THUNDER BAY NATIONAL MARINE SANCTUARY

2009

DRAFT MANAGEMENT PLAN

NATIONAL MARINE SANCTUARIES

THUNDER BAY

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Executive Summary

On October 7, 2000, the National Oceanic and Atmospheric Administration (NOAA) designated Thunder Bay the nation's 13th national marine sanctuary. Thunder Bay National Marine Sanctuary is jointly managed by NOAA and the state of Michigan. The sanctuary's mission is to preserve nationally significant shipwrecks and regional maritime landscape through resource protection, education, and research. The sanctuary also promotes appreciation and responsible use of Thunder Bay, the Great Lakes, and the oceans.

Thunder Bay National Marine Sanctuary is undergoing its first management plan review. The 1992 congressional legislation that reauthorized the National Marine Sanctuaries Act, 16 U.S.C. § 1431 *et seq,* (www.sanctuaries.noaa.gov/about/legislation/) requires that each of the national marine sanctuaries periodically engages in a management plan review process to reevaluate site-specific goals and objectives and to develop management strategies and activities to ensure the sanctuary best protects its resources. The original Thunder Bay National Marine Sanctuary Management Plan was written as part of the sanctuary designation process.

This Draft Management Plan (2009) was prepared by NOAA and the state of Michigan's Department of History, Arts and Libraries in cooperation with the Thunder Bay Sanctuary Advisory Council and with input from the public, local governments, state and federal agencies, and other stakeholders. The plan is comprised of four action plans (Resource Protection, Education and Outreach, Research, and Sanctuary Operations). It sets priorities to guide sanctuary programs and operations and provides the public with a better understanding of the sanctuary's strategies to protect Thunder Bay's resources.

Historical research indicates that more than 200 shipwrecks lie below the waters in and around Thunder Bay. The sheer number of shipwrecks is impressive. However, it is their excellent state of preservation and what they represent—a century and a half of maritime commerce and travel on the Great Lakes—that elevates them to national and international significance deserving an exceptional level of protection, study, and public interpretation. This Draft Management Plan will help protect both shipwrecks that have been located and those that await discovery. Each is a unique and fragile element in history that Thunder Bay National Marine Sanctuary is dedicated to preserving for future generations.

Thunder Bay National Marine Sanctuary

NOAA's Office of National Marine Sanctuaries

The Office of National Marine Sanctuaries (ONMS) serves as the trustee for a system of 14 marine protected areas, encompassing more than 150,000 square miles of ocean and Great Lakes waters from Washington state to the Florida Keys, and from Lake Huron to American Samoa. NOAA's National Ocean Service manages the national marine sanctuaries through the authority of the National Marine Sanctuaries Act of 1972, 16 U.S.C. § 1431 *et seq,* (www.sanctuaries.noaa.gov/about/legislation/).

Marine sanctuaries contain deep ocean gardens, coral reefs, whale migration corridors, deep-sea canyons, historically significant shipwrecks, and other underwater archaeological sites. They range in size from one-quarter square mile in Fagatele Bay, American Samoa, to more than 134,000 square miles at the Papahānaumokuākea Marine National Monument, located in the northwest Hawaiian Archipelago.

The ONMS fosters public awareness of marine resources and maritime heritage through scientific research, monitoring, exploration, education, and outreach, and works closely with its many partners and the public to protect and manage sanctuaries. The ONMS is a world leader in marine management by protecting living marine creatures, environmental quality, and maritime heritage resources, while maintaining recreational and commercial activities that are sustainable and compatible with long-term preservation.

Office of National Marine Sanctuaries' Mission: *Identify, protect, conserve, and enhance the natural and maritime heritage resources, values, and qualities of the National Marine Sanctuary System for this and future generations throughout the nation.*

Thunder Bay National Marine Sanctuary

Thunder Bay National Marine Sanctuary

Located in northwestern Lake Huron, Thunder Bay is adjacent to one of the most treacherous stretches of water within the Great Lakes system. Unpredictable weather, murky fog banks, sudden gales, and rocky shoals earned the area the name "Shipwreck Alley." Today, the 448-square-mile Thunder Bay National Marine Sanctuary protects one of America's best-preserved and nationally significant collections of shipwrecks.

Fire, ice, collisions, and storms claimed over 200 vessels in and around Thunder Bay. To date, more than 50 shipwrecks have been discovered within the sanctuary, and an additional 30 wrecks have been located outside of the sanctuary boundaries (see Appendix). Although the sheer number of shipwrecks is impressive, it is the range of vessel types located in the sanctuary that makes the collection nationally significant. From an 1844 sidewheel steamer to a modern 500-foot-long German freighter, the shipwrecks of Thunder Bay represent a microcosm of maritime commerce and travel on the Great Lakes.

In addition to shipwrecks, the sanctuary protects and interprets the remains of commercial fishing sites, historic docks, and other underwater archaeological sites. Geological and archaeological evidence suggests a high probability of prehistoric archaeological sites resting below sanctuary waters. Whether examined as individual sites, or read as a complex maritime landscape, the maritime heritage resources of the Thunder Bay National Marine Sanctuary are of national and international significance. Collectively, the sanctuary encompasses and protects the remains of an intricately woven maritime landscape shaped by thousands of years of human use of the Great Lakes.

Michigan's Department of History, Arts and Libraries

The sanctuary is managed jointly by NOAA and the state of Michigan. The Michigan Historical Center represents the state in managing the sanctuary. Tracing its history to Public Act 271 of 1913, MCL 399.1 *et seq*, the center comprises the state's history museum system and *Michigan History* magazine, as well as its archaeological, archival records management, and historic preservation programs. The center builds programs and alliances that preserve and interpret Michigan's past and help people discover, enjoy, and find inspiration in their heritage. The center is one of four agencies in the Department of History, Arts and Libraries (HAL). Created in 2001, HAL enriches the quality of life and strengthens the economy for Michigan residents by providing access to information, preserving and promoting Michigan heritage and fostering cultural creativity.

Community-Based Management

Before Thunder Bay's designation as a national marine sanctuary in 2000, the state of Michigan created the Thunder Bay Underwater Preserve, a 290-square-mile area designated in 1981 as the first of eleven preserves authorized by Michigan's "Bottomlands Act", 1980 PA 184, MCL 299.51 *et seq.* The state's preserve program is presently authorized by Part 761 of the Natural Resources and Environmental Protection Act, 1994 PA 451, MCL 324.76101 *et seq.* The 448-square-mile area of Lake Huron is now both a national marine sanctuary and a state underwater preserve.

The Thunder Bay National Marine Sanctuary is jointly managed by NOAA and HAL. The sanctuary superintendent manages the day-to-day operations and activities of the site. A Joint Management Committee, consisting of the director of the ONMS and a state agency member (appointed by the director of HAL), makes major policy, budget, and management decisions. In addition, an advisory council provides advice to the sanctuary superintendent. Members of the advisory council represent the community's interests, including government, education, research, recreational fishing, diving, tourism, economic development, the state-designated underwater preserve, and the community-at-large. The advisory council members serve as liaisons between their constituents and the sanctuary, keeping sanctuary staff informed of issues and concerns.

The official name of the sanctuary is the Thunder Bay National Marine Sanctuary and Underwater Preserve. To simplify the name, the Joint Management Committee has agreed to use Thunder Bay National Marine Sanctuary.

Protecting Thunder Bay's Underwater Treasures

For over 12,000 years, people have traveled on the Great Lakes. From Native American dugout canoes to wooden sailing craft and steel freighters, thousands of ships have made millions of voyages across the Great Lakes. The last 150 years have been particularly explosive, transforming the region into one of the world's busiest waterways. Yet, with extraordinary growth comes adversity. Over 200 pioneer steamboats, majestic schooners, and huge steel freighters wrecked near Thunder Bay alone. Today, the sanctuary's shipwrecks capture dramatic moments from centuries that transformed America. As a collection, they illuminate an era of enormous growth and remind us of risks taken and tragedies endured.

Lake Huron's cold, fresh water ensures that Thunder Bay's shipwrecks are among the best preserved in the world. Many sites remain virtually unchanged for over 150 years. With masts still standing, deck hardware in place and the crews' personal possessions often surviving, sites located in deeper waters are true time capsules. Other shipwrecks

Regulations

The following activities are generally prohibited in the sanctuary without a permit:

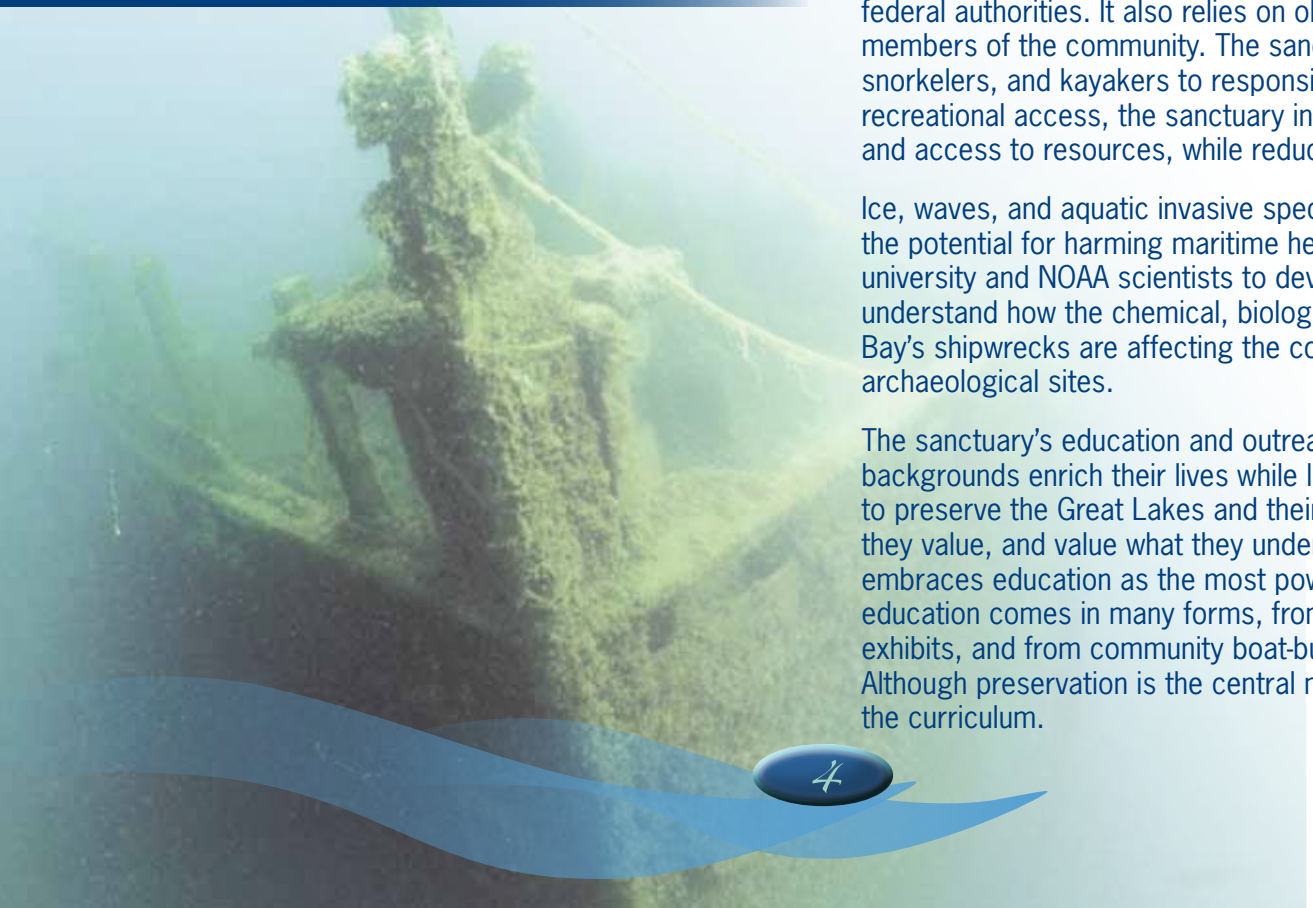
- *Recovering, altering, destroying, or possessing underwater cultural resources.*
- *Drilling into, dredging, or otherwise altering the lake bottom associated with underwater cultural resources.*
- *Using grappling hooks or other anchoring devices if a mooring buoy exists.*

Sanctuary Resources

Federal regulations generally define the sanctuary's resources as:

- *Any sunken watercraft, including a ship, boat, canoe, skiff, raft, and barge that sank on or before the date of sanctuary designation.*
- *The rigging, gear, fittings, trappings, and equipment, the personal property of the officers, crew, and passengers, and the cargo of any sunken watercraft, that sank before the date of sanctuary designation, located within the sanctuary.*
- *Any historic remnant of docks or piers or associated material, or materials resulting from activities of historic and prehistoric Native Americans.*

This is a general summary only and not to be relied upon for any purpose. For relevant regulations, see 15 C.F.R. Part 922, Subpart R. Regulations are also available at www.thunderbay.noaa.gov/pdfs/tbnmsregs.pdf.



lay well-preserved but broken up in shallower waters. Readily accessible by kayakers, snorkelers, and divers of all abilities, these sites often provide sanctuary users with their first shipwreck experience.

Thunder Bay's shipwrecks are magnificent, yet vulnerable. Natural processes and human impacts threaten the long-term sustainability of our underwater maritime heritage. Through research, education, and community involvement, the sanctuary works to protect our nation's historic shipwrecks for future generations. Protecting Thunder Bay's underwater treasures is a responsibility shared by the sanctuary, its many partners, and the public.

Thunder Bay National Marine Sanctuary protects a nationally significant collection of shipwrecks and related maritime heritage resources. By fostering an understanding that our past connections to the Great Lakes and oceans are critical to our future, the sanctuary works to ensure that future generations will continue to experience and value Thunder Bay's irreplaceable underwater treasures.

The Thunder Bay National Marine Sanctuary regulations protect these maritime heritage resources. To enforce these regulations, the sanctuary partners with local, state, and federal authorities. It also relies on observations from recreational divers and other members of the community. The sanctuary strongly encourages recreational divers, snorkelers, and kayakers to responsibly visit sanctuary shipwrecks. To facilitate recreational access, the sanctuary invests in mooring buoys designed to improve safety and access to resources, while reducing visitor impacts.

Ice, waves, and aquatic invasive species such as zebra and quagga mussels all have the potential for harming maritime heritage resources. The sanctuary is working with university and NOAA scientists to develop long-term monitoring programs to better understand how the chemical, biological, and physical conditions found around Thunder Bay's shipwrecks are affecting the corrosion and deterioration of these irreplaceable archaeological sites.

The sanctuary's education and outreach programs help people of all ages and backgrounds enrich their lives while learning about, physically experiencing, and working to preserve the Great Lakes and their maritime heritage. Because people preserve what they value, and value what they understand, Thunder Bay National Marine Sanctuary embraces education as the most powerful resource preservation tool. Sanctuary education comes in many forms, from programs for teachers and students to imaginative exhibits, and from community boat-building to remotely operated vehicle competitions. Although preservation is the central message, the sanctuary promotes learning across the curriculum.

Thunder Bay National Marine Sanctuary conducts, supports, promotes, and coordinates scientific research and monitoring of its maritime heritage resources to ensure their long-term protection. Archaeological and historical research conducted by the sanctuary and its partners is fundamental to better understanding the region's historic shipwrecks. This knowledge is essential for addressing management issues and enhancing resource protection. Archaeological and historical research is also at the heart of the sanctuary's exhibits, education initiatives, and public programming.

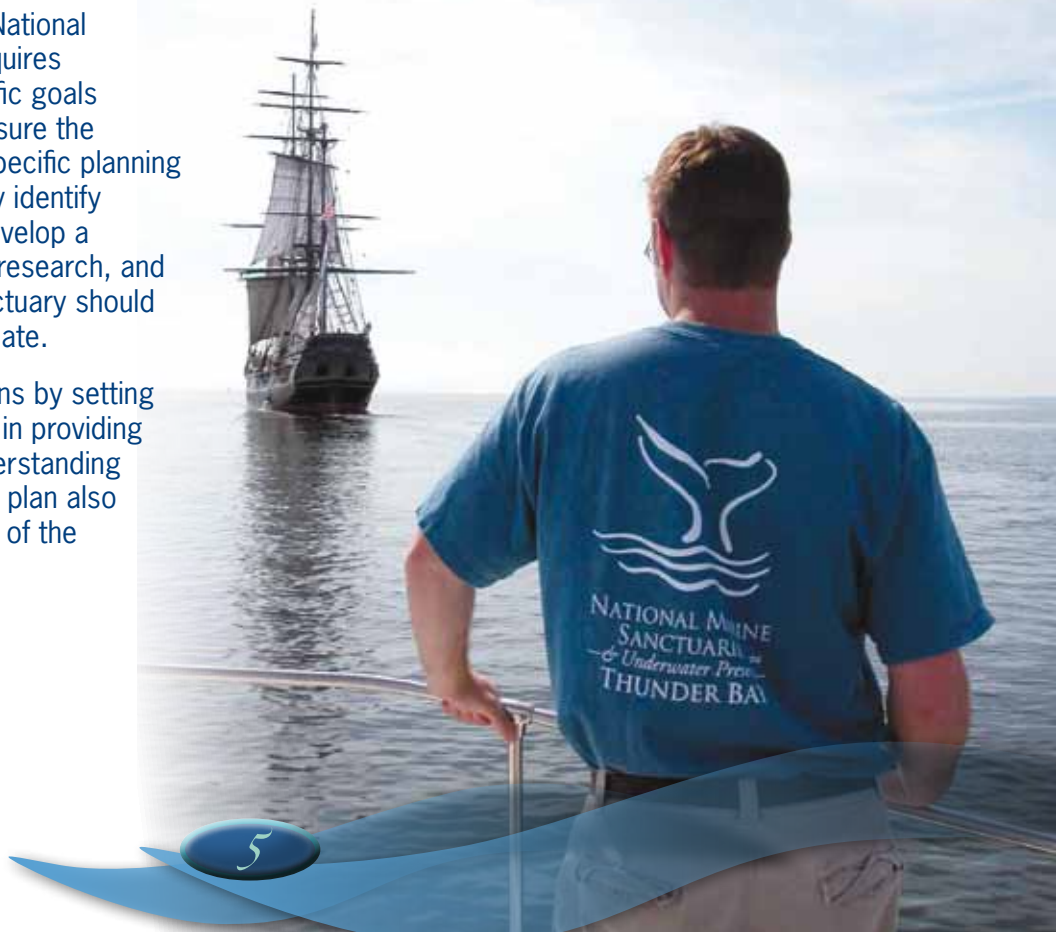
The sanctuary relies heavily on the work of others to carry out its mission. Partners in the form of private businesses, nongovernmental organizations, educational and cultural institutions, and local, state, and federal agencies provide expertise for scientific research and exploration, resources and capacities for site monitoring and enforcement, and support for educational and outreach programs. Thunder Bay National Marine Sanctuary's many partnerships have been, and will continue to be, critical to the success of the sanctuary.

Building a New Management Plan

New challenges and opportunities emerge with time. For this reason, the National Marine Sanctuaries Act (www.sanctuaries.noaa.gov/about/legislation/) requires periodic updating of sanctuary management plans to reevaluate site-specific goals and objectives and to develop management strategies and activities to ensure the sanctuary best protects its resources. Management plans are sanctuary-specific planning and management documents used by all national marine sanctuaries. They identify immediate, mid-range, and long-term challenges and opportunities, and develop a course for the future. A management plan describes resource protection, research, and education programs that guide sanctuary operations, specifies how a sanctuary should best protect its resources, and describes sanctuary regulations if appropriate.

The revised management plan will guide sanctuary programs and operations by setting budget and project priorities. The plan will also assist the advisory council in providing advice on management decisions and provide the public with a better understanding of the sanctuary's strategies to protect the resources of Thunder Bay. The plan also includes specific performance measures designed to assess the progress of the sanctuary in implementing this new management plan.

This management plan is consistent with the National Marine Sanctuaries Act, and implementing regulations that incorporate the standards, requirements, and policies of the Federal Archaeological Program (FAP) developed by the Department of Interior's National Park Service. Additionally, the ONMS has incorporated the UNESCO Convention on the Protection of the Underwater Cultural Heritage Annex Rules (www.thunderbay.noaa.gov/pdfs/tbnmsregs.pdf.) into office's practice and policies, including this management plan, which are also consistent with the FAP.



The original Thunder Bay National Marine Sanctuary Management Plan was written as part of the sanctuary designation process and published in the Final Environmental Impact Statement (www.thunderbay.noaa.gov/pdfs/ThunderBayEIS.pdf). This document is the new Thunder Bay National Marine Sanctuary Draft Management Plan and its contents are the result of the sanctuary's first management plan review since its designation in 2000. NOAA and the State of Michigan's HAL prepared the Draft Management Plan in cooperation with the advisory council and with input from the public, state and federal agencies, and other stakeholders.

The Thunder Bay National Marine Sanctuary management plan review began in September 2006 with a series of public scoping meetings held in Alpena (9/24/06 and 9/26/06), Presque Isle County (9/25/06), Alcona County (9/28/06), and Lansing (9/29/06). The scoping meetings were used to gather input on resource management issues from resource users, interest groups, government agencies, and other members of the public. The sanctuary also received written comments via mail, fax, and email from September 18, 2006 to October 13, 2006. Approximately 100 comments were received from the public.

Public comments were used to identify issues to be addressed in the updated management plan. The advisory council established six working groups consisting of sanctuary staff, members of the advisory council, and members of the public to address the issues identified: boundaries, education and outreach, resource protection, funding, research, and sanctuary operations.

The working groups held 22 working group meetings to develop action plan strategies and activities for the Draft Management Plan. The boundary working group met first, and based on the density and historical, archaeological, and recreational value of resources, recommended that the sanctuary be expanded to a 3,662-square-mile area encompassing Alpena, Alcona, and Presque Isle counties and lakeward to the international border with Canada. On May 22, 2007, the advisory council voted to accept a resolution to recommend expansion of the sanctuary boundary to the 3,662-square-mile area. Additionally, the advisory council voted to accept the funding working group's recommendation to develop a local foundation to provide additional support to the sanctuary.

The education and outreach, research, and resource protection working groups' recommendations for action plan strategies and activities were presented at the February 19, 2008 advisory council meeting and the advisory council voted unanimously to accept the recommendations. These included strategies for expanding sanctuary education and outreach programs, promoting the Great Lakes Maritime Heritage Center and Trail, further characterizing and monitoring sanctuary resources, and enhancing sanctuary resource protection programs.

This Draft Management Plan was developed by sanctuary staff with advice from advisory council working groups comprised of advisory council members and other members of the public. The core of this Draft Management Plan is four action plans: Resource Protection, Education and Outreach, Research, and Sanctuary Operations and Administration. Each action plan begins with background information on current sanctuary programs and an overview of the direction the sanctuary will take to address current management needs. The goals and objectives are also stated for each action plan.

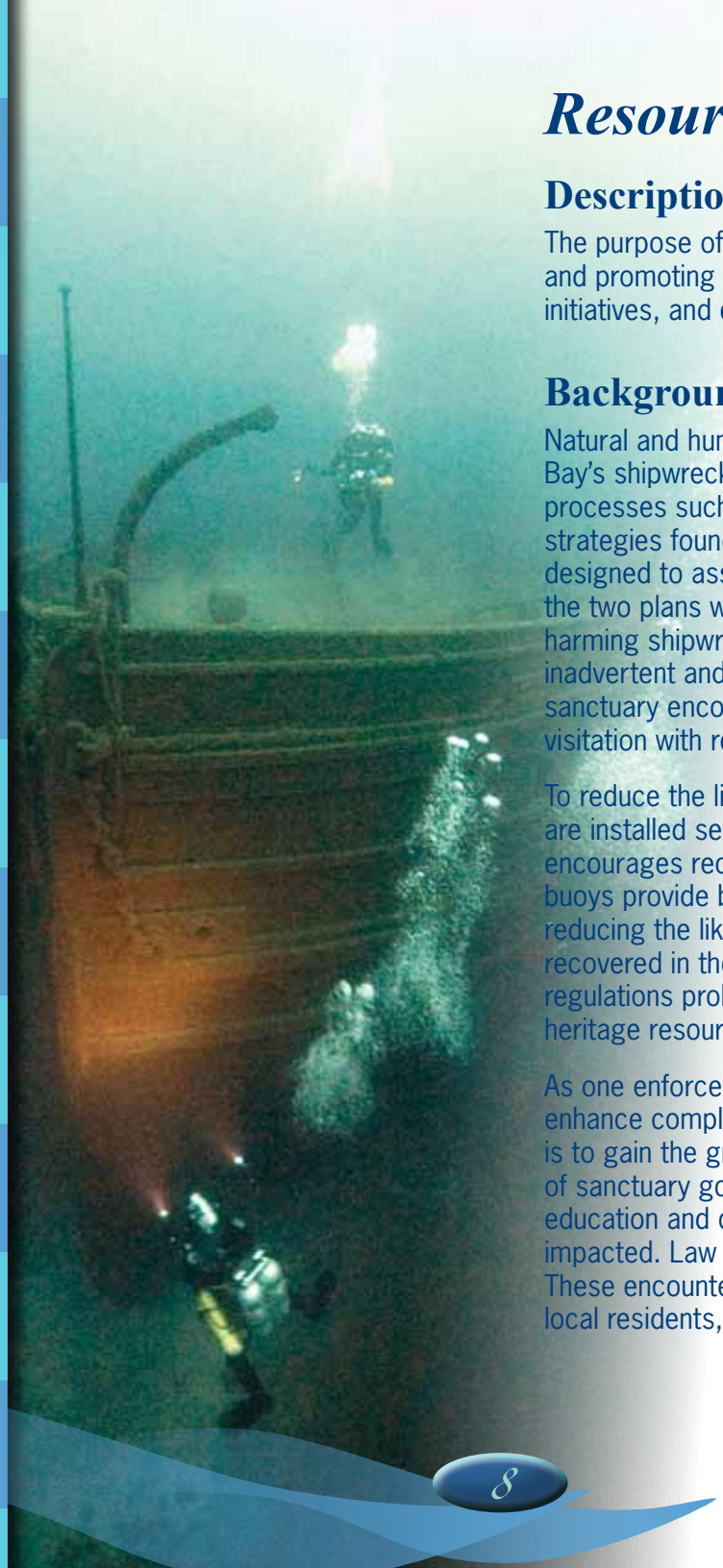
Strategies describe how the goals will be accomplished for a particular issue or program area. Each strategy is divided into specific activities for sanctuary staff to complete. Action plan resource requirements are estimated based on the overall needs for conducting the strategies, including staff salaries. These estimates have been developed to represent the full requirements to conduct programs and projects, including outside funding, as described over a five-year period. Full implementation of these action plans is dependent on continued support from state and federal funding, grants, donations, and contributions from partners.

Performance measures for each action plan are identified to assist in evaluating the sanctuary's progress over time. As these measures are monitored, data is collected on progress towards the achievement of outcomes. In areas where the sanctuary is falling short of targets, staff will work to identify the obstacles preventing Thunder Bay National Marine Sanctuary from reaching targets. Results will be compiled, synthesized, and then reported by the site superintendent annually at an advisory council meeting.

This Draft Management Plan is being circulated to the public for written comment. Additionally, Draft Management Plan hearings are being held to gather further public comments and suggestions. Please see the sanctuary's Web site (www.thunderbay.noaa.gov) for details.

The Final Management Plan will be comprised of the Draft Management Plan with modifications made after analyzing the public comments. All comments will be considered, and the sanctuary will provide a response to all comments upon release of the Final Management Plan. The Final Management Plan will become the new planning document that guides sanctuary actions to ensure that the sanctuary emerges better able to protect and use its maritime heritage resources for the benefit of current and future generations.

The strategies and activities contained in Thunder Bay's Draft Management Plan support the sanctuary's mission to preserve its nationally significant shipwrecks and maritime landscape through resource protection, education, and research, while promoting appreciation and responsible use of Thunder Bay, the Great Lakes, and the oceans.



Resource Protection Action Plan

Description

The purpose of this action plan is to strengthen resource protection by emphasizing and promoting responsible use of the resources, increasing and focusing education initiatives, and enhancing enforcement efforts.

Background

Natural and human processes can threaten the long-term sustainability of Thunder Bay's shipwrecks and other maritime heritage resources. While the effects of natural processes such as ice or zebra mussel damage on shipwrecks will be studied using strategies found in the Research Action Plan, the Resource Protection Action Plan is designed to assess and reduce human impacts on sanctuary resources. In practice, the two plans will be highly integrated. Human activities have the greatest potential for harming shipwrecks and other maritime heritage resources. They include anchoring, inadvertent and intentional diving practices that damage resources, and looting. The sanctuary encourages public access to its resources and strives to balance increased visitation with resource management and preservation.

To reduce the likelihood of anchor damage to sanctuary resources, mooring buoys are installed seasonally at popular shipwreck sites in the sanctuary. The sanctuary encourages recreational users to responsibly visit the sanctuary's shipwrecks. Mooring buoys provide better access to shipwrecks and increase diver safety, while greatly reducing the likelihood of anchor damage. Mooring buoys are installed in the spring and recovered in the fall to avoid ice and storm damage during winter months. Sanctuary regulations prohibit the use of grappling hooks or other anchoring devices on maritime heritage resource sites if a mooring buoy is present.

As one enforcement tool, the sanctuary uses "interpretive enforcement," which seeks to enhance compliance primarily through education. The goal of interpretive enforcement is to gain the greatest level of compliance through public understanding and support of sanctuary goals. Interpretive enforcement emphasizes informing the public through education and outreach about responsible behavior before resources are adversely impacted. Law enforcement officers interact with users on the water and at the dock. These encounters allow officers to make direct, informative contacts with visitors and local residents, while conducting routine enforcement activity.

Enforcement is also achieved by maintaining sufficient presence within the sanctuary to deter violations. Successful enforcement relies on frequent on-water patrols that ensure sanctuary users are familiar with regulations in order to deter willful or inadvertent violations and provide quick response to violations and emergencies. The sanctuary also works to create public awareness about state laws that protect shipwrecks and archaeological sites in all of Michigan's waters, including the Michigan Underwater Preserve system. Thunder Bay National Marine Sanctuary partners with NOAA's Office of Law Enforcement, the U.S. Coast Guard, Michigan Department of Natural Resources, Alpena County Sheriff, and Michigan State Police to assist in sanctuary enforcement.

In addition to protecting resources in the sanctuary, the sanctuary conserves artifacts removed from Michigan waters. The Great Lakes Maritime Heritage Center features a conservation lab in which recovered maritime heritage artifacts are stabilized for long-term preservation and storage. The sanctuary receives artifact donations from private collections throughout Alpena and Northeast Michigan. Accepted artifacts are accessioned into the Michigan Historical Center's archaeological collection and assessed for conservation needs. Though sanctuary regulations and Michigan law prohibit recovery of new artifacts without a permit, the state provides a mechanism for previously recovered artifacts to return to public ownership.

As indicated above, mooring buoy placement, enforcement, education, and conservation are vital to resource protection. Consequently, through the management plan review process, it was recommended by the advisory council that the sanctuary expand to provide these protection programs to shipwrecks and other maritime heritage resources in waters off Alcona and Presque Isle counties. A boundary expansion working group evaluated three alternatives when considering expansion. The recommendation to expand to include the waters off Alcona and Presque Isle counties was based on the density of known and undiscovered resources, the historical, archaeological, and recreational significance of individual and collective resources, and the maritime landscape:

A) No expansion (448 square miles)

B) Boundary extending from the New Presque Isle Lighthouse in Presque Isle County south to Sturgeon Point Lighthouse in Alcona County, east to west 83 degrees longitude (808 square miles)

C) An area extending from Alcona County's southern boundary to Presque Isle County's northern boundary, east to the international border with Canada (3,662 square miles)

Advisory Council's Boundary Alternatives

A) ***Current Sanctuary Boundary***

B) ***Proposed Boundary****: New Presque Isle Light to Sturgeon Point Light*

C) ***Proposed Boundary:*** *Presque Isle County to Alcona County*

The group considered a larger area – all waters off Alpena, Alcona, and Presque Isle counties plus Spectacle Reef – but excluded it because interest expressed by the public and local governments was limited to expansion to Presque Isle, Alpena, and Alcona counties. The group also discussed expanding to Presque Isle and Alcona counties east to the west 83 degrees longitude, but excluded it due to the potential for well preserved, undiscovered wrecks in deeper waters to the international border with Canada.

The working group recommended Alternative C to provide protection for those maritime heritage resources currently known and those yet to be discovered. They also believed that by expanding sanctuary boundaries to this area, important national treasures would be protected through the sanctuary's resource protection programs, while allowing recreational use of the resources. On May 22, 2007, the boundary expansion working group presented this recommendation to the advisory council which passed a resolution to expand the boundary to the recommended area. Please refer to www.thunderbay.noaa.gov/pdfs/boundeval.pdf for a full description of the working group's recommendation to expand sanctuary boundaries. Subsequently, bills were introduced in the U.S. Senate by Sen. Carl Levin and in the U.S. House of Representatives by Rep. Bart Stupak, and co-sponsored by Rep. Thaddeus McCotter, to expand the sanctuary boundaries to the advisory council's recommended area.

Resource Protection

Goal

Strengthen protection of Thunder Bay National Marine Sanctuary's resources through compliance with sanctuary regulations, while increasing resource access.

Objectives

- Increase access while promoting responsible use of sanctuary resources.
- Continue to use and enhance enforcement, including on-water and interpretive enforcement, as a resource protection tool.
- Better understand recreational use patterns and the effects of users on the resources.

Strategies

STRATEGY RP-1: Evaluate and assess a proposed expansion of the sanctuary to a 3,662-square-mile area from Alcona County to Presque Isle County, east to the international border with Canada to protect, manage, and interpret additional shipwrecks and other potential maritime heritage resources.

Activity 1.1: Initiate a public process to consider the advisory council's recommendation to expand the sanctuary boundary.

A. Conduct an analysis of the advisory council's boundary recommendation to determine whether the potential expansion is consistent with the policies and purposes of the National Marine Sanctuaries Act.

B. Provide the public with the opportunity to comment on the analysis by holding public meetings in Alpena, Alcona, and Presque Isle counties.

Activity 1.2: Develop an Environmental Impact Statement to meet requirements under the National Environmental Policy Act, if the analysis conducted in Activity 1.1 results in a recommendation to expand the boundary.

A. Develop a Draft Environmental Impact Statement (DEIS).
B. Receive program review and clearance of the DEIS.
C. Release the DEIS to the public and accept and evaluate public comments.
D. Develop the Final Environmental Impact Statement (FEIS).
E. Receive program review and clearance of the FEIS.
F. Finalize and release the FEIS.
G. Receive final review of the FEIS by congress and the Governor.

STRATEGY RP-2: Assess and evaluate recreational use of sanctuary resources.

Activity 2.1: Monitor use of sanctuary resources by recreational users in order to better understand use patterns and the effects of use on the resources, and to better serve recreational users.

A. Develop procedures to allow users to easily and voluntarily report recreational use of the resources and provide incentives for reporting use.

B. Work with dive stores and charter boats to document recreational use of the resources.

C. Collaborate with enforcement partners to document recreational use of the resources.

STRATEGY RP-3: Increase compliance with sanctuary regulations and other applicable state and federal laws.

Activity 3.1: Ensure sufficient patrol presence in the sanctuary through partnerships and interagency coordination.

A. Provide information to law enforcement personnel on interpretive enforcement.

B. Develop outreach materials for enforcement officers to distribute while patrolling the sanctuary.

C. Host regional law enforcement/maritime heritage resource law workshops.

D. Develop an interagency communication and response plan.

Activity 3.2: Evaluate the use of technology to enhance enforcement efforts.

Activity 3.3: Use interpretive enforcement as a tool to inform users about sanctuary regulations.

A. Provide information to law enforcement personnel on interpretive enforcement.

B. Integrate interpretive enforcement into shore-side signage throughout the sanctuary region.

C. Include informational insets about the sanctuary and Michigan Underwater Preserve System in state boat registration renewal packets.

D. Provide U.S. Coast Guard Auxiliary members, marina employees, and other appropriate individuals and organizations with information about recognizing and reporting violations of sanctuary regulations.

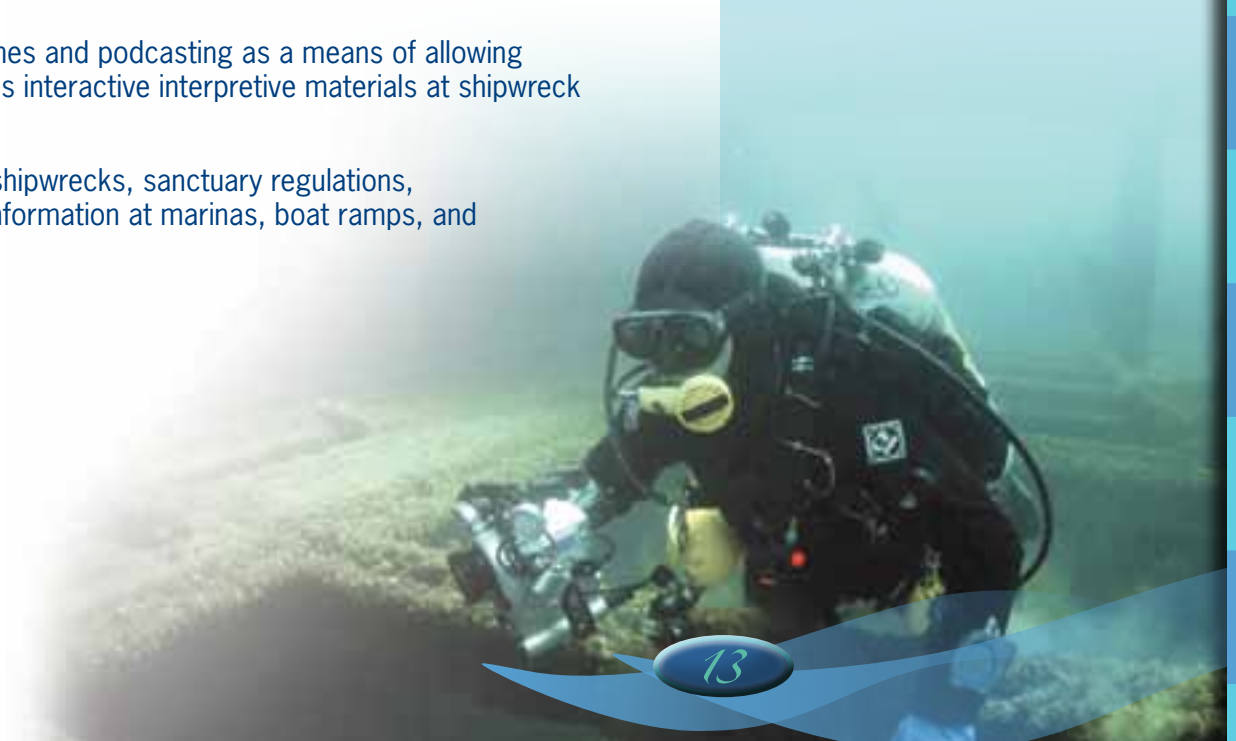
STRATEGY RP-4: Increase and encourage access and responsible use of sanctuary resources by fostering greater awareness among recreational users.

Activity 4.1: Provide practical information for users such as shipwreck locations, information, access points, regulations, and contact information.

A. Develop outreach materials and Web-based information for recreational users of sanctuary resources.

B. Explore the use of cell phones and podcasting as a means of allowing recreational users to access interactive interpretive materials at shipwreck sites.

C. Provide information about shipwrecks, sanctuary regulations, and enforcement contact information at marinas, boat ramps, and other access points.



Activity 4.2: Maintain existing and install additional mooring buoys at shipwreck sites to protect shipwrecks from anchor damage and to facilitate shipwreck access.

A. Develop a five-year plan for increasing the total number of moored shipwrecks in the sanctuary, including permitting procedures, staffing requirements, and operational and scheduling considerations.

B. Develop an operational plan for annual redeployment and maintenance of existing buoys.

C. Work with local dive charters to monitor moorings throughout the dive season.

D. Investigate the permit requirements for using smaller, easier to maintain marker buoys where appropriate.

Activity 4.3: Reduce the impact of divers and snorkelers on Thunder Bay's maritime landscape by forming a partnership with commercial operators to educate their customers about maritime heritage resources, the sanctuary, and diving and snorkeling etiquette using a program similar to Florida Keys National Marine Sanctuary's Blue Star Program.

Activity 4.4: Work with other agencies, local governments, and non-governmental organizations to improve recreational access along Lake Huron.

STRATEGY RP-5: Preserve and curate maritime heritage artifacts.

Activity 5.1: Establish membership criteria and procedures for an accessions committee to evaluate donation criteria and artifact handling policies.

Activity 5.2: Continue development of infrastructure for conservation laboratory and curation facilities for the long-term storage of artifacts.

Activity 5.3: Make artifacts available to the public and to professionals via exhibits, loans, and selected access to the artifact collection.

Requirements

Action plan resource requirements (in thousands) are estimated based on the overall needs for conducting the strategies, including staff salaries. These estimates have been developed to represent the full requirements to conduct programs and projects, including outside funding, as described over a five-year period. Full implementation of these action plans is dependent on continued support from state and federal funding, grants, donations, and contributions from partners.

STRATEGY	YR 1	YR 2	YR 3	YR 4	YR 5
Evaluate and assess a proposed expansion of the sanctuary to a 3,662-square-mile area from Alcona County to Presque Isle County, east to the international border with Canada to protect, manage, and interpret additional shipwrecks and other potential maritime heritage resources.	75	75	75	75	75
Assess and evaluate recreational use of sanctuary resources.	37	12	12	12	33
Increase compliance with sanctuary regulations and other applicable state and federal laws.	46	51	56	61	66
Increase and encourage access and responsible use of sanctuary resources by fostering greater awareness among recreational users.	7	9	10	11	12
Preserve and curate maritime heritage artifacts.	2	2	16	2	2
Total Estimated Annual Cost	**167**	**149**	**169**	**161**	**188**

Performance Measures

OUTCOME	Performance Measure	Baseline
Increased awareness of sanctuary and state regulations among recreational users of Thunder Bay National Marine Sanctuary	By 2014, 100% of major boat launches and marinas adjacent to the sanctuary will have outdoor signage or kiosks about regulations and responsible use of sanctuary resources.	There are eight major boat launches or marinas in the three-county (Alpena, Alcona, and Presque Isle) region, none of which have adequate signage.
Increased public access to sanctuary resources	By 2014, 40 shipwrecks will be equipped with moorings buoys.	As of 2008, 21 shipwrecks have moorings. A total of 33 sites have permits for moorings.

Education And Outreach Action Plan

Description

The purpose of this action plan is to enhance public awareness, understanding, and stewardship of the sanctuary, the Great Lakes, and the oceans.

Background

Sanctuary education and outreach programs are designed to raise public awareness about the sanctuary and its resources, encourage public involvement in resource protection, increase knowledge about Great Lakes maritime history, and expand ocean literacy. Education and outreach at Thunder Bay National Marine Sanctuary includes both formal programs for learners of all ages and informal programs for sanctuary visitors and constituents, including user groups impacting sanctuary resources. Education and outreach at the sanctuary also includes promotion of the sanctuary, the Great Lakes Maritime Heritage Center, and the Great Lakes Maritime Heritage Trail. While education and outreach efforts are concentrated in and around the Great Lakes Maritime Heritage Center, they extend out to the region, state, and nation with initiatives in maritime heritage, archaeology, and ocean and Great Lakes literacy. Various strategies, introduced below, allow the sanctuary to efficiently and effectively carry out its education objectives.

Great Lakes Maritime Heritage Center

To foster appreciation and preservation of the Great Lakes and their maritime heritage, the sanctuary developed exhibits at the Great Lakes Maritime Heritage Center. The “Exploring the Shipwreck Century” exhibit is designed to help visitors appreciate the role of the Great Lakes in American history, and to foster public awareness and appreciation for Great Lakes shipwrecks. The main components of the 9,000-square-foot exhibits are a full-size replica schooner and shipwreck, along with a shipwreck gallery, artifact storage and conservation laboratory, kids’ discovery area, and a 93-seat theater. The exhibits are free and open year round.

Education & Outreach

Great Lakes Maritime Heritage Trail

Working with a variety of state and local partners, the sanctuary has established the Great Lakes Maritime Heritage Trail. The trail promotes and interprets Northeast Michigan's rich maritime heritage. By providing innovative interpretation that enhances individuals' experiences while accessing maritime resources, the trail fosters an appreciation for the Great lakes and their rich history. The sanctuary has established segments of the trail along the Thunder Bay River, which features a boardwalk and a pedestrian bridge, a historically-themed riverfront park, historic docks, and outdoor interpretation. Long-range plans are being developed to expand the Great Lakes Maritime Heritage Trail along Northeast Michigan's Lake Huron shoreline.

Classroom Initiatives

Providing educational opportunities for students and educators is a high priority for the sanctuary. To reach as many students as possible, the sanctuary provides curriculum and training opportunities to regional educators and students. A new curriculum featuring Great Lakes shipping and shipwrecks published in partnership with the Michigan Department of History, Arts and Libraries and the Wisconsin Historical Society is the cornerstone of classroom programs. This comprehensive book and companion activity guide uses Thunder Bay shipwrecks to relate to the larger story of Great Lakes maritime history. Titled "Exploring the Shipwreck Century," the curriculum directly connects with the exhibits and programming at the Great Lakes Maritime Heritage Center. Workshops for educators, field trips to the center, and supplementary classroom materials and Web sites further enhance students' opportunities to discover the shipwrecks of Thunder Bay.

Distance Learning

Thunder Bay's distance learning initiatives allow the sanctuary's education programs to extend across the nation. Education staff carries out a variety of programs as part of the sanctuary's three-level approach to distance learning or 'telepresence' connections. Live expeditionary broadcasts from Thunder Bay featuring archaeologists and scientists exploring the sanctuary from the on-water and most heavily produced level of programs. Mid-level point-to-point connections allow sanctuary staff to go directly into classrooms around the country and showcase center exhibits and programs to a nationwide audience. A final aspect of Thunder Bay's telepresence programming involves bringing in interactive programs from researchers around the world to the Great Lakes Maritime Heritage Center. This range of telepresence allows the sanctuary to institute programs with varying financial and staff resources. The infrastructure supporting these programs is strong, including an innovative Internet2 community collaborative connection, mobile and studio video conferencing equipment, and live broadcast transmission and technologies.

Education & Outreach

Shipboard Education

When students are provided opportunities to experience the Great Lakes firsthand and to explore the history and archaeology above and below the waves for themselves, lifelong memories and real behavioral change can be made. The sanctuary embraces education aboard tall ships and research vessels to effect this change, supporting sail, research, and snorkeling trips on Lake Huron. Half-day educational programs aboard partner vessels with nationally recognized watershed education programs have carried thousands of students and visitors on Thunder Bay over the last five years. Research and training ships like NOAA's RV *Huron Explorer* and the Michigan Sea Cadets' *Pride of Michigan* afford students opportunities to work alongside scientists as they conduct research in the sanctuary. Moreover, snorkeling trips to shallow shipwreck sites enable students to experience a piece of history and inspire the next generation of divers to wisely observe these fragile and non-renewable historic resources.

Part of a Larger Organization

As part of NOAA, the National Ocean Service, and the Office of National Marine Sanctuaries, Thunder Bay has access to an extended network of scientific expertise and resources. This content is the foundation for sanctuary education and outreach initiatives. The implementation of NOAA's ocean literacy mandate – an increased awareness of oceans and one's connectedness to oceans – is also one of the core components of Thunder Bay's education action plan. In addition to grounding our programs, NOAA products, services, and information are distributed via Thunder Bay as an on-the-ground storefront and hub for access to NOAA in the Midwest.

Thunder Bay Maritime Festival

The sanctuary's largest annual outreach event is the Thunder Bay Maritime Festival. This outreach centerpiece encourages participants to delve deeper into the maritime world. Since 2001, the sanctuary has hosted an annual community festival to reconnect constituents with the area's maritime heritage. In recent years, the Thunder Bay Maritime Festival has attracted over 10,000 visitors each year, and has become the highlight of Alpena's 4th of July festivities.

Education & Outreach

ROV Building Competition

The Great Lakes Regional Marine Advanced Technology Education (MATE) Center's Remotely Operated Vehicle (ROV) Building Competition for high school students has also become a highly anticipated annual event. Begun as a small pilot program in 2001, the competition has grown to hosting a dozen or more teams from around the region, supported by dozens of volunteers recruited from around the Great Lakes. Designed to inspire the next generation of underwater scientists and explorers to pursue careers in marine technology, archaeology, and science, the sanctuary considers the ROV program one of its most successful, with the ability to annually expose hundreds, if not thousands, of people to sanctuary resources and messages through technology and engineering.

An Integrated Approach

The sanctuary will use education and outreach as a tool to address specific priority issues identified in the management plan. Education is essential to achieving many of the sanctuary's management objectives and will be used to both complement and promote resource protection and research programs.

Goal

Use education as a management tool to protect sanctuary resources by increasing public awareness and understanding of the sanctuary's maritime landscape and by encouraging responsible stewardship of its maritime heritage resources.

Objectives

- Build an education and outreach program that complements and promotes sanctuary resource protection and research programs.
- Increase ocean and Great Lakes literacy.
- Target user groups and underrepresented audiences for participation in sanctuary programs.
- Promote the Great Lakes Maritime Heritage Center and Trail as primary mechanisms to implement education and outreach programs.
- Increase communication and coordination among sanctuary education and outreach programs and partners.

Strategies

STRATEGY ED-1: Increase awareness and knowledge of the sanctuary by developing education and outreach materials for a broader audience.

Activity 1.1: Develop education materials and lessons for students and educators.

A. Finalize and publish a maritime heritage curriculum specific to Great Lakes maritime history and the Thunder Bay region.

B. Develop traveling education kits and web resources for classrooms and educators.

C. Develop material for K-12 classroom visits to the sanctuary and Great Lakes Maritime Heritage Center.

D. Develop a database of sanctuary-related lesson plans and classroom materials available to educators.

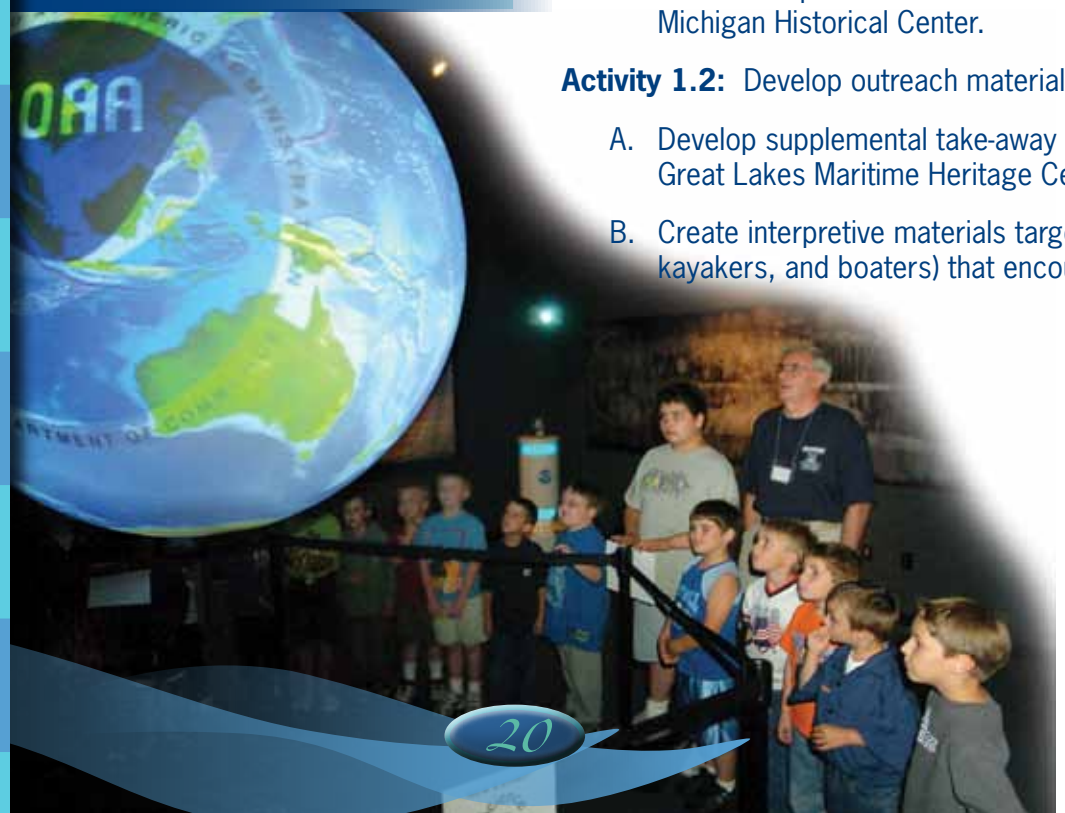
E. Align sanctuary classroom materials with the state of Michigan's content expectations.

F. Coordinate promotion of sanctuary education materials with the Michigan Historical Center.

Activity 1.2: Develop outreach materials for a wide variety of users.

A. Develop supplemental take-away materials for visitors to the Great Lakes Maritime Heritage Center.

B. Create interpretive materials targeting recreational users (divers, snorkelers, kayakers, and boaters) that encourage responsible use of sanctuary resources.



STRATEGY ED-2: Increase awareness and knowledge of the sanctuary through education and outreach programs.

Activity 2.1: Expand education offerings for elementary, secondary, and higher education teachers and students, both at the Great Lakes Maritime Heritage Center and throughout the state.

A. Distribute sanctuary information, curricula, and program information to regional educators through the Centers for Ocean Sciences Education Excellence, National Science Teachers Association, Michigan Education Association, Michigan Science and Social Studies Teachers Associations, and other related associations and conferences.

B. Develop and implement a series of trainings and workshops for educators.

C. Conduct educational programs for regional schools.

   a. Develop a suite of formal education programs for various ages to complement the Great Lakes Maritime Heritage Center exhibits.

   b. Develop and implement “day camp” and overnight programs.

   c. Conduct student workshops and field seminars on sanctuary resources.

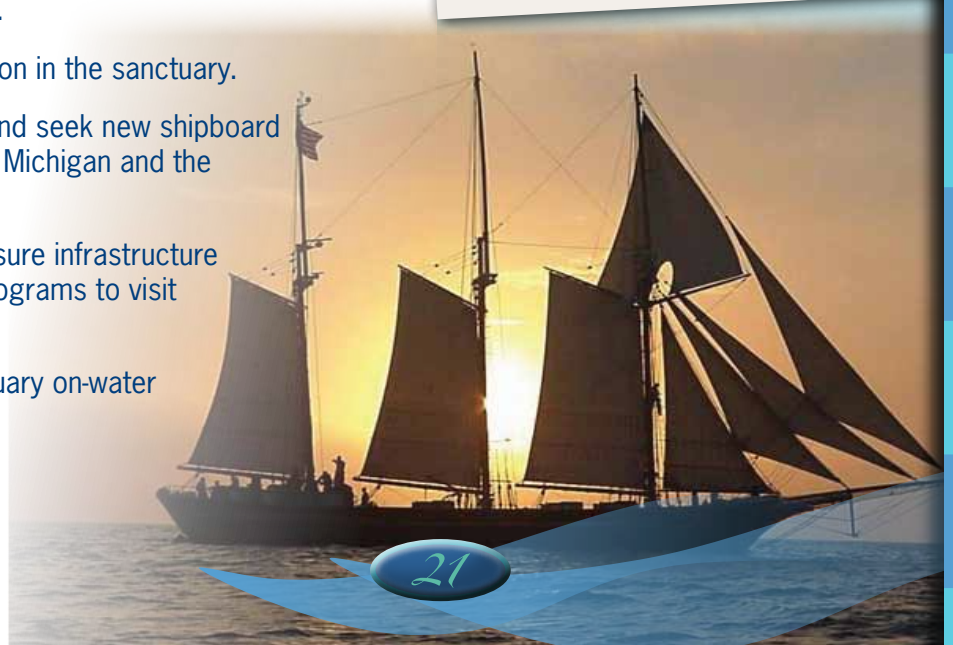
D. Seek opportunities to, or assist with, the integration of sanctuary content in undergraduate and graduate level college courses in archaeology, maritime, museum, aquarium, and science center programs.

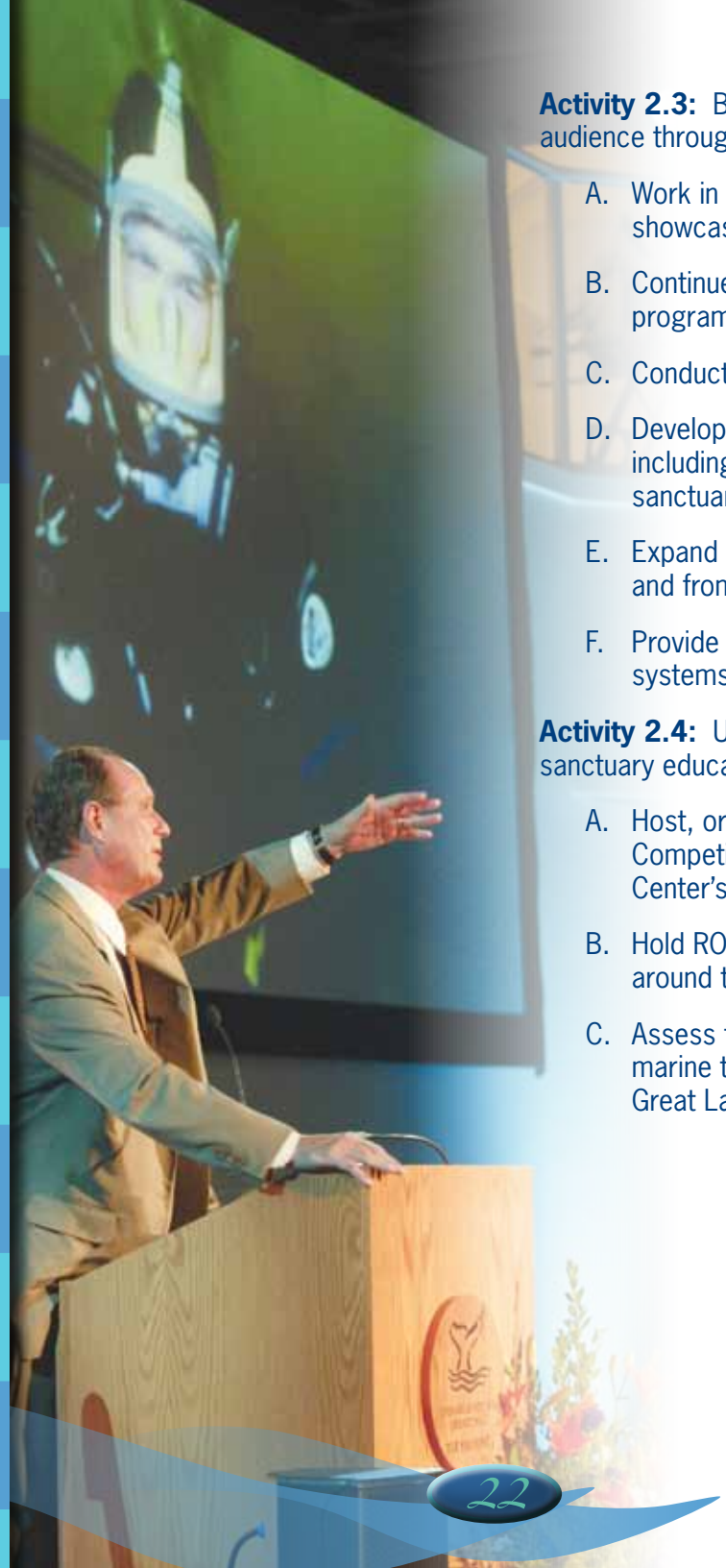
Activity 2.2: Provide opportunities for shipboard education in the sanctuary.

A. Enhance existing shipboard education programs and seek new shipboard education partners and opportunities in Northeast Michigan and the Great Lakes region.

B. Work with local partners and the community to ensure infrastructure to support and encourage shipboard education programs to visit the sanctuary.

C. Strive to participate in regional and national sanctuary on-water educational opportunities.





Activity 2.3: Bring Thunder Bay National Marine Sanctuary content to a national audience through distance learning.

A. Work in conjunction with OceansLive, the ONMS's streaming media site, to create, showcase, and distribute multimedia content.

B. Continue to actively work with distance learning partners to create and distribute programming around the country on various scales.

C. Conduct a live expedition broadcast from the sanctuary on a regular basis.

D. Develop infrastructure to supply regular "in-the-field" educational opportunities, including ship-to-shore video links within the sanctuary and from other sanctuary sites.

E. Expand point-to-point and classroom distance learning program offerings to and from the Great Lakes Maritime Heritage Center.

F. Provide real time data to educators and the public from NOAA's observation systems.

Activity 2.4: Utilize remotely operated vehicles (ROV) and research technology in sanctuary education.

A. Host, organize, and support the annual Great Lakes Regional ROV Building Competition as part of the Marine Advanced Technology Education (MATE) Center's International ROV Building Competition.

B. Hold ROV workshops for students, educators, and educational institutions around the region.

C. Assess the feasibility of developing capacity to facilitate ROV activities and other marine technologies by rehabilitating the dive tank structure adjacent to the Great Lakes Maritime Heritage Center.

STRATEGY ED-3: Enhance sanctuary communications to create greater awareness.

Activity 3.1: Develop and implement a marketing plan to promote the sanctuary and the Great Lakes Maritime Heritage Center and Trail.

A. Develop an annual communications plan.

B. Leverage local, regional, and national media and promotion opportunities to increase awareness about the sanctuary and its programs.

C. Strategically target local points of contact for visitors, providing them with information about the sanctuary and the Great Lakes Maritime Heritage Center and Trail.

D. Distribute promotional literature at Michigan welcome centers.

E. Increase marketing efforts in partnership with local and state travel organizations, including area convention and visitors bureaus, chambers of commerce, and Travel Michigan.

Activity 3.2: Enhance Thunder Bay's Web site to provide quality, up-to-date information about the sanctuary, including implementing Web 2.0 components (social networking, wikis, blogs, etc.) to encourage collaboration and interaction with the public.

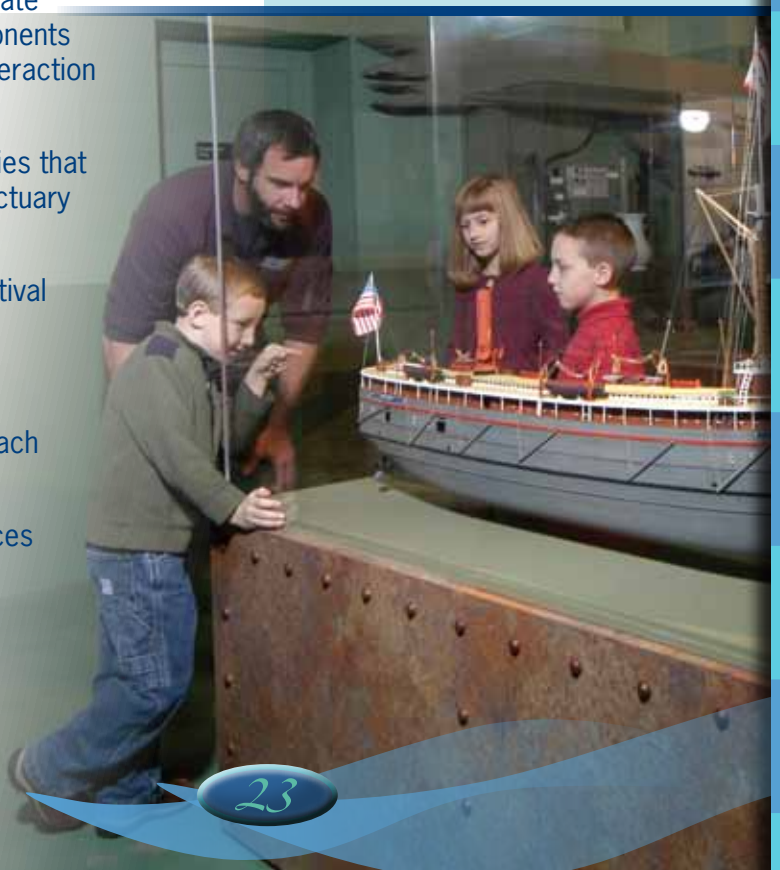
Activity 3.3: Sponsor, organize, and participate in outreach opportunities that promote the sanctuary's mission and that allow for dissemination of sanctuary information.

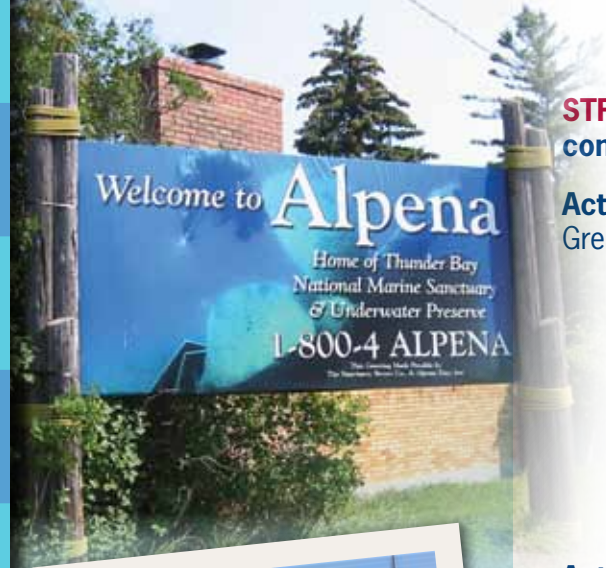
A. Continue to sponsor and organize the Thunder Bay Maritime Festival in Alpena, Michigan.

B. Participate in local community events.

C. Partner with other NOAA programs to participate in regional outreach events.

D. Present at local, regional, and national workshops and conferences targeted at specific impact groups including divers, resource managers, and maritime history and archaeology professionals.





STRATEGY ED-4: Maintain and expand Thunder Bay National Marine Sanctuary community presence.

Activity 4.1: Provide way-finding and promotional signage for the sanctuary and the Great Lakes Maritime Heritage Center and Trail.

A. Work with local and state agencies to improve way-finding for the Great Lakes Maritime Heritage Center and Trail, and shipwreck access points.

B. Establish a promotional presence in communities along the US-23 corridor to market the sanctuary and the Great Lakes Maritime Heritage Center and Trail.

C. Establish promotional and interpretive presence at Michigan welcome centers and other tourism information distribution points throughout the state.

Activity 4.2: Continue to develop the Great Lakes Maritime Heritage Trail in Alcona, Alpena, and Presque Isle counties.

A. Identify partnerships and establish roles with relevant municipalities, state agencies, and non-governmental organizations that will collaborate in the development of the trail.

B. Develop a phased interpretive plan for the Great Lakes Maritime Heritage Trail.

C. Seek funding with partners to implement the interpretive plan.

STRATEGY ED-5: Maximize the impact and effectiveness of education and outreach efforts, including interpretation at the Great Lakes Maritime Heritage Center, through ongoing evaluation.

Activity 5.1: Create a standing working group of education experts from the sanctuary advisory council, local schools, and agencies to advise on sanctuary education and outreach programs.

Activity 5.2: Seek ongoing input from junior high, high school, and college students to provide advice on sanctuary education and outreach programs for similar-aged audiences, to foster youth leadership, and to encourage youth participation in sanctuary education and outreach programs.

Activity 5.3: Develop and implement an ongoing system to evaluate and improve education and outreach programs.

A. Carry out initial assessment of current education and outreach programs that includes expected learning outcomes.

B. Design a process for periodically assessing the levels of understanding, applied skills, and stewardship resulting from the current education and outreach programs.

C. Use the resulting assessments to recommend improvements and estimate resources needed for education and outreach programs.

D. Continue to carry out an ongoing evaluation strategy for education and outreach.

Requirements

Action plan resource requirements (in thousands) are estimated based on the overall needs for conducting the strategies, including staff salaries. These estimates have been developed to represent the full requirements to conduct programs and projects, including outside funding, as described over a five-year period. Full implementation of these action plans is dependent on continued support from state and federal funding, grants, donations, and contributions from partners.

STRATEGY	YR 1	YR 2	YR 3	YR 4	YR 5
Increase awareness and knowledge of the sanctuary by developing education and outreach materials for a broader audience.	7	9.5	47.5	7.5	47.5
Increase awareness and knowledge of the sanctuary through education and outreach programs.	28	43	45	58	58
Enhance sanctuary communications to create greater awareness.	73	93	99	107	121
Maintain and expand Thunder Bay National Marine Sanctuary community presence.	26	47	43	49	55
Maximize the impact and effectiveness of education and outreach efforts, including interpretation at the Great Lakes Maritime Heritage Center and the Great Lakes Maritime Heritage Trail, through ongoing evaluation.	0	12	1	1	12
Total Estimated Annual Cost	**134**	**204.5**	**235.5**	**222.5**	**293.5**

Performance Measures

OUTCOME	Performance Measure	Baseline
Educators are provided with new and updated classroom material on the sanctuary	By 2011, 30 new sanctuary lesson plans and classroom activities will be available to educators.	Currently, 15 lesson plans and classroom activities are available to educators.
Increased opportunities for public participation in sanctuary education and outreach programming	By 2014, the total number of education and outreach programs offered to the public will increase by an average of 10% annually.	A baseline number of education and outreach programs will be determined in 2009.
Increased opportunities for public participation in sanctuary education and outreach programming	By 2014, the sanctuary will increase the number of distance learning programs by an average of 10% annually.	In 2008, approximately 16 distance learning programs were offered to the public.
Increased effectiveness of sanctuary education and outreach programs	By 2010, a performance evaluation tool will be developed and implemented to track the effectiveness of sanctuary education and outreach programs.	There is currently no performance evaluation tool.

Research Action Plan

Description

The purpose of this action plan is to outline the sanctuary's research and monitoring objectives and priorities. The action plan not only guides Thunder Bay National Marine Sanctuary's efforts, but integrates and encourages a broad range of archaeological and interdisciplinary research by sanctuary partners.

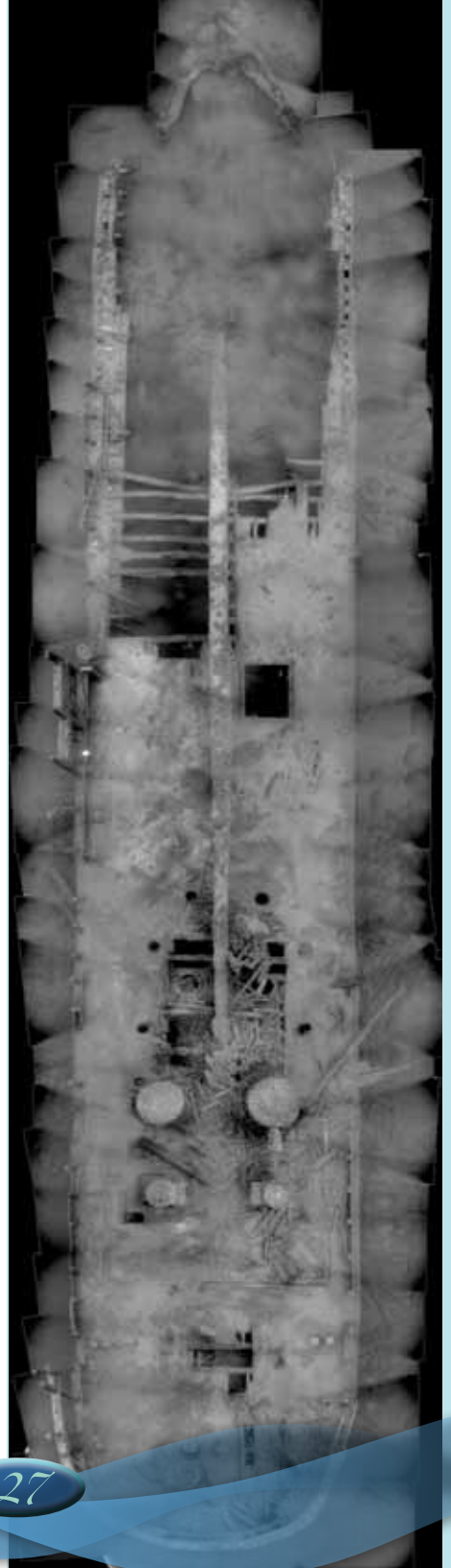
Background

Developing knowledge of the sanctuary's maritime heritage resources through research is a primary function of Thunder Bay National Marine Sanctuary. These resources include shipwrecks, docks, cribs and piers, prehistoric and historic Native American sites, and many other cultural remnants of the past. Thunder Bay National Marine Sanctuary staff conduct, support, promote, and coordinate all research with an aim toward sanctuary characterization. Characterization is the process through which sanctuary resources are inventoried, located, documented, and ultimately analyzed within a broader historical and archaeological context. Knowledge acquired through research is used to evaluate existing management practices, enhance future management decisions, and educate the public about the importance of the Great Lakes and their history.

Characterization of the sanctuary begins with a historical inventory of potential maritime heritage resources located in and around the sanctuary. Derived from historical and archival research of contemporary newspapers, lifesaving station and ship logs, vessel enrollments, insurance and court records, and other published and unpublished literature, Thunder Bay National Marine Sanctuary's maritime heritage site inventory is an ongoing project where new data is continually being added to the sanctuary's files and databases.

Physically locating maritime heritage sites is the next step in sanctuary characterization, and to date, much of the sanctuary's research efforts have focused on locating shipwrecks and related maritime heritage resources. Several remote sensing surveys have been undertaken within the sanctuary and surrounding waters with assistance from various parts of NOAA and other partners. These surveys have included side-scan sonar, Light Detection and Ranging (LIDAR), and high-resolution aerial photogrammetry surveys.

Documentation is perhaps the most intense and important aspect of Thunder Bay's characterization efforts. Archaeological documentation provides baseline data to evaluate the current state of preservation, and can identify threats to sites, such as zebra mussels, ice and anchor damage, looting, and other intentional and unintentional human impacts.



Through documentation, archaeologists reveal the stories of the past that are preserved in Thunder Bay's nationally-significant collection of shipwrecks, and help sanctuary staff create products that allow recreational users - kayakers, snorkelers, and divers - to connect with the Great Lakes and their history. Equally important, the results from sanctuary documentation are used in exhibits, educational materials, and outreach products to allow non-divers to also explore these historic sites.

The majority of shipwreck documentation is done by divers manually mapping maritime heritage sites using tape measures, drawing slates, still photographs, and videography. This method is particularly effective for shore-side and relatively shallow-water sites (0-100 feet deep). Using this method, shallow-water wrecks such at the *New Orleans, Shamrock, Maid of the Mist, Monohansett,* and dozens of other shipwreck sites near North Point, Isaacson Bay, and Black River have been documented by the sanctuary and its partners.

Diving is also an important way archaeologists access shipwrecks beyond the recreational diving depth limit of 130 feet. Using specialized diving equipment, sanctuary researchers have documented several "deepwater" shipwreck sites including an unidentified two-mast schooner located in 2001, the 198-foot wooden passenger steamer *Pewabic*, and the canal schooners *Cornelia B. Windiate, E.B. Allen,* and *Kyle Spangler.* Located in water depths ranging from 100 to 200 feet, these sites have been documented using a combination of techniques including photo-mosaics, archaeological site plans, artistic renderings, and video and still imagery. The sanctuary also uses remotely operated vehicles (ROV) and autonomous underwater vehicles (AUV) to access deeper archaeological sites. The data is essential for evaluating and managing shipwreck sites that are becoming increasingly popular with divers.

All phases of characterization are greatly enhanced through access to historical records. The sanctuary manages the Thunder Bay Sanctuary Research Collection, one of the nation's largest archives of 19th-century Great Lakes maritime history documents. The collection is housed and jointly managed by the Alpena County George N. Fletcher Public Library. Established in 2003 after a major donation of archival material from C. Patrick Labadie, the collection has continued to grow through many other donations. A major focus has been to digitize the collection. Nearly $400,000 in grant funding has been received towards this effort. Digitization accelerates the pace of historic research, fosters greater public access to the collection, and aids in the preservation of fragile documents by reducing the need for direct physical handling.

Data produced from all phases of characterization and related research is being incorporated into the sanctuary's resource database and Geographic Information System (GIS). This allows researchers to better relate historical information with the actual

disposition of shipwrecks and other maritime heritage sites. Satellite imagery, historic and modern charts, and other scientific data are also incorporated into the GIS program to enable better management, interpretation, and public understanding of the sanctuary's maritime landscape.

The sanctuary also works to enhance NOAA and other partners' abilities to observe, protect, and manage the Great Lakes. By working with various partners on interdisciplinary Great Lakes research, the sanctuary is working toward a better understanding of the physical, chemical, and biological processes that affect sanctuary resources, while contributing to efforts to better understand the Great Lakes, one of our nation's most precious natural resources.

Finally, the sanctuary recognizes that global climate change has far reaching effects on the oceans and Great Lakes. Understanding and confronting climate change are increasingly important aspects of marine conservation. To that end, Thunder Bay National Marine Sanctuary is in the process of becoming one of the Office of National Marine Sanctuaries' Sentinel Sites. Sentinel sites are locations in the marine environment that support sustained observations of changes in the status of the marine environment. They allow investigators to track the status of key indicators of ecosystem integrity, serve as a means to provide early warning to resource managers, and offer opportunities for technology and protocol testing. They address NOAA activities in areas of mandated responsibility and help address questions about regional issues such as habitat degradation and invasive species impacts.

Goal

Protect the sanctuary's resources and maritime landscape by inventorying, locating, documenting, assessing, managing, and interpreting the sanctuary's archaeological, historical, and environmental resources.

Objectives

- Characterize the sanctuary's maritime heritage resources.
- Scientifically monitor sanctuary maritime heritage resources to better understand existing and potential threats.
- Develop and encourage collaborative research programs to meet Thunder Bay National Marine Sanctuary's on-going management needs.

Strategies

STRATEGY R-1: Characterize the sanctuary's maritime heritage resources and landscape features.

Activity 1.1: Conduct historical and archival research on potential maritime heritage resources and landscape features in and around the sanctuary.

A. Research and compile historical documentation relevant to sanctuary resources including vessel enrollment and registration documents, court records, insurance files, and regional newspapers.

B. Maintain files and databases on potential shipwrecks and other maritime heritage resources within the sanctuary.

C. Draft a multi-property document to place sanctuary shipwrecks, archaeological sites, and landscape features in a regional and national historic context.

Activity 1.2: Conduct systematic remote sensing and visual surveys to locate and identify maritime heritage resources and landscape features in the sanctuary.

A. Define survey requirements for characterization.

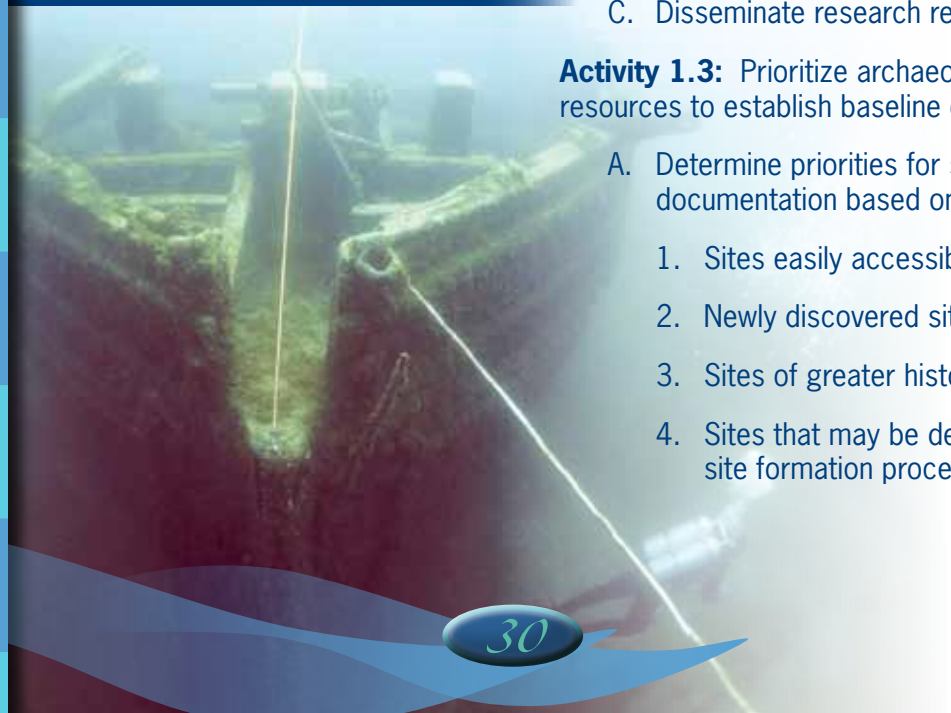
B. Encourage and conduct systematic surveys with sanctuary partners based on above requirements.

C. Disseminate research results to professional and public audiences.

Activity 1.3: Prioritize archaeological documentation of identified maritime heritage resources to establish baseline data for long-term monitoring.

A. Determine priorities for shipwreck and archaeological site research and documentation based on:

1. Sites easily accessible and most heavily visited by recreational users.
2. Newly discovered sites susceptible to first-time looting or disturbance.
3. Sites of greater historical significance.
4. Sites that may be deteriorating or becoming less accessible as a result of site formation processes.



B. Complete baseline documentation of prioritized shipwrecks and archaeological sites including site plans, underwater video, still imagery, and photo-mosaics.

C. Prepare research reports and National Register of Historic Places nominations on documented sites.

D. Disseminate research results to professional and public audiences.

Activity 1.4: Continue to develop the sanctuary's Geographical Information System (GIS) for archaeological, historical, and geographical data management and dissemination.

A. Develop a comprehensive database using existing and new data sets.

B. Maintain and utilize GIS data and create products from the data.

C. Provide public access to the data via the sanctuary's Web site.

STRATEGY R-2: Develop a monitoring program for sanctuary maritime heritage sites.

Activity 2.1: Develop and implement a long-term monitoring plan to determine the natural and human impacts on maritime heritage sites.

A. Collect and evaluate existing data to establish baselines.

B. Establish site-specific requirements for monitoring.

C. Collect monitoring data and continually evaluate monitoring requirements.

STRATEGY R-3: Continue partnership with Alpena County George N. Fletcher Public Library to manage the Thunder Bay Sanctuary Research Collection.

Activity 3.1: Preserve the Thunder Bay Sanctuary Research Collection and continue to partner with the library to make it accessible to the public.

A. Ensure collection infrastructure and policies meet archival standards.

B. Conduct a long-term space evaluation.

C. Determine and implement digitization priorities.

D. Ensure the collection is publically accessible, physically and online.

Activity 3.2: Evaluate opportunities to increase Thunder Bay Sanctuary Research Collection holdings.

A. Develop an acquisitions policy for the collection.

B. Define the scope of the collection.

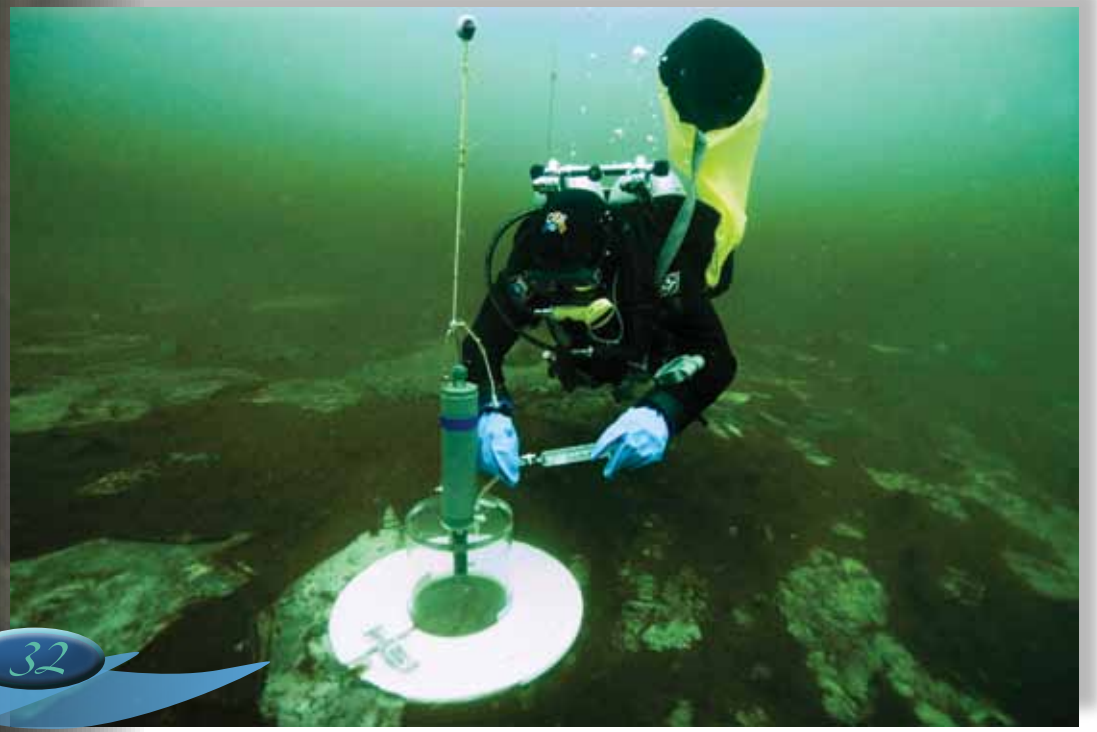
C. Actively pursue donation of archival materials.

STRATEGY R-4: Develop partnerships with local, national, and international researchers and organizations to enhance sanctuary research programs.

Activity 4.1: Develop partnerships to characterize the sanctuary's maritime heritage resources.

Activity 4.2: Develop partnerships with multi-disciplinary researchers and organizations to study Great Lakes ecology including the study of climate change, invasive species, lake biology, geology, and water quality. Also, continue to develop marine observation infrastructure and capabilities to serve as an ONMS Sentinel Site.

Activity 4.3: Create a standing research working group of multi-disciplinary researchers from government agencies, academic institutions, and non-governmental organizations to provide input to further develop and implement a comprehensive sanctuary research program.



STRATEGY R-5: Utilize volunteers, fellows, interns, and other non-permanent staff for sanctuary characterization, research, and monitoring.

Activity 5.1: Work with the sanctuary's volunteer coordinator to recruit, train, and retain volunteers to assist sanctuary staff on various research projects and with the Thunder Bay Sanctuary Research Collection.

A. Offer a variety of Nautical Archaeology Society training modules for sanctuary volunteers.

B. Work with the NOAA Dive Center to establish protocols for certifying and utilizing NOAA-certified volunteer divers.

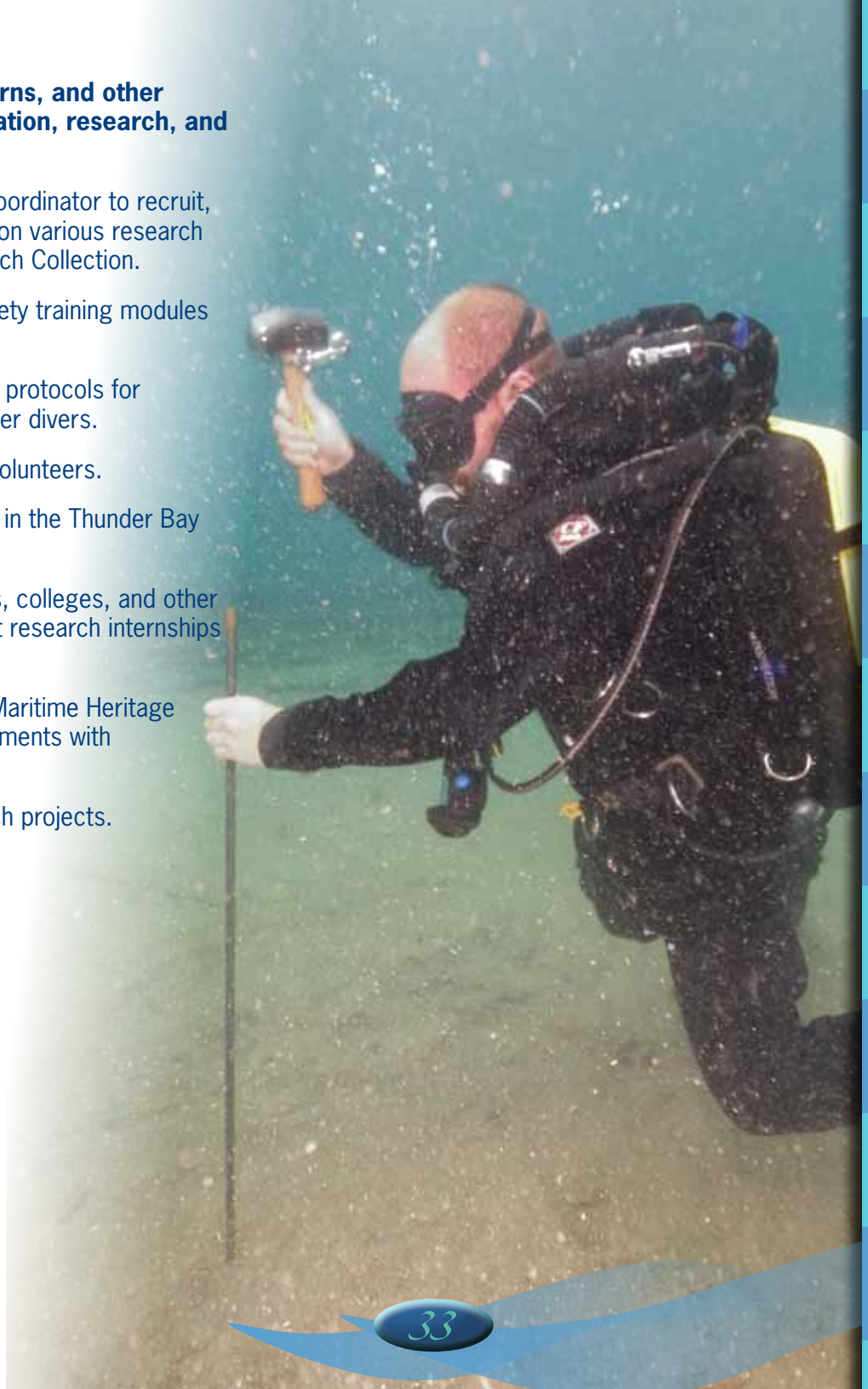
C. Develop a list of research opportunities for volunteers.

D. Develop a list of opportunities for volunteers in the Thunder Bay Sanctuary Research Collection.

Activity 5.2: Establish partnerships with universities, colleges, and other institutions to establish a robust program for student research internships and fellowships.

A. Work with ONMS headquarters and NOAA's Maritime Heritage Program to establish memorandum of agreements with appropriate institutions.

B. Develop a list of prospective student research projects.



Requirements

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STRATEGY	YR 1	YR 2	YR 3	YR 4	YR 5
Characterize the sanctuary's maritime heritage resources and landscape features.	49	49	54	58	63
Develop a monitoring program for sanctuary maritime heritage sites.	4	4	5	5	5
Continue partnership with Alpena County George N. Fletcher Public Library to manage the Thunder Bay Sanctuary Research Collection.	27	30	33	35	38
Develop partnerships with local, national, and international researchers and organizations to enhance sanctuary research programs.	32	39	47	49	57
Utilize volunteers, fellows, interns, and other non-permanent staff for sanctuary characterization, research and monitoring.	10	10	13	13	13
Total Estimated Annual Cost	**122**	**132**	**152**	**136**	**176**

Performance Measures

OUTCOME	Performance Measure	Baseline
Baseline characterization established on priority shipwrecks in the sanctuary	By 2019, baseline documentation will be complete on 40 buoyed shipwrecks in the sanctuary.	Approximately 10 buoyed shipwrecks have baseline documentation.
Provide the public with access to unique holdings of the Thunder Bay Sanctuary Research Collection	By 2014, 100% of the Thunder Bay Sanctuary Research Collection's maps, plans, and other oversized media will be properly stored, catalogued, and digitized.	0% of the maps, plans, and other oversized media have been catalogued or digitized.
Enhanced sanctuary research efforts through a robust volunteer program	By 2011, at least five NOAA-certified volunteer divers will be trained to help with sanctuary diving operations.	The sanctuary currently has no NOAA-certified volunteer divers.

Sanctuary Operations and Administration Action Plan

Description

The purpose of this action plan is to strengthen sanctuary infrastructure, staffing, and program support to ensure effective implementation of the management plan.

Background

Thunder Bay National Marine Sanctuary was established to preserve the area's rich but fragile maritime heritage resources. Protecting 448 square miles requires appropriate facilities and vessels, trained personnel and volunteers, funding and partnerships, and an extensive array of specialized equipment. Developing an effective and sustainable infrastructure has been a major focus of the sanctuary since its designation.

Formerly housed at the Federal Building, the sanctuary is now headquartered at the 20,000-square-foot Great Lakes Maritime Heritage Center. This state-of-the-art building features a 93-seat theater, 9,000 square-feet of exhibit space, distance learning capabilities, an artifact conservation lab, visible curatorial space, a technologically-enhanced education room, a researchers' field station, and administrative offices. In 2008, the center became a Gold Certified Leadership in Energy and Environmental Design (LEED) building, a nationally accepted benchmark for the design, construction, and operation of high-performance green buildings. The center has also won two U.S Department of Energy Awards: *The You Have the Power Award* and *Federal Energy Savers Award,* as well as the *GSA Special Achievement for Real Property Innovation.* The sanctuary, in cooperation with the Great Lakes Environmental Research Laboratory (GLERL), operates three research vessels, including the 41-foot *Huron Explorer*, the first petroleum-free vessel in the nation. *Huron Explorer* uses rapeseed hydraulic oil for its deck crane, winches and marine gear, 100% soy biodiesel for engine fuel, and canola motor oil. A working demonstration of the merits of bio-products in the marine environment, *Huron Explorer* was also awarded the U.S. Department of Energy's *You Have the Power Award.* The sanctuary's goal is to make its entire fleet environmentally friendly and economical to operate.

The sanctuary's mission is supported by nine full-time staff and a number of part-time and seasonal employees, as well as student interns, employed by NOAA and Michigan's Department of History, Arts and Libraries (HAL). Nearly 100 volunteers are used in nearly every facet of the sanctuary, including the greeters and guides at the Great Lakes

Maritime Heritage Center, archival digitization assistants in the Thunder Bay Sanctuary Research Collection, education and research assistants, community boat building, and special events volunteers. For example, the Thunder Bay Community Boat Building Program is a volunteer-driven program that offers several opportunities for individuals of all experience levels to participate in small-boat building. These volunteers build boats to raffle to benefit sanctuary education and outreach programs and host annual Family Boat Building Weekends allowing families to build their own wooden boats.

The sanctuary receives advice from the Thunder Bay Sanctuary Advisory Council. Advisory council members represent the community's different interests, including government, education, research, recreational fishing, diving, tourism, economic development, and the community-at-large. Advisory council members serve as liaisons between their constituents and the sanctuary, keeping sanctuary staff informed of issues and concerns and performing outreach to their respective constituents on the sanctuary's behalf. The advisory council played a large role in the development of this Draft Management Plan, mainly by making recommendations for action plan strategies and activities based on public comments.

Since the opening of the Great Lakes Maritime Heritage Center, the sanctuary has received or partnered on grants totaling over six million dollars. This funding has been used for such activities as digitizing the research collection, surveying the sanctuary, documenting shipwrecks, hosting the Thunder Bay Maritime Festival and ROV building competitions, and creating the Great Lakes Maritime Heritage Trail. Grants and other outside funding are necessary to accomplish the sanctuary's mission. The National Marine Sanctuary Foundation and a local foundation dedicated to the Thunder Bay National Marine Sanctuary are important partners in bringing added resources to implement this management plan.

The sanctuary benefits immensely from partnerships within NOAA and HAL and with non-governmental organizations, private businesses, educational and cultural institutions, community groups, private citizens, and local, state, and federal agencies. With their collaborative focus on supporting the sanctuary's mission, these groups and individuals impart energy, expertise, and equipment to the sanctuary and its operations. One great example is the partnership between the sanctuary and Alpena Regional Medical Center that resulted in the community of Northeast Michigan having access to two monoplace hyperbaric chambers. The chambers serve as a safe and effective treatment option for NOAA and recreational divers suffering dive-related injuries and provide treatment for diabetic ulcers and other ailments that benefit from hyperbaric oxygen treatment.

The sanctuary works with its community partners to improve public safety on and below the water. The sanctuary has participated in two diving and boating accident drills designed to test emergency responses from several agencies, including the U.S. Coast

Guard, Alpena Combat Readiness Training Center, Alpena Central Dispatch, Alpena County Sheriff's Department, Michigan Department of Natural Resources, Alpena Regional Medical Center, and Alpena Fire Department.

With other NOAA partners, the sanctuary is working to improve marine safety by providing the public with access to accurate and up-to-date weather conditions. The sanctuary and NOAA's Great Lakes Environmental Research Laboratory have placed a real-time coastal observation network buoy in the sanctuary at the shipwreck *Montana*, (nine miles from shore) and mounted a meteorological station at the entrance to the Thunder Bay River. This station provides real-time weather data, and has a camera that continuously generates three real-time views of Thunder Bay. By providing real-time data from the sanctuary's shore-based meteorological stations and data buoys, NOAA is improving the National Weather Service's marine forecasts for Thunder Bay. The information is also available on the sanctuary's Web site and will ultimately be accessible from shore-side kiosks.

Goal

Ensure sanctuary operations and administrative capabilities are sufficient to effectively and safely implement the sanctuary's mission.

Objectives

- Ensure necessary sanctuary infrastructure.
- Secure funding to support sanctuary operations and programs.
- Increase staffing and enhance program support through partnerships and volunteers.

Strategies

STRATEGY SO-1: Develop infrastructure to enhance and maintain the Great Lakes Maritime Heritage Center.

Activity 1.1: Continue to develop facilities plans for Thunder Bay National Marine Sanctuary.

A. Conduct and implement an operations requirements evaluation for the Great Lake Maritime Heritage Center and exhibits that includes staffing, maintenance, security, and safety.

B. Update Thunder Bay National Marine Sanctuary's long-term facilities plan that addresses the needs to accommodate the Thunder Bay Community Boat Building Program, research and dive operations, exhibit space, and long-term artifact storage.

C. Develop infrastructure to provide distance learning programming to and from the Great Lakes Maritime Heritage Center.

Activity 1.2: Continually strive to ensure that all sanctuary operations are conducted in as environmentally friendly a manner as possible.

A. Seek out new technologies and alternative energy options to further "green" sanctuary operations and demonstrate the technologies to the public.

B. Use sanctuary exhibit and education and outreach materials and programs to promote "green" technologies and operations to the community.

C. Work with the advisory council to implement the ONMS's "Blue Seas, Green Communities" initiative, an effort to involve the advisory councils in both exploring ways to be more environmentally friendly in sanctuaries and surrounding communities.

Activity 1.3: Continue to develop and update facilities operations manuals that include an organizational chart, staff position descriptions, Great Lakes Maritime Heritage Center operating and emergency procedures, and sanctuary office procedures.

STRATEGY SO-2: Develop infrastructure for research vessels and equipment and field operations.

Activity 2.1: Continue to work with NOAA's Great Lakes Environmental Research Laboratory to safely and efficiently meet Thunder Bay research vessel and research equipment needs.

A. Conduct a needs assessment for the Thunder Bay National Marine Sanctuary's vessel operations requirements, including research vessels, research equipment, staffing, and maintenance requirements.

B. Continually seek out and use, where possible, the best technologies and operating procedures for ensuing environmentally sustainable and energy efficient marine operations.

C. Develop an internal review process for use of Thunder Bay National Marine Sanctuary small boats by sanctuary partners.

STRATEGY SO-3: Hire staff and utilize volunteers to support existing, new, or expanded sanctuary operations, resource protection, education and outreach, and research programs.

Activity 3.1: Hire a full-time education and outreach specialist to assist with expanding education and outreach programs.

Activity 3.2: Hire a graphic/web designer to produce sanctuary outreach materials.

Activity 3.3: Hire a receptionist for the sanctuary office.

Activity 3.4: Hire a marine operations coordinator/captain to operate and maintain sanctuary research vessels.

Activity 3.5: Provide staff with opportunities and resources for professional development training.

Activity 3.6: Attract, train, utilize, recognize, and retain volunteers to support and enhance sanctuary programs.

A. Hire a volunteer coordinator.

B. Finalize a volunteer handbook that includes a description of volunteer opportunities, volunteer policies and procedures, and background information on the sanctuary and the Office of National Marine Sanctuaries.

C. Identify program needs and develop a plan for volunteer recruitment.

D. Create standardized volunteer training programs.

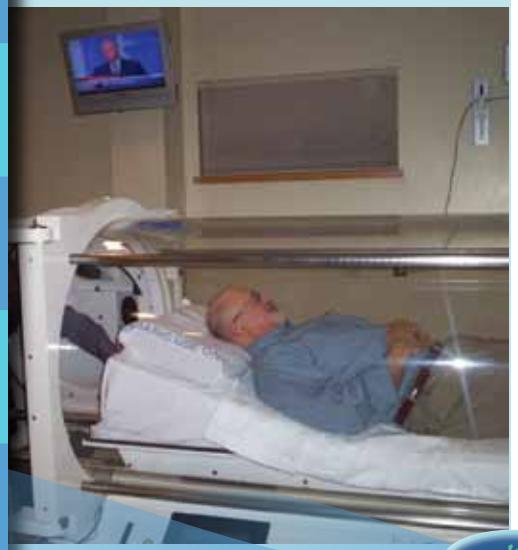
E. Hold at least one volunteer recognition event annually.

STRATEGY SO-4: Develop partnerships and identify outside funding to support sanctuary operations and resource protection, education and outreach, and research programs.

Activity 4.1: Develop, evaluate, and prioritize a list of potential sanctuary partners and ensure proper coordination and communication with new and existing intra- and interagency partners.

Activity 4.2: Continue to partner with the National Marine Sanctuary Foundation and other local organizations to enhance the sanctuary's ability to implement this management plan.

STRATEGY SO-5: Enhance Operation of the Thunder Bay Sanctuary Advisory Council.



Activity 5.1: Strengthen the structure of the advisory council by evaluating and amending the advisory council's charter when needed and developing strategies to enhance the council's participation and effectiveness.

Activity 5.2: Provide support, resources, and guidance to help the advisory council engage and educate the public about sanctuary management issues and ensure they are a respected voice in the community.

STRATEGY SO-6: Develop procedures to ensure safety for staff and sanctuary visitors.

Activity 6.1: Continue to partner with Alpena Regional Medical Center's Center for Wound Healing and Hyperbaric Medicine to ensure access to local hyperbaric treatment for dive accidents.

Activity 6.2: Develop and implement procedures to ensure the safety of staff and the public.

A. Work with the NOAA Dive Center to ensure compliance with NOAA safety procedures.

B. Ensure compliance with safety procedures for research vessels.

C. Continue to develop emergency and safety procedures for the Great Lakes Maritime Heritage Center.

D. Develop a disaster plan in case of environmental or maritime emergencies.

E. Conduct interagency on-water search and rescue and other emergency response drills to ensure readiness.

F. Include safety and emergency response contact information for recreational users through a variety of media.

Activity 6.3: Improve marine safety by providing the public with accurate and up-to-date weather conditions.

A. Partner with NOAA's Great Lakes Environmental Research Laboratory to install additional land-based meteorological stations and real-time environmental coastal observations network (RECON) buoys in the sanctuary.

B. Work with Great Lakes Environmental Research Laboratory to install Webcams that provide digital quality video at appropriate meteorological stations and RECON buoy sites.

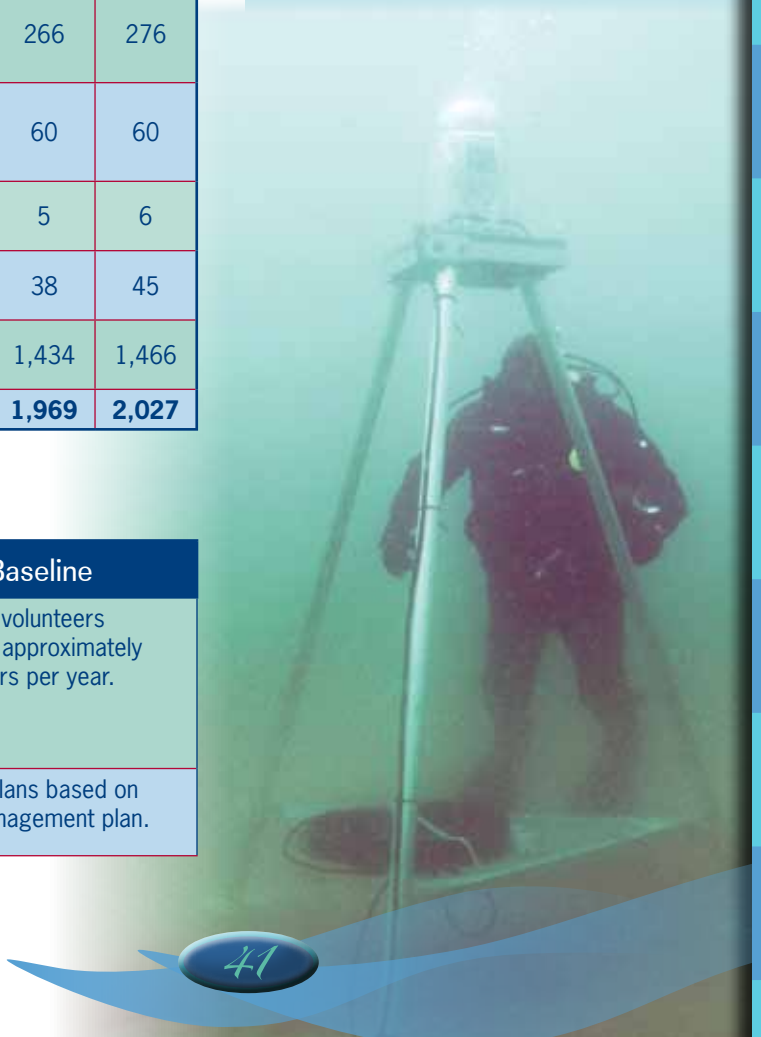
Requirements

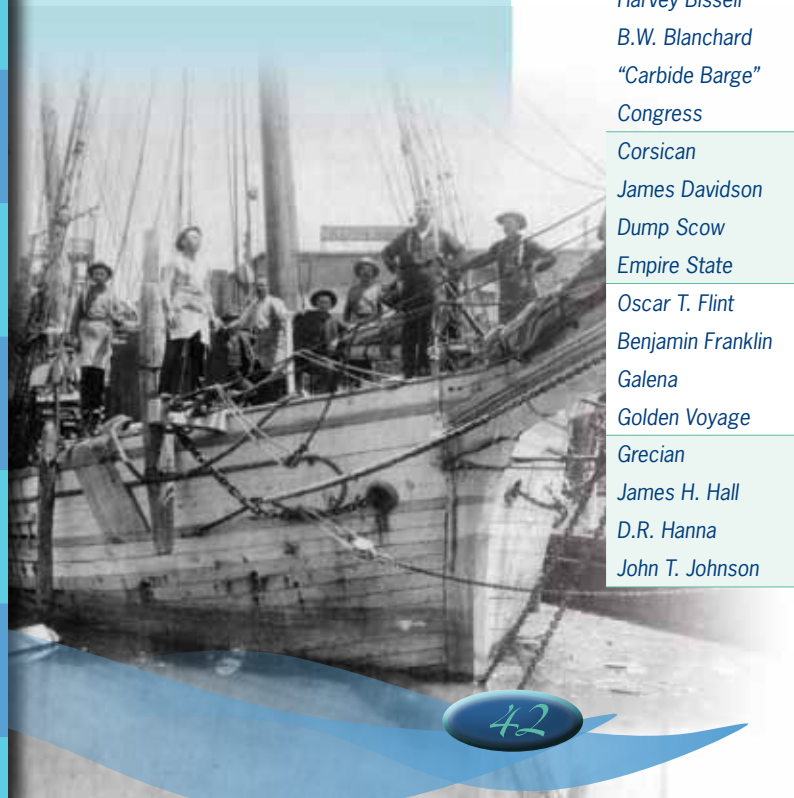
Action plan resource requirements (in thousands) are estimated based on the overall needs for conducting the strategies, including staff salaries. These estimates have been developed to represent the full requirements to conduct programs and projects, including outside funding, as described over a five-year period. Full implementation of these action plans is dependent on continued support from state and federal funding, grants, donations, and contributions from partners.

STRATEGY	YR 1	YR 2	YR 3	YR 4	YR 5
Develop infrastructure to enhance and maintain the Great Lakes Maritime Heritage Center.	7	15	15	16	14
Develop infrastructure for research vessels and equipment and field operations.	120	130	140	150	160
Hire staff and utilize volunteers to support existing, new, or expanded sanctuary operations, resource protection, education and outreach, and research programs.	242	249	259	266	276
Develop partnerships and identify outside funding to support sanctuary operations and resource protection, education and outreach, and research programs.	60	60	60	60	60
Enhance operation of the Thunder Bay Sanctuary Advisory Council.	4	4	5	5	6
Develop procedures to ensure safety for staff and sanctuary visitors.	20	30	30	38	45
Core sanctuary operations and administration costs including labor, rent, and utilities.	1,166	1,371	1,401	1,434	1,466
Total Estimated Annual Cost	**1,619**	**1,859**	**1,910**	**1,969**	**2,027**

Performance Measures

OUTCOME	Performance Measure	Baseline
Enhanced sanctuary capabilities to implement this management plan through a robust volunteer program	By 2014, the number of volunteer hours dedicated to sanctuary resource protection, education and outreach, and research programs will be increased by 25%.	Sanctuary volunteers contribute approximately 3,000 hours per year.
Completed facilities and marine operation plans	By 2011, updated facilities and marine operation plans will be finalized.	Previous plans based on earlier management plan.





Appendix

Shipwrecks of Thunder Bay National Marine Sanctuary

Historical research indicates that more than 200 shipwrecks lie below the waters of Lake Huron, in and around Thunder Bay. The sheer number of shipwrecks is impressive. However, it is their excellent state of preservation and what they represent—a century and a half of maritime commerce and travel on the Great Lakes—that elevate them to national and international significance deserving of an extraordinary level of protection, study, and public interpretation. The list below includes the shipwrecks that have been located in the sanctuary as of January 2009. Each is a unique and fragile element in the history that Thunder Bay National Marine Sanctuary is dedicated to protecting.

Vessel Name	Career	Vessel Type	Depth
E.B. Allen	*1864-1871*	*Schooner*	*100*
Barge No. 1	*1895-1918*	*Barge*	*42*
Barge No. 12	*?-1975*	*Barge*	*35*
Barge No. 83	*1920-1941*	*Barge*	*70*
Harvey Bissell	*1866-1905*	*Schooner Barge*	*15*
B.W. Blanchard	*1870-1904*	*Freighter*	*3-9*
"Carbide Barge"	*unknown*	*Barge*	*92*
Congress	*1861-1868*	*Propeller*	*17*
Corsican	*1862-1893*	*Schooner*	*160*
James Davidson	*1874-1883*	*Bulk Freighter*	*36*
Dump Scow	*unknown*	*Barge*	*140*
Empire State	*1862-1877*	*Schooner*	*12*
Oscar T. Flint	*1889-1909*	*Steam Barge*	*32*
Benjamin Franklin	*1842-1850*	*Paddle Wheeler*	*15*
Galena	*1857-1872*	*Propeller*	*16*
Golden Voyage	*?-1994*	*Cabin Cruiser*	*0*
Grecian	*1891-1906*	*Bulk Freighter*	*98*
James H. Hall	*1885-1916*	*Schooner*	*6*
D.R. Hanna	*1906-1919*	*Bulk Freighter*	*135*
John T. Johnson	*1873-1904*	*Schooner Barge*	*7*

Knight Templar	*1865-1903*	*Schooner Barge*	*5*
Light Guard	*1866-1903*	*Schooner Barge*	*6*
Maid of the Mist	*1863-1878*	*Schooner*	*7*
William Maxwell	*1883-1908*	*Fish Tug*	*12*
Monohansett	*1872-1907*	*Bulk Freighter*	*18*
Montana	*1872-1914*	*Steam Barge*	*66*
New Orleans	*1838-1849*	*Paddle Wheeler*	*13*
New Orleans	*1885-1906*	*Bulk Freighter*	*145*
Nordmeer	*1954-1966*	*Ocean Freighter*	*35*
North Point Barge	*?-1937*	*Barge*	*1*
Ogarita	*1864-1905*	*Bark*	*27*
E.B. Palmer	*1856-1892*	*Schooner*	*16*
O.E. Parks	*1891-1929*	*Steam Barge*	*62*
Pewabic	*1863-1865*	*Propeller*	*170*
Portsmouth	*1853-1867*	*Steam Barge*	*8*
William P. Rend	*1888-1917*	*Steam Barge*	*17*
"Scanlon's Barge"	*unknown*	*Dredge*	*17*
Isaac M. Scott	*1909-1913*	*Freighter*	*175*
Shamrock	*1875-1905*	*Steam Barge*	*11*
William H. Stevens	*1855-1863*	*Schooner*	*10*
William P. Thew	*1884-1909*	*Steam Barge*	*84*
L. VanValkenburg	*1862-1887*	*Schooner*	*60*
Viator	*1904-1935*	*Ocean Freighter*	*188*
Vienna	*1871-1906*	*Schooner*	*70*
John F. Warner	*1855-1890*	*Schooner*	*9*
D.M. Wilson	*1873-1894*	*Bulk Freighter*	*46*
William A. Young	*1883-1911*	*Schooner Barge*	*40*

Appendix

Thunder Bay National Marine Sanctuary
Known Shipwrecks
Reported Shipwrecks
Sanctuary Boundary
PRESQUE ISLE
ALPENA
LAKE HURON
THUNDER BAY
ALCONA
0 5 10 Miles
0 5 10 Kilometers
N
W
E
S