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**Michigan Sea Grant
College Program**

**1997-1998
People and
Projects**



Contents

About Michigan Sea Grant	2
Administration	4
Outreach	5
Communications	6
Sea Grant Extension	7
Sea Grant Agents	8
Campus Specialists	10
Michigan Sea Grant Locations	12
Research	13
Marine Transportation and Engineering	14
Living Resources	16
Environmental Studies	18
Vessel-Based Education Program	20
Fishery Management	22
Policy Committee	24
Phone Listing & Index	26
E-Mail Addresses for Staff & Researchers	28
Program Organization	30

About Michigan Sea Grant

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. Through research, education, and outreach, Michigan Sea Grant helps individuals, communities, marine businesses, and federal, state, local, and Indian agencies to develop, utilize, and conserve the resources of the Great Lakes.

Established in 1969 at the University of Michigan, Michigan Sea Grant became a cooperative program of the University of Michigan and Michigan State University in 1972. Other state universities and colleges also participate in Sea Grant activities. Michigan Sea Grant is funded by the National Sea Grant College Program, a part of the National Oceanic and Atmospheric Administration (NOAA), in the U.S. Department of Commerce. These funds are supplemented by matching funds from the state, Indian nations, universities, businesses, and other non-federal sources.

The three principal functions of the Sea Grant program are research, education, and outreach. Michigan Sea Grant funds interdisciplinary studies of the Great Lakes and their aquatic resources. Sea Grant researchers employ scientific, engineering, economic, and social disciplines to solve Great Lakes problems. Research topics include fisheries, food web dynamics, boating safety, and Great Lakes education.

Sea Grant supports college undergraduate and graduate students working with university faculty to conduct Sea Grant research. Michigan Sea Grant 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 committees or federal agencies. Many Sea Grant-supported students go on to careers in water resources fields. Sea Grant also co-sponsors a summer teen camp for Great Lakes studies, conducts educational programs for public school students, and prepares Great Lakes-related curriculum materials.

Extension agents, part of Michigan Sea Grant's outreach function, are Sea Grant's link between researchers and the people who can use research findings. Extension agents work with residents, businesses, agencies, and others in coastal communities to provide information and assistance. A Communications staff completes the outreach activities by preparing and distributing written and broadcast materials that explain Sea Grant research findings and other Great Lakes information.

Michigan Sea Grant maintains close ties with the other Sea Grant programs in the country. All programs in the National Sea Grant Network cooperate on related projects and share ideas, thus strengthening the effectiveness and impact of Sea Grant 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 guides and coordinates the program's research, education, and outreach activities. The Management Team makes recommendations to a Policy Committee (see page 24), which decides overall policy and program direction.

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Outreach - Communications & Extension

Outreach, the transfer of research findings to the individuals and organizations who can utilize them, is essential to the Sea Grant concept. Michigan Sea Grant outreach is carried out by Extension and Communications, with collaboration on many projects, such as the specially funded project described below.

Zebra Mussel/Aquatic Nuisance Species Outreach Program.

This project is funded under the federal Nonindigenous Aquatic Nuisance Prevention and Control Act of 1990 (P.L. 101-646). It started in response to the need to inform Great Lakes residents about the zebra mussel and how to slow its spread. Michigan Sea Grant Outreach has developed activities that include a central information exchange—the Zebra Mussel/Aquatic Nuisance Species Office; a library for nationwide loan and sale of photographs and illustrations—the Exotic Species Graphics Library; a statewide zebra mussel watch program; an instructional kit for detecting zebra mussel veligers in inland lakes; fact sheets, identification cards, and other publications; and seminars and workshops, including an annual workshop for municipal and industrial water users, and sponsorship of the 6th International Zebra Mussel and Other Aquatic Nuisance Species Conference, held in Dearborn, Michigan, in 1996. In March 1997, Michigan Sea Grant Extension hosted an international symposium on the biology and management of a new nuisance fish, the Eurasian ruffe.

Communications

Michigan Sea Grant Communications plays a crucial role in increasing knowledge of Great Lakes issues by relaying Sea Grant research results and other Great Lakes information to the public, governmental decisionmakers, resource interest groups, and educators. Formats include brochures, booklets, a newsletter, technical reports, displays, special events, and broadcast-quality video. Communications also supports Sea Grant Extension efforts by developing publicity for programs and producing materials on coastal issues.

Major projects in 1997-98 include updating and reprinting a popular series of map-brochures about the Great Lakes, assisting Sea Grant Extension in the production of a field guide to coastal wetlands, and revising and republishing a booklet about Michigan's sand dune ecosystems.

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Sea Grant Extension

Michigan Sea Grant Extension transfers to local communities the knowledge and technology developed through research. This transfer is accomplished by district extension Sea Grant agents, who work with coastal residents and organizations to assess community needs and provide assistance. These agents also bring back to Sea Grant Administration word of emerging problems that need to be addressed through research. Campus specialists at Michigan State University and the University of Michigan support Sea Grant Extension by working with coastal individuals and businesses in response to specific problems.

Major areas in which Sea Grant Extension agents provide assistance are coastal community development, coastal business management, Great Lakes resources management, water safety, and youth education.

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Sea Grant Agents

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Interest areas: Underwater preserves, commercial fishing, aquaculture, water resources and quality management, aquatic nuisance species, fisheries management, hypothermia/cold water near-drowning

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Interest areas: Native American issues (fisheries and economic development)

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Southwest Michigan

Charles Pistis Michigan State University Extension
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Interest areas: Community waterfront development, underwater preserves, marine and boating industry, charter and sport fishing, fisheries management, aquatic nuisance species

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Grand Haven, MI 49417-1492

Cindy Peppin, Secretary

Interest areas: Underwater preserves, volunteer lake monitoring programs, aquatic nuisance species, environmental education, Great Lakes teacher training workshops

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Interest areas: Underwater preserves, coastal business, lake levels, coastal urban fisheries management, water safety, youth education

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Special projects: Tourism attitudes and behavior

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Special projects: Aquaculture industry

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Special projects: Fish waste utilization

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Special projects: Tourism economics; marketing

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Special projects: Interpretation of visitor sites

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Ann Arbor, MI 48109

Special projects: Scuba and surface-supplied diving technology, diving and water safety education

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East Lansing, MI 48824

Special projects: Tourism economics

Ken Vrana Bottomland Preserve Specialist
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Special projects: Underwater preserves, aquatic parks

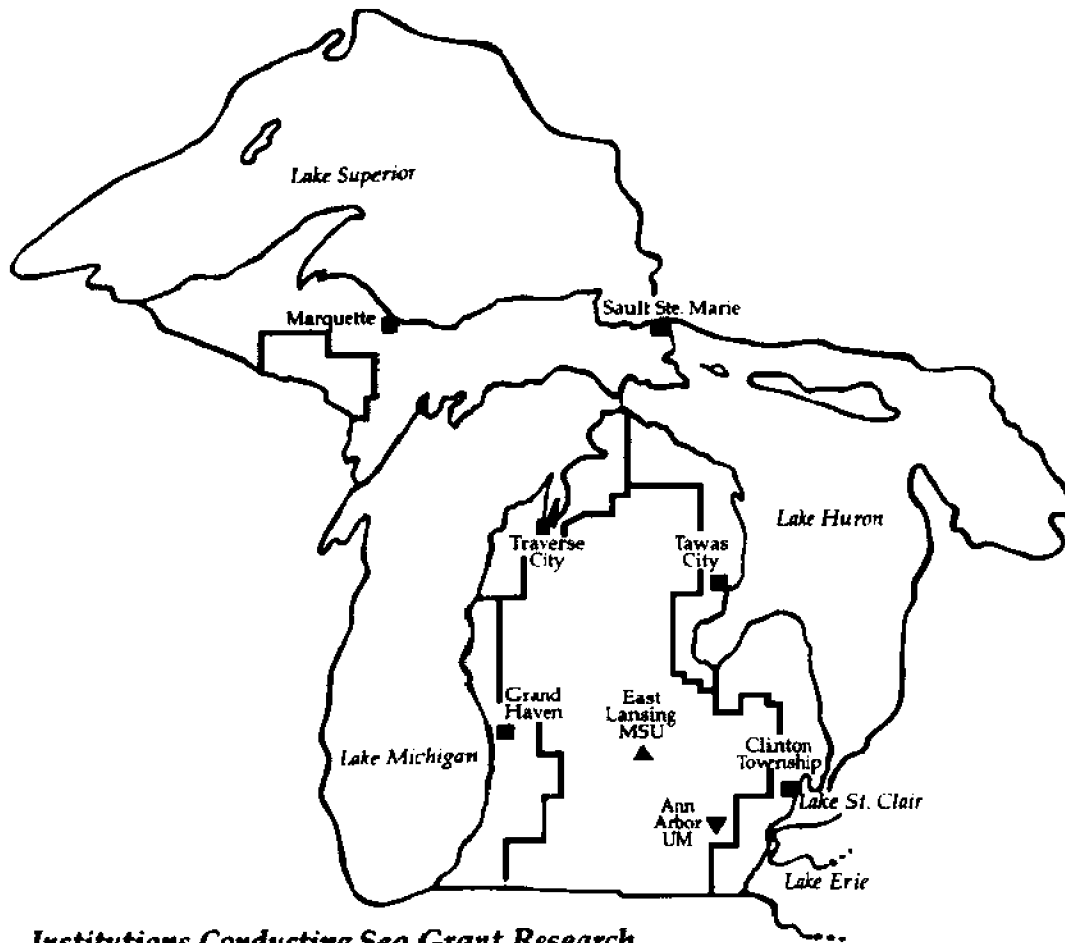
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Special projects: Food science

Matthew Zabik Pesticide Research Center
517/353-6376 204B Pesticide Research Center
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Special projects: Toxic substances research

Michigan Sea Grant Locations



Institutions Conducting Sea Grant Research

University of Michigan, Michigan State University, Michigan Technological University, U.S. Fish and Wildlife Service, Great Lakes Environmental Research Lab, University of Maryland

Administrative Offices ▼ Ann Arbor ▲ East Lansing

Agent Offices & Districts

■ **Marquette**—Upper Peninsula Counties
Alger, Baraga, Cheboygan, Chippewa, Delta, Emmet, Gogebic, Houghton, Keweenaw, Luce, Mackinac, Marquette, Menominee, Ontonagon, Schoolcraft

■ **Traverse City**—Northwest Counties
Antrim, Benzie, Charlevoix, Grand Traverse, Leelanau, Manistee

■ **Grand Haven**—Southwest Counties
Allegan, Berrien, Mason, Muskegon, Oceana, Ottawa, Van Buren

■ **Sault Ste. Marie**—MI Tribal Communities
Bay Mills Indian Community, Grand Traverse Band of Ottawa and Chippewa Indians, Keweenaw Bay Indian Community, Lac Vieux Desert of Lake Superior Chippewa Indians, Sault Ste. Marie Tribe of Chippewa Indians

■ **Mt. Clemens**—Southeast & Urban Counties
Huron, Macomb, Monroe, St. Clair, Sanilac, Tuscola, Wayne

■ **East Tawas**—Northeast Counties
Alcona, Alpena, Arenac, Bay, Iosco, Presque Isle

Research

The research supported by Michigan Sea Grant covers a wide range of topics. These have been divided into five subprograms:

- Marine Transportation and Engineering
- Living Resources
- Environmental Studies
- Vessel-Based Education Program
- Fishery Management

These subject areas include issues that are important to Michigan's coastal residents and businesses and fall within the guidelines of the National Sea Grant Program's Strategic Plan. The research projects chosen for 1997-98 are those that survived a rigorous review process. They bring outstanding talent and knowledge to bear on crucial Great Lakes issues.

Marine Transportation and Engineering

Risk Analysis of Commercial Fishing Vessels Operating in Extreme Seas

Successful fishing operations demand vessels that are safe as well as able to catch fish. One study has shown that small boats are the most likely to be lost in storms; present-day stability criteria used in boat construction apparently do not apply to small craft. What can be done to increase the stability of small fishing vessels when they are subjected to extreme conditions?

Until now, scientists have not completely understood the dynamics of large-amplitude rolling motions which lead to capsizing. This project will benefit both Great Lakes commercial and Native American fishing fleets by analyzing such motions and applying this analysis to vessel design.

Project Goals

Different kinds of fishing produce different kinds of vessel motion. This project will analyze the risk of capsizing for different vessel types, as well as for different types of fishing gear, fishing operations, and sea states. The results will provide a long-needed scientific foundation for the design and testing of fishing vessels to maximize their stability.

Project Methodology

Previous Michigan Sea Grant projects investigated the risk of capsizing in simple symmetric-roll mathematical models in random beam seas. In this latest project, scientists will expand and refine the models developed in those earlier projects. In particular, computer-intensive mathematical and statistical computations will analyze the complex dynamics of vessel motion in both regular and random waves.

Anticipated Results

The scientists at work on this project will improve understanding of yaw, pitch, sway, heave, surge, and random wave motion, and the part these play in capsizing. This research should result in more accurate answers to capsizing questions, more reliable safety measures, and improved small vessel design.

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Living Resources

Ecological and Economic Impacts of Watershed Restoration on Salmonid Productivity in Lake Michigan Tributaries

Salmonid fish—members of the family that includes salmon and steelhead trout—support recreational fisheries in the Great Lakes estimated to be worth \$1 billion a year. At least 30 percent of the chinook salmon and steelhead trout caught in Lake Michigan are produced through natural reproduction in Lake Michigan tributaries.

Many nursery habitats are blocked by dams and, until recently, were exposed to daily fluctuations in water flow from hydropower operations. Under terms specified by the Federal Energy Regulatory Commission in 1994, management of river flows in several Lake Michigan tributaries have been altered from peaking flows to run-of-river flows. Run-of-river flows are designed to increase habitat for the early life stages of salmonids and other fishes.

The ecological impacts of the changed water flow on river habitat, fish production, and yield have not been fully evaluated. This project will investigate these impacts, focusing on the lower Manistee River.

Project Goals

This project will:

1. measure the effect of run-of-river flows on potential salmonid habitats.
2. estimate the contribution of salmon and steelhead trout from the lower Manistee to the Lake Michigan fishery.
3. estimate the economic benefit given the increased production of salmonids with run-of-river flow.
4. estimate the economic cost, in terms of lost hydroelectric production and revenue, of changing from peaking to run-of-river flows.
5. develop an analysis framework for the possible restoration of other Great Lakes tributaries.

Project Methodology

Project scientists will sample Manistee River sites at different times and seasons to determine species abundance and diversity, productivity, growth rates, migratory patterns, and survival. Project scientists will study the changes that dams cause in a stream: temperature, flow, sedimentation rate, and nutrient cycling. They will also estimate the contribution of naturally occurring salmonids as opposed to stocked fish. This distinction can be made by examining the otolith—the so-called “ear bone” of the fish. Ecological models will then be used to predict potential salmonid habitat, abundance, and yield.

Scientists will use economic models to analyze the potential economic benefits from increased fishing and economic losses due to reduced hydropower production.

Anticipated Results

This project will evaluate the effects of legally mandated change in water flow on fish communities and will develop economic models that will estimate the effects of this management action. Linking the Manistee River models with statewide hydrology and fish community models will enable the results to be applied to similar river systems in the Great Lakes basin that may fall under mandated changes in flow management.

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Environmental Studies

The Effects of Food Web Structure and Dynamics on Toxaphene Bioaccumulation

Some contaminants become concentrated in living tissues and organs in a process called *bioaccumulation*. Thus, low chemical concentrations in the environment can become more concentrated in living tissue as the contaminants travel up the food chain.

The bioaccumulating pesticide, toxaphene, has received relatively little study in the Great Lakes region, even though toxaphene levels in the Great Lakes are equal to or higher than PCB and DDT levels. The incorporation of toxaphene into the Great Lakes food web is of great concern because toxaphene has been implicated in both cancer and birth defects, thereby identified as a hazardous substance by the Occupational Safety and Health Administration. Toxaphene is highly persistent, and can be found in fish hundreds of miles from the original application site.

Bioaccumulative contaminants in the Great Lakes decreased dramatically during the 1970s and early 1980s, proving the effectiveness of regulating certain industrial and agricultural chemicals. But the decline in contamination slowed in the late 1980s, and recent data show little or no change at all in organic contaminant levels. Is it possible, scientists wonder, that toxaphene and other contaminants may be recycling themselves through contaminated sediments?

Project Goals

Scientists speculate that different plankton and fish habitats and feeding behaviors result in different routes by which toxaphene is transferred to Great Lakes fish. To test this hypothesis, this project will examine three exposure routes:

1. Air-borne contaminants transferred into the pelagic (water surface) food web.
2. Air-borne contaminants transferred by rapidly settling particles into the benthic (deep water or lake bottom) web.
3. The transfer of contaminants from in-place sediments to the benthic web.

Project Methodology

To test their premise, project scientists will conduct research in Grand Traverse Bay in northern Lake Michigan. They will analyze Bay water and sediments, and assess toxaphene variations in selected plankton and fish. Project scientists hope to identify contamination routes, to measure the quantity and speed of contamination transfer into the food web, and to distinguish between "new" toxaphene deposition (probably from the atmosphere) and "in-place" contamination from contaminated sediments.

Anticipated Results

The study will result in a model of contaminant transfers in the Great Lakes food web. The model will identify the sources of contaminants that contribute to the levelling-off (rather than decline) of contaminants in Great Lakes fish. By quantifying the relative importance of different contaminant exposure pathways, the study will assist regulatory agencies in intelligently managing the Great Lakes resource.

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Vessel-Based Education Program

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

Today's young people face a rapidly changing and challenging world. To prepare them for the complex issues of the future, students need a thorough grounding in the science of natural processes and an enhanced understanding of ecological principles.

Nationwide studies indicate that American schools must do more to develop scientific literacy. In particular, students living in the Great Lakes basin need training in Great Lakes aquatic sciences. The Great Lakes Education Program was developed to help meet this need.

Project Accomplishments

In 1989, Michigan Sea Grant led the development of the Great Lakes Education Program (GLEP) in Macomb County, Michigan. Through studies in the classroom and aboard ship, the GLEP has now taught more than 10,000 fourth grade students, teachers, parents, and volunteers about Great Lakes resources, and the culture, biology, physics, and chemistry of the Lakes. More than 10 percent of the Program's participants have come from Michigan's minority populations.

Pre- and post-cruise tests conducted by researchers have documented that students experience statistically significant gains in their knowledge of the Great Lakes as a result of their participation in the GLEP. Furthermore, evaluations of the GLEP curriculum and field experience consistently indicate a very positive reaction by teachers and parents alike.

Project Goals

The Vessel-Based Education Program research project (VBEM) was established to refine the GLEP for use as a model for multidisciplinary, vessel-based, experiential education to be conducted in other parts of Michigan, the Great Lakes, and nationally. VBEM will also evaluate, refine and improve the GLEP materials for

classroom and hands-on aquatic education, and ultimately will expand the GLEP curriculum to include materials for use in grades seven and ten.

Anticipated Results

VBEM researchers intend to:

1. report on the Great Lakes Education Program's impact on students, volunteers, teachers, families, and communities;
2. refine the GLEP as a classroom/experiential education model adaptable by any Sea Grant or Extension youth education program;
3. develop recommendations for strengthening and implementing GLEP, and for implementing the GLEP in other geographic regions;
4. develop further outreach tools, such as teacher training modules and guidelines for GLEP replication;
5. communicate the results of this work to others interested in Great Lakes education.

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Fishery Management

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

Natural resource managers must make critical decisions affecting sport, commercial, and forage fish in the Great Lakes. However, a number of the significant environmental variables that affect fish populations, including water temperature, ice cover, storms, and water levels, have not been well understood. Further complicating fishery management are the varied interests of commercial fishing operations, sport anglers, regulatory agencies, and environmental interests. This project thus seeks to develop multidisciplinary scientific research to improve understanding, management, and sustenance of the Great Lakes salmonid fishery.

Project Goals

The Fishery Management Project seeks to refine and expand existing fisheries models and their predictive ranges. Project scientists will study the relative importance of biotic (living), abiotic (non-living), management, and harvest factors in determining recruitment, production, yield, and economic benefits and costs of the Great Lakes salmonid fisheries. These models will enable project scientists to evaluate alternative fisheries management strategies. Scientists will also develop an economic framework to assist in making comparisons between fishery management costs and benefits.

Project Methodology

The first step in the Project's research has been to measure and understand variations in year class strength of Great Lakes forage fishes, including development of age-specific catch-per-unit indexes of forage fish abundance. Using survey trawls, existing records, and the collaborative research of others, project scientists are for the first time pulling together extensive databases on Great Lakes salmonids, including salmonid abundance, mortality, harvest, and predator abundance.

Project scientists have also been developing a lake surface temperature database. Water temperature as a controlling factor for

cold-blooded animals offers the greatest promise for unraveling the mysteries of climate effects on year class strength. Researchers have found May and June water temperatures have a strong effect on year class strength of Lake Superior forage fish. Once all the essential data from trawl surveys, records, research, and water temperature have been collected, sophisticated statistical analysis will enable scientists to create enhanced multi-factor models that will help to predict and manage the salmonid fishery resource.

Accomplishments to Date

To date, project scientists have concentrated on developing and refining the necessary databases. Among the data already collected are age compositions for forage fish, salmonid stocking numbers, fishery effort, harvest and harvest age. Project scientists have also created a large inventory of weather-related images from NESDIS, the National Environmental Satellite Data and Information Service. These images reflect cloud cover over Lakes Michigan, Huron, and Superior from 1986 to 1996, and can be used in deriving temperature maps.

Anticipated Results

The Fishery Management Project will create fisheries management models with improved predictive values, valuable cost/benefit analyses, and alternative management strategies. The Project will also provide essential information about salmonid survival and abundance patterns, within-lake and whole-lake climatic effects, and the human dimensions of fishery management.

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Policy Committee

The Michigan Sea Grant Policy Committee assists and guides the Sea Grant Management Team by making recommendations and decisions on program policy. The Policy Committee's functions include reviewing overall program management, recommending directions the program should pursue in research, education, and outreach, setting budget priorities, and approving key personnel appointments. The Policy Committee is chaired by the Vice Presidents for Research at the University of Michigan and Michigan State University. Other members include deans from the two universities and other individuals knowledgeable about Great Lakes issues, research, and management.

- | | |
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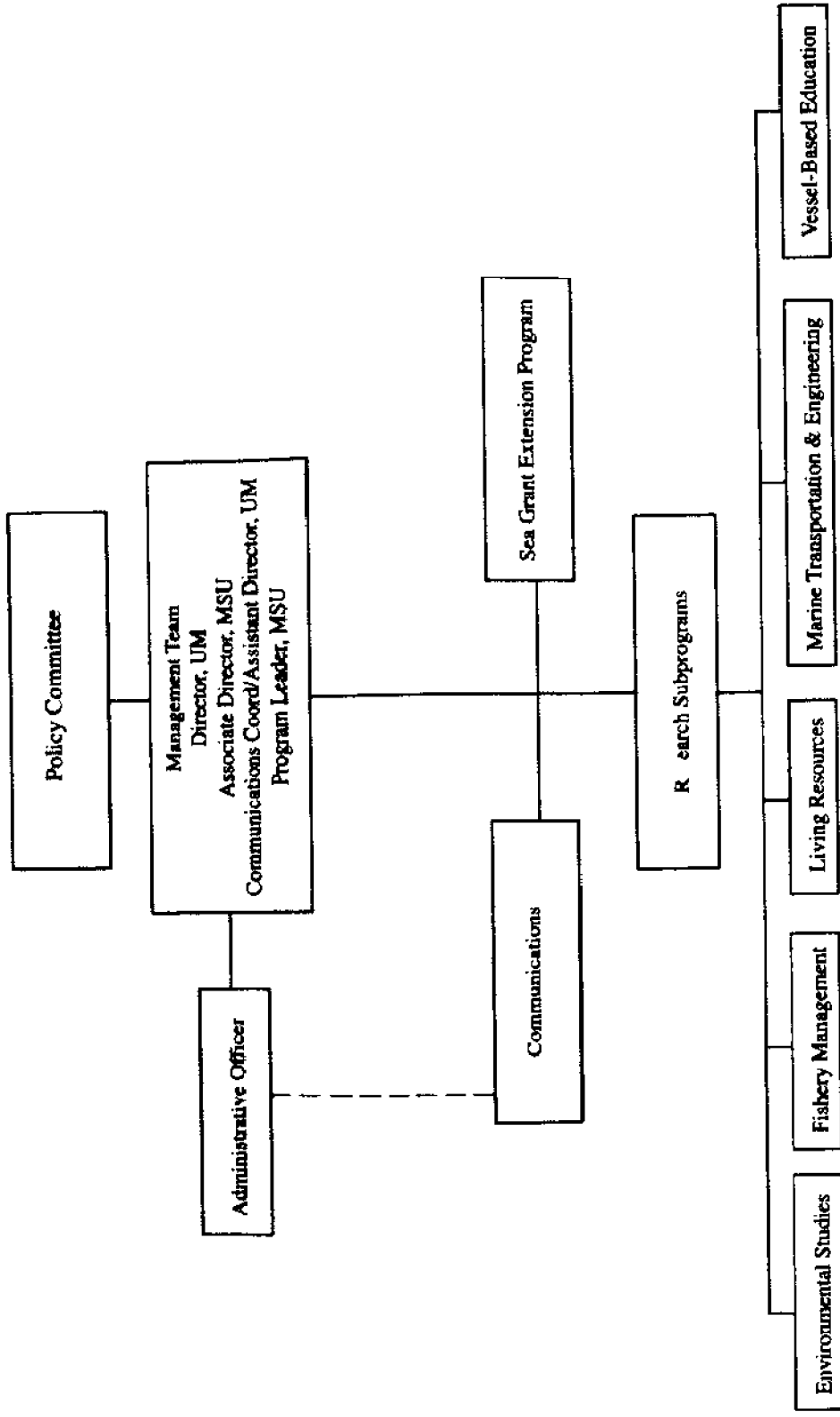
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