks.

#### **1995-97 Work**

The sonar research will advance to the lab testing stage. Meanwhile, a series of conferences and focus groups will develop shipwreck assessment criteria. Field demonstrations will assess how well some existing technologies provide the information required by the criteria, resulting in handbooks to help archaeologists and resource managers decide on which technology to use, based on the specific shipwreck information needed.

#### **1997 and Beyond**

The new sonar technology will be tested in the field, first in the Great Lakes, then at deeper ocean sites. Workshops to train the archeological, management, and salvage communities in assessment methods and to build consensus among these communities will be held. Corporate partnerships will be encouraged to develop the new sonar system commercially. Multi-media public education materials will be developed to enhance shipwreck knowledge and enjoyment.

### **Anticipated Results**

1. New sensing technology, applicable both to underwater archaeology and to fisheries management, geological assessment, and military defense.
2. Greater cooperation among agencies, archaeologists, and salvagers in managing deep-water wrecks.
3. Specific information on deep wrecks to help recreational scuba divers have more enjoyable and safer diving experiences.
4. Interpretative programs for non-divers and children to improve understanding and appreciation of underwater resources.

*Development of a Transferable, Multidisciplinary, Vessel-Based,  
Experiential Education Model*

Today's youth face a rapidly changing and challenging world. To deal successfully with future complex issues, young people will need strong coping skills which include understanding of ecological principals and scientific knowledge of natural processes. Numerous national studies have documented the need for increased attention by educational institutions to developing scientific literacy. Such literacy for citizens of the Great Lakes basin includes an understanding of Great Lakes aquatic sciences.

Since 1989, Michigan Sea Grant has spearheaded the development of the Great Lakes Education Program (GLEP). This program teaches fourth grade students, teachers, parents, and volunteers about Great Lakes resources through classroom studies and hands-on shipboard experiences. The program introduces students to the biological, physical, chemical, and cultural features of the Great Lakes.

### **Project Goals**

The Vessel-Based Education Model project will evaluate the potential of the Great Lakes Education Program to serve as a prototype for multidisciplinary, vessel-based, hands-on (experiential) education elsewhere in the in Great Lakes region and beyond. If the evaluation is positive, the project will complete the development of GLEP for use throughout the K-12 range. This project will also incorporate a teacher training emphasis and prepare the final product for dissemination via national Sea Grant, Extension, and other environmental education networks.

### **1995-1997 Work**

Investigators will conduct detailed evaluation research to determine whether the Great Lakes Education Program is achieving its desired impacts. The researchers will refine and test formal curricula for fourth grade classrooms, teacher training, and volunteer educator training. They will also produce a guide for replicating the GLEP model for multidisciplinary aquatic studies throughout the Great Lakes basin and in other regions of the country.

### **1997 and Beyond**

The use and impact of the fourth grade GLEP curriculum package will be monitored and evaluated in pilot communities. Following any necessary refinements, the package will be made available nationally.

Research will be conducted to assess student, teacher, and volunteer needs at the seventh and tenth grade levels. Draft curricula for seventh and tenth grades will be developed and pilot tested before implementing nationally. Use and success of the GLEP model will be evaluated.

**Anticipated Results**

1. A research report on the impacts of the Great Lakes Education Program on students, volunteers, teachers, families, and communities.
2. A prototype vessel-based education model useful for any Sea Grant or Extension youth education program. This model will include evaluative instruments, which will allow for documentation of the program's impacts.
3. Recommendations for strengthening GLEP and for implementing the program in other regions.
4. Outreach tools such as formal classroom curricula, teacher and volunteer training modules, program promotion materials, and program replication guidelines for use in a variety of educational environments.

*Management Strategies for the Great Lakes Recreational Salmonid  
Fishery in the Face of Environmental Variability*

The viability of sport, commercial, and forage fish species in the Great Lakes depends on a variety of environmental factors. Research by Michigan Sea Grant and others has begun to document the impact on fish populations of previously overlooked non-biological (abiotic) factors. Of particular interest are climatic conditions such as water temperature, ice cover, storms, and water levels. Currently, these factors are still poorly understood, and resource managers must make decisions based partly on incomplete predictive computer models that do not include these significant variables.

Competing visions for Great Lakes fisheries among various stakeholders further complicates the development and implementation of effective, consistent fishery management strategies. These stakeholders include recreational and commercial fishers, agencies, legislatures, and interested citizens. Research on the human dimensions of fisheries is a relatively new and complex field, but it is clear that many individuals interested in fishery management have little understanding of the year-to-year variability in fish populations or the nature and subtleties of ecosystem computer modeling.

**Project Goals**

The Fishery Management project will develop a multidisciplinary methodology by which the Great Lakes salmonid fishery can be more effectively understood, managed, and sustained. Researchers will assess the relative importance of environmental variables and harvesting in determining recruitment and yield of Great Lakes salmonids. Fishery models will be modified to incorporate these factors appropriately. Educational programs will alert stakeholders to the variable nature of the Great Lakes ecosystem, thus encouraging improved decision-making about the fisheries.

**1995-97 Work**

Researchers will collaborate with various agencies on data collection. They will analyze survival, abundance, and climatic patterns and will begin developing a prototype predictive decision model. Communication among researchers, managers, and stakeholders will be developed through meetings, newsletter articles, and a series of fact sheets.

### **1997 and Beyond**

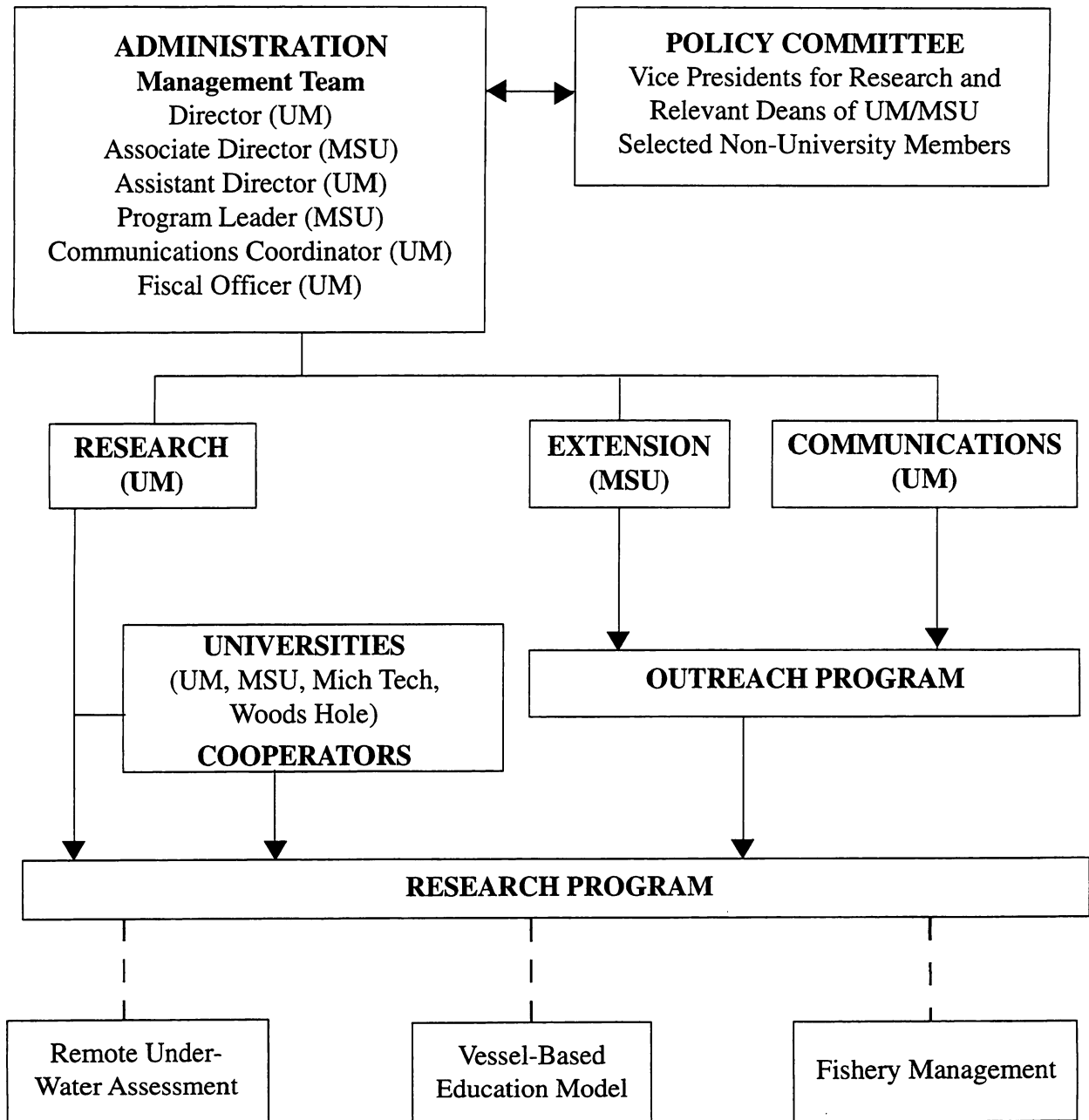
Human dimensions aspects of fisheries management, such as the benefits people seek from recreational fishing, will be examined for their pertinence to the management models being developed. The prototype decision models will be refined and used to explore various scenarios. Management agencies and stakeholders will help test the predictive models for fit with “real world” concerns.

### **Anticipated Results**

1. An enhanced fisheries management predictive computer model, which incorporates abiotic factors and human dimensions into decision-making scenarios.
2. Greater communication and cooperation among researchers, managers, and stakeholders.
3. Specific information on salmonid survival and abundance patterns, within-lake and whole-lake climatic effects, and human dimensions.



## Michigan Sea Grant College Program Structure



## **STAFF ACTIVITIES**

### **Administration**

The Michigan Sea Grant College Program is administered by a Director and Assistant Director at the University of Michigan and an Associate Director and Extension Program Leader at Michigan State University. These individuals comprise the Management Team, which develops program goals and directions and guides and coordinates the program's activities. Management Team members maintain contacts with the administrative staff of the other Sea Grant programs nationwide, and work to raise the overall visibility of Michigan Sea Grant with the public and legislative bodies in Michigan and Washington, D.C.

The Management Team makes recommendations to a Policy Committee comprised of senior level administrators at MSU and UM and at Great Lakes-related organizations. The Policy Committee decides overall policy and program direction by reviewing and approving overall program management strategies, setting budget priorities, and approving key personnel appointments.

### **Outreach**

Outreach is key to the Sea Grant concept. At Michigan Sea Grant, Outreach is a two-way street, a back-and-forth flow of information encouraged and directed by the extension and communications components of the program.

Outreach transfers scientific findings to Great Lakes, marine, and coastal individuals and organizations and transfers information about the needs of these individuals and organizations back to the scientists, so that relevant, applicable research is undertaken. For 1995-97, outreach staff have contributed strongly to the selection of research projects, and have teamed with researchers to develop and carry out plans for disseminating the research findings. For specific information on the outreach activities associated with the research projects, see the individual project descriptions on pages 6-13.

Michigan Sea Grant Extension and Communications conducts other outreach activities as well, initiated in response to needs for Great Lakes information and education.

### ***Extension***

The Extension program's outreach activities are conducted mainly by field agents who work side-by-side with individuals in coastal communities and businesses to resolve resource use problems. Michigan Sea Grant Extension is affiliated with Michigan State University Extension, which provides contacts with people and organizations throughout the state, on-campus expertise, and in-service education. Six Sea Grant Extension agents, located in MSU Extension offices across the state, serve Michigan's 41 coastal counties. Faculty at both Michigan State University and the University of Michigan assist Sea Grant Extension agents by working directly with coastal individuals and businesses in response to specific problems.

Michigan Sea Grant Extension's programming emphasizes the following areas:

*Coastal Community Development*—Many coastal communities are developing facilities attractive to residents and tourists. Sea Grant Extension's work encompasses waterfront development projects, under-water shipwreck preserves, and tourism development.

*Coastal Business Management*—Sea Grant Extension provides business management education to the marina and boating industries, charter fishing captains, commercial and tribal fishers, and aquaculture operations.

*Great Lakes Resources Management*—Sea Grant Extension works in partnership with many agencies and organizations on exotic species, water quality, fisheries management, water levels, shoreline erosion and coastal flooding, and water resources management.

*Water Safety*—Michigan Sea Grant Extension is nationally recognized for its leadership in this field through its work on hypothermia, cold water near-drowning, diver education, dive accident management, and water rescue.

*Youth Education*—Sea Grant Extension has led Michigan's efforts in Great Lakes youth education through its Great Lakes Natural Resources Camp, the shipboard Great Lakes Education Program, field trips, and classroom instruction.

### ***Communications***

The Communications program's outreach activities are conducted by staff located at both Michigan State University and the University of Michigan. The Communications staff provides print, video, and media support for agent activities in the programming areas listed on the previous page.

Communications also relays Sea Grant research results and other Great Lakes information to targeted audiences chiefly by means of mass media—news releases, publications, a newsletter, and broadcast-quality video programs. Communications also participates in special events and exhibits that convey Great Lakes information.

### ***Zebra Mussel Outreach Program***

This project, the *Zebra Mussel Outreach Plan: A Continuing Program of the Great Lakes Sea Grant Network*, is funded under the federal Nonindigenous Aquatic Nuisance Prevention and Control Act of 1990 (P.L. 101-646). It started in 1991 in response to the need to educate Great Lakes residents and others about the zebra mussel and how to slow its spread. Michigan Sea Grant Outreach has developed activities that include a central information exchange (Zebra Mussel/Aquatic Nuisance Species Office); a library for the nationwide loan and sale of photographs and illustrations (Exotic Species Graphics Library); a statewide zebra mussel watch program; fact sheets, identification cards, and other publications; and seminars and workshops.

In March 1996, Michigan Sea Grant sponsored the Sixth International Zebra Mussel and Other Aquatic Nuisance Species Conference, held in Dearborn, Michigan. Also in 1996, the Great Lakes Sea Grant Network is establishing a World Wide Web site to provide educational information about aquatic nuisance species, with links to the Michigan Sea Grant Zebra Mussel/Aquatic Nuisance Species Office and other information sources. The Great Lakes Sea Grant Network has been designated the lead organization for providing public education about the ruffe, an invading fish spreading through the Great Lakes. A ruffe watch program is beginning, and Michigan Sea Grant and Minnesota Sea Grant are co-sponsoring an international symposium on the ruffe in 1997.

In response to the spread of zebra mussels to inland lakes, Michigan Sea Grant produced an educational slide show for inland lake residents about detecting and controlling zebra mussels. Sea Grant also produced a video demonstrating the basinwide accepted protocol for sampling for young zebra mussels veligers in inland lakes. These audio-visual products are used by Sea Grant programs and others throughout the Great Lakes basin and beyond.

A flyer produced by the Great Lakes Sea Grant Network, *Exotics, Don't Let Them Ride With You*, is being mailed to registered boaters by the Michigan Secretary of State in watercraft registration packets. Over the course of three years, these flyers will reach all of Michigan's 800,000-plus registered boaters. The flyer describes how boaters can avoid transporting nonindigenous aquatic organisms from one body of water to another.

## **RECENT AND ONGOING ACCOMPLISHMENTS**

These selected activities provide specific examples of Michigan Sea Grant's impact on the Great Lakes community.

### **Youth Education**

Young people learn about the Great Lakes through a Michigan Sea Grant's summer Great Lakes Natural Resources Camp for teens, the Great Lakes Education Program scholarship project, a video and print curriculum package about the fishery, a shoreline plants field guide, and classroom presentations and field trips.

### **Commercial Fisheries**

Michigan Sea Grant Extension agents provide commercial and tribal fishers and processors with information on fishing gear, fish handling and processing, business management, and marketing.

### **Michigan Tourism**

Coastal communities have guided coastal development by applying Michigan Sea Grant research, including computer simulation models, that documents the economic returns from fishing, boating, and scuba diving. Studies of transient boaters are guiding Upper Peninsula waterfront revitalization projects.

### **Aquaculture**

Sea Grant agents assist aquaculturists through individual consultations, workshops, culture manuals, and a newsletter. Sea Grant has advised those developing important new Michigan aquaculture legislation.

### **Boating Safety**

Michigan Sea Grant engineers have developed computer-based design packages to help small boat designers develop safer, more comfortable high-speed craft. Engineers are also developing fishing vessels designs to reduce capsizing in rough seas. A Sea Grant booklet on protecting vessels from lightning is used in boating courses nationwide.

### **Recreational Fisheries**

Annual Sea Grant workshops, transmission of satellite images showing lake currents and temperatures, and a newsletter help charterboat captains run their fleets successfully and protect the Great Lakes fishery.

Two booklets based on Sea Grant-assisted research provide sport anglers with information on how to cook fish to reduce contaminants and how to preserve fish by freezing, smoking, canning, and pickling.

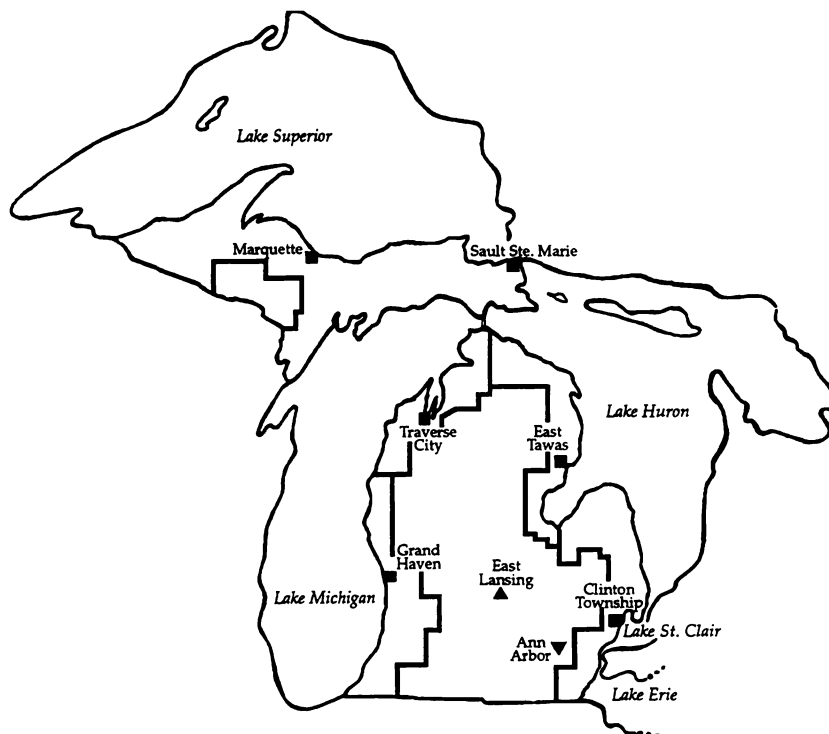
### **Bottomland Preserves**

Michigan Sea Grant research helped inspire the legislation providing for Great Lakes bottomland preserves in Michigan. Sea Grant Extension agents have helped establish a system of nine preserves for protecting shipwrecks. They continue to assist the preserves with wreck documentation and preservation and public education. Michigan Sea Grant now advises other states on the development of sound policies for managing underwater resources.

### **Risk Communication**

A handbook for journalists on reporting on environmental risks has been produced by Michigan Sea Grant and distributed to reporters nationwide. It is also used by government, industry, law firms, and in college classrooms. Sea Grant research on teaching risk concepts to youth has produced recommendations for helping young people learn how to make informed decisions about environmental risks. Other research has produced valuable information on how state agencies can most effectively advise anglers about fish that may be contaminated.

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