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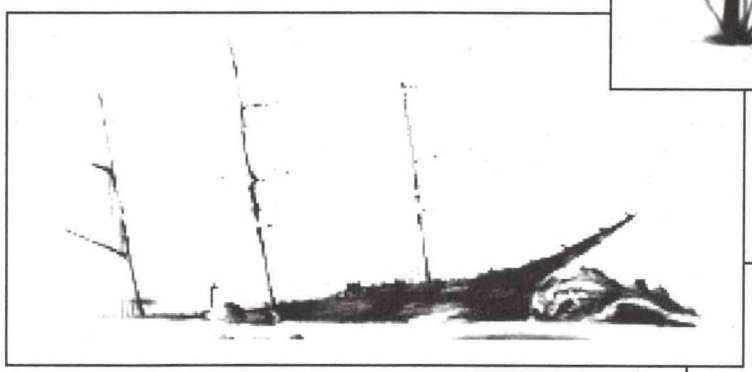
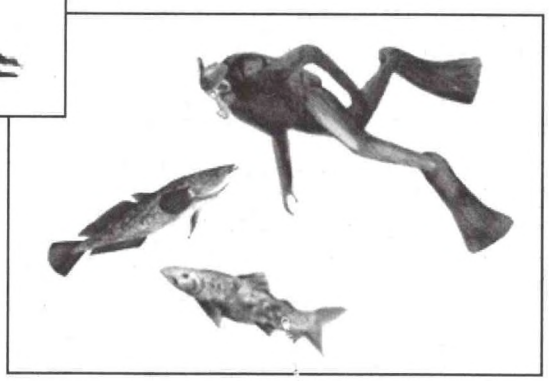
Proposed Thunder Bay National Marine Sanctuary

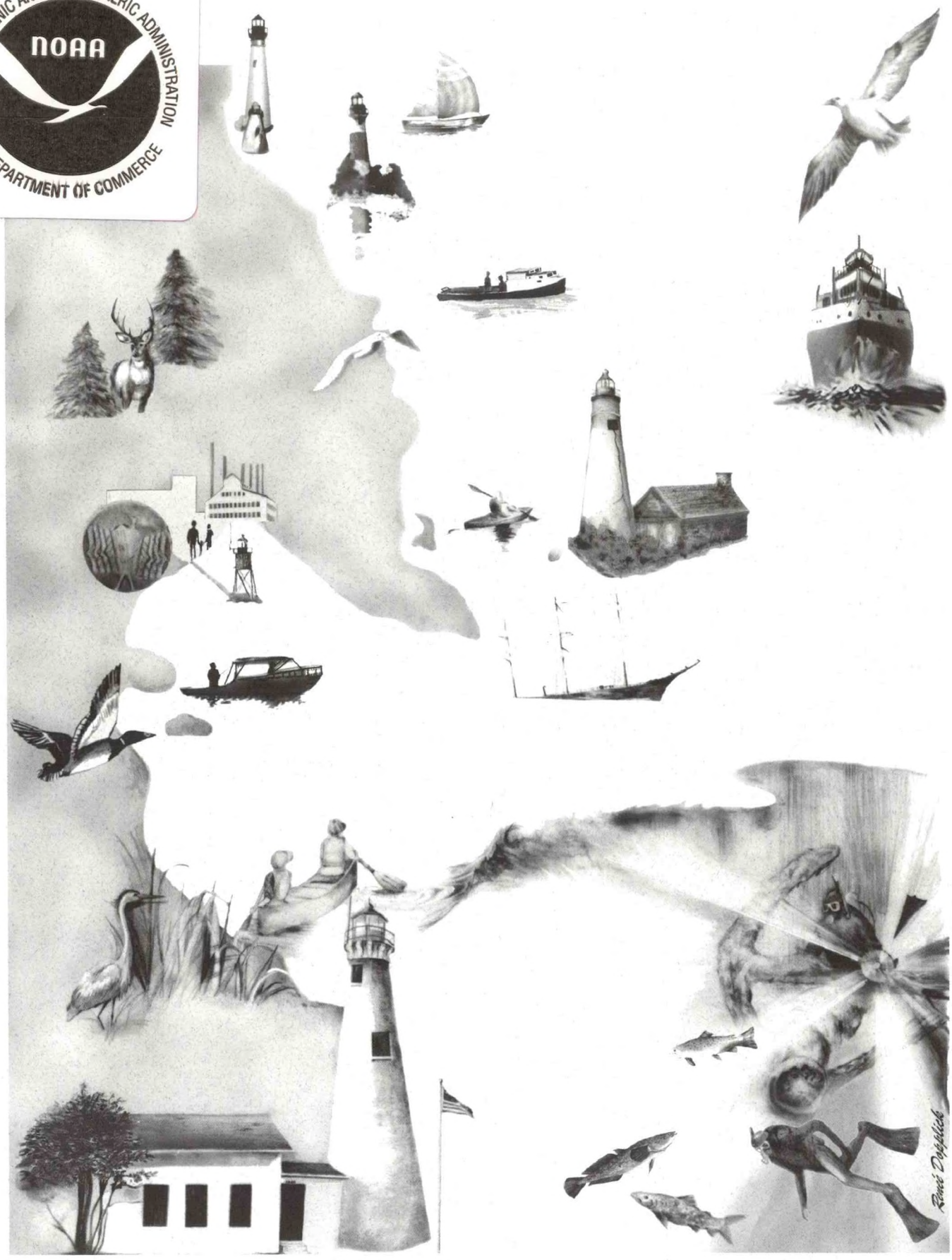
Volume I
DEIS/DMP





Draft Environmental Impact Statement/
Draft Management Plan
Volume I • April 1997

US Department of Commerce
National Oceanic and Atmospheric Administration
National Ocean Service
Office of Ocean and Coastal Resource Management
Sanctuaries and Reserves Division



The maritime cultural landscape of the Thunder Bay region -- an artist perspective by Renee Dopplick . Portions of this artwork are found on the cover and section dividers of this document. Cover design by NOAA.

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Proposed Thunder Bay National Marine Sanctuary

Draft Environmental Impact Statement/ Draft Management Plan Volume I • April 1997

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ACKNOWLEDGMENTS

The Thunder Bay region contains a large concentration of shipwrecks that span more than a century of Great Lakes maritime history. In 1981, the State of Michigan designated the Thunder Bay Underwater Preserve to protect Thunder Bay's shipwrecks. Some people believed, however, that the collection of shipwrecks was deserving of national recognition and support by the National Marine Sanctuary Program. This Draft Environmental Impact Statement/Draft Management Plan represents years of ideas, meetings, and recommendations on how Thunder Bay's underwater cultural resources could best be managed and protected for the appreciation of all interested individuals. Since 1991, many individuals, groups, and government agencies have contributed to the preparation of the Draft Environmental Impact Statement/Draft Management Plan (DEIS/DMP).

The National Marine Sanctuary Program staff would like to thank all members of the Thunder Bay Core Group who dedicated many hours to evaluating what a Thunder Bay National Marine Sanctuary could accomplish (refer to Volume II, Appendix H for names of Core Group members).

Many Alpena community leaders and other individuals have been active in the process to determine whether Thunder Bay should be designated as a National Marine Sanctuary. Their perspective and participation has been invaluable.

The Program staff is also grateful for assistance provided by the Alcona Historical Society, Alpena Area Chamber of Commerce, Alpena Community College, Great Lakes Visual/Research, Inc., Jesse Besser Museum, Michigan Science Teachers Association, Michigan Underwater Preserve Council, Inc., Michigan United Conservation Clubs, Middle Island Lighthouse Keepers Association, Inc., Thunder Bay Divers, Thunder Bay Underwater Preserve Committee, and other groups who contributed to this process.

Numerous federal agencies have been involved, including the Air and Army National Guards, Michigan Sea Grant College Program, National Park Service, NOAA's Great Lakes Environmental Research Laboratory, Old Woman Creek National Estuarine Research Reserve, U. S. Bureau of Indian Affairs, U.S. Coast Guard, U.S. Environmental Protection Agency, and U.S. Fish and Wildlife Service.

The Program staff would like to thank the agencies of the State of Michigan, especially staff in the Department of Environmental Quality, Department of State, and Department of Natural Resources. NOAA staff could not have written this document without the expertise of these state agency staff. The Governor's office has been instrumental in bringing together the state agencies and offering support to the process of determining the feasibility of a Thunder Bay National Marine Sanctuary.

Michigan State University's Department of Park, Recreation and Tourism Resources, Department of Anthropology, and Department of Fisheries and Wildlife all contributed to the DEIS/DMP. In particular, the Center for Maritime and Underwater Resource Management provided invaluable assistance in writing parts of the document and preparing the document for publication. Program staff appreciate their long hours of research, work on the computer, and editing the document.

The DEIS/DMP was created on a Macintosh desktop publishing system and produced as an electronic pre-press document. All narrative, figures, and text were converted to an electronic format for publication.

ABSTRACT

This abstract describes the Draft Environmental Impact Statement and Draft Management Plan (DEIS/DMP) for the Proposed Thunder Bay National Marine Sanctuary (Volume I). The National Oceanic and Atmospheric Administration (NOAA) proposes to designate waters encompassing and surrounding Thunder Bay on Lake Huron as a National Marine Sanctuary, in partnership with the State of Michigan. The Sanctuary boundary, as proposed in the DEIS/DMP, would extend from Presque Isle Lighthouse, south to Sturgeon Point Lighthouse, and lakeward to longitude 83 degrees west. In total, the Sanctuary would encompass 808 square miles. If designated, the Thunder Bay National Marine Sanctuary would establish partnerships among local, state, federal, and tribal agencies, organizations, and businesses for comprehensive management of Thunder Bay's underwater cultural resources, and to highlight the maritime heritage of the Great Lakes.

The Thunder Bay region contains about 160 shipwrecks that span more than a century of Great Lakes maritime history. Based on studies undertaken to date, there is strong evidence of Thunder Bay's national historic significance. National significance is attached to the entire collection of shipwrecks in the Thunder Bay region, as well as to individual vessels.

In 1981, Thunder Bay was established as the first State of Michigan Great Lakes Bottomland Preserve (commonly termed underwater preserve) to protect abandoned underwater cultural resources. NOAA recognizes the state's achievements and commitment to protection of Thunder Bay's underwater cultural resources. NOAA also recognizes the need to complement and supplement these achievements by working with the state to achieve comprehensive management of these underwater cultural resources, including development of education and research programs. The limited financial support available for management efforts at both state and local levels strengthens the need for partnerships among the state, local communities, and the National Marine Sanctuary Program.

The purposes of the Thunder Bay National Marine Sanctuary would be to work cooperatively with local, state, federal, and tribal agencies, organizations, and businesses to:

- complement existing management and enforcement authorities protecting underwater cultural resources;
- provide education opportunities that promote understanding, appreciation, and involvement in the protection and stewardship of underwater cultural resources;
- develop scientific knowledge and enhance management practices related to underwater cultural resources by encouraging research and monitoring programs; and

- encourage the exchange of knowledge and expertise to enhance sustainable uses of the Great Lakes and other underwater cultural resources.

Section 1 of the DEIS/DMP provides an overview of the document. Section 2 describes the background of the Proposed Thunder Bay National Marine Sanctuary.

The Draft Management Plan (DMP), Section 3 of the DEIS, is a proposed five-year plan describing the management (administration and resource protection), education, and research programs for the proposed Sanctuary. The DMP also identifies a variety of possible activities within these programs. For example, part of the education program could include establishing a remote video hook-up of researchers documenting the shipwrecks. Utilization of this technology would provide visual access to shipwrecks for non-divers.

Section 4 provides some management background and historical context of the Thunder Bay region. It includes information on the region's underwater cultural resources, an analysis of the national historic significance of the shipwrecks, and a description of the maritime cultural landscape (e.g., history, past and present human activities, environmental conditions, and natural resources).

Section 5 provides an analysis of the alternatives put forth by NOAA for designating and managing a Thunder Bay National Marine Sanctuary. The four sets of alternatives address designation, boundaries, regulations, and permit administration.

Section 6 provides an analysis of the environmental and social-economic impacts of Sanctuary designation. No adverse environmental or social-economic impacts are anticipated as a result of Sanctuary designation at Thunder Bay. Potential positive economic impacts to the region are estimated in this section. The presence of a National Marine Sanctuary at Thunder Bay would enhance local and regional economies by virtue of increased visitation and tourism in Alpena and surrounding communities. The possible establishment of a Sanctuary education center, in cooperation with the state and local partners, is expected to increase understanding and appreciation for the Great Lakes underwater cultural resources.

Volume II consists of the appendices, including federal and state laws applicable to the designation and management of the Sanctuary, the Economic Impact Assessment, and the national historic significance study.

Soon after the release of the DEIS/DMP, NOAA will hold a series of open houses to discuss the document with the public, answer questions, and explain how to submit comments. Several weeks after the open houses, NOAA will hold formal public hearings. A cooperative local, state, federal, and tribal decision will be made regarding Sanctuary designation after the close of the public comment period. If NOAA decides to proceed with the designation process, based on public and state support for the proposed Sanctuary, a Final Environmental Impact Statement/Management Plan would be prepared.

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ACRONYMS

ANGB	Air National Guard Base
AQCR	Air Quality Control Region
ASA	Abandoned Shipwreck Act
BGSU	Bowling Green State University
CFR	Code of Federal Regulations
CGLAS	Center for Great Lakes and Aquatic Sciences
CILER	Cooperative Institute for Limnology and Ecosystems Research
CMURM	Center for Maritime and Underwater Resource Management
COTFMA	Chippewa-Ottawa Treaty Fishery Management Authority
DEIS	Draft Environmental Impact Statement
DEQ	Department of Environmental Quality
DMP	Draft Management Plan
DNR	Department of Natural Resources
DOI	Department of the Interior
DOS	Department of State
EIA	Economic Impact Assessment
EIS	Environmental Impact Statement
ERIM	Environmental Research Institute of Michigan
FCMP	Fish Contaminant Monitoring Program
FEIS	Final Environmental Impact Statement
GLERL	Great Lakes Environmental Research Laboratory
GLFC	Great Lakes Fishery Commission
GLNPO	Great Lakes National Program Office
IJC	International Joint Commission
LAMP	Lakewide Management Plan
MCMP	Michigan Coastal Management Program
MDPH	Michigan Department of Public Health
MOA	Military Operating Area
MOU	Memorandum of Understanding
MSGCP	Michigan Sea Grant College Program
MSTA	Michigan Science Teachers Association
MSU	Michigan State University
MTTRRC	Michigan Travel, Tourism and Recreation Resource Center

(continued on next page)

NEMCOG	Northeast Michigan Council of Governments
NEPA	National Environmental Policy Act
NMS	National Marine Sanctuary
NMSA	National Marine Sanctuaries Act
NOAA	National Oceanic and Atmospheric Administration
NOS	National Ocean Service
NRC	Natural Resources Commission
PAH	Polynuclear aromatic hydrocarbons
PCB	Polychlorinated biphenyls
SAC	Sanctuary Advisory Council
SAR	Search and Rescue
SEL	Site Evaluation List
USCG	United States Coast Guard
USEPA	United States Environmental Protection Agency
USFWS	United States Fish and Wildlife Service

NOTE TO READER

A. National Environmental Policy Act (NEPA)

This document is both a Draft Environmental Impact Statement (DEIS) and a Draft Management Plan for the Proposed Thunder Bay National Marine Sanctuary. Some of the section headings, and the order in which they are presented, are different from those frequently found in other environmental impact statements. To assist NEPA reviewers, the following table has been developed. Topics normally addressed in an EIS document are listed under the heading "NEPA Requirement." The corresponding section of this document and the page numbers are provided in the other two columns.

NEPA Requirement	Draft EIS/Management Plan	Page
Purpose and Need for Action	Section 2	18
Alternatives	Section 5	164
Affected Environment	Section 4	76
Environmental and Social-Economic Consequences	Section 6	192
List of Preparers	Attachment	223
List of Agencies, Organizations, and Persons Receiving Copies of the DEIS	Attachment	226

B. Endangered Species Act (ESA)

Pursuant to Section 7 of the Endangered Species Act, the Fish and Wildlife Service of the U.S. Department of the Interior was consulted in the performance of the biological assessments of possible impacts on threatened or endangered species that might result from the designation of a National Marine Sanctuary at Thunder Bay. There are no endangered fish or bird species; there is one threatened bird (the Bald Eagle).

C. Resource Assessment

The National Marine Sanctuaries Act, as amended, requires a resource assessment report documenting present and potential uses of the proposed Sanctuary area, including uses subject to the primary jurisdiction of the U.S. Department of the Interior. This requirement has been met in consultation with the Department of the Interior, and the resource assessment report is contained in Section 4, The Sanctuary Setting.

D. Federal Consistency Determination

Section 307 of the Coastal Zone Management Act of 1972, as amended, requires that each Federal agency conducting or supporting activities directly affecting the coastal zone shall conduct or support those activities in a manner which is, to the maximum extent practicable, consistent with the approved state coastal management program. This requirement will be met through a federal consistency determination made by NOAA to the Michigan Coastal Management Program, that the designation of Thunder Bay National Marine Sanctuary is consistent, to the maximum extent practicable, with the Michigan Coastal Management Program.

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Section 1
Overview & Summary

SECTION I
OVERVIEW & SUMMARY

The Draft Environmental Impact Statement/Draft Management Plan (DEIS/DMP) discusses the proposal to designate waters in Michigan's northern Lake Huron, including and surrounding Thunder Bay, as a National Marine Sanctuary. The proposal is for a partnership between the State of Michigan and the National Oceanic and Atmospheric Administration (NOAA) to provide comprehensive and long-term management for shipwrecks and other underwater cultural resources found in the Thunder Bay area.

The purpose of this section is to provide the reader with a summary of the DEIS/DMP. For a complete understanding of the proposal to designate the Thunder Bay National Marine Sanctuary, the reader should refer to Sections 2-6 of this document.

Vision Statement for the Proposed Thunder Bay National Marine Sanctuary

To establish a National Marine Sanctuary that actively promotes education and research on the shipwrecks and other underwater cultural resources of the Thunder Bay region, and that creates a framework for comprehensive protection and management that relies on governmental cooperation and citizen participation.

Key Points

- The underwater cultural resources and maritime heritage of the Thunder Bay region have national historic significance. Protection and management of these resources can provide a variety of education, research, recreation, and tourism opportunities that will benefit Thunder Bay communities now and into the future.

- The Thunder Bay National Marine Sanctuary would be a collaborative effort of local, state, federal, and tribal agencies, organizations, and businesses to comprehensively manage and protect the underwater cultural resources of the Thunder Bay region. Under NOAA's alternatives, the Thunder Bay National Marine Sanctuary would *not* develop regulations or enforcement mechanisms to protect or manage natural resources such as fish, wildlife, and wetlands.

- Comprehensive management includes the protection of cultural resources using scientific knowledge developed through research and monitoring programs. Comprehensive management includes education programs that promote understanding, appreciation, and involvement in the protection and stewardship of underwater cultural resources.

• Underwater cultural resources are submerged historical or cultural features including shipwrecks, wharf and dock sites, prehistoric archaeological sites, and associated artifacts.

• The Thunder Bay National Marine Sanctuary would complement local, state, federal, and tribal efforts to protect underwater cultural resources by adding to existing protection, education, and research efforts.

• NOAA has not determined that Thunder Bay will be designated a National Marine Sanctuary. The process to determine the feasibility of Sanctuary designation will continue with the release of the DEIS/DMP, and corresponding public comment period. A cooperative local, state, federal, and tribal decision will be made regarding Sanctuary designation after the close of the public comment period, which is scheduled for Spring/Summer 1997.

What is the National Marine Sanctuary Program?

In response to growing public concern for the natural, cultural, and historical values of our oceanic, coastal, and Great Lakes waters, Congress passed the Marine Protection, Research and Sanctuaries Act of 1972 (now known as the National Marine Sanctuaries Act), which authorizes the Secretary of Commerce to identify, designate, and comprehensively manage marine and Great Lakes areas of national significance as National Marine Sanctuaries. The National Marine Sanctuary Program is administered by the National Oceanic and Atmospheric Administration (NOAA), within the U.S. Department of Commerce.

The mission of the National Marine Sanctuary Program is to identify, designate, and manage areas of the marine environment of special national (and in some cases international) significance due to their conservation, recreational, ecological, historical, research, educational, or aesthetic qualities. National Marine Sanctuaries come in all shapes and sizes; however, their management is guided by the overriding goal of resource protection. Sanctuary stewardship, education, and research programs help meet these goals.

Since 1972, fourteen National Marine Sanctuaries have been designated, including nearshore and open ocean waters, and ranging in size from less than one square nautical mile (Fagatele Bay, American Samoa) to over 5,000 square nautical miles (Monterey Bay, California). National Marine Sanctuaries may be designated based on differing resources and management needs at individual sites. Although many National Marine Sanctuaries protect nationally significant natural resources, the first National Marine Sanctuary, designated in 1975, protects the nationally significant cultural resources found at the site of the *U.S.S. Monitor*, located offshore of Cape Hatteras, North Carolina.

Why Designate a Thunder Bay National Marine Sanctuary?

National Historic Significance

The Thunder Bay region contains over 160 shipwrecks that span more than a century of Great Lakes maritime history. Although many of these wrecks have been identified, many more are thought to be in the Thunder Bay area and have yet to be located. Collectively, Thunder Bay's shipwrecks represent a "microcosm" of the Great Lakes commercial shipping industry. Based on studies undertaken to date, there is strong evidence of Thunder Bay's national historic significance, as the sunken vessels reflect transitions in ship architecture and construction methods, from wooden sailboats to early steel hulled steamers.

National significance is attached to the entire collection of shipwrecks in the Thunder Bay region, as well as to individual vessels. A large array of shipwrecks exists in the Thunder Bay region, including virtually all types of vessels used on the open Great Lakes. These vessels were engaged in nearly every type of trade, thereby linking Thunder Bay inextricably to Great Lakes commerce. This collection of shipwrecks is highly representative of Great Lakes shipping for the period of 1840 - 1970. A recent study has investigated the potential of Thunder Bay for National Historic Landmark status (Martin 1996). The collection of shipwrecks in the Thunder Bay region should qualify for the National Register of Historic Places.

The historical themes encompassed by the shipwrecks and other underwater cultural resources of the Thunder Bay region include the following (Martin 1996):

- prehistoric transportation
- early trade and exploration by Europeans
- early settlement and military affairs (1679 - 1860)
- westward expansion (1763 - 1898)
- business and agricultural products
- lumber, coal, stone, and ore
- foreign trade and the St. Lawrence Seaway
- commercial sail transportation technology
- commercial steam transportation technology
- motor-powered and unpowered vessel transportation technology .

Assistance to the State of Michigan in Comprehensive Management of Nationally Significant Underwater Cultural Resources

In 1981, Thunder Bay was established as the first State of Michigan Great Lakes Bottomland Preserve (commonly termed underwater preserve). Underwater preserves are established to protect "abandoned property of historical value, or ecological, educational, geological, or scenic features or formations having recreational, educational, or scientific value." The Thunder Bay Underwater Preserve totals 290 square miles, extending from Middle Island (at the

northern edge of Alpena County), south to South Point (at the southern edge of Alpena County), and extending from the ordinary high water mark along the shores of Thunder Bay east to the 150-foot contour line in Lake Huron. Because of increasing public interest in underwater cultural resources, the discovery, exploration, documentation, and study of shipwrecks will continue to be important activities in the Thunder Bay region and the other Great Lakes. Comprehensive and long-term management is important for Thunder Bay, particularly as public interest in its nationally significant collection of shipwrecks increases.

NOAA recognizes the state's achievements and commitment to protection of Thunder Bay's underwater cultural resources, particularly the establishment of Thunder Bay as a state underwater preserve. NOAA also recognizes the need to complement and supplement these achievements by working with the state to achieve comprehensive management of the Thunder Bay region's underwater cultural resources, including education and research programs.

A Draft Memorandum of Understanding (MOU) among NOAA, the federal Advisory Council on Historic Preservation, and the State of Michigan has been outlined and is included in the DEIS/DMP for public review. The final MOU would define the roles and responsibilities of NOAA and the state in management of the Sanctuary. In particular, the final MOU would establish the process for NOAA and the state to authorize certain activities inside the Sanctuary, and identify a process for conflict resolution.

Under the proposed MOU, applications for permits involving activities that may impact historical resources would be reviewed by the State Archaeologist and NOAA. Permits identified in the MOU that strictly adhere to the Sanctuary regulations and relevant state law, would be deemed to be in compliance with Section 106 of the National Historic Preservation Act and would not require approval of the federal Advisory Council on Historic Preservation. Permits that would be outside the scope of the MOU, in whole or in part, would be subject to Section 106 review.

Limited financial support for management efforts at both state and local levels strengthens the need for partnerships among the state, local communities, and the National Marine Sanctuary Program. Designation of Thunder Bay as a National Marine Sanctuary would establish partnerships, in which resources could be shared to achieve comprehensive management and protection of Thunder Bay's underwater cultural resources through long-term research, monitoring, and education.

How Did We Get Here?

Since the early 1970s, members of the Alpena community have been interested in the potential for development of an underwater park featuring shipwrecks in the Thunder Bay region. Based on studies that document the presence in

Thunder Bay of a large number of shipwrecks, and with the support of a local diving club and other civic organizations, Thunder Bay became the first State of Michigan underwater preserve in 1981. The Preserve, as other preserves to follow, was established to protect and preserve bottomland and surface water areas containing abandoned property of cultural or recreational value.

During this same period of time, NOAA was developing a *Site Evaluation List* (SEL) of potential candidates for designation as National Marine Sanctuaries. In 1983, NOAA placed Thunder Bay, as one of five Great Lakes areas, on the final SEL.

In 1991, NOAA elevated the Thunder Bay site from the SEL to become an *active candidate* for National Marine Sanctuary designation. In October 1991, NOAA held public scoping meetings in Lansing and Alpena to learn more about the Bay's resources, activities, and associated management issues; and to share with community members information about the National Marine Sanctuary Program and the feasibility of a Thunder Bay National Marine Sanctuary. Over the next two to three years, there followed a series of meetings of informal working groups to bring together local, state, federal, and tribal agencies, organizations, and businesses to discuss the scope of a National Marine Sanctuary at Thunder Bay.

In 1994, a Thunder Bay Core Group was formed, whose members represent local, state, federal, and tribal agencies. The Core Group assisted in the development and review of management alternatives, in cooperation with a variety of community interests. By mid-1995, the Core Group had narrowed the management focus of a potential Thunder Bay National Marine Sanctuary to underwater cultural resources (e.g., shipwrecks). This recommended focus was presented and agreed upon at an Alpena community meeting in June 1995. Management of natural resources was rejected by the Core Group (see Volume II, Appendix H). Since that time, development of the DEIS/DMP has proceeded in accordance with the recommendations of the Core Group.

What Would a Thunder Bay National Marine Sanctuary NOT Do?

The proposed management of a Thunder Bay National Marine Sanctuary would focus solely on shipwrecks and other underwater cultural resources (i.e., wharf and dock sites, middens or dump sites, and archaeological sites and associated artifacts).

No adverse environmental or social-economic impacts are anticipated as a result of Sanctuary designation at Thunder Bay. Because the sole focus of the proposed Sanctuary is on shipwrecks and other underwater cultural resources, all activities related to implementation of the Sanctuary would be associated with these shipwrecks. NOAA does not anticipate any

adverse environmental impacts from these types of activities. The narrow focus of the proposed Sanctuary management would not involve natural or living resources that may be found within the Sanctuary's proposed boundary as long as the activities would not adversely affect the underwater cultural resources.

A Thunder Bay National Marine Sanctuary would *not* charge or collect general user fees as a means of supplementing Congressional appropriations and supporting Sanctuary activities. NOAA examined the possiblity of user fees and determined the fees to be an undesirable option for the following reasons: (1) strong opposition from Sanctuary users whose livelihoods depend on access to Sanctuary resources; (2) the lack of statutory authority for the Sanctuary Program to charge such fees; and (3) logistical and operational obstacles to collecting and enforcing such fees. Any user fee regulation would require federal approval, and would be subject to the Governor of Michigan's approval.

NOAA is currently exploring, through a revenue enhancement initiative, other voluntary options of funding support. NOAA continues to promote and encourage innovative means, such as partnerships, to fund Sanctuary programs and activities.

NOAA's Proposal for a National Marine Sanctuary

NOAA proposes to designate Thunder Bay and surrounding waters on Lake Huron as a National Marine Sanctuary, in partnership with the State of Michigan. The proposed Sanctuary boundary alternative would extend from Presque Isle Lighthouse, south to Sturgeon Point Lighthouse, and lakeward to longitude 83 degrees west. The total Sanctuary would encompass 808 square miles.

If designated, the Thunder Bay National Marine Sanctuary would establish a partnership between the State of Michigan and NOAA to ensure coordinated efforts among local, state, federal, and tribal agencies, organizations, and businesses for comprehensive understanding and management of Thunder Bay's underwater cultural resources. This effort would highlight the maritime heritage of the Great Lakes. NOAA would create Sanctuary regulations to complement and strengthen existing State regulations protecting underwater cultural resources. For most activities, a separate Sanctuary permit from NOAA would not be required; existing state or federal permits would suffice.

Social-economic impacts of Sanctuary designation are anticipated to be beneficial to the public. In general, the presence of a National Marine Sanctuary at Thunder Bay is projected to enhance local and regional economies by virtue of increased visitation and tourism in Alpena and the surrounding communities. The possible establishment of a Sanctuary education center, in cooperation with the state and local organizations and businesses, is also expected to increase understanding and appreciation for the Great Lakes underwater cultural resources.

Draft Management Plan

Section 3 of the document presents a Draft Management Plan (DMP) for the Proposed Thunder Bay National Marine Sanctuary. The DMP is a proposed five-year plan describing the management (administration and resource protection), education, and research programs for the proposed Sanctuary. The DMP also identifies a variety of possible activities within those programs. If the Sanctuary is designated, individual strategic plans would be developed for each of these programs.

Management Program: Operating and Protecting the Sanctuary in Partnership

- *Administration Program*

The Sanctuary's Administration Program would focus on the roles and responsibilities of the agencies, organizations, and businesses that would be involved in operation of the Sanctuary. Successful operation of the proposed Sanctuary would be possible only through cooperative efforts of appropriate local, state, federal, and tribal agencies, organizations, and businesses. Section 3 also discusses potential Sanctuary staff and facilities, including staff roles, establishment of an office in Alpena, possible satellite offices (as future needs are identified), and development of an education center in partnership with others.

The establishment of a Sanctuary Advisory Council (SAC) is discussed as a mechanism to provide advice and recommendations to the Sanctuary Manager about issues related to Sanctuary programs and implementation. The SAC would encourage community participation in the management of the proposed Sanctuary.

A five-year projection of Sanctuary activities, estimated financial obligations, and economic impacts of the Sanctuary operating budgets and cost-share partnerships is provided in Table 3.4 of the DMP.

- *Resource Protection Program*

The Sanctuary's Resource Protection Program's primary function would be to ensure, through cooperative stewardship, the protection of Thunder Bay's underwater cultural resources, for their long-term integrity and use. *Cooperative stewardship*, as described by the Michigan Underwater Preserve Council and other organizations, involves the active participation in resource protection activities by agencies, organizations, and businesses. Stewardship is important to achieving this primary goal, as is Sanctuary coordination with existing state and regional resource protection plans.

Sanctuary resource protection activities could include:

- coordinating management agencies (e.g., NOAA, the State of Michigan's Department of Environmental Quality, Department of State, and Department of Natural Resources);

• science-based decision-making, including baseline inventory and assessment activities;

• developing and maintaining a mooring buoy system; and

• providing additional support for enforcement personnel.

Education Program: Learning to be Better Cooperative Stewards

The Sanctuary Education Program's primary function would be to promote understanding, appreciation, and involvement in the protection and stewardship of Thunder Bay's underwater cultural resources. Possible activities could include a wide range of programs, facilities, and services offered through schools, and interpretation, and outreach activities. Program activities would support the priorities of the Michigan underwater preserves, particularly those of the Thunder Bay Underwater Preserve. Sanctuary education activities would complement existing efforts relating to underwater cultural resources and the Thunder Bay area's maritime heritage.

Individual educational activity priorities would be identified in an Education Plan, to be developed if the Sanctuary is designated. Possible education activities could include:

• working cooperatively with Great Lakes educators (i.e., schools, colleges and universities, MSU Extension, museums) and other agencies, organizations, and businesses interested in Great Lakes education to identify education themes based on the maritime history and culture of the region (e.g., industrial development, western expansion, and relationships between cultural resources and the natural environment);

• utilizing the Great Lakes education inventory to identify existing education programs that support Sanctuary education themes. The Sanctuary could then work cooperatively to complement, and to assist in maintaining and enhancing these programs. Examples of existing programs include the Elderhostel program, and the signage, displays, and materials along the Thunder Bay Riverwalk Trail;

• identifying and supporting a network of volunteers to help enhance and maintain activities that are consistent with Sanctuary education themes. The network could utilize community expertise and match the interests of volunteers with needed activities. Training, support, and incentives could be provided to volunteers as needs and interests arise;

• establishing remote video hook-ups of researchers inventorying and documenting the shipwrecks. Utilization of this technology would provide visual access to shipwrecks for non-divers; and

• developing a "Thunder Bay Shipwreck Trail." The Sanctuary could select and interpret a collection of shipwrecks for a "shipwreck trail," which would highlight Thunder Bay's maritime heritage. Themes would be developed and

matched with appropriate shipwreck sites to educate visiting divers and non-divers about a variety of subjects, such as historical ship construction, Great Lakes shipping, the effect of environmental processes on shipwrecks, and the effects of salvage on historic shipwrecks.

Research Program: Working Together to Better Understand Thunder Bay's Underwater Cultural Resources and Maritime Heritage

The Sanctuary Research Program would focus on building the public's knowledge and understanding of Thunder Bay's underwater cultural resources, through research and monitoring programs. This knowledge would be used to evaluate existing management programs, and to enhance future management decisions affecting underwater cultural resources. These goals are possible only through active participation of agencies, organizations, and businesses interested in comprehensive management of Sanctuary resources. The Sanctuary Research Program would complement the Michigan underwater preserve program by supporting the inventory, assessment, and monitoring of Sanctuary underwater cultural resources. The Sanctuary Research Program also would be complementary to the Michigan Department of State goal of documenting more fully Michigan's historic resources.

Priorities for Sanctuary research activities and strategies would be incorporated into a Sanctuary Research Plan, to be developed if Sanctuary designation occurs. Possible Sanctuary research activities could include:

- conducting preliminary historical research (i.e., completion of research on all sunken vessels identified in the Thunder Bay region). These data would be important to further analysis of the collection of wrecks and their eventual interpretation for both popular and scholarly audiences;

- inventorying and locating historical materials, involving research of collections at local and regional archives, as well as those of private owners;

- conducting a full scale contextual theme study and developing a database of Great Lakes shipwrecks, to enable further evaluation of Thunder Bay region shipwrecks and possible formal nomination to the U.S. Department of the Interior for National Historic Landmark status; and

- producing an historical guide to maritime resources of the Thunder Bay region, to be available for a variety of user groups.

Additional possible research and monitoring activities include an archaeological inventory and assessment of Thunder Bay's shipwrecks, investigation into impacts of zebra mussels on shipwrecks and recreational diving, and a study of impacts from recreation and tourism.

These research activities would aid in interpreting Thunder Bay's history within regional, national, and international contexts, and would involve local communities in discovering their maritime heritage.

What Are the Designation, Boundary, Regulatory and Administrative Alternatives for a Thunder Bay National Marine Sanctuary?

Section 5 of the DEIS/DMP provides an analysis of the alternatives put forth by NOAA for designation and managment of a Thunder Bay National Marine Sanctuary. The four sets of alternatives address designation, boundaries, regulations, and permit administration. The complete discussion and analysis is contained in Section 5.

NOAA's proposed alternatives are the following:

Designation

NOAA would designate Thunder Bay as a National Marine Sanctuary. All levels of government, other organizations, and businesses would work together to comprehensively manage the underwater cultural resources of the Thunder Bay region in the context of their maritime history and culture.

Boundary

NOAA's proposed boundary would run along the ordinary high water mark of Lake Huron from Presque Isle Lighthouse, south to Sturgeon Point Lighthouse, and lakeward to longitude 83 degrees west (808 square miles). This boundary alternative provides protection for a collection of shipwrecks representative of Great Lakes maritime history; complements and enhances the maritime cultural landscape of the Thunder Bay region; and is readily identifiable to Sanctuary visitors, staff, enforcement personnel, and other agency staff with management responsibilities in the region.

Regulatory

NOAA would adopt regulations similar to those used in other National Marine Sanctuaries to protect underwater cultural resources. The regulations would be consistent with and supplement the State of Michigan regulations. The Sanctuary regulations would provide protection for underwater cultural resources that are not covered by existing state and federal law, and would also ensure a safety net of protection for underwater cultural resources that are covered by state law.

Administrative

The State of Michigan would continue to issue permits under state law related to underwater cultural resources. For activities involving permits from other federal agencies, NOAA would address Sanctuary concerns through the review and authorization, and if necessary, the placing of conditions on the federal permits. For activities adversely impacting underwater cultural resources that require neither a state permit nor a permit from another federal agency, a Sanctuary permit would need to be obtained directly from NOAA in order to conduct the activity.

What is Next in the Process?

If NOAA decides to proceed with the designation process based on public and state support for the proposed Sanctuary, a Final Environmental Impact Statement/ Management Plan (FEIS/MP) would be prepared. The FEIS/MP would respond to comments received on the DEIS/DMP, either at the public hearings or in writing,

and would include discussion of the final proposed boundary, regulatory, and administrative alternatives. The FEIS/MP also would include a determination by NOAA regarding the consistency between the proposed Sanctuary and the Michigan Coastal Management Program. Even if NOAA decides not to proceed with the designation process, an FEIS would be prepared addressing public comments.

As with the DEIS/DMP, copies of the FEIS/MP would be provided to the Michigan Congressional Delegation and to the Senate and House Committees with jurisdiction over the National Marine Sanctuary Program. At the same time, a notice announcing the availability of the FEIS/MP would be published in the Federal Register. If, based on public and state support, NOAA decides to designate the Sanctuary, NOAA would publish a Notice of Designation in the Federal Register.

Beginning with the publication date of that Notice, both the Congressional Committees and the Governor's Office would have 45 days of continuous Congressional session to review the FEIS/MP (including the final proposed regulations for the Sanctuary). During this 45-day review period, the Governor may certify to the Secretary of Commerce (NOAA) that the designation or any of its terms is unacceptable, in which case, the designation would not occur in regard to those terms. The Sanctuary and its regulations would take effect at the end of the 45-day review period; a final Federal Register notice would announce the effective date of the Sanctuary's regulations.

Section 2
Background

SECTION 2
BACKGROUND

- The mission of the National Marine Sanctuary Program is to manage marine and Great Lakes areas of *special national significance* and protect their ecological and cultural integrity for the benefit of current and future generations.

- The Proposed Thunder Bay National Marine Sanctuary is the *collaborative effort* of local, state, federal, and tribal agencies, organizations, and businesses to *comprehensively manage* the underwater cultural resources of the region in the context of its cultural landscape.

- The Thunder Bay region would be :
  - the first freshwater and Great Lakes National Marine Sanctuary
  - the only National Marine Sanctuary located entirely within state waters;
  - the first National Marine Sancuary to focus solely on a large collection of shipwrecks and other underwater cultural resources.

- There are currently 14 National Marine Sanctuaries designated in the United States and Pacific Territories.

A. Introduction

The Draft Environmental Impact Statement/Draft Management Plan (DEIS/DMP) is an important step in the process to determine the feasibility of a Thunder Bay National Marine Sanctuary (NMS) in Lake Huron. It is a reflection of the many hours of work contributed by numerous volunteers, agency representatives, and political officials. The DEIS/DMP incorporates the best available information on the resources and activities of the Thunder Bay region. It is designed to encourage understanding, careful thought, and detailed comments regarding the proposed designation of a Thunder Bay NMS.

1. What is the Proposed Thunder Bay National Marine Sanctuary?

The Proposed Thunder Bay NMS is the collaborative effort of local, state, federal, and tribal agencies, organizations, and businesses to *comprehensively manage* the *underwater cultural resources* of the Thunder Bay region in the context of its *cultural landscape*.

- *Comprehensive management* involves the protection of resources using sound management practices that incorporate scientific knowledge developed through research and monitoring programs. Comprehensive management is dependent on community support, understanding, and participation in sustainable use and stewardship of public resources.

• *Underwater cultural resources* are any submerged historical or cultural feature including shipwrecks, wharf and dock sites, middens or dump sites, archaeological sites, and associated artifacts.

• A *cultural landscape* is a geographic area including both cultural and natural resources, coastal environments, human communities, and related scenery, that is associated with historic events, activities, or persons, or exhibits other cultural or aesthetic values (NPS 1992).

Great Lakes Visual/ Research, Inc.

PURPOSES

The purposes of the Proposed Thunder Bay NMS are to work cooperatively with local, state, federal, and tribal agencies and organizations to:

• complement existing management and enforcement authorities protecting underwater cultural resources;

• provide education opportunities that promote understanding, appreciation, and involvement in the protection and stewardship of underwater cultural resources;

• develop scientific knowledge and enhance management practices related to underwater cultural resources by encouraging research and monitoring programs; and

• encourage the exchange of knowledge and expertise to enhance sustainable uses of Great Lakes and other underwater cultural resources.

Figure 2.1 Scuba diver explores the shipwreck *Monohansett* in Thunder Bay.

2. What is the National Marine Sanctuary Program?

In response to a growing awareness of the natural, cultural, and historical values of our oceanic, Great Lakes, and coastal waters, Congress passed Title III of the Marine Protection, Research and Sanctuaries Act in 1972 (16 U.S.C. 1431 *et seq.*). In 1992, Title III was amended and renamed the National Marine Sanctuaries Act. The Act was most recently amended in 1996 (P. L. 104-283). The Act authorizes the Secretary of Commerce to identify, designate, and comprehensively manage marine and Great Lakes areas of special national significance as National Marine Sanctuaries. The NMS Program is administered by the National Oceanic and Atmospheric Administration (NOAA) within the U.S. Department of Commerce.

National Marine Sanctuaries promote comprehensive management of nationally significant ecological, historical, recreational, and aesthetic marine resources. National Marine Sanctuaries may be designated in coastal and ocean waters, in submerged lands, and in the Great Lakes and their connecting waters. Currently, fourteen National Marine Sanctuaries have been designated and include near-shore and open ocean waters ranging in size from less than one square nautical mile to more than 5,000 square nautical miles. National Marine Sanctuaries encompass a fascinating array of plants and animals, from huge whales to tiny, brightly colored sea snails, and a variety of historical resources, such as the U.S. Civil War ironclad ship *USS Monitor*.

National Marine Sanctuaries are cherished recreational destinations for scuba diving, sport fishing, and wildlife viewing, and support valuable commercial industries, such as fishing, boating, diving, and tourism. Sanctuaries may provide a secure habitat for endangered and rare species, and protect historically significant shipwrecks and cultural artifacts. Part of the challenge of managing these special areas is facilitating multiple uses of the resources to the extent compatible with the primary Sanctuary objective of resource protection.

MISSION

The mission of the NMS Program is to manage marine and Great Lakes areas of special national significance and protect their ecological and cultural integrity for the benefit of current and future generations. The Sanctuary program will develop and implement stewardship, education, and research programs that foster understanding, support, and participation; and promote the ecologically sustainable use of the nation's natural and cultural, marine and Great Lakes resources. The Sanctuary program will provide leadership and act as a catalyst to link the assets and resources of governmental and non-governmental organizations and individuals to promote management and protection of marine and Great Lakes resources.

GOALS

The goals of the NMS Program (NOAA 1994) are to:

- Ensure the health and integrity of Sanctuary resources by protecting biodiversity, biological productivity, cultural resources, and areas of pristine condition.
- Broaden the scope of the Sanctuary system by including a diversity of nationally significant marine and Great Lakes areas especially valued for their ecological and cultural qualities.
- Enhance Sanctuary management by adopting policies, practices, and initiatives that ensure the compatibility of human activities with long-term protection of Sanctuary resources.
- Develop scientific understanding by encouraging research and monitoring programs yielding information that can be used to evaluate existing management practices and provide improved understanding for future management decisions.
- Provide opportunities in education and outreach that promote public understanding, support, and participation in the protection and conservation of marine and Great Lakes resources.
- Encourage the transfer and adoption of resource management practices that can be used globally, regionally, and locally to enhance marine and Great Lakes conservation and ecologically sustainable uses of marine and Great Lakes resources outside Sanctuary boundaries.

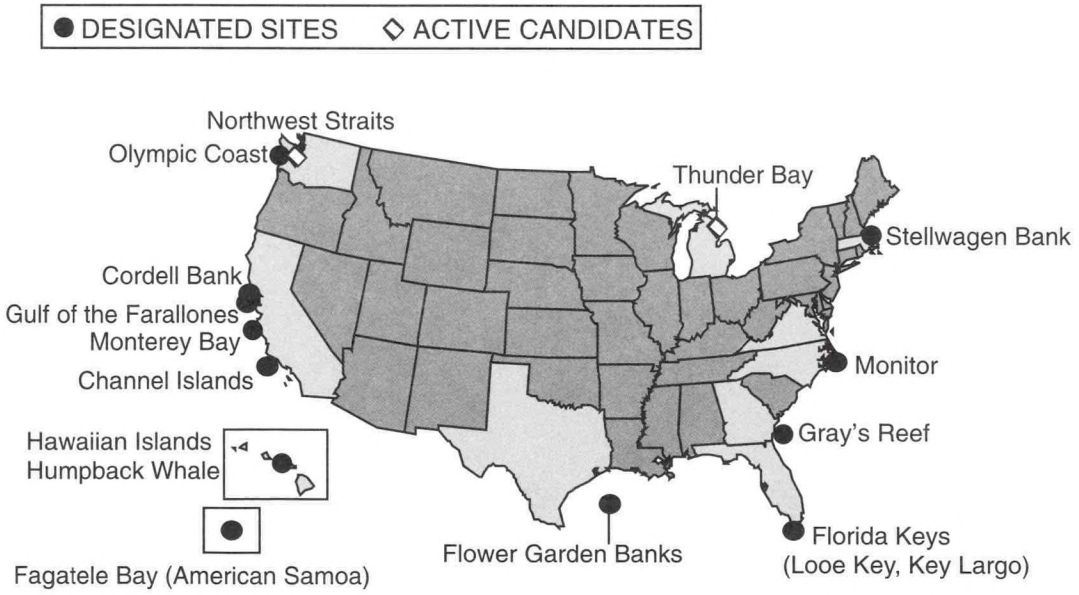


Figure 2.2 The National Marine Sanctuary System (1997).

B. The Feasibility of a Thunder Bay National Marine Sanctuary

I. Need for Action

The Thunder Bay region contains a large concentration of shipwrecks that span more than a century of Great Lakes maritime history. Over 160 shipwrecks have been mentioned in historical records (Martin 1996, Vrana 1993). Twenty-six shipwrecks in Thunder Bay were investigated by divers in 1975 (Warner and Holecek 1975); about 45 shipwrecks in the region are currently explored by recreational divers (McConnell, personal communication 1996).

In 1981, Thunder Bay was established as the first State of Michigan underwater preserve under Part 761, Aboriginal Records and Antiquities of Public Act 451 (1994), as amended, to protect "abandoned property of historical value, or ecological, educational, geological, or scenic features or formations having recreational, educational, or scientific value." The Preserve area totals 290 square miles, extending from Middle Island (northern edge of Alpena County) south to South Point (southern edge of Alpena County), and from the ordinary high water mark along the shores of Thunder Bay, to the eastern boundary along the 150-foot contour line in Lake Huron.

Management of underwater preserves is the joint responsibility of the Michigan Department of Environmental Quality (DEQ) Land and Water Management Division, and the Michigan Department of State (DOS) Michigan Historical Center. State agencies with responsibility for law enforcement in the Preserve include the Alpena County Sheriff's Department, the Michigan State Police, and the Michigan Department of Natural Resources (DNR) Law Enforcement Division.

The discovery, exploration, documentation, and study of shipwrecks continue to be important activities in the Thunder Bay region and the Great Lakes. This continued importance is due, in part, to the increasing public interest in underwater cultural resources and the development of underwater technologies that enhance access to these resources.

NOAA recognizes the national historic significance of the underwater cultural resources of the Thunder Bay region. NOAA agrees with the State of Michigan, the Thunder Bay Core Group, and other stakeholders that a Thunder Bay NMS should focus on underwater cultural resources, as well as highlight the region's maritime heritage.

If NOAA designates the Thunder Bay NMS, it would reaffirm the achievements of the State of Michigan and regional communites in protecting Great Lakes underwater cultural resources and in establishing the Thunder Bay Underwater Preserve. NOAA also recognizes the need to complement and supplement these achievements by facilitating the comprehensive management of Thunder Bay underwater cultural resources, including education and research initiatives. Comprehensive management is important because of the increased interest in

underwater cultural resources, the national significance of these resources in the Thunder Bay region, and the limited financial support available at state and local levels.

2. The Designation Process

Guiding Principles of the Designation Process

The process to determine the feasibility of a Thunder Bay NMS has been guided by some important principles. These principles have evolved throughout the feasibility process and have helped to ensure accuracy of information.

GUIDING PRINCIPLES

NOAA has strived to develop a National Marine Sanctuary in partnership with local, state, federal, and tribal agencies, organizations, and businesses. The Sanctuary would:

- encourage active involvement in the protection and stewardship of Thunder Bay underwater cultural resources;

- complement and supplement existing management, education, and research programs;

- respect and incorporate local values, culture and expertise, and enhance the quality of life of resource users; and

- strengthen local, regional, national, and global awareness and understanding of Great Lakes maritime heritage.

Requirements of the Designation Process

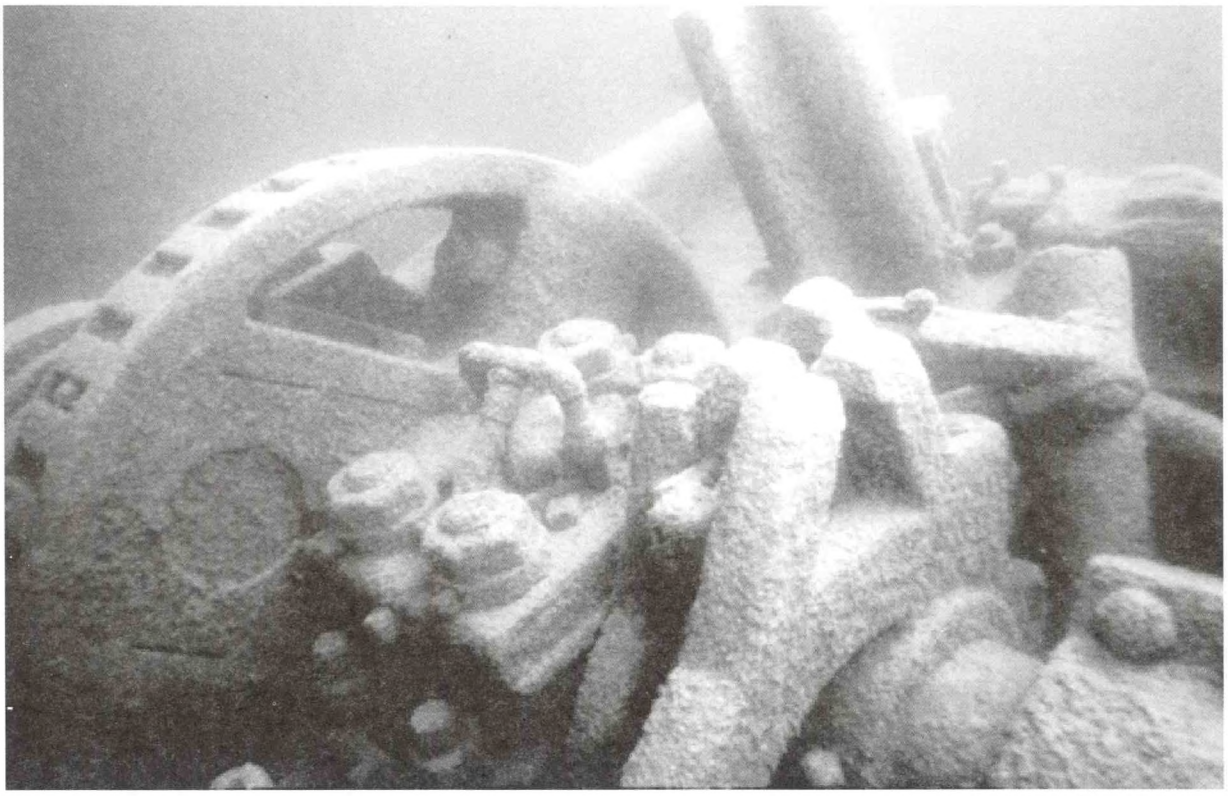
Sections 303 and 304 of the National Marine Sanctuaries Act and its implementing regulations (15 CFR Part 922) outline the steps necessary to designate a NMS. These steps include the preparation of an environmental impact statement (EIS) pursuant to the National Environmental Policy Act (NEPA) for the proposed designation.

Given the diversity of resources and communities in which Sanctuaries are located, the mechanisms for completing the EIS and the steps for designation vary from site to site. The designation process is designed not only to satisfy the requirements of NEPA and the National Marine Sanctuaries Act, but also to meet the needs of local communities; state, federal, and tribal agencies; businesses; non-profit organizations; and political officials.

The steps to designate a Thunder Bay NMS are summarized in Table 2.1 on the following page.

Table 2.1 Steps to designate a Thunder Bay NMS.

Date	Task
July 1991	NOAA activates Thunder Bay as a NMS candidate.
October 1991	Public scoping meetings in Alpena and Lansing.
October 1991 – February1997	Preparation of Draft Environmental Impact Statement/Draft Management Plan (DEIS/DMP), including: • Thunder Bay Region Inventory of Resources • Consultation with regional communities • Consultation with Michigan Coastal Management Program (consistency determination) • Consultation with State Historic Preservation Office and Office of the State Archaeologist • Consultation with U.S. Fish and Wildlife Service and other federal agencies • Consultation with Native American communities • Preparation of proposed regulations • Development of ideas for Draft Memorandum of Understanding.
April 1997	NOAA releases DEIS/DMP.
June 1997	NOAA hosts informational meetings (open houses) to summarize the document and answer questions in an informal setting.
August 1997	NOAA conducts public hearings in all three counties surrounding Thunder Bay.
September – October 1997	NOAA reviews and evaluates all public comments. Based on the public comments and in partnership with the State of Michigan and local community leaders, NOAA reaches a decision on whether Thunder Bay should be designated a National Marine Sanctuary, and if appropriate, how the final document should be modified.
November 1997	NOAA prepares Final Environmental Impact Statement and Management Plan (FEIS/MP).
December1997	NOAA publishes FEIS/MP.
January 1998	If NOAA decides to designate the Thunder Bay NMS, NOAA issues a Federal Register Notice of Designation.
January – February 1998	Sanctuary designation is not final until the end of a 45-day review period of continuous Congressional session during which time the Governor of Michigan and the U.S. Congress can take action.



Michigan State University

Figure 2.3 Machinery from steamer *Monohansett* near Thunder Bay Island.

C. History of the Feasibility Process

I. Prior to Activation as a Sanctuary Candidate (1970 - 1991)

Since the early 1970s, the Alpena community has been exploring the potential for development of an underwater park featuring shipwrecks in the Thunder Bay region. Thunder Bay was identified as an area of the Michigan Great Lakes having a significant concentration of shipwrecks in a 1975 study by Dr. Richard Wright, funded by the Michigan Department of Natural Resources. In 1974, the Michigan State University Department of Park and Recreation Resources coordinated a cooperative project to inventory Thunder Bay's underwater cultural resources. The resulting "*Thunder Bay Shipwreck Survey Study Report*" provided the locations of 17 vessels and the approximate locations of 9 other vessels. The report suggested that the number of located wrecks was sufficient to warrant the establishment of an underwater "reserve" (Warner and Holecek 1975).

Establishment of a reserve was supported by the Thunder Bay Diving Club and civic organizations. In 1981, Thunder Bay was authorized as the first State of Michigan Great Lakes *underwater preserve* under Part 761, Aboriginal Records and Antiquities of Public Act 451 (1994), as amended. The Michigan underwater preserves have been established to preserve and protect

bottomland and surface water areas around the Great Lakes that contain abandoned property of historical, recreational, educational, or scientific value.

During this same time period, the National Oceanic and Atmospheric Administration (NOAA) was developing a Site Evaluation List (SEL) to identify potential candidates for designation as National Marine Sanctuaries. The final SEL was published on August 4, 1983 (48 *Federal Register* 35568) and included five Great Lakes areas: Thunder Bay, Lake Huron; Apostle Islands/Isle Royale, Lake Superior; Green Bay, Lake Michigan; Western Lake Erie Islands/ Sandusky Bay, Lake Erie; and Cape Vincent, Lake Ontario.

The proposal to include Thunder Bay on the SEL was written by John Porter, Chair for the Alpena County Planning Commission, in cooperation

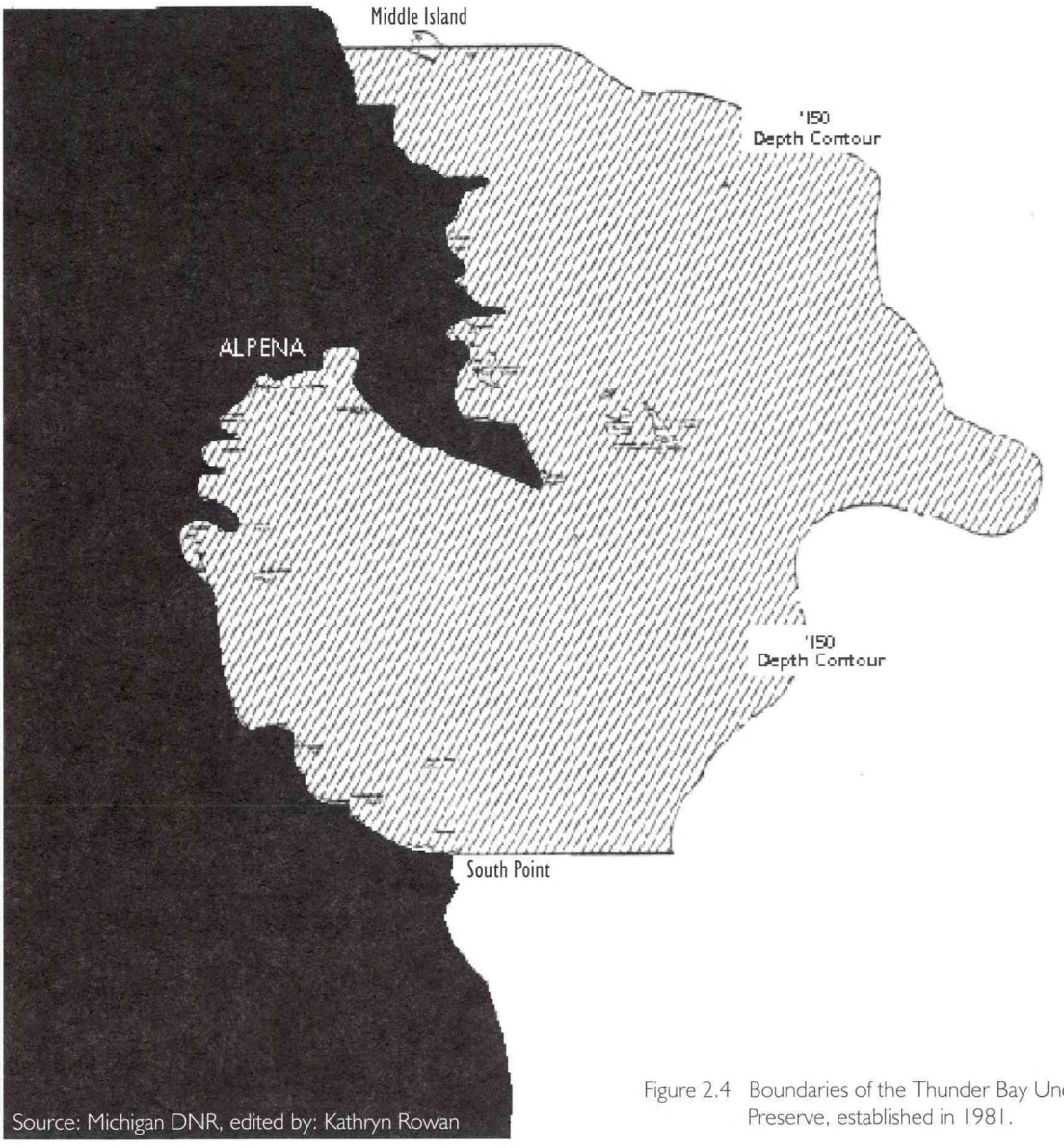


Figure 2.4 Boundaries of the Thunder Bay Underwater Preserve, established in 1981.

with John Schwartz, District Sea Grant Extension Agent for northeast Michigan. The proposal to evaluate Thunder Bay was based on: (1) the large number of intact shipwrecks; (2) the variety of shipwreck environments, including shallow, nearshore sites and deeper offshore sites; and (3) the diversity of vessels representing historical themes and types from the 1830s to 1950s (Schwartz, personal communication 1995). The area proposed as a Sanctuary encompassed approximately 400 square miles of northeast Michigan coastal waters (including Thunder Bay).

After inclusion of Thunder Bay on the SEL in 1983, members of the Alpena community requested that the Michigan Department of Natural Resources (DNR) pursue Sanctuary designation for the site. The State of Michigan was hesitant about designation, citing the inexperience of the NMS Program in state waters, and existing state/federal resource management conflicts as rationale for not pursuing new partnerships with federal agencies (Porter, personal communication 1983).

Michigan Sea Grant Extension created a university specialist position in 1988 to support development of the Michigan underwater preserves and to enhance management of Great Lakes underwater cultural resources. There was renewed interest from members of the Alpena community in exploring opportunities associated with the NMS Program. In 1990, Michigan Sea Grant Extension and a number of Michigan underwater preserve committees invited NOAA, the Director of the National Maritime Initiative, the Michigan DNR, and the Michigan Bureau of History to participate in a tour of the Michigan underwater preserve areas. The purposes of the tour were to acquaint these agencies with preserve resources, to learn about community development efforts and management issues, and to discuss opportunities for sharing financial and in-kind resources in managment and development of the preserves.

A follow-up meeting was held in Fall 1990 at the Michigan Historical Center in Lansing and involved a number of stakeholders to discuss the potential of a NMS in the Great Lakes. After the meeting, representatives from the Alpena community advocated the reconsideration of Thunder Bay as a NMS. In July 1991, Thunder Bay became an active candidate for Sanctuary designation. NOAA then hired an On-Site Liason and housed that staff person at the Michigan DNR's Land and Water Management Division. This marked the beginning of a formal cooperative effort between NOAA and the State of Michigan to determine the feasibility of a Thunder Bay NMS. The office for the On-Site Liaison is currently located at NOAA's Great Lakes Environmental Research Laboratory.

2. Active Sanctuary Candidate (1991 - present)

NOAA hosted public scoping meetings in Lansing and Alpena in October 1991. The purposes of those meetings were to: (1) learn more about resources, activities, and associated management issues in Thunder Bay; and (2) share with interested community members the purposes of

the NMS Program and the process necessary to determine the feasibility of a Sanctuary. The public scoping meetings initiated a series of events which ultimately led to publication of this Draft Environmental Impact Statement/Draft Management Plan (DEIS/DMP). A chronological outline of events that make up the feasibility process for the Proposed Thunder Bay NMS is provided in Table 2.2. Not all events have been included (e.g., civic presentations, student projects, conferences, meetings, and discussions).

Gene Wright

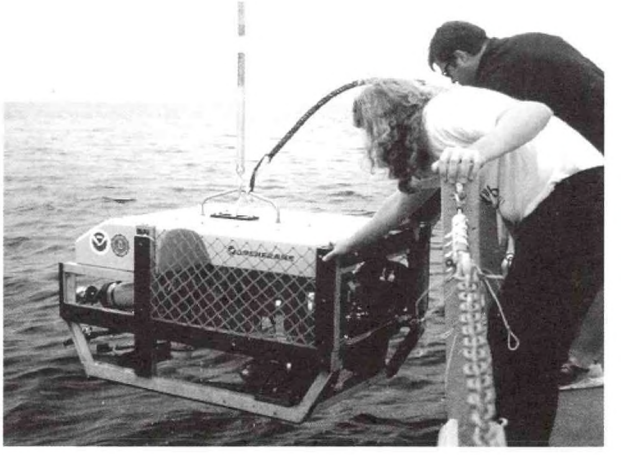
Figure 2.5 Discussions during a workshop at Old Woman Creek National Estuarine Research Reserve.

Gene Wright

Figure 2.6 Tour of NOAA Research Vessel *Shenehon* during the Thunder Bay Excursion.

Gene Wright

Figure 2.7 Preparing for an overflight of the region during the Thunder Bay Excursion.



Gene Wright

Figure 2.8 Launching an ROV (remotely operated vehicle) from the *Shenehon*.

Table 2.2 Feasibility process for the Proposed Thunder Bay NMS.

Year	Event	Description
1991	Activation as Sanctuary Candidate	In July 1991, Thunder Bay was activated from the SEL to begin the formal process of determining the feasibility of NMS designation.
1992	Thunder Bay Work Group Meetings	Throughout Winter and Spring 1992, local, state, federal, and tribal agencies, organizations, and businesses worked together to discuss the scope of a NMS. The information gathered has been incorporated into the *Thunder Bay Region Inventory of Resources* and the DEIS/DMP.
1992	*Thunder Bay Region Inventory of Resources*	Michigan Sea Grant Extension prepared the inventory based on a literature review and personal communications. The document describes the environmental characteristics, natural and cultural resources, and past and present human activities of the region.
1993	*Kids Care About Our Great Lakes* Poster	The poster was a cooperative project with the Michigan Cooperative Extension Service, Alpena Community College, and NOAA. The purpose was to increase awareness of the resources and activities of Thunder Bay and the NMS Program.
1993	Workshop at Old Woman Creek National Estuarine Research Reserve (Huron, Ohio)	The purpose of the workshop was to provide an opportunity for stakeholders from state agencies and Thunder Bay regional communities to interact with staff from designated Sanctuaries and National Estuarine Research Reserves in an operating facility. Discussions further defined the scope and detail of the proposed Sanctuary.
1994	Thunder Bay Core Group	The Core Group was established at the suggestion of participants in attendance at the Old Woman Creek Workshop. The Core Group represents local, state, federal, and tribal agencies and has provided specific recommendations to NOAA regarding the feasibility of a Sanctuary.
1994	Thunder Bay Excursion	In June 1994, the Alpena community, the Thunder Bay Core Group, and NMS staff welcomed resource professionals and political leaders to Thunder Bay. The purpose was to encourage guests to interact with area resources and community leaders prior to the completion of the DEIS/DMP.
1994	Development of Management Alternatives	The Thunder Bay Core Group met to: (1) clarify resource management issues (e.g., fishing, diving, water quality, discharge/disposal, wetlands, vessel traffic); (2) discuss Sanctuary management and boundary alternatives; and (3) evaluate the potential impacts of Sanctuary designation.

Table 2.2 Feasibility process for the Proposed Thunder Bay NMS (continued).

Year	Event	Description
1995	Evaluation of Management Alternatives	Core Group members reviewed all management alternatives in cooperation with a variety of community interests throughout Spring 1995. In June, the Core Group determined that, if designated, a NMS in Thunder Bay should focus on underwater cultural resources (e.g., shipwrecks). The recommendation was discussed further during a community meeting following the Core Group meeting.
1996	Draft Memorandum of Understanding among the State of Michigan, NOAA, and the Federal Advisory Council on Historic Preservation	NOAA drafted an outline of what a Memorandum of Understanding (MOU) could contain. The purpose of an MOU is to clearly define the mechanisms needed to operate a state/ federal partnership in managment of the Sanctuary.
1996	Development of DEIS/DMP	The design, writing, editing, review, and layout of the DEIS/DMP focusing on underwater cultural resources was completed primarily in 1996.

D. Positive Contributions of the Proposed Thunder Bay National Marine Sanctuary

The process to determine the feasibility of a Thunder Bay NMS arose, in part, out of a need to consider alternatives for funding and developing the Thunder Bay Underwater Preserve. The Sanctuary feasibility process, and the consideration of community, state, federal, and tribal partnerships as a means to manage Thunder Bay underwater cultural resources, has reinforced the need to enhance protection, access, and understanding of Thunder Bay's important maritime heritage resources.

Examples of how the Sanctuary feasibility process has already contributed to resource protection through research and education activities in the Thunder Bay region are outlined in the following paragraphs.

1. Education

- The Michigan Science Teachers Association (MSTA) kicked off the feasibility process with a series of teacher training workshops during the summers of 1991, 1992, and 1993. The purposes of these workshops were to provide materials and field experiences to enrich classroom teaching in Great Lakes education. MSTA remains interested in developing future education initiatives with the Thunder Bay NMS.

- The NMS Program, Michigan Cooperative Extension Service, and Alpena Community College held a poster contest during the 4-H Great Lakes Leadership Camp in 1993. Over 9,000 *Kids Care About Great Lakes* posters have been distributed at local, regional, and national education events.

- The NMS Program continues producing the *Beneath the Waves* newsletter. The newsletter, distributed semi-annually to over 1,000 individuals, organizations, and businesses, provides information on the proposed Sanctuary and related projects in the Great Lakes.

- In 1994, the Alpena community, Thunder Bay Core Group, and NMS Program held the *Thunder Bay Excursion*. The purpose of the event was to encourage resource professionals and political leaders to interact with Thunder Bay resources and community leaders, in preparation for release of the DEIS/DMP.

- Increased awareness of the Thunder Bay region has resulted in the nomination of Thunder Bay as a candidate location for national events. These events include the National Youth Envirothon Olympics, and the North American [Paddlesports] Water Trail Conference.

2. Research

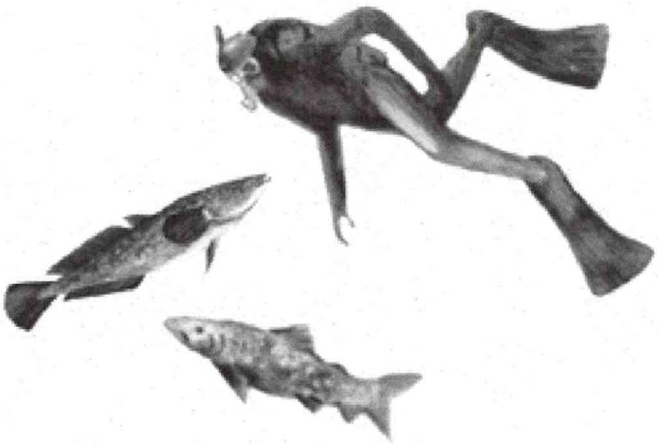
- The NMS Program funded Michigan Sea Grant Extension in 1991-92 to conduct an inventory of resources for the Thunder Bay region. The resulting document describes the environmental characteristics, natural and cultural resources, and past and present human activities of the region.

- The NOAA Great Lakes Environmental Research Laboratory and Alpena Community College conducted biological research in Thunder Bay in 1995. The researchers studied the biology of zebra mussels and their movement in the Bay using satellite technology and temperature profiling.

- The NMS Program funded Great Lakes Visual/Research, Inc. in 1995-96 to evaluate the national significance of Thunder Bay underwater cultural resources. This project led to a collaborative effort between NOAA and the Department of Park, Recreation and Tourism Resources at Michigan State University to develop concepts and preliminary proposals for a Theme Study of the Thunder Bay cultural landscape for consideration as a National Historical Landmark/Maritime Heritage Area. The concepts and preliminary proposals were presented to community leaders in 1995.

- The NMS Program provided funding for the Michigan State University Department of Anthropology in 1996 to conduct research in the Thunder Bay region. The purpose of the project was to learn more about the commercial fishing heritage of Thunder Bay.

Section 3
Draft Management Plan



SECTION 3
DRAFT MANAGEMENT PLAN

- The Draft Sanctuary Management Plan is a five-year plan that proposes the management (operations and resource protection), education, and research programs.

- Protecting the 160 shipwrecks in the Thunder Bay region is important to maintaining and enhancing the recreational, educational, and scientific values of these resources.

- Providing education opportunities that promote understanding, appreciation, and involvement in the protection and stewardship of underwater cultural resources would be a primary function of the Thunder Bay NMS.

- The knowledge acquired through the research and monitoring programs of the Thunder Bay NMS would be used to evaluate existing management practices, and enhance future management decisions.

- The administrative roles and responsibilities of the State of Michigan, NOAA, and the Federal Advisory Council on Historic Preservation would be described in a Memorandum of Understanding (MOU).

- A Sanctuary Advisory Council (SAC) is a mechanism to encourage community participation in the management of a National Marine Sanctuary.

Vision Statement for the Proposed Thunder Bay National Marine Sanctuary

To establish a National Marine Sanctuary that actively promotes education and research on the shipwrecks and other underwater cultural resources of the Thunder Bay region, and that creates a framework for protection and management that relies on governmental cooperation and citizen participation.

A. Introduction

The Thunder Bay National Marine Sanctuary would be managed in partnership with government agencies, non-profit organizations, citizen groups, and the private sector. The Sanctuary would promote visitor/interpretive facilities and education programs that increase knowledge and appreciation for the Thunder Bay shipwrecks and their connection with the broader maritime heritage of the region and nation. The vision for the Sanctuary includes a suite of activities that could include live video hook-ups from the shipwrecks to classrooms, a "shipwreck trail," adult and children educational programs related to Great Lakes maritime and cultural heritage, and research that better identifies and documents the importance of the Thunder Bay shipwrecks.

If designated, Thunder Bay would be the:

- first freshwater and Great Lakes National Marine Sanctuary;

- only National Marine Sanctuary located entirely within state waters; and

- first National Marine Sanctuary to focus solely on a large collection of shipwrecks and other underwater cultural resources.

Purposes of the Thunder Bay NMS

- To complement existing management and enforcement authorities protecting underwater cultural resources;

- To provide education opportunities that promote understanding, appreciation, and involvement in the protection and stewardship of underwater cultural resources;

- To develop scientific knowledge and enhance management practices related to underwater cultural resources by encouraging research and monitoring programs; and

- To encourage the exchange of knowledge and expertise to enhance sustainable uses of the Great Lakes and other underwater cultural resources.

B. Outline of the Draft Management Plan

The Draft Management Plan (DMP) outlines the administrative framework, goals, and possible activities necessary to achieve the vision of a Thunder Bay National Marine Sanctuary. The Thunder Bay NMS would focus predominately on resource protection, education, and research related to shipwrecks and other underwater cultural resources, and the region's maritime heritage.

The DMP is a proposed five-year plan describing potential management (i.e., operations and resource protection), education, and research programs if the Proposed Thunder Bay National Marine Sanctuary is designated. It is based on sound practices for comprehensively managing underwater cultural resources, and for promoting awareness and understanding of Great Lakes maritime heritage. Possible activities in resource protection, education, and research are described in the DMP to give the reader a more concrete view of benefits that can accrue to communities, organizations, and individuals from Sanctuary designation. If the Sanctuary is designated, individual strategic plans would be developed for these programs.

The DMP is divided into the following categories:

- Management: Operating and Protecting the Sanctuary in Partnership
- Education: Learning to be Better Cooperative Stewards
- Research: Working Together to Better Understand Thunder Bay's Underwater Cultural Resources and Maritime Heritage

The DMP first discusses Sanctuary Management, specifically, Operations and Resource Protection. Sanctuary Operations explains how local, state, federal, and tribal partners can work together to operate the Sanctuary. Sanctuary staffing and facilities are also discussed. The Resource Protection program, and following that the Education and Research programs, are described in terms of: (1) how that program relates to existing State and regional plans; (2) Sanctuary management goals; and (3) management activities currently identified for the Sanctuary.

C. Management: Operating and Protecting the Sanctuary in Partnership

1. Administration Framework

Administration refers to the roles and responsibilities of the agencies, organizations, and businesses that would be involved in the operation of the Sanctuary. The Thunder Bay NMS can be successful only through the cooperative efforts of local, state, federal, and tribal agencies, organizations, and businesses having an interest in the comprehensive management of underwater cultural resources.

The NMS Program, the State of Michigan, and local communities can work together in a variety of ways to support the functions of the Sanctuary. The roles and responsibilities that agencies would have in Sanctuary resource protection, research, and education are described in Tables 3.1 - 3.3, at the end of this section. More detailed descriptions of these agencies are provided in Section 4, The Sanctuary Setting.

The administrative roles and responsibilities of the State of Michigan, NOAA, and the Federal Advisory Council on Historic Preservation would be described in a Memorandum of Understanding (MOU). In particular, the MOU would describe the responsibilities of each agency in terms of permits governing activities affecting Sanctuary resources and resolution of conflicts. An outline of the proposed MOU is attached at the end of the DMP on pages 53-57. Additional MOUs may be developed for Sanctuary enforcement activities, or other Sanctuary activities as deemed necessary by NOAA, the State of Michigan, and local communities.

2. Sanctuary Staff and Facilities

Sanctuary Staff

The focus of the Proposed Thunder Bay NMS is underwater cultural resources and maritime heritage. Sanctuary programs will emphasize resource protection, research, and education. Sanctuary staff, therefore, should collectively have skills in resource management, education, maritime history and archaeology, recreation and tourism, and administration.

The staff of the Thunder Bay NMS should, at a minimum, include a Manager, Education Coordinator, Research Coordinator, and Administrative Assistant. The number and expertise of staff will depend on budget allocations and the operating priorities and strategies of the Thunder Bay NMS. Funding and hiring of Sanctuary staff may be accomplished in phases, using a variety of mechanisms.

Sanctuary staff could be hired directly by the NMS Program, or hired through cooperative arrangements with other agencies, organizations, and businesses. For example, a Sanctuary Research Coordinator may be hired jointly by the NMS Program, the Michigan Department of Environmental Quality, the Department of State Michigan Historical Center, and Michigan State University; or an Education Coordinator may be hired jointly by the NMS Program, Alpena Community College, and the Alpena County

Intermediate School District. It is likely that the NMS Program would hire the Sanctuary Manager, rather than develop a cooperative arrangement for this position. The Sanctuary Manager would report directly to the NMS Program and be the primary spokesperson for the Sanctuary. The Sanctuary Manager would be hired and be available upon designation to coordinate the new responsibilities of the Sanctuary. The Sanctuary Manager would be responsible for:

- working cooperatively with appropriate agencies, organizations, and businesses, and the Sanctuary Advisory Council to establish and implement priorities for resource protection, research, and education within the Sanctuary;

- allocating Sanctuary funds for resource protection, research, and education activities;

- working with the Michigan Department of Environmental Quality (DEQ), Michigan Department of State (DOS), and Michigan Department of Natural Resources (DNR) to moderate activities impacting underwater cultural resources, and to facilitate the public comment process for permits to salvage or alter underwater cultural resources;

- representing the Thunder Bay NMS at functions relating to the Sanctuary and the NMS Program;

- assessing the effectiveness of Sanctuary management programs, especially the effectiveness of site-specific management strategies; and

- supervising other Sanctuary staff.

The Education and Research Coordinators, and the Administrative Assistant positions could be developed through a variety of different partnerships between the Sanctuary and other agencies, organizations, and businesses.

The Education Coordinator would be responsible for working with the Sanctuary Manager and appropriate agencies, organizations, and businesses, and the Sanctuary Advisory Council to establish education priorities and strategies for the Sanctuary. These priorities and strategies would be incorporated into a Sanctuary Education Plan to be completed following designation of the Sanctuary. The Education Coordinator would be responsible for coordinating, implementing, and evaluating the priorities and strategies identified in the Education Plan.

The Research Coordinator would be responsible for working with the Sanctuary Manager and appropriate agencies, organizations, and businesses, and the Sanctuary Advisory Council to establish research priorities and strategies for the Sanctuary. These priorities and strategies would be incorporated into a Sanctuary Research Plan to be completed following designation of the Sanctuary. The Research Coordinator would be responsible for coordinating, implementing, and evaluating the priorities and strategies identified in the Research Plan.

The Administrative Assistant would be responsible for assisting with the day-to-day operations of the Sanctuary office, and providing administrative support to Sanctuary staff.

Sanctuary Facilities

The Sanctuary office would be based in Alpena, Michigan. Alpena is centrally located on Thunder Bay and is a mid-point between the proposed northern and southern boundaries of the Sanctuary. Other satellite offices could be established north and south of Alpena if deemed necessary. For example, seasonal offices could be established at the Presque Isle Lighthouses or at Sturgeon Point Lighthouse to accommodate the needs of summer visitors.

The Thunder Bay community has indicated that a Great Lakes education center is important to enhance education opportunities for both local residents and visitors to the region. Development of an education facility also supports the mission of the NMS Program, and the purposes of the Thunder Bay NMS. The Thunder Bay NMS would work actively with local interests and the State of Michigan to further define, and to obtain the resources necessary for the construction and long-term maintenance of an education facility in the Thunder Bay region. Additional Sanctuary facilities may be developed through various partnerships as the Sanctuary becomes established over time. These facilities could include a research and education vessel, seasonal office space, and related equipment.

Potential Economic Impacts

The potential economic impacts of Sanctuary operating budgets and cost-share partnerships are estimated in Table 3.4, at the end of this section (Mahoney et al. 1996). These impacts are from the salaries of Sanctuary staff, capital expenditures for Sanctuary facilities, and from direct contributions by Sanctuary partners (state and local).

Sanctuary Advisory Council

A Sanctuary Advisory Council (SAC) is a mechanism to encourage community participation in the management of a NMS. It is a means by which the NMS Program and the State of Michigan can work cooperatively with a variety of interested organizations and businesses to comprehensively manage a Thunder Bay NMS. Each Sanctuary is given the authority to establish a SAC in accordance with the National Marine Sanctuaries Act. The SAC would advise and provide recommendations to the Sanctuary Manager about issues relating to Sanctuary resource protection, research, and education, and in implementing the overall Sanctuary Management Plan. The SAC cannot exceed 15 members and includes, but is not limited to, local governments, user and special interest groups, non-profit organizations, education and research institutions, and private businesses. Membership would not include state or federal agency representatives.

SAC members would be determined by the NMS Program and the State of Michigan. The NMS Program would request expressions of interest in membership on the Thunder Bay SAC. Applications would be reviewed, and members appointed by the Director, Office of

Ocean and Coastal Resource Management, in consultation with the State of Michigan. SAC membership would be limited to two year terms.

3. Protecting the Sanctuary Resources in Partnership

Introduction

Protecting underwater cultural resources to ensure their long-term use and integrity for present and future generations would be the primary function of the Thunder Bay NMS. Protecting the 160 shipwrecks in the Thunder Bay region (including those having national historic significance, and the other underwater cultural materials and prehistoric sites) is important to maintaining and enhancing the recreational, educational, and scientific values of these resources.

Protection of Sanctuary underwater cultural resources can be accomplished only through active participation of agencies, organizations, and businesses having an interest in the comprehensive management of these resources. The function of resource protection for the Thunder Bay NMS is supported by the NMS Program strategic plan, and state and regional plans (Table 3.5 on pages 50-52). The process of protecting underwater cultural resources through the involvement of many stakeholders and interest groups has been termed "cooperative stewardship" by the Michigan Underwater Preserve Council and other organizations. It would be the intent of the Thunder Bay NMS to protect Thunder Bay shipwrecks and other underwater cultural resources through cooperative stewardship.

National Marine Sanctuary Program

Protecting underwater cultural resources is consistent with the mission of the NMS Program which is "to ensure healthy marine and coastal ecosystems, including natural and cultural resources, by providing innovative management of a network of nationally significant areas through protection, conservation, restoration, and compatible use" (NOAA 1994:1). The NMS Program believes it must "enhance consideration of cultural and maritime heritage into site management" (NOAA 1994:2). In addition, the NMS Program is committed to adopting management policies, practices, and initiatives that ensure the compatibility of human activities with long-term protection of Sanctuary resources (NOAA 1994:5).

State and Regional Plans

Similarly, protection of underwater cultural resources is an important purpose of Michigan underwater preserves. The Thunder Bay Underwater Preserve, like all state underwater preserves, was created to "protect abandoned property of historical value, or ecological, educational, geological, or scenic features or formations having recreational, educational, or scientific value" (Part 761, Aboriginal Records and Antiquities of P. A. 451 [1994], as amended).

The Sanctuary would support one of the goals for historic preservation in Michigan which is

"...to increase protection of resources of historic value" (Michigan DOS 1995: xi). The coastal communities of the Thunder Bay region also recognize the value of resource protection. Recreation and county coastal land management plans have been, or are being, developed by the three counties adjacent to the Sanctuary boundary (i.e., Presque Isle, Alpena, and Alcona). All of these plans recognize that coastal resources are important to education, recreation, and economic development in their communities.

Sanctuary Goals for Resource Protection

The following goals support the mission of the NMS Program and reflect the purposes and intentions of state and Thunder Bay regional plans. The goals would be used to develop a comprehensive resource protection program, including priorities and strategies for protecting cultural resources in the Thunder Bay NMS. The Thunder Bay NMS would work cooperatively with appropriate agencies, organizations, businesses, and the SAC to create innovative partnerships to develop and implement these resource protection priorities and strategies.

In order to effectively and efficiently protect Sanctuary underwater cultural resources, the goals of the Thunder Bay NMS would be to:

- coordinate management activities with other government and non-government programs that protect underwater cultural resources;

- establish innovative partnerships with local, state, federal, and tribal agencies, organizations, and businesses that support the resource protection mission of the Sanctuary;

- develop active and sustainable community involvement through diverse volunteer and private sector initiatives;

- establish an effective enforcement program for Sanctuary regulations that protect underwater cultural resources;

- develop and implement effective emergency response and resource damage assessment programs; and

- ensure that management decisions are based on the best available information, but where such information is incomplete, follow those options that best protect Sanctuary underwater cultural resources.

Proposed Sanctuary Regulations

NOAA proposes regulations to ensure protection of underwater cultural resources in the Proposed Thunder Bay National Marine Sanctuary. The proposed regulations are focused only on underwater cultural resources. NOAA does not propose to develop regulations or enforcement mechanisms to manage natural resources, such as fish, wildlife, and wetlands. The full text of NOAA's proposed regulations is attached at the end of the Draft Management Plan on pages 58 - 74.

Management Activities for Resource Protection

Discussions have been held among the NMS Program, the Thunder Bay Core Group, and regional communities throughout the feasibility process to identify possible management activities for protecting Sanctuary resources. These discussions have resulted in the identification of several management activities for protecting the resources of the Sanctuary. These management activities are not inclusive, nor are they the only management activities of the Sanctuary.

Possible management activities for protecting underwater cultural resources in the Thunder Bay NMS include:

Coordinating Management Agencies

The Sanctuary would help facilitate coordination among management agencies having responsibilities for the Thunder Bay maritime cultural landscape. These agencies include the NMS Program, Michigan DEQ, Michigan DOS, Michigan DNR, and others as appropriate. These coordinated management agencies would identify and address management issues that focus on underwater cultural resources and maritime heritage. Examples are the infestation of zebra mussels on shipwrecks and the impacts on recreational diving experiences, and potential user conflicts in the Bay.

Science-based Decision Making

The Sanctuary would support a scientific research and monitoring program focusing on underwater cultural resources. Initial research activities would provide baseline inventory information on which to make management decisions. Research and monitoring efforts would provide additional inventory and assessment information on which to develop management programs that balance resource protection and sustainable uses of these resources.

Developing and Maintaining a Mooring Buoy System

The Sanctuary would work with other resource management agencies, and local organizations and businesses to continue developing and maintaining a mooring buoy system that provides safe access to shipwrecks with minimum impact to the resources. Mooring buoys also help make the location of sites more visible to both divers and non-divers. The Sanctuary would facilitate efforts to fund and maintain the mooring buoy program.

Cross-deputizing and Supporting Enforcement

Enforcement personnel would be responsible for enforcing Sanctuary regulations and providing on-the-water information and assistance to Sanctuary visitors. The Sanctuary could utilize existing enforcement personnel by cross-deputizing County Sheriff Marine Patrol Officers, Michigan DNR Conservation Officers, Michigan State Police, and U.S. Coast Guard Officers to enforce Sanctuary regulations. Additional training, equipment, and support could be provided to enforcement officers as indicated by priorities, and permitted by budgets.

D. Education: Learning to be Better Cooperative Stewards

I. Introduction

Focused and sustainable education programs are necessary to encourage and support cooperative stewardship of National Marine Sanctuaries. Providing education opportunities that promote understanding, appreciation, and involvement in the protection and stewardship of underwater cultural resources would be a primary function of the Thunder Bay NMS. For the purposes of this Draft Management Plan, "education" includes a wide range of programs, facilities, and services associated with education through schools, interpretation, and outreach. Meaningful Sanctuary education programs can be accomplished only through the support and active participation of agencies, organizations, and businesses having an interest in the comprehensive management of underwater cultural resources. Development and implementation of education programs, facilities, and services as part of the Thunder Bay NMS is supported by the NMS Program Strategic Plan, and state plans (Table 3.5).

National Marine Sanctuary Program

Development and implementation of education programs are consistent with the NMS Program goal to "promote appreciation and stewardship of marine and coastal resources [both natural and cultural]" (NOAA 1994:3). Educational opportunities would constitute important attractions and services to visitors of Thunder Bay. Educational programs would be developed to encourage responsible behaviors on the part of recreationists and tourists.

State Programs

Sanctuary education programs also support the educational interests of the Thunder Bay Underwater Preserve and the Michigan underwater preserves. The State of Michigan places high priority on environmental education. A goal of environmental education programs is to assist citizens in becoming more aware and better informed of environmental issues, and, thereby, placing a greater value on the State's resources (Michigan Senate 1993).

Regional Programs

It is the intent of the Thunder Bay NMS to work in partnership to support and complement existing education efforts relating to underwater cultural resources and the maritime heritage of the Thunder Bay region, and to develop and maintain new education initiatives as appropriate. A primary emphasis would be to promote coordination and development of partnerships that create, integrate, and package educational opportunities and to make these opportunities accessible to all Sanctuary visitors (e.g., school children, adult residents, and tourists). Throughout the feasibility process for the Sanctuary, the Thunder Bay regional community indicated a strong interest in enhancing the quality and availability of education relating to

Thunder Bay. An inventory and assessment of current Great Lakes education programs and activities in the Thunder Bay region was conducted by the Michigan State University Department of Park, Recreation and Tourism Resources (Denton and Mahoney, in progress). The initial purpose of the study was to identify on-going environmental education activities in the Thunder Bay region. The study included a series of focus groups that involved schools, agencies, and other organizations that provide and/or support environmental, natural resources, and cultural resources education.

The focus groups revealed that agencies and organizations in the region have made significant investments in education-related projects, programs, and materials. However, focus group participants indicated there is still a general lack of awareness about the cultural, economic, and ecological significance of Thunder Bay, despite the contributions and efforts of these organizations. This may be in part due to the lack of: (1) coordination of educational materials and investments; (2) promotion, access, and distribution of materials and programs; (3) an organization to maintain and update educational materials and programs; (4) teacher training and encouragement to incorporate Great Lakes education concepts into classroom activities; and (5) educational access to resources (e.g., on-the-water field trips to Thunder Bay and its resources).

The focus group participants expressed interest in having educational opportunities for people of all ages, including local residents and visitors to the area, particularly the growing population of retired persons. They expressed a strong need to develop, incorporate, and distribute Great Lakes educational materials to enhance regional tourism and recreation opportunities. Several organizations are currently involved in efforts to promote eco- and heritage tourism in the Thunder Bay region.

2. Sanctuary Goals for Education

The following goals support the mission of the NMS Program, reinforce the purposes and intentions of state programs, and reflect the findings of the Great Lakes education study conducted in the Thunder Bay region. The goals would be used to develop an Education Plan, including priorities and strategies for education programs in the Thunder Bay NMS. The Thunder Bay NMS would work cooperatively with appropriate agencies, organizations, and businesses, and the SAC to create innovative partnerships to develop and implement these education priorities and strategies.

Goals

In order to conduct meaningful education programs that focus on underwater cultural resources and the maritime heritage of the region, the goals of the Thunder Bay NMS would be to:

- develop and implement science-based education programs that promote awareness and

understanding of Sanctuary underwater cultural resources, Thunder Bay maritime heritage, and the NMS Program;

• provide educational leadership to develop and implement collaborative education programs that meet the needs and interests of residents, local and regional schools, and visitors to the Sanctuary;

• act as a clearinghouse of quality education materials (e.g., curricula, equipment, technology, and expertise), and assist in developing and maintaining an inventory of existing education programs so they are accessible to educators;

• encourage the involvement of volunteers to help foster understanding and participation in the protection and stewardship of Sanctuary resources;

• ensure that education programs support overall management goals for resource protection, research, and administration; and

• facilitate the transfer of Sanctuary information and experiences for use locally, regionally, nationally, and globally.

Management Activities for Sanctuary Education

There are many opportunities for the development of Sanctuary education programs. Denton and Mahoney (in progress) provides an inventory of existing Great Lakes education programs. The Great Lakes education study for the Thunder Bay region identifies opportunities to develop education activities for the Sanctuary. These activities include education initiatives that could be supported and coordinated by the Thunder Bay NMS. These activities are not inclusive. Priorities for Sanctuary education and strategies for implementing these activities would be included in the Education Plan to be developed if the Sanctuary is designated. The Education Plan would be developed cooperatively by the Sanctuary, the SAC, and other interested agencies, organizations, and businesses.

Possible education activities for the Thunder Bay Sanctuary as identified by the Great Lakes education study include:

Developing Sanctuary Education Themes

The Sanctuary could work cooperatively with Great Lakes educators (i.e., schools, colleges, universities, and museums) and other agencies, organizations, and businesses interested in Great Lakes education to identify education themes based on the maritime cultural landscape focus of the Sanctuary (e.g., industrial development, western expansion, and relationships between cultural resources and the natural environment). These themes would focus the Education Plan, and help to prioritize the needs of the community, the State of Michigan, and the Sanctuary.

Supporting and Enhancing Existing Education Programs

The Sanctuary could utilize the Great Lakes education inventory to identify existing education programs that support Sanctuary education

themes. The Sanctuary could then work cooperatively to complement and assist in maintaining and enhancing these programs. Examples of existing programs include the Elderhostel program, and the signage, displays, and materials along the Thunder Bay Riverwalk Trail in Alpena. In addition, the Sanctuary would develop and maintain a database of these current and developmental education programs, services, and products, and facilitate access to these educational resources.

Developing and Maintaining Supplemental Education Programs

The Sanctuary could utilize the Great Lakes education inventory to evaluate the gaps in existing education programs relative to Sanctuary themes. This evaluation would consider publics not served, themes not addressed, and opportunities for using new technologies. For example, there currently are no Great Lakes education opportunities for adults, or substantive information for tourists visiting the region. The Sanctuary, in cooperation with appropriate partners, could then better prioritize education needs, and assist in securing funds to develop and maintain education programs, products, and services.

Identifying and Supporting a Network of Volunteers

The Sanctuary could identify and support a network of volunteers to help enhance and maintain activities that are consistent with Sanctuary education themes. The Sanctuary would utilize community expertise and interests in matching volunteers with needed activities. Training, support, and incentives would be provided to volunteers as needs and opportunities arise.

Providing Access to Sanctuary Resources

The Sanctuary could facilitate access to Sanctuary resources and materials. As an example, the Sanctuary could work in partnership to develop and secure funding for the construction of a Great Lakes education center. Such a facility would provide opportunities for both residents and tourists, and would accommodate a wide range of education and research activities from auditorium lectures, to interactive exhibits that provide visual access to shipwrecks for non-divers. The facility could also provide space for visiting scholars and volunteers. Other opportunities include acquiring a Sanctuary education/research vessel. The Sanctuary could work with appropriate agencies, organizations, and businesses to acquire and maintain a vessel for conducting on-the-water education and research activities.

Providing Leadership in Technology

The Sanctuary could encourage and develop the use of educational technologies in supporting education themes. These include utilization of the Internet, the World Wide Web, and multimedia programs.

Other Possible Educational Activities

Designing and Implementing a Thunder Bay Kids Week

The Sanctuary could develop a Kids' Week with special events for school students that are

designed to enhance awareness of Great Lakes maritime heritage. The events would be intended to kindle an interest in the maritime history of the Thunder Bay region and to inspire a sense of stewardship. Sanctuary education staff, in cooperation with volunteers and other cosponsors, would organize Kids' Week events. Activities could consist of lectures, classroom visits, field experiences, and audio-visual presentations.

Establishing Remote Video Hook-ups

The Sanctuary could establish remote video hook-ups of researchers documenting the shipwrecks. Utilization of this technology would provide visual access to shipwrecks for non-divers. The Sanctuary could use these videos to develop presentations for specific age groups. Sanctuary education staff, volunteers, and government or private interests could produce the educational presentations.

Developing a "Thunder Bay Shipwreck Trail"

The Sanctuary could select and interpret a series of shipwrecks as a "shipwreck trail" to highlight Thunder Bay's maritime heritage. Themes would be developed and matched with appropriate shipwreck sites to educate visiting divers and non-divers about such subjects as ship construction, Great Lakes shipping, the effect of environmental processes on shipwrecks, and the effects of salvage on historic shipwrecks. Interpretive materials would be developed to help divers and snorkelers understand what they see underwater. Landside interpretation would be developed to offer both divers and non-diving visitors a glimpse into the rich maritime history of Thunder Bay.

Sponsoring and Supporting Adult Education

The Sanctuary could sponsor and support Great Lakes maritime heritage education opportunities for adults interested in learning more about Great Lakes maritime and cultural heritage. Organizations offering adult education would be identified. Sanctuary education staff would assist these organizations that offer programs linked with Great Lakes maritime heritage by conducting guest lectures, organizing field trips, and distributing educational brochures.

E. Research: Working Together to Better Understand Thunder Bay's Underwater Cultural Resources and Maritime Heritage

I. Introduction

Developing knowledge about underwater cultural resources by encouraging research and monitoring programs would be a primary function of the Thunder Bay NMS. The knowledge acquired through research and monitoring can be used to evaluate existing management practices, and enhance future management decisions. Effective Sanctuary research and monitoring programs can only be accomplished through the active participation of agencies, organizations, and businesses having an interest in the comprehensive management of underwater cultural resources. The function of conduct-

ing research and monitoring for the Thunder Bay NMS is supported by the NMS Program Strategic Plan and state and regional plans (Table 3.5). It is the intent of the Thunder Bay NMS to conduct research and monitoring of Thunder Bay underwater cultural resources by working together in partnership with a variety of organizations.

National Marine Sanctuary Program

Development of a scientific research program is consistent with the strategic plan of the NMS Program which promotes "coordinated research and monitoring efforts throughout the program" (NOAA 1994: 8). The NMS Program believes that cost effective, long-term monitoring programs that determine and monitor the health of marine [and Great Lakes] resources are vital (NOAA 1994: 9). The National Marine Sanctuaries Act directs the NMS Program to support, promote, and coordinate scientific research on, and monitoring of, the resources of these marine areas, especially long-term monitoring and research.

State and Regional Plans

A Sanctuary research program contributes to the Thunder Bay Underwater Preserve and the Michigan underwater preserve program by supporting the inventory, assessment, scientific study, and monitoring of underwater cultural resources. It also complements a second goal of historic preservation in Michigan to "document Michigan historic resources more fully" (Michigan DOS 1995: xi). An effective research and monitoring program for Thunder Bay underwater cultural resources can help counties implement coastal management plans by assisting in the identification and evaluation of these resources. Identification, evaluation, and monitoring of Sanctuary resources supports county recreation and economic development plans by providing accurate resource information on which to base decisions for tourism, recreation, and economic development.

2. Sanctuary Goals for Research

The following goals support the mission of the NMS Program and reflect the purposes and intentions of state and Thunder Bay regional plans. The goals would be used to develop the Research Plan, including priorities and strategies for research and monitoring programs in the Thunder Bay NMS. The Thunder Bay NMS would work cooperatively with appropriate agencies, organizations, and businesses, and the SAC to create innovative partnerships to develop and implement these research and monitoring priorities and strategies.

Goals

In order to conduct effective and efficient research and monitoring programs, the Thunder Bay NMS would:

- inventory and assess Sanctuary resources, and existing and potential threats to those resources (both natural and human induced);

• monitor Sanctuary resources to ensure their long-term protection and to evaluate management practices;

• develop a research plan that places the highest priority upon research that addresses threats to Sanctuary resources;

• develop and encourage collaborative programs with other agencies, organizations, and businesses;

• identify and evaluate the values associated with Sanctuary resources (e.g., historical, recreational, economic, aesthetic); and

• encourage research targeted at management issues such as resolving multiple-use conflicts, and understanding user impacts.

Management Activities for Sanctuary Research

Discussions have been held during community and Core Group meetings throughout the feasibility process to identify possible management activities for Sanctuary research and monitoring programs. In addition, Martin (1996) identified important next steps for Sanctuary research efforts. These activities are not inclusive. Priorities for research activities and strategies for implementing these priorities would be incorporated into the Research Plan, to be developed if the Sanctuary is designated. The Research Plan would be developed cooperatively by the Sanctuary, the SAC, and other interested agencies, organizations, and businesses.

Possible research activities for the Thunder Bay Sanctuary as recommended by Martin (1996) include:

Completing Preliminary Historic Research

The Sanctuary could complete preliminary historical research on all vessels identified as having been lost in the vicinity of Thunder Bay. This research would include a search of enrollment and registration documents, court records, insurance files, and regional newspapers for information on individual vessels. All of these data would be critical in further analysis of the collection of wrecks and its eventual interpretation to both popular and scholarly audiences.

Inventorying and Locating Historical Materials

The Sanctuary could locate, inventory, and, as possible, obtain copies of iconographic materials and items of material culture related to Thunder Bay shipwrecks from regional libraries, archives, museums, and private collections. This step would be important in the broader interpretation of the maritime history of Thunder Bay and the Great Lakes to the general public. This work would involve research in local and regional archives.

Conducting a Theme Study

The Sanctuary could conduct a full-scale contextual theme study and develop a larger database of Great Lakes shipwrecks to further evaluate the shipwrecks of the Thunder Bay region and to formally nominate them for National Landmark Status. The contextual theme study and enlarged database would require extensive re-

search in the regional, national, and international archives mentioned above, plus substantial writing and editing.

Producing an Historical Guide

The Sanctuary could produce an historical guide to maritime resources (underwater and terrestrial) in the Thunder Bay region. The guide would be of value to a broad spectrum of user groups and further publicize the Sanctuary's role in protecting underwater cultural resources. These research activities would help to interpret the history of Thunder Bay within the regional, national, and international context and involve local communities in discovering and documenting their maritime heritage.

Other Possible Research and Monitoring Activities

Archaeological Inventory and Assessment

The Sanctuary could facilitate an archaeological inventory and assessment of known shipwrecks in the Sanctuary. This is important for informed decision-making and site planning.

Recreational Diving Impacts

The Sanctuary could investigate the factors associated with depreciative behavior (e.g., theft, vandalism) and its negative effects on shipwrecks. The positive personal and social benefits from recreational diving would be identified and evaluated. This scientific information would enhance resource management and the development of monitoring programs.

Zebra Mussels, Shipwrecks, and Recreational Diving

The Sanctuary could investigate factors associated with the infestation of zebra mussels and the impacts upon shipwrecks and recreational diving. This information would help enhance visitor experiences and historic preservation efforts.

Monitoring of Tourism-Related Impacts

The Sanctuary could develop a tourism research and monitoring program to identify and evaluate the economic benefits and costs to the Sanctuary and coastal communities. The results would assist in regional decision-making.

Table 3.1 Resource protection in the Thunder Bay NMS.

Federal/Tribal	NMS Program: • Coordinates protection of Sanctuary resources; • Allocates Sanctuary funds based on recommendations of appropriate agencies, organizations, and businesses and the SAC; • Works cooperatively with US Coast Guard and other appropriate agencies, organizations, and businesses, and the SAC to develop and maintain emergency response plans for the Sanctuary; • Works cooperatively with designated Sanctuary enforcement personnel to conduct surveillance and enforcement activities in the Sanctuary; • Develops and maintains an active volunteer program for protecting underwater cultural resources; • Scientifically monitors and evaluates the overall progress toward Sanctuary resource protection; • Works cooperatively with the Michigan Department of Environmental Quality and Michigan Historical Center, and participates in the public comment process for permits being issued for underwater salvage operations and other activities impacting underwater cultural resources; and • Participates in the state public comment process for permits issued within the boundaries of the Sanctuary (see regulatory alternatives; and outline of Memorandum of Understanding). U.S. Coast Guard: • Enforces federal laws throughout the Sanctuary; • Provides on-scene coordination and Regional Response Center facilities under the National Contingency Plan for the removal of oil and hazardous substances in the event of a spill that threatens Sanctuary resources; and • Conducts search and rescue operations within the boundaries of the Sanctuary.
State	Michigan Department of Environmental Quality (Michigan DEQ): • Maintains joint responsibilities with the Michigan Historical Center for management of underwater cultural resources in the Thunder Bay Underwater Preserve and throughout the boundaries of the Sanctuary; • Works cooperatively with the NMS Program to protect and manage underwater cultural resources within the boundaries of the Sanctuary; • Issues permits for underwater salvage operations in conjunction with the Michigan Historical Center; • Issues permits for construction and other activities impacting Great Lakes bottomlands; • Works cooperatively with SAC membership to monitor and evaluate the progress toward Sanctuary resource protection; and • Supports and encourages the efforts of volunteers involved in the protection of underwater cultural resources. Michigan Department of State (Michigan DOS), Michigan Historical Center: • Maintains joint responsibilities with the Michigan DEQ for management of underwater cultural resources in the Thunder Bay Underwater Preserve and throughout the boundaries of the Sanctuary; • Issues permits for underwater salvage operations in conjunction with the Michigan DEQ; • Works cooperatively with the SAC to monitor and evaluate the progress toward Sanctuary resource protection; and • Supports and encourages the efforts of volunteers in the protection of underwater cultural resources. Michigan Department of Natural Resources (Michigan DNR): • Maintains management responsibilities for natural resources under a public trust; • Law Enforcement Division works cooperatively with the NMS Program, the USCG, Michigan State Police, and County Sheriff's Departments to conduct enforcement and surveillance operations in the Sanctuary; • Works cooperatively with the SAC to monitor and evaluate the progress toward Sanctuary resource protection; and • Supports and encourages the efforts of volunteers in the protection of underwater cultural resources.

Table 3.1 Resource protection in the Thunder Bay NMS (continued).

Local Governments	• County Sheriff's Departments work cooperatively with the NMS Program, the USCG, the Michigan DNR Law Enforcement Division, and the Michigan State Police to conduct enforcement and surveillance operations in the Sanctuary; • Participate on the SAC and work cooperatively with its membership to monitor and evaluate the progress toward Sanctuary resource protection; and • Support and participate as volunteers in the protection of underwater cultural resources.
Sanctuary Advisory Council (SAC)	• Advises the Sanctuary on the effectiveness of Sanctuary regulations in providing adequate resource protection; • Advises the Sanctuary on the effectiveness of cooperative agreements for surveillance and enforcement; • Recommends improved methods of resource protection; • Establishes working groups and/or subcommittees on resource protection and enforcement as needed to provide technical advice and recommendations; and • Supports, encourages, and participates as volunteers in the protection of underwater cultural resources.

Table 3.2 Education in the Thunder Bay NMS.

Federal/Tribal	NMS Program: • Coordinates education efforts in the Sanctuary; • Allocates Sanctuary funds for education based on the recommendations of appropriate agencies, organizations, businesses, and the SAC; • Works cooperatively with agencies, organizations, businesses, and the SAC to prioritize education programs; • Encourages and facilitates collaborative education efforts in the Sanctuary; and • Supports and encourages volunteer education efforts in the Sanctuary. Other Federal/Tribal Agencies: • Work cooperatively with the Sanctuary to encourage and support education efforts in the Sanctuary; • Advise the Sanctuary on education priorities and opportunities; and • Support and encourage volunteers in Sanctuary education efforts.
State Agencies	Michigan DEQ, Michigan DOS, and Michigan DNR: • Work cooperatively with the Sanctuary to encourage and support education efforts in the Sanctuary; • Advise the Sanctuary on education priorities and opportunities; and • Support and encourage volunteers in Sanctuary education efforts.
Local Governments	• Work cooperatively with the Sanctuary to encourage and support education efforts in the Sanctuary; • Participate on the SAC to advise the Sanctuary on education priorities and opportunities; and • Support, encourage, and participate as volunteers in Sanctuary education efforts.
Sanctuary Advisory Council	• Reviews education proposals and projects and advises the Sanctuary; • Advises the Sanctuary on education needs and opportunities; and • Supports, encourages, and participates as volunteers in education efforts.

Table 3.3 Research in Thunder Bay NMS.

Federal/Tribal	NMS Program: • Coordinates research and monitoring efforts in the Sanctuary; • Allocates Sanctuary funds for research based on the recommendations of appropriate agencies, organizations, and businesses and the SAC; • Works cooperatively with agencies, organizations, businesses, and the SAC to prioritize research projects based on criteria such as management issues; • Encourages and facilitates collaborative research and monitoring efforts in the Sanctuary; and • Supports and encourages volunteers in Sanctuary research and monitoring efforts. Other Federal/Tribal Agencies: • Work cooperatively with the Sanctuary to encourage and support research efforts in the Sanctuary; • Advise the Sanctuary on research priorities and opportunities; and • Support and encourage volunteers in Sanctuary research and monitoring efforts.
State Agencies	Michigan DEQ, Michigan DOS, and Michigan DNR: • Work cooperatively with the Sanctuary to encourage and support research efforts in the Sanctuary; • Advise the Sanctuary on research priorities and opportunities; and • Support and encourage volunteers in Sanctuary research and monitoring efforts.
Local Governments	• Work cooperatively with the Sanctuary to encourage and support research efforts in the Sanctuary; • Participate on the SAC to advise the Sanctuary on research priorities and opportunities; and • Support, encourage, and participate as volunteers in Sanctuary research and monitoring efforts.
Sanctuary Advisory Council	• Advises the Sanctuary on the review of Sanctuary research and monitoring projects and proposals; • Advises the Sanctuary on research needs and opportunities; and • Supports, encourages, and participates as volunteers in research and monitoring efforts.

Table 3.4 Potential economic impacts of Sanctuary operating budgets and cost-share partnerships.

	Year 1	Year 2	Year 3	Year 4	Year 5
Thunder Bay NMS Operating Budget	$150,348	$173,890	$199,000	$205,000	$211,000
State and Local Partners	$10,000 (Services)	$29,000 ($10,000 Services $19,000 Salary)	$60,000 ($20,000 Services, $40,000 Salary)	$71,800 ($30,600 Services, $41,200 Salary)	$83,400 ($41,000 Services, $42,400 Salary)
Capital Expenditures				$84,000 (Boat)	$1,300,000 (Education Center)
Functions of the Thunder Bay NMS • Resource Protection • Research • Education	• Sanctuary designation • Establishment of Sanctuary Advisory Council (SAC) • Programs to develop awareness of Sanctuary and resources • Work with SAC to finalize managment priorities (e.g., mooring buoy program, enforcement program, volunteer program)	• Hire Education Coordinator • Development of education plan • Programs to develop awareness of Sanctuary and resources • Volunteer program • Continue implementation of management plan	• Hire Research Coordinator/Maritime Archaeologist • Development of a research plan • Implementation of an education plan • Develop plan and fundraising strategies for education center • Volunteer program • Continue implementation of management plan	• Fundraising for the education center • Continue implementation of research and education plans • Continue implementation of management plan • Acquisition of Sanctuary research and education vessel	• Complete construction of the education center • Continue implementation of research and education plans • Continue implementation of management plan
Total Economic Impact					
• Sales	$143,200	$216,500	$295,200	$304,200	$312,800
• Income	$97,800	$155,700	$218,000	$224,600	$230,900
• Jobs	3 - 4	6	7	7	7 - 8

Table 3.5 Comparison of federal, state, and local plans to the functions of the Proposed Thunder Bay NMS.

Strategic, Recreation, and Economic Development Plans	Functions of the Thunder Bay NMS		
	Resource Protection	Research	Education
Federal Plans			
NOAA Strategic Plan	"...to conserve and manage wisely the Nation's coastal and marine resources..."	"...to describe and predict changes in the Earth's environment..."	
National Marine Sanctuary Program	"...to manage marine and Great Lakes areas of special national significance to protect their ecological and cultural integrity..."	"...develop research programs that ... promote the ecologically sustainable use of the nation's... cultural resources."	"develop and implement stewardship, education, ...programs that foster public understanding, support and participation of the nation's natural and cultural marine resources."
State Plans			
Comprehensive Historic Preservation Plan	"...increase protection of Michigan's historic resources..."	"...document Michigan's historic resources more fully..."	"...increase public knowledge of Michigan's historic resources and the benefits of historic preservation."
Environmental Education Plan			The goal of environmental education programs is to assist citizens in becoming more aware and informed of environmental issues, and thereby, place a greater value on the State's resources.
Local Plans (City of Alpena)			
Coastal Land Use & Design Plan	Focus efforts on the Thunder Bay Underwater Preserve, and the waterfront for tourism and associated development.	Analyze coastal area features to determine the best uses of the coastal area while maintaining ties with the City's heritage.	Focus efforts on the Thunder Bay Underwater Preserve, and the waterfront for tourism and associated development.
City of Alpena Comprehensive Development Plan	Focus efforts on the waterfront and the area's other natural resources.	Focus efforts on the waterfront and the area's other natural resources.	Promote the Thunder Bay Underwater Preserve, and facilities and services for scuba divers. Provide a permanent shipwreck interpretive center.
City of Alpena Downtown-Waterfront Linkage Plan			Recognize the importance of waterfront visitors, and provide high quality community experiences.

Table 3.5 Comparison of federal, state, and local plans to the functions of the Proposed Thunder Bay NMS (continued).

Strategic, Recreation, and Economic Development Plans	Functions of the Thunder Bay NMS		
	Resource Protection	Research	Education
Local Plans (City of Alpena)			
Alpena, Michigan Retail Market Assessment & Strategic Plan			"...acquire frontage along the Thunder Bay River or waterfront as a site for an Underwater Park and Museum based on Alpena's shipwreck history"
Local Plans (County of Alpena)			
Alpena County Coastal Land Management Plan	Local governments should recognize the importance of coastal resources, including the numerous shipwrecks found in the coastal areas and shallows.	Analyze coastal area resources and issues, and propose alternative management options and strategies focusing on important coastal resources.	Promote the Thunder Bay Underwater Preserve.
County of Alpena Recreation Master Plan	Recognizes the Thunder Bay Underwater Preserve and the proposed Sanctuary as unique county features.		Describes the need to establish a Great Lakes visitor center.
Economic Adjustment Strategy for Alpena County	Recognizes the importance of coastal and water resources, and for having high quality designated natural areas (e.g., state parks) for tourism and recreation.		
Local Plans (Presque Isle County)			
Recreation Plan for Presque Isle County	Recognizes the abundance and importance of high quality water resources.		Discusses renovations of the Presque Isle Lighthouse Park, a popular tourist attraction.

Table 3.5 Comparison of federal, state, and local plans to the functions of the Proposed Thunder Bay NMS (continued).

Strategic, Recreation, and Economic Development Plans	Functions of the Thunder Bay NMS		
	Resource Protection	Research	Education
Local Plans (Alcona County)			
Areawide Recreation Master Plan for Alcona County, Alcona Township, and Curtis Township	Places high priority on protecting county shorelines, lakes, streams, wetlands, forestlands, and recreational properties.		High priority placed on the Black River/Lake Huron Fishing Pier Project along 160 feet of Lake Huron shoreline.
Alcona County Economic Development Strategy and Action Summary	Recognizes the importance of economic development without a decline in environmental quality.		
Regional Plans (Northeast Michigan)			
Northeast Michigan Economic Strategy Directions for Regional Strategic Planning	Recommendations include preserving the natural resources that attract tourists.		Recommendations include nurturing of education at all levels, and acting upon opportunities that exist in tourism and water-related recreational development.
Northeast Michigan Overall Economic Development Program Annual Report	Utilize Northeast Michigan's natural resources to enhance economic development; employ sound management practices which also preserve these resources.		
Northeastern Michigan Growth Trends	Tourism in Michigan is the third largest industry. The major attraction is the quality of the natural resources.		

Attachment I

Draft Memorandum of Understanding

The development of a Memorandum of Understanding (MOU) between NOAA, the State of Michigan and the federal Advisory Council on Historic Preservation related to management of the Proposed Thunder Bay National Marine Sanctuary is important to the Sanctuary's successful operation. The MOU should clearly define and describe the roles and responsibilities of all parties.

Presented below is an outline of what an MOU among the parties could include. This outline is intended to present sufficient information for the public to understand the responsibilities of the agencies related to management of the Proposed Thunder Bay National Marine Sanctuary. It is important to note that the content of this draft MOU is based on NOAA's proposed alternatives as described in Section 5 of the DEIS/DMP.

At the close of the public comment period on this DEIS/DMP, NOAA and the State of Michigan will make a determination, based on public comment, on whether or not to proceed with the designation process for the Thunder Bay National Marine Sanctuary. If a decision is made to proceed, NOAA, the State of Michigan, and the federal Advisory Council on Historic Preservation would develop a MOU, which would be signed by appropriate officials. The final MOU would be included in the Final Environmental Impact Statement/Management Plan.

Draft Outline For MOU Between NOAA, the State Of Michigan and the Federal Advisory Council on Historic Preservation

I. Purpose and Scope

The purpose of the MOU would be to establish mechanisms for coordination between NOAA, State of Michigan agencies, and the federal Advisory Council on Historic Preservation, so they could, in partnership, protect and manage the underwater cultural resources of the Thunder Bay National Marine Sanctuary. Nothing in the MOU would change the state's ownership or authority over state-owned lands or other state-owned resources. The State of Michigan would continue to exercise all its regulatory authorities.

The MOU would: (1) set up processes for NOAA and the State of Michigan to authorize certain activities inside the Sanctuary, (2) describe the process to determine compliance with Section 106 of the National Historic Preservation Act, including coordination with the federal Advisory Council on Historic Preservation, and (3) establish a process for resolving any conflicts that may occur between the parties to the MOU.

II. Background

A. General Statements

NOAA's purpose in designating a Thunder Bay National Marine Sanctuary would be to enter into partnership with the State of Michigan to provide comprehensive and long-term protection and management to the underwater cultural resources located in the Sanctuary. The State of Michigan is responsible for protection of underwater cultural resources in the Thunder Bay Underwater Preserve. Designation of the Thunder Bay National Marine Sanctuary would establish NOAA and the state as co-trustees for underwater cultural resources within the Sanctuary.

Activities prohibited in the Sanctuary (unless authorized by permit) would be identified. Fishing activities (provided they do not harm Sanctuary resources) would not regulated by NOAA.

NOAA and the State of Michigan agree that in order to protect underwater cultural resources, the Sanctuary regulations would prohibit the unauthorized removal, disturbance, injury or possession of underwater cultural resources, and the unauthorized alteration of the lakebottom, if these activities would impact underwater cultural resources. Applications for permits involving activities that may injure historical resources would be reviewed by the State Historic Preservation Office and NOAA. Permits that strictly adhere to the Sanctuary regulations and state law would be deemed to be in compliance with Section 106 of the National Historic Preservation Act, and would not require approval of the Advisory Council on Historic Preservation. Permits that are outside of the scope of this MOU, in whole or in part, would be subject to Section 106 review.

B. Definitions

Definitions, such as "underwater cultural resources" and "prohibited activities" would be defined.

III. Authorities

Purposes of the following Acts would briefly be described:

A. National Marine Sanctuaries Act of 1996 (federal)

B. National Historic Preservation Act of 1966 (federal)

C. Part 761, Aboriginal Records and Antiquities of Public Act 451 (1994), as amended (State of Michigan)

D. Part 325, Great Lakes Submerged Lands of Public Act 451 (1994), as amended (State of Michigan)

IV. Permit Review Responsibilities of the Parties

A. General Information.

The State of Michigan would continue to issue permits under state law related to underwater cultural resources; for activities involving permits from other federal agencies, NOAA would address Sanctuary concerns through the review and authorization, and if necessary, the placing of conditions on the federal permits; for an activity adversely impacting underwater cultural resources but that requires neither a state permit nor a permit from another federal agency, a Sanctuary permit would need to be obtained directly from NOAA in order to conduct the activity.

B. Procedures for NOAA Review of State Permits.

A description would be provided of the procedures to be followed in reviewing:

1. Applications for state permits to conduct activities prohibited by Sanctuary regulation.

2. Other permit issues (archaeological recovery permits).

V. Enforcement

Sanctuary regulations could be enforced via cross-deputization of State enforcement personnel. Violation of Sanctuary regulations could be subject to civil penalties under the National Marine Sanctuaries Act.

VI. Consultation and Conflict Resolution

A. General.

Consultation would be required between NOAA and other federal agencies for projects that would involve either "disturbing, moving, removing or injuring, possessing, or attempting to disturb, move, remove or injure, or possess an underwater cultural resource" or altering the lakebottom in a manner that would adversely affect underwater cultural resources.

B. Conflict Resolution.

Following reasonable attempts to resolve disagreements between NOAA and the state on activities which are likely to affect Sanctuary resources, disagreements would be elevated to the Michigan Department of Environmental Quality and/or the Department of State, and to NOAA's National Ocean Service for final resolution. Provision for further elevation would also be made.

C. Rights of Appeal or Petition.

This MOU would not be intended to limit any rights of appeal or petition of any party to this MOU.

VII. Subsidiary Agreements

Additional agreements (if needed) may be put into place, in writing, by both parties.

VIII. Term of Agreement

Unless amended or terminated by mutual agreement, the MOU would remain in effect for five years. The MOU would be reviewed at five years. It is the intent of the parties to have an MOU in place as long as the Sanctuary is designated.

IX. Amendments and Modifications to MOU

The MOU could be amended at any time, by written mutual consent of the parties.

X. Other Provisions

Nothing in the MOU would be intended to conflict with current NOAA or state directives, or with applicable law. Any changes to the Sanctuary or its management structure and operation would have to be agreed to by the state.

XI. Signatures

NOAA:

1. Director, Office of Ocean and Coastal Resource Management
2. Chief, Sanctuaries and Reserves Division

State of Michigan:

1. Director, Department of Environmental Quality
2. Director, Department of Natural Resources
3. Secretary, Department of State

Advisory Council on Historic Preservation

1. Chair

Attachment 2

Summary of Proposed Sanctuary Regulations

The proposed Sanctuary regulations would set forth the boundary of the Proposed Thunder Bay National Marine Sanctuary; prohibit a narrow range of activities; and establish certification and permitting procedures (see "Proposed Thunder Bay National Marine Sanctuary Regulations" on page 61). Other provisions of the existing National Marine Sanctuary Program regulations would also apply to the Sanctuary. These include the regulations for certification of existing permits and other authorizations, notification and review procedures to conduct otherwise prohibited activities, setting forth the maximum per day penalties for violating Sanctuary regulations, and establishing procedures for administrative appeals (see "Proposed Amendments to Generic Sanctuary Regulations" on page 68).

Specifically, the proposed regulations would add a new Subpart R to Part 922, Title 15, Code of Federal Regulations. Proposed § 922.190 and proposed Appendix A to subpart R would set forth the boundary of the Sanctuary.

Proposed § 922.191 would define various terms used in the regulations. Sanctuary resources would be defined to include only underwater cultural resources, which would be defined as "any submerged resource possessing historical, cultural, or archaeological significance, including shipwrecks, sites, contextual information, structures, districts, and objects significantly associated with or representative of earlier people, cultures, maritime heritage, and human activities and events." This definition would also state that "[h]istorical resources includes ' historical properties,' as defined under the National Historic Preservation Act, as amended, and its implementing regulations, as amended." That Act defines "historic properties" as "any prehistoric or historic district, site, building, structure, or object included in, or eligible for inclusion on the National Register, including artifacts, records, and material remains related to such a property or resource."

State of Michigan agency representatives suggested NOAA include resources that are significant primarily due to their recreational attraction and use within the definition of underwater cultural resources, similar to provisions of Part 761, Aboriginal Records and Antiquities of Public Law 451 (1994), as amended. However, NOAA's focus has been on those resources that are significant due to their historical, cultural, or archaeological significance. Further, many of the resources within NOAA's proposed definition would include sites that enjoy a substantial amount of recreational use. Consequently, NOAA has preliminarily determined that the proposed definition should not be expanded, but specifically requests comments on this issue.

Other terms appearing in the proposed regulations are defined at 15 CFR Part 922 Subpart A, and/or in the Marine Protection, Research, and Sanctuaries Act of 1972, as amended, 33 U.S.C. 1401 *et seq.*, and 16 U.S.C. 1431 *et seq.*

Proposed § 922.192 would prohibit a narrow range of activities and thus make it unlawful to conduct them. However, the prohibited activities could be conducted lawfully if:

(1) necessary for law enforcement, or to respond to an emergency threatening life or the environment;

(2) conducted pursuant to a valid lease, permit, license, or other authorization issued by any Federal, State, or local authority of competent jurisdiction, or to any valid right of subsistence use or access, in existence as of the effective date of this designation subject to certification by the Director of the Office of Ocean and Coastal Resource Management under § 922.193 and § 922.47; or

(3) conducted in accordance with the scope, purpose, terms and conditions of a State or Federal permit issued pursuant to § 922.193 and § 922.49; a National Marine Sanctuary permit issued pursuant to § 922.193 and § 922.48; or a Special Use permit issued pursuant to section 310 of the NMSA.

The first activity prohibited would be disturbing, moving, removing or injuring, possessing, or attempting to disturb, move, remove or injure, or possess an underwater cultural resource, from within the boundary of the Sanctuary. The intent of this regulation is to protect the underwater cultural resources of the Sanctuary for the benefit of the public through, for example, education, observation in situ, and research.

The second activity prohibited would be drilling into, dredging or otherwise altering the lakebottom associated with underwater cultural resources, including contextual information; or constructing, placing or abandoning any structure, material or other matter on the lakebottom associated with underwater cultural resources, except as an incidental result of: (a) anchoring vessels; (b) traditional fishing operations (as defined in the regulations); and (c) minor projects that the State Archaeologist certifies will not adversely affect underwater cultural resources. Appendix B to Subpart R lists the minor projects that may fall within this latter exception; taken from the current version of R 322.1013 of Part 325, Great Lakes Submerged Lands of Public Act 451. The intent of this regulation is to protect the underwater cultural resources of the Sanctuary from the harmful effects of activities such as, but not limited to, dredging, excavations, drilling into the lakebottom, and dumping of dredged materials.

A third prohibition would make it unlawful to interfere with, obstruct, delay or prevent an investigation, search, seizure or disposition of seized property in connection with enforcement of the NMSA or any regulations issued under the NMSA.

Proposed § 922.193 would provide for certification by the Director of OCRM of activities conducted pursuant to a valid lease, permit, license, or other authorization issued by any Federal, State, or local authority of competent jurisdiction, or to any valid right of subsistence use or access, in existence as of the effective date of Sanctuary designation.

Proposed § 922.194 would provide for the conduct of activities prohibited by Sanctuary regulations at Section 922.192(a)(1) through (2), provided that the activity is conducted in accordance with the scope, purpose, manner, terms and conditions of a State of Michigan permit (State Permit) which the State Archaeologist certifies is consistent with the Programmatic Agreement among NOAA, the State and the Advisory Council on Historic Preservation, developed pursuant to the NMSA and Section 106 of the National Historic Preservation Act (NHPA). Such State Permits are deemed to have met the "authorization" requirements of 15 CFR § 922.49 of the National Marine Sanctuary Program regulations. If a State Permit is not certified as consistent with the Programmatic Agreement, the applicant would be required to follow the procedures of 15 CFR § 922.49 to obtain an individual Sanctuary authorization of the State Permit. Such activity would also be subject to Section 106 of the NHPA. If there is only a Federal permit applicable to the activity, the applicant must follow the procedures of 15 CFR § 922.49 to obtain an individual Sanctuary authorization of the Federal permit, subject to Section 106 of the NHPA. Finally, if there is no State or Federal permit required to conduct the prohibited activity, the person must obtain a Sanctuary permit pursuant to 15 CFR § 922.48 of the NMSP regulations to conduct such activity, subject to Section 106 of the NHPA. For a proposed activity not prohibited by Sanctuary regulations but that may impact Sanctuary resources, NOAA may review state permit applications for such activity during identified public comment periods and provide comments to the Michigan Department of Environmental Quality, the Michigan Department of State, and other management agencies, as appropriate.

As appropriate, the Director of OCRM would coordinate with the State of Michigan, governing bodies of Tribes with reservations affected by the Sanctuary, and representatives of adjacent county governments, regarding areas of mutual concern and threats to Thunder Bay's underwater cultural resources. The Director may enter into memoranda of understanding regarding such coordination to further the goals of the Sanctuary.

Proposed Thunder Bay National Marine Sanctuary Regulations

Subpart R — Thunder Bay National Marine Sanctuary

Authority: Sections 302, 303, 304, 305, 306, 307, 310, and 312 of the National Marine Sanctuaries Act (NMSA) (16 U.S.C. 1431 *et seq.*)

§ 922.190 Boundary.

(a) The Thunder Bay National Marine Sanctuary (Sanctuary) consists of an area of approximately 808 square miles of surface waters of Lake Huron and the submerged lands thereunder, over and around the underwater cultural resources in Thunder Bay. The boundary forms an approximately rectangular area by extending along the ordinary high water mark of the Michigan shoreline from Presque Isle Lighthouse, at 45 21.4 N latitude, south to Sturgeon Point Lighthouse, at 44 42.7 N latitude, and lakeward from those points along latitude lines to 83 W longitude. The coordinates of the boundary are set forth in Appendix A to this Subpart.

§ 922.191 Definitions.

(a) The following terms are defined for purposes of Subpart R:

Minor project means any project listed in Appendix B to this Subpart.

Programmatic Agreement means the agreement among NOAA, the Federal Advisory Council on Historic Preservation, and the State of Michigan, developed pursuant to the NMSA and Section 106 of the National Historic Preservation Act, setting forth the procedures for review and approval of State Permits which authorize activities prohibited by the Sanctuary regulations.

Sanctuary resource means any underwater cultural resource as defined in this section.

State Archaeologist means the State Archaeologist, Michigan Historical Center, Michigan Department of State.

State Permit means leases, permits, licenses, approvals, or other authorizations issued by the State of Michigan for the conduct of activities or projects within the Thunder Bay National Marine Sanctuary that are prohibited by the regulations at Section 922.192.

Traditional fishing means those commercial or recreational fishing activities that were customarily conducted within the Sanctuary prior to its designation, as identified in the Draft Environmental Impact Statement and Management Plan for this Sanctuary.

Underwater cultural resource means any submerged resource possessing historical, cultural, or archaeological significance, including shipwrecks, sites, contextual information, structures, districts, and objects significantly associated with or representative of earlier people, cultures, maritime heritage, and human activities and events. Historical resources include "historical properties," as defined in the National Historic Preservation Act, as amended, and its implementing regulations, as amended.

(b) Other terms appearing in the proposed regulations are defined at 15 CFR Part 922 Subpart A, and/or in the Marine Protection, Research, and Sanctuaries Act of 1972, as amended, 33 U.S.C. 1401 *et seq.*, and 16 U.S.C. 1431 *et seq.*

§ 922.192 Prohibited or otherwise regulated activities.

(a) Except as specified in paragraphs (b) through (c) of this section, the following activities are prohibited and thus are unlawful for any person to conduct or to cause to be conducted:

(1) Disturbing, moving, removing or injuring, possessing, or attempting to disturb, move, remove or injure, or possess an underwater cultural resource.

(2) Drilling into, dredging or otherwise altering the lakebottom associated with underwater cultural resources, including contextual information; or constructing, placing or abandoning any structure, material or other matter on the lakebottom associated with underwater cultural resources, except as an incidental result of:

(i) anchoring vessels;

(ii) traditional fishing operations; or

(iii) minor projects that do not adversely affect underwater cultural resources.

(3) Interfering with, obstructing, delaying or preventing an investigation, search, seizure or disposition of seized property in connection with enforcement of the Act or any regulations issued under the Act.

(b) The prohibitions in paragraphs (a)(1) and (2) of this section do not apply to valid law enforcement activities, or any activity necessary to respond to an emergency threatening life or the environment.

(c) The prohibitions in paragraphs (a)(1) and (2) of this section do not apply to any activity: certified by the Director pursuant to § 922.193 and § 922.47; executed in accordance with the scope, purpose, terms and conditions of a State or Federal permit issued pursuant to § 922.193(a) or (b), and § 922.49; National Marine Sanctuary permit issued pursuant to § 922.193(c) and § 922.48; or a Special Use permit issued pursuant to section 310 of the NMSA.

§ 922.193 Certification of preexisting leases, licenses, permits, approvals, other authorizations, or rights to conduct a prohibited activity.

(a) A person may conduct an activity prohibited by § 922.192 (a)(1) through (2) if such activity is specifically authorized by a valid State, or local lease, permit, license, approval, or other authorization in existence on the effective date of Sanctuary designation, or by any valid right of subsistence use or access in existence on the effective date of Sanctuary designation, provided that:

(1) for any State or local lease, permit, license, approval, or other authorization, or any right of subsistence use, the State Archaeologist certifies to NOAA, within 90 days of the effective date of designation, that the activity authorized under the State or local lease, permit, license, approval, or other authorization, or any right of subsistence use, is being conducted consistent with the Programmatic Agreement, in which case such activity shall be deemed to have met the requirements of this section and § 922.47; or

(2) in the case where either (i) the State Archaeologist does not certify that the activity authorized under a State or local lease, permit, license, approval, or other authorization, or right of subsistence use is being conducted consistent with the Programmatic Agreement; or (ii) the activity is conducted pursuant only to a Federal permit, the holder of the authorization or right complies with paragraphs (b) through (k) of this section.

(b) For an activity described in paragraph (a)(2) of this section, the holder of the authorization or right may conduct the activity prohibited by § 922.192(a)(1) through (2) provided that: (1) the holder of such authorization or right notifies the Director, in writing, within 90 days of the effective

date of Sanctuary designation, of the existence of such authorization or right and requests certification of such authorization or right; (2) the holder complies with the other provisions of § 922.193; and (3) the holder complies with any terms and conditions on the exercise of such authorization or right imposed as a condition of certification, by the Director, to achieve the purposes for which the Sanctuary was designated.

(c) The holder of an authorization or right described in paragraph (a)(2) above authorizing an activity prohibited by § 922.192 may conduct the activity without being in violation of applicable provisions of § 922.192, pending final agency action on his or her certification request, provided the holder is in compliance with this § 922.193.

(d) Any holder of an authorization or right described in paragraph (a)(2) above may request the Director to issue a finding as to whether the activity for which the authorization has been issued, or the right given, is prohibited by § 922.192, thus requiring certification under this section.

(e) Requests for findings or certifications should be addressed to the Director, Office of Ocean and Coastal Resource Management; ATTN: Sanctuary Manager, Thunder Bay National Marine Sanctuary, [Insert Sanctuary Office Address]. A copy of the lease, permit, license, approval, or other authorization must accompany the request.

(f) The Director may request additional information from the certification requester as he or she deems reasonably necessary to condition appropriately the exercise of the certified authorization or right to achieve the purposes for which the Sanctuary was designated. The information requested must be received by the Director within 45 days of the postmark date of the request. The Director may seek the views of any persons on the certification request.

(g) The Director may amend any certification made under this § 922.193 whenever additional information becomes available justifying such an amendment.

(h) Upon completion of review of the authorization or right and information received with respect thereto, the Director shall communicate, in writing, any decision on a certification request or any action taken with respect to any certification made under this § 922.193, in writing, to both the holder of the certified lease, permit, license, approval, other authorization, or right, and the issuing agency, and shall set forth the reason(s) for the decision or action taken.

(i) Any time limit prescribed in or established under this § 922.193 may be extended by the Director for good cause.

(j) The holder may appeal any action conditioning, amending, suspending, or revoking any certification in accordance with the procedures set forth in § 922.50.

(k) Any amendment, renewal, or extension made after the effective date of Sanctuary designation, to a lease, permit, license, approval, other authorization or right is subject to the provisions of § 922.194 and § 922.49.

§ 922.194 Permit procedures and criteria.

(a) A person may conduct an activity prohibited by § 922.192 (a)(1) through (2) if conducted in accordance with the scope, purpose, manner, terms and conditions of a State Permit provided that:

(1) the State Archaeologist certifies to NOAA that the activity authorized under the State Permit will be conducted consistent with the Programmatic Agreement, in which case such State Permit shall be deemed to have met the requirements of § 922.49; or

(2) in the case where the State Archaeologist does not certify that the activity to be authorized under a State Permit will be conducted consistent with the Programmatic Agreement, the person complies with the requirements of § 922.49 of this part.

(b) If no State Permit is required to conduct an activity prohibited by § 922.192 (a)(1) through (2) of this subpart, a person may conduct such activity if it is conducted in accordance with the scope, purpose, manner, terms and conditions of a Federal permit, provided that the person complies with the provisions of § 922.49 of this part.

(c) In instances where the conduct of an activity is prohibited by § 922.192 (a)(1) through (2) of this subpart is not addressed under a State or other Federal lease, license, permit or other authorization, a person must obtain a Sanctuary permit from NOAA pursuant to § 922.48 of this part and the Programmatic Agreement in order to conduct the activity.

Appendix A to Subpart R of Part 922 - Thunder Bay National Marine Sanctuary Boundary Coordinates

Note: Appendix A to Subpart R will set forth the final Sanctuary boundary coordinates after consideration of comments received on the DEIS/MP.

Appendix B to Subpart R of Part 922 - Minor Projects for Purposes of Section 922.192(a)(2)(iii)

Pursuant to R 322.1013 of Part 325, Great Lakes Submerged Lands of Public Act 451, the Michigan Department of Environmental Quality (Department) issues permits for projects that are of a minor nature which are not controversial, which have minimal adverse environmental impact, which will be constructed of clean, non-polluting materials, which do not impair the use of the adjacent bottomlands by the public, and which do not adversely affect riparian interests of adjacent owners. The following projects are minor projects:

(a) Noncommercial single piers, docks, and boat hoists which meet the following design criteria:

(i) are of a length or size not greater than the length or size of similar structures in the vicinity and on the watercourse involved; and

(ii) provide for the free littoral flow of water and drift material.

(b) Spring piles and pile clusters when their design and purpose is usual for such projects in the vicinity and on the watercourse involved.

(c) Seawalls, bulkheads, and other permanent revetment structures which meet all of the following purpose and design criteria:

(i) the proposed structure fulfills an identifiable need for erosion protection, bank stabilization, protection of uplands, or improvements on uplands;

(ii) the structure will be constructed of suitable materials free from pollutants, waste metal products, debris, or organic materials;

(iii) the structure is not more than 300 feet in length and is located in an area on the body of water where other similar structures already exist;

(iv) the placement of backfill or other fill associated with the construction does not exceed an average of 3 cubic yards per running foot along the shoreline and a maximum of 300 cubic yards; and

(v) the structure or any associated fill will not be placed in a wetland area or placed in any manner that impairs surface water flow into or out of any wetland area.

(d) Groins 50 feet or less in length, as measures from the toe to bluff, which meet all of the following criteria:

(i) the groin is low profile, with the lakeward end not more than 1 foot above the existing water level; and

(ii) the groin is placed at least 1/2 of the groin length from the adjacent property line or closer with written approval of the adjacent riparian.

(e) Filling for restoration of existing permitted fill, fills placed incidental to construction of other structures, and fills that do not exceed 300 cubic yards as a single and complete project, where the fill is of suitable material free from pollutants, waste metal products, debris, or organic materials.

(f) Dredging for the maintenance of previously dredged areas or dredging of not more than 300 cubic yards as a single and complete project when both of the following criteria are met:

(i) no reasonable expectation exists that the materials to be dredged are polluted; and

(ii) all dredging materials will be removed to an upland site exclusive of wetland areas.

(g) Structural repair of man-made structures, except as exempted by R 322.1008(3), when their design and purpose meet both of the following criteria:

(i) the repair does not alter the original use of a recently serviceable structure; and

(ii) the repair will not adversely affect public trust values or interests, including navigation and water quality.

(h) Fish or wildlife habitat structures which meet both of the following criteria:

(i) are placed so the structures do not impede or create a navigational hazard; and

(ii) are anchored to the bottomlands.

(i) Scientific structures such as staff gauges, water monitoring devices, water quality testing devices, survey devices, and core sampling devices, if the structures do not impede or create a navigational hazard.

(j) Navigational aids which meet both of the following criteria:

(i) are approved by the United States Coast Guard; and

(ii) are approved under Act No. 303 of the Public Acts of 1967, as amended, being §281.1001 et seq. of the Michigan Compiled Laws, and known as the Marine Safety Act.

(k) Extension of a project where work is being performed under a current permit and which will result in no damage to natural resources.

(l) A sand trap wall which meets all of the following criteria:

(i) the wall is 300 feet or less in length along the shoreline;

(ii) the wall does not extend more than 30 feet lakeward of the toe of bluff;

(iii) the wall is low profile, that is, it is not more than 1 foot above the existing water level; and

(iv) the wall is constructed of wood or steel or other non-polluting material.

(m) Physical removal of man-made structures or natural obstructions which meet all of the following criteria:

(i) the debris and spoils shall be removed to an upland site, not in a wetland, in a manner which will not allow erosion into pubic waters;

(ii) the shoreline and bottom contours shall be restored to an acceptable condition; and

(iii) upon completion of structure removal, the site does not constitute a safety or navigational hazard. Department staff shall consider fisheries and wildlife resource values when evaluating applications for natural obstruction removal.

Proposed Amendments to Generic Sanctuary Regulations

§ 922.1 Applicability of regulations.

Unless noted otherwise, the regulations in Subparts A, D and E apply to all thirteen National Marine Sanctuaries for which site-specific regulations appear in Subparts F through R, respectively. Subparts B and C apply to the site evaluation list and to the designation of future Sanctuaries.

§ 922.40 Purpose.

The purpose of the regulations in this Subpart and in Subparts F through R is to implement the designations of the thirteen National Marine Sanctuaries for which site specific regulations appear in Subparts F through R, respectively, by regulating activities affecting them, consistent with their respective terms of designation in order to protect, preserve and manage and thereby ensure the health, integrity and continued availability of the conservation, ecological, recreational, research, educational, historical and aesthetic resources and qualities of these areas. Additional purposes of the regulations implementing the designation of the Florida Keys National Marine Sanctuary are found at § 922.160.

§ 922.41 Boundaries.

The boundary for each of the thirteen National Marine Sanctuaries covered by this part is described in Subparts F through R, respectively.

§ 922.42 Allowed Activities.

All activities (e.g., fishing, boating, diving, research, education) may be conducted unless prohibited or otherwise regulated in Subparts F through R, subject to any emergency regulations promulgated pursuant to §§ 922.44, 922.111(c), or 922.165, subject to all prohibitions, regulations, restrictions, and conditions validly imposed by any Federal, State, or local authority of competent jurisdiction, including Federal and State fishery management authorities, and subject to the provisions of § 312 of the Act. The Assistant Administrator may only directly regulate fishing activities pursuant to the procedure set forth in § 304(a)(5) of the NMSA.

§ 922.43 Prohibited or otherwise regulated activities.

Subparts F through R set forth site-specific regulations applicable to the activities specified therein.

§ 922.44 Emergency regulations.

Where necessary to prevent or minimize the destruction of, loss of, or injury to a Sanctuary resource or quality, or minimize the imminent risk of such destruction, loss, or injury, any and all such activities are subject to immediate temporary regulation, including prohibition. The provisions of this section do not apply to the Cordell Bank, Florida Keys and Hawaiian Islands Humpback Whale National Marine Sanctuaries. See §§ 922.111(c), 922.165, and 922.186, respectively, for the authority to issue emergency regulations with respect to those sanctuaries.

§ 922.45 Penalties.

(a) Each violation of the NMSA or FKNMSPA, any regulation in this part, or any permit issued pursuant thereto, is subject to a civil penalty of not more than $100,000. Each day of a continuing violation constitutes a separate violation.

(b) Regulations setting forth the procedures governing administrative proceedings for assessment of civil penalties, permit sanctions, and denials for enforcement reasons, issuance and use of written warnings, and release or forfeiture of seized property appear at 15 CFR Part 904.

§ 922.46 Response costs and damages.

Under § 312 of the Act, any person who destroys, causes the loss of, or injures any Sanctuary resource is liable to the United States for response costs and damages resulting from such destruction, loss or injury, and any vessel used to destroy, cause the loss of, or injure any Sanctuary resource is liable in rem to the United States for response costs and damages resulting from such destruction, loss or injury.

§ 922.47 Pre-existing authorizations or rights and certifications of pre-existing authorizations or rights.

(a) Leases, permits, licenses, or rights of subsistence use or access in existence on the date of designation of any National Marine Sanctuary shall not be terminated by the Director. The Director may, however, regulate the exercise of such leases, permits, licenses, or rights consistent with the purposes for which the Sanctuary was designated.

(b) The prohibitions listed in Subparts F through P, and Subpart R do not apply to any activity authorized by a valid lease, permit, license, approval or other authorization in existence on the effective date of Sanctuary designation, or in the case of the Florida Keys National Marine Sanctuary the effective date of the regulations in Subpart P, and issued by any Federal, State or local authority of competent jurisdiction, or by any valid right of subsistence use or access in existence on the effective date of Sanctuary designation, or in the case of the Florida Keys National Marine Sanctuary the effective date of the regulations in Subpart P, provided that the holder of such authorization or right complies with certification procedures and criteria promulgated at the time of Sanctuary designation, or in the case of the Florida Keys National Marine Sanctuary the effective date of the regulations in Subpart P, and with any terms and conditions on the exercise of such authorization or right imposed by the Director as a condition of certification as the Director deems necessary to achieve the purposes for which the Sanctuary was designated.

§ 922.48 National marine sanctuary permits—application procedures and issuance criteria.

(a) A person may conduct an activity prohibited by Subparts F through O, and Subpart R if conducted in accordance with the scope, purpose, terms and conditions of a permit issued under this section and Subparts F through O, or Subpart R, as appropriate. For the Florida Keys National Marine Sanctuary, a person may conduct an activity prohibited by Subpart P if conducted in accordance with the scope, purpose, terms and conditions of a permit issued under § 922.166.

(b) Applications for permits to conduct activities otherwise prohibited by Subparts F through O, or Subpart R should be addressed to the Director and sent to the address specified in Subparts F through O, or Subpart R, as appropriate. An application must include: (1) a detailed description of the proposed activity including a timetable for completion; (2) the equipment, personnel and methodology to be employed; (3) the qualifications and experience of all personnel; (4) the potential effects of the activity, if any, on Sanctuary resources and qualities; and (5) copies of all other required licenses, permits, approvals or other authorizations.

(c) Upon receipt of an application, the Director may request such additional information from the applicant as he or she deems necessary to act on the application and may seek the views of any persons or entity, within or outside the Federal government, and may hold a public hearing, as deemed appropriate.

(d) The Director, at his or her discretion, may issue a permit, subject to such terms and conditions as he or she deems appropriate, to conduct a prohibited activity, in accordance with the criteria found in Subparts F through O, or Subpart R, as appropriate. The Director shall further impose, at a minimum, the conditions set forth in the relevant subpart.

(e) A permit granted pursuant to this section is nontransferable.

(f) The Director may amend, suspend, or revoke a permit issued pursuant to this section for good cause. The Director may deny a permit application pursuant to this section, in whole or in part, if it is determined that the permittee or applicant has acted in violation of the terms and conditions of a permit or of the regulations set forth in this section or Subparts F through O, Subpart R or for other good cause. Any such action shall be communicated in writing to the permittee or applicant by certified mail and shall set forth the reason(s) for the action taken. Procedures governing permit sanctions and denials for enforcement reasons are set forth in Subpart D of 15 CFR Part 904.

§ 922.49 Notification and review of applications for leases, licenses, permits, approvals or other authorizations to conduct a prohibited activity.

(a) A person may conduct an activity prohibited by Subparts L through P, and Subpart R if such activity is specifically authorized by any valid Federal, State, or local lease, permit, license, approval, or other authorization issued after the effective date of Sanctuary designation, or in the case of the Florida Keys National Marine Sanctuary after the effective date of the regulations in Subpart P, provided that: 1) the applicant notifies the Director, in writing, of the application for such authorization (and of any application for an amendment, renewal, or extension of such authorization) within fifteen (15) days of the date of filing of the application or the effective date of Sanctuary designation, or in the case of the Florida Keys National Marine Sanctuary the effective date of the regulations in Subpart P, whichever is later; 2) the applicant complies with the other provisions of this § 922.49; 3) the Director notifies the applicant and authorizing agency that he or she does not object to issuance of the authorization (or amendment, renewal, or extension); and 4) the applicant complies with any terms and conditions the Director deems reasonably necessary to protect Sanctuary resources and qualities.

(b) Any potential applicant for an authorization described in paragraph (a) above may request the Director to issue a finding as to whether the activity for which an application is intended to be made is prohibited by Subparts L through P, or Subpart R, as appropriate.

(c) Notification of filings of applications should be sent to the Director, Office of Ocean and Coastal Resource Management at the address specified in Subparts L through P, or Subpart R, as appropriate. A copy of the application must accompany the notification.

(d) The Director may request additional information from the applicant as he or she deems reasonably necessary to determine whether to object to issuance of an authorization described in paragraph (a) above, or what terms and conditions are reasonably necessary to protect Sanctuary resources and qualities. The information requested must be received by the Director within 45 days of the postmark date of the request. The Director may seek the views of any persons on the application.

(e) The Director shall notify, in writing, the agency to which application has been made of his or her pending review of the application and possible objection to issuance. Upon completion of review of the application and information received with respect thereto, the Director shall notify both the agency and applicant, in writing, whether he or she has an objection to issuance and what terms and conditions he or she deems reasonably necessary to protect Sanctuary resources and qualities, and reasons therefor.

(f) The Director may amend the terms and conditions deemed reasonably necessary to protect Sanctuary resources and qualities whenever additional information becomes available justifying such an amendment.

(g) Any time limit prescribed in or established under this § 922.49 may be extended by the Director for good cause.

(h) The applicant may appeal any objection by, or terms or conditions imposed by, the Director to the Assistant Administrator or designee in accordance with the provisions of § 922.50.

§ 922.50 Appeals of administrative action.

(a)(1) Except for permit actions taken for enforcement reasons (see Subpart D of 15 CFR Part 904 for applicable procedures), an applicant for, or a holder of, a National Marine Sanctuary permit; an applicant for, or a holder of, a Special Use permit issued pursuant to § 310 of the Act; a person requesting certification of an existing lease, permit, license or right of subsistence use or access under § 922.47; or, for those Sanctuaries described in Subparts L through P and Subpart R, an applicant for a lease, permit, license or other authorization issued by any Federal, State, or local authority of competent jurisdiction (hereinafter appellant) may appeal to the Assistant Administrator:

(A) the granting, denial, conditioning, amendment, suspension or revocation by the Director of a National Marine Sanctuary or Special Use permit;

(B) the conditioning, amendment, suspension or revocation of a certification under § 922.47; or

(C) for those Sanctuaries described in Subparts L through P and Subpart R, the objection to issuance of or the imposition of terms and conditions on a lease, permit, license or other authorization issued by any Federal, State, or local authority of competent jurisdiction.

(2) For those National Marine Sanctuaries described in Subparts F through K, any interested person may also appeal the same actions described in § 922.50(a)(1)(A)-(B). For appeals arising from actions taken with respect to these National Marine Sanctuaries, the term "appellant" includes any such interested persons.

(b) An appeal under paragraph (a) of this section must be in writing, state the action(s) by the Director appealed and the reason(s) for the appeal, and be received within 30 days of receipt of notice of the action by the Director. Appeals should be addressed to the Assistant Administrator for Ocean Services and Coastal Zone Management, NOAA 1305 East-West Highway, 13th Floor, Silver Spring, MD 20910.

(c) The Assistant Administrator may request the appellant to submit such information as the Assistant Administrator deems necessary in order for him or her to decide the appeal. The information requested must be received by the Assistant Administrator within 45 days of the postmark date of the request. The Assistant Administrator may seek the views of any other persons. For the Monitor National Marine Sanctuary, if the appellant has requested a hearing, the Assistant Administrator shall grant an informal hearing. For all other National Marine Sanctuaries, the Assistant Administrator may determine whether to hold an informal hearing on the appeal. If the Assistant Administrator determines that an informal hearing should be held, the Assistant Administrator may designate an officer before whom the hearing shall be held.

The hearing officer shall give notice in the *Federal Register* of the time, place and subject matter of the hearing. The appellant and the Director may appear personally or by counsel at the hearing and submit such material and present such arguments as deemed appropriate by the hearing officer. Within 60 days after the record for the hearing closes, the hearing officer shall recommend a decision in writing to the Assistant Administrator.

(d) The Assistant Administrator shall decide the appeal using the same regulatory criteria as for the initial decision and shall base the appeal decision on the record before the Director and any information submitted regarding the appeal, and, if a hearing has been held, on the record before the hearing officer and the hearing officer's recommended decision. The Assistant Administrator shall notify the appellant of the final decision and the reason(s) therefore in writing. The Assistant Administrator's decision shall constitute final agency action for the purposes of the Administrative Procedure Act.

(e) Any time limit prescribed in or established under this section other than the 30-day limit for filing an appeal may be extended by the Assistant Administrator or hearing officer for good cause.

Section 4
The Sanctuary Setting

SECTION 4
THE SANCTUARY SETTING

- About 160 *shipwrecks* and hundreds of other *underwater cultural resources* are known, probable, or suspected to exist within the boundaries of the Proposed Thunder Bay National Marine Sanctuary.

- Many of these sites are located within the *Thunder Bay Underwater Preserve,* established by the State of Michigan in 1981.

- The entire collection of Thunder Bay region shipwrecks is highly representative of Great Lakes shipping for the period of 1840-1970. This collection of shipwrecks is believed to have *national historic significance.* In addition, at least eight vessels have potential national historic significance.

- The underwater cultural resources are part of a *maritime cultural landscape* that includes lighthouses, historic wharfs and docks, submerged prehistoric sites, present-day maritime activities and folklife, coastal communities, aquatic life, and natural scenery.

- There are many stakeholders of the shipwrecks and maritime cultural landscape of the Thunder Bay region, including local residents and tourists.

A. Introduction

Much of the information described in this section has been excerpted and summarized from the *Thunder Bay Region Inventory of Resources*, completed by Michigan Sea Grant Extension in 1993. The Inventory is based on a thorough review of literature and comprises the best available information on the underwater cultural resources, past and present human activities, and environmental characteristics of the Thunder Bay region. The Inventory identifies many limitations in information about these maritime resources and activities.

Additional research was conducted by Great Lakes Visual/Research, Inc. in 1996 to evaluate the national historic significance of Thunder Bay shipwrecks. This recent work has been summarized in Part E of this section, and is included in Volume II, Appendix G.

The reader is encouraged to learn more about the Sanctuary setting by reading the *Thunder Bay Region Inventory of Resources* (Vrana 1993) and the *Preliminary Comparative and Theme Study of National Historic Landmark Potential for Thunder Bay, Michigan* (Martin 1996). The Inventory is available for review at the Alpena Community College and Alpena County Library.

B. Study Area

The Thunder Bay region as discussed in the Draft Environmental Impact Statement/Draft Management Plan (DEIS/DMP) extends from Presque Isle Harbor to Sturgeon Point and eastward into Lake Huron to longitude 83 degrees west. It includes Lake Huron waters east of Alpena County, and portions of Alcona County and Presque Isle County (Figures 4.1 - 4.3).

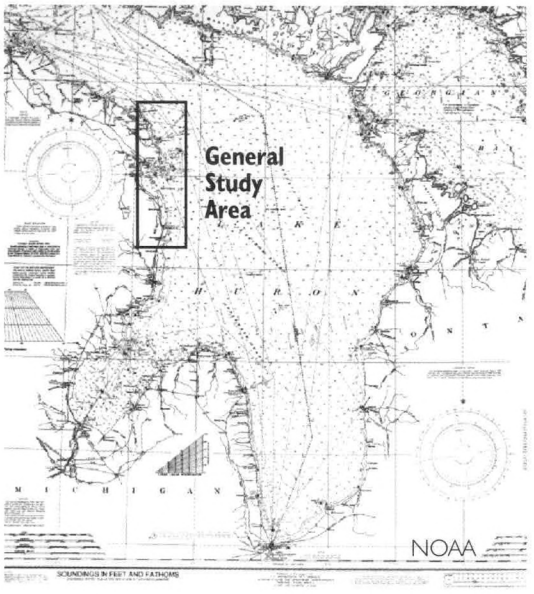


Figure 4.1 Identification of general study area.

Figure 4.2 Satellite photograph of Thunder Bay region.

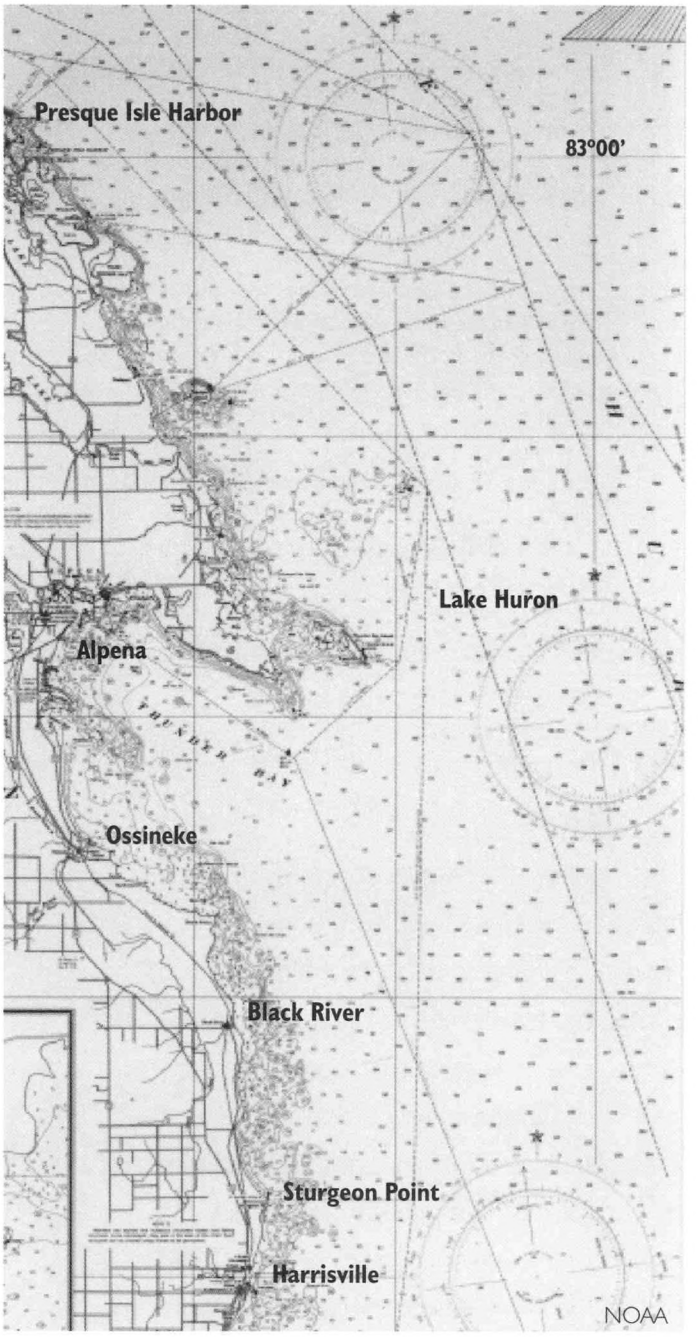


Figure 4.3 General study area.

C. Shipwreck Law and Management in the Great Lakes Region

The Great Lakes comprise the largest system of fresh surface water on earth (U.S. EPA and Environment Canada 1988). Eight states and the Province of Ontario own nearly all of the approximately 94,000 square miles of Great Lakes surface waters and underlying submerged lands or bottomlands. The State of Michigan and the Province of Ontario own about 75% of the total submerged lands area (U.S. Bureau of Census 1993).

The federal *Abandoned Shipwreck Act* (ASA) of 1987 (43 U.S.C. 2101 et seq.) affirms state ownership and management authority for abandoned shipwrecks that meet at least one of the following criteria: (1) embedded in submerged lands of a state, (2) embedded in coralline formations protected by a state on submerged lands of a state, or (3) on submerged lands of a state and included in, or determined eligible for, inclusion in the National Register of Historic Places (maintained by the National Park Service). Guidelines for the ASA were published in the Federal Register on December 4, 1990 (55 Federal Register 50116-50145). The guidelines are voluntary and *not* binding on any state.

The states of Indiana, Michigan, Ohio, and Wisconsin have laws that are specific to shipwrecks and other underwater cultural resources on state bottomlands. All Great Lakes states and the Province of Ontario have general law relating to historic preservation or archaeology that may be applied to underwater cultural resources (Vrana and Mahoney 1993).

Part 761, Aboriginal Records and Antiquities of P. A. 451 (1994), as amended, was enacted "to protect and preserve, and to regulate the taking of, aboriginal records and antiquities within the state; to preserve abandoned property of historical or recreational value [on Great Lakes bottomlands]; to designate and regulate Great Lakes bottomland preserves; to prescribe the powers and duties of certain state agencies; to create a fund; and to prescribe penalties and provide remedies." Part 761 was formerly the *Aboriginal Records and Antiquities Act* (Public Act 173 of 1929, as amended by Public Act 184 of 1980, and Public Act 452 of 1988).

Key components of Part 761 include the following:

- permit required to explore or excavate aboriginal remains;
- permit required to remove or disturb underwater cultural resources;
- state retains exclusive right and privilege of field archaeology;
- exemption from public disclosure of site information;
- penalty for permit violations;
- state reserves title to all archaeological objects and data;
- penalty for unauthorized removal or intentional destruction of archaeological materials;

- requirement to report and penalty for disturbance of human remains;
- state can seek civil action for damages (including forfeiture of equipment used in the violation);
- removal of artifacts allowed without permit under certain conditions;
- recognizes the right of people to own abandoned property under certain conditions;
- provision for intentionally sinking vessels in bottomland preserves;
- recognizes the right to engage in recreational diving;
- public accepts dangers in scuba diving on underwater cultural resources; and
- establishes the state underwater salvage and preserve advisory committee.

State appropriations were *not* provided for implementation of Part 761. Currently, there are *no* rules for state bottomland preserves (underwater preserves). The state *Underwater Salvage and Preserve Committee* is composed of appointees from the Michigan Department of Environmental Quality, Michigan Department of Natural Resources, Michigan Department of State, and public members appointed by the Governor.

Leadership in service and program development for state underwater preserves has been taken on primarily by local advocacy groups (commonly known as preserve committees), businesses, and the Michigan Underwater Preserve Council. The Council is a private, non-profit organization that represents the interests of preserve committees and stakeholders throughout Michigan. Nine state underwater preserves are currently designated in the Michigan Great Lakes (Figure 4.4). In addition to the state underwater preserves, Isle Royale National Park protects shipwrecks under federal law.

There are 16 management areas within the Great Lakes that were created specifically for the preservation and/or protection of shipwrecks and other underwater cultural resources, or explicitly include shipwrecks within their management plans (Vrana and Mahoney 1993). Seven additional shipwreck management areas are proposed in the Great Lakes (Table 4.1 and Figure 4.5). Six shipwreck management areas have been established in Lake Huron.

State programs involving shipwreck management are administered generally by state historic preservation offices, state archaeology offices, and departments of natural resources or equivalents. Many state agencies and local organizations are assisted by university programs (including NOAA Sea Grant) with interests in underwater preserves and maritime archaeology.

The State of Wisconsin and the Province of Ontario are the only states to have established formal programs in maritime archaeology. These state/provincial programs are assisted by the following avocational organizations in underwater archaeology: Wisconsin Underwater Archaeology Association, Save Ontario Shipwrecks, and Preserve Our Wrecks (Ontario).

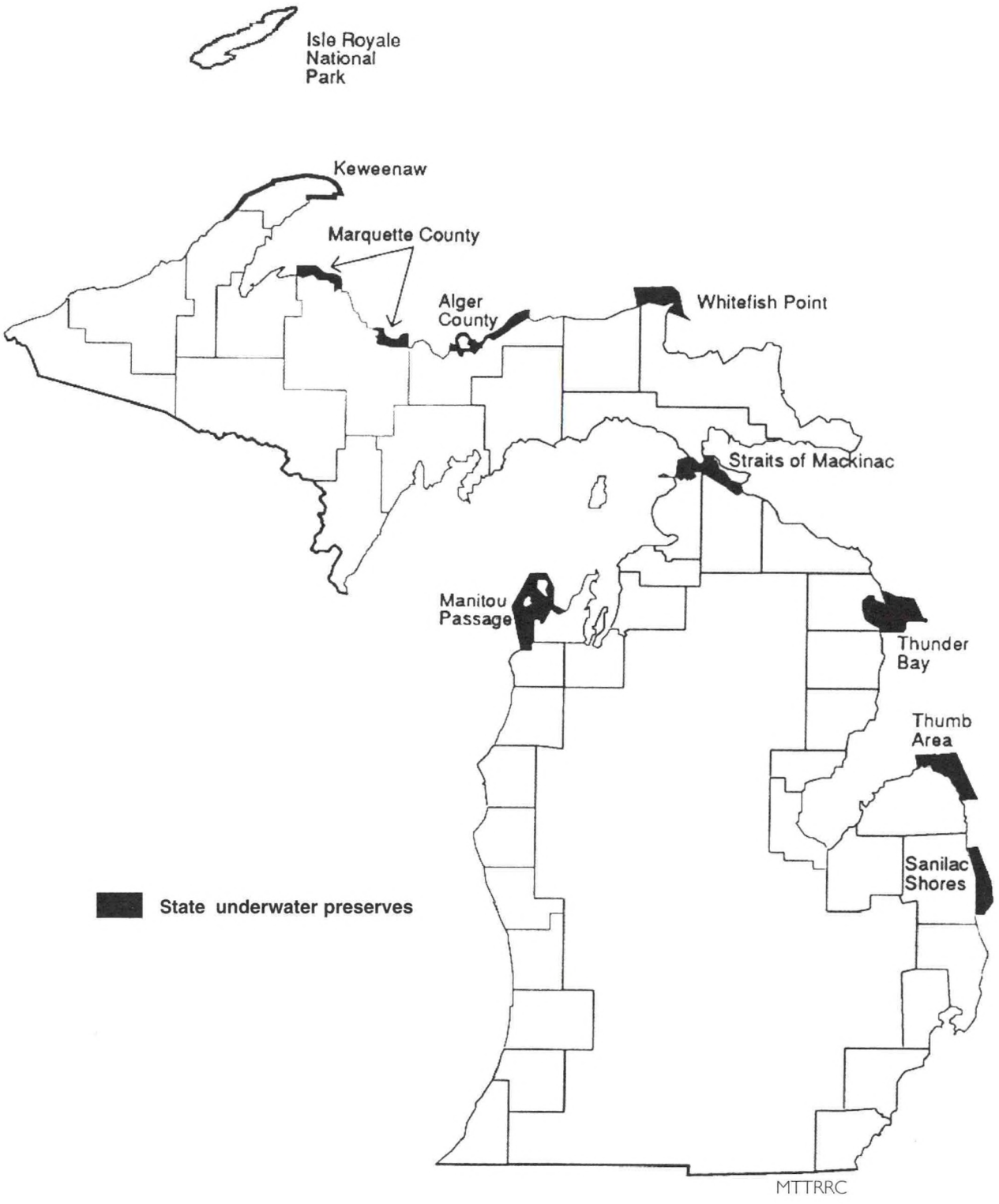


Figure 4.4 State of Michigan underwater preserves.

Table 4.1 Great Lakes shipwreck management areas (established and *proposed*) (adapted from Vrana and Mahoney 1993).

Location	Name of Area	Administration	Lake	Size (square mi)
Michigan	Alger County Underwater Preserve	State/Local	Superior	113
	Detour Passage Underwater Preserve	State/Local	Huron	*proposed*
	Isle Royale National Park	U.S.	Superior	684
	Keweenaw Underwater Preserve	State/Local	Superior	103
	Manitou Passage Underwater Preserve	State/Local	Michigan	282
	Marquette County Underwater Preserve	State/Local	Superior	144
	Pictured Rocks National Lakeshore*	U.S.	Superior	16
	Sanilac Shores Underwater Preserve	State/Local	Huron	163
	Sleeping Bear Dunes National Lakeshore*	U.S.	Michigan	20
	Southwest Michigan Underwater Preserve	State/Local	Michigan	*proposed*
	Straits of Mackinac Underwater Preserve	State/Local	Michigan/Huron	148
	Thumb Area Underwater Preserve	State/Local	Huron	276
	Thunder Bay Underwater Preserve	State/Local	Huron	288
	Whitefish Point Underwater Preserve	State/Local	Superior	376
Ontario	Fathom Five National Marine Park	Canada	Huron	52
	National Marine Park	Canada	Superior	N/A
	Pukaskwa National Park	Canada	Superior	31
	Leamington Marine Heritage Area	Ontario/Local	Erie	*proposed*
Ohio	*Bass Islands Submerged Lands Preserve*	State/Local	Erie	*proposed*
	Cleveland-Lorain Submerged Lands Preserve	State/Local	Erie	*proposed*
Wisconsin	Apostle Islands National Lakeshore*	U.S.	Superior	83
Minnesota	*Split Rock Underwater State Park*	State	Superior	*proposed*
Indiana	Indiana Dunes National Lakeshore*	U.S.	Michigan	1.5

* Surface jurisdiction only

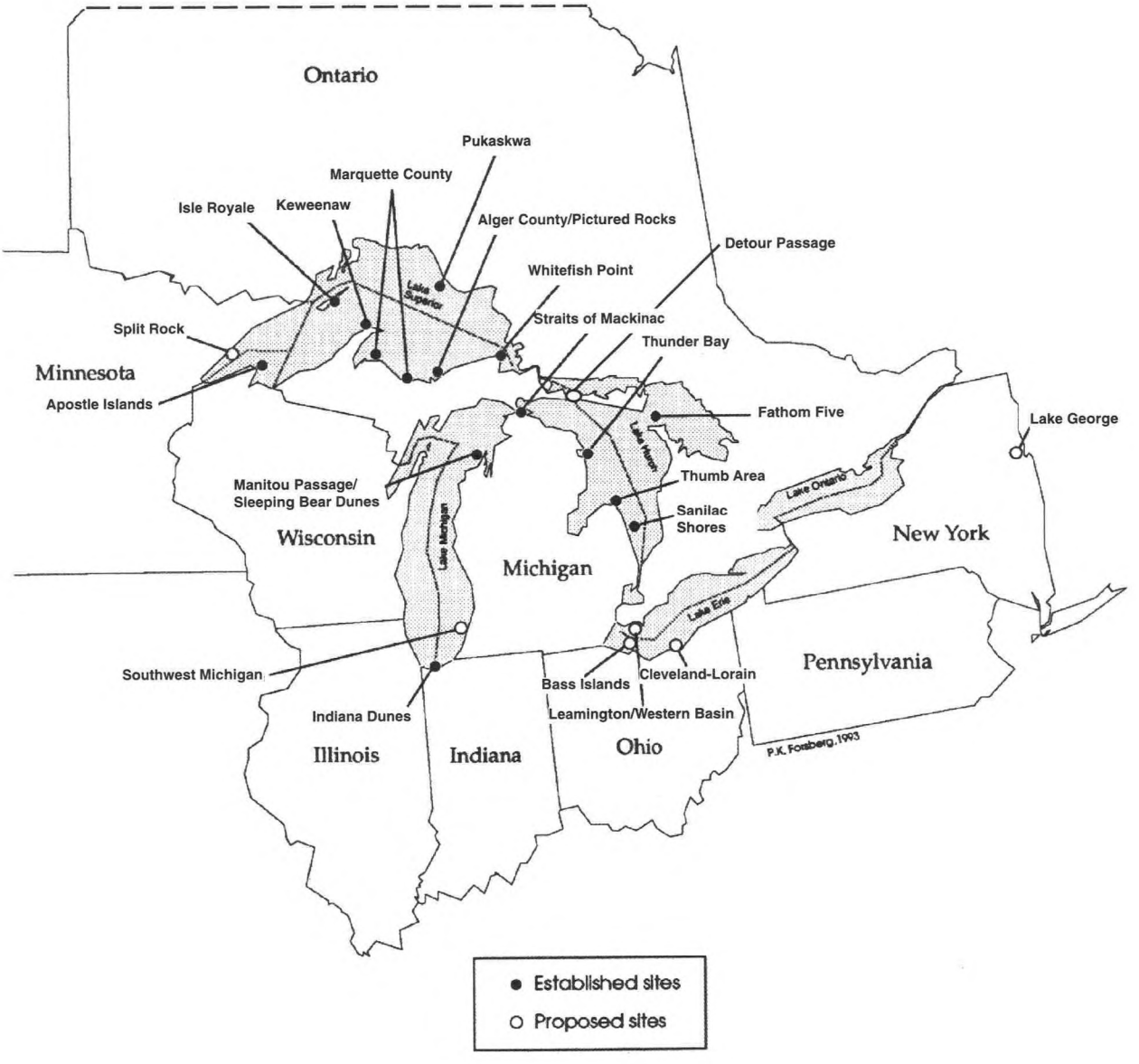


Figure 4.5 Locations of Great Lakes shipwreck management areas (adapted from Vrana and Mahoney 1993).

D. Underwater Cultural Resources of the Thunder Bay Region

I. Historic Shipwrecks

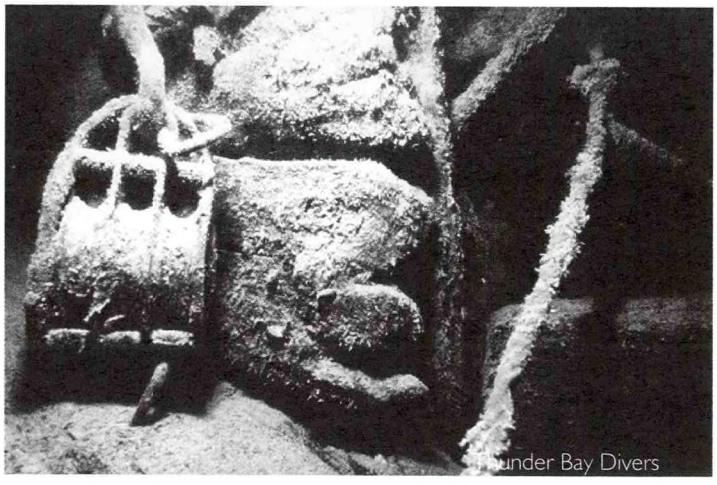
The collection of historic shipwrecks in Thunder Bay represents a diversity of vessels that navigated the Great Lakes in the 19th and 20th centuries. These sunken vessels reflect transitions in ship architecture and construction methods from the era of wooden sailing boats to that of early steel-hulled steamers. There are also examples of unusual vessel types, including a wooden paddlewheel steamer built in 1844 and a "turtleback" bulk freighter from the 1890s.

The underwater archaeological sites and their associated artifacts can tell us about how the crews of Great Lakes vessels lived and worked, and what their larger society and culture were like (Terrell 1995). In addition, the shipwrecks provide insight into the regional commerce of the Thunder Bay region in the 19th and 20th centuries.

Known, probable, and suspected shipwrecks within the Thunder Bay region are listed in Tables 4.2 to 4.4. These lists indicate a potential total of 160 shipwrecks in the region. The locations of known shipwrecks in the Thunder Bay region and the estimated locations of probable and suspected sites are shown in Figure 4.8.

Known total losses are defined as vessels for which archaeological evidence and/or strong historical documentation (three primary sources or more) confirm the existence and location where they were stranded, foundered, burned/exploded, or abandoned. *Probable* total losses include those vessels for which oral tradition, one or more historical primary sources, or three or more reliable secondary sources indicate their location. *Suspected* total losses encompass those shipwrecks listed in secondary sources, but not confirmed by primary documents, oral tradition, or archaeological fieldwork.

Thunder Bay Divers



Thunder Bay Divers

Figure 4.6 (above) Remains of a wooden sailing boat in Thunder Bay.
Figure 4.7 (left) Scuba diver visiting a shipwreck site near North Point.

Table 4.2 Known shipwrecks in the Thunder Bay region.

Name of Vessel	Rig	Year Built	Date of Loss
Albany	steamer		1-1-1856
American Union	schooner		6-6-1894
Allen, E.B.	schooner	1864	11-20-1871
Barge No. 1	barge	1895	11-8-1918
Blanchard, B. W.	propeller	1870	11-29-1904
Flint, Oscar T.	propeller	1889	11-25-1909
Galena	propeller	1857	9-25-1872
Gardner, Nellie	schooner	1873	Oct-1883
Grecian	propeller	1891	6-15-1906
Hanna, D.R.	propeller	1906	5-16-1919
Ishpeming	schooner	1872	11-25-1903
Magruder, J.H.	scow	1869	9-17-1895
Miztec	schooner	1890	Jul-1920
Monohansett	steamer	1872	11-11-1907
Monrovia	propeller	1943	6-25-1959
Montana	propeller	1872	9-6-1914
New Orleans	steamer	1844	6-11-1849
New Orleans	propeller	1885	6-30-1906
Nordmeer	propeller	1954	11-19-1966
Norman	propeller	1890	5-30-1895
Northern Light	barge	1858	Aug-1881
Oswegatchie	propeller	1867	11-26-1891
Pewabic	steamer	1863	8-9-1865
Portsmouth	propeller	1853	11-15-1867
Rend, William P.	propeller	1888	9-22-1917
Scanlon's Barge	deck barge		
Scott, Isaac M.	propeller	1909	11-9-1913
Shamrock	schooner	1875	6-26-1905
St. Maries	propeller	1885	8-30-1892
Thew, WM. Peter	propeller	1884	6-22-1909
Van Valkenburg, Lucinda	schooner	1862	5-3-1887
Viator	propeller	1904	10-31-1935
Windiate, Cornelia B.	schooner	1874	Dec-1875
Woolson, Mary	schooner	1890	7-18-1920

Table 4.3 Probable shipwrecks in the Thunder Bay region.

Name of Vessel	Rig	Year Built	Date of Loss
Adriatic	bark		1872
Aimee	steam tug	1879	1883
Alvina	schooner	1871	Oct-1901
Arnaline/FalsePetrel?	prop/brig?		1842
Bay City	schooner	1857	11-19-1902
Becker, B.H.	propeller	1932	8-10-1937
Bertha M.	schooner	1902	7-28-1930
Berriman, Francis	schooner	1872	5-7-1877
Bridge, H.P.	bark	1864	1865
Brooklyn	schooner	1864	6-15-1892
Bruce, Kate L.	schooner	1872	11-11-1877
Corsican	schooner	1862	6-1-1893
Davidson, James	propeller	1874	10-4-1883
Deemer, Edward H.	propeller	1899	5-20-1923
Don Quixotte	steamer	1836	1836
Effort	barge	1941	
Egan, Marion	schooner	1861	9-22-1875
Egyptian	propeller	1873	12-9-1897
Ellen	schooner	1846	Nov-1856
Elvina	schooner	1868	10-31-1901
Empire State	schooner	1862	11-8-1877
Excelsior	bark	1865	10-15-1871
Exile	schooner	1867	11-26-1916
Fish, William	brig	Nov-1869	
Florida	propeller	1889	5-20-1897
Franklin, Benjamin	steamer	1842	1850
Franz, W.C.	propeller	1901	11-21-1934
Gilberts, W.H.	propeller	1892	5-22-1914
Goodell	schooner	1864	Nov-1891
Guenther	barge		1890
Guillotine	schooner		4-1-1881
Hall, James H.	schooner	1885	11-7-1916
Harvest Queen	schooner	1863	9-13-1888

Continued on the following page

Table 4.3 Probable shipwrecks in the Thunder Bay region (continued).

Name of Vessel	Rig	Year Built	Date of Loss
Hathaway, Colonel	schooner	1870	9-16-1881
Havre	schooner	1836	11-02-1845
Heart Failure	dredge		c.1910
Helen, C.	propeller	1874	10-4-1922
Holmes	schooner		10-14-1887
Hubbard, H.	schooner	1842	Jun-1845
Hunter	schooner	1854	Sep-1872
Ida & Mary	scow	1858	1872
Jeka	tug		4-22-1930
Johnson, John T.	schooner	1873	11-28-1904
Jupiter	schooner	1857	9-15-1901
Knight Templar	barge		7-25-1903
Lafarge, Frank	schooner		1901
Larson, Julia	schooner	1874	8-26-1912
Mackinaw	propeller	1866	10-28-1890
Marine City	steamer	1866	8-28-1880
Maryett	yacht		10-19-1901
Maxwell, William	tug	1883	9-19-1908
Miami	propeller	1888	8-6-1924
Mildred	tug	1868	11-6-1872
Miller, Grace	tug		10-13-1875
Mitchell	steamer		11-14-1914
Morse, Fred A.	schooner	1871	6-27-1892
Morton, J.D.	steamer		1853
Mowatt, James	schooner	1884	10-1-1919
New York	propeller	1879	10-10-1910
Ney, Marshall	schooner		1847
Nichols	steamer		11-13-1913
Nonpareil	schooner	1856	7-7-1866
Northhampton	brig		Nov-1854
Ochs, Jay	tug	1888	10-20-1905
Ogarita	schooner	1864	10-25-1905
Palmer, E.B.	schooner	1874	11-1-1892
Parkes, O.E.	propeller	1891	5-3-1929
Paquette, Fishtug	tug		c.1910

Continued on the following page

Table 4.3 Probable shipwrecks in the Thunder Bay region (continued).

Name of Vessel	Rig	Year Built	Date of Loss
Raab, Lucy	schooner	1858	Nov-1862
Raynor, Annie C.	schooner	1858	11-17-1863
Red Bottom	schooner		1876
Roanoke	schooner	1843	10-27-1866
Shaw, John	schooner	1885	11-13-1894
Simons, WM. H.	barge	1919	9-16-1933
Spangler, Kyle	schooner	1856	11-7-1860
Stephens, WM. H.	schooner	1855	Oct-1863
Venus	schooner	1872	10-3-1887
Vienna	schooner	1849	10-27-1906
Warner, John F.	schooner	1855	10-13-1890
Wilson, Belle	propeller	1881	8-8-1888
Wilson, D.M.	propeller	1873	10-27-1894
Woolson, Mary	barge		7-19-1920
Young, William A.	schooner	1883	11-17-1911

Table 4.4 Suspected shipwrecks in the Thunder Bay region.

Name of Vessel	Rig	Year Built	Date of Loss
Acontias	barge		10-29-1887
Bemis, A.S.	tug	1859	9-5-1872
Bissel, Harvey	schooner	1866	11-28-1905
Blake, J.W.	schooner		1855
Braman, D.R.	schooner		1-1-1870
Canada	propeller		1-1-1883
Carkin	tug		10-30-1887
Chase, Steven	fish tug		4-18-1933
Choctaw	whaleback	1892	7-11-1916
Cochrane, Tom	tug		Oct-1862
Congress	propeller	1861	1867 or 1893
Corsair	schooner		9-28-1872
Czar	schooner		1-1-1875
Detroit	steamer barge		4-29-1872
Fulton, Robert	steamer	1835	1844
Goliath	steamer		11-3-1851
Harwich	schooner		1-1-1858
Ironton	schooner		9-26-1894

Continued on the following page

Table 4.4 Suspected shipwrecks in the Thunder Bay region (continued).

Name of Vessel	Rig	Year Built	Date of Loss
Kaliyuga	steamer	1887	10-19-1905
Lady Washington	schooner		10-19-1828
Lathrop, S.B.	tow barge		5-14-1902
Mackinaw	steamer	1866	1-1-1890
Marine City	barge		11-18-1901
Marine City	sidewheel		8-29-1880
Meeker, Lewis	schooner		1-1-1872
Merrick, M.F.	schooner		5/6-17-1889
Mollie	scow		9-15/16-1881
Neshota	schooner	1864	1872
New Hampshire	schooner	1846	1885
Ninna	schooner	1866	May-1875
Number 83	scow	1920	10-26-1941
Oswegatchie/3 Barges	steamer /barges		11-21-1891
Portland	schooner		1-1-1867
Prindiville	tug		4-13-1881
Rounds, W.H.	schooner		4-12-1905
Rumbell	steamer		1-1-1910
Ryan	steamer		6-12-1890
Scow #105	barge		8-3-1934
Stevens, JN orJH	steamer barge		5-15-1927
Thousand Islander	steamer		12-28-1928
Tu Jax	yacht	1913	9-5-1913
Typo	schooner		10-14-1899
Wesley	schooner		9-19-1902

* Shipwreck tables 4.2 - 4.4 were assembled from two different databases. The tables provide the best available information for the Thunder Bay region (including Presque Isle Harbor to Sturgeon Point), and reflect different levels of accuracy in historical documentation (i.e., known, probable, suspected). These tables will be amended based on continued historical research of Great Lakes vessels and Thunder Bay shipwrecks.

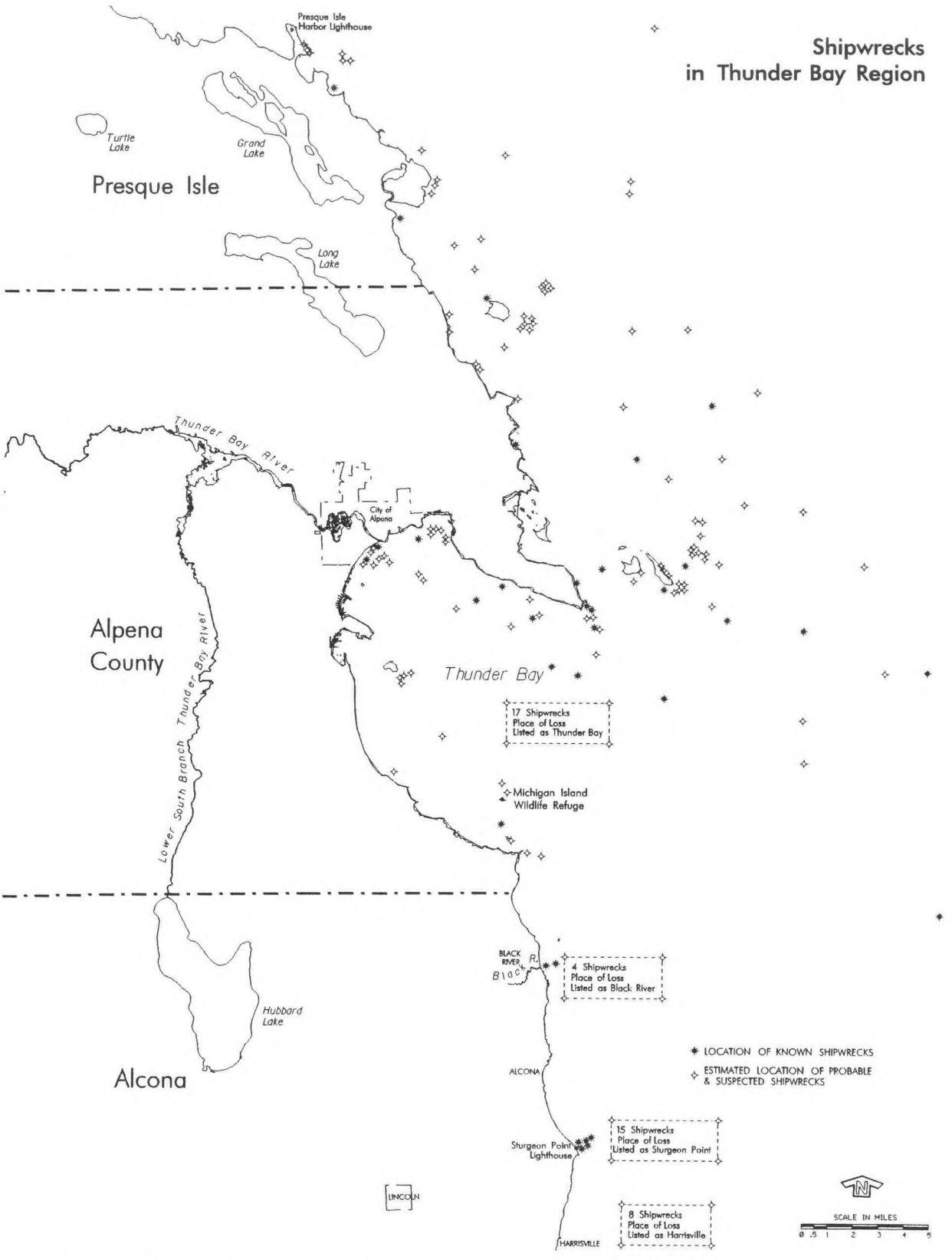
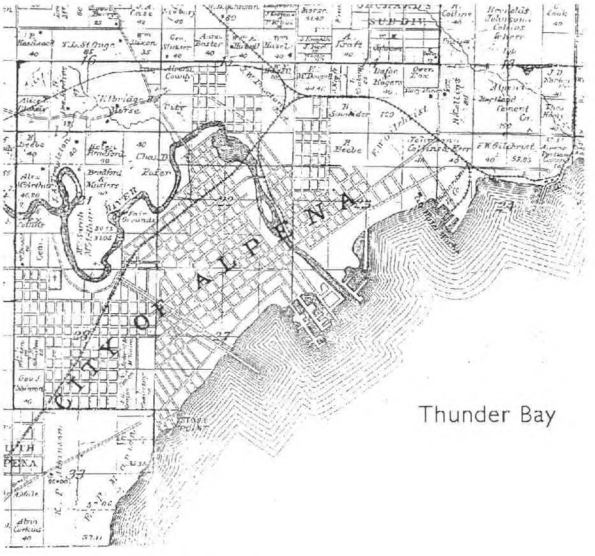


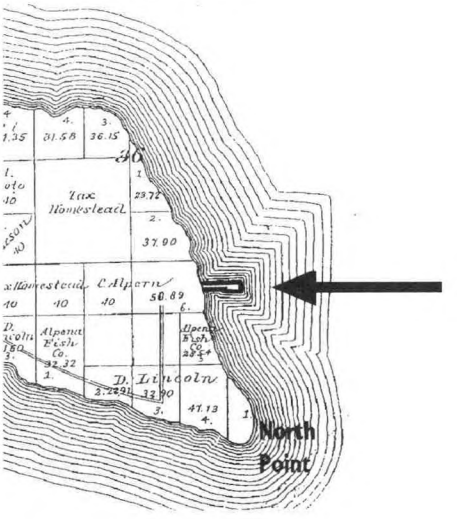
Figure 4.8 Approximate locations of shipwrecks in the Thunder Bay region

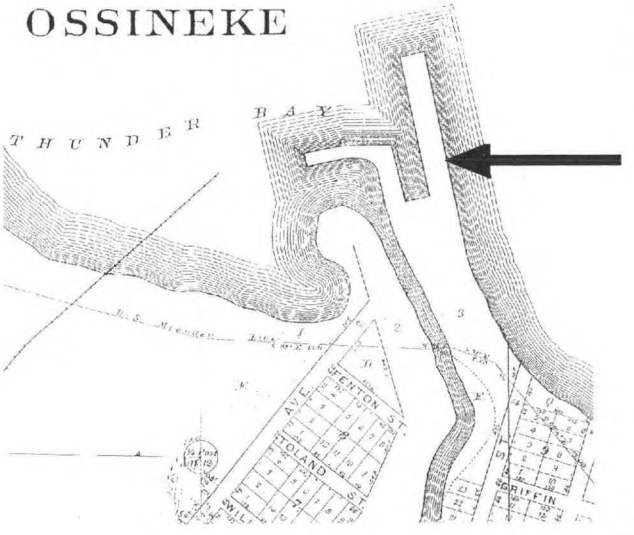
2. Land Associated Underwater Historical Sites

No surveys, inventories, or assessments of land associated underwater historic sites are known to have been completed for the Thunder Bay region (Vrana 1993). Considering the settlement of the region, however, it is probable that these types of sites exist. As an example, the 1903 plat book of Alpena County shows a number of wharfs and docks in Alpena Harbor (Figure 4.9), and a dock is shown just north of land owned by the Alpena Fish Company on North Point (Figure 4.10). A large wharf appears to have existed at Ossineke in 1880 (Figure 4.11; Sanborn-Perris Map Company 1880).

The remains of historical dock sites have been observed underwater near the light station and boathouse on Thunder Bay Island; in Alpena Harbor and Whitefish Bay; and at Ossineke, South Point, Black River, and Middle Island (McConnell, personal communication 1992). Other land associated underwater sites may remain from Native American habitation in the Thunder Bay region.







(upper left) Figure 4.9 Alpena waterfront in 1903.
(upper right) Figure 4.10 North Point in 1903.
(lower left) Figure 4.11 Ossineke/Devils River in 1880.

3. Native American and Coastal Archaeological Sites

Cultural materials associated with the coastal villages and habitation sites of Native Americans may exist in nearshore waters of Lake Huron (Vrana 1993). Materials from Native American fishing and trade activities, and sites from Archaic peoples could be located on Lake Huron bottomlands in deeper water (Halsey 1990; Fitting 1975). Predictions of Archaic period sites in deeper water are based on the existence of lower water levels in glacial lakes that pre-date the present Great Lakes (Halsey 1990; Fitting 1975).

More recent Native American habitation sites are clustered at the mouth of the Thunder Bay River and at the mouth of the Devils River near Ossineke (Peebles and Black 1976).

The discovery of Naub-Cow-Zo-Win discs in sites near the mouth of the Thunder Bay River is of particular importance to archaeologists because they "represent the only proven prehistoric occurrence of these symbols and, therefore, their oldest documented appearance" (Cleland 1985:131). These shale discs are engraved with symbolic and stylistic representations of the underwater panther, the otter, the beaver, a class of thunderbirds or thunderers (Figure 4.12), the moose, star shapes, and possibly the great medicine tree of the Ojibway (Cleland 1985). The disks may have been personal amulets and "because of their limited archaeological distribution, they were somehow associated specifically with Thunder Bay on Lake Huron" (Cleland 1985:138).

Most of the Thunder Bay region has not been surveyed to locate coastal archaeological sites (Mead, personal communication 1992). Twenty-four prehistoric and historic archaeological sites have been identified within the Alpena County coastal area (i.e., landward 2 miles from the Great Lakes shoreline). The Presque Isle County coastal area contains 15 sites and the Alcona County coastal area contains four sites (Halsey, personal communication 1995; Mead 1992).

Peebles and Black (1976) reviewed the published and unpublished literature on archaeological sites within the coastal areas of Michigan. As of 1997, no archaeological sites in the coastal zone adjacent to the proposed Sanctuary are on the National Register of Historic Places.

Figure 4.12 Naub-Cow-Zo-Win disk possibly representing a "thunderbird" or "thunderer."

E. National Historic Significance

I. Introduction

Before NOAA can designate a National Marine Sanctuary, the proposed Sanctuary must be shown to contain resources of "special national significance" because of their conservation, recreational, ecological, historical, research, educational, or aesthetic qualities. The Proposed Thunder Bay National Marine Sanctuary contains a collection of shipwrecks that are believed to be of special national significance.

The shipwrecks of the Thunder Bay region constitute a microcosm of the Great Lakes commercial shipping industry as developed over the last two hundred years. However, it has never been clear how representative these shipwrecks are of the broader context of Great Lakes history. This section is intended to provide some preliminary discussion of the historic context of Thunder Bay and its national historic significance.

The information in this section is excerpted and summarized from the *Preliminary Comparative and Theme Study of National Historic Landmark Potential for Thunder Bay, Michigan* (Martin 1996). The complete study is reproduced in Volume II, Appendix G.

The theme study consisted of historical research on specific historic shipwreck sites and their relationship to both the regional and national contexts to the extent that initial evaluations of historic significance could be made. Due to the limited scope of the project, the study emphasized archival research; it included no archaeological field work and only minimal comparative work. The results indicate which sites have the greatest potential for *national historic significance,* based on criteria of the National Historic Landmark Program.

Vessels that are known, probable, and suspected shipwrecks within the Thunder Bay region were interpreted according to important Great Lakes historical themes. These historical themes include prehistoric transportation; early trade and exploration by Europeans; early settlement and military affairs; westward expansion; business and agricultural products; lumber; coal, stone, and ore; foreign trade and the St. Lawrence Seaway; transportation technology (commercial sail); transportation technology (commercial steam); and transportation technology (motor-powered and unpowered vessels).

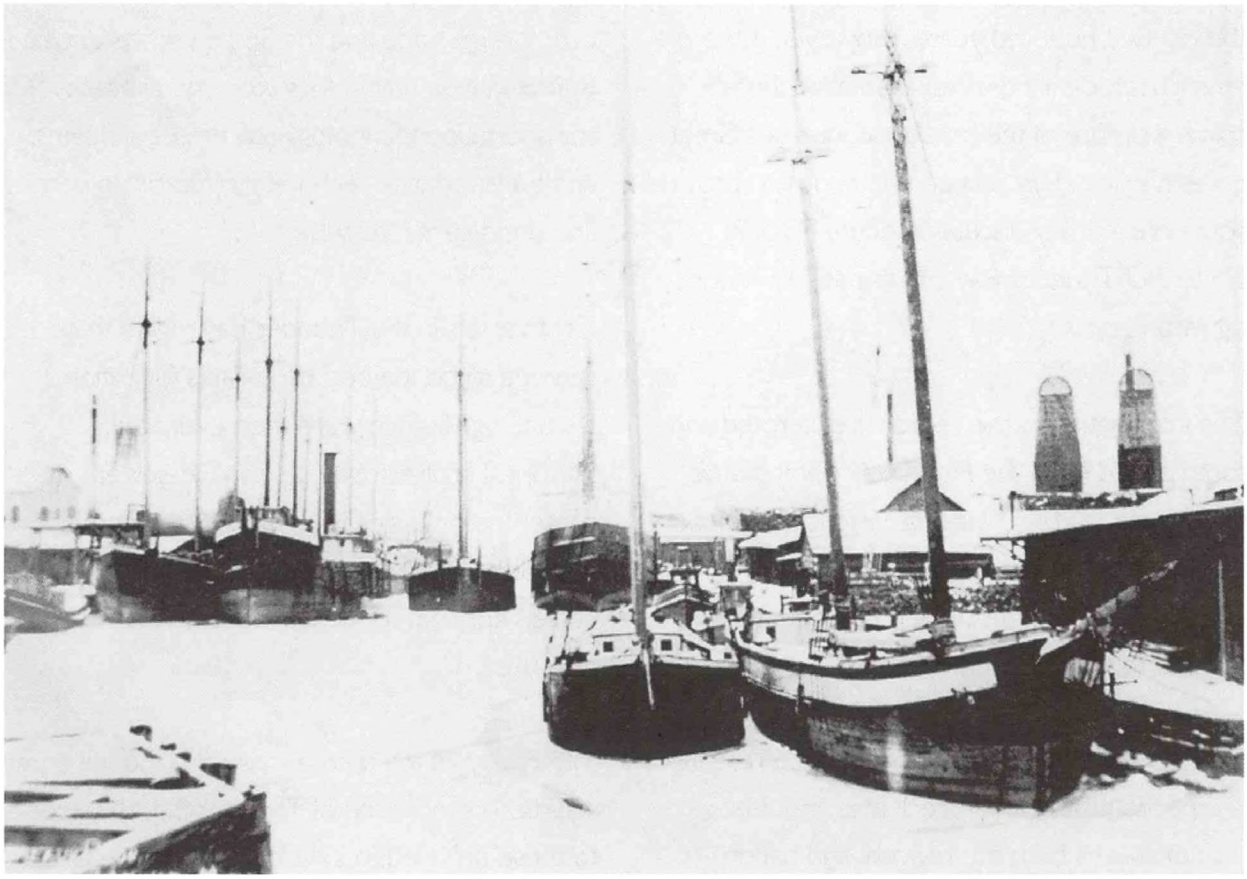
Eight vessels in the Thunder Bay region that seemed to be the best candidates for national historic significance were then evaluated. Historical profiles of these eight vessels are presented on pages 94 - 100. Due to project limitations, the historic significance of individual vessels adjacent to Alcona County was not evaluated.

The results of the theme study also include some statistical comparison of Thunder Bay shipwrecks to those believed to exist throughout the Great Lakes basin. Thunder Bay shipwrecks were

compared to an approximately 16% sample of Great Lakes shipwrecks. This comparative work is discussed on pages 101 - 106.

Specific submerged sites of other types—small craft, abandoned docks, fishing camps—were not investigated. However, the potential value of these sites has been noted within the broader context of the history of the United States, the Great Lakes, and Thunder Bay region.

The choice to pursue both research of specific vessels and limited statistical sampling was made as a means to get the most mileage out of preliminary funding. The statistical analysis provided a mechanism by which the collection of Thunder Bay shipwrecks could receive rudimentary comparison to the regional context. Research of individual vessels provided a link between the historical contexts of the Great Lakes and the nation, and the special conditions that brought vessels to their demise at Thunder Bay. The decision to deal with a dual emphasis dictated the early selection of specific vessels that seemed to be the best candidates for national historic significance. Ideally, all vessels would have been thoroughly researched before such a determination was made. The same limitations that impacted research for specific vessels made it necessary for statistical sampling of Great Lakes shipwrecks based on secondary sources with little additional research.



Jesse Besser Museum

Figure 4.13 Lake vessels in winter storage at Alpena.

2. Vessels of Potential National Historic Significance

Vessels of potential national historic significance in the Thunder Bay region are listed in Table 4.5. Profiles of these vessels are presented by historical theme in the following pages. The profiles are excerpted from Martin (1996). More detailed historical sketches of the careers of these vessels are found in Volume II, Appendix G of the DEIS/DMP.

Table 4.5 Vessels of potential national historic significance.

Name	Type	Built	Lost	Historical Theme
Havre	schooner	1836	1845	early schooner trade
H. Hubbard	schooner	1842	1845	early schooner trade
New Orleans	sidewheeler	1844	1847	westward expansion / passenger trade
John F. Warner	schooner	1855	1890	early lakes to ocean trade
Kyle Spangler	schooner	1856	1860	early lakes to ocean trade
James Mowatt	schooner	1884	1919	height of schooner development
Grecian	propeller	1891	1906	steel shipbuilding/ bulk cargo trade
Isaac M. Scott	propeller	1909	1913	steel shipbuilding and bulk cargo trade; Great Storm of 1913

A similar study of potential national historic significance for Alcona County shipwrecks could not be completed prior to publication of the DEIS/DMP. Therefore, the current list of vessels of potential national historic significance should be considered as preliminary.

Early Schooner Trade

- *Havre*

The two-masted schooner *Havre* was built in Richmond, Ohio in 1836 by Jared Lockwood. The vessel was named for the fledgling port of Havre, Michigan (just north of present-day Toledo, Ohio) — no longer in existance. *Havre* was initially enrolled at Buffalo, New York on August 31, 1836 with the following dimensions: 80' 2" x 23' 3" x 8' 4" and 134 89/95 gross tons. The original owners were Lewis D. Allen, Augustus H. Scoville, and Thadeus Brooks all of Buffalo, and Jared Lockwood and W. Reed of Richmond, Ohio. Brooks served as master, and the home port was Buffalo.

Havre was engaged in Great Lakes domestic trade during its entire career, including freight and passenger service. The original enrollment describes the vessel as having a "scroll" head, a decorative piece above the stem that was not in universal usage, even during this early period of lakes navigation. The vessel was described later as having a "figurehead."

Havre changed ownership several times before its last enrollment on May 5, 1845 at Detroit, Michigan. The last owner and master was Edgar R. Hugunin of South Port in the Wisconsin Territory. *Havre* went ashore on Middle Island, Lake Huron on November 2, 1845 after nearly ten years in the upper lakes trade. The vessel valued at $5,000 was declared a total loss.

- *H. Hubbard*

The schooner *H. Hubbard* was a two-masted vessel built at Port Huron, Michigan in 1842. The first enrollment issued on July 12, 1842 at Detroit, Michigan gave the dimensions as 52' x 16' 1" x 6' 2" and 53 46/95 gross tons. The vessel was named for part owner Henry Hubbard of Sullivants, New Hampshire. D.M. Heyedin of Port Huron was the other owner and A. Howe was the first master.

H. Hubbard was sailing between Detroit and Sault Ste. Marie when it capsized in the vicinity of Thunder Bay on or about June 8, 1845. The crew, including young ordinary seaman Peter White (later prominent Marquette businessman and investor), were picked up by a passing vessel and taken to Bay City. Later attempts to find and retrieve the vessel were unsuccessful.

Early Lakes to Ocean Trade

- *Kyle Spangler*

The two-masted schooner *Kyle Spangler* was built in 1856 at Black River (now Lorain), Ohio by William Jones (1808-1888). William Jones was a member of the famous Jones shipbuilding family who was responsible for some of the most successful Great Lakes vessels built during the wooden shipbuilding era.

Kyle Spangler was first enrolled at Cleveland on May 15, 1856 with the following dimensions: 130' 7" x 26' 1" x 11' 1" and 349.56 gross tons. The owners decided to send the vessel to the Atlantic coast with lumber in 1859. Little is known about the trip, but it appears that ownership changed while the schooner was on saltwater.

While upbound on Lake Huron on November 7, 1860, *Kyle Spangler* collided with the downbound schooner *Racine* between Middle Island and Thunder Bay, and sank. At the time, the vessel was valued at $9,000 and had an insurance rating of A1, the highest a vessel could obtain.

- *John F. Warner*

The two-masted schooner *John F. Warner* was built at Cleveland, Ohio in 1855 by Quayle and

Martin. It was one of the first of a series of vessels built by Quayle and Martin for European trade. The *John F. Warner* was enrolled at Cleveland on August 27, 1855 with the following dimensions: 126.75' x 26.5' x 11.19' and 341 55/95 gross tons.

In 1858, *John F. Warner* was issued a certificate of registry to allow the vessel to participate in foreign trade. Its first trip was to Greenwich, England with a cargo of barrel staves. The staves were sold and the vessel returned to Cleveland via Glasgow, England where a cargo of pig iron was loaded. The *John F. Warner* completed two more trips to England before returning to Great Lakes coastal trade in 1860.

John F. Warner was involved in several accidents before its loss at the mouth of the Thunder Bay River near Alpena, Michigan on October 13, 1890. The vessel was anchored off the river mouth when the anchor chain parted and the master was unable to sail into the Thunder Bay River. The vessel grounded a few hundred feet from the harbor lighthouse and swung broadside onto the sea. The crew escaped unharmed, but continuous buffeting by the waves broke the vessel in half in clear view of residents of Alpena. The lath and lumber cargo were later removed and the wreck was moved south of Alpena and abandoned a few days later.

Height of Schooner Development

- *James Mowatt*

The three-masted schooner *James Mowatt* was built at Milwaukee, Wisconsin in 1884 by Wolf and Davidson. The vessel was first enrolled at Milwaukee on August 1, 1884 with the following dimensions: 166' 4" x 33' 1" x 13' and 523.17 gross tons. *James Mowatt* turned out to be the last full-rigged, three-masted schooner built at Milwaukee. It was built with fine lines and a clean run that foretold of fair speed.

W.W. Wolf remained managing owner of the vessel until 1887. *James Mowatt* was reenrolled at Port Huron, Michigan in 1894 with J.W. Squires as managing owner and master. J.W. Squires remained managing owner until 1907 when he was replaced by Richard F. Squires. *James Mowatt* became a total loss on October 10, 1919. On that day, the vessel foundered thirteen miles northwest of Alpena, Michigan with a cargo of lumber.

Westward Expansion/Passenger Trade

- *New Orleans*

The wooden sidewheel steamer *New Orleans* was built at Detroit, Michigan in 1844 by B.F. Goodsell, reportedly on the bottom of the

burned steamer *Vermilion*. This reconstruction of badly damaged lake vessels was not unusual during this period when calamities were frequent and iron fasteners and engineering equipment were extremely expensive and difficult to obtain. The vessel was first enrolled at Buffalo, New York on September 13, 1844 with the following dimensions: 185' 4" x 26' 8" x 12' 10" and 610 gross tons.

New Orleans was first owned by Samuel F. Gelston of Buffalo, Jeremiah Northrop of Rochester, Erastus Prosser of Albany, and Stephen Card of New York City. James C. Evans and Samuel Gelston purchased the vessel in 1845.

Throughout its career, *New Orleans* was used to run from Lake Erie to ports on the west shore of Lake Michigan. This service was connected to the immigrant and package freight trade. *New Orleans* made bimonthly trips westward, taking immigrants and travelers west with their belongings and such freight as was available. On the return trip, the vessel carried travelers on their way east, condensed products of agriculture like whiskey, and such manufactured goods and other freight that the west offered. *New Orleans* had a U.S. Postal Service contract for at least part of its career.

While upbound in a heavy fog, the sidewheeler *New Orleans* grounded on a reef west of Sugar Island on June 13, 1847. The passengers and crew were removed to Thunder Bay Island by local fishermen and cared for by the lighthouse keeper. Strong winds on June 14 broke the

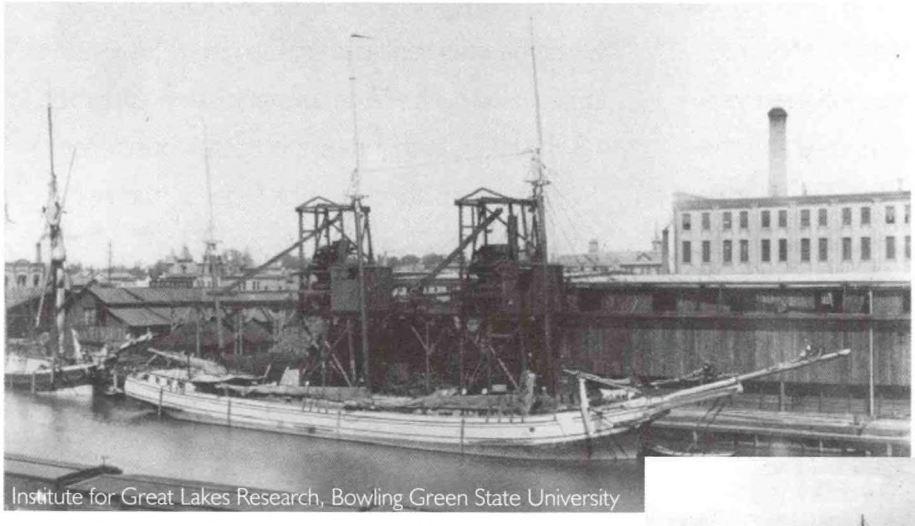


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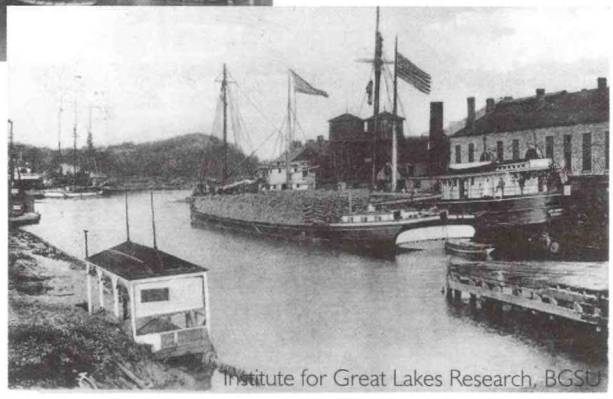
Figure 4.14 (left) Upper lakes schooner *James Mowatt* at coal dock.

Figure 4.15 (below) Schooner *James Mowatt* with a load of lumber at Michigan City, Indiana.



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vessel's back and it sank, becoming a total loss. The cross-head steam engine was removed and transported to Detroit in the *Albany*.

Steel Shipbuilding and the Bulk Cargo Trade

- *Grecian*

The propeller *Grecian* was part of the critical design revolution that took early steel bulk carriers from the initial blueprint developed around the *Spokane* of 1886 and evolved the carriers into the large pre-World War I "lakers." *Grecian* was a "turtleback" built at Cleveland, Ohio in1891 by Globe Ship Building Company. The vessel was enrolled at Cleveland on March 31, 1891 with the following dimensions: 296' 2" x 40' 4" x 21' 1" and 2,348 gross tons. *Grecian* was propelled by a triple expansion steam engine and two coal-fired scotch boilers built also by Globe Ship Building Company.

Turtleback freighters "created a very pleasing picture with their rounded forward decks, gracefully-curved hulls, refined forward quarters, and rakish stacks . . . but by 1892, the turtleback was falling into disfavor with vessel owners and masters. They were slightly more expensive to build and captains voiced strong objections, claiming that visibility ahead was reduced and that sound was different, particularly during thick weather" (Wright 1969:75).

The design of turtlebacks was influenced significantly by the "whaleback" design attributed to Alexander McDougall of Duluth, Minnesota. *Grecian* was employed in the iron ore and coal trade throughout its career. It was lost through a series of accidents in 1906. First, the vessel struck a rock five miles below Detour, Michigan but was able to make it to a dock at Detour before sinking. *Grecian* was then raised and towed down Lake Huron by the propeller *Sir Henry Bessemer* for repair at the Detroit Ship Building Company. While en route, the vessels encountered a storm and *Grecian* sank off Thunder Bay on June 15. No lives were lost, but the vessel proved a total loss. Subsequent salvage attempts were unsuccessful.

- *Isaac M. Scott*

The steel-hulled propeller *Isaac M. Scott* was built at Lorain, Ohio in1909 by the American Ship Building Company. The vessel was enrolled at Cleveland on June 29 with the following dimensions: 504' x 54' x 30' and 6,372 gross tons. *Isaac M. Scott* was powered by one triple expansion steam engine and two coal-fired scotch boilers built also by the American Ship Building Company.

Isaac M. Scott was built for the Virginia Steam Ship Company of Cleveland, Ohio and was managed throughout its career by the M.A. Hanna Company, also of Cleveland. The vessel's home port was Fairport, Ohio. The vessel name came from Isaac MacBurney Scott (1866-1942), who was President of the La Belle Iron Works, presumably a customer of the M.A. Hanna Company.

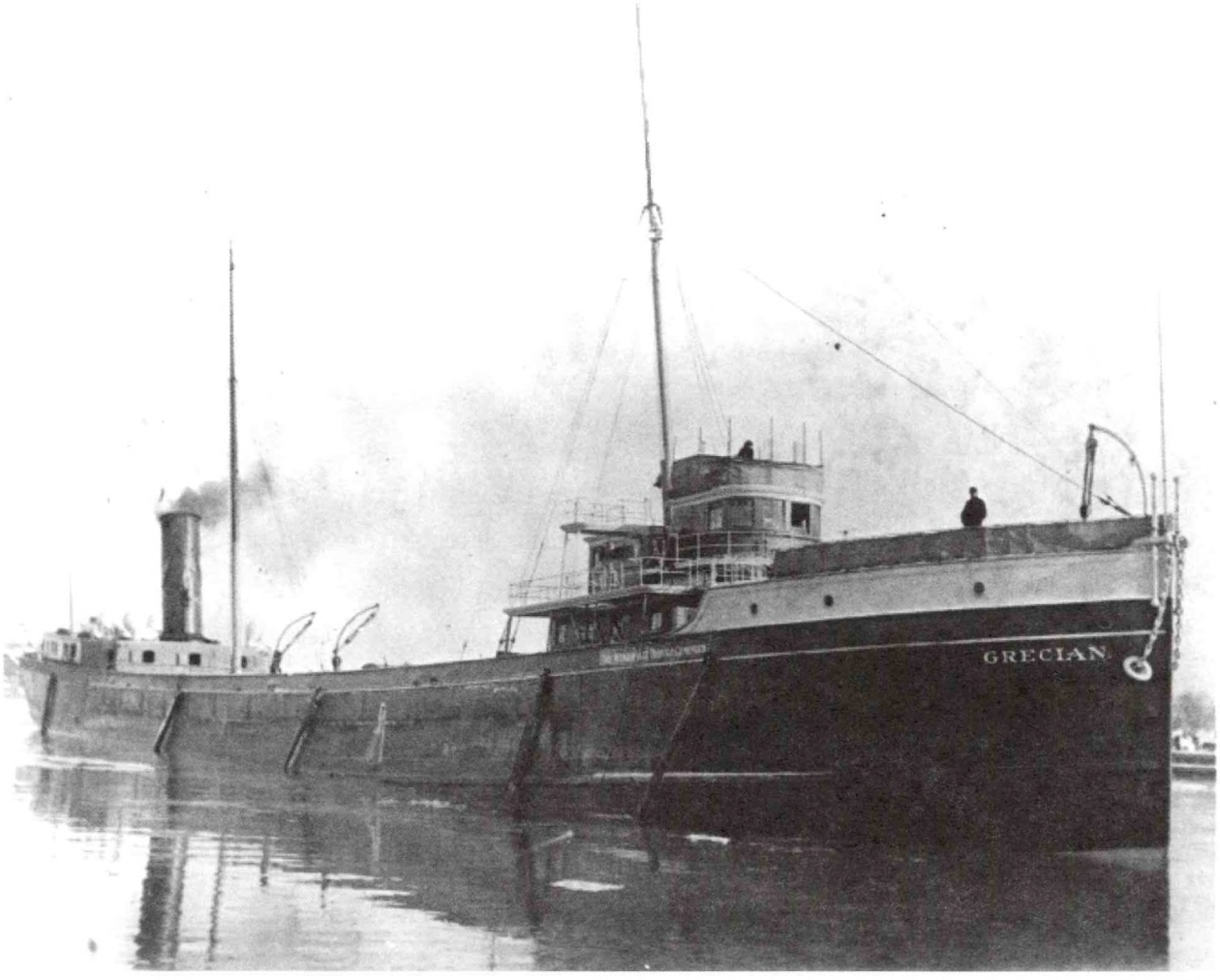

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Figure 4.16 Propeller *Grecian* underway.

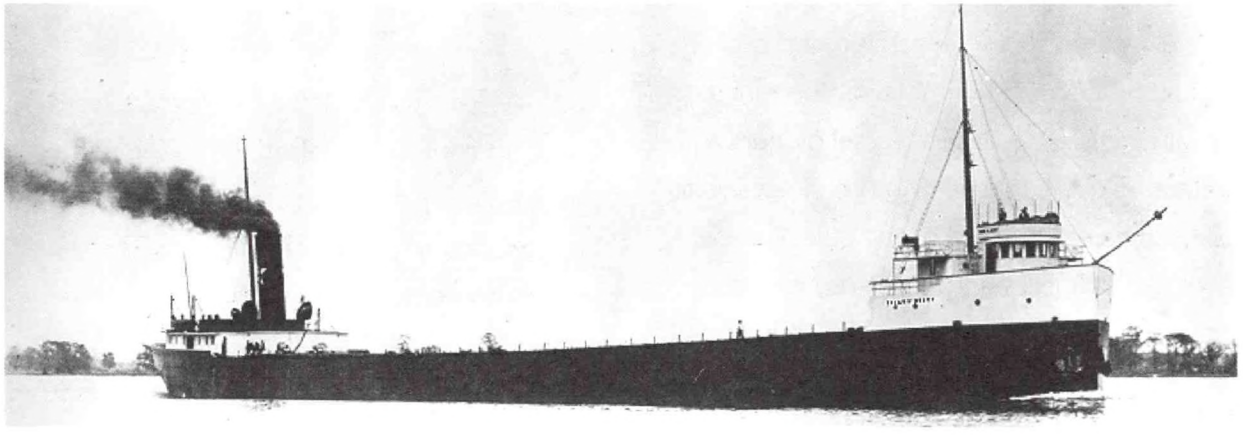

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Figure 4.17 Bulk freighter *Isaac M. Scott* foundered later in the Great Storm of 1913.

The vessel operated in the iron ore and coal trade throughout its career, making weekly trips from the lower to the upper lakes. This trade consisted of the north and westward movement of coal, and the south and eastward movement of iron ore to the steel mills of the southern lakes.

Isaac M. Scott was one of eleven vessels lost during the Great Storm of 1913, a catastrophe often described as "the most disastrous that has ever swept our Great Lakes, both from loss of life and property" (Bowen 1940:189-190). This storm took the lives of an estimated 235 mariners, 178 of which were lost on Lake Huron. The storm brought high winds, heavy snow, and bitter cold that paralyzed road and rail traffic ashore, downed power lines, and interrupted communications.

Isaac M. Scott left Cleveland on or about November 7, 1913 with coal upbound for Milwaukee. The vessel was last sighted during the morning of November 9, north of Tawas, Michigan, just a few hours before the brunt of the storm struck Lake Huron. Sometime within the next twenty-four to forty-eight hours, *Isaac M. Scott* foundered with all hands. *Isaac M. Scott* and *Charles S. Price* were lost with twenty-eight lives each, the greatest number of individuals lost in a single sinking during the Great Storm of 1913.

The loss of so much vessel tonnage during the storm caused immediate difficulties in moving enough raw bulk products to meet the needs of domestic commerce. Industry had difficulty obtaining enough coal and iron ore. Food and feed industries could not obtain enough grain to fill their needs. Prices for consumer products rose all over the country.

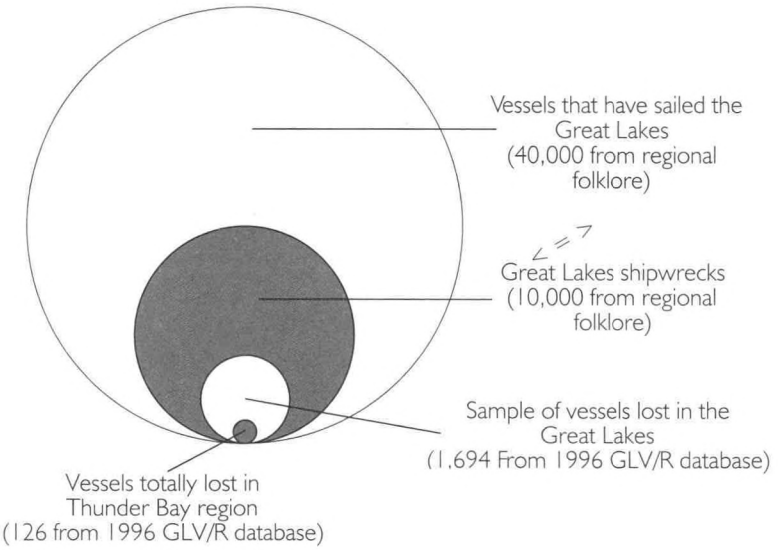
The long term consequences of the storm and the sinking of lake vessels, including *Isaac M. Scott,* were several. Complaints about the U.S. Weather Bureau led to increased efforts toward achieving better weather forecasting and more rapid communication of storm warnings. Criticism of the shipping companies and shipbuilders led to a series of conferences with insurers and mariners that resulted in construction of vessels with more longitudinal strength and greater stability.

3. Thunder Bay Shipwrecks as Representative of the Larger Great Lakes

Martin (1996) is the first study to compare a discrete number of shipwrecks to a sample of the total Great Lakes shipwrecks in order to test representativity (Figure 4.18). The statistical study does not discuss the representativity of Thunder Bay shipwrecks among the estimated 40,000 vessels to have sailed the Great Lakes. Instead, the study considers the representativity of known and probable Thunder Bay shipwrecks to the known, probable, and suspected shipwrecks of the Great Lakes. This approach was chosen because the number of vessels totally lost is a subset of the total set of Great Lakes vessels. Regional folklore holds that there are 10,000 Great Lakes shipwrecks. Though historians feel that this number is inflated, for this study it is assumed to be viable for statistical purposes.

Martin (1996) combined several existing databases to compile a database of 1,694 Great Lakes shipwrecks (roughly 17% of the total figure prominent in regional folklore). The database has several known biases: (1) it contains few vessels under 20 gross tons; (2) it includes a high percentage of vessels lost on Lake Erie; (3) it includes only vessels, no other submerged sites; and (4) it is strongest in the Post-Civil War period. The limitations of this sample are such that the results should be carefully interpreted as indicators of trends only.

The sample of Great Lakes shipwrecks is based largely upon secondary sources and, therefore, is composed primarily of probable and suspected total losses. The locations of some shipwrecks are known, having been confirmed through archaeological and historical investigation.



Vrana after Martin (1996)

Figure 4.18 Sampling design for preliminary comparative analysis of Thunder Bay region shipwrecks.

For Thunder Bay, the method was much the same. Nevertheless, prior studies and more focused research on the Thunder Bay region shipwrecks has increased the number of known and probable total losses relative to the number of suspected shipwrecks.

As Tables 4.6 and 4.9 illustrate, the comparative strengths of the identified shipwrecks at Thunder Bay include a strong collection of wooden sailing vessels from the heyday of sail (1850-1880), and a good collection of wooden and steel vessels powered by steam engines (1880-1920). Thunder Bay is the final resting place for an unusually large number of steel propellers, particularly from the critical decades when changes in vessel design were rapid and short-lived (i.e., 1880 - 1920).

Table 4.6. Comparison of basic vessel types* lost at Thunder Bay and a sample of vessels lost on the Great Lakes.

Type of Vessel	# Lost at Thunder Bay	# Lost on the Great Lakes	%Thunder Bay of Great Lakes Sample	% of Great Lakes Sample
Sail				
Ships, Brigs, Barks	5	86	0.3	5.1
Sloops	0	15	0.0	0.9
Schooners	54	675	3.2	39.8
Scows	1	80	0.0	4.7
Steam				
Sidewheelers	4	56	0.2	3.3
Propellers	40	393	2.4	23.2
Motor	2	21	0.1	1.2
Unpowered	10	119	0.6	7.0
Unknown/Unclear	10	249	0.6	14.7
Totals	126	1694	7.4%	99.9%

*Note: Type of vessels at the time of loss only.

Although Thunder Bay has a large number of wooden vessels, it has a higher percentage of steel vessels than wood vessels when compared to the number lost on the Great Lakes (i.e., 8.5% to 7.7%) (Table 4.7).

Table 4.7 Comparison of basic vessel construction material lost at Thunder Bay and a sample of vessels lost on the Great Lakes.

Type of Material	# Lost at Thunder Bay	# Lost on the Great Lakes	%Thunder Bay of Great Lakes Sample	% of Great Lakes Sample
Wood	91	1187	5.4	70.0
Iron	0	15	0.0	0.9
Composite	0	5	0.0	0.3
Steel	10	118	0.6	7.0
Unknown/Unclear	25	369	1.5	21.8
Totals	126	1694	7.5%	100.0%

In terms of cargos carried, Table 4.8 shows that Thunder Bay shipwrecks were engaged in all major trades at the time of loss. Thunder Bay is particularly strong in vessels engaged in the trades that were the backbone of Great Lakes commerce: wood products, grain iron ore, coal, and passenger/package freight. Two statistical outliers are apparent in Table 4.8. The percentage of Thunder Bay vessels engaged in carrying copper and in commercial fishing is excessively high, indicating that the sample is not representative in these catagories. Given the frequency with which copper cargos were transported past Thunder Bay and the amount of commercial fishing activity that occurred in the area, it seems likely that these statistics would be high. However, common sense would indicate that Thunder Bay shipwrecks probably would comprise less than fifty percent of both commodities. Therefore, these outliers should be ignored pending future expansion of the Great Lakes database.

Interpretation of Table 4.8 is limited also from a small sample size. Unlike the other tables which were based on a sample size of 1,694 shipwrecks, less than 400 of the original sample had information readily available on last cargo. Both primary and secondary sources often provided conflicting data for last cargo, forcing the elimination of doubtful information and shrinking the sample size to less than 350. In addition, some vessels in the sample were abandoned and, therefore, probably had no cargo aboard, further decreasing the numbers to a final sample size of 289.

Table 4.8 Comparison of primary vessel cargos lost at Thunder Bay and a sample of vessels lost on the Great Lakes.

Type of Cargo	# Lost at Thunder Bay	# Lost on the Great Lakes	%Thunder Bay of Great Lakes Sample	% of Great Lakes Sample
Copper	1	2	0.3	0.7
Furs	0	2	0.0	0.7
Grain	7	48	2.4	16.6
Wood Products	9	50	3.1	17.3
Iron Ore/Pig Iron/Taconite	3	24	1.0	8.3
Coal	15	54	5.2	18.7
Petroleum	0	4	0.0	1.4
Stone/Sand/Gravel	2	36	0.7	12.5
Fish	5	6	1.7	2.1
Mixed Cargo/Military	0	29	0.0	10.0
Sulphur	0	2	0.0	0.7
Passenger/Package Freight	3	13	1.0	4.5
Lead/Zinc	0	1	0.0	0.3
Salt	1	9	0.3	3.1
Railroad Cars/Locomotives	0	8	0.0	2.8
Miscellaneous	0	1	0.0	0.3
Total	46	289	15.7%	100.0%

More work needs to be done with regard to sample size to increase reliability and validity of the data.

The number of vessels lost in the Thunder Bay region are listed chronologically and compared with sample Great Lakes losses in Table 4.9. There were few recorded losses of vessels in the vicinity of Thunder Bay during the late 18th and early 19th centuries. Only in the 1830s and 1840s, when the tide of westward movement was approaching full force, did the Thunder Bay region begin to accumulate shipwrecks. As the number of vessels in service above Port Huron increased sharply, so did the number of shipwrecks. The Thunder Bay statistics appear to be reflective of the larger trends in terms, specifically in terms of number of vessels lost each year. As the number of commercial vessels operating on the Great Lakes decreased and safety require-

Table 4.9 Total number of vessels lost at Thunder Bay compared with sample Great Lakes loss statistics by decade, 1760-1979.

Decade	# Lost at Thunder Bay	# Lost on the Great Lakes	%Thunder Bay of Great Lakes Sample	% of Great Lakes Sample
1760-69	0	6	0.0	0.4
1770-79	0	4	0.0	0.2
1780-89	0	3	0.0	0.2
1790-99	0	4	0.0	0.2
1800-09	0	7	0.0	0.4
1810-19	0	17	0.0	1.0
1820-29	0	30	0.0	1.8
1830-39	1	55	0.0	3.2
1840-49	6	124	0.4	7.3
1850-59	5	207	0.3	12.2
1860-69	11	141	0.6	8.3
1870-79	16	179	0.9	10.6
1880-89	13	174	0.8	10.3
1890-99	17	178	1.0	10.5
1900-09	22	189	1.3	11.2
1910-19	16	103	0.9	6.1
1920-29	6	120	0.4	7.1
1930-39	8	63	0.5	3.7
1940-49	2	28	0.1	1.7
1950-59	2	19	0.1	1.1
1960-69	1	33	0.0	1.9
1970-79	0	10	0.0	0.6
Totals	126	1694	7.3%	100.0%

ments became more stringent, the number of shipwrecks decreased. By the 1970s, there were very few shipwrecks on the lakes.

The comparative weaknesses of the shipwreck collection at Thunder Bay include few prototypical vessels (such as the first whaleback or the

earliest sidewheeler), few vessels with a long and direct association with nationally important Americans, and few known vessels from the earliest days of lakes navigation. However, Thunder Bay appears to be highly representative of the larger Great Lakes context from the 1840s through the 1970s, as the number and types of vessels and cargoes lost there reflect the major trends in Great Lakes shipping.

Conclusion

In its role as an impediment, a shelter, and a destination for navigators, the Thunder Bay region has accumulated an impressive array of shipwrecks. Virtually all types of vessels employed on the open lakes regularly passed along this important trade route, and most vessel types are represented in its shipwreck collection. These vessels were engaged at the time of their loss, or sometime during their careers, in nearly every kind of trade. The vessels, therefore, tie Thunder Bay inextricably to Great Lakes' commerce to an extent that may be difficult to equal elsewhere. Most of these trades had a national—and some had an international—significance and spawned uniquely designed vessels. Thunder Bay, therefore, impacted the design and construction of traditional Great Lakes craft.

The preliminary research and analysis completed as part of Martin (1996) led to six major conclusions regarding the shipwrecks of Thunder Bay: (1) they are representative of the composition of the Great Lakes merchant marine for the period 1840-1970; (2) they may be used to study and interpret the various phases of American westward expansion via the Great Lakes; (3) they may be used to study and interpret the growth of the American extraction and use of natural resources; (4) they may be used to discuss various phases of American industrialization; (5) one vessel (*Isaac M. Scott*) provides the vehicle to study and interpret a specific event (the Great Storm of 1913) that had strong repercussions regionally, nationally, and internationally; and (6) they provide important material for the interpretation of American foreign intercontinental trade in the Great Lakes context. All of these areas of study will help to create a better understanding and reinterpretation of events that shaped the broad patterns of American history and culture.

F. Maritime Cultural Landscape

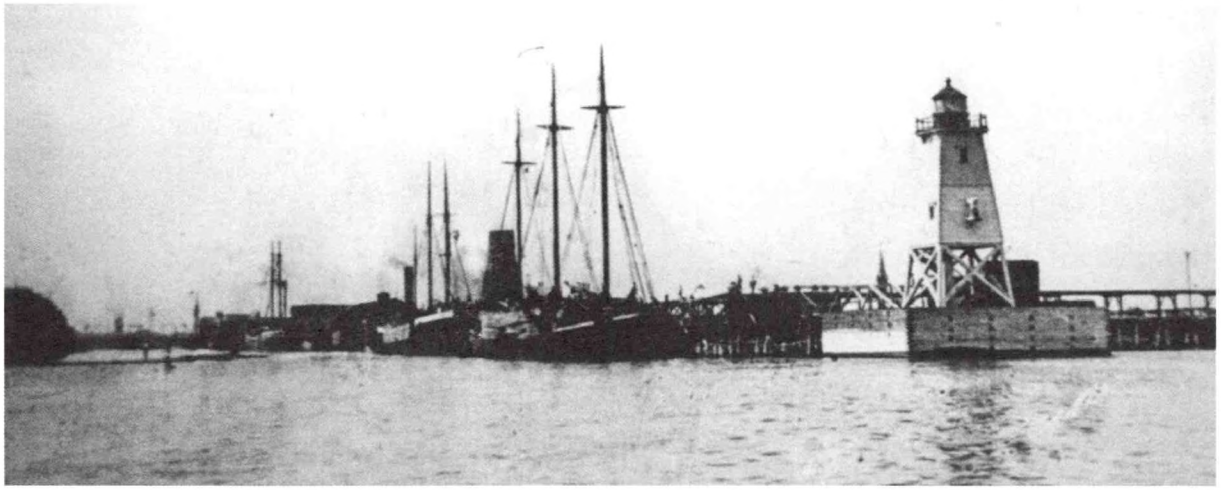
I. Alpena County Maritime History

If the Proposed Thunder Bay National Marine Sanctuary is designated, it would focus on understanding the maritime cultural landscape. A cultural landscape is a geographic area including both cultural and natural resources, coastal environments, human communities, and related scenery that is associated with historic events, activities or persons, or exhibits other cultural or aesthetic values (NPS 1992). In other words, while the shipwrecks of the Thunder Bay region are the most evident underwater cultural resource, the Thunder Bay National Marine Sanctuary would put the shipwrecks in the larger context of the region's lighthouses, life-saving stations, shipwreck salvage operations, and other maritime economic activities.

The maritime history of the Thunder Bay region is characterized by the use of, and dependence upon, natural resources. These resources include animal furs, fisheries, forests, farmland, and limestone. The first recorded use of natural resources for transportation, food supplies, and recreation in Thunder Bay was by Native Americans during the Woodland period. European activity probably originated with the efforts of Native Americans and French traders to locate and trap beaver during the 1600s (Tanner 1987).

Trading and supply boats routinely passed Thunder Bay on their way to outposts at Mackinaw, Sault Ste. Marie, and Green Bay. The *Griffon* in 1679 was the first major European vessel to pass by Thunder Bay, but many more vessels were to follow. The need to transport supplies to northern frontier posts stimulated construction of small brigs, sloops, and schooners. Thunder Bay accumulated a large collection of shipwrecks because of its strategic location along shipping lanes, and because the Bay and nearby islands provided shelter for vessels during inclement weather (Wade 1947; State Historical Soc. of Wis. 1872; Carver 1778).

The following pages summarize maritime history in Alpena County and the Thunder Bay region.



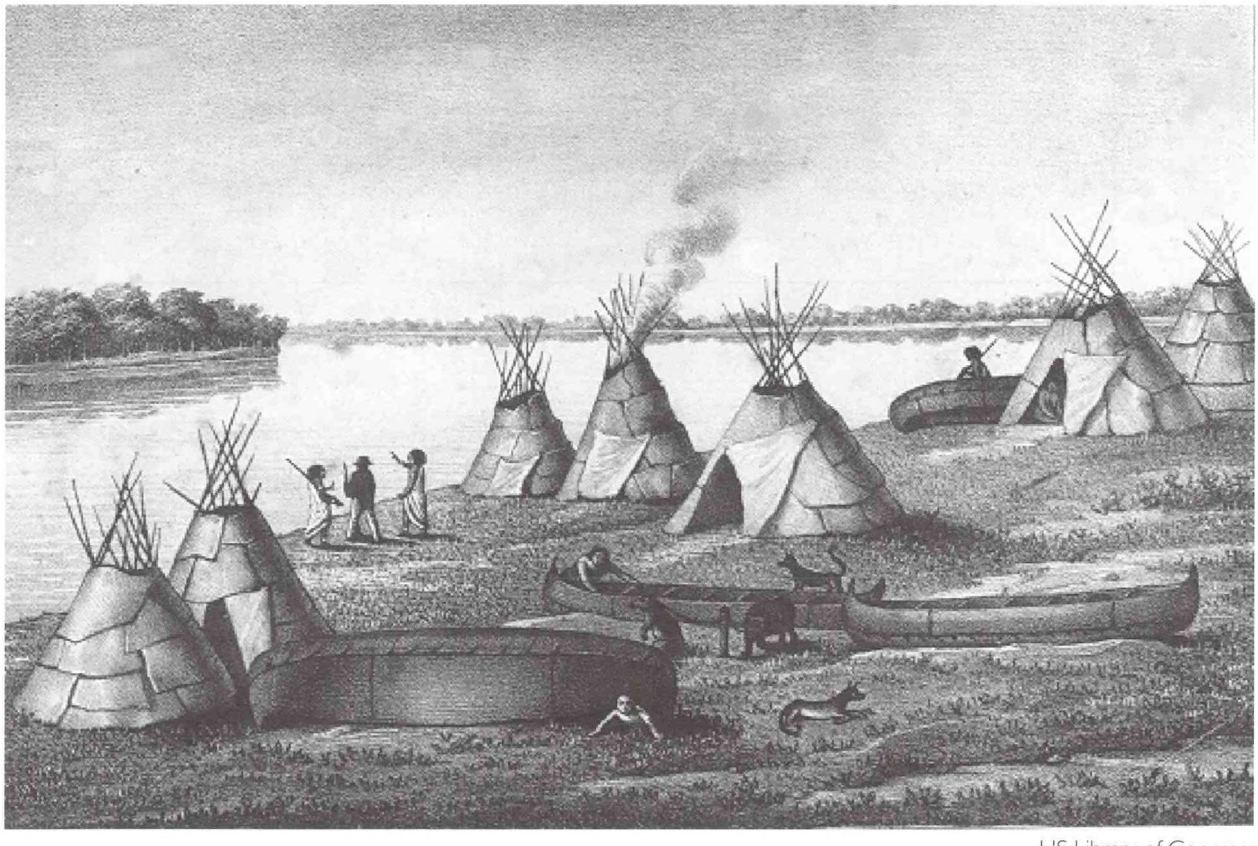
Jesse Besser Museum

Figure 4.19 Alpena Harbor around the turn of the 20th century.

There is a lack of knowledge about the earliest inhabitants of the Thunder Bay region. Archaeological evidence indicates that human occupation of southern Michigan began as early as 12,000 years ago, but northern Michigan probably was not occupied by these nomadic hunters until several thousand years later. Stone and copper tools, which may date to about 1,500 BC (Late Archaic), are the oldest artifacts discovered in Alpena County (Michigan History Division 1978:7).

Archaic peoples appeared to survive in a subsistence economy based primarily on hunting and gathering, although they began to utilize fish sometime around 3,000 BC (Cleland 1982). Fishing-related artifacts of Archaic peoples found in upper Great Lakes sites include bone or copper fishhooks, gorges and spears, notched pebble net-sinkers, and fishbones (especially sturgeon) (Cleland 1982; Quimby 1960).

Great Lakes fish were of particular importance in the diet of Ottawa and Ojibway peoples inhabiting the northeast lower peninsula of Michigan during the Woodland and historic cultural stages. Because of the importance of fish and fishing in determining subsistence and settlement patterns, Cleland (1992, 1982) refers to this way of life as the *inland shore fishery* of the northern Great Lakes.



US Library of Congress

Figure 4.20 Ottawa village at the Straits of Mackinac.

The place name of Thunder Bay has its roots in a popular legend about a Huron suitor of the daughter of an Ottawa Chief (Haltiner 1984):

One night as their canoe rocked lightly on the waters, one of the young Ottawa braves, who was a rejected suitor, was watching them with fiercely jealous eyes. He set out in his canoe and stealthly approached the unsuspecting lovers. As he drew near them he quickly bent his bow and sent an arrow whistling through the air at the heart of his hated rival. The slight noise he made, however attracted the attention of We-no-ka who leaped to her feet in alarm and threw herself in front of her Huron lover-- just in time to receive in her own breast the feathered shaft of death. This sudden movement overturned the frail birchen craft and in an instant the Huron brave was trying desperately to save his lover from drowning -- not realizing the dreadful calamity that had already overtaken his beloved We-no-ka. It was in vain. They both soon sank beneath the waves. And then a rumble and roar of thunder announced the great displeasure of the Manitou (or great spirit). The assassin, in a frightened frenzy leaped into the lake-- his death shriek floating over the waves like the cry of a lost spirit. Then followed peal after peal of thunder -- flash after flash of lightning! And the tribes knew the Great Spirit was mightily offended. Nevermore would they trust themselves on the waters of what, from then on, was known as the Bay of Thunder - or Thunder Bay.

Figure 4.21 Naub-Cow-Zo-Win disk representing a "thunderbird" and Thunder Bay's name.

The methods for catching fish included netting, spearing, hook and line, and the construction of a weir. Nets were frequently constructed of nettle stalk fiber or basswood twine and were used as seines or gillnets. The seines were either hand held or pulled by a boat... The gillnet, on the other hand, had a much larger mesh size and was usually set in one place in a lake or river... Built of logs, saplings, and lengths of cord, a weir is an enclosure which prevents fish from swimming upstream and funnels them into a very narrow opening where fishermen harvested the fish by net or spear (Cornell 1986:81).

Gill nets were used also by the Ojibway to capture whitefish and lake trout on offshore shoals during fall and early winter spawning (Tanner 1987). Densmore (1979) details Ojibway fishing techniques and the processing of fish during the early 1900s in a reprint of a 1929 publication by the Smithsonian Institution.

Ojibway villages in the Thunder Bay region during the 1800s included Mujekewis, Shoshekonawbegoking, and Sagonakato on the north shore of the Bay, and Shingabawassin on the south shore. Native Americans became an integral part of the regional economy in northern Michigan during the late 1800s (Tanner 1987; Clifton et al. 1986). They worked at mining and lumber camps, on survey crews, as stevedores on vessels plying the Great Lakes, and carried mail. Fishing remained an important occupation, and some hunting and trapping also continued in this region (Tanner 1987:180). Other Native Americans produced traditional craft items for sale, or found seasonal and factory work in Michigan cities and towns (Cleland 1992; Cornell 1986).

Traditional ways of life and the annual cycle of activities of the inland shore fishery have been altered by modern culture, development, and technology (Clifton et al. 1986). Nonetheless, Ottawa and Ojibway treaty rights to fish for subsistence and commercial purposes on the Great Lakes were reaffirmed by Federal Court decisions in 1979 and 1981 (Cleland 1992; Cornell 1986). Much of northwestern Lake Huron was declared a tribal fishing area based on Federal Court interpretation of the Treaty at Washington (1836).

Currently, the Michigan Department of Natural Resources (DNR), the United States Department of Interior (DOI), and the Chippewa-Ottawa Treaty Fishery Management Authority (COTFMA) share responsibilities for managing commercial fisheries in the Great Lakes under an Agreement for Entry of Consent Order (U.S. District Court 1985). The Agreement was facilitated by the U.S. District Court and remains in effect until the year 2000.

There is little physical evidence of the prehistoric and historic Native American ways of life in the Thunder Bay region. "The villages and camps of the early inhabitants are marked only by a scattering of ceramic fragments, chert flakes, and broken or abandoned stone and copper tools. Most of the burial mounds have been destroyed" (Michigan History Division 1978:7). Nevertheless, the heritage of Alpena County's Ojibway and Ottawa residents provides an important foundation for, and influence on, later historical events of the Thunder Bay region.

European Settlement and the Founding of Alpena

The Thunder Bay region was purchased from Native Americans by the federal government in the Treaty of Saginaw (1819). Although some land was used as a reservation area, European settlement soon pushed Native American villages inland to Mikado and Hubbard Lake (Tanner 1987; May 1980). By the 1850s, the Alpena area became a center for fur trading, fishing, and lumbering.

The area of present-day Alpena County was first surveyed in 1840 and became a county in 1857. The survey of the town of Fremont began in 1856. In 1859, the state legislature changed the name of Fremont to "Alpena," a Native American word meaning "good partridge country" (Boulton 1884). The population of the City of Alpena grew steadily from 290 in 1860 to 674 in 1864 and to 2,756 in 1870. In 1873, Alpena County had 4,807 citizens; 3,964 of these citizens lived in the City of Alpena. Most of the early settlers in the Alpena area were from New York and New England, but the lumber camps later attracted Swedes, Norwegians, and French-Canadians to the area (May 1980; Holzhueler 1974; Boulton 1884).

Lighthouses and Life-Saving Stations

The original Presque Isle Lighthouse was built in 1840 and is located in Presque Isle Harbor (Figure 4.60). A more recent Presque Isle Lighthouse was constructed in 1870 to replace the old station. This more recent structure is a conical brick tower standing 109 feet high. A lightkeeper's house of Dutch Colonial construction is attached to the lighthouse.

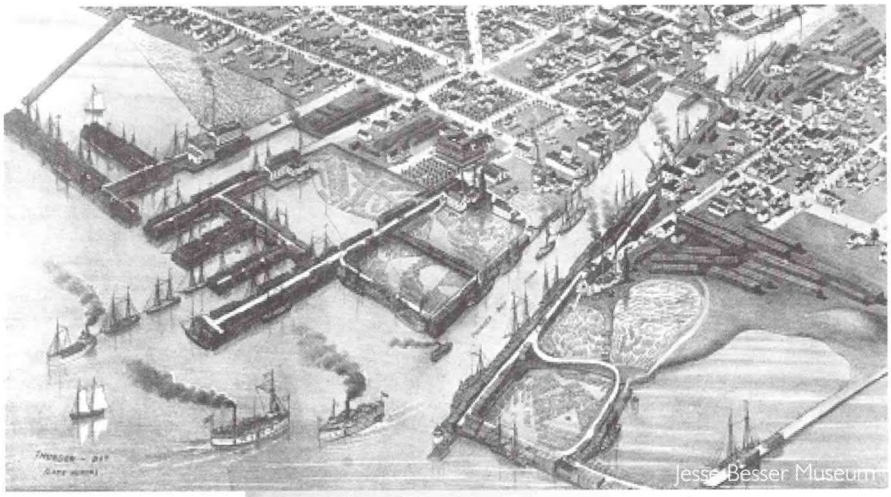


Figure 4.22 (left) "Birds-eye" view of the City of Alpena in 1880, including lumber docks to the left of the Thunder Bay River mouth and log booms to the right of the river mouth.

Figure 4.23 (below) View of Alpena residences and businesses along the Thunder Bay River in 1886.

The 1870 lighthouse is situated in a public park maintained by Presque Isle Township (Clifford 1994). The light at the newer Presque Isle Lighthouse is still operational (Figure 5.4).

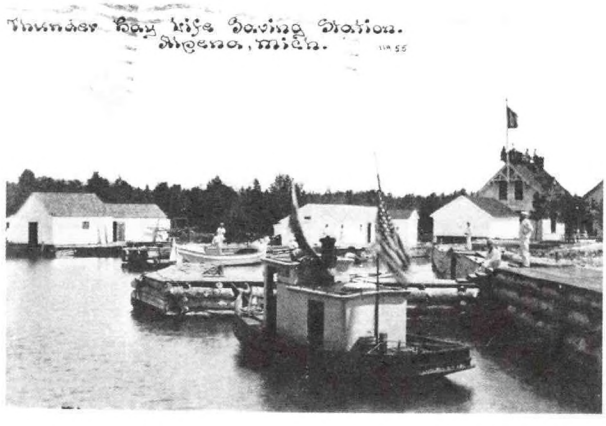
The Middle Island Lighthouse was built in 1905. The 71 foot tower is made of brick and painted white with an orange band in the middle (Clifford 1994). The light continues to be operational.

A lighthouse 40 feet in height was in use on Thunder Bay Island by 1837. The tower was heightened by ten feet in 1857 and is still in operation (Hyde 1986; Boulton 1884).

In 1875, a temporary light was placed on pilings at the mouth of the Thunder Bay River. In 1877, a wooden lighthouse was erected on a crib at the north-end pier. This light was reconstructed in 1888 and replaced by a steel structure in 1914 (Hyde 1986; U.S. Lighthouse Board 1903,

Michigan Maritime Museum

Figure 4.24 Thunder Bay Island Lighthouse complex.



Michigan Maritime Museum

Figure 4.25 Thunder Bay Island Life-Saving Station.

Michigan Maritime Museum

Figure 4.26 Life-boat drills of the Thunder Bay Island life-saving crew.

1877, 1875). U.S. Weather Station #85 was opened at Alpena in 1872 to record atmospheric conditions, provide accurate weather reporting, and convey cautionary signals for use by mariners (NOAA 1872).

Despite the development of these navigational aids, the frequency of shipwrecks in the vicinity of Thunder Bay led to the establishment of U.S. Life-Saving Service Stations at Thunder Bay Island in 1876 and Middle Island by the 1880s. These facilities were manned by crews that trained extensively in the use of rescue boats and other life-saving equipment. They were among the busiest stations on Lake Huron, assisting hundreds of vessels every year and saving thousands of lives. Starting in 1915, the U.S. Life-Saving, Lighthouse, and Revenue Cutter Services were consolidated to form the U.S. Coast Guard (O'Brien 1976). A small U.S. Coast Guard station continues to operate in Alpena .

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Figure 4.27 Beach apparatus manned by the Thunder Bay Island life-saving crew.

Furs

By the early 19th century, the trapping of beaver by Native Americans and Europeans had reached virtually every corner of what is now the State of Michigan. Furs usually were trapped by Native Americans and exchanged for manufactured goods at a trading post like Mackinaw. American traders sent the furs down Lake Huron in canoes and later in sailing vessels to warehouses in Detroit. The furs were then shipped to Europe via Montreal or New York (May 1980). The American Fur Company and the Northwest Fur Company had profitable businesses in furs during the early 19th century, but by the 1830s the supply of animal pelts was reduced drastically by over-trapping. The two companies then diversified their trade by branching into commercial fishing (American Historical Association 1945:375).

Fisheries

W.F. Cullings, who is believed to be the first white resident of the Thunder Bay region, began a fishing camp on Thunder Bay Island in 1835. Some evidence suggests that Cullings was an employee of the American Fur Company and had established himself on the island on the company's account rather than his own, but this is unclear (Holzhueter 1974; Boulton 1884). Later, a few buildings were constructed on the present site of the City of Alpena by hunters from Mackinaw; Walter Scott erected a fishhouse and trading post near these buildings.

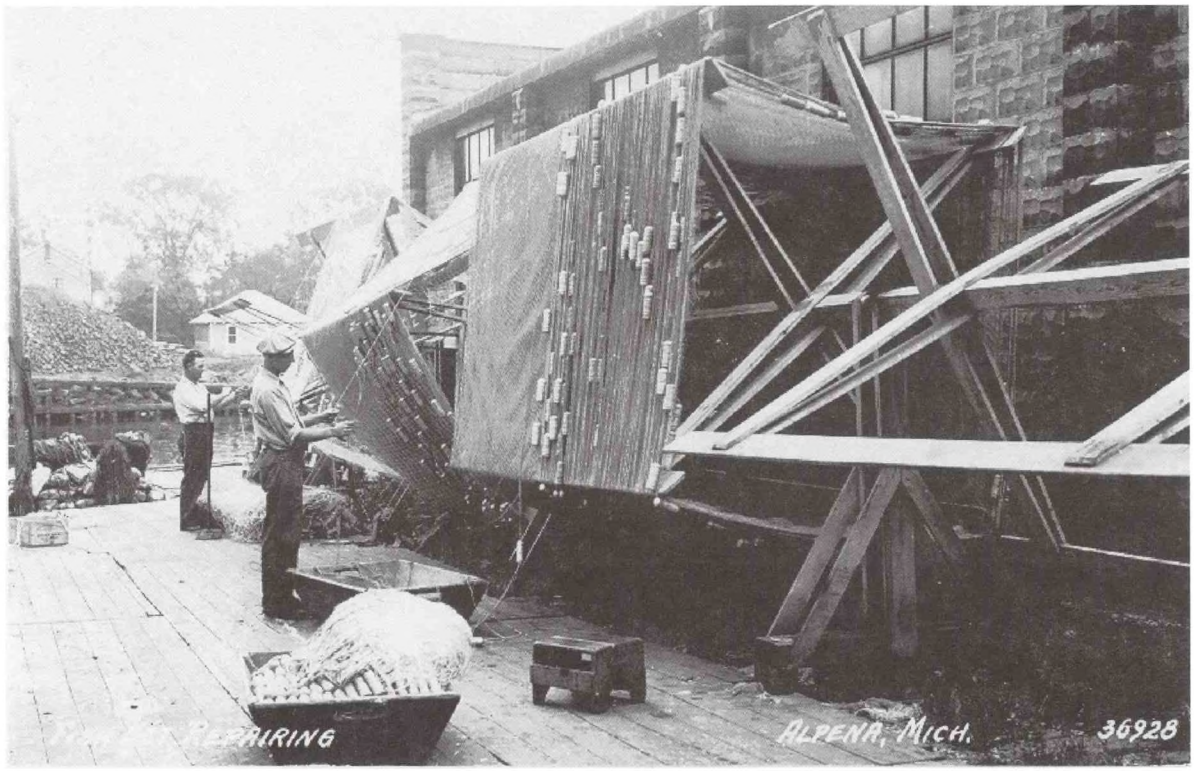
Figure 4.28 Great Lakes commercial fishing operation using mackinac boats, probably mid to late 1800's. This may resemble early operations on Thunder Bay Island and Sugar Island.

By the 1840s, both Thunder Bay Island and Sugar Island were used extensively for fishing operations (Boulton 1884). In 1846, Presque Isle and Thunder Bay fishing operations exported a total of 12,000 barrels of fish, equaling over 15% of the American and Canadian commercial fisheries of Lakes Huron, Michigan, and Superior (Port Huron Observer, July 31, 1847).

Lumbering, settlement, and port development all impacted the nearshore fisheries. River drives during the lumbering era damaged the river bottom; waste cuttings and sawdust covered the bottom and caused deoxygenation through decay processes. The draining of swamps, filling of shoreline areas, and dredging of navigation channels further diminished the nearshore aquatic habitat (Michigan DNR 1987; Smith 1972). By 1886, fish stocks in the area may have decreased by two-thirds, as witnessed by Williams, Plough, and Campbell, all of whom operated fisheries between Whitefish Point and North Point (Goode 1887; Boulton 1884:193).

The depletion of fish stocks led to the creation of a federal program for fish planting. In 1882, a United States fish hatchery was established in a building located on Water Street, east of First Street in Alpena. The hatchery was moved in 1928 to Park Place near the City Hall, and was closed in 1933 when its duties were transferred to other facilities (Haltiner 1986).

The extent of the Canadian and American Lake Huron commercial fisheries during 1879-1969 was estimated by Baldwin et al. (1979) (Table



Michigan Maritime Museum

Figure 4.29 Commercial fishing operations in Alpena during the 1940s.

4.10). Although early documentation of fish catches were poor, Lake Huron provided up to 18.7% of Great Lakes production until the 1940s, when exotic species and overfishing contributed to a decline in Lake Huron fisheries production (Table 4.10).

Table 4.10 Lake Huron and Great Lakes commercial fisheries production (in tons) (U.S. and Canadian) 1879-1969.

Year	Lake Huron	Great Lakes	% of Great Lakes Fisheries Production
1879	11,402	79,057	14.4%
1889	27,149	146,430	18.5%
1899	24,597	146,617	16.8%
1909	--	--	
1919	21,861	117,116	18.7%
1929	16,319	98,712	16.5%
1939	19,777	111,188	17.8%
1949	8,953	111,912	8.0%
1959	7,641	104,528	7.3%
1969	5,226	123,468	4.2%

Source: Baldwin et al. (1979:186-187)

Based on information collected between 1919 and 1926, Thunder Bay was second only to Saginaw Bay in American fish production on Lake Huron. Gillnets were used first on Lake Huron at Alpena around 1835, and chubs were first harvested there in 1902 (Koelz 1926). Captain A. E. Persons asserted that he introduced the steam tug to the Great Lakes fisheries in 1875 at Alpena and revolutionized the entire industry (McCullough 1989). Fish harvested by firms with camps on the north shore of Thunder Bay, Crooked Island, Sugar Island, and Ossineke were shipped to Detroit, Buffalo, or New York City (Cross 1992; Haltiner 1986).

Commercial ice houses in Alpena shipped ice to Detroit, Toledo, and Cleveland (Alpena Argus , January 11,1893:3). This industry was closely tied to commercial fishing because local firms such as the Alpena Fish Company used ice from the Thunder Bay River to preserve fish (Alpena Argus, January 25, 1893:3).

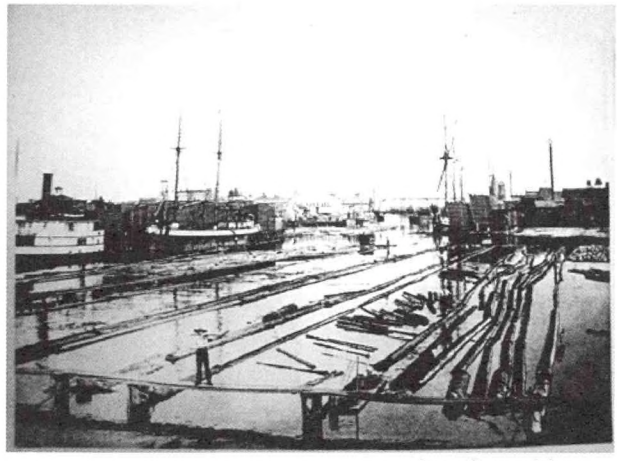
Today, the primary groups using the Lake Huron fisheries are recreational anglers, Native American commercial fishers, and state licensed commercial fishers. The popularity of recreational fishing increased after the collapse of commercial fish stocks by the late 1940s. Opportunities for recreational fishing expanded in the late 1960s with the introduction of salmon in the Great Lakes. The decline in the economic impact of commercial fishing is illustrated by the decline in numbers of people employed in commercial fishing on the Great Lakes from a total of 6,901 in 1930 to 1,180 in 1975. By comparison, about 2.8 million recreational anglers were active on the Great Lakes in 1975 (U.S. Comptroller General 1977).

Alcona Historical Society

Figure 4.30 Ice-making operations on the Thunder Bay River in Alpena.

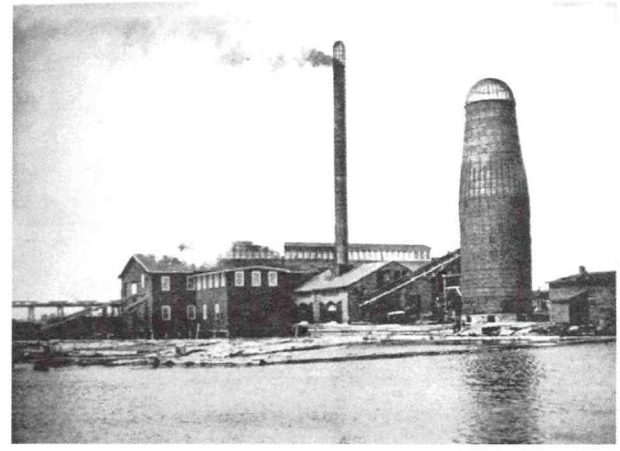
Lumbering

The first sawmill at present-day Alpena was erected by Jonathan Birch in 1836 on the Thunder Bay River, but hostilities with Native Americans forced him to move to Sulphur Island for a time, before transferring his operation to Devils River. The first sustained lumbering operation in the Thunder Bay River area began in 1859, when Lockwood & Minor shipped a load of lumber from Alpena. Soon, other lumber mills entered operation, and production increased rapidly as the U.S. Civil War and growth in eastern and western cities created an enormous demand for lumber. By the late 19th century, there were at least a dozen large establishments producing lumber for export (Boulton 1884; Sandborn 1884).



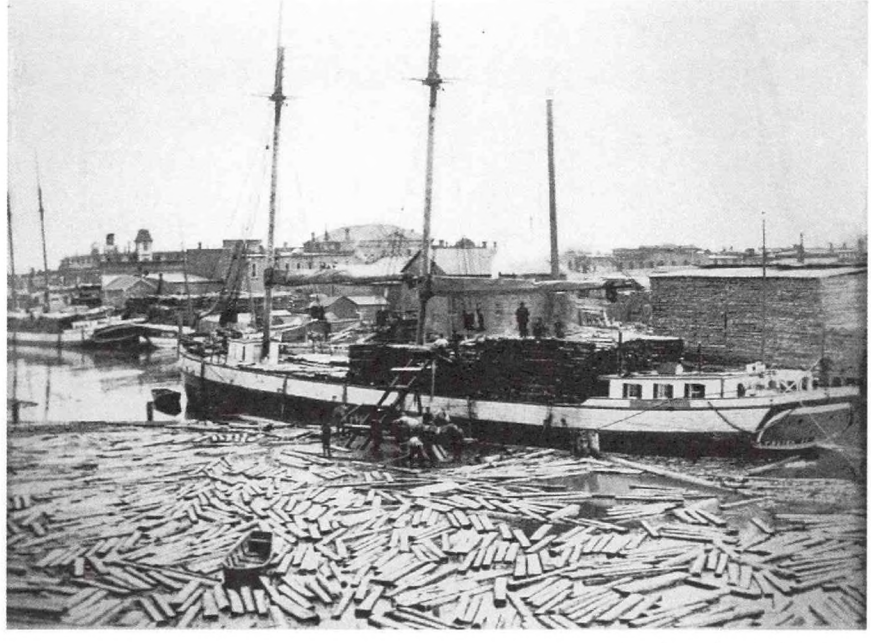
Jesse Besser Museum

Figure 4.31 Log sorting ponds at the mouth of the Thunder Bay River in 1894.



Jesse Besser Museum

Figure 4.32 Churchill lumber mill in Alpena at the turn of the 19th century.



Jesse Besser Museum

Figure 4.33 Loading cedar in Alpena with a horse-power elevator in 1889.

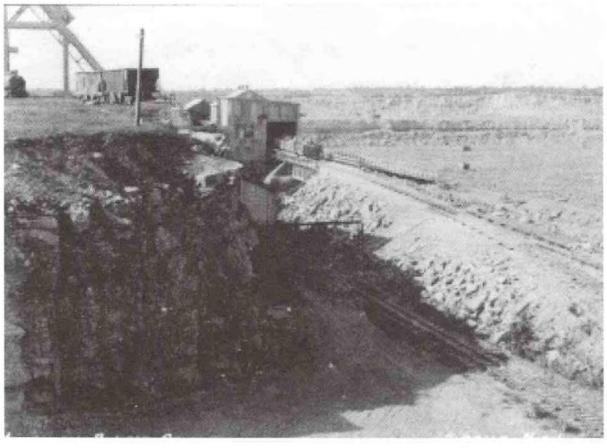
Timber for the mills was cut locally at first. As nearby supplies were depleted, the harvesting activities moved inland along the Thunder Bay River and its tributaries, which served as the primary means of transporting the cut timber. By the 1890s, timber in the region was exhausted, so additional timber was imported from Canada in huge rafts.

Logs were collected, sorted, and fed to the respective sawmills by the Thunder Bay River Boom Company (Alpena Argus, January 11,1893:3). The need for sorting and holding ponds and booms for logs led to the creation of dock systems along the Thunder Bay River and at the River mouth. Logs were cut into lumber, shingles, or lath, and then stacked on the docks for shipment by boat to many Great Lakes cities. Alpena's era of lumber mills came to an end in 1921, when the F. W. Gilchrist mill closed its doors (Havinghurst 1949).

Quarries

Limestone lies close to the surface and has been mined heavily in the area of Rogers City and the City of Alpena. Rogers City is known as the site of the world's largest limestone quarry (May 1980). Although the quarrying and use of limestone in Michigan is known to have occurred early in the 19th century, it gained prominence in the City of Alpena at the time when lumbering was in decline.

Local limestone began to be used in building trades, and in the production of cement. In 1901, the Alpena Portland Cement Company began operation on the north shore of Thunder Bay (Haltiner 1986; May 1980). Limestone was used at the Michigan Alkali Company plant in the City of Alpena as early as 1903 to make soda ash for glass manufacturing. However, soda ash



Jesse Besser Museum

Figure 4.34 Michigan Alkaline Company quarry.

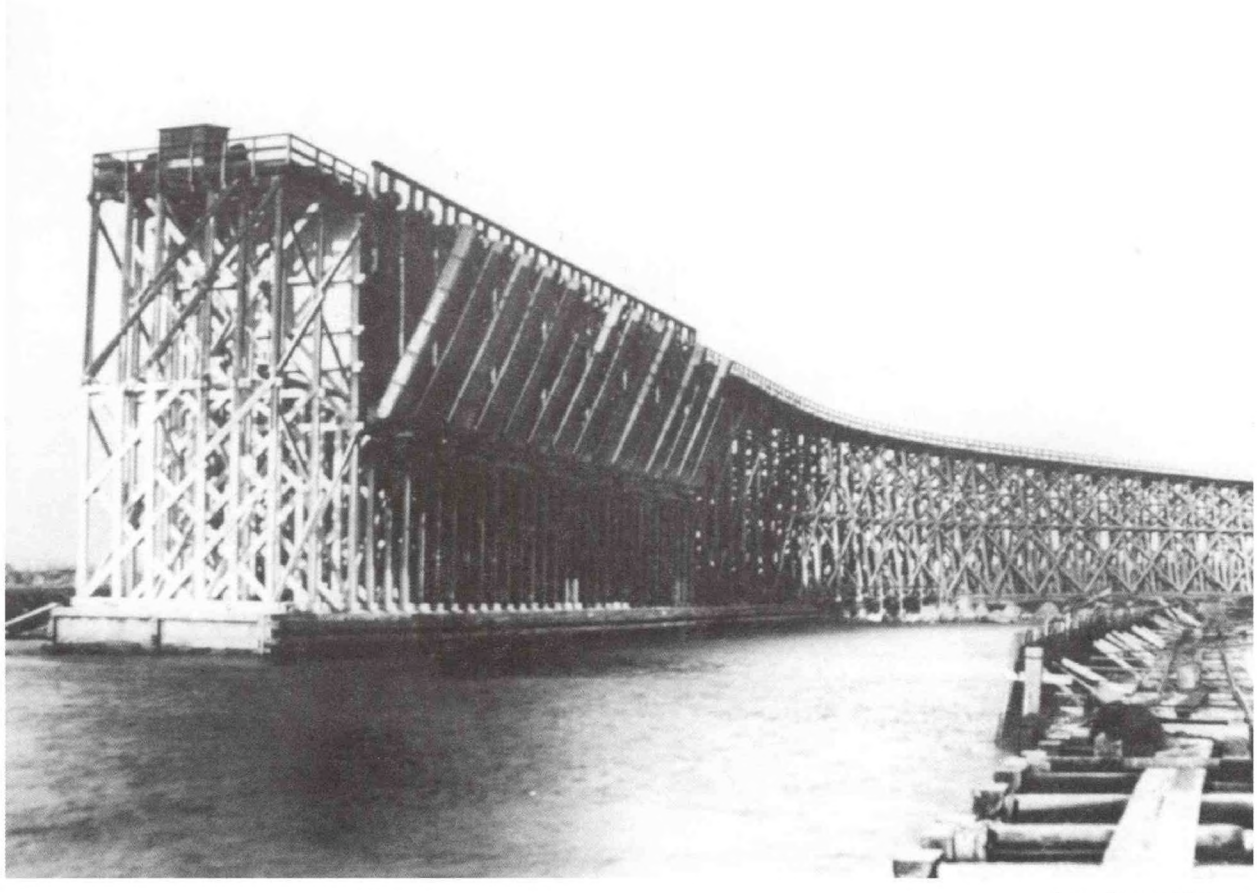
Jesse Besser Museum

Figure 4.35 Huron Portland Cement Company in 1917

production created so much waste that the company ventured into cement production.

Cement production was begun by the Huron Portland Cement Company in 1907. The plant grew steadily, producing over 900,000 barrels of cement with six kilns in 1910, and became the largest cement-producer in the world. LaFarge Corporation purchased the Huron Portland Cement Company in 1986 and continues cement production within the City of Alpena (Just, personal communication 1996; Haltiner 1986; May 1980).

The Great Lakes Stone and Lime Company of Rockport in northern Alpena County began operation in 1913 and provided rock for building and paving materials. The company is no longer in business.



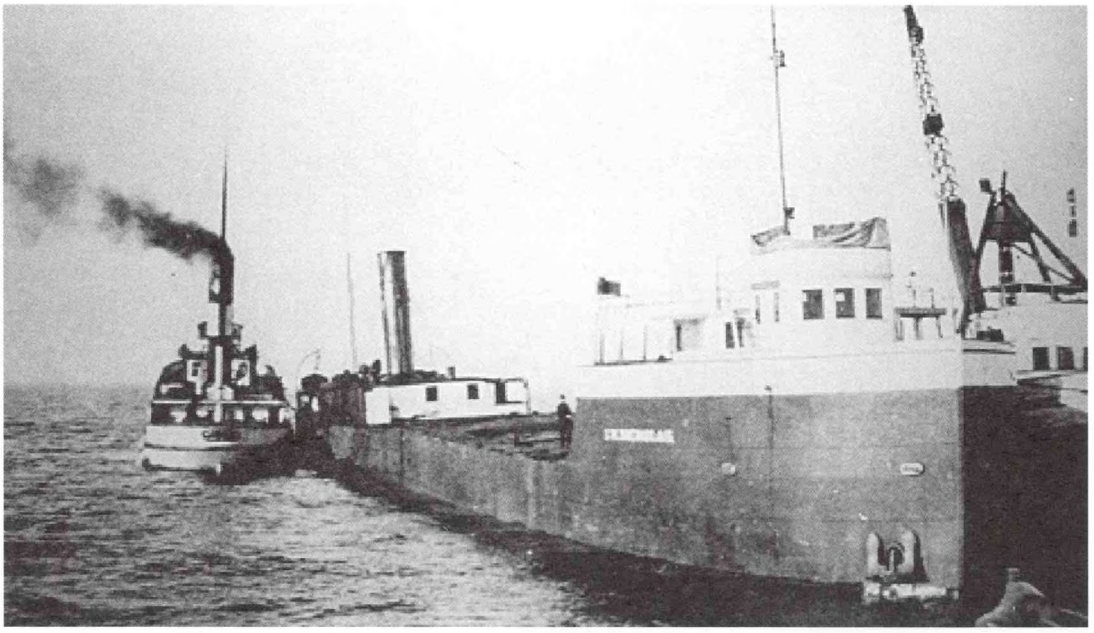
Jesse Besser Museum

Figure 4.36 Loading dock of the Michigan Alkaline Company in 1918.

Shipwreck Salvage Operations

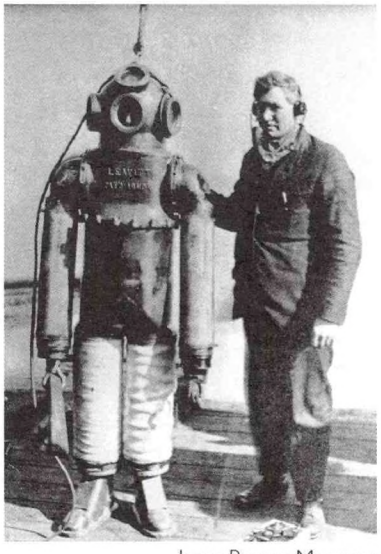
The City of Alpena became a base of operations for wrecking and salvage firms because of the frequent shipwrecks in the Thunder Bay region. Wreckers quickly descended on grounded or sunken vessels to recover the vessels or as much removable property as possible before the wreck disintegrated.

Jim and Tom Reid, notable Michigan salvors of the early 1900s, began their careers in the wrecking business at Alpena. The Reids were involved also in the log rafting business between Georgian Bay and Michigan that provided logs for the Alpena lumber mills (Haltiner 1986; Doner 1958).



Jesse Besser Museum

(top) Figure 4.37 Salvage tug *James Reid* assisting wrecked steamer *I.W. Nicholas* near the Thunder Bay River in 1913.



Jesse Besser Museum

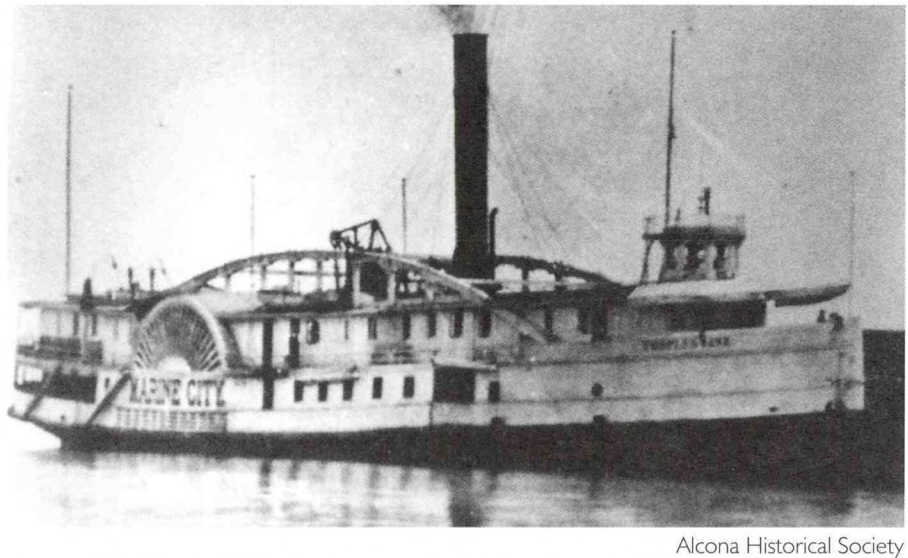
(left) Figure 4.38 Commercial diving suit used in salvage of steamer *Pewabic* in 1917.

2. Alcona County Maritime History

The maritime history of Alcona County followed much the same pattern as Alpena County to the north. Commercial fishing, lumbering, and other maritime trades shaped these areas and the communities founded within them. Alcona and Alpena Counties are close geographically (Alcona County was part of Alpena County until 1869), but they do not share Thunder Bay. Alcona County's coastline begins about two miles south of South Point, the southern boundary of Thunder Bay (NOAA 1976; Reynolds 1883).

Alcona County includes a number of coastal communities. From north to south these communities include Black River (4.5 miles south of South Point), Alcona (also known as the "Cove" --now a ghost town-- about four miles south of Black River), Harrisville (twelve miles south of Black River), Springport (formerly known as High Banks and South Harrisville -- a ghost town -- about one mile south of Harrisville), and Greenbush (formerly known as "Sliding Banks," about six miles south of Harrisville) (NOAA 1976; Reynolds 1883). Communities established at Black River Island and Sturgeon Point during the 1800's no longer exist. At first these communities were dependent upon supplies from outside, but over time they became self-reliant (Reynolds 1883).

Besides the possible incursion of the fur trader, the first permanent white settlers in what is now Alcona County were commercial fishermen. Black River, Black River Island, Sturgeon Point, Harrisville (including Springport), and Greenbush began as commercial fishing bases during the 1840s. By the mid-1880s, the commercial fishery of Alcona County was centered in the vicinity of Alcona (Reynolds 1883). Small sail- and oar-powered fishing craft of this era (i.e., 1840s - 1890s) were reportedly grounded in Alcona County, but there is no indication of whether any of these vessels became total losses.



Alcona Historical Society

Figure 4.39 Sidewheeler *Marine City* burned and sank at Sturgeon Point in 1880.

The shipment of salted fish in barrels soon gave rise to the manufacture of barrel staves, a predecessor of the bulk timber trade that came to dominate regional industry in the late 19th century (Reynolds 1883). As the value of native timber came to exceed the value of fishery production, some commercial fishermen switched to lumbering. In 1854, commercial fishermen Holden and Davison purchased forested land and started a mill at Harrisville, thus initiating the lumbering period.

Later, lumbermen started large-scale operations that shipped wood products from Black River, Alcona, and Harrisville to ports throughout the Great Lakes. Alcona County lumbering firms included Holden and Davison; Harris and Sons; Weston, Colwell and Company; Johnston, Haynes and Company; James Beard and Company; and Alger, Smith and Company of Black River, who were especially well known for their boat masts and spars (Gauthier *n.d.*, Prescott 1937, Reynolds 1883).

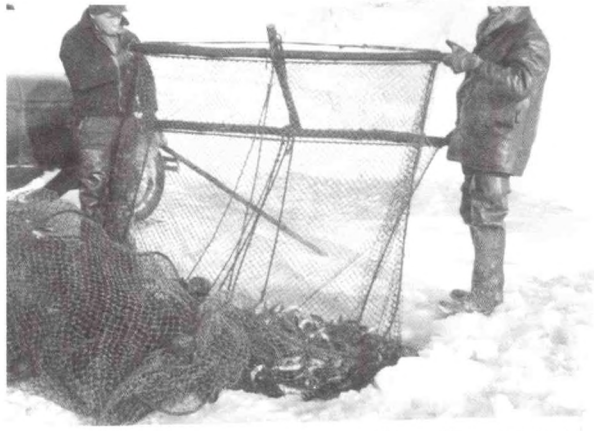
Alcona Historical Society

Figure 4.40 (left) Gillnet fishermen with lake trout at Black River (probably 1930s).

Figure 4.41 (below right) Commercial fishing through the ice near Black River (probably 1930s).

Figure 4.42 (below left) Small tug towing log boom near Black River (probably 1930s).

Alcona Historical Society



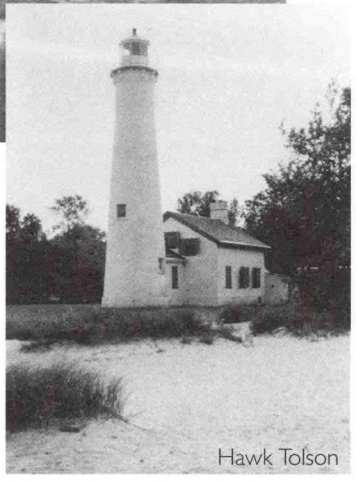
Alcona Historical Society

Much of Alcona County's virgin timber was cut during the late 1800s and shipped to the markets in Chicago, where it was sent westward to build the cities of the Great Plains. The tow barge and log rafting systems (i.e., logs enclosed by a large boom which was towed by a tug) were extensively employed to transport local timber to market until railroads superseded them around the turn of the century.

Most of the early docks and warehouses were constructed to service the commercial fishing and lumbering interests of Alcona County (Reynolds 1883). Public facilities, including the U. S. Light Station and the U.S. Life-Saving Service Station at Sturgeon Point, were built to protect or enhance Great Lakes commercial shipping (NOAA 1976, Gauthier n.d.). The U.S. Life-Saving Service Station at Sturgeon Point was built in 1876 and later deactivated and dismantled.

The Sturgeon Point Light Station was constructed in 1869. The original light, visible for 16

Alcona Historical Society



Hawk Tolson

Figure 4.43 (above) Sturgeon Point Light Station and Life-Saving Station (probably in 1900-1910).

Figure 4.44 (right) Sturgeon Point Lighthouse as it stands today (1996).

miles, was replaced by an acetylene lamp in 1912. The conical brick light tower stands 68 feet high. The adjoining Cape Cod style brick building served as the lightkeeper's house (Clifford 1994). Although the light is no longer operational, the light tower and lightkeeper's house are presently adapted as a maritime museum by the Alcona Historical Society. The Sturgeon Point Light Station was listed on the National Register of Historic Places in 1969.

Agriculture became an important economic force by the late 1800s, and waterborne transportation was used to move produce to market, as well as to import necessary industrial resources like coal and salt to Alcona County. A number of commercial fishermen became farmers (Reynolds 1883).

By the early 1900s, the waterborne commerce of Alcona County was largely confined to the passing of vessels engaged in bulk mineral transportation (e.g., coal, salt, iron ore, copper). The major shipping routes were located only a few miles off the Michigan coast of Lake Huron, such that virtually every type of commercial vessel passed by Alcona County. This remains the case to this day.

The management emphasis of the Michigan Great Lakes changed from commercial fishing to recreation during the 1950s-60s. A harbor-of-refuge was completed at Harrisville in 1959 to help promote recreational boating and fishing.

Conclusion

The maritime history of Alcona County paralleled that of Alpena County through the early 20th century. Thereafter, Alcona County became separated from the mainstream commercial shipping industry as harbor improvements failed to keep up with the growing size of Great Lakes bulk carriers. In the commercial fishing and lumbering eras, Alcona County has the same claim to historical significance as does its neighbor, Alpena County, to the north.

The complete text of the Alcona County maritime history, including a list of shipwrecks, is reproduced in Volume II, Appendix G.

3. Past and Present Human Activities

Commercial/Industrial Enterprise

Commercial Fishing

- History

Great Lakes fish have been important in the diet of Ottawa and Ojibway peoples inhabiting northeast lower Michigan since the development of the *inland shore fishery* (Cleland 1992). "The use of gillnets set on off-shore shoals for the capture of whitefish and lake trout constituted the heart of this *inland shore fishery*" (Tanner 1987:19). The Thunder Bay region of Lake Huron has a long history of Native American subsistence and commercial fishing.

European settlers began to arrive in the early 1800s and soon engaged in commercial fishing using a number of methods. "Gillnets appeared in the vicinity of Alpena about 1835 and within the next 15 years were commonly used in the deeper open waters of the lake. Seines, fyke nets, pound nets, and trap nets were all being fished by 1900" (Berst and Spangler 1972:879). The Lake Huron commercial fishery, through about 1940, was composed primarily of whitefish, lake trout, cisco, walleye, yellow perch, and suckers.

During 1940 - 1965, commercial catches decreased dramatically, especially lake trout and cisco (Berst and Spangler 1972). Lake Huron whitefish landings "fluctuated between 900 and 1,400 metric tons from 1900 to 1930, increased to 2,500 tons in 1932, then declined to 113 tons by 1945" (Berst and Spangler 1972:882).

- Present Day

Today, the Thunder Bay region of Lake Huron is considered one of the most lucrative whitefish fishing grounds in the Great Lakes (Johnson, personal communication 1992). Currently, whitefish is the only commercially harvested species within the Thunder Bay region.

The Michigan Department of Natural Resources (DNR) Fisheries Division authorizes two annual research permits to commercial fishermen for the harvest of whitefish within the Thunder Bay region of Lake Huron. Results of the research will be used to assist in evaluating the future role of commercial fishing in this area (Michigan DNR, personal communication 1996).

Currently, there are no tribal (Native American) licensed fishermen in the Thunder Bay region of Lake Huron. In 1985, Michigan Native American communities, the State of Michigan, and the U. S. Department of Interior negotiated an Agreement for Entry of Consent Order, to manage commercial fishing in Lake Huron waters ceded by the Treaty of Washington (1836) (Figure 4.45). The Order, which will expire in the year 2000, states that no tribal licensed fishing will occur south of a line extending east from Hammond Bay Harbor (Hammond Bay is north of Rogers City, Michigan).

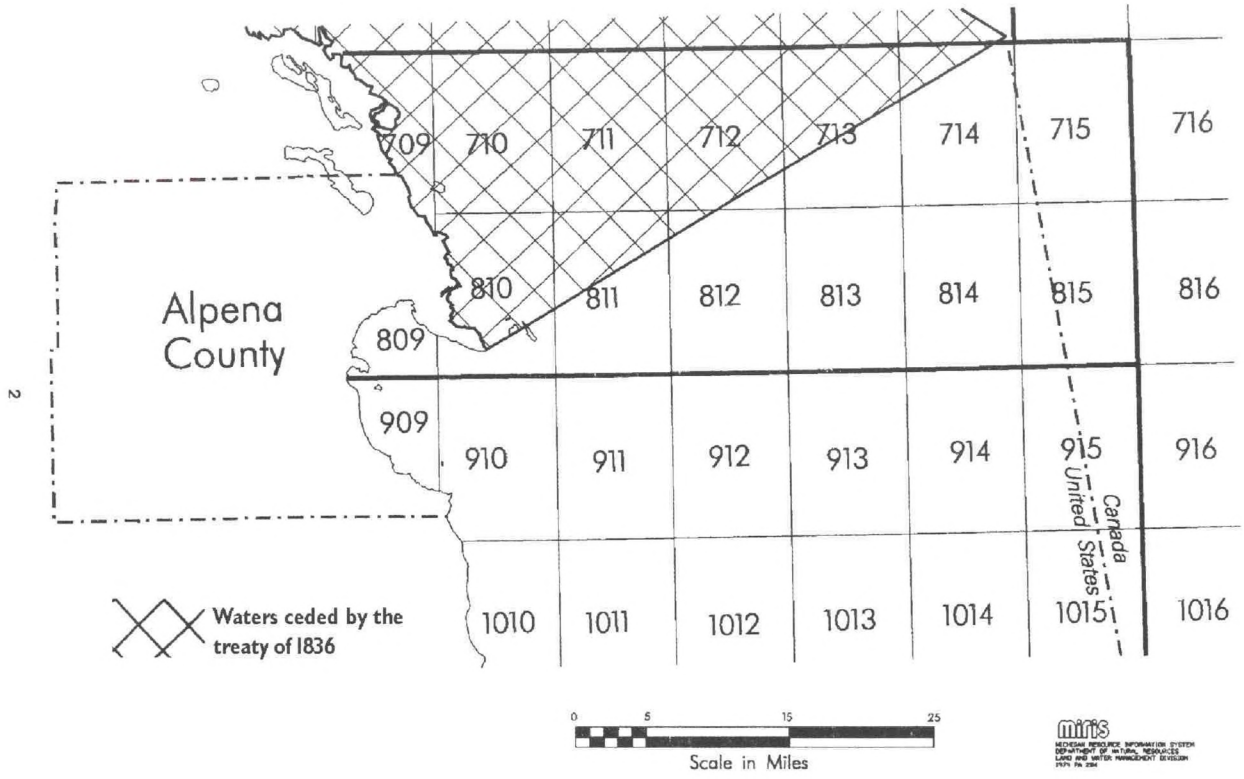


Figure 4.45 State of Michigan commercial fishing zones and Lake Huron waters ceded by the Treaty of Washington (1836) for tribal licensed fishing.

- Fisheries Management

The Michigan DNR Fisheries Division has the responsibility to "protect and enhance the public trust in populations and habitat of fishes and other forms of aquatic life, and promote optimum use of these resources for benefit of the people of Michigan" (Fisheries Division 1991:5).

The State of Michigan is a member of the Great Lakes Fishery Commission (GLFC) that both develops coordinated programs of research and recommends management actions on a regional basis (GLFC 1992). A joint strategic plan for management of Great Lakes fisheries was developed by state and federal agencies in 1980 (GLFC 1980); the strategic plan and associated publications provide guidelines for fish habitat management and planning (Dochoda 1988; GLFC 1987). Information relating to the condition of fisheries habitat, habitat management and planning, and other dimensions of fisheries management are developed by Lake Committees and are published as annual reports. The state, federal, provincial, and tribal governments of Michigan and Ontario have completed a set of fish community goals that will serve as an umbrella for coordinated fishery planning.

Fisheries stocking programs for Lake Huron are conducted by the U.S. Fish and Wildlife Service (USFWS), the Michigan DNR, and by several Native American tribes. The Michigan DNR stocks a variety of species in the Thunder Bay

region. Brown trout stocked in Lake Huron near Alpena are reared at the Thompson hatchery in the Upper Peninsula and the Oden hatchery near Petoskey. Walleye, which are stocked regularly in the Thunder Bay River and Thunder Bay, are reared at the James Pond Hatchery in Alpena. The James Pond is a walleye rearing pond managed jointly by the Michigan DNR and local angling groups.

Shipping and Navigation

- History

In the 19th century, communication with the outside world was conducted primarily through vessels that put in at either the City of Alpena or Thunder Bay Island. In 1859, the steamer *Colombia* made Alpena a semi-regular stop as the lumber mills spurred more commercial activity (Haltiner 1986). Even then, access to the City of Alpena was limited by a sand bar at the mouth of the Thunder Bay River that prohibited entry of vessels drawing more than six and a half feet. Larger vessels loaded and unloaded offshore using tugs, scows, and rafts (Boulton 1884).

In 1865, Devils River (later, Ossineke) had only three feet of water over the nearshore sand bar, restricting access to the mill and dock. As a result, cargo was shipped from Morris' Dock near Nine Mile Point. Paxton's or McDonald Bay, between Sugar and Thunder Bay Islands, was used for the anchorage of vessels, as was the area between the mainland and Sugar and Middle Islands (Boulton 1884; Barnet 1874).

Waterborne trade from the City of Alpena in 1874 totaled 492 vessels of 159,072 gross tons, and employed 6,492 individuals. These vessels cleared the local customs house with cargos of cedar posts, house blocks, lath, shingles, lumber, fish, merchandise, ice, pickets, and bark. The City of Alpena developed a navigation channel of 16 foot depth extending a mile above the harbor mouth by 1889 (U.S. Department of War1889). In 1897, 1,245 vessels totaling 353,982 gross tons cleared the port. The City of Alpena was described as the most convenient shipping port for agricultural products and manufactured goods for locations up to 50 miles inland (Mansfield 1899; Boulton 1884).

The slow development of an adequately dredged and maintained river channel, in combination with the increasing number of vessels visiting the City of Alpena, led to the creation of an intricate series of loading and unloading docks. These docks altered the shoreline and by 1900, had extended the waterfront by at least 50 feet into Thunder Bay (Boulton 1884). Alterations to the shoreline north of the City of Alpena began around 1901 as the cement companies established loading docks.

Dependence on waterborne communications left the community so isolated during the winter that the state legislature passed a bill in 1865 to build the Duncan, Alpena, and AuSable River State Road (Boulton 1884:181). Railroads reached the City of Alpena in 1886 beginning with the Detroit, Bay City, and Alpena Railroad.

In 1918, the Boyne City, Gaylord, and Alpena Railroad further strengthened Alpena's connection with other Michigan cities (Haltiner 1986). Despite the strong dependence of the Alpena community upon waterborne commerce, there was surprisingly little shipbuilding activity. Except for some small boat construction and repair work, Alpena does not seem to have maintained a shipyard capable of building or drydocking large vessels.

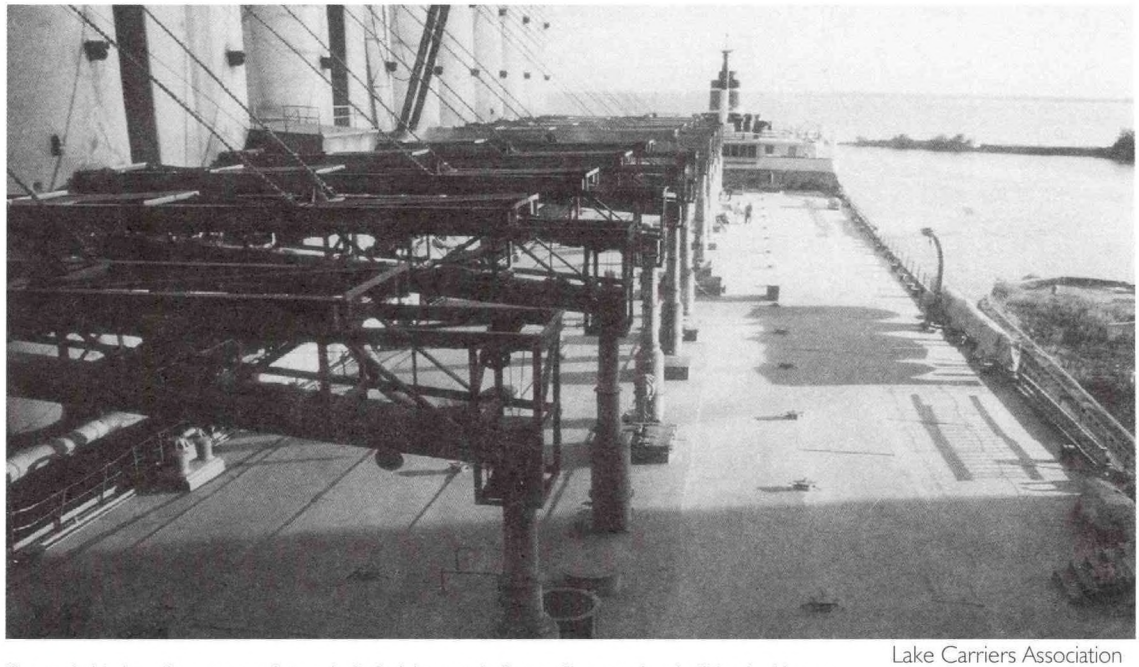
The post-lumbering era of the early 1900s brought the decline of Alpena's waterfront. The docks deteriorated and became hazards to navigation. In 1923-24, a stone breakwater was constructed, and in 1937, the growing recreational use of Thunder Bay and the River led to dredging of a yacht basin (Haltiner 1986).

Other Alpena County ports developed less quickly. A small breakwater was built in Ossineke, but the controlling depth remained at four feet in 1981. Located on the northern boundary of Alpena County, Rockport was used by the Kelley Island Lime and Transport Company beginning in 1913. By 1985, Rockport was used primarily by recreational anglers (NOAA 1985; U.S. Army Corps of Engineers 1940).

- Present Day

Upbound and downbound commercial shipping lanes on Lake Huron are located within the Thunder Bay region. The shipping lanes begin approximately 5 miles due east of the Middle Island Light, 5 1/2 miles due east of the Thunder Bay mid-channel buoy, and 6 miles due east of the South Point daymark (NOS 1990, 1988). A federal navigation channel corresponding to a course of 304 degrees from the Thunder Bay mid-channel buoy is maintained by the U.S. Army Corps of Engineers for use by commercial and recreational boat traffic entering and departing Alpena. Traditionally, the commercial shipping season has lasted from April until early December (Barry 1972).

Commercial shipping to and from Alpena is associated predominantly with the cement producing operations of LaFarge Corporation. Inland Lakes Management of Alpena, under contract to LaFarge Corporation, normally operates four bulk carriers that transport cement from Alpena, to distribution plants throughout the Great Lakes region (Figure 4.45). Two of these vessels each carry approximately 8,000 tons of cargo per trip out of Alpena, and the other two vessels each carry approximately 11,000 tons of cargo per trip out of Alpena. These vessels then return to Alpena empty ("light"). In total, the cement bulk carriers complete approximately 60 round trips per year (120 transits). In addition, approximately 20 loads of coal per year (40 transits) are delivered to LaFarge Corporation. Other uses of Thunder Bay by commercial vessels include occasional deliveries of coal to Abititi-Price Corporation, fuel delivery by Alpena Oil Company, salt delivery by Goodrich Everett, and visitation on an irregular basis by boats seeking a safe haven from storms on Lake Huron (Ghiata, personal communication 1992).



Lake Carriers Association

Figure 4.46 Loading cement into a bulk freighter at LaFarge Corporation facilities in Alpena.

• Aids to Navigation

Aids to navigation within the Thunder Bay region are owned and maintained by the U.S. Coast Guard (USCG), private organizations, or individuals. Nautical charts numbered 14684 (NOS 1990) and 14689 (NOS 1988) are available to commercial operators and recreational boaters navigating the Thunder Bay region of Lake Huron.

USCG floating aids to navigation are usually placed on location by the 1st of April and are removed by the 1st of December by USCG Cutter Bramble, a 180-foot buoy tender stationed in Port Huron, Michigan (Betters, personal communication 1992). USCG Cutter Bramble is under direction of the 9th Coast Guard District in Cleveland, Ohio. All USCG aids to navigation within the Thunder Bay region are maintained by USCG Station St. Ignace. USCG Station St. Ignace is under direction of USCG Group Sault Ste. Marie.

• Dredging

The federal navigation channel at Alpena begins at the 24-foot depth contour in Thunder Bay and extends to the turning basin about 0.75 miles upstream from the mouth of the Thunder Bay River, for a total length of 2.5 miles (U.S. Army Corps of Engineers 1984). Maintenance dredging is performed periodically to remove sediments (silt, detritus, sand and clay) that accumulate in the channel. Since at least 1963, these sediments, known as spoils, have been deposited in the open waters of Thunder Bay. The disposal site is approximately 3.5 miles west of the Thunder Bay junction buoy on a course of 282 degrees, and measures 2,600 feet by 2,600 feet (U.S. Army Corps of Engineers 1984,1985).

Aviation

The Alpena County Regional Airport serves the northeast Michigan counties of Alpena, Presque Isle, Montmorency and Alcona. The airport is

> ...an all-weather facility capable of handling virtually all commercial and general aviation aircraft types. It has two runways, a rotating beacon, a lighted wind indicator, hanger space, two fixed based operators [i.e., Aviation North and Welch Aviation] who provide aviation services, a passenger terminal, and automobile rentals. The control tower is operated by Air National Guard aircraft traffic controllers and is supplemented by full navigational aids including a modern instrument landing system. In addition, a fully computerized National Weather Service office is located in the main terminal building (Alpena County Regional Airport 1992).

Great Lakes Aviation of Spencer, Iowa, provides scheduled passenger service to and from Detroit and Sault Ste. Marie, with connections in Detroit to other destinations. Aviation North and Welch Aviation provide air charter services, aircraft maintenance, fueling, flight instruction, and ground handling services to all transient and based general aviation aircraft.

Oil and Gas Development

Michigan Public Act 61 of 1939 created a permit system for the drilling of oil and gas wells that is administered by the Geological Survey Division of the Michigan DNR. The Michigan DNR is responsible for managing state land and mineral resources "to ensure protection and enhancement of the public trust" (Michigan DNR 1982). The DNR is prohibited by Part 325, Great Lakes Submerged Lands of P. A. 451 (1994), as amended, from entering into a lease or deed of unpatented Great Lakes bottomlands that permits drilling for oil and gas, unless "all drilling operations originate from locations above and inland of the ordinary high-water mark." However, leases can be obtained for upland area drilling sites that remove oil and gas from locations under the bottomlands. There are currently no active leases for the coastal zone of Alpena County.

As a constraint to upland drilling,

> ...the State Oil & Gas Lease specifically addresses the issue that no wells shall be drilled in wetlands, habitat identified as crucial to the survival of an endangered species, or areas of historical or archaeological significance. In areas having special wildlife, environmental and/or recreational significance

where drilling may occur, the lease provides for negotiation of a drilling plan to minimize impacts . . . the lease also provides for a 1/4 mile setback of wells from the Great Lakes, unless an exception is approved by the Michigan Natural Resources Commission (NRC) (Michigan NRC 1989).

Regional Industrial Development

Industrial development opportunities identified for Alpena, Michigan include the manufacturing of wood furniture and fixtures, manifold business forms, architectural and ornamental metal work, commercial lighting fixtures, and sporting and athletic goods. Non-manufacturing opportunities include services such as hotels, rooming houses, camps and other lodging places, membership sports and recreation clubs, nursing and personal care facilities, and home health care services. Other development opportunities that were identified include: industries with high demand for water availability; industries with a high demand for water transportation; industries associated with commercial fishing, recreational boating, and aquaculture products; industries associated with tourism and recreation; industries related to health care and health care services; and retail industries (Midwest Research Institute 1988).

Military Aviation

The Phelps-Collins Air National Guard Base (ANGB) is an adjunct operation of the Alpena County Regional Airport and has been used for military training since 1953. The mission of the Base is to improve the nation's defense capability and the readiness of specialized air units for a variety of military and civilian purposes. Phelps-Collins ANGB coordinates its operations with other military bases in Michigan and elsewhere (Alpena County Regional Airport 1992).

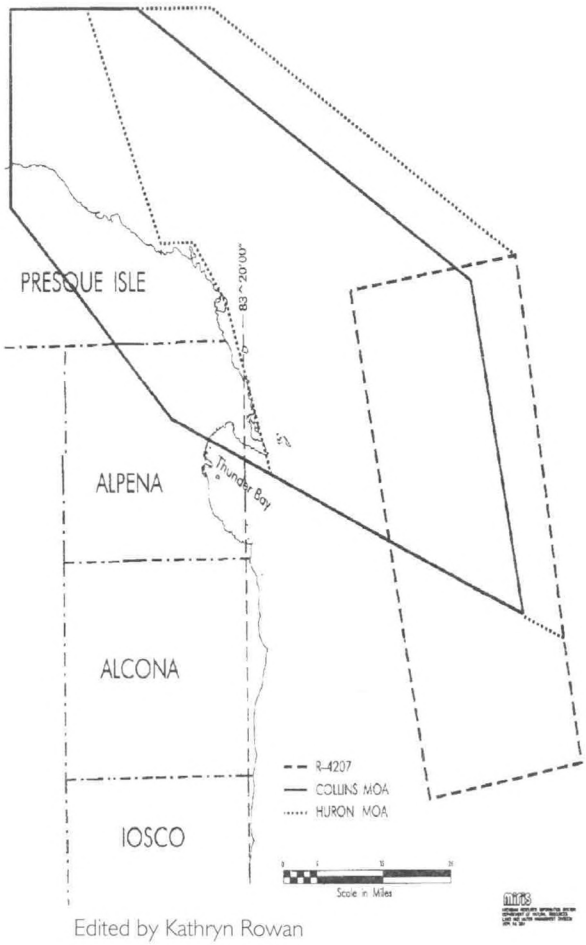
A large portion of the Thunder Bay region is below two of the ANGB Military Operating Areas (MOAs), adjacent to a restricted area, and traversed by a bi-directional Visual Low Altitude Training Route (VR) (Figure 4.46). In addition, a proposal is being processed to make permanent the Trout Temporary MOA, with a minimum authorized altitude of 4,000 feet. The airspace over the Thunder Bay region to 15 miles offshore is one of a few areas authorized for supersonic flight in the central United States (Kimble, personal communication 1992).

Recreational Activities

History

Recreation in early Alpena was limited to a few activities including, "dancing and sail-boat excursions to some of the islands" (Boulton 1884:180). Later, sport fishing, swimming,

Figure 4.47 Military operating areas for the Phelps-Collins Air National Guard Base in Alpena.



Edited by Kathryn Rowan

Gene Wright, Old Woman Creek NERR

Figure 4.48 Air National Guard helicopter operating over the Thunder Bay region.

Gene Wright, Old Woman Creek NERR

Figure 4.49 Air National Guard jets at the Phelps-Collins Base in Alpena.

boating, and touring excursions on the Bay and inland lakes became popular (Boulton 1884). In the 1890s, there was a movement to develop the water resources of the region for recreation. During the winter, ice boating, sleighing, hockey, and skating took place on Thunder Bay (*Alpena Argus*, 1 February 1893:3). Many elegant waterfront entertainment pavilions were constructed to provide activities for the local citizens and tourists. Alpena's Huron Beach Pavilion opened in 1896 (Haltiner 1986).

Summer resorts began to develop by the 1890s. El Cajon on Little Thunder Bay started operations around 1892 and boasted luxuries such as a new beach, buggy riding, cold water springs, peaceful cottages, and a scenic view of Lake Huron and offshore islands (*Alpena Argus*, 30 August 1892). During the 1930s, highway U.S. 23 was graded and paved, making it easier for motorists to visit Alpena County (Haltiner 1986).

The Lake Huron shore lured people to Alpena County during the 1920s, and the serenity of the small inland lakes continues to attract vacationers. Sport fishing became an important management emphasis for the Great Lakes during the 1960s with the decline of commercial fisheries and introduction of salmon as a sport fish. More recently, scuba (self-contained underwater breathing apparatus) divers have journeyed to Thunder Bay to explore and enjoy the many shipwrecks, geological features, and aquatic organisms.

Boating

The State of Michigan consistently leads the United States in the number of registered watercraft and boating activity. An estimated 35% of the total 137,000 recreational boat-days in Alpena County during 1986 took place on Lake Huron (Talhelm et al. 1988). A total of 4,497 boats were registered in 1989 in Alpena County (4,302 pleasure craft and 61 commercial craft). In 1991, the harbors of Alpena, Harrisville, and Rogers City recorded a combined 8,437 transient boat days.

Figure 4.50 Visiting the historical boathouse of the Thunder Bay Island Light Station by kayak.

Based on a user survey, the Boating Programs Branch of the Michigan DNR (1990) estimated the average boat length launched from Michigan Great Lakes launch sites in 1990 was 18 feet.

Eighty percent of respondents were repeat users of a site. Seventy percent of respondents indicated that their primary activity was fishing, followed by pleasure boating and water skiing. If respondents indicated that their boating was poor, then fishing or weather conditions were listed as a main problem. The average distance traveled to a launch site was 20 miles. Approximately 75% of respondents indicated that additional public launch sites at other locations are needed (Michigan DNR 1990).

Fishing

Although sport fishing is an important recreational activity in Michigan, the number of people participating in sport fishing appears to be leveling. In 1989, a total of 8,643 resident annual, 965 non-resident annual, and 1,834 daily fishing licenses were sold in Alpena County. Approximately one-third of resident and non-resident anglers fished the Great Lakes, predominantly from private boats using baits, trolling, or casting (Mahoney et al. 1986). The most important attributes used by resident and non-resident anglers in selecting a fishing site include angler crowding, competition from other recreation activities, places to fish from shore, boat launching and marina facilities, and parking (Mahoney et al. 1986).

The Michigan Brown Trout Festival has been held in Alpena during the third full week of July since 1975, and is the oldest continuously held fishing tournament on the Great Lakes. The purpose of the Festival is "to promote Lake Huron fishing and to invite out of town guests to experience Alpena, 'a warm and friendly port' located in the heart of the sunrise side" (Alpena Convention & Visitors Bureau, 1990). A non-profit organization, with five officers and a Board of Directors (selected from 13 local service clubs), plans and manages the Festival.

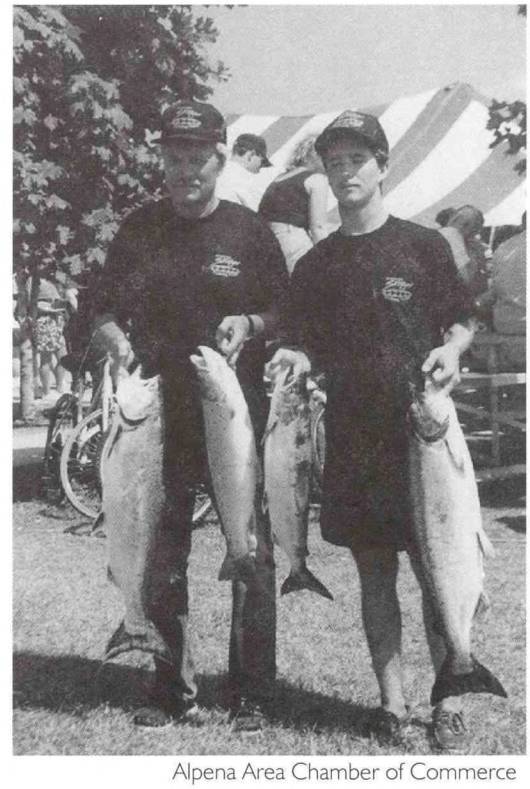
Figure 4.51 Recreational boats at the Alpena Municipal Marina.

There are nine days of tournament fishing for five lake species: brown trout, lake trout, salmon, steelhead, and walleye. Prizes include cash and merchandise donated by local and national sponsors. A number of family-oriented recreational events are also organized during the tournament. In 1990, participation in the Festival included 850 registered anglers from 115 cities (8 states) and an estimated 30,000 spectators, over the nine day period (Alpena Convention and Visitors Bureau 1990).

Figures 4.52 and 4.53 A catch of trout and salmon from Lake Huron, at the Michigan Brown Trout Festival.

Scuba Diving

Sport diving with scuba in Thunder Bay/Lake Huron appears to total far less recreational activity than boating or sport fishing, but has generated public interest due in part to the abundance of shipwrecks and the establishment of the Thunder Bay Underwater Preserve. District Extension Sea Grant Agents in 1986 and 1990 - 1991 found that sport divers visiting the Thunder Bay Underwater Preserve were

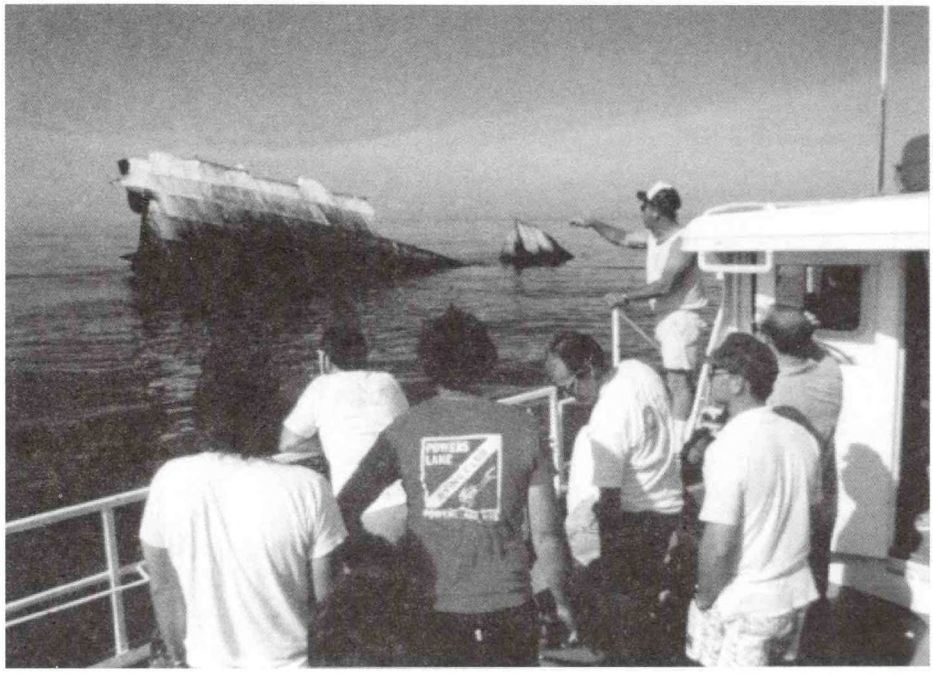


Alpena Area Chamber of Commerce

primarily between 26 and 45 years old. Most of these divers were from Michigan, with the second highest percentage from Ohio. Generally, most divers visit the region during July and August and use charter and private boats to access the Preserve (Stewart 1992; Peterson et al. 1987).

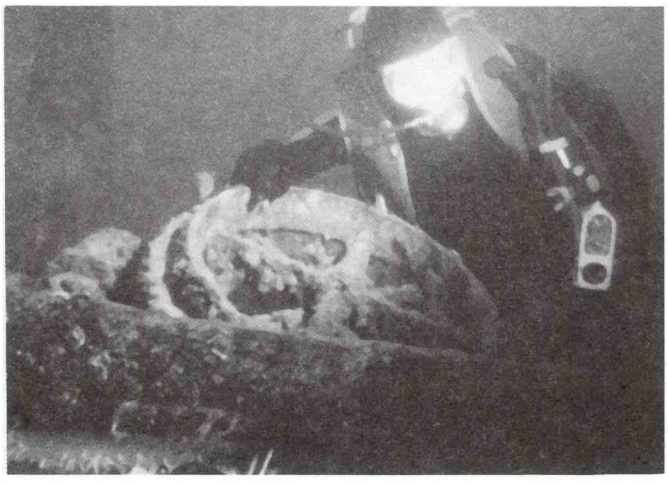
Hunting and Furbearer Harvest

Although hunting is a popular recreational activity in Michigan, the number of people participating in recreational hunting appears to be declining (Nelson 1991). In Alpena County, an estimated annual average of 3,090 hunter days were expended for waterfowl from 1985 - 1990. An



Thunder Bay Divers

Figure 4.54 Dive charter boat and scuba divers at the *Nordmeer* site.



Thunder Bay Divers

Figures 4.55 and 4.56 Recreational scuba divers visiting shipwrecks of the Thunder Bay region.

estimated annual average of an additional 1,570 hunter days were expended for geese in Alpena County from 1985-1990 (Reiss, personal communication 1992). The majority of waterfowl hunting takes place during the fall duck and geese seasons in areas with a large amount of emergent vegetative cover (e.g., Squaw Bay, Misery Bay and coastal wetlands from Ossineke southeast to South Point).

The sale of fur harvester licenses in Michigan is also decreasing (Nelson 1991). Trapping activity along the Thunder Bay coastline is probably concentrated on furbearers in coastal marshes (i.e., muskrat, beaver, mink, and possibly raccoon) (Carlson, personal communication 1992). There is no known trapping taking place on offshore islands (Carlson, personal communication 1992).

Recreation and Tourism Facilities and Services

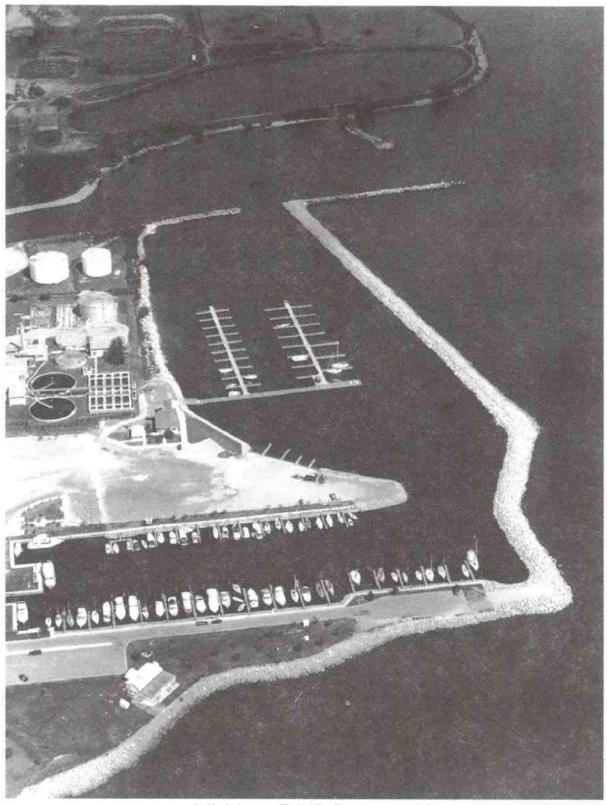
- Harbors and Marinas

Four recreational harbors have been developed in the Thunder Bay region by the Michigan State Waterways Commission in cooperation with local units of government so that boaters will be no more than 15 shoreline miles away from safety. The harbors have marinas and other facilities and services to serve recreational users. Typically the marinas are managed by private businesses under leases from local governments. State or local governments manage some of the marinas.

Harbor and marina facilities are located at Alpena Harbor, Partridge Point Basin (private facility), Harrisville Harbor, Presque Isle Harbor, and Rogers City Boat Harbor (Figures 4.57 - 4.59). All of these facilities have gasoline and diesel fuel, water, electricity, restrooms, shower facilities, VHF-FM radio, holding tank pump-out, and launch ramps. Several of the harbors also have haul-out facilities, marine/general stores, repair services, fish cleaning stations, and a harbor master. Site specific features include condominium homes and a beach at Partridge Point Basin, two historical lighthouses at Presque Isle Harbor, and a picnic area, playground, and beach at the Rogers City Boat Harbor.

- Boat Launching Facilities

There are three public boat launching facilities within 25 miles of the City of Alpena that have direct access to Lake Huron. Alpena Municipal Marina is located on Lake Huron at the City of Alpena and has hard-surfaced ramps with sufficient water depth to accommodate most boats with trailers, as well as courtesy piers, toilets, and 126 parking spaces. North Riverfront Park is located on Thunder Bay River in the City of Alpena. The park has plans for a hard-surfaced ramp, courtesy pier, and boat dockage. Devils



Michigan DNR Parks and Recreation Division

(upper left) Figure 4.57 Alpena Harbor
(upper right) Figure 4.58 Presque Isle Harbor
(lower right) Figure 4.59 Harrisville Harbor

River Mouth, located 9 miles south of the City of Alpena, has a ramp and parking facilities. All of these facilities can be used to launch small boats (i.e., trailerable boats, car-top boats, canoes, windsurfers, jet-skis) but might not accommodate some boats because of shallow water depth.

The only private boat launching facility in the Alpena vicinity is Partridge Point Marina, located on Lake Huron, one mile south of the City of Alpena. The marina has two hard-surfaced (concrete) ramps and one soft-surface ramp.

- Park Properties and Associated Recreation Facilities and Services

The following public park properties and associated recreation facilities and services are either located on Thunder Bay or provide direct access to Thunder Bay and Lake Huron:

Bay View Park, located on Lake Huron, City of Alpena (adjacent to the municipal small boat harbor), totals 27 acres with 3,100 feet of Lake Huron shoreline, and includes a swimming beach, breakwater fishing area, picnic area,

bandshell and other intensive recreation facilities, restrooms, and parking. The park is managed by the City of Alpena (23.5 acres) and by the Alpena School District (3.5 acres).

Thompson Park, located on Lake Huron, City of Alpena (State Avenue, southwest of Bay View Park), totals 1 acre with 160 feet of Lake Huron shoreline, and includes a swimming beach with lifeguards, picnic area, open space, and portable restrooms. It is managed by the City of Alpena.

Blair Street Park, located on Lake Huron, City of Alpena (State Avenue, southwest of Bay View Park), totals 4 acres with 173 feet of Lake Huron shoreline, and includes a swimming area, picnic area, handicapped-accessible fishing pier, and parking.

Mich-e-ke-wis Park, located on Lake Huron, City of Alpena (State Avenue, southwest of Bay View Park), totals 39 acres with 2,700 feet of Lake Huron shoreline, and includes swimming beaches with lifeguards (Starlite and Mich-e-ke-wis), picnic area, other intensive recreation facilities, restrooms, and parking. It is managed by the City of Alpena.

North Riverfront Park, located on Thunder Bay River, City of Alpena (Fletcher Street, near the Post Office), totals 2.3 acres with 570 feet of Thunder Bay River shoreline, and includes open space and parking. It also has a fishing pier, boating facilities, boardwalk, and picnic area. The park is managed by the City of Alpena.

The Penrose Family

Figure 4.60 The old Presque Isle Lighthouse (above), built in 1840, and the New Presque Isle Lighthouse (Figure 5.4), built in 1870, are featured at parks near Presque Isle Harbor. The parks are administered by Presque Isle Township; the 100-acre park at the 1870 lighthouse is operated by the Presque Isle Lighthouse Historical Society. Facilities at these parks include historical museums, nature trails, a covered pavilion, and picnic areas.

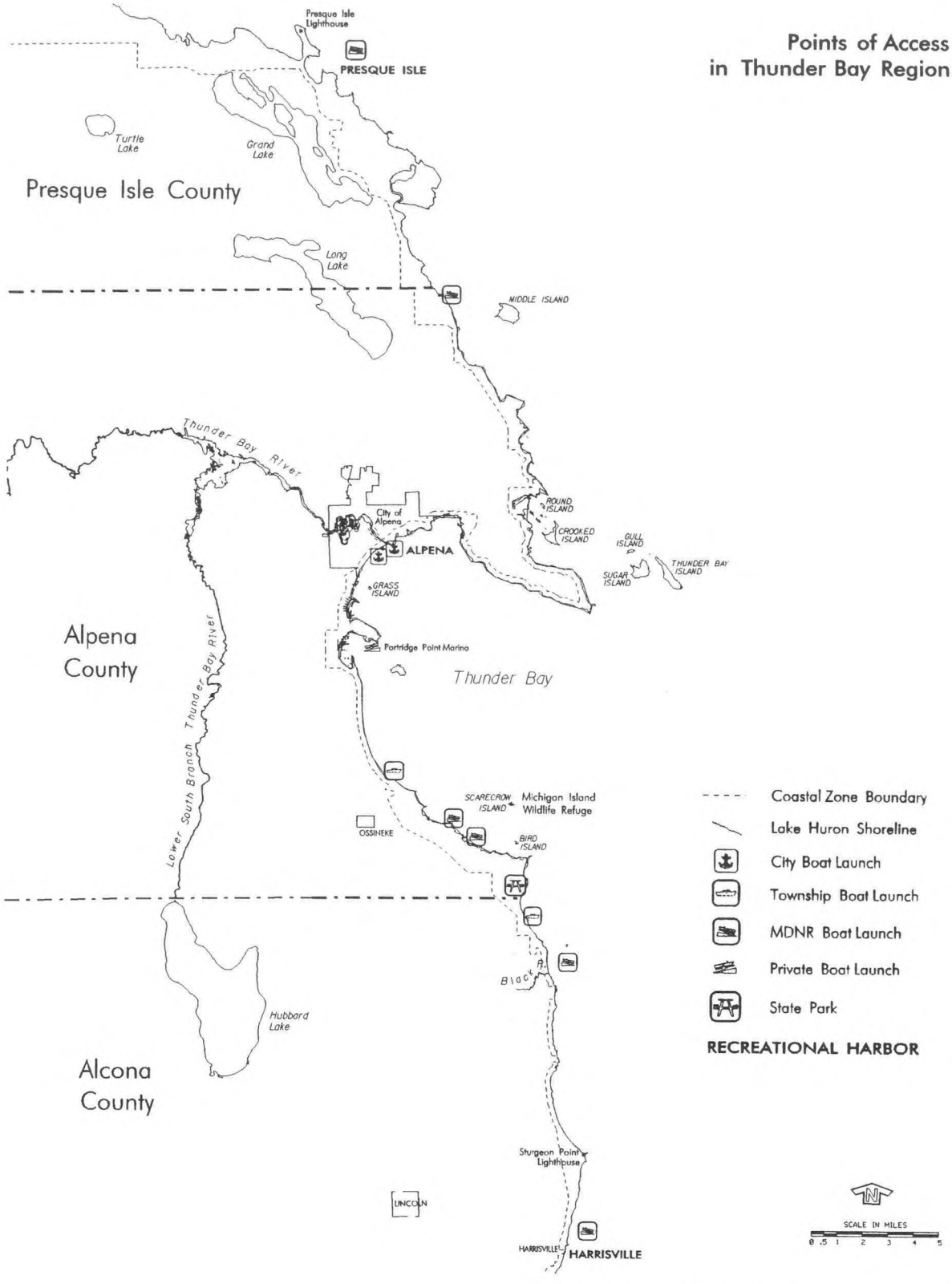


Figure 4.61 Selected water-based recreation facilities in the Thunder Bay region.

South Riverfront Park, located on the Thunder Bay River, City of Alpena (near the Federal Building), totals 1.9 acres with approximately 850 feet of Thunder Bay River shoreline, and includes dock fishing, boat dockage, and opportunities for passive recreation. The park is managed by the City of Alpena and the federal government.

LaMarre Park, located on the Thunder Bay River, City of Alpena (Eighth and River Street), totals 1.5 acres with 367 feet of Thunder Bay River shoreline, and includes a wooden fishing pier, picnic area, and parking. It is managed by Alpena County.

Ossineke (Sanborn) Park, located on Lake Huron, is 10 miles south of the City of Alpena. It totals 3 acres of property that includes a swimming beach, picnic area, toilets, and parking. It is managed by Sanborn Township.

Ossineke State Forest Campground, located on Lake Huron, 11 miles south of the City of Alpena, is part of Mackinaw State Forest and includes a swimming beach, boat launch, picnic area, hiking trails, 42 campsites, water, toilets, and parking. It is managed by the Michigan DNR Forest Management Division.

Negwegon State Park, located on Lake Huron, 14 miles south of the City of Alpena, totals approximately 1,674 acres. It has minimal facility development, including a swimming beach, hiking trails, vault toilets, and parking. There are plans for 125 campsites and other outdoor recreation facilities. The park is managed by the Michigan DNR Parks and Recreation Division.

An unnamed "park," located on Thunder Bay Island, has informal campsites and cooking areas that have been established by visitors near the abandoned U.S. Coast Guard boathouse and dock. The dock is located in the channel between Sugar Island and Thunder Bay Island. The island is managed by the U.S. Fish & Wildlife Service (Shiawassee National Wildlife Refuge).

- Restaurants and Eating Establishments

The Alpena area has approximately 41 eating establishments with a maximum capacity of over 3,650 patrons (Pardike 1992).

- Lodging and Camping

Peak occupancy for motels in the Thunder Bay region of Alpena County occurs during the months of June, July, and August. The months of May, September, and October also seem to have above average occupancy for most motels providing monthly statistics (Pardike 1992). There are four establishments that provide primitive camping and six establishments that provide convenience camping near the Thunder Bay region of Alpena County.

Marine Safety and Law Enforcement

The Officer in Charge of USCG Station Alpena (Auxiliary Operated or AUXOP) coordinates the Thunder Bay area search and rescue (SAR) operations of the Alpena USCG Auxiliary Unit.

The area of SAR responsibility for the Auxiliary Unit is from Sturgeon Point (southern boundary) to Rogers City (northern boundary). The Officer in Charge and the Auxiliary Unit cooperate with the Alpena County Sheriff Department, the Presque Isle Sheriff Department, and the Alcona County Sheriff Department in SAR operations. USCG Station Alpena is comprised of one regular USCG employee (Officer in Charge) under the direction of USCG Group Sault Ste. Marie. The Auxiliary Unit is comprised of 8 private boats and auxiliary operators. A total of two boats and marine safety operators are available from the Alpena County Sheriff Department and Presque Isle County Sheriff Department (Betters, personal communication 1992).

USCG Station Alpena can request additional SAR assistance from USCG Station St. Ignace and USCG Station Tawas City through the Rescue Coordination Center of the USCG 9th District Office in Cleveland, Ohio (Betters, personal communication, 1992). Air rescue and emergency evacuation operations are provided by USCG Air Station Traverse City, which can transport sport divers to a recompression chamber if commercial air service is not available (USCG, personal communication 1995).

The Officer in Charge of the USCG Station Alpena can enforce federal regulations on Lake Huron (Betters, personal communication 1992). State regulations on Lake Huron can be enforced by conservation officers from the Michigan DNR, state police officers, and county sheriffs (Chapman, personal communication 1992). Conservation officers, state police officers, and sheriff deputies are stationed in Alpena.

Conservation officers patrol Thunder Bay approximately once or twice per week during the summer (June-September). Law enforcement responsibilities of these patrols include fishing regulations, the Marine Safety Act, and underwater preserve related violations of Part 761, Aboriginal Records and Antiquities of P. A. 451 (1994), as amended. A low level of law violations recently have been recorded for patrols of Thunder Bay (Chapman, personal communication 1992).

Thunder Bay Education and Research Activities

- Education

Environmental education activities and/or science education in the Thunder Bay region have been conducted by the Alpena Educational Service District, Alpena Community College, Michigan Sea Grant Extension, and the 4-H Program (MSU Extension, personal communication 1992). However, there is an overall lack of coordinated environmental education programming and curricula on Thunder Bay and Lake Huron ecosystems, and the maritime history and underwater cultural resources of the Thunder Bay region.

The Michigan Science Teachers Association (MSTA) held an in-service workshop in Alpena during August 1993 for teachers interested in Great Lakes education, research, and resource

management. During July 1992, the MSTA conducted a work and study cruise for teachers aboard the research vessel *Laurentian* (University of Michigan) in Thunder Bay. Topics of the cruise included Great Lakes sampling methods, physical and biological processes, and underwater cultural resources (MSTA 1992). A product of these workshops and the MSTA Thunder Bay National Marine Sanctuary Project will be curricula on the Great Lakes (and the Thunder Bay region) (Lau, personal communication 1993).

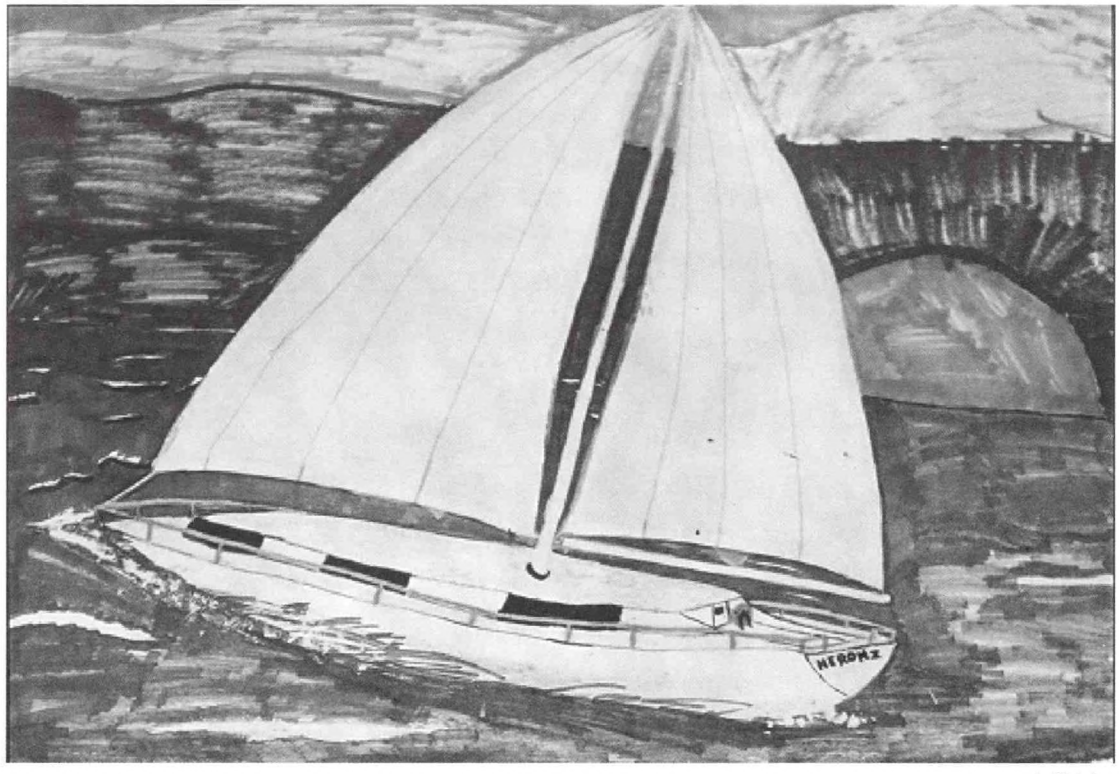
- Research

Organizations conducting research activities in the Thunder Bay region include the following (personal communication with program offices, unless otherwise cited):

State Organizations

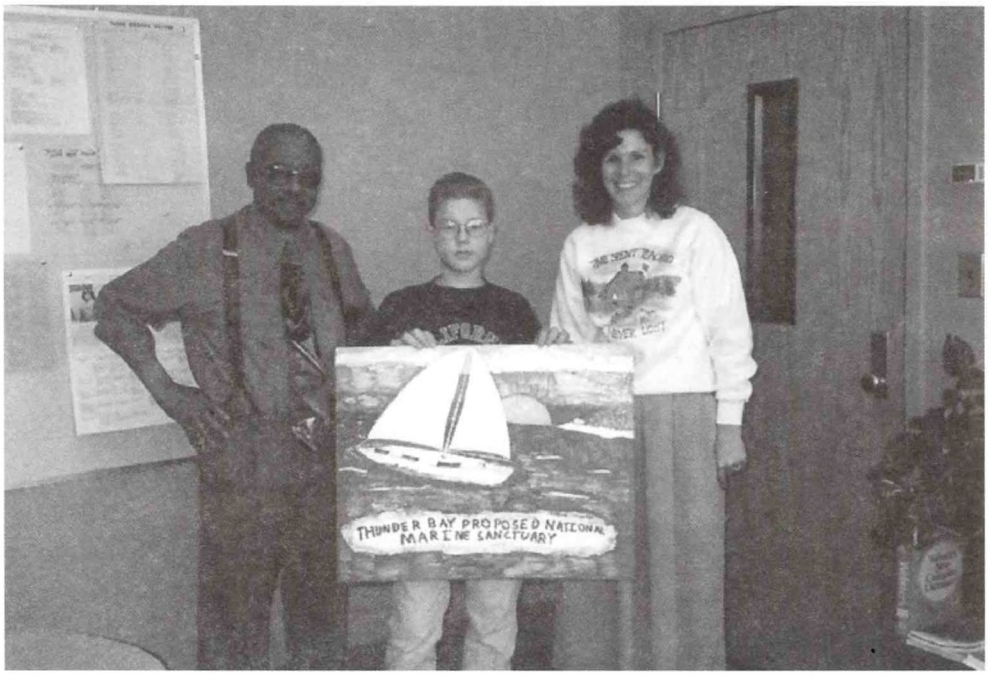
Michigan Department of State (DOS):

Michigan Historical Center- Administers programs in archaeology, historic preservation, and



NOAA

Figure 4.62 Artwork from the "Kids Care About Our Great Lakes" poster contest (1993) sponsored by the Michigan 4-H Program and the National Marine Sanctuary Program.



NOAA

Figure 4.63 The winner of the poster contest sponsored by the Michigan 4-H Program and the National Marine Sanctuary Program.

museums. It includes the Office of the State Archaeologist, and the State Historic Preservation Office.

Michigan Department of Natural Resources (Michigan DNR):

Fisheries Division - Maintains a Great Lakes Research Station in the City of Alpena to conduct fisheries research.

Wildlife Division - Maintains a Field Office in Atlanta and a Research Station in Houghton Lake with responsibilities for wildlife research in Alpena and nearby counties.

Michigan Department of Environmental Quality (Michigan DEQ):

Surface Water Quality Division - Responsible for surface water quality monitoring and research in the Thunder Bay River watershed and other watersheds in the Thunder Bay region. The Division office is in Lansing.

Michigan Coastal Management Program (MCMP) - Funds research related to the Great Lakes coastal zone, shorelands, and bottomlands. The Program office is part of the Land and Water Management Division, located in Lansing.

Michigan State University:

Michigan Sea Grant College Program (MSGCP) - Research, education, and outreach are principal functions of the program. Also, the program conducts technology development and transfer. Research activities include studies of Great Lakes processes, aquatic resources, and social dimensions (MSGCP 1991).

Center for Maritime and Underwater Resource Management (CMURM) - Conducts social research, scientific management studies, and technology transfer involving maritime and underwater resources.

University of Michigan:

Center for Great Lakes and Aquatic Sciences (CGLAS) - The center is comprised of various faculty, research scientists, technicians, and students interested in studying the Great Lakes.

Federal Agencies

U.S. Fish and Wildlife Service (USFWS):

Great Lakes Science Center - Research addresses lake trout rehabilitation, fish population dynamics, habitat studies, chemical contaminants, and non-indigenous (exotic) species. Headquarters is in Ann Arbor. Field work generally takes place at biological stations. The research vessel *Grayling* is based in Cheboygan (NFRC-GL 1992).

Alpena Fishery Resources Office - Provides technical assistance to state, tribal and provincial fishery management agencies, and participates in research studies on Lake Huron.

National Oceanic and Atmospheric Administration (NOAA):

Michigan Sea Grant College Program (MSGCP) - Funds for the program are provided by NOAA and the State of Michigan (see summary under state organizations).

Michigan Coastal Management Program (MCMP) - Funds for research are provided by NOAA and the State of Michigan (see summary under state organizations).

Great Lakes Environmental Research Laboratory (GLERL) - Comprised of two divisions (Biogeochemical Sciences and Physical Sciences); research programs focus on contaminated sediments and the toxicology of organic contaminants, processes affecting the fate of organic contaminants, lake levels and diversions, ecosystem structure and function, nutrient recycling, physical oceanography, climate

change, and the introduction of exotic species. GLERL also participates in research projects with the Cooperative Institute for Limnology and Ecosystems Research (CILER) at the University of Michigan. GLERL is located in Ann Arbor, and maintains the research vessel *Shenehon* for Great Lakes studies (GLERL 1992).

Environmental Protection Agency (USEPA):

The Great Lakes National Program Office (GLNPO) in Chicago conducts and funds research on many aspects of the Great Lakes, and maintains research vessels on the Great Lakes (MSGCP 1992). The USEPA and Environment Canada are guiding the development of Lakewide Management Plans (LAMPs) for each of the Great Lakes, based on an ecosystem approach. These plans will identify ways to reduce and prevent pollution and restore lake ecology (Vigmostad 1992).

U.S. Coast Guard (USCG):

Administers programs in marine safety (including aids to navigation and vessel inspections), recreational boating safety, prevention of oil discharge on the Great Lakes, and federal law enforcement.

4. Environmental Conditions and Natural Resources

Environmental Conditions

Thunder Bay Region Watersheds

A watershed or drainage basin is the area of land from which a lake or stream receives water (Judson et al. 1987). The abiotic and biotic characteristics of watersheds interact to affect the characteristics of a lake, stream, or other body of water. Three watersheds that influence the Thunder Bay region include lands surrounding Lake Huron, county coastal areas, and lands that drain into the Thunder Bay River.

- Lake Huron Watershed

Lake Huron is 206 miles in length and a maximum of 183 miles wide (USEPA and Environment Canada 1988). The total shoreline length is estimated at 3,827 miles, including the shoreline of approximately 30,000 islands found within the lake (USEPA and Environment Canada 1988). Over one-half of the land area comprising the Lake Huron watershed is located in the Province of Ontario, Canada. The remainder of the watershed includes a large portion of the eastern half of Michigan's lower peninsula and a small section of Michigan's upper peninsula. The watershed totals 51,700 square miles (USEPA and Environment Canada 1988).

- Coastal Watersheds

Alpena County, Presque Isle County, and Alcona County contain large coastal watersheds that border Thunder Bay and associated waters of Lake Huron. United States Geological Service (USGS) quadrangle names for Alpena County coastal areas (south to north) include Black River, Spruce, South Point, Ossineke, Alpena, North Point, Thunder Bay Island, Long Lake East, and Middle Island (MUCC 1993; Michigan Geological Survey Division 1991).

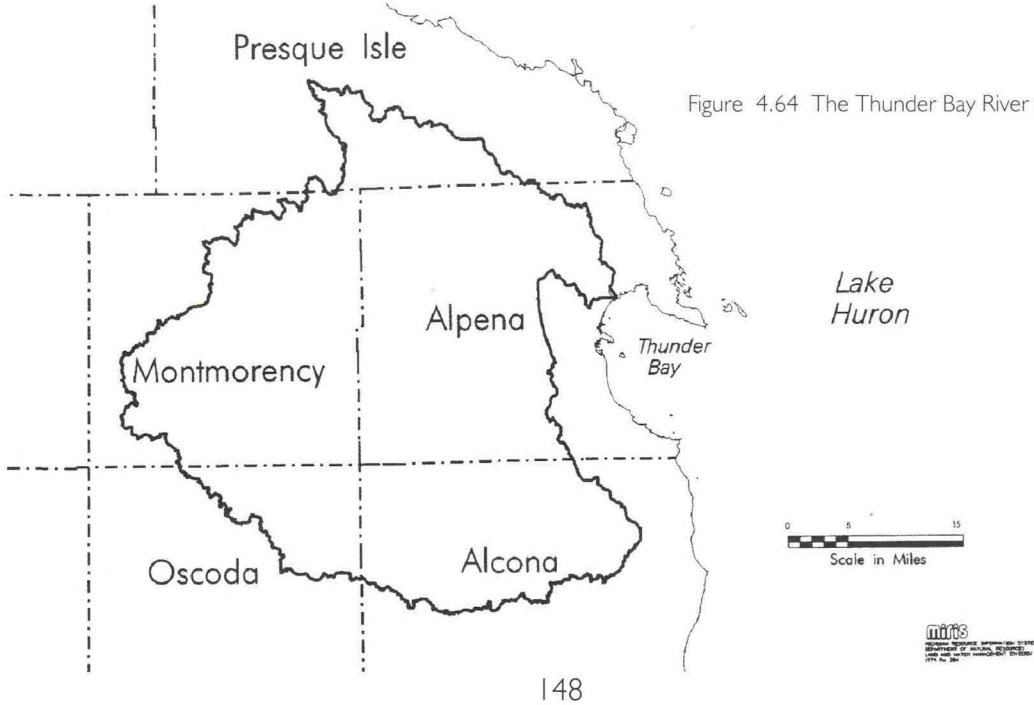


Figure 4.64 The Thunder Bay River watershed.

- Thunder Bay River Watershed

The watershed of a large river usually can be subdivided into a number of secondary watersheds that are drained by tributaries of the river (Judson et al. 1987). The watershed of the Thunder Bay River and its tributaries total approximately 1,200 square miles of land and encompasses approximately two-thirds of Alpena and Montmorency Counties, one-third of Alcona County, and portions of Oscoda and Presque Isle Counties (Figure 4.62) (MRIP 1992; Burton 1981).

Geology

Thunder Bay is located on the northeast perimeter of the ancient Michigan Basin, a depression formed at the end of the volcanic Precambrian Era (Dorr and Eschman 1970). Soils and other geologic materials overlying the Precambrian Era bedrock can be traced to the last glacial period of the Cenozoic Era.

During the Pleistocene Epoch of the Cenozoic Era, a series of glaciers advanced slowly in a southerly direction and then receded to the north over the landscape of present-day Michigan. These glacial events were named Nebraskan, Kansan, Illinoian, and Wisconsinian. The advancing and receding ice lobes deepened and widened the old river valleys that later would become glacial lakes and eventually the present-day Great Lakes basins. As the most recent (Wisconsinian) glaciers receded, they deposited glacial till on the present-day Thunder Bay region. Glacial till is a composite of unconsolidated rock materials of all sizes, including clay, silt, sand, gravel, and boulders.

In addition to the glacial till, lake sediments from glacial lakes that preceded Lake Huron overlay the bedrock of the Thunder Bay region coastal zone and Lake Huron bottomlands. Farrand (1982) classifies the soils along the Alpena County coastal zone as either lacustrine clay and silt (i.e., clay-rich till on low-lying areas formerly inundated by glacial lakes) or dune sand (i.e., fine to medium sand associated with former lake and outwash plains). Because of the thin layer of glacial till over bedrock in many parts of the Alpena County coastal zone, the groundwater under these areas is vulnerable to contamination from surface activities (Lusch 1992a; 1992b).

Thunder Bay has several notable geological features. Carbonate rocks (i.e., limestone and Karst), located in the north-northeast section of Alpena County, extend out into Lake Huron and form a 40 to 75 foot drop-off on the eastern side of Thunder Bay Island. Nearby in Misery Bay are limestone sinkholes (Figure 4.63). In addition, numerous rock shoals and reefs within Thunder Bay have caused many shipwrecks and have provided the impetus for the construction of lighthouses and life-saving stations.

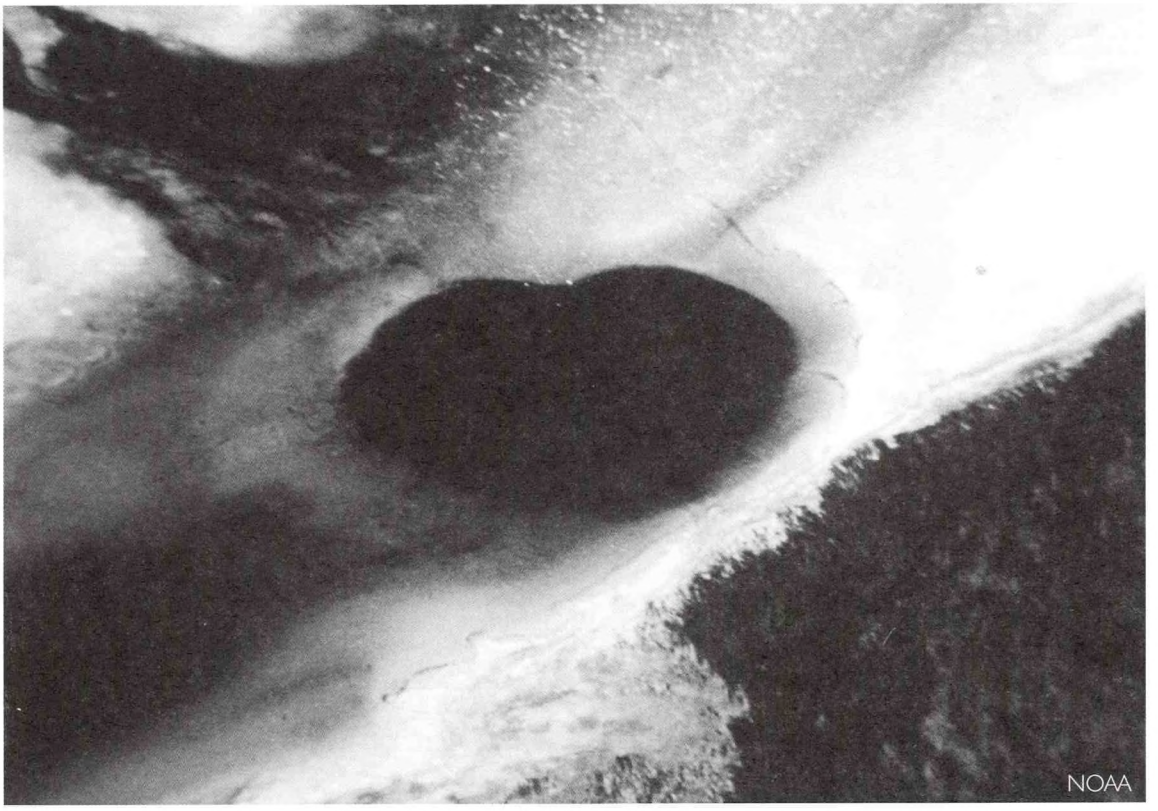


Figure 4.65 A sinkhole and shoal waters in Misery Bay.

Meteorology/Climate

The climate of Alpena is influenced by its location with respect to major storm tracks and the moderating effects of the Great Lakes. Prevailing winds are from the northwest except during May and June when southeast winds predominate (NOAA 1991).

Summers in Alpena are warm and sunny. Record mean temperatures at Alpena for June, July, and August (1873 - 1991) range from the low to mid 60s with an average high of 77° F. Most storms pass to the north of Alpena, often bringing brief showers every few days. Summer showers moving from the southwest weaken and sometimes dissipate as they approach Alpena, although heavy thunderstorms with damaging winds occasionally occur. The mean rainfall is 29.11 inches (NOAA 1991).

The average wintertime storm track is south of Alpena, and most passing storms bring snow. Winter storms often bring winds with an easterly component, and result in a mean snowfall of 85.7 inches. Precipitation from these storms is increased by both the moisture and instability picked up from Lake Huron, and the forced upslope flow as the storms move westward over land. Minimum air temperatures during early

winter are higher than would be expected at this latitude because of the moderating influence of Lake Huron. But as nearby waters freeze over, particularly the Straits of Mackinac, sub-zero temperatures become fairly common by February, lowering the average winter temperature to 13° F. Freezing temperatures have occurred as late as June and as early as late August (NOAA 1991).

Annual Average Meteorological Measures in Alpena, Michigan (NOAA 1991)

Mean Winds	6.7 - 9.2 mph
Mean Rainfall	29.11 inches
Mean Snowfall	85.7 inches

Bottomlands/Bathymetry

The Thunder Bay region of Lake Huron can be segmented into three areas: nearshore, Thunder Bay, and open lake based on the depth of water and distance from shoreline (Figure 4.64) (NOS 1990; NOS 1988). In general, surface sediments within this region are classified as undifferentiated till or bedrock (Dolan et al. 1986). The topography and sediments of bottomlands within these areas can be described as follows (miles are expressed as statute miles):

- Nearshore Areas

The nearshore portion of the Thunder Bay region is defined as the bottomlands extending out to approximately the 25 foot depth contour line. Overall, the area can be characterized as being very shallow and having a gradually sloping to flat gradient. Islands can be found off South, Hardwood, Partridge, and North Points, as well as Rockport and Black River. Bottomland topography includes reefs located off Sulfur Island (Partridge Point) and extending from North Point to Crooked Island. Misery Bay contains exposed and submerged rocks, as well as a sinkhole.

- Thunder Bay

Thunder Bay can be described as an area west of a line from South Point to North Point, but not including nearshore areas previously described. The Bay has a gradually sloping bottom with flats that extend from the nearshore area located off of the Thunder Bay River to the open waters of Lake Huron. Depths range from approximately 25 feet at the eastern boundaries of the nearshore areas to approximately 60 feet at the eastern boundary of Thunder Bay. Sediments of this area include the following: less than 25% clay-size particles; mean grain size of sediments range from 2 to 4 PHI[1] in the northern half of the Bay to less than 2 PHI in the southern half of the Bay; surfice sediments have a pH[2] of 7.0-7.5; and surface sediments have less than .05% nitrogen and less than 0.022% phosphorus, less than .05% P205 (Thomas 1981).

- Open Lake

The open waters of Lake Huron reach a depth of approximately 60 feet at the eastern boundary of Thunder Bay (i.e., on a line from South Point

1. PHI is a scale for grain size of sediments. A PHI size of 2.0 corresponds to medium sand; a PHI size of 4.0 corresponds to fine sand/coarse silt.

2. pH is a scale for acidity (1.0) or alkalinity (14.0). Neutral is 7.0

to North Point), 100 feet about 3 miles lakeward of Thunder Bay, 150 feet about 7 miles lakeward of Thunder Bay, and 200 feet about 14 to 15 miles lakeward of Thunder Bay (i.e., longitude 83 degrees west). The bottomlands are located at increasing depths traveling east from Thunder Bay to the midline of the Lake Huron basin. The maximum depth of Lake Huron is 748 feet (Michigan Sea Grant Extension 1990).

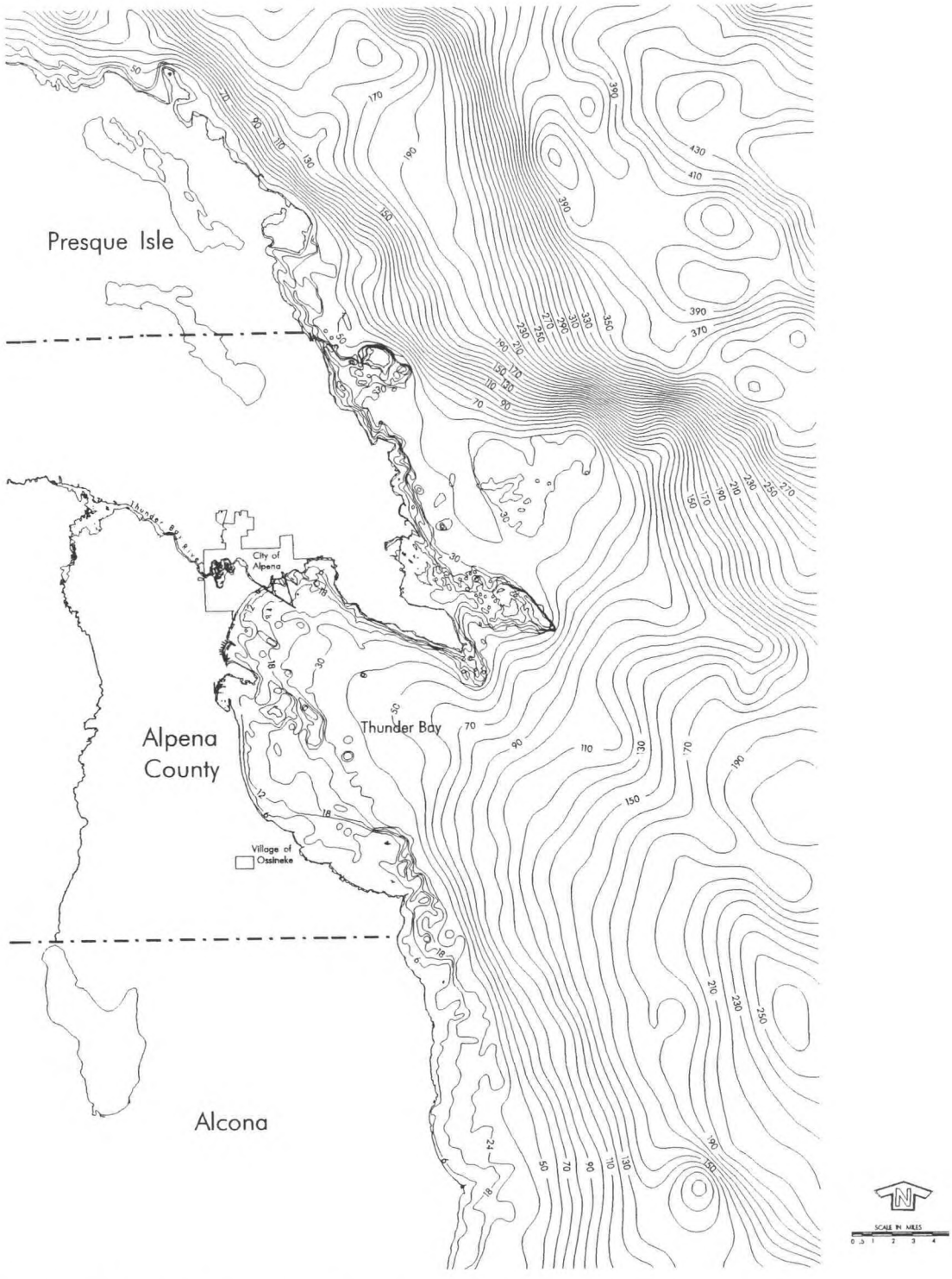


Figure 4.66 Topography of bottomlands in the Thunder Bay Region.

Limnology

- Water Levels

Lake water levels fluctuate monthly and yearly (NOAA 1992). Factors influencing water level changes include precipitation, runoff, temperature and evapotranspiration, meteorological events (i.e., wind and storms), crustal movement (i.e., isostatic rebound or uplifting), flooding and erosion, dredging for navigation improvements, water diversion, regulation of water levels, and water control structures (Great Lakes Commission 1986). The annual average water level for the period of 1982 - 1991 at the three NOAA stations nearest Thunder Bay (Harbor Beach, Harrisville, and Mackinaw City) is slightly over 579 feet above sea level (NOS 1992).

The primary cause of long-term fluctuations in Great Lakes water levels is the amount of precipitation and evapotranspiration from the lakes (USEPA and Environment Canada 1988; Great Lakes Commission 1986). The average annual precipitation on Lake Huron and the Lake Huron watershed ranges between 27.6 and 39.4 inches; annual precipitation in the Thunder Bay region averages 27.6 inches (USEPA and Environment Canada 1988).

In addition to precipitation on the lake surface and runoff from the watershed, Lake Huron receives fresh water from Lake Superior through the St. Marys River and from Lake Michigan through the Straits of Mackinac. Water flow through the St. Marys River into Lake Huron is estimated at 78,000 cubic feet per second; water flow through the Straits into Lake Huron is estimated at 52,000 cubic feet per second (US EPA and Environ. Canada 1988). Lake Michigan and Lake Huron function as one hydraulic unit and have the same water levels due to the direct and substantial connection of these lakes through the Straits of Mackinac (USFWS 1988).

- Thermal Regime and Water Circulation

The annual thermal cycle of Lake Huron and Thunder Bay is typical of that for northern lakes. After ice-out, the shallow nearshore regions heat up faster than offshore areas and large horizontal gradients in temperature can occur during this period. When surface heating has persisted long enough to warm the surface waters of the entire region, the surface waters become vertically stratified. The time of onset of whole-lake stratification can vary from year to year by up to one month, with the latest time of occurance being late June. Once the lake stratifies, the surface waters continue to warm until fall cooling begins. Just as in the spring heating regime, the nearshore waters respond more rapidly to cooler air temperatures than the offshore regions due to their greater thermal mass (GLERL, personal communication 1997).

Although coastline features may suggest that the long term circulation of the Bay is counterclockwise, the dominate circulation pattern is governed by the variances of the wind. Satellite-tracked drifting buoys were used in part of an ongoing study of the circulation and mixing of Thunder Bay (McCormick, personal communication 1997). The drifting buoy data showed

complex water movement within the Bay. Two conclusions are suggested from this study. First, in general, the currents in the Bay are weaker than those experienced in other coastal regions of Lake Huron. Second, there is little persistence of current flow. In the future, computer models will be developed to take further advantage of data sets that enable better understanding and management of Great Lakes and coastal resources (McCormick, personal communication 1997).

Of particular interest within the Thunder Bay region is the long homogeneous water mass observed in 1973 and 1980 that extends along the western shore of Lake Huron from the Straits of Mackinac to Thunder Bay (Moll et al. 1985). This water mass was interpreted by Moll et al. (1985:209) to represent Lake Michigan water entering Lake Huron through the Straits of Mackinac. Regions impacted by Lake Michigan waters were found to have relatively high alkalinity and ion concentrations (Moll et al. 1985).

Saylor and Miller (1991:2) indicate that seiches (i.e., oscillations of water levels caused by winds) drive currents hydraulically eastward and westward through the Straits of Mackinac. The current flow is affected by differences in thermocline levels between Lake Michigan and Lake Huron during the summer. The result is a westward flow of water below the thermocline into Lake Michigan. This inflow of relatively unmixed Lake Huron waters has important implications for water chemistry and biology in northern Lake Michigan. The eastward outflow of surface waters into Lake Huron during the summer is comprised of relatively unmixed Lake Michigan waters (Saylor and Miller 1991). Annual net flow of water from these processes is eastward into Lake Huron.

- Ice Conditions

In general, Thunder Bay receives milder ice conditions than the average for nearshore areas of Lake Huron. The average date of freeze-up is the last week in December and the average date for maximum ice thickness is the second week in February (Bolsenga et al. 1988). Maximum ice thickness averaged 37 cm (14.5 inches) for 1965 - 1979; ice growth averaged approximately 8 mm (.32 inches) per day; and ice dissipation averaged approximately 28 mm (1.10 inches) per day (Bolsenga 1988). The average date of ice breakup was the second week in March (Bolsenga 1988).

Air Quality

The Michigan Air Sampling Network is designed to "measure air quality throughout the state, and consists of over 200 monitoring sensors in 27 counties. The network is operated by the Air Quality Division of the Michigan Department of Environmental Quality (DEQ), city or county agencies, and industries" (Michigan DEQ 1995:11). Alpena County has monitoring sensors for total suspended particulate (TSP), particulate matter, lead, toxic organics, trace metals, and meteorological data. LaFarge Corporation in the City of Alpena began an

industrial monitoring program in 1995 (Michigan DEQ 1995). Results of air quality monitoring is provided in annual and special reports available through the Michigan DEQ.

Water Quality

Much of the concern about changes in Great Lakes water quality has focused on excessive nutrient enrichment (i.e., eutrophication) and toxic contamination (Rossman 1986). Excessive nutrients and toxic contaminants are commonly called pollutants.

Phosphorus enrichment was diagnosed as a problem within Thunder Bay during the 1970s and led to the designation of Thunder Bay as a "problem area" by the International Joint Commission (IJC) in 1977 (Horvath et al. 1981; Waybrant 1977). In response to the problem area designation, the Michigan DNR conducted a water quality study of Thunder Bay in 1980 (Horvath et al. 1981), and the Northeast Michigan Council of Governments (NEMCOG) completed a water quality study of the Thunder Bay watershed in 1980 (Burton 1981).

Horvath et al. (1981) classified the Thunder Bay River mouth as eutrophic, the Alpena Harbor area as mesotrophic (i.e., between eutrophic and oligotrophic), and Thunder Bay waters as oligotrophic. Oligotrophic waters are low in nutrient inputs with low organic production (Wetzel 1983). The Thunder Bay River mouth and Alpena Harbor are relatively small areas in comparison to waters of the Bay. The classification was based on water quality parameters (chlorophyll a, total phosphorus, and secchi depth transparency) and biological indicators (benthic macroinvertebrates). Historical water quality data indicate that the outer Bay has remained stable over time (i.e., 1960s - 1980) and that water quality in Alpena Harbor has improved slightly (Horvath et al., 1981). Results from the study of the Thunder Bay watershed in 1980 indicate that the Thunder Bay River was generally of high water quality, although there were localized areas of water quality degradation (Burton 1981).

With the exception of some screening for heavy metals by Horvath et al. (1981), there is minimal site specific data on toxic contaminants in Thunder Bay. Horvath et al. (1981) indicated that heavy metals were generally found at, or below, detection levels in Thunder Bay during 1980, except for elevated iron concentrations found in the Thunder Bay River and elevated zinc concentrations at certain sampling stations in July.

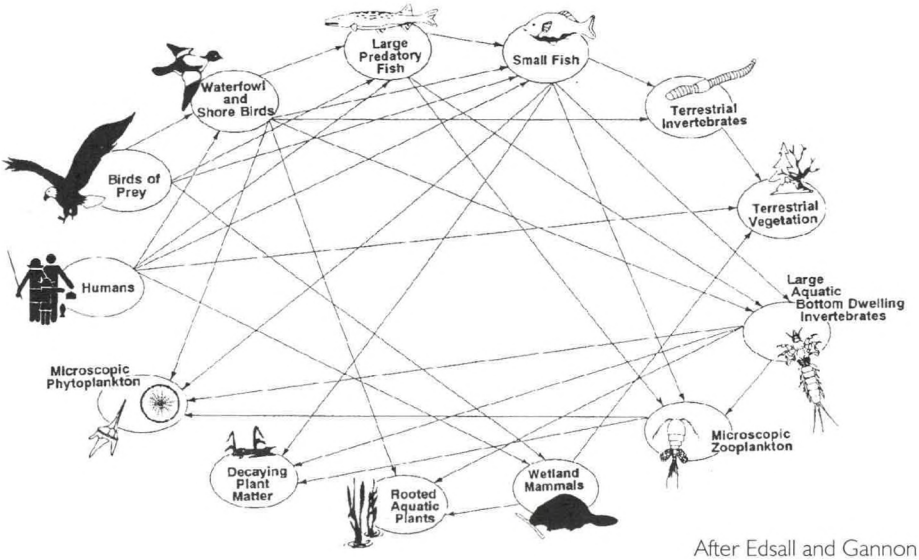
The Fish Contaminant Monitoring Program (FCMP) is administered by the Surface Water Quality Division of the Michigan Department of Environmental Quality (DEQ). "The goals of the FCMP are to: (1) evaluate whether fish contamination problems exist in specific surface waters; (2) identify spatial differences and temporal trends in the quality of Michigan's surface waters with respect to persistent, bioaccumulative chemicals; (3) evaluate whether existing pollution prevention, regulatory, and remedial programs are effectively eliminating or reducing chemical

contamination in the aquatic environment; and (4) support the establishment or removal of public health sport fish consumption advisories by the Michigan Department of Public Health" (Michigan DEQ 1995b:1). Fish contaminant monitoring methods used in the Thunder Bay region include wild fish edible portion monitoring, wild fish (whole fish) trend monitoring, river mouth caged fish trend monitoring, and special caged fish studies (Michigan DEQ 1995b). Results of these studies have been provided in annual and special reports since 1983.

Since 1973, the Great Lakes Water Quality Board of the IJC has identified Areas of Concern (originally called "problem areas"). These are areas where "the 1972 (revised in 1978) Great Lakes Water Quality Agreement objectives of jurisdictional standards, criteria, or guidelines established to protect uses have been exceeded and remedial measures are necessary to restore all beneficial uses" (IJC 1987:37). The three Areas of Concern nearest Thunder Bay are the Saginaw River system and Saginaw Bay, the St. Marys River, and the Spanish River in Ontario, Canada (IJC 1987). Remedial action plans are being prepared by the IJC under guidance from the Great Lakes Water Quality Board in order to restore beneficial uses in the Areas of Concern (IJC 1987).

Natural Resources

The Proposed Thunder Bay National Marine Sanctuary would protect and manage the underwater cultural resources (e.g., shipwrecks, historical remains of docks and wharves, and underwater prehistoric sites) of the Thunder Bay region. As proposed, the Sanctuary would not protect or manage the region's natural resources (e.g., wetlands, islands, wildlife, and aquatic organisms). The natural resources of the Thunder Bay region are described in the DEIS because they are an important part of the maritime cultural landscape and scenery of the region.



After Edsall and Gannon (1993)

Figure 4.67 Generalized food web for Lake Huron waters of the Thunder Bay region.

Wetlands

Herdendorf et al. (1980) indicated that approximately 7,417 acres of coastal wetlands exist in the Thunder Bay region; about half of this total acreage is located within the South Thunder Bay Wetland (Figure 4.66). Over 99% of the coastal wetlands located within the Thunder Bay region were classified as palustrine systems by Herdendorf et al. (1980). Palustrine systems include a broad range of wetlands usually dominated by trees, shrubs, persistent emergents, emergent mosses, and lichens; these systems include wetlands traditionally termed marshes, swamps, bogs, and fens (Cowardin et al. 1979). Several wetland areas have been designated by the State of Michigan as *Environmental Areas*. The purpose of these Environmental Areas is to protect critical fish and wildlife habitat.

Islands

Twenty-eight islands are found east of Alpena County (Table 4.11) and within the South Thunder Bay Wetland east of Alcona County. Some very small islands or protruding rocks located offshore of Partridge Point and Bare Point in Squaw Bay or elsewhere are not included in this total (Taylor, personal communication 1992).

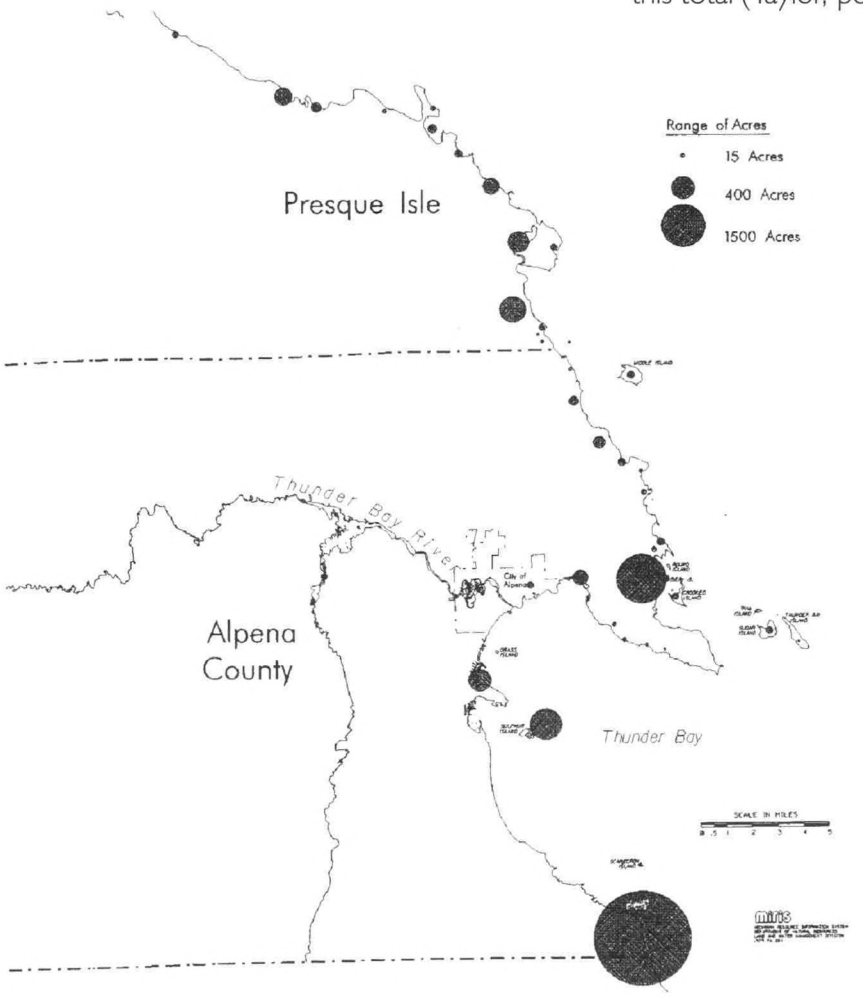


Figure 4.68 Coastal wetlands in the Thunder Bay region.

Table 4.11 Islands in Lake Huron, east of Alpena and Alcona Counties (some islands have multiple owners).

# of Islands	Total Acreage	Range of Acreage	Ownership			
			County	State	Federal	Private
28	964.56	.3 - 280.0	1	18	2	9

Aquatic Plants

A comprehensive field survey of aquatic plants within the Thunder Bay region has not been completed. Herdendorf et al. (1980) identified some plant species probably occurring in coastal wetlands of the region, primarily through literature review. Wells et al. (1992) identified plant species found on some islands and associated wetlands in the region during a 1987 census.

Makarewicz et al. (1989) studied phytoplankton in the offshore regions of Lake Huron in 1983 - 1985. Phytoplankton are small, plantlike organisms comprised of photosynthetic pigments that constitute the base of primary productivity within lake ecosystems (Wetzel 1983).

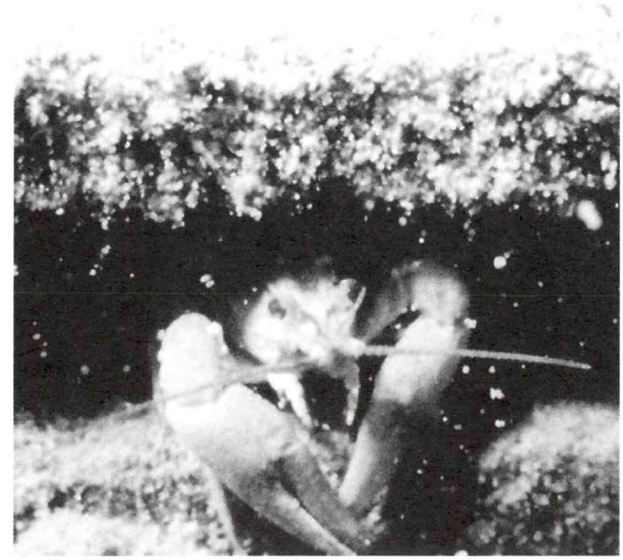
Aquatic Animals

Aquatic animals are an important part of the food web for Lake Huron waters of the Thunder Bay region. Aquatic animals that may be viewed near shipwrecks include benthic invertebrates, such as sponges, hydras, aquatic worms, crayfish, freshwater shrimp, univalve snails, bivalve clams and mussels, and aquatic insects (Pennak 1989; Wetzel 1983). Other aquatic animals that may not be visible by eye include zooplankton (primarily Rotifera, Cladocera, and Copepoda).

- Fish

In general, the fish inhabiting the Thunder Bay region can be characterized as forage and predator species. The preferred habitat of these fish varies with the species and the stages of their life cycle (Scott and Crossman 1973; Hubbs and Lagler 1964).

Important forage fish stocks in Lake Huron include whitefish, alewives, rainbow smelt, bloaters, deepwater sculpin, slimy sculpin, ninespine stickleback, and trout-perch (Argyle 1991). Other forage species found in Lake Huron include lake herring and suckers (USFWS 1988). Most forage species can usually be found



Thunder Bay Divers

Figure 4.69 Crayfish in the shelter of a Thunder Bay shipwreck.

inshore near the lake bottom in search of food. Some species, such as the bloater (Coregonus hoyi), other ciscoes or "chubs," and deepwater sculpin, prefer deepwater habitats (Scott and Crossman 1973; Hubbs and Lagler 1964).

Predatory fish species found in Lake Huron include lake trout, brown trout, rainbow trout (steelhead), coho salmon, chinook salmon, pink salmon, walleye, yellow perch, and burbot (USFWS 1988). These species can be found in a wide range of depths within inshore and offshore areas of the lake, feeding upon forage fishes (Scott and Crossman 1973; Hubbs and Lagler 1964). To a large extent, the locations of predatory fishes are dependent upon the abundance and distribution of forage fishes.

With the exception of burbot and sea lamprey, the predatory fishes are important recreational fishery species (Rakoczy and Rogers 1990). The recreational fishery is maintained through international sea lamprey control programs, the rearing and stocking of certain fish species by state, provincial and federal governments, and fishing regulations (USFWS 1988).

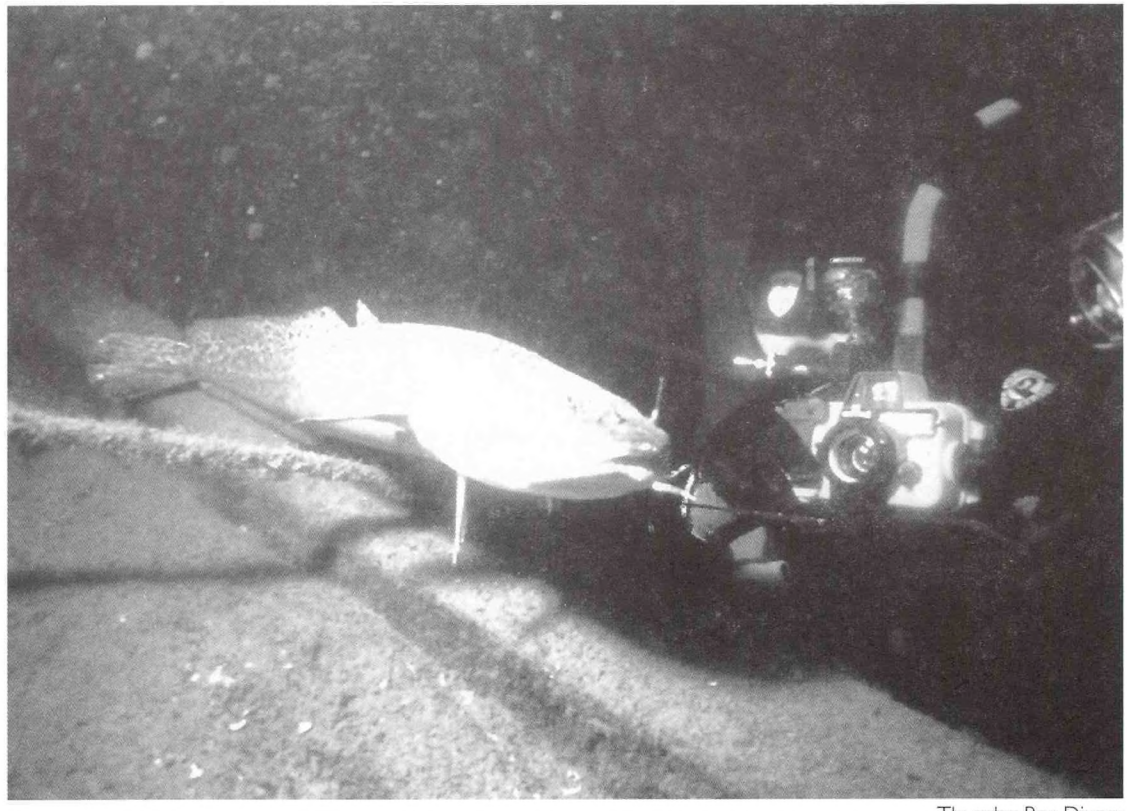
Fish species observed around shipwrecks and other scuba diving sites in the Thunder Bay region include alewife, brown trout, burbot, carp, channel catfish, northern pike, salmon, smallmouth bass, splake, steelhead, yellow perch and walleye (McConnell, personal communication 1992; Warner and Holecek 1975). A sizable population of smallmouth bass was reported on the *Molly T. Horner* site; large channel catfish were reported on the steamer *Johnson* (Warner and Holecek 1975). Warner and Holecek (1975) also suggest that the Misery Bay sinkholes and the limestone wall near Thunder Bay Island are good locations for viewing fish species.

- Reptiles and Amphibians

With the exception of some records presented by Herdendorf et al. (1980), the literature review did not reveal site specific information on reptiles and amphibians of the Thunder Bay region. A similar conclusion was made by the U.S. Fish and Wildlife Service (1988) in relation to the coastal wetlands of Lake Huron. Species of reptiles and amphibians recorded for Alpena County that may inhabit the Thunder Bay region include the mudpuppy, Jefferson salamander, American toad, wood frog, green frog, northern leopard frog, eastern smooth green snake, northern water snake, northern brown snake, northern ribbon snake, eastern garter snake, massasauga rattlesnake, snapping turtle, and midland painted turtle (Harding and Holman 1990; Holman et al. 1989; Herdendorf et al. 1980:773-774).

- Birds

A total of approximately 160 breeding bird species were recorded for all habitat types in Alpena County from 1983 - 1988 (Brewer et al. 1991). Bird species with the greatest number of observations in open water habitats of Michigan's northern lower peninsula include American coot, barn swallow, belted kingfisher, Canada goose,



Thunder Bay Divers

Figure 4.70 Burbot and scuba diver on a Thunder Bay shipwreck.

great blue heron, green-backed heron, mallard, tree swallow, and wood duck (Brewer et al. 1991). Killdeer and spotted sandpiper were frequently observed on shoreland habitats; caspian tern, common tern, herring gull, and ring-billed gull typically nest in shore and beach habitats (Brewer et al. 1991). There has also been a large increase in cormorants (McCormick, personal communication 1997).

Winter bird use of Lake Huron is generally low. Species commonly reported during the winter include mallard, common goldeneye, common merganser, and red-breasted merganser; these species occur as scattered groups throughout open water shoreline areas (USFWS 1988:32).

- Mammals

Very little site specific information is available on mammals of the Thunder Bay region. However, the northern half of the Lake Huron basin is known to provide "excellent habitat for big game, small game, and furbearers" (USFWS 1988:71). Big game mammals include white-tailed deer, black bear, and a small population of elk in the northeast lower peninsula of Michigan (USFWS 1988; Baker 1983). Small game animals include snowshoe hare, eastern cotton-tail, grey fox, and red squirrel (USFWS 1988).

Mammals that may utilize the coastal wetlands of the Thunder Bay region include eastern cotton-

tail, snowshoe hare, beaver, meadow vole, muskrat, red fox, raccoon, long-tailed weasel, mink, river otter, and white-tailed deer (Herdendorf et al. 1980:760). The wetlands of Lake Huron are essential habitat for beaver, muskrat, mink, and river otter (USFWS 1988:72). For detailed information on the distribution, life histories, and habitat preferences of Michigan mammals, consult Baker (1983).

- Aquatic Nuisance Species

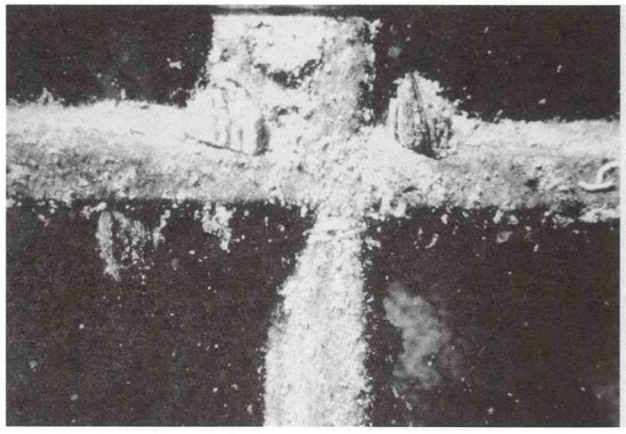
The four primary aquatic nuisance species in the Thunder Bay region are the zebra mussel, the spiny water flea, the sea lamprey, and the Eurasian ruffe. An aquatic nuisance species is defined as a waterborne, non-indigenous organism that threatens: (1) the diversity or abundance of native species, (2) the ecological stability of infested waters, or (3) a commercial, agricultural, aquacultural, or recreational activity dependent on infested waters (Michigan DNR 1995).

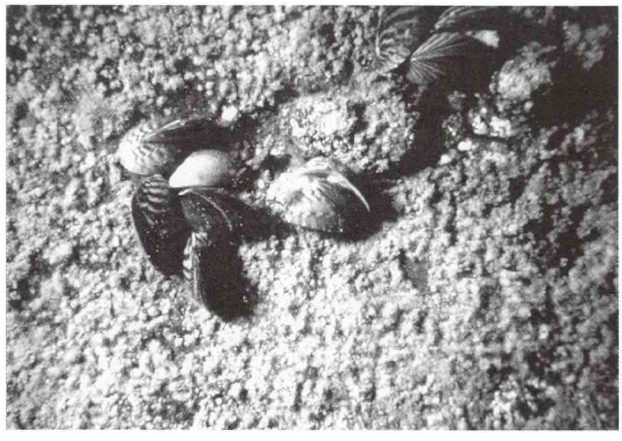
The populations of sea lamprey are controlled through application of the chemical lampricide TFM to Great Lakes streams. Presently, there are only two streams within the proposed Sanctuary boundary that are on the treatment schedule (McClain, personal communication 1995).

- Endangered, Threatened, or Rare Species

No comprehensive studies of endangered, threatened, or rare species have been conducted within the proposed Sanctuary boundary.

Fish and bird species known to occur within the proposed Sanctuary boundary that are currently on Michigan and federal lists of endangered, threatened, and rare species are identified in Tables 4.12 and 4.13.





Thunder Bay Divers

Figure 4.71 (above) and 4.72 (below) Zebra mussels have colonized shipwrecks in the Thunder Bay region.

Table 4.12 Listing of State of Michigan endangered, threatened, and rare species.

	Endangered	Threatened	Rare	Special Concerns
Fish	None	Channel Darter Lake Sturgeon Shortjaw Cisco Sauger	None	Kiyi
Birds	None	Caspian Tern Common Tern Common Loon Osprey Red Shouldered Hawk	None	Black-crowned Night Heron

Table 4.13 Listing of federal endangered, threatened, and rare species.

	Endangered	Threatened	Rare	Special Concerns
Fish	None	None	None	Shortjaw Cisco Lake Sturgeon Deepwater Cisco Kiyi
Birds	None	Bald Eagle	None	None

Section 5
Alternatives

SECTION 5
ALTERNATIVES

Proposed Alternatives for the Thunder Bay National Marine Sanctuary

- NOAA would designate Thunder Bay as a National Marine Sanctuary. All levels of government, organizations, and businesses would work together to comprehensively manage the underwater cultural resources of the Thunder Bay region in the context of the maritime cultural landscape.

- The Thunder Bay NMS boundary would run north to Presque Isle Harbor, south to Sturgeon Point Lighthouse and lakeward to longitude 83 degrees west. This boundary alternative is 808 square miles.

- NOAA would adopt regulations similar to those used in other Sanctuaries to protect underwater cultural resources. These regulations would be consistent with State of Michigan regulations.

- Permits would be issued either by the State of Michigan, a federal agency, or NOAA: for some activities, the State of Michigan would issue permits under state law related to underwater cultural resources. For other activities, NOAA would review and authorize permits from other federal agencies, or may issue its own permit.

A. Introduction

The Alternatives section provides a comparative analysis of a reasonable range of possible federal actions, in this case whether to designate a National Marine Sanctuary, and if so, what the Sanctuary may look like in terms of boundary, regulatory, and administrative alternatives. These alternatives are compared in terms of the resources and human uses identified in Section 4, The Sanctuary Setting, and in light of the relative environmental consequences from the various agency actions (alternatives) that may be taken. Public input on the alternatives and their impacts is important in the decision-making process. The State of Michigan and NOAA will consider public comments when deciding whether there should be a Sanctuary. If there is going to be a Sanctuary, public input is highly beneficial to the cooperative development of how the Sanctuary would look, what programs and services the Sanctuary would offer, and who would administer and enforce the regulations.

The Alternatives section presents four sets of alternatives related to the designation and management of the Proposed Thunder Bay National Marine Sanctuary (Figure 5.1). The information provided in this section should help to answer the following questions:

1. Should Thunder Bay be designated as a National Marine Sanctuary?

If the Thunder Bay National Marine Sanctuary is designated:

2. What should the boundaries be?

3. What should the NOAA Sanctuary regulations include?

4. How should the permit system be administered?

All of the alternatives are based on the determination that a Thunder Bay National Marine Sanctuary would focus solely on the shipwrecks and other underwater cultural resources of the region, and not be involved in the protection or management of natural resources. This determination was made as a result of the feasibility process where it was determined that NOAA would not be involved in the management of natural resources.

Comprehensive ecosystem management of natural resources was rejected during the feasibility process as a management option by the Thunder Bay Core Group. This was based in part on a conclusion that the State of Michigan has adequate authority to manage natural resources in Thunder Bay. To review the minutes of the Core Group meeting, refer to Volume II, Appendix H.

The alternatives, therefore, consider the natural resources of Thunder Bay in terms of their scenic or aesthetic qualities, and only as they relate to the cultural landscape of the region. However, NOAA seeks comment on whether the proposed Sanctuary should also manage natural resources.

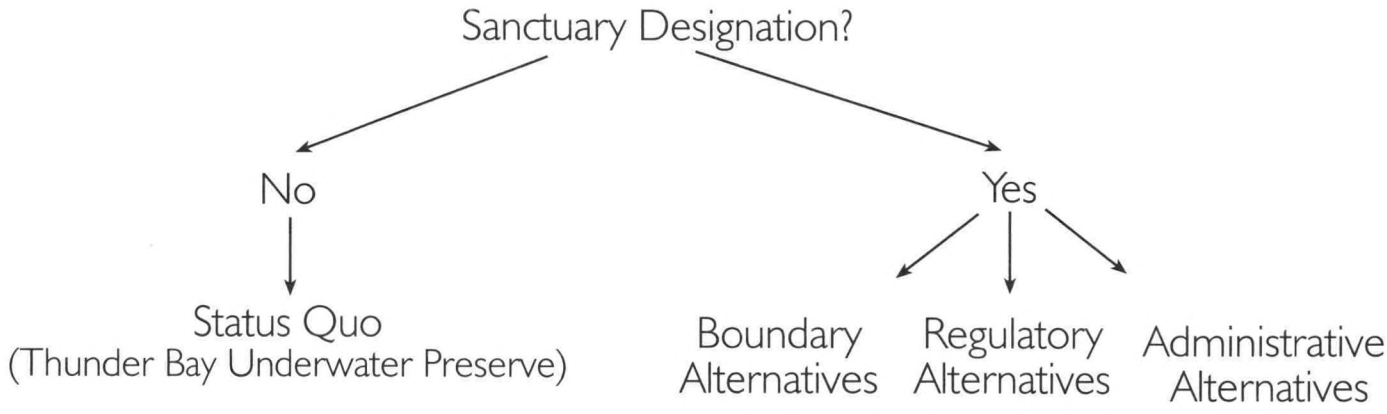


Figure 5.1 Alternatives related to the designation and management of the Proposed Thunder Bay NMS.

Summary of Proposed Alternatives

Sanctuary Designation Alternatives

A. No Sanctuary designation: NOAA would not designate Thunder Bay as a National Marine Sanctuary (the "status quo" or "no action" alternative). Thunder Bay would continue to be administered as a State of Michigan underwater preserve.

B. Sanctuary designation: NOAA would designate and establish the Thunder Bay National Marine Sanctuary. All levels of government, organizations, and businesses would work together to comprehensively manage the underwater cultural resources of the Thunder Bay region in the context of the maritime cultural landscape *(NOAA's proposed alternative)*.

If NOAA designates the Thunder Bay National Marine Sanctuary, the following additional alternatives and questions need to be discussed:

Boundary Alternatives

A. Existing Thunder Bay Underwater Preserve: NOAA would adopt the existing state-designated underwater preserve, which is 290 square miles, as the Sanctuary boundary.

B. Alpena County latitudes: NOAA would use the northern and southern latitudes of Alpena County and extend the lakeward boundary to longitude 83 degrees west. This boundary alternative is 448 square miles.

C. Presque Isle Harbor to Sturgeon Point: NOAA would adopt a northern boundary marked by the northernmost Presque Isle Lighthouse, and a southern boundary marked by the Sturgeon Point Lighthouse. The boundary would extend lakeward to longitude 83 degrees west and would establish a Sanctuary of 808 square miles *(NOAA's proposed alternative)*.

continued on next page

Summary of Proposed Alternatives (continued)

Regulatory Alternatives

A. State of Michigan: NOAA would adopt regulations that mirror the State of Michigan regulations to protect underwater cultural resources.

B. Other Sanctuaries: NOAA would adopt regulations similar to those used in other Sanctuaries to protect underwater cultural resources. The regulations would be consistent with the State of Michigan regulations *(NOAA's proposed alternative)*.

Administrative Alternatives

A. Permits issued by NOAA: All Sanctuary permits would be issued solely by NOAA. These Sanctuary permits would be in addition to existing permits issued by state and/or other federal agencies. The State of Michigan would be involved in the review of Sanctuary permits through Section 106 of the National Historic Preservation Act.

B. Permits issued either by the State of Michigan, a federal agency, or NOAA: (1) the State of Michigan would continue to issue permits under state law related to underwater cultural resources; (2) for activities involving permits from other federal agencies, NOAA would address Sanctuary concerns through the review and authorization, and if necessary, the placing of conditions on the federal permits; or (3) for an activity adversely impacting underwater cultural resources but that requires neither a state permit nor a permit from another federal agency, a Sanctuary permit would need to be obtained directly from NOAA in order to conduct the activity *(NOAA's proposed alternative)*.

I. Sanctuary Designation Alternatives

A. No Sanctuary designation: NOAA would not designate Thunder Bay as a National Marine Sanctuary (the "status quo" or "no action" alternative). Thunder Bay would continue to be administered as a State of Michigan underwater preserve.

Under Designation Alternative A, existing management authorities (federal, state, tribal, and regional agencies) having responsibilities in the Thunder Bay region would retain authority and Thunder Bay would not be designated as a National Marine Sanctuary. The long-term protection and management of Thunder Bay underwater cultural resources would remain with existing local, state, federal, and tribal authorities and programs.

Management of underwater cultural resources in Michigan is defined by Part 761, Aboriginal Records and Antiquities of P. A. 451 (1994), as amended, and Part 325, Great Lakes Submerged Lands of P. A. 451 (1994), as amended. In addition, the federal Abandoned Shipwreck Act (ASA) of 1987, applies to certain abandoned shipwrecks in Michigan waters.

Part 761, Aboriginal Records and Antiquities of P. A. 451 authorizes the establishment of Michigan underwater preserves to protect "abandoned property of historical value, or ecological, educational, geological, or scenic features or formations having recreational, educational, or scientific value." Part 325, Great Lakes Submerged Lands of P. A. 451 provides for oversight and control of activities on state-owned bottomlands of the Great Lakes. See Volume II, Appendices D and E, for the full text of these state laws.

Under Designation Alternative A, the existing legal protection now provided by Part 761 in the underwater preserves would be provided throughout the Sanctuary. However, these existing laws have gaps which leave certain underwater cultural resources unprotected from commercial salvage and personal collection. With no additional Sanctuary regulations, there would be no supplemental protection of underwater cultural resources that are not protected under the existing legal regime. For additional discussion on this topic, refer to the regulatory alternatives in this section.

The Michigan Department of Environmental Quality's (DEQ) Land and Water Management Division and the Department of State's (DOS) Michigan Historical Center are responsible for the management of the Thunder Bay Underwater Preserve, as well as for underwater cultural resources outside of the Preserve boundaries. The Michigan Underwater Salvage and Preserve Committee provides technical and other assistance to the Director of the DEQ and the Secretary of DOS for actions relating to Michigan underwater preserves and the management of underwater cultural resources (e.g., creation of preserves, permit applications, permit fees, legislation, and rules).

Examples of ongoing projects in the Alpena and the Thunder Bay Underwater Preserve include mooring buoys, interpretive signs and displays. These projects are funded through grants issued by the Michigan Coastal Management Program in cooperation with non-profit organizations in Alpena. Development of informational materials and maintenance of mooring buoy systems are supported through the volunteer efforts of the Thunder Bay Underwater Preserve Committee and the Alpena Area Chamber of Commerce. Outreach and technical assistance are provided by Michigan Sea Grant Extension, Michigan State University, and The University of Michigan.

Dedicated state funding and staff support, however, are limited for administration of the Thunder Bay Underwater Preserve and the management of underwater cultural resources. Currently, the DEQ and DOS each have only one staff person to oversee the underwater preserve

program, which consists of ten underwater preserves. The primary responsibility of the existing staff is to review permit applications and address other regulatory issues raised by the public. The one staff person in the DEQ works on two programs and is estimated to work only 10-15% of his time on the underwater preserve program. Given the number of underwater preserves and the limited staff, adequate time and resources are not available at present to develop coordinated educational, research and enforcement efforts, particularly efforts dedicated to underwater cultural resources and the associated maritime heritage of the Thunder Bay region.

With the designation of a Thunder Bay National Marine Sanctuary, resources could be allocated to strengthen partnerships that assist in the comprehensive management of underwater cultural resources, and to provide additional resources for education, research, monitoring, and enforcement.

B. Sanctuary designation: NOAA would designate Thunder Bay as a National Marine Sanctuary. All levels of government, organizations, and businesses would work together to comprehensively manage the underwater cultural resources of the Thunder Bay region in the context of the maritime cultural landscape (NOAA's proposed alternative).

Under Designation Alternative B, NOAA would designate Thunder Bay as a National Marine Sanctuary. The Sanctuary would provide supplemental protection of underwater cultural resources, and supplemental resources for education, interpretation, personnel, research, and administration. This would lead to comprehensive management of underwater cultural resources for the Thunder Bay region. NOAA estimates that the Thunder Bay National Marine Sanctuary would receive about $200,000 in federal funds from NOAA each year.

Section 3 of this document, Draft Management Plan, describes many of the proposed activities that NOAA, the State of Michigan, local agencies, nonprofit organizations, and other partners could undertake. Section 4, The Sanctuary Setting, identifies the underwater cultural resources, other resources, and the human uses of those resources and Thunder Bay in general. Section 6 identifies the environmental, social, and economic impacts from each of the alternatives.

The implications of designating a Sanctuary are described below in the context of the boundary alternatives, regulatory alternatives and administrative alternatives.

2. Boundary Alternatives

This section discusses boundary alternatives for the Proposed Thunder Bay National Marine Sanctuary. These boundary alternatives evolved as a result of information collected for the Thunder Bay Region Inventory of Resources (Vrana 1993) and through input received from regional experts and community members throughout the feasibility process.

During the feasibility process, NOAA considered a boundary that ran north to Presque Isle Harbor, south to Sturgeon Point Lighthouse, and eastward in an arc formation so the point of the arc touched longitude 83 degrees west. Given the similarity to another boundary alternative (described below as Boundary Alternative C), NOAA decided to include only one of these boundary alternatives for the following reasons: (1) the number of known, probable, and suspected shipwrecks is similar to the arc boundary and (2) it would be very difficult to identify, administer, and enforce a boundary with an arc.

Boundary Alternatives

A. Existing Thunder Bay Underwater Preserve: NOAA would adopt the existing state-designated underwater preserve, which is 290 square miles, as the Sanctuary boundary.

B. Alpena County latitudes: NOAA would use the northern and southern latitudes of Alpena County and extend the boundary lakeward to longitude 83 degrees west. This boundary alternative is 448 square miles.

C. Presque Isle Harbor to Sturgeon Point: NOAA would adopt a northern boundary marked by the northernmost Presque Isle Lighthouse, and a southern boundary marked by the Sturgeon Point Lighthouse. The boundary would extend lakeward to longitude 83 degrees west and would establish a Sanctuary of 808 square miles *(NOAA's proposed alternative)*.

All boundary alternatives would include Thunder Bay proper and encompass almost all of the existing Thunder Bay Underwater Preserve. Boundary Alternatives B and C would omit a small portion of the eastern boundary of the Preserve which extends lakeward just beyond longitude 83 degrees west. The landward extent of all boundary alternatives would be Lake Huron's ordinary high water mark and, therefore, would not affect any activities on land (Figure 5.2).

Criteria were selected to evaluate boundary alternatives. Selection of criteria was based on the goals of the NMS Program, the goals of the Proposed Thunder Bay NMS, and the needs of the State of Michigan and regional communities.

The criteria include:

1. Known, probable, and suspected locations of shipwrecks in the Thunder Bay region;

2. Known and probable locations of nationally historic shipwrecks in the Thunder Bay region;

3. Maritime cultural landscape of the Thunder Bay region, including lighthouses/lifesaving stations, known and suspected historic and prehistoric sites, natural and aesthetic resources, and coastal communities;

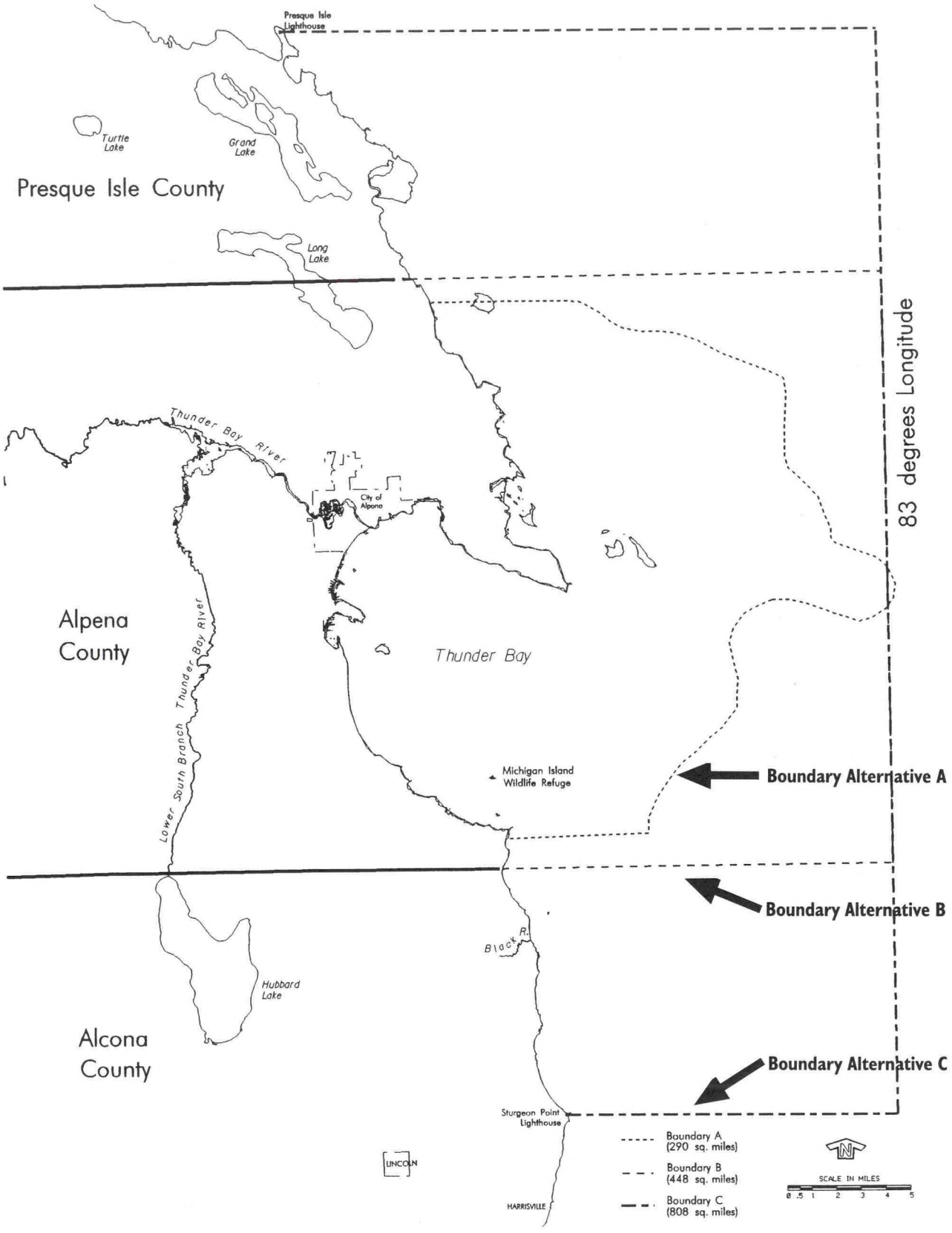


Figure 5.2 Boundary alternatives for the Proposed Thunder Bay NMS.

4. Accessibility to underwater cultural resources and associated Sanctuary facilities and services;

5. Existing and potential infrastructure for community recreation and tourism, and other Sanctuary support services (i.e., education, research); and

6. Effectiveness and efficiency of Sanctuary management and administration.

Criterion 1: Known, probable, and suspected shipwrecks

The location of shipwrecks is an important criterion in determining the boundary of the Sanctuary, because these resources are the focus for designation. Underwater cultural resources are any submerged historical or cultural feature, including shipwrecks, piers and wharves, Native American sites, and other historic or prehistoric sites. In terms of shipwrecks, known total losses are defined as vessels for which archaeological evidence and/or strong historical documentation (three primary sources or more) confirm the existence and location where they were stranded, foundered, burned/exploded, or abandoned. Probable total losses include those vessels for which oral tradition, one or more historical primary sources, or three or more reliable secondary sources, confirm their location. Suspected total losses encompass those shipwrecks listed in secondary sources, but not confirmed by primary documents, oral tradition, or archaeological fieldwork.

Criterion 2: Nationally historic shipwrecks

The mission of the NMS Program is to manage nationally significant ecological and cultural resources within marine and Great Lakes environments for the benefit of current and future generations. Therefore, the boundaries of the Sanctuary must encompass those underwater cultural resources having national historic significance, as well as those having regional or local significance. For additional discussion on national significance, refer to Section 4, The Sanctuary Setting.

Criterion 3: Maritime cultural landscape

The Proposed Thunder Bay National Marine Sanctuary should be considered in the context of the maritime cultural landscape of the region. Cultural landscape is defined as a geographic area including the following components: cultural and natural resources; coastal environments; and human communities and related scenery that is associated with historic events, activities, or persons, or that exhibits other cultural or aesthetic values (NPS 1992). Most of the cultural landscape would not be regulated or managed by NOAA because the landward boundary of the Sanctuary would stop at the

ordinary high water mark. However, NOAA could work in partnership with other agencies, organizations, and businesses to develop research and education programs that encourage residents and visitors to understand, appreciate, and become stewards of the maritime cultural landscape.

In determining the boundaries of the Sanctuary, the lighthouses/lifesaving stations, historic and prehistoric coastal sites, and associated coastal communities should be considered as part of the cultural landscape. The quality of the cultural landscape provides context and meaning to the management, education, and research programs of the Sanctuary. The quality of the cultural landscape also enhances or detracts from the experiences of Sanctuary visitors.

Criterion 4: Accessibility to the Sanctuary resources and associated facilities and services

The primary mission of the NMS Program is to protect resources while facilitating existing and multiple uses within the Sanctuary to the extent compatible with the primary mission. This cannot be accomplished without the active involvement and interaction of Sanctuary users with Sanctuary resources, facilities, and programs. Visitors to the Sanctuary must have access to the resources found within the boundaries of the Sanctuary, and to the facilities and services associated with the Sanctuary. Consistent with the federal Abandoned Shipwreck Act (ASA) of 1987, recreational divers are guaranteed access to shipwreck dive sites. Similarly, the Proposed Thunder Bay NMS must provide programs that are meaningful and accessible to visitors, divers and non-divers alike. Criterion 4 focuses on the facilities and services that are directly connected or enhance accessibility to Lake Huron and the resources of the Sanctuary.

Criterion 5: Infrastructure for recreation, tourism, and Sanctuary support services

Because it is important for visitors to have access to the resources and programs of the Sanctuary, an infrastructure must be available to accommodate and support visitors. The infrastructure has the potential to enhance or detract from the experiences of visitors. This infrastructure could include public boat launching facilities, water-based recreation services (e.g., charter services and canoe rentals), maritime attractions (e.g., museums, interpretive centers, and historic structures), conference facilities, and research/education facilities. Infrastructure is considered for the following coastal communities that are either within or near the boundaries of the Sanctuary: Harrisville, Black River, Ossineke, Alpena, Presque Isle, and Rogers City.

Criterion 6: Effectiveness and efficiency of Sanctuary management

Consideration must be given to maximizing the effectiveness and efficiency of Sanctuary management. Many aspects of Sanctuary management are included in Criteria 1-5. However, other aspects deserve consideration. These include the ability to identify the Sanctuary boundary by a

user, and the availability or proximity of enforcement personnel and visitor safety services in relation to the boundaries of the Sanctuary. Enforcement personnel could include the U.S. Coast Guard, Michigan DNR Conservation Officers, Michigan State Police, and the Sheriff Marine Patrols. Visitor safety providers include the U.S. Coast Guard, hospitals, and hyperbaric facilities (for scuba divers).

Summary of Boundary Alternatives A, B, and C

A larger number of known, probable, and suspected shipwrecks, as well as those shipwrecks of potential national historic significance would be included in Boundary Alternative C, as compared to Boundary Alternatives A and B (Tables 5.1 and 5.2; Figure 5.3). The shipwrecks of potential national historic significance are the *Havre, H. Hubbard, Kyle Spangler, John F. Warner, James Mowatt, New Orleans, Grecian*, and the *Isaac M. Scott* (Martin 1996). Potential national historic significance was evaluated by Martin (1996) using criteria of the National Historic Landmark Program.

Table 5.1 Number of known, probable, and suspected shipwrecks by boundary alternative.

Boundary	# of Known Shipwrecks	# of Probable Shipwrecks	# of Suspected Shipwrecks	Total
A	26	71	15	**112**
B	28	73	15	**116**
C	34	83	43	**160**

Table 5.2 Shipwrecks of potential national historic significance.

Boundary	Vessels with Known Locations	Vessels with Probable Locations	Vessels with Suspected Locations
A	*John F. Warner, New Orleans, Grecian*	*Kyle Spangler*	*Havre, H. Hubbard*
B	*John F. Warner, New Orleans, Grecian*	*Kyle Spangler*	*Havre, H. Hubbard*
C	*John F. Warner, New Orleans, Grecian*	*Kyle Spangler, Isaac M. Scott, James Mowatt*	*Havre, H. Hubbard*

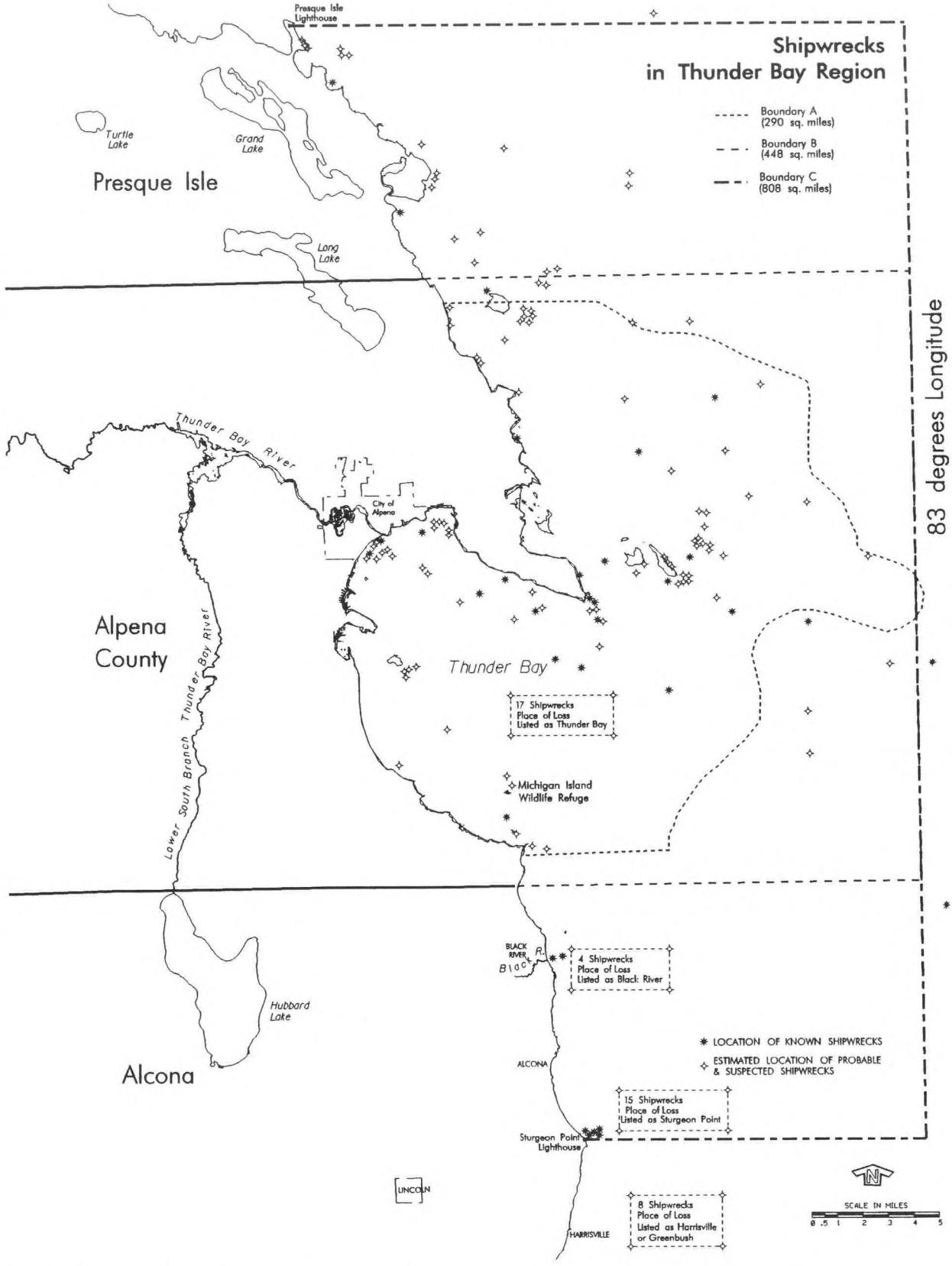
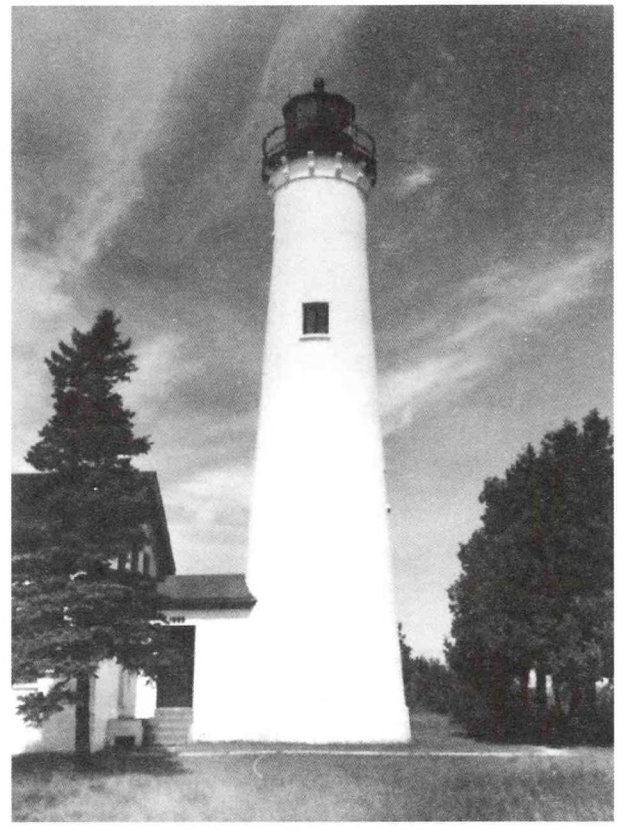


Figure 5.3 Locations of known shipwrecks, and estimated locations of probable and suspected shipwrecks within boundary alternatives of the Proposed Thunder Bay NMS.

It is important to consider the coastal maritime resources adjacent to Sanctuary boundaries as part of the maritime cultural landscape, although the boundaries of the Sanctuary would not extend beyond the ordinary high water mark. Coastal maritime resources include lighthouses/ lifesaving stations, and historic and prehistoric sites. Boundary Alternatives A and B would be adjacent to the Lighthouses at Middle Island and Thunder Bay Island, while Boundary Alternative C would also include the Sturgeon Point Lighthouse and Presque Isle Lighthouses (Figure 5.4 and 5.5). Boundary Alternative C would be adjacent to all of Negwegon State Park, known to have numerous coastal historic and prehistoric sites (Table 5.3).

The Penrose Family

Figure 5.4 Presque Isle Lighthouse, constructed in 1870.



Michigan Historical Center

Figure 5.5 Sturgeon Point Lighthouse, constructed in 1869.

Table 5.3 Maritime cultural landscape.

Boundary	Lighthouses/ Lightsaving Stations	Other Historic and Prehistoric Coastal Sites	Islands	Coastal Communities	Diversity of Natural Landscape
A	Thunder Bay Island Lighthouse, Middle Island Lighthouse	Devils River prehistoric shrine, Devils River burial ground, Norwegian Creek settlement, Hooley Creek settlement, Thunder Bay Island and Sugar Island commercial fishing camps	Bird, Scarecrow, Sulpher, Grass, Crooked, Misery, Round, Sugar, Thunder Bay, Gull, Middle, and 15 unnamed Islands	Alpena, Ossineke	Wetlands of Squaw Bay, residential development of Partridge Point; Alpena City harbor and waterfront development; undeveloped rocky shoreline of North Point; residential development of Thunder Bay: undeveloped Islands with the exceptions of Middle Island and Thunder Bay Island Lighthouses; Middle Island Lighthouse as a visible boundary endpoint.
B	Same as Boundary A	Same as Boundary A	Same as Boundary A	Same as Boundary A	Sandy beach frontage at Negwegon Park; wetlands of Squaw Bay; residential development of Partridge Point; Alpena City harbor and waterfront development; undeveloped rocky shoreline of North Point; residential development of Thunder Bay; undeveloped Islands with the exception of Middle Island and Thunder Bay Island Lighthouses.
C	Same as Boundary A, and Sturgeon Point Lighthouse, Presque Isle Lighthouses	Same as Boundary A	Same as Boundary A	Same as Boundary A, and Harrisville, Black River, Presque Isle, Roger City	Sturgeon Point Lighthouse as a visible boundary endpoint; miles of sandy frontage at Negwegon State Park; wetlands of Squaw Bay, residential development of Partridge Point; Alpena City harbor and waterfront development; undeveloped rocky shoreline along North Point; minimal residential development of Misery Bay; undeveloped islands with the exception of Middle Island and Thunder Bay Island Lighthouses; minimal residential development from Rockport to Presque Isle; Presque Isle Lighthouse as a boundary endpoint.

Boundary Alternatives A and B would extend to about the middle of the Park. An equal number of islands would be adjacent to the Sanctuary in all boundaries, with the exception of Black River Island off Alcona County, included in Boundary C.

Alpena would be the central coastal community in all of the proposed boundaries. Boundary Alternatives A, B, and C would be adjacent to or include the community of Ossineke. Boundary Alternative C would also be adjacent to or nearby Harrisville, Black River, Presque Isle, and Rogers City. All boundary alternatives would have diverse natural scenery along the shoreline.

Access to Sanctuary resources, associated facilities and services, and interaction with Sanctuary visitors is important to the comprehensive management of the Sanctuary. Access points include coastal parks, public beaches, harbors and marinas, and coastal visitor centers and museums. Boundary Alternatives A, B, and C would have similar numbers of parks and beaches with the exception of Negwegon State Park. Boundary Alternative C would be adjacent to all of Negwegon State Park, an addition of approximately three miles of public beaches and coastal resources. Boundary Alternative C could provide significant opportunities for visitor interaction and access to Sanctuary resources by being adjacent to the public boat launch site at Rockport and to Presque Isle Harbor. Presque Isle Harbor includes a public marina, two lighthouses, and a visitor center. Boundary Alternative C would also be adjacent to the Sturgeon Point Lighthouse and its associated visitors' center and museum. Boundary Alternatives A and B would not be adjacent to any existing coastal visitor center and/or museum.

Many of Alpena's facilities and services would be available for all boundary alternatives. The larger area of Boundary Alternative C would include local charter boat operators in Presque Isle and Alcona counties; public boat launching facilities at Presque Isle, Rockport, and Black River; and the lighthouses at Sturgeon Point and Presque Isle. Boundary Alternative C would also have more diverse infrastructure (i.e., facilities and services) available due to the close proximity to Rogers City and Harrisville (Tables 5.4 and 5.5).

Table 5.4 Accessibility to the Sanctuary resources, and associated facilities and services.

Boundary	Coastal Parks & Other Public Coastal Lands	Miles of Public Beaches (approximate)	Public Harbors, Marinas	Private Harbors & Marinas	Coastal Visitor Centers/ Museums
A	Bay View Park, Thompson Park, Blair Street Park, Mich-e-ke-wis Park, Ossineke (Sanborn) Park, Ossineke State Forest, Negwegon State Park (northeastern corner)	5.75	Alpena Municipal Marina	Partridge Point Marina	0
B	Same as Boundary A	6.0	Same as Boundary A	Same as Boundary A	0
C	Same as Boundary A, and Negwegon State Park, Huron National Forest	8.75	Same as Boundary A, and Presque Isle Harbor	Same as Boundary A	Sturgeon Point Lighthouse, Presque Isle Lighthouses

Jesse Besser Museum

Figure 5.6 An ice boat on Thunder Bay around the turn of the 20th century.

Table 5.5 Infrastructure for tourism, recreation, and Sanctuary support services.

Boundary	Coastal Communities	Water-based Recreation Services	Conference Facilities	Education/ Research Facilities	Public Boat Launching Facilities	Maritime Attractions
A	Alpena, Ossineke	Thunder Bay Divers, Trout Scout Chartering, Charlie's Charters, DES Charter Service, Fishin' Fun Charter Service, Lake & Stream Charter Service, Bay Charters, Bounty Hunter, Three Harbors	Alpena Community College, Alpena Civic Center, Alpena Holiday Inn	Alpena Community College	Alpena Municipal Marina, North Riverfront Park, Devil's River Mouth, Ossineke State Forest Campground, Snug Harbor	Jesse Besser Museum
B	Same as Boundary A	Same as Boundary A	Same as Boundary A	Same as Boundary A	Same as Boundary A, and Rockport	Same as Boundary A
C	Same as Boundary A, and Harrisville, Black River, Presque Isle, Rogers City	Same as Boundary A	Same as Boundary A	Same as Boundary A	Same as Boundary A, and Rockport, Presque Isle Harbor.	Same as Boundary A, and Sturgeon Point Lighthouse, Presque Isle Lighthouses

In terms of effectiveness and efficiency of Sanctuary operation, Boundary Alternative A is already recognized as the existing Thunder Bay Underwater Preserve. Boundary Alternative B would be identified by the north and south boundaries of Alpena County, which lack obvious landmarks. Boundary Alternative C would be the most recognizable boundary because the north and south boundaries are lighthouses and the lakeward boundary is longitude 83 degrees west. Potentially, more enforcement personnel would be available for Boundary Alternative C because it would include Alcona and Presque Isle Counties (Table 5.6).

Tables 5.6 Effectiveness and efficiency of Sanctuary management.

Boundary	Ease of Boundary Recognition	# of Possible Agency Resources and Enforcement Personnel Accessible to Boundary	Visitor Safety Services
A	One visible endpoint with Middle Island Lighthouse; 150 ft contour line	Alpena County Sheriff's Marine Patrol (1 full time; volunteers; 1 30ft boat) 15 Coast Guard (1 full time; 1 seasonal; Coast Guard Auxiliary; 1 boat); Michigan State Police for dive recovery; Michigan DNR Conservation Officers	Alpena Community Hospital, recompression chambers in Kalamazoo and Milwaukee, WI
B	No visible endpoints (county lines); 83 degrees longitude west	Same as Boundary A	Same as Boundary A
C	Two visible endpoints- Sturgeon Point Lighthouse and Presque Isle Lighthouses; longitude 83 degrees west	Same as A plus, Alcona County Sheriff's Marine Patrol (2 part time; 1 boat) Presque Isle County Sheriff's Marine Patrol (1 full time; 1 boat); Michigan DNR Conservation Officers (2 in Alcona County with 1 boat)	Same as Boundary A

Boundary Alternative C: NOAA's Proposed Alternative

Boundary Alternative C (north to Presque Isle Harbor, south to Sturgeon Point Lighthouse, and lakeward to longitude 83 degrees west) is NOAA's proposed boundary alternative. This boundary is proposed because it would include the greatest number of shipwrecks known to be in the Thunder Bay region, and encompass the greatest area for protecting those shipwreck sites having probable or suspected locations in the region. The larger boundary of the Sanctuary would allow for continued research efforts to locate, identify, and assess these shipwrecks. Boundary Alternative C would protect the known locations of the shipwrecks identified as having potential special national significance.

Boundary Alternative C would be an excellent complement to the maritime cultural landscape and is representative of the maritime history of the Thunder Bay region. The boundary would be readily identifiable, marked by the Sturgeon Point Lighthouse to the south, and the Presque Isle Lighthouses to the north. Both Sturgeon Point and Presque Isle Lighthouses have visitor centers and museums, which would allow for easy access by Sanctuary visitors. The eastern boundary of the Sanctuary (longitude 83 degrees west) would also be readily identifiable. Boundary Alternative C would include or be adjacent

to all of the primary coastal wetlands and the islands of the Thunder Bay region.

Boundary Alternative C would be adjacent to all of Negwegon State Park, and its coastal historic and prehistoric sites. The Park contains approximately seven miles of undeveloped sandy and rocky beaches which would provide access to the Sanctuary. Close proximity of the Sanctuary to Negwegon State Park would help to foster the development of partnerships with the Park for education and research activities. Boundary Alternative C would also be near many other state, county, and city coastal parks along the shoreline. Alpena would be the central community to Boundary Alternative C. Boundary Alternative C would also be adjacent to or nearby the communities of Harrisville, Black River, Ossineke, Presque Isle and Rogers City. This regional network of communities, spanning three counties and constituting two congressional districts, would provide a diverse infrastructure for supporting Sanctuary programs, services, and visitors. These multiple political districts could further strengthen the vision of cooperative and participatory management of the underwater cultural resources of the Thunder Bay region. All levels of government could share a collective responsibility to retain and protect those underwater cultural resources.

In summary, Boundary Alternative C is the proposed boundary alternative because it would protect a collection of shipwrecks that are representative of Great Lakes maritime history and have potential national historic significance. Boundary Alternative C would best complement and enhance the cultural landscape and maritime history of the Thunder Bay region. The boundary would be readily identifiable to Sanctuary visitors, staff, and enforcement personnel, and by other agencies with management responsibilities in the region. It would provide high quality access for visitors using Sanctuary resources and for Sanctuary staff interacting with visitors.

3. Regulatory Alternatives (Regulations to Protect Underwater Cultural Resources)

Regulatory alternatives describe substantive options for protecting underwater cultural resources of the Proposed Thunder Bay National Marine Sanctuary. The evaluation of regulatory alternatives was conducted as a series of meetings that included written materials developed by NOAA and the Thunder Bay Core Group (for a more complete discussion of this process, refer to Section 2, Background). As part of this process, NOAA and the Thunder Bay Core Group concluded that there was no evidence of negative impacts upon the natural resources. Because the national significance of Thunder Bay natural resources and ecosystems were not established, the conclusion was made that a comprehensive ecosystem management approach was not needed. The regulatory alternatives, therefore, focus only on underwater cultural resources.

The regulatory alternatives identified for the Proposed Thunder Bay National Marine Sanctuary are:

Regulatory Alternatives

A. State of Michigan: NOAA would adopt regulations that mirror the State of Michigan regulations protecting underwater cultural resources.

B. Other Sanctuaries: NOAA would adopt regulations similar to those used in other Sanctuaries to protect underwater cultural resources. The regulations would be consistent with the State of Michigan regulations *(NOAA's proposed alternative)*.

A. State of Michigan: NOAA would adopt Sanctuary regulations that mirror the State of Michigan regulations protecting underwater cultural resources.

Under Regulatory Alternative A, NOAA would adopt Part 761, Aboriginal Records and Antiquities, of Public Act 451 (1994), as amended, and Part 325, Great Lakes Submerged Lands, of Public Act 451 (1994), as amended.

The Sanctuary regulations would mirror the state regulations and apply to the entire Sanctuary, rather than just the Thunder Bay Underwater Preserve. In particular, the Sanctuary regulations would provide for the control of "hand-taking" of artifacts from all locations within Sanctuary boundaries. Under Part 761, Aboriginal Records and Antiquities of P. A. 451, a person may recover abandoned property outside an underwater preserve without a permit if the abandoned property is not attached to or located near the immediate vicinity of and associated with a sunken aircraft or watercraft, and if the abandoned property is recoverable by hand without mechanical or other assistance. Under Regulatory Alternative A, "hand-taking" activities would be prohibited within the boundaries of the Sanctuary, including locations outside of the Thunder Bay Underwater Preserve. This represents the most significant change between the state regulations and the Sanctuary regulations under Regulatory Alternative A.

From a resource protection perspective, Alternative A would not protect as many underwater cultural resources. State law is limited in scope to protecting "abandoned" property. Abandoned property is defined under Part 761, Section 324.76101 as "an aircraft; a watercraft, including a ship, boat, canoe, skiff, raft or barge; the rigging, gear fittings, trappings, and equipment of an aircraft or watercraft; the personal property of the officers... which have been deserted, relinquished, cast away, or left behind and for which attempts at reclamation have been abandoned by owners and insurers. Abandoned property also means materials resulting from activities of historic and prehistoric Native Americans." Adopting Sanctuary regulations that mirror Part 761 would leave historic shipwrecks that are not abandoned unprotected by Sanctuary regulations.

B. Other Sanctuaries: NOAA would adopt regulations similar to those used in other Sanctuaries to protect underwater cultural resources. The regulations would be consistent with the State of Michigan regulations (NOAA's proposed alternative).

Under Regulatory Alternative B, NOAA would adopt Sanctuary regulations that are generally used in other National Marine Sanctuaries to protect underwater cultural resources. The regulations would be consistent with the purpose and intent of the state regulations under Part 761, Aboriginal Records and Antiquities, of P. A. 451 (1994), as amended, and Part 325, Great Lakes Submerged Lands, of P. A. 451 (1994), as amended. These types of Sanctuary regulations have proven to be an effective safety net for protection of underwater cultural resources (*Craft v. National Park Service* 34 F. 3d 918 [9th Cir. 1994]).

The Sanctuary regulations, (Section 922.192 (a)) under Regulatory Alternative B would prohibit "disturbing, moving, removing, injuring, possessing or attempting to disturb, remove or injure, or possess underwater cultural resources," both within the boundaries of the Thunder Bay Underwater Preserve and throughout the boundaries of the Sanctuary. The regulations would also prohibit the alteration of the lakebottom if such an activity caused an adverse impact on underwater cultural resources.

The following activities would not be subject to the Sanctuary regulations if they did not adversely impact underwater cultural resources: anchoring vessels; traditional fishing operations (as defined in the regulations); and minor projects as defined in Part 325, Great Lakes Submerged Lands of P. A. 451 (1994), as amended.

In accordance with the MOU and Section 106 of the National Historic Preservation Act, applications for permits involving activities identified in the MOU would be reviewed by the State Historic Preservation Office and NOAA. Permits that strictly adhere to the Sanctuary regulations and/or relevant state law would be deemed to be in compliance with Section 106 of the National Historic Preservation Act and would not require approval of the federal Advisory Council on Historic Preservation. Permits that do not strictly adhere to the Sanctuary regulations and/or relevant state law would be subject to Section 106 review.

The Sanctuary regulations as proposed under Regulatory Alternative B, would expand coverage to all shipwrecks, and not just "abandoned" shipwrecks, as defined under state law and the federal Abandoned Shipwreck Act. The Sanctuary regulations would, therefore, serve as a federal safety net for state underwater cultural resources that the State of Michigan may be unable to protect under either state law or the Abandoned Shipwreck Act.

For the full text of NOAA's proposed regulations, refer to Section 3, Draft Management Plan (Attachment 2, pages 58 - 74).

Regulatory Alternative B:
NOAA's Proposed Alternative

NOAA's proposed alternative is Regulatory Alternative B, to adopt regulations similar to those used in other Sanctuaries to protect underwater cultural resources (Part 922, National Marine Sanctuary Program Regulations). The Sanctuary regulations would be consistent with State of Michigan regulations protecting underwater cultural resources. Protection would be provided for underwater cultural resources that are not covered by existing state law (i.e., property that is not abandoned), and would provide a better safety net of protection for underwater cultural resources that are covered by state law. It is important to note that under Regulatory Alternative B, the state permit programs under Part 761, Aboriginal Records and Antiquities of P. A. 451 and Part 325, Great Lakes Submerged Lands of P. A. 451 would remain in effect. The Sanctuary regulations would build upon and strengthen these existing state programs.

While Part 761, Aboriginal Records and Antiquities of P. A. 451 and the federal Abandoned Shipwreck Act cover only abandoned property, the Sanctuary regulations would be broader and could regulate activities affecting property that is not abandoned. Implementation of the Sanctuary regulations would be limited, however, to activities in which no "taking" of private property would occur. While Sanctuary regulations could not prohibit a person who owns artifacts on a non-abandoned shipwreck from removing these artifacts, the Sanctuary program could require that individual to provide a report to NOAA and the State of Michigan on the contents removed and to videotape the shipwreck for documentation purposes. This broader coverage of underwater cultural resources is possible because NOAA would become a trustee of underwater cultural resources if Thunder Bay is designated as a National Marine Sanctuary.

The provision for protecting non-abandoned shipwrecks is more important due to the *Brother Jonathan* decision in the 9th Circuit Court of Appeals (*Deep Sea Research v. The Brother Jonathan*, 102 F. 3d 379 [9th Cir. 1996]). This decision appears to limit the term "abandoned" used by states in protecting underwater cultural resources under state law, as well as under the federal Abandoned Shipwreck Act. A January 1997 decision on a Michigan case by the 6th Circuit Court of Appeals is consistent with the *Brother Jonathan* decision in regard to the issue of abandonment (*Fairport International Exploration, Inc. v. The Shipwrecked Vessel Known as The Captain Lawrence*, No. 95-1783 [6th Cir. 1997]).

If states are increasingly limited in the number of shipwrecks and other underwater cultural resources that are under their jurisdiction, the protection of these resources is reduced. By adopting Sanctuary regulations that are similar to those used in other Sanctuaries to protect

underwater cultural resources, the State of Michigan and NOAA would have greater authority to protect more of these resources.

Along with federal designation and regulations, public concerns arise in regard to federal intrusion into state and local matters and the loss of

What Does the State of Michigan Regulate Now?

Aboriginal Records and Antiquities (Part 761 of Public Act 451)

- Requires a joint permit from the Department of Environmental Quality and the Department of State for the taking of abandoned property (e.g., shipwrecks and associated artifacts that have been deserted, relinquished, cast away, or left behind, and for which attempts at reclamation have been abandoned by owners and insurers).

- Allows for the "hand-taking" (the taking of artifacts without mechanical assistance) of certain abandoned property outside underwater preserve boundaries.

- Applies only to "abandoned" property.

- The DEQ may assess fines for violations.

Great Lakes Submerged Lands (Part 325 of Public Act 451)

- Requires a permit and/or lease, deed, or other agreement from DEQ for the following activities on Great Lakes bottomlands:

  - dredging and/or filling bottomlands below the ordinary high water mark;
  - placement or alteration of a structure on bottomlands below the ordinary high water mark; and
  - development, construction, and operation of a marina or other commerical structures.

- The DEQ may issue minor permits, as defined under the Part 325 administrative rules, if the proposed activity of a minor nature is not controversial, has minimal adverse environmental impact, etc.

- The DEQ may assess fines for violations.

Figure 5.7 What the State of Michigan regulates now.

What is Different in the Proposed Sanctuary Regulations?

If the Thunder Bay National Marine Sanctuary is designated, relevant State of Michigan regulations (Part 761 and Part 325) would continue to be implemented in the Sanctuary boundary.

The following aspects of the proposed Sanctuary regulations would be different than what is currently regulated under State of Michigan law:

- "Hand-taking" of artifacts outside the Thunder Bay Underwater Preserve, but still within the Sanctuary boundary, would be prohibited.

- Underwater cultural resources (e.g., historically, culturally, or archaeologically significant shipwrecks) would be protected regardless of whether they are "abandoned." For example, such resources may not be moved or injured without a permit.

- As an additional enforcement mechanism, NOAA could assess civil penalties under the National Marine Sanctuaries Act for violation of Sanctuary regulations.

Figure 5.8 What is different in the proposed Sanctuary regulations.

What Would the Sanctuary Regulations NOT DO?

The Sanctuary regulations:

- would not assess a user fee for individuals to be in the Sanctuary;

- would not regulate or manage natural resources such as wetlands, fish, wildlife, or water;

- would not regulate activities on land; the inland boundary of the Sanctuary would stop at the ordinary high water mark (shoreline);

- would not prohibit fishing activities;

- would not limit access to fishing areas;

- would not create "no fishing" zones; and

- would not interfere with fish stocking programs, or fishery research projects.

Figure 5.9 What the Sanctuary regulations would not do.

state management and control over state resources. These concerns are addressed in general terms as part of the administrative alternatives. Particular attention is given to the proposed provision that provides for administration of permits by the State of Michigan for certain activities affecting the underwater cultural resources.

4. Administrative Alternatives

There are two administrative alternatives related to how the Sanctuary regulations would be administered if Thunder Bay is designated as a National Marine Sanctuary.

Administrative Alternatives

A. Permits issued by NOAA: All Sanctuary permits would be issued solely by NOAA. These Sanctuary permits would be in addition to existing permits issued by state and/or other federal agencies. The State of Michigan would be involved in the review of Sanctuary permits through the National Historic Preservation Act Section 106 process.

B. Permits issued either by the State of Michigan, a federal agency, or NOAA: (1) the State of Michigan would continue to issue permits under state law related to underwater cultural resources; (2) for activities involving permits from other federal agencies, NOAA would address Sanctuary concerns through the review and authorization, and if necessary, the placing of conditions on the federal permits; or (3) for an activity adversely impacting underwater cultural resources but that requires neither a state permit nor a permit from another federal agency, a Sanctuary permit would need to be obtained directly from NOAA in order to conduct the activity *(NOAA's proposed alternative).*

A. Permits issued by NOAA: All Sanctuary permits would be issued solely by NOAA. These Sanctuary permits would be in addition to existing permits issued by state and/or other federal agencies. The State of Michigan would be involved in the review of Sanctuary permits through the National Historic Preservation Act Section 106 process.

Under Administrative Alternative A, the State of Michigan would continue to administer its permit programs under Part 761, Aboriginal Records and Antiquities of P.A. 451 (1994) as amended, and Part 325, Great Lakes Submerged Lands of P.A. 451 (1994) as amended. However, in addition to a permit applicant applying for a state permit, the applicant would also apply for a Sanctuary permit if the activity was prohibited by Sanctuary regulations. For example, if an individual proposed to salvage artifacts from an abandoned shipwreck, that individual would apply for both a state permit under Part 761 and a Sanctuary permit. The State of Michigan would have the option of being involved in the review of all Sanctuary permits through the National Historic Preservation Act Section 106 process.

B. Permits issued either by the State of Michigan, a federal agency, or NOAA: (1) The State of Michigan would continue to issue permits under state law related to underwater cultural resources; (2) for activities involving permits from other federal agencies, NOAA would address Sanctuary concerns through the review and authorization, and if necessary, the placing of conditions on the federal permits; or (3) for an activity adversely impacting underwater cultural resources but that requires neither a state permit nor a permit from another federal agency, a Sanctuary permit would need to be obtained directly from NOAA in order to conduct the activity.

The three scenarios described in Administrative Alternative B are as follows:

1. The State of Michigan would issue a state permit for an activity related to underwater cultural resources if that activity could be conducted consistent with Michigan law. If the state permit is certified by the State Archaeologist as consistent with the Programmatic Agreement among NOAA, the State, and the federal Advisory Council on Historic Preservation, the activity will have met the criteria of Section 106 of the National Historic Preservation Act and of the Sanctuary program. Thus, the activity would be deemed authorized by NOAA and no separate Sanctuary permit would be required. For example, if an individual proposed to remove artifacts from an abandoned shipwreck within the Thunder Bay Underwater Preserve, that individual would apply for a State of Michigan permit under Part 761, Aboriginal Records and Antiquities, of P.A. 451. If the state certified the permit as consistent with the Programmatic Agreement, then the individual would not have to obtain a Sanctuary permit, because the Part 761 permit would address all Sanctuary concerns.

2. For activities for which a federal permit is required (most likely a Corps of Engineers permit), NOAA would review and "authorize" the federal permit to address any concerns of the Sanctuary program. NOAA would coordinate with the other federal agencies to determine which permits needed a NOAA authorization. If necessary, NOAA would place conditions on the federal permit to address Sanctuary concerns. The permit applicant would follow the existing procedures laid out in 15 C.F.R. § 922.49.

3. For an activity adversely impacting underwater cultural resources but that requires neither a state permit nor a permit from another federal agency, the applicant would apply for a Sanctuary permit directly from NOAA in order to conduct the activity. This could occur for activities involving "hand-taking" outside the Thunder Bay Underwater Preserve but still within the Sanctuary boundary, or salvage from a shipwreck that is not abandoned and is located anywhere within the Sanctuary boundary.

In summary, the permit application procedure for any activity that is currently regulated under

State of Michigan law related to the protection of underwater cultural resources would remain exactly the same. If a federal permit is required in addition to a state permit, NOAA would review that federal permit for NOAA authorization, but the applicant would not directly apply to NOAA for a Sanctuary permit. If an activity is proposed that is prohibited by Sanctuary regulations, and no state or federal permit program exists to authorize the activity, the applicant would apply directly to NOAA for a Sanctuary permit. Sanctuary permits would be issued out of the Thunder Bay National Marine Sanctuary office to be located in Alpena. NOAA anticipates that this would be a rare situation, given that most activities would require an existing state or federal permit.

Administrative Alternative B: NOAA's Proposed Alternative

NOAA is proposing Alternative B because it relies on the existing state permitting program for many of the permits that will be issued. If Sanctuary concerns can be addressed through the issuance of a state permit and through Section 106 of the National Historic Preservation Act, NOAA does not believe that a separate Sanctuary permit is necessary. This alternative takes into account the well-established permit program at the state level. If the applicant is applying for a permit to conduct an activity that is already regulated by the State of Michigan, the applicant would not do anything different if the Sanctuary is designated.

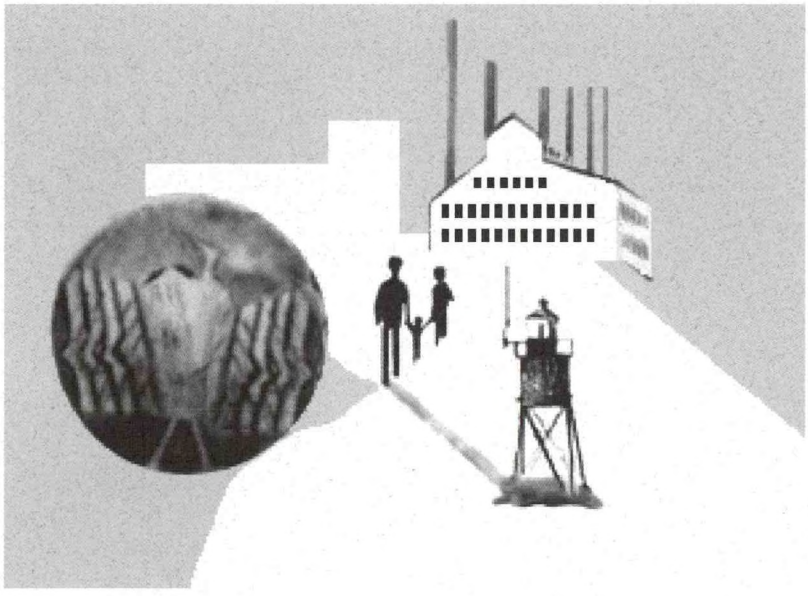
Alternative B also allows Sanctuary concerns to be addressed through the review and authorization by NOAA of the issuance of federal permits. The permit applicant would apply for a federal permit (e.g., from the Corps of Engineers). NOAA would work with the federal agency to ensure that there would be no adverse impact on underwater cultural resources; this would result in the authorization of the federal permit.

NOAA believes that the great majority of activities in the proposed Sanctuary would be covered by either an existing state or federal permit. NOAA expects, therefore, that few applicants will be required to apply directly to NOAA for a Sanctuary permit.

Section 6
Environmental

and

Social-Economic Consequences of the Alternatives



SECTION 6
ENVIRONMENTAL & SOCIAL-ECONOMIC CONSEQUENCES OF THE ALTERNATIVES

- Sanctuary designation would improve the protection and management of shipwrecks and other underwater cultural resources.
- The total economic impact of Sanctuary designation is estimated at $5.8 million in sales, $3.3 million of income, and nearly 180 full and part-time jobs within five years.
- The Sanctuary would provide national recognition of the Thunder Bay region, contribute to outdoor recreation experiences, and enhance education opportunities for visitors and residents.
- Sanctuary designation is not expected to have any significant negative social-economic impacts because no additional regulations are proposed that would eliminate or curtail existing recreation or commercial activities.
- Commercial salvage companies that sell shipwreck artifacts and other archaeological materials may be adversely impacted by Sanctuary designation. These impacts do not appear to be significant.
- Negative impacts related to congestion or other user conflicts could be moderated through comprehensive management.

A. Introduction

An analysis and assessment of impacts associated with proposed federal actions is a requirement of the National Environmental Policy Act (42 U.S.C. 4321 et seq.) *Impact assessments* provide information that is critical in making effective, efficient, and equitable decisions involving people and the physical resources of concern. The physical resources of concern in this DEIS/DMP are shipwrecks and other underwater cultural resources.

This section assesses the environmental, social, and economic impacts of alternatives for the Proposed Thunder Bay National Marine Sanctuary. In this case, environmental impacts are defined as impacts on underwater cultural resources and associated bottomlands. Social-economic impact assessments help predict "how implementing the proposed management strategies will directly and indirectly affect user groups, communities, and/or industries, as well as the local economy and overall quality of life" (Wellman and Cluett 1996). The predictions are based on an understanding of existing environmental, social, and economic conditions, and estimates of changes to existing conditions.

The assessment of social-economic impacts of the Proposed Thunder Bay National Marine Sanctuary is based on: (1) limited secondary sources of information describing the existing social conditions and trends in the Thunder Bay region (especially Alpena County), (2) the economic impact assessment (EIA) developed by Mahoney et al. (1996) specifically for the Proposed Sanctuary, and (3) comments from the Thunder Bay Core Group and other public comments during the Sanctuary feasibility process.

B. Underwater Cultural Resources

Underwater cultural resources include shipwrecks, the remains of wharves and docks, middens or dumpsites, and submerged prehistoric sites. Shipwrecks have been the focus of most historical research, recreational activity, and public interest involving underwater cultural resources in the Great Lakes region. About 160 shipwrecks are believed to be present within the proposed Sanctuary boundary. Hundreds of other underwater cultural resources may exist within the proposed boundary, but they have not been surveyed systematically.

Underwater cultural resources exist in dynamic physical environments. In particular, sites within nearshore areas and shallows are often subject to the actions of high-energy waves, longshore currents, and ice movement. Certain sites are also susceptible to vandalism, theft, and unintentional damage due to a variety of human factors that remain virtually unexplored by research.

There is general agreement that underwater cultural resources are impacted by environmental processes and human activities that cause deterioration of cultural materials over time. However, the extent of impacts has not been documented for shipwrecks and other underwater cultural resources in the proposed Sanctuary boundary.

C. Identification of Stakeholders (Including User Groups)

Shipwrecks and other underwater cultural resources are used by people who are stakeholders in these resources. *Stakeholders* can be viewed as individuals, groups, or organizations that influence or are affected by the use and management of particular resources. Defining people in terms of different stakeholders helps organizations to better understand and respond to a diversity of needs, perceptions, expectations, concerns, and issues relating to underwater cultural resources.

Different groups of stakeholders in the underwater cultural resources of the Thunder Bay region include recreational divers, heritage tourists, dive and tourism businesspeople, museum professionals, historic preservationists, history enthusiasts, researchers, educators, state resource managers, and federal resource managers (Vrana and Mahoney 1993). Other publics may not benefit directly from these resources, but may enjoy the historical information provided by shipwrecks and the maritime cultural landscape of the region.

Many of these stakeholders supported designation of the Thunder Bay Underwater Preserve in 1981 and advocated the evaluation of the region for inclusion in the NOAA National Marine Sanctuary Program, beginning in 1982 (Vrana 1989). Numerous actions have been taken by local stakeholders to better coordinate activities,

services, and planning associated with the Thunder Bay Underwater Preserve.

The most active coordinating organization has been the Thunder Bay Underwater Preserve Committee. The Committee is an unincorporated advocacy group organized in 1980 to enhance promotion, management, and development of the Preserve. The Committee has been associated with the Alpena Area Chamber of Commerce since 1982. Other local organizational stakeholders in the Preserve have included the Jesse Besser Museum, Northeast Michigan Community Foundation, Alpena General Hospital, Alpena Community College, City of Alpena, historic preservation organizations, and local dive and water sports related businesses.

The Thunder Bay Divers has been the largest retail dive shop and dive charter business for the region since designation of the Preserve in 1981. The Jesse Besser Museum has developed a number of exhibits about the Preserve, shipwrecks, and maritime heritage of the region. Most of these exhibits have been displayed on a temporary basis. Although recommended in local planning and development documents, there are no active plans to establish an information and interpretive center for the Preserve to showcase the underwater cultural resources and maritime heritage of the region.

D. Social-Economic Characteristics

The population of Alpena County has been decreasing since the late 1970s, and according to the 1990 population figures, totals 30,605 (U.S. Department of Commerce 1992). The largest and most central coastal community in the Thunder Bay region is the City of Alpena (Alpena County) with a population of 11,354 (1990). Other incorporated coastal communities in the Thunder Bay region include Ossineke Township (Alpena County) with a population of 1,652; Alcona Township, including Black River (Alcona County) with a population of 906; Haynes Township, including Sturgeon Point (Alcona County) with a population of 549; and Presque Isle Township (Presque Isle County) with a population of 1,312 (U.S. Department of Commerce 1992).

Over 85% of coastal property adjacent to the proposed Sanctuary boundary is in private ownership (Ayres et al. 1982). Negwegon State Park comprises much of the total of public coastal property. The Park, which is under development, is located in the southeast corner of Alpena County.

The per capita income of Alpena County in 1993 was $16,559. Most employment in 1993 was in private, nonfarm businesses (78%), and government (18%). About 23% of employment and 17% of earnings were in service businesses; about 15% of employment and 27% of earnings were in manufacturing (Michigan Department of Commerce 1996). Tourism and recreation are important parts of the service sector.

Employment in manufacturing industry categories in northeast lower Michigan has declined slowly

since the late 1970s (ZHA Inc. et al. 1990). A goal of economic development for Alpena County and the City of Alpena is to maintain the higher paying jobs of manufacturing (Kolasa, personal communication 1992; Midwest Research Institute 1988; Ayres et al. 1982).

The principal economic base employers in Alpena County are the Alpena General Hospital, Besser Corporation, ABT Company, Inc., LaFarge Corporation, Presque Isle Corporation, Fletcher Paper Corporation, and NEMROC, Inc. These employers are involved primarily in regional medical care, and the manufacture of wood and cement products. About 16% of the employed County work force is on the payroll of these seven employers. The 1994 average unemployment rate for Alpena County was 11.3%; the 3-year average unemployment rate (1990-92) was 12.1% (Michigan Department of Commerce 1996, 1993).

The median age of Alpena County residents is 35.3 years. About 25% of the Alpena County population is age 55 years and older; 15% of the County population is age 65 years and older (U.S. Department of Commerce1992). Income from retirement provides approximately 44% of all economic support in the region. This source of income is more important than manufacturing and tourism (ZHA Inc. et al. 1990).

The Midwest Research Institute (1988) conducted a situational analysis (or social assessment) of the social and economic conditions of Alpena County to help develop an economic adjustment strategy for the County. The situational analysis included focus groups, surveys, and interviews with community leaders. Conclusions from the situational analysis are summarized as follows:

> Strengths of Alpena's social and economic conditions include: a superior natural setting near major state parks, lakes, and stream fishing, with boating and water sports activities, which promises further development opportunities in tourism and recreation; talented people in the community; residents of the community like the quality of life available and want to remain in Alpena; Alpena is a growing retail center with a record of increasing retail sales; employment in the service industries is growing, and general employment opportunities in these industries are favorable; Alpena County has a diversified manufacturing base that can provide substantial employment stability for a segment of the existing work force; Alpena County has a viable infrastructure including adequate to good streets, sewers, and utilities; availability of professional skills; superior medical facilities to support the growing needs of an aging population; a growing enrollment and the recent addition of advance study courses at Alpena Community College; job training facilities; available industrial sites; a growing awareness of the importance of providing an attractive business climate to prospective developers and business persons; an awareness that planning is vital

to economic development; and recent goal setting by the Alpena city government.

Community residents and leaders perceive that the current economic condition in Alpena County is weak. Limitations in the local business [and social] climate include: a lack of consensus on how to resolve major issues facing the community and region; a declining total population and an aging population, which reduces the tax base in the region while requiring an increase in the use and quality of social services; the loss of some younger members of the work force, which reduces the economic viability of the community in its industrial promotion efforts and decreases the tax base; a very slow growth for most manufacturing activities; a somewhat conservative atmosphere in investment circles in terms of providing loans; distance from emerging markets, which has fostered the perception that Alpena is too isolated in relation to other Michigan business hubs; limited and unreliable air service and the need for better highway access to facilitate commercial transport; and no strategy for coordinating and implementing local development plans.

A breakdown of selected demographic and housing characteristics for Alpena County is available from the U.S. Department of Commerce, Bureau of the Census (1992).

Employment projections for the Northeast Lower Michigan Service Delivery Area (SDA) (Alcona, Alpena, Cheboygan, Crawford, Montmorency, Oscoda, Otsego, and Presque Isle Counties) during 1988 to 2000 indicate that "service workers will continue to grow faster than total employment. This occupational group is expected to account for more job growth than any other broad group, increasing its share of total employment in the Northeast Lower Michigan SDA from 19.2% in 1988 to 20.6% in 2000" (Michigan Department of Labor 1991:37). Service workers, as an occupational group, include tourism-related job categories and exclude private household workers.

An important component of population change in northeast lower Michigan has been an increase in the number of people age 65 and over, which increased by over 50 percent in the 1970s. The trend in aging of the resident population in northeast lower Michigan and Alpena County is expected to continue (ZHA Inc. et al. 1990).

E. Impacts of Sanctuary Designation Alternatives

Sanctuary Designation Alternatives

A. No Sanctuary designation: NOAA would not designate Thunder Bay as a National Marine Sanctuary (the "status quo" or "no action" alternative). Thunder Bay would continue to be administered as a State of Michigan Underwater Preserve.

B. Sanctuary designation: NOAA would designate and establish the Thunder Bay National Marine Sanctuary. All levels of government, organizations, and businesses would work together to comprehensively manage the underwater cultural resources of the Thunder Bay region in the context of the maritime cultural landscape *(NOAA's proposed alternative).*

I. Impacts of Proposed Sanctuary Designation Alternative B

Under this alternative, NOAA would designate Thunder Bay as a National Marine Sanctuary. Designation of the Sanctuary would enhance the use and protection of underwater cultural resources (particularly shipwrecks) and the lakebottom directly associated with those underwater cultural resources. Protecting underwater cultural resources to insure their long-term use and integrity for present and future generations would be a primary function of the Thunder Bay NMS. Protecting the 160 shipwrecks mentioned in historical records (including those having national historic significance) and the other underwater cultural materials and prehistoric sites is important to maintaining and enhancing the recreational, educational, and scientific values of these resources. NOAA would provide supplemental financial resources for protection, education, and research of the underwater cultural resources.

The Sanctuary would provide supplemental protection for underwater cultural resources that are not defined as "abandoned" under state law or the federal Abandoned Shipwreck Act. The Sanctuary regulations, as proposed under Regulatory Alternative B, would expand coverage to all shipwrecks, and not just "abandoned" shipwrecks. The Sanctuary regulations would, therefore, serve as a federal safety net for state underwater cultural resources that the State of Michigan may be unable to protect under state law or the Abandoned Shipwreck Act.

The Thunder Bay National Marine Sanctuary would perform a variety of functions related to resource protection, education, and research. For example, it would:

- Coordinate agencies, organizations, and businesses to identify and address management issues that focus on underwater cultural resources and maritime heritage. Examples are the infestation of zebra mussels on shipwrecks and their impacts on recreational diving experiences, and potential user conflicts in the Bay.

- Provide educational leadership to develop and implement collaborative education programs that meet the needs and interests of local schools, residents, and visitors to the Sanctuary.

- Support a scientific research and monitoring program focusing on underwater cultural resources. Initial research activities would provide baseline inventory information on which to base management decisions.

- Develop and maintain a mooring buoy system to provide safe access with minimum impact to the resources and help make the location of sites more visible to both divers and non-divers.

- Inventory and assess Sanctuary resources, as well as document existing and potential threats to these underwater cultural resources (both natural and human induced).

All of these activities would contribute to the comprehensive management of the Thunder Bay region's underwater cultural resources. Without the ability to conduct these activities, fewer shipwrecks and other underwater cultural resources would be protected adequately; fewer personnel would be available for education on Thunder Bay's maritime heritage; and fewer research dollars would be available for documenting the nationally significant shipwrecks.

Although the Sanctuary designation process has stimulated interest in Great Lakes education and the need for an education center or visitor center, it is unlikely that such a facility would be constructed without Sanctuary designation. This is due primarily to the lack of local and state resources (i.e., staff, money) dedicated and/or available to develop and maintain such a facility.

Designation of the Proposed Thunder Bay National Marine Sanctuary is expected to benefit underwater cultural resources and the lakebottom directly associated with those underwater cultural resources. Because there are no proposed Sanctuary fishing regulations or other Sanctuary regulations of natural resources, ecosystems or habitats, designation of the Sanctuary will have no significant impact on natural resources in the region.

Projections of Economic Impacts for Sanctuary Designation Alternative B

If the Thunder Bay National Marine Sanctuary is designated, NOAA would invest in the comprehensive management of underwater cultural resources within the proposed boundary. This investment would include the development of programs, facilities, and services for resource protection, education, and research.

An *Economic Impact Assessment (EIA)* is commonly used to help determine whether a proposed federal action (such as Sanctuary designation) is a wise investment of public funds. An EIA was completed in 1996 by Michigan State University to provide estimates of the potential economic impacts associated with designation of the Proposed Thunder Bay National Marine Sanctuary (Figure 6.1). A complete copy of the EIA is provided in Volume II, Appendix F of this DEIS/DMP (Mahoney et al. 1996). The following information is excerpted primarily from the introduction and results of Mahoney et al. (1996).

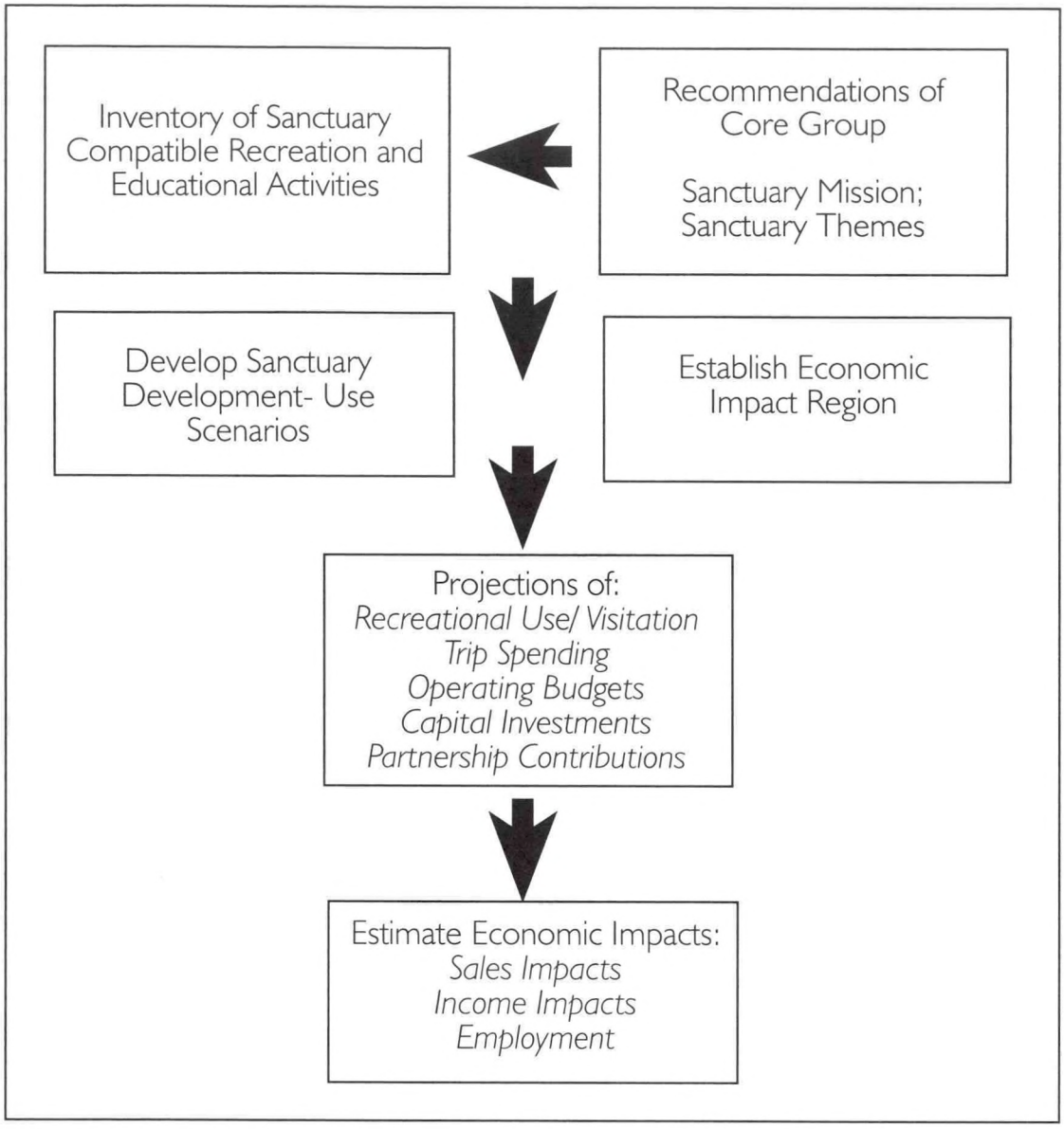


Figure 6.1 Method of estimating the economic impacts of the Proposed Thunder Bay National Marine Sanctuary.

The EIA provides estimates of the potential direct and total (direct plus indirect plus induced) economic impacts associated with different Sanctuary "development-use scenarios" over a five-year period (Table 6.1). The economic impacts are linked to the increasing use of the Sanctuary by visitors to the Thunder Bay region, the operating budget of the Sanctuary, and support from Sanctuary partners.

An input-output model was used to generate estimates of these impacts. An input-output model traces the flows of economic activity between different sectors within a regional economy.

Table 6.1 Development-use scenarios for the Proposed Thunder Bay National Marine Sanctuary.

	Year 1	Year 2	Year 3	Year 4	Year 5
Recreation and Education Visits					
Scuba diving trips	1,200	1,350	1,500	1,800	2,000
Bird watching (day trips)	800	1,400	1,900	2,400	3,000
Bird watching (overnight trips)	1,100	1,800	2,500	3,300	4,000
Kayaking/canoeing (day trips)	1,100	1,800	2,500	3,300	4,000
Kayaking/canoeing (overnight trips)	200	250	275	300	350
Sightseers (day trips)	750	900	1,000	1,200	1,350
Sightseers (overnight trips)	900	1,500	3,000	6,000	9,000
Gt. Lakes education - student contacts			8,000	10,000	12,000
NOAA Operating Budgets	$150,348	$173,890	$199,000	$205,000	$211,000
Partnership Contributions					
Services	$10,000	$10,000	$20,000	$30,000	$41,000
Shared Positions		$19,000	$40,000	$41,200	$42,400
Construction - Education Center					$1,300,000

The EIA concentrates on the potential positive economic impacts of the proposed Sanctuary. Sanctuary designation is not expected to have any significant negative economic impacts because no additional Sanctuary regulations are being proposed that would eliminate or curtail existing recreational or commercial activities (e.g., sport fishing and hunting, commercial fishing, charter operations, commercial shipping).

The EIA does not make any attempt to estimate the potential non-monetary benefits of the proposed Sanctuary to tourists, resident recreationists, or local publics, such as school children, environmental organizations, or community improvement associations. Likewise, the EIA does not quantify the potential negative externalities (e.g., additional crowding at local attractions and facilities), or fiscal impacts such as additional public service costs that could be associated with increased tourism generated by the proposed Sanctuary.

Given the relatively low levels of projected visitation in the first five years of Sanctuary operation, the types of visitation, and available capacity in the region, it is unlikely that the proposed Sanctuary would produce a noticeable increase in crowding or public service costs. Current infrastructure, facilities, and services

should be adequate to accommodate the rate of growth and scale of development that comprise the development-use scenarios.

Results of the Economic Impact Assessment

Even with conservative budget and visitation estimates, a Thunder Bay National Marine Sanctuary would have significant positive economic impacts on the region (Tables 6.2 - 6.3; Figures 6.2 - 6.4).

Direct spending associated with trips to the Sanctuary would increase from $554,000 in Year 1 to $2.4 million in Year 5 (Table 6.2). However, not all of this direct spending would be captured by the region. It is estimated that $2.4 million in direct visitor spending in Year 5 would generate $2.2 million in direct sales, $1.3 million in direct income, and 100 direct jobs. Estimated total economic impacts (direct and indirect impacts) of recreational visits directly related to the Sanctuary mission and themes would increase from $892,000 in sales, $514,000 in income, and 31 jobs in Year 1 to $4.6 million in sales, $2.7 million in income, and 158 jobs in Year 5.

NOAA operating budgets would produce a total economic impact of $143,200 in sales, $97,800 in income, and 3 to 4 jobs in Year 1 (Table 6.3). It is estimated that this would increase to $161,200 in sales, $110,000 in income, and 4 jobs in Year 5. Two partnership cost-share positions (i.e., education coordinator, maritime archaeologist) could add additional economic

Table 6.2 Economic impacts of spending by Sanctuary visitors by year.

	Year 1	Year 2	Year 3	Year 4	Year 5
Visitor Spending ($000's)	$554	$776	$1,131	$1,763	$2,368
Direct Effects					
Sales ($000's)	418	625	963	1,563	2,155
Income ($000's)	254	380	586	948	1,311
Jobs	20	29	45	73	100
Total Effects					
Sales ($000's)	892	1,341	2,066	3,291	4,627
Income ($000's)	514	774	1,192	1,898	2,670
Jobs	31	46	71	113	158

impacts. It is estimated that the NOAA operating budget and these cost-share positions would generate $312,800 in total sales impact, $230,900 in total income, and 7 to 8 jobs in Year 5.

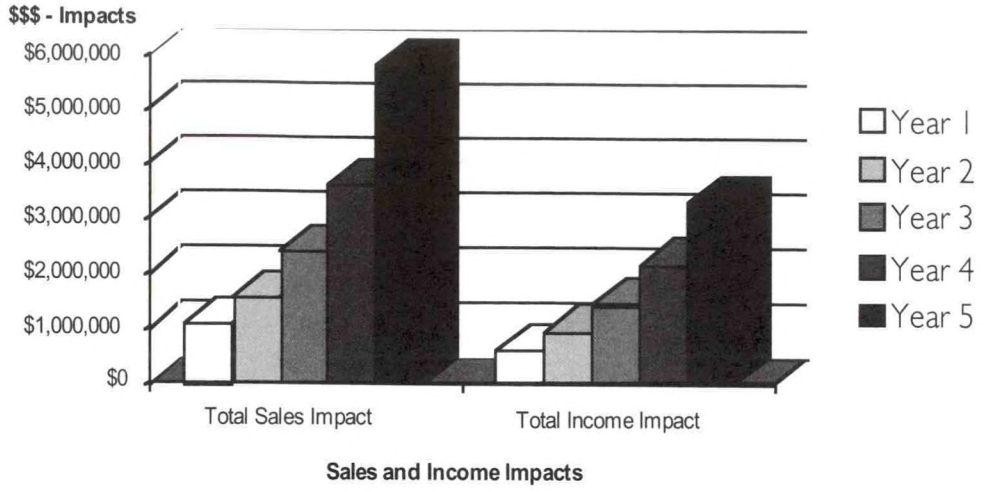
Other partnership contributions, including services, surplus equipment, and volunteer/donated labor, would not provide much additional economic impact because these contributions would not generate a great deal of additional spending in the region. Nevertheless, these partnerships are still important because they would contribute to the mission and quality of Sanctuary programs and services.

If visitation, operating budgets, and partnership projections are realized, the Sanctuary has the potential for producing nearly $2.4 million in direct sales impacts, about $1.5 million in direct income, and more than 100 jobs (Table 6.2 and Table 6.3). The estimated growth in Sanctuary

Table 6.3 Economic impacts of Sanctuary operating budgets and cost-share partnerships.

		Year 1	Year 2	Year 3	Year 4	Year 5
Operating Budget Impacts						
Direct Effects						
	Sales ($000's)	90.80	93.52	96.33	99.22	102.2
	Income ($000's)	69.40	71.48	73.63	75.84	78.11
	Jobs	2.30	2.37	2.44	2.51	2.59
Total Effects						
	Sales ($000's)	143.20	147.50	151.92	156.48	161.17
	Income ($000's)	97.80	100.73	103.76	106.87	110.07
	Jobs	3.50	3.61	3.71	3.82	3.94
Total Impacts (Including Partnership Positions)						
Direct Effects						
	Sales ($000's)	90.80	131.52	175.25	180.57	185.69
	Income ($000's)	69.40	109.48	152.55	157.19	161.60
	Jobs	2.30	4.37	4.44	4.51	4.59
Total Effects						
	Sales ($000's)	143.20	216.50	295.25	304.21	312.79
	Income ($000's)	97.80	155.72	217.96	224.58	230.89
	Jobs	3.50	6.33	7.23	7.39	7.54

Figure 6.2 Total sales and income impacts of the proposed Sanctuary.



produced sales, income, and employment impacts are displayed in Figures 6.2 and 6.3. A comparison of operating budgets, total sales impacts, and total income impacts of the Proposed Thunder Bay National Marine Sanctuary are displayed in Figure 6.4.

Summary of Potential Positive and Negative Impacts from Sanctuary Designation Alternative B

The potential positive impacts from Sanctuary designation include the following:

- tourism development by establishment of a major (national/international) water-based attraction

- national recognition from being part of a system of National Marine Sanctuaries

- regional sales, income and employment, including service sector jobs for younger wage-earners

- recreation and volunteer opportunities for a large retired/aging resident population

- opportunities for partnership development with different levels of government and the private sector

- opportunities to attract other sources of funding for education, research, and development

- preservation of underwater cultural resources through comprehensive management

- opportunities for direct and indirect access to underwater cultural resources

Figure 6.3 Total employment impacts of the proposed Sanctuary.

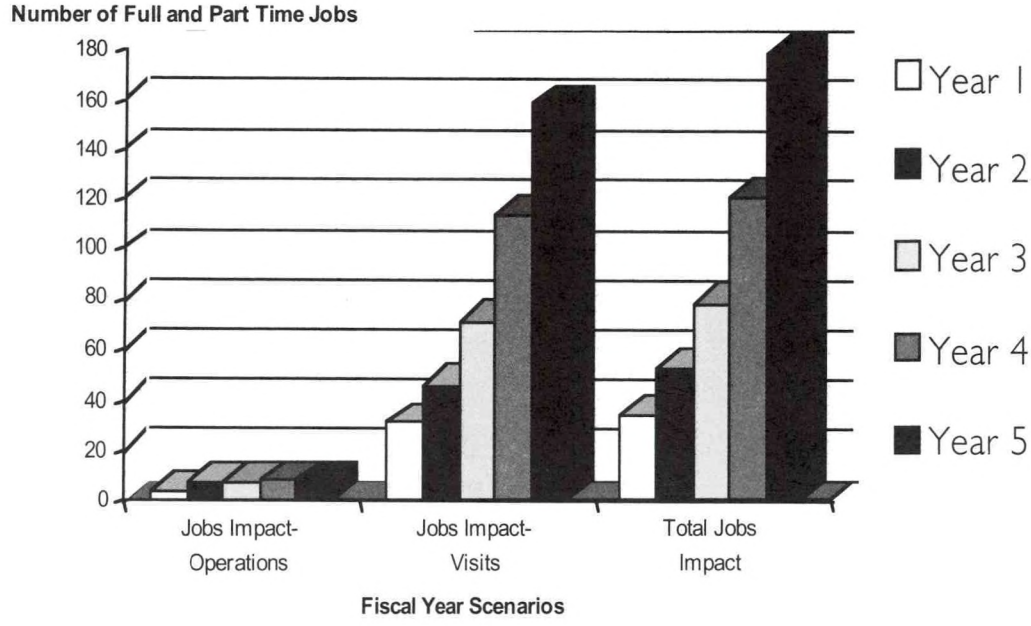
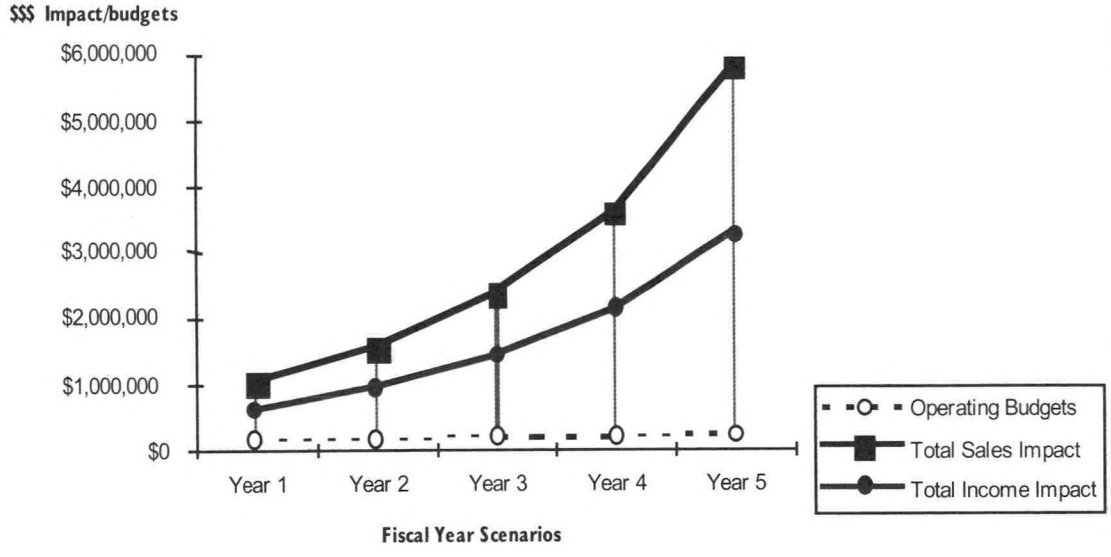


Figure 6.4 Comparison of operating budgets, total sales impacts, and total income impacts of the proposed Sanctuary.



- enhanced knowledge of Great Lakes maritime heritage through maritime heritage education programs and historic preservation projects

- linkage of land-based maritime heritage tourism (e.g., lighthouses) with water-based recreation (e.g., scuba diving)

- operational cost-effectiveness through coordination of management programs

Potential negative impacts include the following:

- deteriorating physical condition of underwater cultural resources from cumulative effects of increased visitation

- visitor dissatisfaction due to crowding on some popular shipwreck sites

- conflicts among divers and other recreational users (e.g., sport anglers, pleasure boaters, personal watercraft users)

- costs to community infrastructure (e.g., emergency medical services, other local government services)

- perceived bureaucracy (e.g., "red tape," inefficiency) associated with federal programs

- regulations and regulatory approaches to management

- growth in federal programs associated with the Sanctuary

2. Impacts of Sanctuary Designation Alternative A

Thunder Bay and adjoining waters would not be designated as a National Marine Sanctuary under Designation Alternative A. Instead, the current focus of shipwreck management would remain with local and state organizations that are involved with the Thunder Bay Underwater Preserve. The current positive impacts associated with the Thunder Bay Underwater Preserve in protection of shipwrecks would continue to be realized under Alternative A. The State of Michigan has adequate laws to protect "abandoned" shipwrecks and other underwater cultural resources. However, there is a recognized lack of local and state personnel and financial resources for conducting comprehensive management of underwater cultural resources in the Thunder Bay region.

Scuba diving tourism associated with the Thunder Bay Underwater Preserve is not expected to increase at the rates anticipated by designation of a national travel destination area, such as the Sanctuary (Mahoney, et al. 1996). As an example, dive charter activity in the Preserve appears to have leveled off in the five-year period of 1990-1995 (Thunder Bay Divers 1994; Barnhill, personal communication 1996). It is anticipated that scuba diving activity would remain constant or slightly decrease in the Thunder Bay region without better coordination of services and marketing by stakeholders. This prediction is based on the recent trend in dive charter activity, and the increasing competitiveness of the diving industry as a whole in the Great Lakes region.

Simple extrapolation of past trends indicates an annual growth rate of 5 to 10 percent in the Michigan travel and tourism industry through the year 2000 (Holecek 1995:19). Current efforts to encourage eco-tourism and heritage tourism are expected to continue in promoting northeast Michigan and the Thunder Bay region as a travel destination. The numbers of these types of visitors (and associated social-economic impacts) would probably increase, although not at the rates expected with the development and marketing of a major water-based attraction like the Proposed Thunder Bay National Marine Sanctuary (Mahoney, personal communication 1996). Presently, there is no major cultural resource-based attraction that would identify the Thunder Bay region as a primary destination for ecotourists or heritage tourists. A Sanctuary would attract the attention of organizations, e.g., travel writers, conservation and heritage organizations, that can help promote the area as a destination.

F. Impacts of Boundary Alternatives

Boundary Alternatives

A. Existing Thunder Bay Underwater Preserve: NOAA would adopt the existing state-designated underwater preserve, which is about 290 square miles, as the Sanctuary boundary.

B. Alpena County latitudes: NOAA would use the northern and southern latitudes of Alpena County and extend the lakeward boundary to longitude 83 degrees west. This boundary alternative is 448 square miles.

C. Presque Isle Harbor to Sturgeon Point: NOAA would adopt a northern boundary marked by the northernmost Presque Isle Lighthouse, and a southern boundary marked by the Sturgeon Point Lighthouse. The boundary would extend lakeward to longitude 83 degrees west and would establish a Sanctuary of 808 square miles *(NOAA's proposed alternative)*.

1. Impacts of the Proposed Boundary Alternative C

The major differences among the boundary alternatives are (1) the area of bottomlands/surface waters and (2) the number of shipwrecks and other underwater cultural resources that would be protected by the Thunder Bay NMS. NOAA's proposed boundary (Boundary Alternative C) would protect 34 known shipwrecks, 83 probable shipwrecks, and 43 suspected shipwrecks for a total of 160 shipwrecks. The Sanctuary would protect other underwater cultural resources such as prehistoric archaeological sites and cultural materials, although the extent of these resources is unknown. NOAA, the State of Michigan, local organizations, and other partners would provide resources to protect and manage these underwater cultural resources in a comprehensive manner. As discussed in Section 3, Draft Management Plan, this comprehensive management would be accomplished through resource protection, education, and research.

If NOAA's proposed alternatives are selected, all shipwrecks would be protected. In contrast, under the State of Michigan's Part 761, Aboriginal Records and Antiquities, only abandoned shipwrecks are protected. In addition, positive environmental impacts from protection of underwater cultural resources would be enhanced by preventing illegal salvage, deterring souvenir collecting, and reducing accidental damage to these resources. These benefits would be realized to a greater extent in Boundary Alternative C due to the greater number of shipwrecks and other underwater cultural resources located on these bottomlands.

Potential negative impacts on users include restrictions on commercial salvage and souvenir collection. In addition, there could be cumulative adverse impacts to a greater number of underwater cultural resources from an increased number of divers expected to visit the Sanctuary. However, the amount of negative impacts under any of the boundary alternatives is expected to be very low.

2. Impacts of Boundary Alternative A

Boundary Alternative A would mirror the State of Michigan's existing Thunder Bay Underwater Preserve. The positive environmental impacts of Sanctuary designation discussed above would be realized, but these positive impacts would not be as large as in Boundary Alternative C. For example, fewer shipwrecks would be afforded regulatory protection. Under Boundary Alternative A, there are 8 fewer known shipwrecks, 12 fewer probable shipwrecks, and 28 fewer suspected shipwrecks. In addition, federal funds for education and research would be available only within the smaller boundary area.

Potential negative impacts on users and underwater cultural resources would probably be less under Boundary Alternative A than Boundary Alternatives B or C.

3. Impacts of Boundary Alternative B

Boundary Alternative B would run from the north and south boundaries of Alpena County lakeward to longitude 83 degrees west. This is a larger boundary than Boundary Alternative A, but smaller than Alternative C (NOAA's proposed alternative). Approximately the same number of shipwrecks under Boundary Alternative B would be protected as under Boundary Alternative A. Additional financial resources for resource protection, education, and research would be applied to a larger area than Boundary Alternative A, but to a smaller area than Boundary Alternative C.

G. Impacts of Regulatory Alternatives

Regulatory Alternatives

A. State of Michigan: NOAA would adopt regulations that mirror the State of Michigan regulations to protect underwater cultural resources.

B. Other Sanctuaries: NOAA would adopt regulations similar to those used in other Sanctuaries to protect underwater cultural resources. The regulations would be consistent with the State of Michigan regulations *(NOAA's proposed alternative)*.

Overall, the potential positive impacts from Sanctuary regulation in both Regulatory Alternatives A and B include additional resources and flexibility in enforcement of regulations through involvement of state/local and federal officers, increased ability to prosecute violators, increased ability to educate visitors, and increased capabilities for advocating adherence to regulations (i.e., self-policing, stewardship). Potential negative impacts include visitor inconvenience from increased activities in law enforcement and adherence, as well as the perception of unnecessary regulations and regulatory approaches to management.

The primary difference between Regulatory Alternatives A and B relates to the overall protection of underwater cultural resources. Under Regulatory Alternative A, the Sanctuary regulations would be narrower in scope because they would mirror the State of Michigan regulations, which apply only to abandoned property. In contrast, the Sanctuary regulations under Regulatory Alternative B would be broad enough to protect all underwater cultural resources in the proposed boundary of the Sanctuary.

A regulatory prohibition against the disturbance or removal of underwater cultural resources, and against disturbance, alteration, or construction on corresponding bottomlands throughout the Sanctuary would be constant in Boundary Alternatives A, B, and C. Permits from the State of Michigan under Part 761 of P.A. 451 (1994), as amended, would be available for scientific research and appropriate recovery of cultural materials if these activities are consistent with the intent of the National Historic Preservation Act (16 U.S.C. 470 et seq.). The differences in the alternatives are the number of underwater cultural resources protected and the potential for new finds in the corresponding boundary areas. Under Designation Alternative A (no designation), underwater cultural resources that are not protected by state law would remain unprotected. In addition, the Sanctuary program could not provide personnel and financial resources for inventory, enforcement, education, and research.

In addition to the projected positive impacts to underwater cultural resources, the associated social-economic impacts are also expected to be positive. In particular, the recreational dive community and related dive industry is expected to benefit from Sanctuary designation.

Commercial salvage companies and businesses selling shipwreck artifacts or other archaeological materials, although limited in number, may be adversely impacted. However, the Sanctuary is entirely in state waters, and, therefore, commercial salvage and sale of artifacts are already subject to state regulations similar to those that would be applied pursuant to federal historic preservation law.

There have been no significant commercial shipwreck salvage or "treasure hunting" operations in the Thunder Bay region since designation of the Thunder Bay Underwater Preserve in 1981. There have been only seven salvage

permits issued for removal or alteration of shipwrecks or associated artifacts in the region since 1980 (Graf, personal communication 1996). One of those permits was issued to protect the hull of a sunken vessel from dredging of a new marina in Alpena harbor. The hull was moved to a location outside the breakwater in 1988. Two permit applications were denied.

The economic impact of commercial shipwreck salvage and treasure hunting to coastal communities in the Thunder Bay region and State of Michigan has been negligible since passage of the Michigan Underwater Salvage and Preserve Act in 1980. The last large-scale salvage operation in Michigan Great Lakes waters was the 1988 salvage of steamer *Regina* in southern Lake Huron (Halsey 1990).

The greatest overall negative impact on Great Lakes shipwrecks in Michigan waters since 1980 is commonly believed to be from: (1) the depreciative behavior of scuba divers (i.e., theft, vandalism), and (2) inadvertent damage while participating in recreational boating and scuba diving activities. The impacts of recreational diving have been reduced significantly by the enactment and enforcement of state laws that specifically prohibit the alteration of shipwrecks and other underwater cultural resources, the adherence of divers to those laws, and the development of a "conservation ethic" among recreational divers. This ethic is often portrayed in the statement, "take only pictures and leave only bubbles," and has led to efforts in self-policing, and private-public initiatives to enhance diving etiquette on shipwrecks (e.g., PADI Project AWARE, Great Lakes Regional Conference on Underwater Cultural Resources). A rationale of "finders, keepers" was common among recreational divers from the 1950s - 70s.

In addition, there are unknown negative impacts to shipwrecks and other underwater cultural resources from harbor and shoreline improvements, dredging of navigation channels and harbors, coastal construction projects (including marina development), and natural coastal processes (e.g., nearshore wave action and currents, ice movement, sand deposition). Most projects related to harbor and channel improvement and maintenance are supported by federal funds.

In summary, industries related to recreational use of the Sanctuary should benefit economically from protection of underwater cultural resources. If the Sanctuary is designated, negative economic impacts to commercial salvors, businesses that sell archaeological artifacts, and souvenir collectors might occur, but these impacts should be minor. In addition, the negative impacts to these users are outweighed by the positive environmental and economic impacts resulting from supplemental protection and management. The degree of impacts, both positive and negative, is directly associated with the number and type of underwater cultural resources within the three boundary alternatives.

H. Impacts of Administrative Alternatives

Administrative Alternatives

A. Permits issued by NOAA: All Sanctuary permits would be issued solely by NOAA. These Sanctuary permits would be in addition to existing permits issued by state and/or other federal agencies. The State of Michigan would be involved in the review of Sanctuary permits through the Section 106 process of the National Historic Preservation Act.

B. Permits issued either by the State of Michigan, a federal agency, or NOAA: (1) the State of Michigan would continue to issue permits under state law related to underwater cultural resources; (2) for activities involving permits from other federal agencies, NOAA would address Sanctuary concerns through the review and authorization, and if necessary, the placing of conditions on the federal permits; or (3) for an activity adversely impacting underwater cultural resources but that requires neither a state permit nor a permit from another federal agency, a Sanctuary permit would need to be obtained directly from NOAA in order to conduct the activity *(NOAA's proposed alternative)*.

The administrative alternatives, when evaluated by themselves, do not cause different impacts. There are virtually no differences in environmental or social-economic impacts associated with who issues the permits, as the issuance of permits is an administrative action. The differences are associated with the protection of underwater cultural resources; this discussion is found under the regulatory alternatives.

I. Moderation of Potential Negative Impacts

Sanctuary designation is not expected to have any significant negative economic impacts because no additional Sanctuary regulations are being proposed that would eliminate or curtail existing recreational or commercial activities (e.g., sport fishing and hunting, commercial fishing, charter operations, commercial shipping).

Given the relatively low levels of projected visitation in the first five years of Sanctuary operation, the types of visitation, and available capacity in the region, it is unlikely that the proposed Sanctuary would produce a noticeable increase in crowding or public service costs to coastal communities. Current infrastructure, facilities, and services should be adequate to accommodate the expected rate of growth and scale of development through year 2001 (Mahoney et al. 1996).

The Sanctuary would make possible the comprehensive and scientific management of underwater cultural resources. Comprehensive and scientific management should moderate (1) the physical impacts to these resources from increased visitation, (2) recreational dissatisfaction due to crowding, (3) conflicts among users, and (4) conflicts between recreational visitors and coastal property owners. Only limited instances

of crowding and recreation related conflicts are expected in the proposed Sanctuary, based on the experiences of stakeholders in the state Thunder Bay Underwater Preserve.

Physical impacts to shipwrecks and other underwater cultural resources (e.g., vandalism, theft, other damage) would need to be monitored and evaluated before action is taken by law enforcement authorities. An estimation of the types and rates of deterioration, the determination of negative effects, and the identification of specific causes are important factors that should be considered for more effective management of shipwrecks, and more efficient use of limited organizational resources to moderate negative effects. Some of these factors may need to be evaluated on a site by site basis.

Negative impacts from perceived bureaucracy, regulations and regulatory approaches to management, and growth in federal programs associated with the Sanctuary would be moderated by the Memorandum of Understanding with the State of Michigan, the actions of the Sanctuary Advisory Committee, and public awareness and involvement in Sanctuary programs.

The success of the Proposed Thunder Bay National Marine Sanctuary would be dependent on cooperation and the development of partnerships with businesses, local communities, and state and tribal governments. All of these organizations and other stakeholders would share responsibility for assuring effective, efficient, and equitable management and development of the Thunder Bay National Marine Sanctuary.

J. Enhancement of Potential Positive Impacts

The potential positive economic impacts associated with designation of a Thunder Bay National Marine Sanctuary would be dependent on cooperative efforts to develop and market the Sanctuary. The amount of economic impact can be increased through (1) cooperative efforts to attract more recreational visits, (2) increasing the length of stay and spending in the area, (3) public and private investment in Sanctuary related facilities, services, and businesses, and (4) attracting additional resources (e.g., grants, donations) from outside the region. Although the Sanctuary is located primarily near Alpena County, there would be great potential for enlisting interest and support of organizations and individuals thoughout the state, region, and country.

In particular, there would be opportunities for volunteer programming in partnership with local foundations and the business community. These programs could incorporate seniors that comprise a relatively large percentage of the Alpena County and regional population. Service sector jobs associated with the Sanctuary could be marketed to young residents in conjunction with hospitality and tourism training to encourage the retention of youth in Alpena County and the region.

The designation of a Thunder Bay National Marine Sanctuary may not directly assist in increasing the manufacturing base of the region, but it could enhance the quality of life, which may attract to new businesses start up and investment in general (including manufacturing). This quality of life approach to economic development appears to have been successful in other Michigan communities using history and historic preservation as development themes (e.g., Petosky, Marshall).

Critical to the mission of the Proposed Thunder Bay National Marine Sanctuary is protection of a nationally significant collection of shipwrecks and preservation of an important Great Lakes and regional maritime heritage. The Sanctuary would build on the successes of the state Thunder Bay Underwater Preserve to better protect and preserve these resources, and enhance opportunities to access and enjoy this heritage.

The NOAA National Marine Sanctuary Program would provide funding and investment for scientific management, education, and research that is not available (or expected in the near future) from state and local sources. These Sanctuary programs, in partnership with businesses, local communities, and state and tribal governments, could enhance the quality of life in Alpena County and the Thunder Bay region for present and future generations of residents and visitors.

K. Conclusion

Significant underwater cultural resources, particularly historic shipwrecks, are located within the Proposed Thunder Bay National Marine Sanctuary. These resources are of value to different users within the Sanctuary, including: (1) recreational divers who value the shipwrecks as part of their diving experience, which is enriched by the historical-cultural significance of the underwater cultural resources, (2) commercial salvors and souvenir collectors, (3) archaeologists, historians, and educators who value the resources for research and teaching, and (4) anglers and boaters who may value the resources because their historical or cultural significance enhances the fishing/boating experience.

These resources are also of value to other users who do not actually visit the proposed Sanctuary, including: (1) historical museum visitors and museum professionals, (2) Great Lakes maritime heritage "buffs" interested in the connections between land and water-based maritime history, and (3) non-users who value or appreciate the long-term preservation of underwater cultural resources for their mere existence or for potential use by present and future generations.

The assessment indicates that a Thunder Bay National Marine Sanctuary could have significant positive impacts on the economy of Alpena County and the Thunder Bay region without

significant negative social impacts. Over 75% of the visitors' spending and the Sanctuary operating budgets would be captured by the region's economy. This spending has the potential to generate a significant amount of sales and income for local businesses, especially those that provide services and products to tourists. The additional jobs, particularly those created in the hospitality and service sectors, would further diversify the economy of Alpena County and provide important employment to young persons in the region. The projected economic impacts associated with the Sanctuary would be much greater than the expected growth in its operating budget (Mahoney et al. 1996).

Sanctuary designation not only would increase the numbers of visitors to the region, but also could provide recognition, accessibility, and opportunities that could improve the quality of the experiences for tourists, as well as the quality of life for residents. The Sanctuary could provide a focus and mechanism for the partnerships needed to develop facilities, services, and programs that are meaningful to visitors and local residents, while protecting the underwater cultural resources upon which recreation and tourism is based.

Because there are no proposed Sanctuary regulations of natural resources, ecosystems, or habitats, designation of the Sanctuary will not adversely impact the region's natural resources. Designation of the Thunder Bay National Marine Sanctuary would provide positive environmental impacts and associated positive economic impacts from scuba diving and heritage tourism. These positive impacts would outweigh the potential negative economic impacts to commercial salvors and related industries. The resource protection goals of the National Marine Sanctuaries Act would be met while guaranteeing access to recreational divers, boaters, and anglers. Management strategies would facilitate these compatible multiple uses of the underwater cultural resources in a manner that avoids or minimizes negative impacts to these resources.

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