

MARITIME HERITAGE RESEARCH, EDUCATION, AND MANAGEMENT PLAN

Papahānaumokuākea

Marine National Monument



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Abbreviations

ARCH	Maritime Archaeological Resources
AUV	autonomous underwater vehicle
CFR	Code of Federal Regulations
CRED	Coral Reef Ecosystem Division
CRER	Coral Reef Ecosystem Reserve
FAP	Federal Archaeological Program
FWS	U.S. Fish and Wildlife Service
GIS	geographic information system
Heritage Plan	Maritime Heritage Research Plan
HIMB	Hawai'i Institute of Marine Biology
MHP	Maritime Heritage Program
MMB	Monument Management Board
MOA	Memorandum of Agreement
Monument	Papahānaumokuākea Marine National Monument
NARA	National Archives and Records Administration
NHPA	National Historic Preservation Act
NMFS	National Marine Fisheries Service
NMSP	National Marine Sanctuary Program
NOAA	National Oceanic and Atmospheric Administration
NOS	National Ocean Service
NPS	National Park Service
NRHP	National Register of Historic Places
NWHI	Northwestern Hawaiian Islands
OHA	Office of Hawaiian Affairs
ONMS	Office of National Marine Sanctuaries
PMNM	Papahānaumokuākea Marine National Monument
ROP	2004 Northwestern Hawaiian Islands Reserve Operations Plan
SHPD	State's Historic Preservation Division
State	State of Hawai'i
UNESCO	United Nations Educational, Scientific and Cultural Organization



“You only know where you are on the ocean by memorizing where you came from.”

NAINOA THOMPSON, MASTER HAWAIIAN NAVIGATOR

Executive Summary

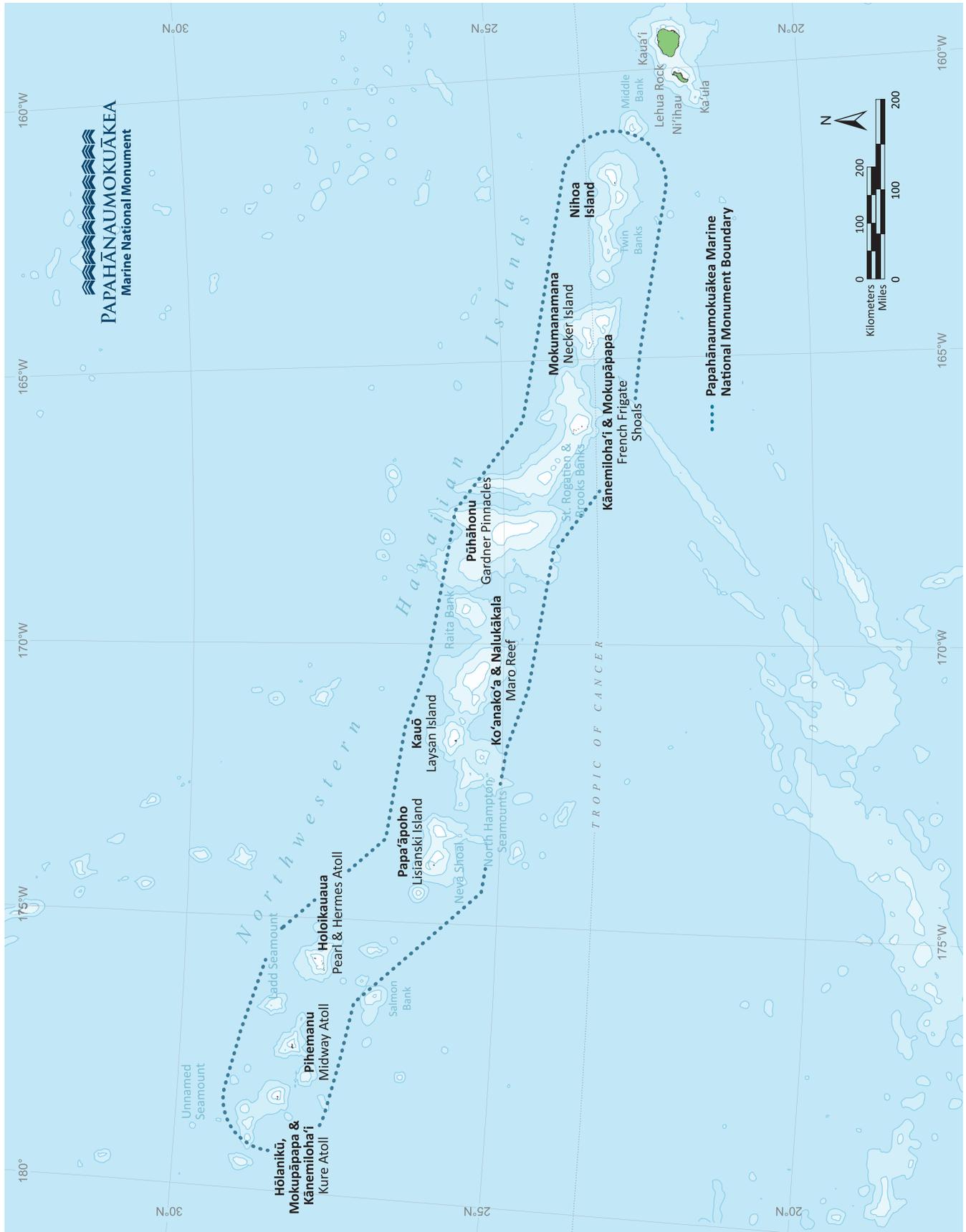
Papahānaumokuākea Marine National Monument (PMNM, Monument) possesses a rich maritime heritage stretching back long before written records. Native Hawaiian chants and oral histories tell of exploration and settlement in the area, while more recent shipwreck sites scattered throughout the Monument help tell the story of a post-contact maritime past. PMNM’s Maritime Heritage Program aims to build toward a future of research and management that will encompass these two broad components of human experience in the Monument.

Archival research indicates that there may be as many as 60 shipwreck sites, the earliest of which dates back to 1818, and at least 61 aircraft sites in Monument waters. These sites represent the material legacy of our nation’s maritime heritage in this region, providing a window through which we can better understand our seafaring past. Considering these sites in the context of living culture and traditional knowledge helps us to more holistically perceive their significance to the Hawaiian Islands.

The National Oceanic and Atmospheric Administration’s Office of National Marine Sanctuaries headquarters performance measures and the Federal Archaeology Program mandate the inventory and documentation of heritage sites. PMNM’s management of maritime heritage resources began in 2002 with its recognition as a component of the Northwestern Hawaiian Islands Reserve Operations Plan. This Heritage Resource Management Plan describes past and present maritime heritage research conducted to support the management of PMNM and to develop a framework for the future.

This document is one of several “step-down” plans called for in the Monument Management Plan. To date, maritime heritage management in PMNM has fo-

OPPOSITE Shipwreck *Kaiyo Maru* beached at Laysan Island (Wayne Levin).





LEFT A diver explores a triple expansion steam engine at the *Quartette* shipwreck site at Pearl and Hermes Atoll (NOAA/Tane Casserley).

ABOVE Filmmaker John Brooks films the bow of the USS *Macaw* at Midway Atoll (NOAA/Robert Schwemmer).

OPPOSITE Map of the Northwestern Hawaiian Islands showing the PMNM boundary (PNMN/NOAA).

cused primarily on the inventory, documentation, and interpretation of maritime heritage sites as they are defined in the Monument’s Maritime Heritage Action Plan: “resources including submerged and beached shipwrecks, aircraft, and other sites of historical, cultural and archaeological significance.” This document addresses these attempts to inventory and protect the maritime heritage sites in PMNM. By identifying research gaps and opportunities, and exploring ways to expand the program’s scope, maritime heritage in PMNM will not only become a more effective tool for developing public stewardship of all of the Monument’s resources, but will also become more relevant for this unique site with its vital, living culture.

The purpose of this document is to broaden the scope of maritime heritage in the Monument so that this multicultural and multidisciplinary field of study can become a tool for inclusion among Monument stakeholders, constituency, and the general public. Its ultimate goal is to develop the foundation for more integration with other Monument programs, specifically those concerned with Native Hawaiian culture and history and the protection and understanding of marine natural resources.



“It continues to amaze and delight us, that evidence resting on the ocean floor for nearly two centuries, helps reveal our collective history.”

JAMES DELGADO, DIRECTOR, NOAA'S ONMS MARITIME
HERITAGE PROGRAM

CHAPTER ONE

Introduction

Created by Presidential Proclamation 8031 on June 15, 2006, Papahānaumokuākea Marine National Monument (PMNM, Monument) established the Northwestern Hawaiian Islands (NWHI) as one of the world's largest protected marine areas. Ecosystem protections for the natural resources in this area date back to 1909, when President Theodore Roosevelt established what is now known as the Hawaiian Islands National Wildlife Refuge. On June 30, 2010, the World Heritage Committee of the United Nations Educational, Scientific and Cultural Organization (UNESCO) unanimously inscribed Papahānaumokuākea as a mixed (i.e., cultural and natural) site—the first such site in the United States and one of only 27 mixed sites in the world. The Monument was the first nomination of a World Heritage Site in the United States in 15 years.

The NWHI are a chain of islands, atolls, and shoals extending approximately 1,240 miles (2,000 kilometers [km]) northwest from the main Hawaiian Islands. The NWHI and the main Hawaiian Islands together form the Hawaiian Archipelago in the central North Pacific Ocean. A vast, remote, and largely uninhabited marine region, the Monument encompasses an area of approximately 142,948 square miles (370,234 km²) of ocean dotted with small islands, islets, and atolls. The complex array of shallow coral reefs, deepwater slopes, banks, seamounts, and abyssal and pelagic oceanic ecosystems that populate this area support a stunning diversity of marine life. The small islands, reefs, and shoals of Papahānaumokuākea are the longest, oldest, and most illuminating example of island formation and atoll evolution in the world, spanning 28 million years (Grigg et al. 2008). The near-pristine reefs, islands, and water of Papahānaumokuākea provide refuge and habitat for a wide array of threatened

OPPOSITE Kelly Gleason investigates a ginger jar at the *Two Brothers* shipwreck site (NOAA/Greg McFall).



ABOVE Sailing vessel *Dunnottar Castle*, wrecked at Kure Atoll in 1886 (San Francisco Public Library).

RIGHT Brenda Altmeier dives above the wreckage of *Dunnottar Castle* at Kure Atoll (NOAA/Robert Schwemmer).

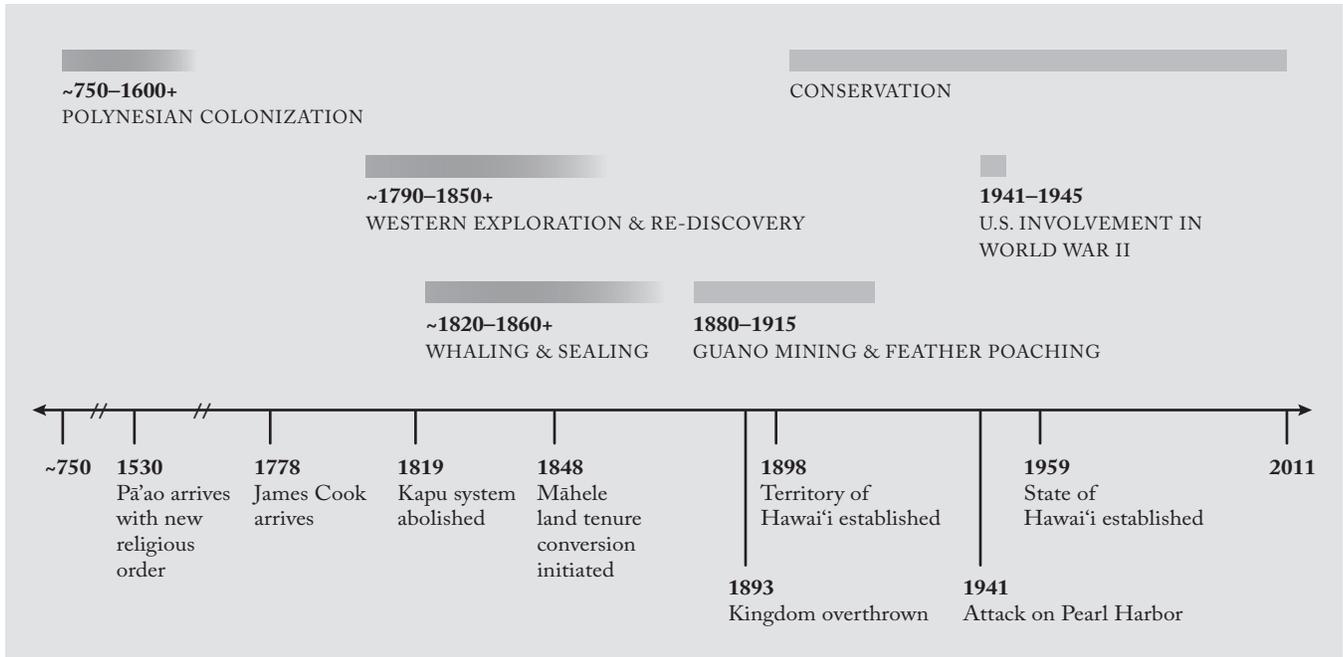


and endangered species, and the Monument is one of the last predator-dominated coral reef ecosystems on the planet. The region provides critical nesting and foraging grounds for 14 million seabirds, making it the largest tropical seabird rookery in the world. The region's natural resources, Native Hawaiian cultural resources, and maritime heritage resources make PMNM one of the most significant protected marine areas in the world.

This Maritime Heritage Research Plan (Heritage Plan) has been developed to support and guide implementation of the Maritime Heritage Action Plan (discussed below). The purpose of the Heritage Plan is to establish a 15-year research, education, and management framework to guide and broaden the Monument's Maritime Heritage Program (MHP).

1.1 Maritime Heritage in Papahānaumokuākea Marine National Monument

The National Oceanic and Atmospheric Administration's (NOAA's) Office of National Marine Sanctuaries (ONMS) defines maritime heritage resources as the cultural, historical, and archaeological traces of past seafaring activities and of humanity's interaction with the seas that can be found on the shore or underwater. In the Monument Management Plan, the definition of maritime heritage resources includes submerged and beached shipwrecks, aircraft, and other sites of historical, cultural, and archaeological significance (U.S. Fish and Wildlife Service et al. 2008).



Papahānaumokuākea boasts a rich maritime heritage encompassing hundreds of years of continuous seafaring, reaching back long before the advent of written records. Consequently, maritime heritage can be viewed as a continuum, beginning with Polynesian explorers, moving through the age of sail, passing through the turmoil of World War II, and continuing with present-day researchers who make discoveries with each new expedition to the NWHI (see figure above). Native Hawaiian chants and oral histories tell of exploration and settlement in this area over millennia, while shipwreck sites scattered throughout Papahānaumokuākea help tell the story of a more recent maritime past.

A timeline of human interactions with the NWHI. Different “eras” of interaction are shown above a timeline with significant events in Hawaiian history (Beckwith 2007; Kittenger 2010).

Maritime heritage in PMNM reaches far beyond the material remains of shipwreck sites on the seafloor. As developed in this Heritage Plan, the vision for the MHP is to facilitate a broad, interdisciplinary understanding of the historical use of this remarkable site, establishing a foundation upon which to develop a meaningful management direction through integrating, supporting, and complementing the Monument’s rich cultural and natural science programs. Archaeology, always a multidisciplinary science, incorporates history, biology, ethnography, anthropology, materials conservation, photography, survey, drafting, and geology (Australian Institute for Maritime Archaeology 2011)—and this is not an exhaustive list. Until recently, efforts to manage archaeological sites have not fully exploited these sites’ relevance to fields of study beyond the scope of their traditional audience. Maritime heritage sites are not only part of an underwater environment but are intimately connected with broader maritime landscapes—heritage sites on land, in ports, and in cities that developed be-



Filmmaker John Brooks documents maritime archaeologists mapping the whaling shipwreck *Pearl* (NOAA/Robert Schwemmer).

cause of maritime trade, as well as communities that were shaped by a history of colonization. Consequently, management of heritage sites should be considered not only a technical issue but also a social one, necessitating engagement with the public and the cultural sensitivity that such engagement warrants. Because of these myriad connections with both the cultural landscape and the natural environment, successful management of maritime heritage sites in the Monument requires an interdisciplinary approach.

1.2 Development of the Heritage Plan

The Monument Management Plan identifies six priority management needs, one of which—Understanding and Interpreting the Northwestern Hawaiian Islands—comprises four action plans germane to this document.

- Marine Conservation Science Action Plan.
- Native Hawaiian Culture and History Action Plan.
- Historic Resources Action Plan.
- Maritime Heritage Action Plan.

Maritime heritage pertaining to Polynesian and Native Hawaiian exploration and settlement across the Hawaiian archipelago and the Pacific is covered

under the Native Hawaiian Culture and History Action Plan and the associated Native Hawaiian Research Plan. The Historical Resources Action Plan covers terrestrial historical resources and sites, including terrestrial sites associated with Midway Atoll.

In early February 2010, researchers, resource managers, and partners met at the PMNM office in Honolulu, Hawai‘i, for a two-day Maritime Heritage Research Plan Workshop. The aim was to establish guidelines for developing a Research Plan document that would provide a framework for the research, monitoring, and management specified in the MHP. The workshop brought together a group of people with shared backgrounds and interests in the maritime heritage of the NWHI to help them build future partnerships and collaborations.

Workshop participants included personnel from ONMS, the National Marine Fisheries Service (NMFS), the National Park Service (NPS), the State of Hawai‘i (State), the U.S. Fish and Wildlife Service (FWS), the University of Hawai‘i, University of Rhode Island, the Polynesian Voyaging Society, Flinders University, and other independent researchers and historians. The workshop included both plenary and breakout sessions that focused on developing the following research priorities.

- Management needs and strategies.
- Outreach and education.
- Database and information management.
- Research questions and opportunities.
- Integration of historic resources, culture, and maritime heritage.
- Partners, collaborations, and interdisciplinary opportunities.

Participants in the Maritime Heritage Research Plan Workshop explored not just maritime archaeological questions, but multidisciplinary topics as well. It was widely agreed that researchers have only begun to address the plethora of questions and opportunities awaiting more in-depth study. In addition to the familiar themes addressed in the MHP—whaling, fishing, navigation, military history, communication, environmental impacts, and exploration—other research directions were identified.

- What is the cultural landscape of PMNM?
- How does historical ecology inform maritime heritage and what are the connections? (Exploration and navigation in the Monument as a continuum.)
- Develop a better understanding of how these islands and atolls were used in traditional, non-instrument navigational training for Native Hawaiians.

Management of heritage sites should be considered not only a technical issue but also a social one, necessitating engagement with the public and the cultural sensitivity that such engagement warrants.



ABOVE Double-hulled sailing canoe *Hōkūle‘a* sailing in Papahānaumokuākea Marine National Monument (Na‘alehu Anthony).

RIGHT Keoni Kuoha blows on a pū (trumpet shell) as the sailing canoe *Hōkūle‘a* approaches Mokumanamana (NOAA/Randall Kosaki).



- Compare navigational structures and make connections beyond the NWHI to places like the Marquesas.
- Apply Traditional Ecological Knowledge to the geographic assessment of the site.
- Develop a better understanding of the unique site formation processes at NWHI atolls.
- Compare ocean space conceptions in the NWHI.

Strategies to develop these research directions were also developed. These include the following.

- Expand recognition of the site and its resources.
- Create maritime archaeology field schools in the NWHI to enable students to develop projects and develop more research questions of their own.
- Conduct more interviews and retrieve oral histories to capture knowledge that may otherwise be lost.
- Continue to foster relationships and work with graduate students.
- Develop grant programs for students (undergraduate and graduate) and provide funding for research.
- Develop collaborative awareness training programs.
- Foster more interdisciplinary work.



ABOVE Derek Smith collects oceanographic data from the *Dunnottar Castle* shipwreck site at Kure Atoll (NOAA/Kelly Gleason).

LEFT Tane Casserley and Kelly Gleason document a gudgeon at the *Pearl* shipwreck site (NOAA/Robert Schwemmer).

- Develop connections with the academic community (high school, undergraduate, and graduate), including in-school visits.
- Expand data-sharing, including the Monument’s spatial bibliography.

With representatives from the Monument’s Native Hawaiian team participating in the workshop, the forum offered a rare opportunity for in-reach as well as out-reach. The workshop contributed to the development of a network of individuals and experts with a deeper understanding of and appreciation for PMNM.

1.3 Heritage Plan Vision, Goals, and Structure

As previously stated, the vision for this Heritage Plan is to facilitate a broad, interdisciplinary understanding of the historical use of this remarkable site, establishing a foundation upon which to develop a meaningful management direction through integrating, supporting, and complementing the Monument’s rich cultural and natural science programs.

The Heritage Plan serves as a guide for a broad range of stakeholders—maritime archaeologists and other scientists, cultural practitioners, resource managers, the Monument Management Board (MMB), the public, and the Monument’s co-trustee representatives. The Heritage Plan provides managers and maritime archaeologists with the means to direct their research in the Monument toward answering important resource management questions. Researchers from academic and research institutions can use the plan to focus their research



proposals on topics that are relevant to the Monument's management needs. Additionally, the Heritage Plan will help managers gain a better understanding of the ways that maritime heritage can be used as an effective tool for broadening research and outreach.

The Heritage Plan will also serve as a guide for the review and evaluation of permit applications for maritime heritage research in the Monument. As new research proposals arise, the plan will be used by permit coordinators and others as a tool to evaluate research needs, merit, and applicability to management efforts.

In addition to building on the past history of maritime heritage research among the co-trustee agencies, the Heritage Plan aims to develop a broader understanding of the ways that the MHP can expand beyond the boundaries of the Monument Management Plan's definition through effective partnerships, innovative research, engaging outreach, and multidisciplinary management. These endeavors include expanding research efforts to embrace such diverse topics as seafaring traditions, oral histories, archival research, interactions between past human societies and the marine environment, and the implications of traditional knowledge for contemporary society.

The Heritage Plan presents an opportunity to envision a future direction for the MHP, taking into account the singular opportunities, challenges, and partnerships that exist in this region. With greater collaboration and multidisciplinary research, maritime heritage management in the Monument offers an unprecedented platform for inclusion of a myriad of interests and participants.

The remainder of this document is organized as follows. Chapter 2, *Background*, provides the historical context of maritime heritage in the Monument and summarizes the work conducted to date. Chapter 3, *Research*, discusses the research needs and prioritized actions that the Heritage Plan envisions for future endeavors. Chapter 4, *Education*, examines the education and outreach program as it currently exists and identifies goals for future efforts. Chapter 5, *Management*, summarizes the current management issues pertaining to maritime heritage in the Monument and lays out some management concerns and directions for future consideration. Chapter 6, *Implementation*, identifies innovative and multidisciplinary approaches to realizing the research, education, and management strategies discussed in the preceding chapters. Chapter 7, *References*, lists the references cited in the text.

Appendix A, *Maritime Heritage Resources*, is a working list of all the resource sites of vessels and aircraft that have been reported lost in PMNM. Appendix B, *State and Federal Preservation Mandates*, lists the regulatory authorities relevant to the survey and protection of maritime heritage resources in the NWHI.

With greater collaboration and multidisciplinary research, maritime heritage management in the Monument offers an unprecedented platform for inclusion of a myriad of interests and participants.

OPPOSITE Jason Raupp documents ballast at the *Gledstanes* shipwreck site (NOAA/Tane Casserley).



“Back in the early nineteenth century, America had more frontiers than the West: there was also the sea, and the Nantucket whaleman was the sea-going mountain man of his day, chasing the sperm whale into the distant corners of the Pacific Ocean. Americans today have lost track of the importance the sea had in creating the nation’s emerging identity.”

NATHANIEL PHILBRICK, AUTHOR, *IN THE HEART OF THE SEA*

CHAPTER TWO

Background

2.1 Heritage Framework

The NWHI have a long history of scientific exploration and discovery. Beginning with the earliest explorers and voyagers who documented scientific observations in their oral histories and ships’ logs, scientific observation continues through today. Title to the islands and waters of the NWHI was vested in the Kingdom of Hawai‘i throughout the 1800s; and throughout the nineteenth century, Hawaiian royalty initiated a number of expeditions to the NWHI. The *Albatross* Expedition of 1902 and the *Tanager* Expedition of 1923–24 were the first research expeditions driven entirely by scientific enquiry. These began a legacy of dedicated research on the natural resources of the NWHI.

Research and monitoring conducted by federal and state agencies, academic institutions, and other organizations over the last 50 years have contributed substantially to our understanding of the NWHI ecosystem. Between 1963 and 1969, Pacific Ocean Biological Survey Program biologists from the Smithsonian Institution made trips to French Frigate Shoals to gather data. Following these expeditions, NMFS, FWS, and the Hawai‘i Department of Land and Natural Resources began collaborative research and surveys to document relationships between species and to assess the impacts of commercial fishing in the late 1970s (Grigg and Pfund 1980; Grigg and Tanoue 1984; DiNardo and Parrish 2006).

The history of maritime heritage research in the Monument is much more recent. A reconnaissance survey in 1998, supported by the University of Hawai‘i Marine Option Program, examined sites at Midway Atoll. Systematic surveys of the NWHI began in 2002 (Van Tilburg 2002).

OPPOSITE Whalers on a whaleboat (New Bedford Whaling Museum).

A key objective of this Heritage Plan is to create an environment wherein two intrinsically linked programs—Native Hawaiian culture and maritime heritage—can be more effectively and dynamically interconnected.

With the creation of the Coral Reef Ecosystem Reserve in 2000, maritime heritage was included as a recognized category of information needed to advance the comprehensive management of resources in the NWHI. A “history and archaeology” category was included in the 2003 Information Needs workshop (Alexander et al. 2004). The 2004 Northwestern Hawaiian Islands Reserve Operations Plan (ROP) includes a Maritime Heritage Action Plan identifying its desired outcome: “To best protect Maritime Cultural resources in the NWHI.” To this end, the plan defines four strategies, three performance measures, a summary of resource needs, and potential participants. The ROP was the basis for the first 5 years of reserve operation, and its components have been incorporated into the Monument Management Plan.

ONMS drew a distinction between “cultural resources” (pertaining to Native Hawaiian topics as the living culture in Hawai‘i) and “historical and archaeological resources” (pertaining to post-European contact topics). For the purposes of the Monument Management Plan, Native Hawaiian cultural resources fall under the rubric of the Native Hawaiian Culture and History Action Plan and are addressed in the associated Native Hawaiian Research Plan. A key objective of this Heritage Plan is to create an environment wherein these two intrinsically linked programs can be more effectively and dynamically interconnected.

2.1.1 CO-TRUSTEE AGENCY RESPONSIBILITIES FOR MARITIME HERITAGE RESOURCES

The Presidential proclamation and associated regulations established an institutional “co-trusteeship” of the monument, requiring two federal agencies (NOAA and FWS) and the State to manage the monument collaboratively as “co-trustees.” NOAA and FWS promulgated final regulations that provided the federal authority for the Monument under Title 50 Code of Federal Regulations (CFR) Part 404 on August 19, 2006. These regulations codified the scope and purpose, boundary, definitions, prohibitions, and regulated activities for managing the Monument; they also codified the framework under which the State would join with NOAA and FWS as Monument co-trustees. The co-trustees signed a memorandum of agreement (MOA) on December 8, 2006, establishing roles and responsibilities as well as coordination bodies and mechanisms for managing the Monument. Though ostensibly the proclamation and MOA named three agencies as co-trustees, in actuality the co-trusteeship comprises seven different partner agencies that include different divisions of the primary co-trustee agencies as well as the Office of Hawaiian Affairs.

All three Co-Trustee agencies (the State, FWS, and NOAA) have programs and statutory responsibilities for managing and preserving heritage resources (cul-



tural, historical, and archaeological) under their respective jurisdictions. All three seek to protect these resources for the benefit of the public. Management of these resources varies greatly between agencies based on their priorities and expertise. Each co-trustee’s specific responsibilities for maritime heritage resources are briefly reviewed below.

Mokumanamana from Mo’o Head (Wayne Levin).

STATE OF HAWAII’I

Oversight of archaeological research in Hawai’i is the responsibility of the Department of Land and Natural Resources—specifically the State’s Historic Preservation Division (SHPD). SHPD issues annual permits for archaeologists, conducts National Historic Preservation Act (NHPA) Section 106 review as called for by federal statutes, and provides rules governing standards for archaeological inventory surveys on state lands (Chapter 13-276, Hawaii Administrative Rules). Notably, these rules have been designed to facilitate terrestrial site surveys and are not always applicable to maritime work.

OFFICE OF HAWAIIAN AFFAIRS

The Co-trustees signed a MOA on December 8, 2006, establishing the MMB, which coordinates management of Papahānaumokuākea at the field level. This seven-member board includes two members from each of the Co-trustee agencies as well as the Office of Hawaiian Affairs (OHA), which serves as the principal agency working for Native Hawaiians.

Currently, OHA is the only state agency with constitutional and statutory mandates to advocate for Native Hawaiians and to assess the policies and practices of other agencies' impacts on Native Hawaiians. OHA, on behalf of the MMB, continues to convene the Papahānaumokuākea Native Hawaiian Cultural Working Group to obtain advice and guidance from Native Hawaiian cultural experts, including kūpuna (respected elders) and practitioners, on all Monument actions affecting Native Hawaiians and cultural resources at Papahānaumokuākea. The Native Hawaiian Cultural Working Group provides guidance to the MMB through OHA. Support and guidance from the host culture of the Hawaiian Archipelago assists in the incorporation of Native Hawaiian culture into Monument management (State of Hawai'i et al. 2009).

U.S. FISH AND WILDLIFE SERVICE

FWS manages millions of acres of lands in all U.S. states and several U.S. territories. While FWS is recognized as a leader in conserving, protecting, and enhancing natural resources—specifically fish, wildlife, plants, and their habitats—the agency also plays an important role in protecting our nation's cultural legacy. The Pacific Region alone manages more than 150 refuges and fish hatcheries in Washington, Oregon, Idaho, Nevada, California, and the Pacific Islands. More than 2,800 archaeological sites have been recorded on these lands.

Heiau at Mokumanamana
(Kekuewa Kikilo).



FWS, under the Department of the Interior, and NOAA, under the Department of Commerce, operate under the common mandates of the Federal Archaeological Program (FAP). The FAP is the aggregate of the laws, regulations, and guidelines that address federal management of cultural, historical, and archaeological (heritage) resources.

The Monument Management Plan states that the purpose of the Historic Resources Action Plan is to “Identify, preserve, protect, stabilize, and wherever appropriate, reuse, recover, and interpret historic resources associated with Midway Atoll and other historic resources within the Monument.” It defines historic resources as the “non-marine sites, structures, artifacts, in the Monument associated with the historic period (after first Western contact with Native Hawaiians in 1778).” It further states that “Historic resources in the Monument fall into two broad categories: Midway Atoll historic period resources, and those elsewhere in the Monument” (U.S. Fish and Wildlife Service et al. 2008). Interpretation of the land and sea interaction between sites at Midway Atoll is an important collaborative effort between FWS and NOAA archaeologists.

NOAA’S OFFICE OF NATIONAL MARINE SANCTUARIES

ONMS has a clear mandate to protect and manage the heritage resources within the boundaries of its sanctuaries and monuments. ONMS’s Maritime Heritage Program (as distinguished from the Monument’s MHP) was created in 2001 by the National Marine Sanctuary Program (NMSP) to provide a more effective management structure for meeting its obligation to protect and manage the historic, cultural, and archaeological resources within the National Marine Sanctuary System. The Maritime Heritage Program has identified five drivers to support the vision of ONMS.

- Enhancing cultural, historic and archaeological resource management and protection at existing sites, and supporting expanded and new sites in the National Marine Sanctuary System through the identification of nationally significant maritime heritage resources worthy of addition to the System.
- Activating the public to support ocean conservation and the National Marine Sanctuary System with key messages about relevance and value of maritime heritage in the oceans and lakes and especially at existing and potential new sites.
- Supporting the passage of strong new legislation for the National Marine Sanctuary System by demonstrating the importance of maritime heritage resource protection, management and interpretation.
- Linking local communities and economies to sanctuaries through maritime heritage examples.

The Monument Management Plan states that the purpose of the Historic Resources Action Plan is to “Identify, preserve, protect, stabilize, and wherever appropriate, reuse, recover, and interpret historic resources associated with Midway Atoll and other historic resources within the Monument.”

- Demonstrating the relevance of the Maritime Heritage Program to the sites, to the National Marine Sanctuary System and to NOAA.
- Maritime heritage research in the Monument is driven by three strategies specified in the Maritime Heritage Action Plan.
- Document and inventory maritime heritage resources throughout the life of the plan.
- Incorporate maritime heritage into public education and outreach throughout the life of the plan.
- Coordinate interagency efforts to protect maritime heritage resources for the life of the plan.

This plan will help develop a broad, multidisciplinary, and comprehensive Maritime Heritage Program for Papahānaumokuākea that reflects the unique character of maritime heritage at this World Heritage Site.

The Heritage Plan is designed to ensure that research meets the comprehensive needs of the Monument and is conducted in a manner compatible with state and federal legislation and guidelines, as well as with the Monument’s mission, goals, and objectives. This document is intended to advise management on the priorities, needs, and gaps of maritime heritage research in the NWHI. Additionally, this plan facilitates the exploration of larger themes and opportunities for maritime heritage in the Monument to help develop a broad, multidisciplinary, and comprehensive Maritime Heritage Program for Papahānaumokuākea that reflects the unique character of maritime heritage at this World Heritage Site.

2.2 Archaeological Significance

The history of human interaction with Papahānaumokuākea has left a material legacy on the seafloor and in terrestrial locations, providing a wealth of sites to interpret. These include sacred archaeological sites on Nihoa and Mokumanamana that also highlight the connection between these terrestrial sights and navigation training. Evidence of ancient resource modification and collection—such as artificial reefs and fishing materials, as well as mooring and anchoring sites—tells stories of continued human interaction with this dynamic environment.

Beginning thousands of years ago, long-distance voyages across the Pacific established the remarkable navigational skill and maritime ability of Polynesian sailors. Human settlement of the Pacific Islands and subsequent voyages throughout Oceania are unprecedented feats of exploration and seafaring achievement. Despite this impressive legacy and ongoing tradition in the Pacific, few physical remains of these vessels and practices exist in an archaeological context. These types of vessels rarely sink due to their design, and most archaeological evidence of voyaging canoes has been discovered in a terrestrial environment (Van Tilburg 2002). Oral traditions tell the stories that bring this part of



TOP Ancient Hawaiian home site at Nihoa (Wayne Levin).

BOTTOM Native Hawaiian sinker stone at Mokumanamana (Wayne Levin).



Hawai‘i’s seafaring past back to life and highlight the long, ongoing tradition of voyaging that began and continues to this day in the Pacific.

The material remains of a more recent seafaring history in the NWHI—such as American and British whaling ships, Japanese junks, U.S. Navy steamers, Hawaiian fishing sampans, Pacific colliers, salvage vessels, and U.S. Navy aircraft—dot the waters of the archipelago. These sites provide the physical record of past activities in the NWHI, but they also represent the broader cultural heritage and human history of this World Heritage Site.

2.2.1 HISTORY OF THE NORTHWESTERN HAWAIIAN ISLANDS

Though Native Hawaiian artifacts have not yet been found underwater in PMNM, the potential exists for discoveries to reveal additional Native Hawaiian archaeological resources in both terrestrial and marine environments beyond Nihoa and Mokumanamana.

NATIVE HAWAIIAN PRESENCE

Native Hawaiian presence in the NWHI has been documented through archaeological sites on Nihoa and Mokumanamana (Necker), the only two high islands in the chain (Emory 1928; Cleghorn 1988). These islands provide a rare and exceptional record of past human occupation through material remains such as intact ritual sites (*heiau*, or shrines), agricultural terraces, archaeological deposits, and other cultural artifacts (Kikiloi and Graves 2005).

Many of the low-lying atolls north and west of Nihoa and Mokumanamana are subject to the dynamic conditions that characterize the NWHI. Small sand islands and sand spits shift over time and are washed over in the winter by strong storm waves. To date, no Native Hawaiian archaeological remains have been discovered on these islands (Apple 1973; Ziegler 1990); however, a systematic archaeological survey for such sites has not yet been undertaken. Hawaiian archaeologist Kekuewa Kikiloi has rediscovered historical Hawaiian place names for the NWHI and genealogical connections to the main Hawaiian Islands that reveal a deeper history of the archipelago (Kikiloi 2003). Though Native Hawaiian artifacts have not yet been found underwater in PMNM, the potential exists for discoveries to reveal additional Native Hawaiian archaeological resources in both terrestrial and marine environments beyond Nihoa and Mokumanamana.

EUROPEAN CONTACT

With the arrival of outsiders, major changes were initiated in the archipelago, and the number and diversity of maritime travelers visiting Hawai'i changed

Falls of Afton at anchor
(Bishop Museum).



dramatically. Based on existing evidence, it is believed that at the time of western contact, the NWHI were not universally known to Native Hawaiian communities. Some communities on Kaua'i and Ni'ihau, however, did access the NWHI. For example, Hawaiians from the island of Kaua'i, accompanying an exploring expedition in 1788, were themselves unaware of the existence of Nihoa Island. Upon returning to Kaua'i and consulting within their communities, they discovered a traditional knowledge of the island (Vancouver 1798). There is also historical evidence that Nihoa was used and accessed by Hawaiians from Ni'ihau in the nineteenth century. According to the Robinson family, residents of Ni'ihau Island had the capability to travel to Ka'ula and Nihoa Islands by canoe, and some people from Ni'ihau would spend 3 months in the summer on Nihoa Island until the late 1800s (Iversen et al. 1990:23).

Visits by voyaging Hawaiians to the NWHI during this period may also be evidenced by a fresh calabash, or gourd, found in 1805 by the Russian explorer Urey Lisiansky on a beach of Lisianski Island near French Frigate Shoals. In an account of his voyage Lisiansky states, "[I] found on the beach a small calabash, which had a round hole cut on one side of it. This could not have been drifted from a great distance, as it was fresh and in good preservation" (Lisiansky 1814). Much has been attributed to the discovery of this calabash, but it may have simply drifted to Lisianski Island from another island in the archipelago.

Regular voyaging by Hawaiians to the NWHI may have diminished shortly after contact due to extensive disease epidemics. Analyses of 113 whalers' logs visiting the NWHI from 1791 to 1878 contain no reference to Native Hawaiian fishermen (Iversen et al. 1990:22). The fact that Native Hawaiians were not known to access this area in the early historic period may be the result of disease epidemics (which took a heavy toll on Native Hawaiian knowledge holders and their cultural information passed down through oral tradition), may reflect the high cost of trips to this zone, or may evidence the persistence of cultural protections that put the area off limits.

HAWAIIAN MONARCHY

As western explorers began to rediscover the NWHI, the Hawaiian monarchy became increasingly interested and active in establishing cultural ties to these islands. In some cases, Hawaiian monarchs contracted western sailors to make trips of exploration to the NWHI and to claim these islands under western law for the Kingdom of Hawai'i (Williams 2009). In other cases, monarchs themselves visited the islands, including some of the highest ranking Native Hawaiian chiefs of the nineteenth century. Queen Ka'ahumanu, King Kamehameha IV, King David Kalākaua, and Queen Lydia Lili'uokalani, for example, visited Nihoa to reconnect with the island (State of Hawaii et al. 2009).



In 1885, Queen Lili'uokalani of Hawai'i, the last monarch of the Kingdom of Hawai'i, visited Nihoa with an entourage of 200 (Bishop Museum).

A crew of whalers on deck (New Bedford Whaling Museum).



WHALING

The whaling industry transformed the Hawaiian Islands beginning in the early nineteenth century (Kuykendall 1938; Miller 1989; Beechert 1991). Vessels stopped in Honolulu and other Hawaiian ports for provisions and to recruit new crew members. At one time, Native Hawaiians comprised nearly one-fifth of the sailors in the Pacific-based American whaling fleet. As whales became scarce from decades of overfishing, whaling vessels ventured farther afield, traveling thousands of miles on years-long voyages in search of new whaling grounds. When the Japan Grounds were discovered just beyond Kure Atoll around 1820, ships began sailing through the NWHI in search of “liquid gold” (whale oil).

Though many sailors successfully navigated their way through the remote, low-lying atolls in the region, many others found danger and tragedy. Between 1822 and 1867, at least 10 whaling vessels were reported lost in the NWHI; of these 10, five sites have been identified and investigated: the British whaleships *Pearl* and *Hermes*, (the earliest shipwrecks discovered to date in the NWHI) lost on the same night in 1822 at the atoll that now bears their name; the American brig *Two Brothers*, wrecked at French Frigate Shoals in 1823; the British whaler *Gledstanes*, wrecked on the reef at Kure Atoll in 1837; and the American whaleship *Parker*, wrecked and scattered across the lagoon at Kure Atoll in 1842.

TRANSPACIFIC COMMERCE

Russian and French ships of discovery also transited the region and sometimes found themselves on the sharp coral reefs. In the late nineteenth and early twentieth centuries, the atolls of the NWHI were positioned directly along the

route of many sailing vessels carrying cargoes of coal, copra (dried coconut), sandalwood, timber, and food across the Pacific. *Dunnottar Castle*, a 258-foot iron-hulled sailing ship, was lost at Kure Atoll in 1886. The wreck is a remarkable, intact example of an iron-hulled tall ship bound for California carrying a cargo of coal from Sydney, Australia.

MIDWAY ATOLL

The NWHI, and in particular Midway Atoll, became a potential commodity in the mid-nineteenth century. Captain William Reynolds of USS *Lackawanna* took formal possession of Midway Atoll for the United States in August 1867. Shortly afterward, USS *Saginaw*, a Civil War-era side-wheel gunboat, was assigned to support improvement efforts at Midway, where a coal depot was to be built in support of transpacific commerce. For 6 months, *Saginaw* served as a support vessel for divers as they labored to clear a channel into the lagoon. In October 1870, the unsuccessful operation was terminated. *Saginaw* set a course for nearby Kure Atoll to check for castaways before returning to San Francisco, but she wrecked on the reef at Kure Atoll in the middle of the night.

Midway's importance grew for commercial and military planners. The first transpacific cable and station were in operation by 1903. In the 1930s, Midway became a stopover for Pan American Airways' "flying clippers"—seaplanes crossing the ocean on their 5-day transpacific passage.

With the rise of Imperial Japan in the mid-1930s, the United States was inspired to invest in the improvement of Midway. In 1938 the Army Corps of Engineers dredged the lagoon, and Midway was declared second to Pearl Harbor in terms of naval base development in the Pacific. The construction of the naval air facility at Midway began in 1940; French Frigate Shoals also supported a U.S. naval air facility. Midway became an important advance submarine base, and the reef was dredged to form a channel and harbor to accommodate submarine refit and repair. Patrol vessels of the Hawaiian Sea Frontier forces stationed patrol vessels at most of the islands and atolls (Braisted 1985; Cohen et al. 1990; Linville 2010).

Midway was of vital importance to both Japanese and American war strategies in World War II, and the raid of June 4, 1942, is one of the most significant events in the history of the naval base. The Battle of Midway took place 100–200 miles north of Midway Atoll. Four Japanese aircraft carriers and one American carrier were sunk, and the Japanese military was forced to withdraw from a planned invasion. Although most of the battle took place far to the north, an intense air battle was waged directly over and around the atoll. Thirty-one plane crashes have been conclusively identified by archival research. Of

Midway was of vital importance to both Japanese and American war strategies in World War II, and the raid of June 4, 1942, is one of the most significant events in the history of the naval base.

TOP LEFT Submarine piers at Midway Atoll (NARA).



TOP RIGHT Aerial view of Midway Atoll (NARA).



CENTER Aerial view of French Frigate Shoals, 1935 (Bishop Museum).



BOTTOM LEFT A consolidated B-24, landing flaps down, skims over the nesting goonies at Midway Island (NARA).

BOTTOM RIGHT Damage on Midway Island before the Japanese raiders were repelled, June 4, 5, and 6, 1942; burning oil tanks hit (NARA).



these, 22 were American and 9 were Japanese; these crash sites are all considered war graves. The Battle of Midway is considered the most decisive U.S. victory of that period and is referred to as the turning point of the war in the Pacific. Midway Atoll has since been designated as a National Memorial to the Battle of Midway.

Efforts to interpret the Battle of Midway are ongoing. Beginning with archival research and oral histories, there is a wealth of relevant information for the Monument to explore and develop. Shipwreck sites associated with the Battle of Midway are in deep water outside Monument boundaries, but the remains of

the air battle have the potential to rest in the shallower waters around the atoll. No aircraft associated with the battle have been investigated by NOAA maritime archaeologists. Efforts to discover and explore these sites include the 2003 and 2010 remote sensing survey efforts at Midway Atoll. Neither survey revealed targets; however, much work remains to be done. Interpreting the sunken aircraft associated with this famous battle added an important maritime component to surveys conducted in collaboration with FWS archaeologists in 2009.

2.2.2 MARITIME ARCHAEOLOGICAL SURVEYS

Maritime archaeologists conduct archaeological surveys to characterize the maritime heritage resources on the seafloor as a pivotal part of the effort to develop an inventory and a better understanding of the resource base in Papahānaumokuākea. Characterization begins with a historical inventory of the potential resources and proceeds to the field research component: physically locating and documenting these sites. Field research to date has resulted in the documentation of 20 maritime heritage sites. These have been documented at both Phase 1 (general site description) and Phase 2 (thorough site documentation and evaluation of a site for eligibility for inclusion in the National Register of Historic Places [NRHP]) levels.

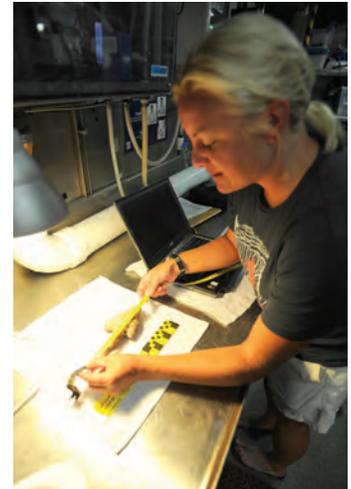
2.2.3 ARTIFACT RECOVERY, CONSERVATION, AND ANALYSIS

Activity MH-1.4 of the Monument Management Plan establishes that recovery and analysis of artifacts, carried out in a manner that respects the integrity of the ecosystem and the environmental goals of the Monument, may be an appropriate approach for interpretation. The advantage of this approach is that it brings information to the public, rather than taking more visitors to sensitive sites. Such recovery is carried out through the established permitting processes of the Monument.

2.2.4 ARCHIVAL RESEARCH

Archival research is the foundation of the maritime heritage field work that is conducted in the Monument. Similarly, it is the basis for the work of investigators from a wide range of disciplines, including historical ecology and Native Hawaiian research.

Initial efforts to develop an inventory of potential maritime heritage sites in the NWHI began with archival research. Archival research was conducted by NOAA MHP staff as well as by multiple partners (e.g. students, agencies, individuals) for the purposes of personal research, academic projects, and manage-



Kelly Gleason documents a whaling harpoon tip recovered from the *Two Brothers* shipwreck site (NOAA/Derek Smith).

Deirdre O'Regan conducts archival research at the Nantucket Historical Association Research Library (NOAA/Kelly Gleason).



ment efforts. Local, national, and international archives were investigated: State and Bishop Museum archives in Hawai‘i; the Library of Congress, National Archives and Records Administration (NARA), the Naval Historical Center, the New Bedford Whaling Museum, Mystic Seaport, and the Nantucket Historical Association outside the state; and the Public Records Office in London. Archival research is ongoing, and individual collections and papers have been the subject of research over the years.

2.2.5 REMOTE SENSING

To meet federal and program mandates to inventory and explore maritime heritage sites in PMNM, technologies more far-reaching than diver surveys—specifically, remote sensing technology—are necessary to increase the potential for site discovery and survey. Remote sensing entails survey of the seafloor using optical, sonar, and magnetometer technologies.

To date, remote sensing projects have been conducted in 2003, 2005, and 2010. The most comprehensive survey occurred in 2010, with magnetometer and sidescan sonar surveys at French Frigate Shoals, Pearl and Hermes Atoll, Lisianski Island, and Midway and Kure Atolls. This survey yielded two new maritime heritage sites and the creation of several photomosaics of sonar imagery of the seafloor surrounding known shipwreck sites. These data help with the delineation of site boundaries and a better characterization of the seafloor at maritime heritage sites. The contracting company, SEARCH, Inc., provided a thorough report of activities and an assessment of previous remote sensing efforts in the Monument (SEARCH 2011).

In addition to the remote sensing contracted or conducted by maritime archaeologists, the Pacific Islands Benthic Habitat Mapping Center in the School of Ocean and Earth Science and Technology at the University of Hawai‘i at Mānoa utilizes multibeam sonar data collected by the NOAA research vessel *Hi‘ialakai* and the NMFS research vessel *AHI* (Acoustic Habitat Investigator), a 25-foot survey launch commissioned in 2003. Data from multibeam surveys is collected for the purposes of benthic habitat mapping and classification, and has not yielded information about maritime heritage resources to date. However, reprocessing the data collected during these missions could enhance their value for heritage purposes. Upcoming phases for remote sensing also include the use of autonomous underwater vehicle (AUV) surveys to increase survey area and efficiency in target locations.



Jason Burns and Michael Krivor of SEARCH, Inc., collect magnetometer and side scan sonar data in the NWHI (NOAA/Kelly Gleason).

2.3 Historical Ecology

A central focus of the Heritage Plan is to further the understanding of how human societies have interacted with ecosystems in the NWHI through time. Historical ecology was identified as a research priority at the Maritime Heritage Research Plan Workshop and at a separate workshop on historical ecology held at the Monument offices in July 2009.

Historical ecology has been defined as seeking to gain a “practical understanding of past and current relationships among environmental and human systems, requiring a culturally specific temporal and spatial perspective applied at the regional scale” (Crumley 1994:8). Research in historical ecology is primarily characterized as empirical studies of changes in human–environment interactions through time that consider the complexity of factors (both social and environmental) involved. A key research focus is understanding reciprocity in human–environmental relationships through time. For example, anthropogenic actions can be implicated as the causal mechanisms for ecosystem change. Such actions can be described empirically as the alteration of natural disturbance regimes and placed within the context of social and historical factors that initiated these changes. Conversely, ecosystems and their embedded resources can influence the evolution of human societies, their changing patterns of production, and attendant demands on local ecosystems.

Historical studies have been pivotal in describing how human societies have mediated ecological conditions in marine ecosystems. Such conditions can result from deleterious interactions that have affected current ecosystem structure and function (e.g. Jackson et al. 2001; Pandolfi et al. 2003, 2005; Lotze et al. 2006).

A central focus of the Heritage Plan is to further the understanding of how human societies have interacted with ecosystems in the NWHI through time.



ABOVE Derek Smith collects coral samples for genetic analysis at the *Quartette* shipwreck site at Pearl and Hermes Atoll (NOAA/Kelly Gleason).

LEFT A green sea turtle beneath the pier at Midway Atoll (Greg McFall).

OPPOSITE Visitors to Laysan
(Wayne Levin).

Not all human actions, however, are deleterious or lead to ecosystem decline. In the Pacific Islands, for example, societies have interacted with coral reef ecosystems for millennia, and various human disturbance regimes associated with continually evolving societies have been subjected to reef ecosystems (Kirch and Hunt 1997; Allen 2002). The development of Pacific Island societies has also been moderated by ecological constraints (Kirch and Hunt 1997; Kirch 2007), such as resources in the nearshore marine environment (Kirch 1982; Allen 2003). From the perspective of historical ecology, the current state of Pacific coral reef ecosystems is therefore a historical legacy of reciprocal and dynamic interactions between ecological conditions and human societies. Coral reefs are, in fact, peopled seascapes, a linked social-ecological system shaped as much by human agency as by physical factors (Shackeroff et al. 2009).

As in historical ecology, the *cultural landscape* approach—or the *cultural seascape* approach, in the case of the Monument—views environments as inseparable from human societies. Mather and Jensen (2010:341–342) refer to the cultural seascape approach as encouraging “the asking of broader theoretical questions. For example, how did the early Indian or European explorers ‘see’ and experience these waters and surrounding landforms?” This humanistic approach provides a lens through which to spatially integrate human activities with environmental features, correlating fishing, whaling, place names, sites, and vegetation.

In 2009, PMNM hosted a workshop addressing historical ecology attended by experts from Scripps Institute of Oceanography, Hawai‘i Institute of Marine Biology, NOAA, University of Miami, Hawaiian language scholars, and the University of Hawaii Hawaiian Studies Program and East-West Institute. The intent of the workshop was to develop a specialized area of historical ecology focusing on the Hawaiian Archipelago. It explored both the status of current research and the opportunities for further research in the archipelago. This workshop served as a foundation for relationships necessary to promote future research in the NWHI. Some preliminary work has been done in the area of historical ecology (Kittinger 2010), and the understanding of long-term trends in both social and ecological conditions that has arisen from this research may help to inform future research efforts in this field.

2.4 *Native Hawaiian Heritage and Living Culture*

Papahānaumokuākea is a sacred place in the history and cosmology of Native Hawaiian people, and Native Hawaiians recognize the islands as a sacred ancestral homeland from which life arises and to which spirits return after death (Kikiloī 2010). It is impossible, therefore, to explore the social and environmental history of this World Heritage site without understanding the significance



Aspects of Native Hawaiian heritage, including fishing, religion, and politics, are links to the kind of broad, interdisciplinary understanding of the heritage of the Northwestern Hawaiian Islands that can help management pursue a sustainable direction for this World Heritage Site.

of Papahānaumokuākea in Native Hawaiian heritage and living culture. Native Hawaiian heritage in Papahānaumokuākea is being rediscovered through archival and field research, site visits and cultural activities, and the perpetuation of cultural practices and traditions. For example, archaeological research at sites at Nihoa and Mokumanamana is helping to further define ancient traditions and lifeways on these islands. Hawaiian archaeologist Kekuewa Kikiloi has recently dated occupation of these sites to around AD 1450, and is helping to deepen understanding of the role and significance of numerous intact heiau. Kikiloi has also rediscovered Hawaiian place names for the NWHI, evidencing a rich history and connection to living cultural traditions (Kikiloi 2010).

The NWHI remain an essential training ground for contemporary Hawaiian wayfinders (non-instrument navigators). Led by Nainoa Thompson, the first Hawaiian master wayfinder to navigate across the Pacific in several centuries, Hawaiian wayfinding has undergone a revival starting with the launching of the traditional voyaging canoe *Hōkūleʻa*. Native Hawaiians developed the world's first blue-water sailing technology, engineered sophisticated ocean-going vessels, and created a reliable navigational system based on observations of the natural world (State of Hawaii et al. 2009). Not only do the NWHI serve as a training ground for novice navigators, but traditional sailing canoes have traveled throughout Papahānaumokuākea in recent years. Other cultural activities have also been conducted in the Monument, such as observation of celestial phenomena, cultural learning activities, and repatriation of remains. Aspects of Native Hawaiian heritage, including fishing, religion, and politics, are links to the kind of broad, interdisciplinary understanding of the heritage of the Northwestern Hawaiian Islands that can help management pursue a sustainable direction for this World Heritage Site.

These activities and related investigations into the past evidence a living tradition that enriches the meaning of maritime heritage in Papahānaumokuākea. Efforts to interpret maritime heritage will continue to be intertwined with a comprehension of the living history and tradition of Native Hawaiian seafaring, navigation, and other cultural traditions and practices. Key areas for future work and collaboration include supporting additional archaeological field research, historical archival research, and the perpetuation and relearning of cultural practices and traditions.

As stated earlier, the Maritime Heritage Plan complements a forthcoming Papahānaumokuākea Native Hawaiian Cultural Research Plan, which will address priorities and methodologies for Native Hawaiian cultural research within and about the NWHI. Monument management operates under the policy that natural, cultural, and historical resources have equal value, and Native



Kalepa Babayan navigating to Nihoa on the Hawaiian sailing canoe *Hōkūleʻa* (Kaimana Barcase).

Hawaiians traditionally manage all natural resources as cultural resources. Both of these research plans seek to address management needs and concerns within Papahānaumokuākea, and while they are drafted and reviewed separately, the Management Plan expresses a goal of ultimate integration. Maritime heritage in the monument has the distinct honor and opportunity to be integrated with living Native Hawaiian cultural practices and traditions.



HI'IALAK

HI-2

“I was delighted and astounded to hear of the discovery of the *Two Brother’s* remains. This is what underwater archaeology is all about: finding the physical evidence that makes the long ago past real.”

NATHANIEL PHILBRICK, AUTHOR, *IN THE HEART OF THE SEA*

CHAPTER THREE

Research

Research is a critical maritime heritage activity that is called out in the Monument Management Plan. In addition to fulfilling mandates for inventory of maritime heritage resources, research provides the body of knowledge that supports education and outreach efforts.

Oral history, myths and legends, landscapes, and material culture work in concert to tell the story of the human relationship with the sea in the NWHI. Research encompasses an array of activities, from examination of archival records, to documentation of oral histories, to search and survey for new maritime heritage sites using remote sensing techniques, to the manual documentation of maritime heritage sites.

Field research is an integral component of unveiling this complex story. Moreover, a headquarters-level MHP performance measure requires that 100% of known historical, cultural, and archaeological resources within each national marine sanctuary and monument boundary be inventoried in NOAA’s Maritime Archaeological Resources (ARCH) database by 2015. This performance measure does not presume any level of archaeological documentation—only that the physical site is known and has been entered into the database.

Most field research in PMNM is conducted through diver surveys (snorkel and scuba), during which underwater maritime heritage sites are mapped. The first systematic survey of heritage resources in the NWHI was conducted in 2002 by a small volunteer team during a multidisciplinary research cruise. In 2004, the NOAA research vessel *Hi‘ialakai* became a dedicated NOAA National Ocean Service (NOS) asset in Honolulu. Equipped with a shipboard recompression chamber, a chamber operator on staff, and an air compressor and dive lockers for

OPPOSITE *Hi‘ialakai* recovers small boats at the end of a work day (NOAA/Kelly Gleason).



TOP NOAA Ship *Hi'ialakai* at Pearl and Hermes Atoll (NOAA/Greg McFall).

BOTTOM Cathy Green, Tane Casserley, and Jason Raupp work on the site plan for the *Churchill* at French Frigate Shoals (NOAA/Kelly Gleason).

scientific personnel, this ship is uniquely suited for diving expeditions in remote atolls. In 2005, *Hi'ialakai* became the primary platform for maritime heritage research in the Monument, supporting annual PMNM-led multidisciplinary surveys. In even-numbered years beginning in 2008, one research expedition is led by the maritime heritage team (with “piggyback” missions on board). This allows the maritime heritage team to have a greater influence on the itinerary and berthing plan. Maritime heritage surveys are also possible using air travel to Midway Atoll and French Frigate Shoals, or by charter vessel to the NWHI.

3.1 Goals

Though a great deal of research has been conducted in the NWHI, a tremendous amount remains to be done. This section highlights some potential research gaps and needs to inform priorities for future endeavors. Many of these focus areas were identified in the 2-day Maritime Heritage Research Plan Workshop in February 2010. Strategy MH-1 of the Maritime Heritage Action Plan (below) establishes the broad goals and the activities by which to achieve them.

STRATEGY MH-1: Document and inventory maritime heritage resources throughout the life of the plan.

Studying and protecting maritime heritage resources begin with basic documentary research and field site surveys. These activities are similar to those involved with ecosystem research. Both involve consolidation of past research and archival data, scientific SCUBA diving operations, and bathymetric mapping and remote sensing surveys. Maritime heritage surveys are compatible with planned multitasking missions, interagency cooperation, and operational efficiency.

Activity MH-1.1: Identify, collect, and review publications, data sets, and documents annually. Archival research and review of existing documents are the first steps in creating and confirming the maritime heritage resource inventory in the NWHI, as well as in formulating an effective field survey plan. Documents from at least two maritime heritage sites will be added to the site database per year.

Activity MH-1.2: Plan and carry out coordinated field mapping surveys of selected sites annually. Conducting field mapping surveys is the next step in understanding and interpreting heritage sites. Techniques can include shoreline terrestrial survey and inventory; marine remote sensing using magnetometer and sidescan sonar to locate potential heritage targets; and noninvasive diving surveys to assess and inventory sites (Dean 1992). These phases generally take place during multidisciplinary research cruises and are the result of coordinated interagency planning. Results are incorporated into a comprehensive Monument maritime heritage resource inventory maintained by ONMS. As an ongoing annual activity, maritime heritage field surveys will be conducted and progress reports will be completed annually.

Activity MH-1.3: Complete a status report on potential environmental hazards within 1 year, and update it annually. Wreck sites and other debris can represent potential environmental hazards that may be identified through field survey work. The MMB will be informed of any discovered potential hazards in order to assess the need for response or remediation (see Section 3.3.4, Emergency Response and Natural Resource Damage Assessment Action Plan). A status report on potential environmental hazards from wreck sites, disposal, etc. will be compiled by year 1 and updated annually.

Activity MH-1.4: Develop status report on maritime heritage artifact recovery operations within two years, and recover and conserve maritime heritage artifacts as appropriate. When excavation and analysis of material remains are appropriate for site interpretation, and when these tasks can be done in a manner that respects the integrity of the ecosystem and the environmental goals of the Monument, recovery of selected artifacts is a way of bringing the data to the public, rather than taking more visitors to the NWHI site. Such recovery will be carried out through the established permitting processes of the Monument (see Section 3.4.1, Permitting Action Plan, and Appendix A). A status report on potential and completed maritime heritage recovery operations will be completed by year 2 and updated annually.

Activity MH-1.5: Develop and implement an internal maritime heritage resource database within 5 years. An internal database of known maritime heritage resources will be established and maintained by the Monument maritime archaeologist for the prioritization of targets, to be completed by year 5.

A view of scientists and their gear en route to a dive site at Pearl and Hermes Atoll (NOAA/Kelly Gleason).



Field research is an integral component of unveiling the complex story told through oral history, myths and legends, landscapes, and material culture work.

3.2 Context

The archaeological survey projects carried out to date are summarized below. Individual site reports and more in-depth project reports are available from the Monument upon request.

3.2.1 MARITIME ARCHAEOLOGICAL SURVEYS

2002 SURVEY

The 2002 maritime archaeological survey was the first systematic survey for maritime heritage resources in the NWHI. A small team led by NOAA maritime archaeologist and Principal Investigator Hans Van Tilburg included Suzanne Finney and Marc Hughes of the University of Hawai‘i. The 2002 survey was conducted quickly and with basic hand tools, as time was limited at each atoll visited during the 2002 Northwestern Hawaiian Islands Coral Reef Assessment and Monitoring Program expedition. Maritime heritage sites were often documented in a single dive before the team had to move on to the next site. Prior to the expedition, Van Tilburg developed a thorough inventory of potential sites based on interviews with scientists and review of newspaper collections, maritime texts, damage assessment records, and numerous archival sources. At that time, 51 potential sites had been identified. This report is an excellent reference guide for the potential and existing sites in the NWHI (Van Tilburg 2002).

2003 SURVEY

In August and September 2003, a small maritime archaeology team conducted several days of survey at Kure and Midway Atolls. The team included Principal Investigator and NOAA maritime archaeologist Hans Van Tilburg, Bradley Rodgers and Kelly Gleason of East Carolina University, and Andy Lydecker of Panamerican Consultants Inc. All operations were conducted from the NOAA Coral Reef Ecosystem Reserve (CRER) vessel *Mana Cat*. The project included maritime archaeological survey dives on known and newly discovered maritime heritage sites, diver surveys to search for new sites, and remote sensing operations. The team conducted several days of magnetometer surveys, and the results included discovery of the Navy side-wheel steam vessel USS *Saginaw* at Kure Atoll and documentation of the American sailing ship *Carrollton* and USS *Macaw* at Midway Atoll (Van Tilburg 2003).

2005 SURVEY

Between May 14 and June 7, 2005, a team of five MHP archaeologists participated in a 25-day expedition to the NWHI aboard *Hi‘ialakai*. The team, led by Principal Investigator and ONMS Pacific Islands Region maritime heritage



coordinator Dr. Van Tilburg, included NOAA maritime archaeologists John Broadwater, Robert Schwemmer, Tane Casserley, and Kelly Gleason. Work in 2005 included remote sensing survey at French Frigate Shoals, dive surveys of Maro Reef, maritime archaeological surveys at Pearl and Hermes and Kure Atolls, and the collection of extensive photo and high-definition video documentation of maritime heritage sites by NOAA Ocean Media Center filmmaker John Brooks.

The 2005 survey work focused on the archaeological survey of the wrecks of whaling ships discovered by NMFS Coral Reef Ecosystem Division (CRED) divers in 2004. All evidence suggests that these are the British whalers *Pearl* and *Hermes* (after which the atoll was named), which ran aground on April 24, 1822. The ships were on their way from Honolulu to hunt for whales on the newly discovered Japan Grounds when they crashed into the reef; the castaways endured 4 months on Southeast Island.

Fixed baselines were established at two fore reef sites in the rough surf and surge zone, and the maritime archaeologists collected photo documentation and measurement data for a site plan. Anchors, trypots (cauldrons for rendering whale oil), and portions of the tryworks (structures built to house the trypots)

Filmmaker Ziggy Livnat documents the wing section of a World War II-era Corsair at Midway Atoll (NOAA/Tane Casserley).



were documented. Divers have now counted six cannon, seven try pots, five anchors, and numerous other artifacts at these sites. The team recovered several small diagnostic artifacts to be conserved for research and outreach.

The team also conducted survey work at Kure Atoll, where the entire bow section of a nineteenth-century wooden whaling ship was lifted over the reef and deposited in the calm lagoon waters. Among other artifacts resting inside the lagoon are anchors, chain, windlass, and deck machinery. This ship may be the American whaler *Parker* lost at Kure in 1842 during a storm, after which the castaways made their way to Green Island. John Brooks collected video footage of maritime heritage sites for documentation, as well as for development of outreach products such as a short documentary film. The 2005 expedition was the first of what have become annual Monument-led multidisciplinary research expeditions to the NWHI (Van Tilburg 2005).

2006 SURVEY

In July 2006, a six person maritime archaeology team, including ONMS Pacific Islands Region maritime heritage coordinator Dr. Hans Van Tilburg; ONMS Pacific Islands Region maritime archaeologist Dr. Kelly Gleason; ONMS maritime archaeologists Tane Casserley, Brenda Altmeier, Robert Schwemmer; and intern Lindsey Thomas, conducted 17 days of survey at Pearl and Hermes, Midway, and Kure Atolls. While at Kure Atoll, the team completed Phase 2 (completed site documentation including site plan) surveys of the *Parker* site and the USS *Saginaw* site. The team was able to identify and conduct an initial Phase 1 survey (preliminary site assessment) of the British sailing vessel *Dunnottar Castle*. At Pearl and Hermes Atoll the team completed a Phase 2 site plan survey of the British whaler *Pearl*, and documented an unidentified wreck site called the “Oshima” site (Van Tilburg 2006).

2007 SURVEY

The 2007 *Hi'iialakai* expedition was hindered by mechanical issues that shortened the duration of the trip before the ship even left port; nevertheless, the project was a tremendous success. The 2007 maritime heritage team included ONMS maritime archaeologists Dr. Hans Van Tilburg, Dr. Kelly Gleason, Tane Casserley, and PMNM Deputy Superintendent Sean Corson.

At French Frigate Shoals the team investigated metal debris initially discovered in October 2005 by CRED divers. Preliminary dives revealed a major portion of a very large wooden sailing vessel. Site artifacts included parts of the windlass, small capstan, spar/mast reinforcing bands, two hawse pipes, three large iron anchors, numerous blocks and pulleys, large-diameter wire rope, chain plates and deadeyes, large fasteners or bolts, copper drift pins, chain (anchor cable), copper

OPPOSITE Hoku Johnson dives down to peer into a try pot at the *Pearl* shipwreck site (NOAA/Tane Casserley).

Scientists meet nightly on board a research expedition on the NOAA vessel *Hi'ialakai* (NOAA/Kelly Gleason).



sheathing, ship's pump, port hole, wire rope strops, lead scupper pipes, and other metal debris. These are all consistent with a late-nineteenth or early-twentieth century wooden sailing vessel. The site is likely the wreck of the wooden four-masted 665-ton sailing schooner *Churchill*. *Churchill* was sailing with a cargo of copra bound for the west coast when, due to strong currents, she struck a reef and sank in 1917.

The team also investigated the remains of the 440-foot Liberty ship *Quartette* (former U.S. Navy vessel USS *James Swan*), which ran aground at Pearl and Hermes Atoll in 1952. At this time the team was only able to investigate the bow section forward of the superstructure, which was carried over the reef into the shallow back reef. The team located major features of the wreck (e.g., masts, fairleads, superstructure, deck features, bridge features) in an area of more than 45,000 square meters.

While transiting at Pearl and Hermes Atoll, the wreckage of a fairly modern sailing vessel was spotted by coxswain Gaetano Mauritzio. The fiberglass cabin, stainless steel transom rail, attached outboard engine and associated rigging and fiberglass material indicated a modern sailing vessel possibly 10–12 feet in beam and 40–60 feet long (Van Tilburg 2007).

2008 SURVEY

The 2008 survey was the first maritime heritage–led expedition on *Hi'ialakai*; previous voyages had carried maritime heritage efforts as piggyback missions. The opportunity to lead a research cruise allowed the maritime heritage team to

have greater influence on the cruise schedule and allowed more berthing space for maritime archaeologists. The 2008 maritime archaeology team included Principal Investigator and PMNM maritime heritage coordinator Dr. Kelly Gleason, ONMS Pacific Islands Region maritime heritage coordinator Dr. Hans Van Tilburg, ONMS MHP national coordinator Tane Casserley, ONMS Thunder Bay National Marine Sanctuary education coordinator Cathy Green, Flinders University Research Fellow Jason Raupp, Sea History Magazine editor Deirdre O'Regan, and Open Boat Films filmmaker Stephani Gordon.

The team conducted activities to fulfill four main tasks in keeping with Monument objectives to identify new maritime heritage sites and develop education and outreach strategies:

- Non-invasive assessment surveys of selected wreck sites.
 - The schooner *Churchill* at French Frigate Shoals.
 - The whaling ship *Hermes* at Pearl and Hermes Atoll.
 - The sailing ship *Dunnottar Castle* at Kure Atoll.
 - The newly discovered whaling ship *Gledstanes* at Kure Atoll.
 - The unidentified whaling shipwreck at French Frigate Shoals (later identified to be the Nantucket whaling ship *Two Brothers*).
- Snorkeler towboard survey of areas with high potential for wreck sites—specifically Kure Atoll, French Frigate Shoals, and Pearl and Hermes Atoll.
- Recovery of three selected artifacts from shipwreck sites at Kure Atoll (Section 106 compliance complete, Navy permit approved) for the purposes of education, outreach, and research.
- Collection of high-definition film footage for an education and outreach video product.

Snorkel towboard surveys proved successful for the discovery of an unidentified whaling shipwreck site at French Frigate Shoals. Towboard surveys involve two snorkelers being towed behind a small boat at a slow (approximately 2 knots/hour) speed to survey a wide area of the seafloor. In 2008, towboard surveys were also conducted at Pearl and Hermes and Midway Atolls.

Documentation of *Churchill* and *Hermes* concluded the Phase 2 archaeological survey (completed site documentation including site plan) of these two sites. The survey was conducted using baseline trilateration methods. The Phase 1 survey (preliminary site assessment) of *Dunnottar Castle*, conducted using baseline offsets and visual assessments of artifacts and feature orientation to be used as an interpretation and outreach tool. Documentation of *Gledstanes* and the

previously unidentified whaling shipwreck site at French Frigate Shoals began the Phase 2 surveys using baseline trilateration; site plans were to be used for interpretation and outreach. Further surveys of these newly discovered sites may be necessary to determine the full extent of the sites' boundaries.

The 2008 survey accomplished all the articulated mission goals. Interpretation of these sites is ongoing, and education and outreach products are developed on completion of fieldwork and data processing (Gleason 2008).

2009 SURVEY

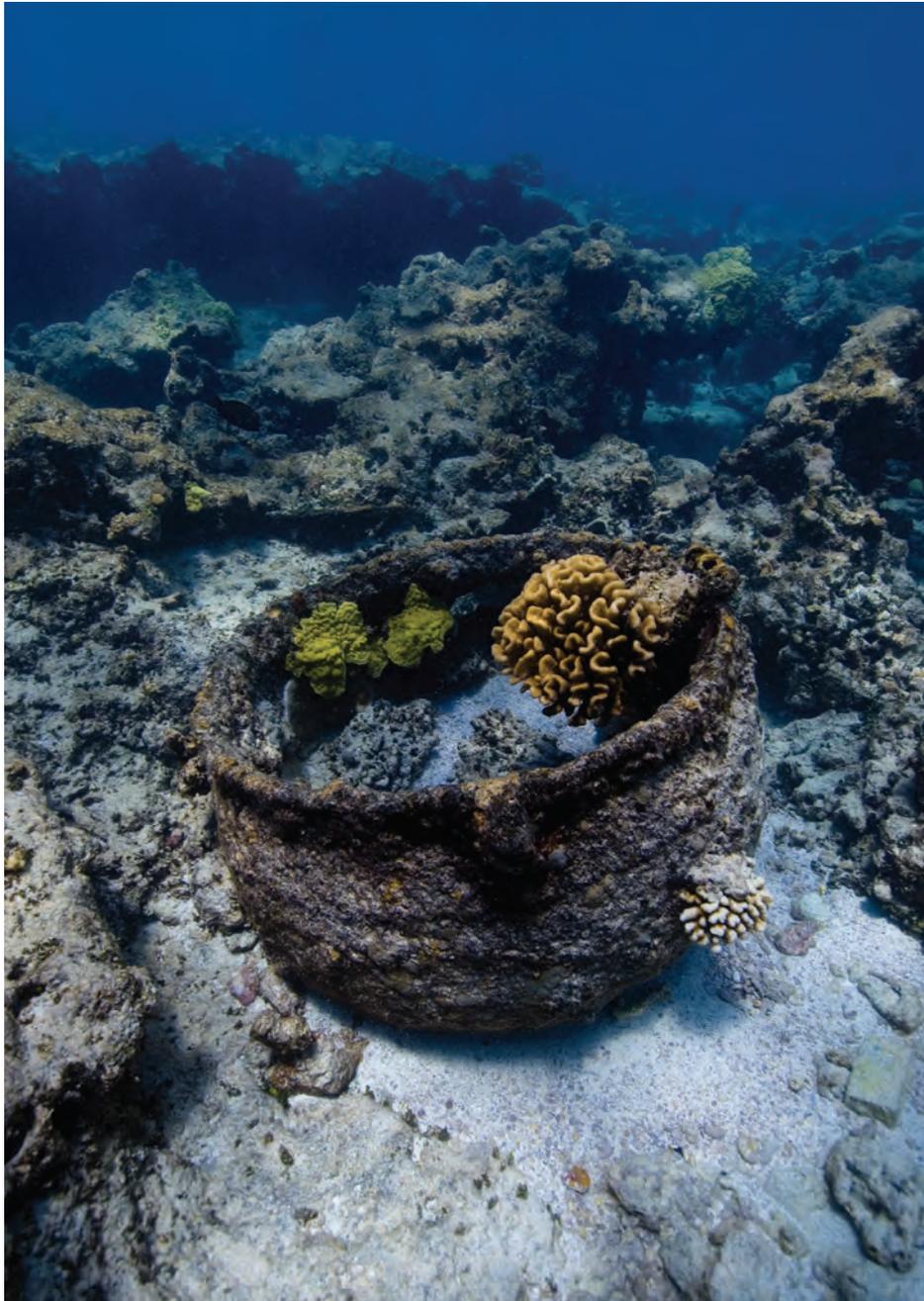
A three-person maritime archaeology team conducted 16 days of survey in the Monument in June 2009. The team was part of a larger, 20-person scientific expedition on *Hi'ialakai* that included work at Kure, Midway, and Pearl and Hermes Atolls; French Frigate Shoals; and Laysan Island. Maritime archaeology was a piggyback mission in 2009, limiting the team's access to daily boat space and time at individual sites.

A primary objective of the 2009 maritime heritage mission was to support Derek Smith, a graduate student at Hawai'i Institute of Marine Biology, as he began his thesis research to compare the structure of biological communities at maritime heritage sites to that of surrounding habitats. To carry out this work, Smith, Ann Mooney of PMNM, and Monument maritime heritage coordinator and Principal Investigator Dr. Kelly Gleason conducted diving surveys at five shipwreck sites over the course of 16 days. The team collected data on benthic community structure and substrate type, fish population, and coral population genetics, as well as oceanographic information including temperature, salinity, pH, wave height, tidal range, and dissolved oxygen at both shipwreck and control sites. The goal of the project was to create a snapshot of the shipwreck ecosystem to determine if there are differences between it and that of the control sites.

The management implications of this kind of study are important to help maritime heritage managers understand the interactions, impacts, and potential benefits of shipwreck sites. Smith's work will contribute to the development of long-term monitoring strategies by helping to identify quantitative environmental parameters and to build an understanding of shipwreck sites as part of the larger ecosystem. This pilot study was a tremendous success.

In addition to the environmental assessments at maritime heritage sites, the 2009 survey included further surveys at several known shipwreck sites in the Monument. While surveying at the unidentified whaling ship at French Frigate Shoals first discovered the previous year (referred to as the *Shark Island Whaler*), the team came across an exciting new portion of the site. In addition to the dis-

The management implications of 2009 study are important to help maritime heritage managers understand the interactions, impacts, and potential benefits of shipwreck sites.



ABOVE Kelly Gleason measures the diameter of a grinding stone used to sharpen tools on board the whaleship *Two Brothers* (NOAA/Derek Smith).

LEFT One of four trypots discovered at the *Two Brothers* shipwreck site (NOAA/Tane Casserley).

covery of a fourth trypot, three blubber hooks, a grinding wheel, and a kedge anchor, the team found four small (40 cm high by 40 cm wide) cast iron pots that resemble small trypots. Further research revealed that these small cast iron pots were imported to Nantucket in the early nineteenth century for use on whaling ships. Thus, field research conducted in June 2009 initiated an exciting new multidisciplinary project in the Monument, as well as building documentation and interpretation of the *Shark Island Whaler* site (this is the site determined in 2011 to be the Nantucket whale ship *Two Brothers*) (Gleason 2009).

2010 SURVEY

In May and June 2010, maritime heritage led the 25-day research expedition in the Monument. The eight-person maritime heritage team consisted of three smaller teams: a two-person remote sensing team running sidescan sonar and magnetometer operations at each atoll from the NOAA small boat HI-2; a three-person ecological assessment team conducting a biogeographical study on maritime heritage sites; and a three-person maritime archaeology team conducting site surveys, documentation, and interpretation of new and known maritime heritage sites.

In May and June 2010, maritime heritage led the 25-day research expedition in the Monument. The success of the cruise—like the continued broadening of the maritime heritage research efforts in the Monument—is the result of the tremendous effort and dedication of the maritime heritage team who participated in this survey.

Over the course of 25 days, the team visited French Frigate Shoals, Lisianski Island, Pearl and Hermes Atoll, Kure Atoll, Midway Atoll, and Nihoa Island. Personnel consisted of PMNM maritime heritage coordinator Dr. Kelly Gleason; Jason Raupp of Flinders University; Alysia Curdts, Derek Smith, Nyssa Silbiger, and Anne Rosinski of the Hawai'i Institute of Marine Biology; and Michael Krivor and Jason Burns of SEARCH, Inc. While at French Frigate Shoals, the maritime archaeology team (Gleason, Raupp, and Curdts) continued documentation of the site of an early nineteenth-century whaling ship discovered during the 2008 survey. The discovery of dozens of new artifacts—including five whaling harpoon tips, lances, datable ceramics, kitchenware, bottle glass, an early nineteenth-century sounding lead, rigging, blubber hooks, and ballast—gave the team a wealth of new information, which was used to narrow down the identity of the site as the Nantucket whale ship *Two Brothers* wrecked at French Frigate Shoals in February of 1823.

Work at the site included the recovery of one of the whaling harpoon tips for analysis, treatment, and interpretation. Harpoons were usually etched with the name of the ship and maker, so there is hope that careful treatment and the creation of a mold of the artifact will yield significant information about the site. The team created a site plan that documents the location and distribution of artifacts in an area of the site that was discovered during the 2009 survey. The team also documented a total of four new vessels during 2 days of work at Lisianski Island, including a large section of a late-nineteenth-century wooden-hulled sailing vessel and the remains of three modern vessels.

The remote sensing team Krivor and Burns from SEARCH covered approximately 300 line miles of survey over the course of 15 survey days. In addition to searching for new wrecks, the remote sensing team successfully surveyed the extent of areas of new sites. Sidescan sonar mosaics that will be created will offer valuable multidisciplinary utility and will contribute to broader mapping efforts in the Monument by providing refined areas of survey.

The ecological assessment team (Smith, Silbiger, and Rosinski) compiled a picture of the environment surrounding six maritime heritage sites that collectively span more than 180 years. The team conducted 35 transect surveys to document fish species richness and abundance, rugosity, and benthic community structure. The team also collected 5 days of continuous oceanographic data, retrieved and deployed data loggers, and collected coral samples for genetic analysis and connectivity research.

The success of the cruise—like the continued broadening of the maritime heritage research efforts in the Monument—is the result of the tremendous effort and dedication of the maritime heritage team who participated in the 2010 survey.

Following a successful maritime heritage cruise in May 2010, PMNM maritime heritage coordinator Kelly Gleason returned to the *Two Brothers* whaling shipwreck site at French Frigate Shoals during a subsequent research cruise to the NWHI in August 2010. After acquiring the appropriate permits, Gleason and a small team of scientists recovered two more whaling harpoon tips, two whaling lance tips, two ceramic sherds, and a cast iron cooking pot. All these artifacts were immediately transported to a conservation laboratory in California. Research following the work at the French Frigate Shoals whaling shipwreck site in 2010 led maritime archaeologists to determine that the identity of the ship was *Two Brothers*, a Nantucket whaling ship whose captain, George Pollard Jr., was also the unfortunate captain of the whaleship *Essex*. The identity was released to the public in February 2011 (Gleason 2010).

BATTLE OF MIDWAY

In January 2009, the Monument maritime archaeologist, Monument geographic information system (GIS) specialist, and FWS archaeologist conducted one week of terrestrial survey of World War II–related sites at Midway Atoll. This project began as a grant-funded collaborative effort and has become an ongoing collaboration to integrate the land and sea sites associated with the Battle of Midway. Planned outcomes for this project include an interactive GIS database of Battle of Midway sites—one version would be designed for managers and another for public outreach.

Next steps include further remote sensing survey at Midway Atoll for maritime heritage sites associated with the battle and continued development of the Battle of Midway GIS database project. This ongoing project highlights the abundant potential for integrating research and stewardship of maritime heritage resources in the Monument through institutional collaboration (Speulda-Drews 2010).

3.2.2 ARTIFACT RECOVERY, CONSERVATION, AND ANALYSIS

Managers have determined that there are compelling reasons for the recovery of specific artifacts: conservation, protection, research, and outreach.

In 2005, permits were obtained to recover several small, diagnostic artifacts associated with three whaling shipwreck sites. These artifacts held the potential to yield information about the origins and dates of the shipwreck sites. The artifacts were all documented on the seafloor, recovered from hard substrate, and photographed and kept in a salt/freshwater mixture until they were brought to Honolulu, at which point they were packaged and shipped to the conservation facility in California.

In 2007, funding was secured to begin to develop a small maritime heritage exhibit at the Monument's Mokuāpāpapa Discovery Center in Hilo, Hawai'i. In 2008, permits were obtained to recover three artifacts that would serve as the centerpieces of this exhibit: two ship's bells and a sounding lead from two shipwreck sites at Kure Atoll. The justification for their recovery was the potential to positively identify the sites, as well as their education and outreach potential in the exhibit in Hilo.

Interpretive display of these artifacts allows maritime archaeologists to share the *Parker*, *Pearl*, *Hermes*, and *USS Saginaw* stories with the public, most of whom will never have the opportunity to visit the remote atolls of the Monument. Moreover, study of the artifacts will aid in the confirmation of the sites' identities, and the artifacts will provide the opportunity for further maritime heritage research. Finally, the recovery of artifacts serves the invaluable purpose of preservation and protection of nonrenewable resources, in the event of unlawful looting or disturbance by divers. For all these reasons, managers have determined that there are compelling reasons for the recovery of specific artifacts: conservation, protection, research, and outreach.

In August 2008, a maritime archaeology team discovered an unidentified nineteenth-century whaling shipwreck site at French Frigate Shoals. On further investigation of the site in June 2009, a small team discovered the tip of a whaling harpoon resting in coral rubble. Such an artifact is significant for its potential to identify the site. Several types of markings with diagnostic potential may be found on whalecraft such as whaling harpoons. A blacksmith mark, stamped with a name, could help date an iron and identify its origin. The identity of the ship, as well as of the individual whaleboat, was often placed on harpoons, but not on other whalecraft. If a whale was struck and then lost and another ship subsequently took that whale, the sailors would find the harpoon from the first ship and maintain ownership and proceeds of that whale to the first ship (Lytle 1984). For these reasons, the harpoon tip was an exciting and valuable find.



TOP Stephani Gordon documents the recovery of the ship's bell at the *Parker* shipwreck site at Kure Atoll (NOAA/Tane Casserley).

CENTER LEFT Cathy Green documents the bell of the USS *Saginaro* in the *Hi'ialakai's* wetlab (NOAA/Tane Casserley).

CENTER RIGHT CSU Chico students clean and conserve a cast iron cooking pot recovered from the *Two Brothers* shipwreck (Georgia Fox).

BOTTOM A bottle neck recovered from the *Pearl* shipwreck site (Georgia Fox).



Maritime archaeologists search for shipwreck sites at French Frigate Shoals on towboards (NOAA/Tane Casserley).

In May 2010, permits were obtained to recover and conserve the whaling harpoon tip at the French Frigate Shoals site. Once thoroughly recorded on the seafloor, the harpoon was recovered and transferred according to proper protocol. During the May 2010 survey of the site, several significant new artifacts were discovered and documented: four more whaling harpoon tips, whaling lance tips, ceramics, and glass, among dozens of other artifacts dating to the early nineteenth century. Because no permits had been obtained for any artifacts other than the original harpoon tip, all artifacts were documented in place. Monument staff determined that these new artifacts warranted a permit amendment on the basis of their potential to yield valuable information and to serve as outreach tools as part of the *Lost on a Reef* exhibit at Mokupāpapa Discovery Center (and other similar exhibits). In August 2010, the Monument maritime archaeologist recovered two whaling harpoon tips, two lances, and two pieces of ceramic. These were again documented and transferred to the conservation facility in California for conservation and analysis in accordance with appropriate transport protocol.

All artifact recovery and conservation to date has occurred under the direction of Dr. Georgia L. Fox of the Heritage Resources Conservation Laboratory at California State University, Chico. Reports of work conducted in 2005, 2008, and 2010 detail specific methods and techniques (Fox 2006, 2010); these are available on request. Research conducted during the conservation and analysis of these artifacts informed several scholarly articles and presentations.

3.2.3 COLLABORATIVE RESEARCH

Descriptions of some outstanding student projects are provided below.

A Maritime History of the Northwestern Hawaiian Islands from Laysan to Kure, Tane Renata Casserley (1998)

Tane Casserley, a graduate certificate candidate in Maritime Archaeology and History in the Marine Option Program at the University of Hawai‘i at Mānoa, compiled one of the earliest descriptions of maritime history in the NWHI, focusing on the islands from Laysan to Kure Atoll. His effort to compile the previous available data into a single body of work has proven an invaluable resource for both researchers and managers. Casserley’s work drew heavily on the Atoll Research Bulletin published by the Smithsonian Institution, as well as on manuscripts from the Bishop Museum in Honolulu, Hawai‘i, and the Hawaiian and Pacific Collections of the Hamilton Library at the University of Hawai‘i, through which he developed a historical record of the NWHI (focusing mainly on shipwrecks) until the early 1940s.

Wales to Pacific Whales: The British South Sea Whaling Trade in the Early 19th Century, Kehaulani Suzanne Kerr (2008)

This study focuses on the archaeological evidence of British whaling ships in the South Seas during the late eighteenth and early nineteenth centuries. It attempts to bring together disparate sources regarding the British South Sea whaling trade: the few published works that describe the British occupation in the Pacific Ocean in the early nineteenth century, archaeological material, and iconographic sources. This paper examines the period from the beginning of the South Sea trade in 1775 to the 1840s, when the whaling trade was in decline. Kerr's primary research questions are developed using the wrecks of *Pearl* and *Hermes* in the historical context of the British South Sea trade.

Historical Ecology of Coral Reefs in the Hawaiian Archipelago, John N. (Jack) Kittinger (2010)

This dissertation examines the historical relationship between human societies and coral reef ecosystem conditions over the past millennium in the Hawaiian Archipelago by integrating archaeological data, anecdotal historical accounts, ethnographic information, and modern ecological and social data. Research results revealed historical periods of reef recovery, including a recovery in the NWHI from ~AD 1950 to the present day. These recovery periods—which are attributed to a complex set of social factors including depopulation and demographic change, economic transformations, and ecosystem protections—served to release reefs from human stressors. This novel finding of recovery periods suggests that coral reef ecosystems can exhibit resilience to impacts if stressors are reduced over large spatial and temporal scales; it challenges conventional assumptions and reported findings that human impacts are cumulative and lead only to long-term trajectories of ecosystem decline.

Cuttin' in and Tryin' out: Industrial Perspectives on 19th Century American and British Whaling Ships, Jason Raupp (2010)

This research seeks to explore the industrial nature of pelagic whaling ships that operated in the Pacific region in the early to mid-nineteenth century. It attempts to contextualize the industrial experience and working environment through the historical and archaeological investigation of the whaling ships wrecked in PMNM. These sites represent well-preserved and untouched examples of the physical remains of whaling vessels that operated in the Pacific. The tropical reef environment of the region, as well as other natural and cultural factors that have affected site formation, have resulted in archaeological deposits characterized by the non-wooden artifacts of the industry. The comparable time periods and

Over the next 5 years, research should be broadened to include research beyond physical sites, more diverse partnership efforts, and interpretation of the Monument’s maritime history in a context of millennia rather than centuries.

contrasting nationalities represented suggest that in-depth study of the artifact assemblages and site distributions could shed light on technological differences between the contemporary fleets as well as changes over time. Examination of the technological developments, industrial processes, and social and cultural conditions on board these ships will facilitate a better understanding of this important aspect of world maritime heritage.

The Ecology of Shipwrecks: an Assessment of Biodiversity, Derek Smith (2010)

The purpose of this research was to determine if each shipwreck site studied supports a distinct ecosystem and if there are residual effects from shipwreck disturbances that manifest as differences between wreck sites and surrounding coral reef communities. The ecological survey data collected allowed for a comparative analysis among sites to identify patterns in reef recovery. These data also established a baseline for continued monitoring and conservation efforts. The results of this study will help inform future management decisions regarding the preservation and protection of maritime heritage resources.

3.2.4 ARCHIVAL RESEARCH

Because the maritime history of so many nations has involved the Hawaiian archipelago, archival resources pertaining to the NWHI have the potential to exist in depositories worldwide. Accordingly, archival projects have involved partnerships with agencies and organizations locally, nationally, and internationally. One example is the contract awarded in 2010 to SEARCH, Inc., to conduct archival research specific to the Battle of Midway. The resulting report, *Maritime Heritage Remote Sensing Survey of Papahānaumokuākea Marine National Monument, Northwestern Hawaiian Islands: Archival Research Report*, reflects hours of effort at the Naval Historical Center (Aviation History Section and Navy Department Library), NARA, and NARA Pacific Region (SEARCH 2010).

3.3 Prioritized Actions

Research through continued exploration and interpretation of maritime heritage sites remains a priority. Inventory and characterization of maritime heritage resources is still in its initial phases—fewer than one-sixth of potential maritime heritage sites have been located to date. Over the next 5 years, research should be broadened to include research beyond physical sites, more diverse partnership efforts, and interpretation of the Monument’s maritime history in a context of millennia rather than centuries.

3.3.1 EXPLORATION AND INVENTORY

AIRCRAFT AT MIDWAY ATOLL

The 70th anniversary of the Battle of Midway is in June 2012. To enhance public interest in the remembrance of this crucial battle, the MHP should pursue exploration to identify the sites of more than 70 aircraft lost in the vicinity of Midway Atoll.

In 2010, an extensive archival research project was undertaken to determine the extent of aircraft loss in association with the battle (SEARCH 2010). The next step is exploration to identify individual sites. The initial phase of exploration will entail a partnership effort with NMFS CRED or another organization with similar remote sensing capacity.

ONGOING EXPLORATION

Only 15% of the potential maritime heritage resources in PMNM have been located to date. Forthcoming inventory efforts should be focused on French Frigate Shoals (whaling shipwreck sites); Lisianski Island (whaling wrecks *Holder Borden* and *Konohasset*, and cannon jettisoned by Russian explorer Urey Lisiansky); and submerged cultural and maritime heritage resources around Nihoa and Mokumanamana. Successful magnetometer and sidescan sonar surveys were conducted in some of these areas in 2010; the next phase of exploration should entail AUV and multibeam sonar surveys.

REEXAMINATION OF REMOTE SENSING DATA

Multibeam data previously collected by *Hi'ialakai* and the NMFS CRED small boat *AHI* should be reexamined for their potential to yield maritime heritage targets. Initial processing of data for benthic habitat classification efforts often



USS *Enterprise* SBD-2 scout-bombers over the Pacific, circa late 1941 (NARA).



Maritime archaeologists used NMFS CRED's *AHI* multibeam small vessel to conduct remotely operated vehicle operations (NOAA/Robert Schwemmer).

OPPOSITE Nihoa
(Wayne Levin).

resulted in overlooking data that could be relevant for maritime heritage managers. Anomalies indicating shipwreck and aircraft sites may exist in the multi-beam data, but further processing efforts are required.

PREPARATION OF A PMNM MARITIME CULTURAL LANDSCAPE STUDY

As stated in the 2011 ONMS MHP Tactical Plan, the MHP will emphasize all aspects of heritage, including maritime culture in its broadest definition of human interaction with the lakes and seas, as well as overviews of maritime use and activity as characterized in the “maritime cultural landscape” approach. The MHP is adopting this approach to assessing sites within the National Marine Sanctuary System, as well as sites worthy of designation as sanctuaries. By examining a breadth of resources—such as names on charts, traditional fishing grounds, anchorages, navigational aids, historic shipping lanes, submerged pre-historic landscapes, and habitation sites—the MHP redefines and expands the scope of maritime heritage within the ONMS to include sites that do not possess resources such as shipwrecks, which have hitherto been the primary focus of MHP’s activities (Delgado 2011). Papahānaumokuākea will also become the subject of a Program-wide effort to develop a Maritime Cultural Landscape of the Northwestern Hawaiian Islands.

3.3.2 CLIMATE CHANGE AND MARITIME HERITAGE RESOURCES

As the body of knowledge regarding climate change increases, the possible effects of climate change on maritime heritage resources continue to gain importance. The connection between climate change and maritime heritage resources should be qualitatively and quantitatively examined, and documentation addressing these concerns should be developed by 2012.

3.3.3 PUBLICATION

Scholarly publications are addressed here because of their close relationship to research. Publication in the context of popular media is addressed in Chapter 4, *Education and Outreach*.

SCHOLARLY LITERATURE ON PMNM MARITIME HERITAGE PROJECTS

Publication in scholarly, peer-reviewed journals is an important component of any research project. All major PMNM maritime heritage projects should be assessed for publication either as internal ONMS/MHP reports or through a scholarly press. Although outreach materials have been developed, a paucity of peer-reviewed literature concerning PMNM maritime heritage sites has been published to date. Recent publications relative to the discovery of the *Two Brothers* whaling ship include papers in the *Bulletin of Australasian Institute for*



Maritime Archaeology (Raupp and Gleason 2010), *Historical Nantucket* (Gleason and Raupp 2010), and *The Explorers Journal* (Delgado and Gleason 2011). Beginning with this work, at least one scholarly article (addressing sites such as *Dunnottar Castle* or *Churchill*) should be submitted to an appropriate journal each year. Examples of important journals for archaeologists include *Historical Archaeology*, *the International Journal of Nautical Archaeology*, and the *Journal of Field Archaeology*. Effort should be made to broaden the publication audience to include journals focusing on traditional culture, history, and a wide range of scientific disciplines.

Books are another important venue for publication. ONMS Pacific Islands Region Maritime Heritage Coordinator Hans Van Tilburg detailed the history and rediscovery of the USS *Saginaw*, a pioneer U.S. Navy ship in the Pacific, whose wreck resulted in an epic open boat voyage to bring rescue for the survivors, in *A Civil War Gunboat in Pacific Waters*. Like *Saginaw*, the saga of the *Two Brothers* has potential for an engaging and informative book.

SHIPWRECK SURVIVOR CAMPS

PMNM maritime heritage staff has begun a collaborative, multidisciplinary project to investigate the ecological impacts of shipwreck survivor camps in the NWHI. While the progress of research was presented informally at a research conference in 2011, a scholarly article should be developed and submitted by the end of 2012.

3.3.4 NATIVE HAWAIIAN CULTURE

To date, no underwater surveys to investigate submerged cultural resources have been undertaken around Nihoa and Mokumanamana. Because Nihoa and Mokumanamana feature the archaeological landscapes of residential sites, agricultural terraces, and ceremonial complexes from settlements where Native Hawaiians resided between 1000 and 1700 AD (Cleghorn 1988), the seafloor certainly has the potential to yield examples of material culture lost or thrown overboard during attempts to transfer gear and supplies between sailing vessels and the islands. Survey for material culture directly related to the transport of canoes, including anchors and possible evidence of attaching canoe ladders to the islands, are important subjects of future survey efforts in the NWHI.

To address this gap in maritime archaeological survey efforts, maritime heritage staff should, in collaboration with Native Hawaiian archaeologists, begin to build the capacity and develop strategies for underwater survey in specific areas around Nihoa and Mokumanamana beginning in 2012.



A view of a diver and Nihoa in the background (Greg McFall).

3.3.5 MONITORING

Prior to the initiation of Derek Smith's work in 2009, no strategy for extracting measurable biological or environmental data from maritime heritage sites in the field had been established, and biological analyses of the effects of shipwrecks on the environment remained largely subjective. Because evaluations of shipwrecks as environmental threats have been limited in the Pacific to ships in intertidal locations (Helton 2003a) or that have grounded on a coral reef (Maragos and Burgett 2004), they are of limited utility in understanding how shipwreck sites interact with the environment at different depths and substrates in the NWHI.

Similarly, the physical classification schemes for shipwreck sites are largely descriptive, failing to consider environmental factors (Muckelroy 1978; Delgado and Murphy 1984). No strategy for monitoring takes into account the various levels of impact that shipwrecks may have on the environment, nor does any classification scheme take into account the immense value a shipwreck may have either as a historical resource or, in some cases, as an artificial reef (Lechanteur and Griffiths 2001).

Currently, no study of shipwreck sites in PMNM includes an annual monitoring scheme for biological data, though Smith's research brings such a strategy closer to realization. PMNM plans to develop an interdisciplinary classification scheme for shipwreck sites to serve the needs of both maritime heritage and natural resource managers. This effort would include development of a repeatable protocol for acquiring ecological information about shipwreck sites in

The establishment of measurable standards for evaluating both anthropogenic and environmental effects, as well as the capacity to classify sites on the basis of these threats, will provide a valuable tool for resource managers who seek to understand the comprehensive role shipwrecks play in the environment.

PMNM. The establishment of measurable standards for evaluating both anthropogenic and environmental effects, as well as the capacity to classify sites on the basis of these threats, will provide a valuable tool for resource managers who seek to understand the comprehensive role shipwrecks play in the environment.

3.3.6 HISTORICAL ECOLOGY

Historical ecology efforts began at PMNM with a workshop hosted by PMNM in 2009 and attended by experts from Scripps Institute of Oceanography, Hawai'i Institute of Marine Biology (HIMB), NOAA, University of Miami, Hawaiian language scholars, University of Hawaii Hawaiian Studies Program, and the East-West Institute at UH. The workshop explored both the status of current research and opportunities for further research into historical ecology in the Hawaiian Islands, and served as a foundation for relationships necessary for future research in Papahānaumokuākea. Despite a wealth of excellent research conducted to date in the NWHI, including Jack Kittinger's dissertation (Kittinger 2010), the topic of historical ecology provides an opportunity for more in-depth research regarding a variety of topics, including those listed below.

- *Oral history research with fishers and fishing families that accessed the NWHI.* Many of the fishers who accessed the NWHI as early as the 1940s are still alive, and their memory of the condition of reefs and the operations of fisheries in the area are a valuable source of historical ecological information. An oral history research program could help define the scope of fisheries operations, perceptions of coral reef conditions, and interactions between fisheries operations and coral reef ecosystems.
- *Seabird exploitation and recovery in the NWHI.* Seabird populations were exploited by the millions in the late nineteenth and early twentieth centuries in the NWHI (Rauzon 2001), and no comprehensive assessment has been made to date of the extent of these activities and their impact on seabird populations. Significant resources have been made to quantify the current status of seabird populations, and there is significant potential to explore how historical exploitation has affected modern populations.
- *History of scientific exploration and discovery.* The NWHI have a rich history of scientific exploration, and some of the data collected by these early investigations have yet to be duplicated or systematically reviewed.
- *Understanding fisheries legacies.* With the exception of lobster and bottomfish stocks, the extent and scope of fisheries in the NWHI have not been well documented. There is a need to understand how fisheries operations have affected the structure and function of ecosystems in the NWHI, and the historical ecological legacies of these activities.



ABOVE Jason Raupp and Alysia Curdts transfer underwater sketches and measurements to a site plan in the *Hi‘ialakai’s* drylab (NOAA/Kelly Gleason).

LEFT Randall Kosaki and Catherine Marzin of NOAA/ONMS investigate the Smithsonian Archives in Washington, DC (NOAA/Kelly Gleason).

- *Applying historical ecological data to management and policy.* Though significant efforts have been made to understand and quantify historical ecological conditions, these data have not yet been systematically applied to conservation strategies or policy in the NWHI. There is a great opportunity to explore the application of historical ecological information to management of Papahānaumokuākea.

3.3.7 STUDENT PROJECTS

The identified objective of developing far-reaching collaborative relationships, together with the need to leverage scarce resources, underscores the value of empowering both undergraduate and graduate students to participate in maritime heritage research projects. To facilitate student projects and to help align them to Monument priorities, maritime heritage staff should develop a list of relevant projects suitable for student involvement by 2012. Beyond undergraduate and graduate student projects, efforts should be made to introduce high school students to maritime heritage research. Through collaborations with specific teachers and classes, high school students can use maritime heritage projects as a way to explore career possibilities and creatively help PMNM maritime heritage staff fill gaps in research and outreach efforts.



“The [Papahānaumokuākea Marine National Monument] creates a new opportunity for ocean education and research for decades to come. Successful ocean stewardship depends on informed policy makers and an informed public.”

PRESIDENT GEORGE W. BUSH

CHAPTER FOUR

Education and Outreach

4.1 Goals

The wealth of knowledge both developed and untapped that the Monument represents is only as valuable as it is accessible to the people who can be enriched by it. Strategy MH-2 (below) of the Maritime Heritage Action Plan establishes guidelines for building and enhancing the education and outreach program already integral to the Monument Management Plan.

STRATEGY MH-2: Incorporate maritime heritage into public education and outreach throughout the life of the plan.

Raising public awareness of the maritime heritage field is essential to better valuing and protecting the resource. Protection comes through understanding the nature of heritage resources and what we can learn from them, as well as familiarity with established preservation laws. Education and outreach efforts for maritime sites emphasize “bringing the place to the people, not the people to the place” in a responsible manner.

Activity MH-2.1: Incorporate maritime heritage materials into Monument education and outreach projects annually. Resources and opportunities for collaboration for education and outreach are available through the MMB agencies and other entities. Monument maritime archaeologists will coordinate and participate in public outreach regarding Monument heritage resources and maritime history. Outreach efforts may include presentations, displays, still and video projects, and website materials. This activity includes potential support for the promotion of Native Hawaiian cultural outreach and education via Section 3.1.2, the Native Hawaiian Culture and History Action Plan.

OPPOSITE A view from below the surface at Mokumanamana (James Watt).

Activity MH-2.2: Develop and deliver public maritime heritage educational materials at selected presentations, conferences, and events. Shipwreck topics often appeal to large audiences at local, national, and international levels, and offer a chance to not only highlight the relatively new field of maritime heritage, but also to emphasize the unique nature of the NWHI, the need for conservation and ecosystem management, and the overall stewardship of all ocean resources. A minimum of two maritime heritage presentations will be given at professional conferences or public events each year.

The wealth of knowledge both developed and untapped that the Monument represents is only as valuable as it is accessible to the people who can be enriched by it.

Developing an education and outreach strategy for the MHP is predicated on imbuing the public with a sensitivity for the value of maritime heritage resources. Because the general public will never have the opportunity to visit most of the Monument's sites, education and outreach efforts assume a different significance than they do where visitation is encouraged and facilitated. The priority becomes bringing the place to the people in a creative and engaging way.

Although it is important to develop an outreach program emphasizing compatible activities and the ethics of responsible diving at shipwreck sites for those few individuals who might have the opportunity to visit the NWHI, such individuals constitute a tiny percentage of the overall public. Accordingly, the preponderance of the education and outreach program is devoted to the broader general public.

The development of cross-cutting themes to bridge Euroamerican and Native Hawaiian ideas of culture and history—for example, exploration, navigation, historical ecology, and contrasting viewpoints of the ocean—could lead to innovative partnerships and creative approaches to outreach and education. Collaborative outreach efforts—exploiting venues such as the Waikiki Aquarium, the Bishop Museum, the Pacific Aviation Museum, Lahaina Courthouse, the USS *Arizona* Memorial, cruise ships, airlines, hotels, and airports—could promote not just maritime heritage but also an array of broader Monument messages and themes.

4.2 Context

4.2.1 EXHIBITS

To date, outreach efforts have focused on bringing the public an experience through outreach materials (websites, posters, brochures, exhibits, and films). The Mokuapāpapa Discovery Center for Hawaii's Remote Coral Reefs, which opened on the bay front in Hilo, Hawai'i, in May 2003, is a valuable Monument asset for public outreach. This 4,000-square-foot facility, free to the public, was built to interpret the natural science, culture, and history of the Northwestern Hawaiian Islands. Interactive displays, three-dimensional models, a wet lab, and

an immersive theater allow the visitor to experience this special and remote area. A 2,500-gallon saltwater aquarium displays fishes from the NWHI reefs. Beside it is a mock-up of Hawai'i Undersea Research Laboratory's *Pisces V* submersible.

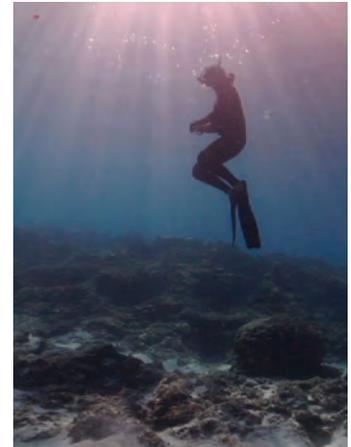
The Discovery Center has demonstrated its value to the community and visitors alike, with annual visitorship of approximately 60,000. Although its exhibits cover many aspects of the Monument, until recently none of them addressed maritime heritage. In February 2010, a new maritime heritage-themed exhibit, *Lost on a Reef*, opened for the public to view.

The recovery, conservation, and display of artifacts from three shipwreck sites in 2005 (*Pearl*, *Hermes*, and *Parker*) and two sites in 2008 (USS *Saginarw* and *Parker*) added a new maritime heritage component to the Center's current displays. The artifacts are displayed in locked, climate-controlled glass display cases. Interpretive panels present information about the rich maritime heritage of the NWHI and describe important aspects of shipwreck management, including the ownership and recovery of artifacts—an area of knowledge unfamiliar to the general public.

Lost on a Reef also displays three items from partnering institutions. The Mystic Seaport Museum of America and the Sea generously donated two artifacts—a whaling harpoon and a sextant. The sextant was invented independently in both England and America in 1731. This sextant was made in London, England, around 1830 by Heath & Co. Most sailing vessels traveling through the NWHI in the nineteenth century would have carried a sextant on board.

The History of Diving Museum in Islamorada, Florida, generously donated a Morse diving helmet and wing nut wrench from its extensive collection. The diving helmet helps tell the story of the USS *Saginarw* shipwreck. This helmet approximates the type that the ship's divers would have used while blasting the channel at Midway. The diving helmet is circa 1870s, made by A. J. Morse & Sons in Boston. Established in Boston in 1837, Morse was the first maker of diving equipment in the United States. This early helmet (serial no. 1635) exhibits the modifications made over decades by early divers for increased safety, comfort, and personal preference. The wing nut wrench would have been used by the tenders who dressed the diver to tighten the helmet's wing nuts. The collar of the rubberized canvas diving suit was squeezed between the brales (straps) and the breastplate of the helmet to make a watertight seal.

The material culture from these shipwreck sites, along with other objects PMNM is working to acquire—such as another dive helmet, a ship model, and additional artifacts—will help tell the stories of the early seafarers who passed through the Monument hundreds of years ago.



A screen capture from the *Lost on a Reef* short film of a freediver at Pearl and Hermes Atoll (Open Boat Films).



The rear wall space in the program room was dedicated to the *Lost on a Reef* exhibit. As in the rest of the Discovery Center, all main exhibit labels are printed in both Hawaiian and English. This exhibit exemplifies the principle of “bringing the place to the people, not the people to the place.”

4.2.2 FILM PROJECTS

Films can be an effective way to reach out to the public and to convey a message of stewardship and conservation. In March 2006, John Brooks of NOAA’s Ocean Media Center produced a maritime heritage film—*Exploring a Sunken Past*—for the ONMS Pacific Islands Region Maritime Heritage Program using footage collected during the 2005 survey described in Chapter 3. The Pacific Islands Region of ONMS funded the project, and the film focused on the history and management of maritime heritage resources in the Pacific Islands Region.

Following production of the film, the Monument was established and several new shipwreck sites were discovered and documented by NOAA maritime archaeologists, creating a need for more current video documentation and interpretation. In 2008, Open Boat Films (formerly Flyingfish Science and Film) was contracted to develop and assist in producing a maritime heritage film for public outreach. This film was also intended to complement the *Lost on a Reef* exhibit at the Mokuapāpapa Discovery Center. Over the course of a 30-day research expedition on *Hi‘ialakai* in August 2008, filmmaker Stephani Gordon collected video footage throughout the NWHI, including Kure Atoll. She shot high-definition video footage of terrestrial and underwater maritime heritage sites, and she interviewed the maritime archaeology team members about various aspects of their work—preservation, artifact recovery, site history, and interpretation efforts.

The *Lost on a Reef* film, completed in January 2010, is shown on a large screen throughout the day in the exhibit room to convey a sense of place and to introduce the people who conduct the research and develop the interpretation that made the exhibit possible. The film highlights the recovery of some of the artifacts on display in the exhibit—the ship’s bell and sounding lead from USS *Saginaw* and another ship’s bell from the whaling ship *Parker* site. In addition to its regular showing at the Mokuapāpapa Discovery Center, the *Lost on a Reef* film was entered by the filmmaker in more than 15 film festivals internationally. It has proven an effective way to reach a broad audience with messages about the history and protection of maritime heritage resources in PMNM. The film is available to the public on request, and can be viewed on PMNM’s website at http://www.papahanaumokuakea.gov/maritime/film_clips.html.

Films can be an effective way to reach out to the public and to convey a message of stewardship and conservation.

OPPOSITE Filmmaker Stephani Gordon documents maritime heritage resources in the NWHI for the film *Lost on a Reef* (NOAA/Tane Casserley).

4.2.3 PUBLICATIONS AND OUTREACH MATERIALS

Research in the NWHI is often conducted over the course of several years. During any given research expedition, time to conduct fieldwork may be severely limited by cruise schedule, weather, and conditions. Consequently, work beginning in one field season may take several years to complete.

Over the course of such drawn-out research, staff members have developed publications in the form of a book, short articles, and web-based pieces to describe the story and research carried out to date. Such outreach projects and publications will continue to be developed on an ongoing basis to convey the broader maritime heritage story of Papahānaumokuākea. PMNM maritime heritage publications and references, as well as links to expedition blogs can be found at the Monument's Maritime Heritage website (<http://www.papahanaumokuakea.gov/maritime/welcome.html>).

4.2.4 PUBLIC LECTURES AND SYMPOSIA

Public lectures and presentations provide an opportunity for outreach and interaction with the community locally and at a distance. Depending on the venue, presentations can reach a diverse audience and personally connect with the public. For the past several years, PMNM Maritime Heritage Program staff have regularly participated in public speaking opportunities locally (Hanauma Bay, University of Hawai'i, local public and private schools) as well as at a distance (museums, conferences, universities).

In January 2011, PMNM maritime heritage coordinator Kelly Gleason organized and led an entire session, *Voyages to Papahānaumokuākea: Maritime Archaeology in the Most Remote Archipelago on Earth*, focused entirely on maritime heritage research in the Northwestern Hawaiian Islands, at the annual Society for Historical Archaeology Conference. The conference includes an Underwater Archaeology component, and the well-attended PMNM session provided an excellent opportunity to report on the multidisciplinary maritime heritage activities recently conducted in the Monument to a broad, international community of terrestrial and maritime archaeologists.

4.2.5 TELEPRESENCE

Telepresence is a technological approach with rich potential for maritime heritage outreach, and one that has not yet been well developed by maritime heritage staff, although ONMS has used this approach to broadcast from remote shipwreck sites into classrooms and public venues. This cutting-edge technology, with its realtime, interactive character, could be tremendously beneficial for a site



Cathy Green in Alpena, Michigan connects with an audience in Hilo, Hawaii for a telepresence event at the Mokupāpapa Discovery Center (NOAA/Andy Collins).

like PMNM, which few will ever visit in person, by embodying the injunction to bring the place to the people. In February 2010, a pilot telepresence project was initiated to connect Mokupāpapa Discovery Center, Thunder Bay National Marine Sanctuary, and Mystic Aquarium during an opening event for the *Lost on a Reef* exhibit.

4.3 *Prioritized Actions*

The Monument has developed a solid foundation for education and outreach, and the opportunities to build upon this foundation abound. Some key actions are briefly discussed below.

4.3.1 EXHIBITS

TRAVELING *LOST ON A REEF* EXHIBIT

A modular maritime heritage exhibit, based on the *Lost on a Reef* exhibit at the Mokupāpapa Discovery Center, will be designed for easy transport and update. The exhibit will tell the story of maritime heritage in the Monument along with the broader story of natural and cultural resource protection and preservation in the remote atolls of the NWHI. The exhibit will be displayed at host sites in the Sanctuary System (such as Thunder Bay National Marine Sanctuary) and partner sites (such as Mariner's Museum in Newport News, Virginia; the North Carolina Aquariums; and the Virginia Aquarium & Marine Science Center). In addition to information about broader PMNM and ONMS efforts, interpretive panels and an interactive display will allow visitors to experience a variety

of topics such as shipwreck and survival camp stories in the remote atolls of the NWHI, maps and images of shipwreck sites, seafaring stories, and activities of maritime archaeologists in the field, in addition to information about broader PMNM and ONMS efforts. The exhibit will also highlight the connections between National Marine Sanctuary sites and maritime heritage stories. This project will contribute to broader ONMS education and outreach goals, bringing a very remote resource (PMNM) to a geographically diverse audience.

TRAVELING *TWO BROTHERS* EXHIBIT

The recent discovery of the shipwrecked Nantucket whaler *Two Brothers*—notable for its connection to the whaleship *Essex*, which was the inspiration for Herman Melville’s classic *Moby-Dick*—has drawn widespread attention. George Pollard, Jr., captained both vessels, and it was the wreck of the *Two Brothers* that sealed his fate as a failed whaling captain. It is also remarkable that *Two Brothers* is the first Nantucket whaler discovered in an archaeological context, further highlighting the unparalleled potential for exploration and discovery in the NWHI. The Nantucket Historical Association, the Mystic Seaport Museum, and the Maritime Museum of San Diego have all expressed interest in supporting and hosting an exhibit to be developed upon completion of artifact conservation (September 2011). Contributing to such exhibits communities that are linked through maritime heritage stories forge active connections.

TRAVELING USS *SAGINAW* EXHIBIT

The discovery of the U.S. Navy side-wheel steam vessel USS *Saginaw* by ONMS MHP staff in 2003 brought an important PMNM seafaring story to light. After a failed attempt at blasting a channel at Midway Atoll, *Saginaw* sailed north to Kure in October 1870 to check for shipwrecked sailors before heading home to San Francisco. Unfortunately, *Saginaw* wrecked on the low-lying outer reef at Kure Atoll. The survivors salvaged what they could and built a camp at Green Island in the southern part of the atoll. *Saginaw*’s crew constructed a small schooner named *Deliverance*, and five volunteers set out for help in the main Hawaiian Islands. The gig capsized in the surf in Kauai 31 days after departing Green Island, and only one of the volunteers survived the tragic ending to the harrowing open boat journey. The ship’s bell and sounding lead were discovered and conserved in 2008, and they are currently on display as part of the *Lost on a Reef* exhibit at Mōkupāpapa Discovery Center. Other artifacts from the shipwreck are on display at the U.S. Naval Academy Museum in Annapolis, Maryland, and the gig is currently on display at Saginaw County’s Castle Museum in Saginaw, Michigan. The compelling story of the *Saginaw* together with the ship’s remaining material culture would make an engaging mobile exhibit highlighting the connection between communities through common ties to this dramatic seafaring tale.

4.3.2 FILM PROJECTS

The excitement engendered by the *Two Brothers* discovery suggests the tremendous potential for a compelling documentary. Whether funded by the Monument or by external partners, such a documentary would be an invaluable outreach vehicle and should be pursued at the earliest opportunity. The *Lost on a Reef* film confirmed the value and reach of short film projects. PMNM should continue to use film as a means to reach a wide audience, both nationally and internationally.

Similarly, the opportunities for powerful documentary production should be considered as further exploration, documentation, and recovery projects move forward as discussed in Chapter 3, *Research*. Additionally, developing a film project focused on the broad continuum of exploration and seafaring in the Monument would help to weave together all elements of maritime heritage in the NWHI and interpret this broad story for a diverse audience.

4.3.3 PUBLICATIONS AND OUTREACH MATERIALS

POPULAR MEDIA ARTICLES

In addition to the scholarly articles discussed in Chapter 3, *Research*, articles for the popular media can be an effective tool to reach audiences much farther afield than visitors and residents in the Hawaiian archipelago. To date, more than five articles (both scholarly and popular media) have been published about the *Two Brothers* discovery. Several more have been published on a wide range of topics related to maritime heritage in Papahānaumokuākea. A top priority should be to develop and publish an in-depth popular article on the *Two Brothers* discovery, to dovetail with the scholarly undertaking. Additional articles should be developed and published as appropriate.

Articles for the popular media can be an effective tool to reach audiences much farther afield than visitors and residents in the Hawaiian archipelago.

DISCOVERY CENTER OUTREACH MATERIALS

The installation of the *Lost on a Reef* exhibit at the Mokuāpapa Discovery Center and the recent media attention surrounding the identification of the *Two Brothers* shipwreck site have elevated the profile of maritime heritage at the Discovery Center. Consequently, staff and volunteers must be better equipped to respond to this heightened interest. To this end, PMNM maritime heritage staff will work with Discovery Center staff to develop training and outreach materials. This is a high priority to fulfill an immediate need.

4.3.4 TELEPRESENCE

Installation of infrastructure for telepresence programs has begun at Midway Atoll. To take advantage of the potential presented by the forthcoming 70th an-

niversary of the Battle of Midway, the infrastructure must be completed, satellite time purchased, and a project designed and developed. An initial pilot project would entail a land-based Midway broadcast. Projects in subsequent years could include underwater broadcasts.

4.3.5 INFORMATION SHARING

The sharing of information with other institutions and scholars, as well as the general public, is a valuable outreach tool in itself. Moreover, such data sharing can facilitate the multidisciplinary emphasis inherent in the directives of the Monument Management Plan.

PMNM SPATIAL BIBLIOGRAPHY

The Monument's spatial bibliography (available at <http://www.pmnmmims.org>) is an invaluable tool for students, scholars, and research managers alike. Using state-of-the-art GIS technology, the bibliography allows the user to search for bibliographic information tied to specific locations in the NWHI.

Currently, the spatial bibliography is populated primarily with natural resource data and literature. The database will be expanded to include maritime heritage and historical literature, greatly increasing the availability of such information to a wide range of users. This process should begin before 2012.

Students in a Nautical Archaeology Society course learn maritime archaeology mapping and documentation techniques (NOAA/Kelly Gleason).



OFFICE OF HAWAIIAN AFFAIRS GIS DATABASE

Greater collaboration between PMNM Maritime Heritage GIS database projects and OHA's GIS database will assist both programs in their efforts to inventory and understand the archaeological resource base. OHA's GIS database falls under the Research: Land, Culture, and History division, and holds the potential for collaborative efforts and information sharing. Student projects may also be developed to contribute data to both of these ongoing GIS database projects. OHA's GIS database may also be an important tool for collaborating on the development of the Monument's Maritime Cultural Landscape study.

BATTLE OF MIDWAY DATABASE

In 2009, NOAA and FWS initiated a collaborative project to build a database integrating terrestrial and marine sites associated with the Battle of Midway. The completion of an interactive Battle of Midway map based in a GIS environment will have utility not only for resource managers but also as a tool for public interpretation. This map will be modeled on extant interactive shipwreck maps, and it is intended to be completed and available by June 2012.

4.3.6 MARITIME HERITAGE EDUCATION

NAVIGATING CHANGE

Navigating Change is an educational and environmental stewardship program that integrates traditional knowledge with western science to inspire the next generation of conservation leaders. The curriculum as it is currently developed focuses on grades 4–5. However, the program holds tremendous potential for expansion to a broader age range and a wider scope.

More collaboration between the Navigating Change and maritime heritage programs would broaden the scope of both, adding to the connection between natural and cultural history. Beginning in 2012, maritime heritage staff will collaborate with Navigating Change to develop a career development program targeting grades 6–12 and a professional development program aimed at teachers.

CAREER DEVELOPMENT AND PATHWAYS TO THE FUTURE

As PMNM's Navigating Change Program works to broaden its target audience to include middle school, high school, and professional development programs, collaborations have begun between the Monument's Navigating Change Coordinator and the Monument's Maritime Heritage Coordinator. Beginning with a pilot project in early 2012, PMNM's Maritime Heritage Coordinator will lead a 2-day career development workshop for 30 8th and 9th graders. Beginning with a target demographic of young women, the workshop will seek to connect dynamic women working in the Hawaiian Islands community in the

field of conservation with these 30 young women. Through hands-on, experiential learning led by local experts in their respective fields, the young women will have the opportunity to develop personal and professional relationships with women working in the conservation field, and become linked to a network of women working in both marine and terrestrial conservation in Hawai'i. Utilizing place-based learning, the workshop will facilitate the opportunity for career inspiration; network development; and assistance with future volunteer, internship, and job opportunities in the local community. The workshop will include hands-on activities relative to maritime heritage, Polynesian voyaging and wayfinding, native plant restoration, and albatross and monk seal observation. The 2012 experience will serve as a pilot project for similar future workshops aimed at career development for middle school and high school students.

Hawai'i possesses a wealth of local resources to facilitate place-based learning activities, as well as the opportunity to connect young people to dynamic professionals in the field of marine and terrestrial conservation. PMNM's Maritime Heritage Program aspires to take the lead in developing connections between these two groups beginning with the 2012 workshop. Career development activities will include maritime heritage; however, through multidisciplinary activities, the programs will have relevance to a wide spectrum of interests and will appeal to a broad range of young people.

UNIVERSITY COLLABORATION, PROGRAMMING, AND PARTNERSHIPS

As referenced in earlier sections of the Heritage Plan, cooperative projects with students are a critical part of PMNM's Maritime Heritage Program. Ongoing efforts to conduct research in collaboration with graduate students are an important part of the MHP's growth, and undergraduate and graduate assistance in the field has been an invaluable source of support. Such partnerships currently exist on a case-by-case basis, and have piggybacked on the Monument's science partnership with the Hawai'i Institute of Marine Biology (HIMB). Future efforts to collaborate and develop partnerships with universities should begin with establishing ongoing programs to link both undergraduate and graduate students with MHP staff to conduct and assist with field and archival research. Classroom and special event lectures should be offered on a regular basis, and communication between maritime heritage staff and staff at Hawai'i Community Colleges, universities, and local museums can facilitate greater presence of maritime heritage in universities and colleges.

NATIVE HAWAIIAN HISTORY AND CULTURE

Native Hawaiian history and culture are the foundation for maritime heritage research in PMNM. More modern maritime heritage in the NWHI opens the door to the broader discussion about human activities in this region over the



Students in a Nautical Archaeology Society course learn maritime archaeology mapping and documentation techniques (NOAA/Kelly Gleason).



Kaylene Keller, LouAnn Spuelda-Drews, and Kelly Gleason conduct terrestrial surveys of Battle of Midway sites at Midway Atoll in 2009 (NOAA).

millennia. The earliest seafarers set the stage for a continued exploration that continues to the present day. Archaeological and natural resource findings continue to make PMNM a remarkable place for discovery and exploration.

Challenges to the development of the continuum between early Polynesian voyaging and more recent maritime heritage activities in the Monument include the lack of material culture relative to Polynesian seafaring in PMNM. Despite few submerged maritime cultural resources discovered in the Monument relative to Native Hawaiian activities, oral histories and chants telling the stories of a seafaring legacy still exist. Western seafaring activities such as whaling had major implications for the Hawaiian people, with up to 1,000 Native Hawaiian sailors shipping out annually by the mid-nineteenth century. Weaving together multiple elements of seafaring heritage in the Monument helps us to recognize that more modern maritime heritage is part of a much longer story of navigation and seafaring. Through a constant effort to integrate a maritime heritage approach that views the NWHI through a cultural lens, the MHP can help focus attention to key strategies in the Monument Management Plan's Native Hawaiian Culture and History Action Plan, including capacity building, education, and outreach.

Additional efforts to expand collaboration between Native Hawaiian and maritime heritage researchers should be developed through cooperative multidisciplinary field projects during maritime heritage research expeditions to Papahānaumokuākea. These expeditions offer an invaluable opportunity for knowledge sharing and may provide further insight into opportunities to initiate projects that focus on the continuity of seafaring and exploration in the NWHI.



“Our duty is to use the land and seas wisely, or sometimes not use them at all. Good stewardship of the environment is not just a personal responsibility, it is a public value.”

PRESIDENT GEORGE W. BUSH

CHAPTER FIVE

Management

5.1 Goals

The Heritage Plan is linked to the Monument Management Plan through the critical roles that maritime heritage plays in effective management of the Monument. It is also an important component of management-driven research conducted in the Monument. Implementation of this plan is the responsibility of the Monument’s Maritime Heritage Coordinator. It is intended to function as a flexible guide for the MHP. Strategy MH-3 (below) of the Maritime Heritage Action Plan establishes guidelines for maritime heritage management.

STRATEGY MH-3: Coordinate interagency efforts to protect maritime heritage resources for the life of the plan.

Because of NOAA’s previous maritime heritage work in the region, efforts to inventory, evaluate, interpret, and preserve maritime heritage resources in the NWHI will be coordinated by a staff maritime archaeologist through ONMS, and conducted in close collaboration and coordination with the MMB. Each program or agency provides expertise in related fields: maritime archaeology field survey (NOAA); museum program, terrestrial archaeology, and National Historic Preservation Act (NHPA) implementation (FWS); and state survey, inventory, and preservation (Department of Land and Natural Resources).

Activity MH-3.1: Coordinate interagency maritime heritage resources management annually. Communication by the MMB with heritage preservation efforts on a larger scale is essential. Communication involves sharing research and preservation efforts in the Monument with the related professional fields of archaeology and cultural resource management, among others. Coordination of field activities is also necessary for the more effective use of facilities and equipment. Efforts to collaborate and coordinate will occur annually for the duration of the plan.

OPPOSITE Kelly Gleason takes a closer look at whaling harpoon tips at the *Two Brothers* shipwreck site at French Frigate Shoals (NOAA/Greg McFall).

Activity MH-3.2: Enhance protective measures for selected sites within the NWHI through the National Register nomination process within 2 years. Protection of specific heritage sites will be enhanced by federal recognition under the National Historic Preservation Act and the National Register of Historic Places (Delgado 1985). Additionally, preservation measures of the Department of Land and Natural Resources will be implemented for resources on state submerged lands (up to 3 nautical miles from emergent lands) via the State Historic Preservation Division. Protective status for specific sites will be sought as needed using measures described above. This activity includes potential support for the protection and preservation of Native Hawaiian cultural resources discussed in the Native Hawaiian Culture and History Action Plan (Section 3.1.2). The National Register nomination process for maritime heritage sites will begin by year 2.

Activity MH-3.3: Develop and implement a Monument Maritime Heritage Research Plan within 2 years. The Monument Maritime Heritage Resource Research Plan will be completed within 2 years. Working collaboratively with partner and local agencies, universities, and experts in the field, the MMB will develop a research plan that outlines maritime heritage priorities for the NWHI. This effort will be coordinated by the Monument maritime archaeologist.

5.2 Context



Jason Raupp takes a measurement and bearing at a trypot at the *Two Brothers* shipwreck site (NOAA/Tane Casserley).

Over the last 30 years, the management of maritime heritage resources has evolved through the advent of several exemplary projects, the passage of legislation pertaining to shipwreck management, and the growing support of the American public to the values of conservation. The ethical treatment of artifacts and the public accessibility to sites have been subjects of considerable debate. However, even while this debate continues, several programs have attempted to manage public access in a sustainable way. Active programs in Maryland, the Great Lakes, Scotland, Florida, and Lake Champlain, among others, demonstrate the success and feasibility of shipwreck preserves (Spirek and Scott-Ireton 2003). Both Thunder Bay National Marine Sanctuary in Michigan and the Monitor National Marine Sanctuary in Virginia highlight the potential for special areas protected for their heritage significance.

As an agency charged with management of the Monument, ONMS is responsible for managing maritime heritage resources, such as shipwreck sites, in accordance with the body of laws pertaining to maritime heritage resources (a detailed overview of these laws is provided in Appendix B).

Legislation pertaining to submerged cultural resources has evolved over the last four decades. The passage of the National Historic Preservation Act (NHPA) in 1966 marked a significant effort by the federal government to protect the na-

tion's cultural and archaeological heritage. The NHPA established the responsibility of federal agencies to protect cultural resources on public lands under their jurisdiction.

The Marine Protection, Research, and Sanctuaries Act of 1972 was passed to curb uncontrolled dumping in the marine environment; more importantly for the purposes of maritime cultural resources, it established a mechanism to create a system of National Marine Sanctuaries under the jurisdiction of NOAA (National Marine Sanctuaries 2005). The Civil War ironclad USS *Monitor* was designated as the first National Marine Sanctuary in 1975 when the federal government became aware of its vulnerability to environmental and anthropogenic factors (Terrell 1995).

These actions were followed by passage of the Archaeological and Historical Preservation Act of 1974, the Archaeological Resources Protection Act of 1979, and the Abandoned Shipwreck Act of 1987, all under the guidance of the National Park Service (Lipe and Redman 2003). Passage of the Abandoned Shipwreck Act in 1987 was an important step in establishing guidance for state and federal agencies regarding the effective management of shipwreck sites. However, its effectiveness is only as good as local interest in managing the resources in the area.

As the newest piece of legislation pertaining to shipwreck sites, the Sunken Military Craft Act, which became effective in 2004, does not change law but ensures its uniform application and encourages reciprocal enforcement and protection by foreign sovereigns (Naval Historical Center 2006). The Property Clause of the United States Constitution states the government's continuous and indefinite ownership of United States military craft, sunken or otherwise. This legislation has had limited enforcement, and the Sunken Military Craft Act extends the case law to address all cases concerning sunken military craft. By clearly stating United States policy relative to sunken craft in foreign waters, the United States indicates that it will likewise reciprocate expressions of sovereign intent. It specifically applies to warships such as USS *Saginarw* and other military craft in the NWHI and provides guidelines for dealing with the sovereign immunity of sunken military sites.

At the international level, in November 2001, UNESCO's *Convention on the Protection of the Underwater Cultural Heritage* argued for the importance of underwater cultural heritage as "an integral part of the cultural heritage of humanity and a particularly important element in the history of peoples, nations, and their relations with each other concerning their common heritage." UNESCO acknowledged underwater heritage management as an international issue



Filmmaker John Brooks documents the bow section of the USS *Macaw* shipwreck site at Midway Atoll (NOAA/Robert Schwemmer).

and outlined definitions, goals, and objectives of the proper principles of such management. The Convention emphasized the importance of the public's right to non-intrusive access to *in situ* sites (i.e., resources that remain in place on the seafloor) and the necessity for stronger measures to protect threatened sites. Additionally, the Convention addressed the issue of commercial exploitation of submerged sites, as well as the illegal trafficking of their artifacts. Most importantly, the Convention aimed to promote cooperation and establish the necessity of proper site management and protection (O'Keefe et al. 1999). Guidelines set forth in the November 2001 Convention constituted an internationally approved "best practice" approach to submerged cultural resource management—an excellent example of current best practices in the field of maritime archaeology, with much consideration given to many different stakeholder groups.

NOAA, the State, and FWS collectively have the statutory responsibility to inventory, evaluate, and interpret maritime heritage resources; to increase maritime heritage preservation in the Monument; and to foster awareness of these precious resources throughout the state and nation. It is the shared responsibility

of these entities to mitigate potential impacts on maritime heritage resources. Unlike many natural resources, maritime heritage resources are nonrenewable: once lost, they are gone forever.

The main Hawaiian Islands have experienced the illegal removal of historic artifacts, as well as the potential destruction of historic materials from nearshore construction and dredging projects. However, because of the extensive protections afforded PMNM through its designations as a Coral Reef Ecosystem Reserve, National Wildlife Refuge, Marine National Monument, and World Heritage Site, human impacts on archaeological sites are minimal to nonexistent in the NWHI.

To the contrary, the environment poses the greatest threat of degradation of maritime heritage sites in the NWHI. Strong winter storms and swells often wash over the low-lying atolls and islands north of Nihoa and Mokumanamana, and conditions are variable even during the workable summer months (roughly April through October). Sites on the fore-reef can be heavily pounded by waves and surges year-round, and sands shift seasonally, covering and exposing artifacts and portions of sites. Maritime archaeologists have observed artifacts as large as a trypot (a large iron cauldron about 1 meter wide by 1 meter tall) exposed on the reef one year and broken apart by the next field season. Coralline algae begin to grow around artifacts and features, at times enveloping some sites. The dynamic conditions in the NWHI challenge documentation and interpretation of these sites. The resources' vulnerability to the elements and the intensity of the conditions in the NWHI make inventory, documentation, and protection of these sites particularly urgent.

While maritime heritage sites in the NWHI may at one time have been protected by their remoteness, improved tourist infrastructure at Midway Atoll and the presence of scientific divers throughout the Monument is changing this circumstance. Although access is limited by permit, tourists can visit sites at Midway Atoll, where "recreational permits" are granted. Recreational activities have included diving trips facilitated by the Oceanic Institute. Though such excursions are guided by skilled divemasters, they do not include maritime archaeologists or historical experts. Recreational activities offer a tremendous opportunity for public outreach and engagement, but they also increase the risk of human impact. Moreover, because maritime heritage sites are frequently integrated into the fragile ecosystems around coastal environments, they are environmentally as well as historically significant (Oxley 2001). If not properly educated and aware, visitors have the potential to damage both the historical and ecological integrity of maritime heritage sites and their surrounding environment. These threats emphasize the critical need for education and outreach.

Unlike many natural resources, maritime heritage resources are nonrenewable: once lost, they are gone forever.

Access to the Monument is restricted and regulated through the issuance of permits. Entities proposing research and monitoring activities must be able to demonstrate that they meet specific criteria codified in 50 CFR 404.11 to obtain a permit, as well as meeting applicable criteria provided by relevant state statutes and regulations.

Nevertheless, despite the protection afforded to NWHI sites by their isolation, that same isolation impedes thorough enforcement, and access is challenging even for managers and maritime archaeologists. The threats that do exist—environmental damage and the risks associated with increased visitation—can be mitigated through proper management and monitoring following thorough documentation.

5.3 Prioritized Actions

5.3.1 LISTING IN THE NATIONAL REGISTER OF HISTORIC PLACES

The NRHP is “the official list of the Nation’s historic places worthy of preservation” (National Park Service 2011). The Monument’s Maritime Heritage Action Plan calls for nominating eligible maritime heritage sites for inclusion in the NRHP to enhance their protection through this federal recognition of their significance. Although Nihoa and Mokumanamana Islands are listed in the NRHP as archaeological districts on the basis of the 141 terrestrial archaeological sites identified there, to date no maritime heritage sites have been nominated for inclusion, although several (*Two Brothers*, *USS Saginaw*, *Pearl*, *Hermes*, *USS Macaw*, and *Dunnottar Castle*) are likely candidates under various criteria. Midway’s terrestrial sites have all been determined eligible but have not been listed in the NRHP. There are currently six structures that were designated National Historic Landmarks in 1986.

High priority should be placed on nominating at least one site annually, beginning with the *Two Brothers* shipwreck site in 2011.

5.3.2 MONITORING MARITIME HERITAGE SITES AND RESOURCES

Shipwrecks present the singular challenge of being nonrenewable resources that have become integrated into the environment, often as important habitat for fish and other marine organisms. Consequently, anthropogenic influences—removal or disturbance—as well as natural degradation may have biologically meaningful implications for the surrounding environment. Moreover, in cases

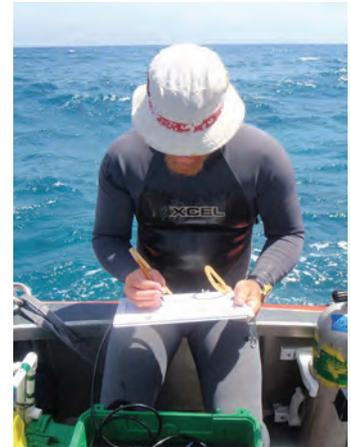
where tourist visitation is allowed or encouraged, such visitation can have profound effects on fragile reef ecosystems (Rogers et al. 1988; Hawkins and Roberts 1993).

Managers rarely have the resources or time to properly monitor all maritime heritage sites in their jurisdiction. In many cases, maritime heritage sites are threatened from the moment of discovery; without careful management, they may vanish entirely. Monitoring provides the information necessary to adjust the protection of a given site to a level commensurate with its vulnerability. Consequently, it is irresponsible to omit a monitoring strategy from any long-term management program.

A widespread acceptance among the archaeological community of *in situ* management as the preferred approach for shipwreck sites emphasizes the importance of regular monitoring strategies (O’Keefe 2002). *In situ* management implies long-term responsibility for individual sites’ sustainability and stewardship; this responsibility must be enforced by proper attention to any changes in site integrity. Because *in situ* management acknowledges a relationship between a shipwreck and its environment, monitoring habitat variation at a heritage site can be a useful approach to assessing potential impacts on the heritage resource. Monitoring can also highlight the intrinsic link between heritage sites and the natural environment.

The collection of measurable environmental data at a shipwreck site provides more precise and quantitative information than subjective visual assessments. Such data are invaluable in understanding the mechanisms by which historical shipwreck sites become habitat. Environmental data are also useful to managers and scientists concerned with other resources in the shipwreck site vicinity. However, most studies of shipwreck sites in an environmental context have focused on ships’ cargoes and their potentially hazardous effects on the ecosystem (Helton 2003b) or on the impacts of ships grounding on coral reefs (Maragos and Burgett 1994). While such studies are important to minimize the threats shipwreck sites can pose for coral reefs and associated marine species, more work is needed to develop a meaningful approach for analyzing the interaction between maritime heritage sites and their surroundings. Accordingly, monitoring efforts should gather biological data in addition to observations on the condition of artifacts and structural integrity of the ship.

Monitoring plans for shipwreck sites are often descriptive, omitting annual monitoring for biological factors. Parks Canada’s current monitoring strategies for historic shipwrecks in Louisbourg, Nova Scotia, reflect efforts at integrating a wide variety of data and a plan for regular monitoring, but no analogous pro-



Derek Smith collects data with a YSI meter at Pearl and Hermes Atoll (NOAA/Kelly Gleason).



Maritime archaeologists consult with Kure Atoll Refuge Manager Cynthia Vanderlip (NOAA/Robert Schwemmer).

gram has been developed for shipwreck sites in the United States. The monitoring program for one of Louisbourg's shipwrecks, *Célèbre*, addresses environmental influence, degree of degradation, corrosion of metals at the site, shipworm damage, and human influence; it is an excellent example of interdisciplinary monitoring (Stevens 2003).

The 2009 survey described in Chapter 3—which focused on supporting Derek Smith's graduate work to assess the biological implications of wreck sites—helped to establish an important baseline dataset to advance such interdisciplinary monitoring efforts in the future (Smith 2010). Such a baseline anchors the heritage site within the context of the ecosystem, and will facilitate a more comprehensive appreciation of how the site interacts with the natural environment. This growing body of knowledge will help inform the investigation of such issues as the effects of climate change on heritage sites.

In addition to yielding the important benefits discussed above, the sharing of data that are relevant to multiple disciplines supports collaborative efforts and can increase the potential for funding and stewardship.

5.3.3 DATA MANAGEMENT AND GIS

GIS has been a critical data management tool for the MHP. Because so many sites encompass hundreds of square meters, it is the best tool for developing site maps and analyzing spatial information. GIS is also a valuable tool for visualizing the interplay of data layers that reflect heritage, history, culture, and nature—and precisely how this interplay creates the broad cultural landscape of Papahānaumokuākea.

GIS helps maritime archaeologists manage resources throughout the vast extent of the Monument. In collaboration with the Monument’s GIS and Information Management team, the maritime heritage staff identified a need to develop a system that could be used to target areas to search for sites, catalog and visualize information about sites, and provide outreach material to the public. A combination of field methods, GIS, and web-based tools has been developed to meet this need.

In addition to the value of GIS for boat drivers and coxswains who take the maritime archaeology team to specific sites in the field, GIS maps are critical for nightly planning while at sea. Utilizing GIS and historic documents, the archaeology team can focus the search area for historic wreck sites. A combination of diver surveys and remote sensing is used to locate the sites and document artifacts. Once site documentation is complete, the team uses desktop-based tools for data entry. The GIS software also allows pictures of specific artifacts and features to be linked to their records in the database, providing researchers and managers with a useful picture of how individual artifacts are distributed. Users can search by type, time period, and various other attributes to better refine database queries.

In addition to its utility as a management tool, the GIS database has tremendous promise for public interpretation of maritime heritage sites. Outreach material and reports can be generated from the database and the web tools. The spatial bibliography can be shared with other agencies and institutions to facilitate research, and a searchable database of sites can be made available for public use. One advantage of a broad GIS library is that certain kinds of information can be made available for general use while other categories are accessible only to approved entities or individuals. The ongoing development of a robust information management system will strengthen every aspect of Monument management.



“No longer do we seek only the knowledge of how to voyage between islands. We seek lessons to carry home to our children—ways to inspire the present generation to love and preserve our Earth as a sanctuary for those who will inherit it.”

NAINOA THOMPSON, MASTER HAWAIIAN NAVIGATOR

CHAPTER SIX

Implementation

Maritime heritage is an inclusive topic—one that is both multicultural and multidisciplinary. The overarching goal of the Heritage Plan is to develop a framework for the future direction of the MHP that will expand the current definition of maritime heritage and work toward better integration with the Monument’s Native Hawaiian and natural science programs.

The deeply held regional interest in the management of protected marine areas creates a fertile environment for interdisciplinary activities. While the preponderance of attention is on natural resources, interdisciplinary projects can serve to highlight the ethic of stewardship that preserves natural, cultural, and maritime heritage resources alike. Collaboration among these fields is the most far-reaching and effective approach to management and protection.

With limited staff available for research, it is important that the Monument develop partnerships with universities, agencies, and other organizations to address the vast potential for maritime heritage research in the NWHI. PMNM has already established a history of pursuing and fostering productive collaborative efforts. Graduate students from the University of Hawai‘i, Flinders University in Australia, East Carolina University, and Southampton University in the United Kingdom have all conducted research involving maritime heritage resources in the Monument.

Numerous individuals have dedicated their time and effort to researching maritime heritage stories in PMNM. These include Clark Conger, who generously devoted time and energy to further investigating the history and wrecking event of the Oregon-built four-masted schooner *Churchill*, lost at French Frigate Shoals in 1917. Pete Hendricks continues to communicate research on

OPPOSITE Sooty terns at Kure Atoll (Wayne Levin).



ABOVE Jason Kehn and Michael Krivor of SEARCH, Inc., collect sonar and magnetometer data in the NWHI in 2010 (NOAA/Kelly Gleason).

RIGHT A zodiac maneuvers through the lagoon at Pearl and Hermes Atoll (NOAA/Kelly Gleason).



the whaling ships *Pearl* and *Hermes* to maritime heritage staff, and Ken Sexton continues to conduct extensive archival research on the whaler *Gledstanes*. These individuals are all invaluable sources of support and assistance in the broad effort to interpret the maritime history of PMNM.

The Monument has also collaborated with partners such as NPS, FWS, and the State in maritime heritage efforts. NMFS has long been a partner in efforts to locate maritime heritage resources; CRED divers and scientists involved in ecological monitoring projects and removal of marine debris have abundant opportunity to spot maritime heritage sites in areas that archaeologists might not have the chance to visit. Indeed, following outreach efforts to educate the marine debris team about potential sites and how to spot them, divers have reported several such sites to maritime heritage staff. Similarly, *Hiʻialakai* crew members log many hours at sea, not always in the company of maritime archaeologists. In 2006, PMNM maritime heritage staff conducted a 2-day Nautical Archaeology Society course to educate the ship's crew about maritime archaeology and what to do if they encounter a site with no maritime archaeologist present.

Collaborations with local partners are essential in building close ties with the local community. The Monument has established and will continue to strengthen relationships with the Polynesian Voyaging Society, the Waikiki Aquarium, The Nature Conservancy, and others. At the same time, more far-reaching partnerships bear valuable fruit—for example, communities around the country, such as New Bedford and Nantucket, Massachusetts, and Saginaw, Michigan, have

strong historical ties to the maritime heritage of the Monument. And because of PMNM's importance as a World Heritage Site, broad connections will remain invaluable in promoting the global significance of the Monument's maritime heritage resources. Nurturing these existing relationships and developing new ones will remain critical to building the Maritime Heritage Program on a sustainable basis.

The Monument's ongoing efforts to inventory, document, and protect its maritime heritage sites have been instrumental in opening a window into the NWHI's seafaring past, and they have contributed materially to a growing body of knowledge about humans' historical interaction with the sea. Using the cultural landscape (or seascape) approach to examine the broad themes of human presence in the NWHI—exploration, whaling, the age of sail, and military history—as well as investigating the young science of historical ecology, maritime heritage staff will continue adding to this precious store of knowledge. Moreover, through the many and varied collaborations that have already been created and the many more that await fruition, Monument staff will find new and captivating techniques for bringing the stories of the past to the attention of present—and future—enthusiasts. By embracing a holistic, multidisciplinary approach to research, management, and outreach, Monument staff will create bridges between fields of endeavor—maritime heritage, terrestrial archaeology, natural resources, and Native Hawaiian culture—that have traditionally been treated separately.

The Monument's ongoing efforts to inventory, document, and protect its maritime heritage sites have been instrumental in opening a window into the NWHI's seafaring past, and they have contributed materially to a growing body of knowledge about humans' historical interaction with the sea.

Aerial view of Kure Atoll (Robert Shallenberger).



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APPENDIX A

Maritime Heritage Resources

This appendix aims to list all the resource sites—marine vessels and aircraft—that have been reported lost in the Papahānaumokuākea Marine National Monument. Of 126 potential losses, 20 historic maritime heritage sites have been confirmed. Archival research and inventory is ongoing, and continues to develop and change as corrections are made and discoveries are added.

<i>Vessel Name</i>	<i>Type</i>	<i>Date Lost</i>	<i>Information Source</i>	<i>Site Confirmed?</i>
KURE ATOLL				
Gledstanes	whaler	1837	site work 2008	yes
<i>Parker</i>	whaler	1842	site work 2003–06	yes
USS <i>Saginarw</i>	navy gunboat	1870	site work 2003–06	yes
<i>Dunnottar Castle</i>	ship	1886	site work 2006–08	yes
<i>Hachinobe Maru</i>	trawler	1938	documents	
<i>Houei Maru #5</i>	trawler	1976	site work 2002–06	yes*
<i>Paradise Queen II</i>	fishing vessel	1998	site work 2003	yes*
F4U-1 Corsair	naval aircraft	1945	site work 2002	yes
F4U-1 Corsair	naval aircraft	1945	documents	
—	Japanese junk	—	documents	
—	fishing vessel	—	site work 2002	yes*
<i>Isaac Holder</i>	ship	—	documents	
MIDWAY ATOLL				
<i>General Seigel</i>	schooner	1886	documents	
<i>Wandering Minstrel</i>	bark	1888	documents	
<i>Julia E. Whalen</i>	schooner	1903	documents	
<i>Carrollton</i>	bark	1906	site work 2003	yes
<i>Helene</i>	sloop	1915	documents	
Fishing vessel	sampan	1925	documents	
USS <i>Macaw</i>	sub rescue vessel	1944	site work 2003	yes
—	water barge	1957	site work 2003	yes
LCVP	navy landing craft	—	site work 2002	yes
<i>Nightingale</i>	fishing vessel	1983	documents	
—	navy barge	—	site work 2002	yes
F4U Corsair	naval aircraft	—	site work 2002–08	yes
PM-1	naval aircraft	1935	documents	
PBY-5 Catalina	naval aircraft	1941	documents	

<i>Vessel Name</i>	<i>Type</i>	<i>Date Lost</i>	<i>Information Source</i>	<i>Site Confirmed?</i>
MIDWAY ATOLL (CONTINUED)				
F2A-3 Buffalo	naval aircraft	1942	documents	
H8/K1 Kawanishi	naval aircraft	1942	documents	
SOC-2 Seagull	naval aircraft	1942	documents	
SBD-3 Dauntless	naval aircraft	1942	documents	
B5/N2 Nakajima	naval aircraft	1942	documents	
B5/N2 Nakajima	naval aircraft	1942	documents	
B5/N2 Nakajima	naval aircraft	1942	documents	
B5/N2 Nakajima	naval aircraft	1942	documents	
B5/N2 Nakajima	naval aircraft	1942	documents	
B3/A1 Aichi	naval aircraft	1942	documents	
A6/M2 Mitsubishi	naval aircraft	1942	documents	
A6/M2 Mitsubishi	naval aircraft	1942	documents	
A6/M2 Mitsubishi	naval aircraft	1942	documents	
F2A-3 Buffalo	naval aircraft	1942	documents	
F2A-3 Buffalo	naval aircraft	1942	documents	
F2A-3 Buffalo	naval aircraft	1942	documents	
Sb2U-3 Vindicator	naval aircraft	1942	documents	
Sb2U-3 Vindicator	naval aircraft	1942	documents	
Sb2U-3 Vindicator	naval aircraft	1942	documents	
Sb2U-3 Vindicator	naval aircraft	1942	documents	
Sb2U-3 Vindicator	naval aircraft	1942	documents	
Sb2U-3 Vindicator	naval aircraft	1942	documents	
SBD-3 Dauntless	naval aircraft	1942	documents	
SBD-3 Dauntless	naval aircraft	1942	documents	
SBD-3 Dauntless	naval aircraft	1942	documents	
SBD-3 Dauntless	naval aircraft	1942	documents	
PBY-5 Catalina	naval aircraft	1942	documents	
SBD-2 Dauntless	naval aircraft	1942	documents	
SBD-2 Dauntless	naval aircraft	1942	documents	
B-17E Flying Fortress	army aircraft	1942	documents	
P-40B Warhawk	army aircraft	1942	documents	
SBD-3 Dauntless	naval aircraft	1942	documents	
SBD-3 Dauntless	naval aircraft	1942	documents	
SBD-3 Dauntless	naval aircraft	1942	documents	
SBD-4 Dauntless	naval aircraft	1943	documents	
F4U-1 Corsair	naval aircraft	1943	documents	
F4U-1 Corsair	naval aircraft	1943	documents	
F4U-1 Corsair	naval aircraft	1943	documents	
SBD-3 Dauntless	naval aircraft	1943	documents	
F4U-1 Corsair	naval aircraft	1943	documents	

<i>Vessel Name</i>	<i>Type</i>	<i>Date Lost</i>	<i>Information Source</i>	<i>Site Confirmed?</i>
MIDWAY ATOLL (CONTINUED)				
F4U-1 Corsair	naval aircraft	1943	documents	
F4U-1 Corsair	naval aircraft	1943	documents	
F4U-1 Corsair	naval aircraft	1943	documents	
SBD-5 Dauntless	naval aircraft	1943	documents	
SBD-5 Dauntless	naval aircraft	1943	documents	
PV-1 Ventura	naval aircraft	1943	documents	
F4U-1 Corsair	naval aircraft	1943	documents	
F4U-1 Corsair	naval aircraft	1943	documents	
F4U-1 Corsair	naval aircraft	1944	documents	
SBD-4 Dauntless	naval aircraft	1944	documents	
F4U-1 Corsair	naval aircraft	1944	documents	
PBY-5 Catalina	naval aircraft	1944	documents	
SBD-5 Dauntless	naval aircraft	1944	documents	
F4U-1 Corsair	naval aircraft	1944	documents	
SNJ-4 Texan	naval aircraft	1944	documents	
PBY-5A Catalina	naval aircraft	1944	documents	
J2F-4 Duck	naval aircraft	1944	documents	
SB2C-3 Helldiver	naval aircraft	1944	documents	
PV-1 Ventura	naval aircraft	1945	documents	
FG-1A Corsair	naval aircraft	1945	documents	
PEARL AND HERMES ATOLL				
<i>Pearl</i>	whaler	1822	site work 2004–06	yes
<i>Hermes</i>	whaler	1822	site work 2004–08	yes
<i>Waji Maru</i>	schooner	1904	documents	
—	sampan	1908	documents	
<i>Quartette</i>	liberty ship	1952	site work 2002–10	yes
<i>Good Friends</i>	sloop	1976	documents	
—	fishing vessel	—	site work 2006	yes*
<i>Mimi</i>	fishing vessel	1989	site work 2005	yes*
LISIANSKI ISLAND				
<i>Holder Borden</i>	whaler	1844	documents	
<i>Konohasset</i>	whaler	1846	documents	
<i>Wanderer</i>	brig	1872	documents	
<i>Afton</i>	bark	1887	documents	
<i>Aju (Yeiji) Maru</i>	schooner	1904	documents	
—	sampan	pre-1923	documents	
—	—	pre-1923	documents	
—	—	pre-1923	documents	
<i>Irene's Challenge</i>	fishing vessel	1977	documents	

<i>Vessel Name</i>	<i>Type</i>	<i>Date Lost</i>	<i>Information Source</i>	<i>Site Confirmed?</i>
LISIANSKI ISLAND (CONTINUED)				
Unknown	sailing vessel	pre-1920	site work 2010	yes
Unknown	anchor	pre-1900	site work 2010	yes**
Unknown	fishing vessel	—	site work 2010	yes*
LAYSAN ISLAND				
<i>Ceylon</i>	bark	1902	documents	
<i>C Kennedy</i>	schooner	1905	documents	
<i>Kaiyo Maru #25</i>	fishing vessel	1959	site work 2002	yes
—	bamboo raft	—	site work 2002	yes**
—	anchors and debris	—	site work 2002	yes**
—	whaler	pre-1859	documents	
MARO REEF				
<i>McNear</i>	bark	1900	documents	
<i>O.M. Kellogg</i>	schooner	1915	documents	
<i>Mission San Miguel</i>	tanker	1957	documents	
FRENCH FRIGATE SHOALS				
<i>South Seaman</i>	whaler	1859		
<i>Daniel Wood</i>	whaler	1867	documents	
<i>Mattie Dyer</i>	schooner	1896	NMFS/CRED 2005	yes
<i>Conetable de Richmond</i>	ship	1903	documents	
<i>Churchill</i>	schooner	1917	NMFS/CRED 2005, site work 2007–2008	yes
YP-277	converted trawler	1942	documents	
<i>Keola</i>	fishing vessel	1981	documents	
<i>Carolyn K</i>	fishing vessel	1985	documents	
Landing craft	LCM	unknown	site work 2003–05	yes
<i>Two Brothers</i>	whaler	1822	site work 2008–10	yes
MOKUMANAMANA ISLAND				
PBM-5 Privateer	naval aircraft	1945	documents	

* Not considered a historic site (over 50 years old for the purposes of this inventory).

** Considered an artifact, rather than a site, for the purposes of this inventory.

State and Federal Preservation Mandates

The following statutes and legislation may pertain to the survey and protection of maritime heritage resources in the NWHI.

<i>Statute/Legislation</i>	<i>Description</i>
Hawaii Revised Statutes Chapter 6E (Historic Preservation) http://www.hawaii.gov/dlnr/hpd/hrs_6_e.htm	Establishes protection and management of submerged cultural, archaeological and historic properties older than 50 years on state lands (including aviation properties) under the Department of Land and Natural Resources.
National Historic Preservation Act of 1966 (16 USC 470) http://www.cr.nps.gov/local-law/nhpa1966.htm	Provides the mandate for federal agencies to survey, inventory, assess, and nominate to the National Register cultural, archaeological, and historical resources in federally managed waters. Section 106 requires federal agencies to take into account the affect of any federal undertaking on historic structures and properties. Section 110 makes federal agencies responsible for the preservation of historic properties which are owned or controlled by that agency.
Archaeological Resources Protection Act of 1979 (16 USC 470aa) (ARPA) http://exchanges.state.gov/culprop/96-95.html	Established “to secure, for the present and future benefit of the American people, the protection of archaeological resources and sites which are on public lands and Indian lands, and to foster increased cooperation and exchange of information between governmental authorities, the professional archaeological community, and private individuals.”
National Register of Historic Places (36 CFR 60) http://www.nationalregisterofhistoricplaces.com	Part of a national program to coordinate and support public and private efforts to identify, evaluate, and protect our historic and archeological resources. Properties listed in the Register include districts, sites, buildings, structures, and objects that are significant in American history, architecture, archeology, engineering, and culture. The National Register is administered by the National Park Service.
Abandoned Shipwreck Act of 1987 (43 USC 2101) http://www.nps.gov/phso/archeology/ABSA.htm	Asserts federal title to three categories of abandoned shipwrecks in or on state submerged land, and transfers that title to the state or territory for preservation and management efforts.
Sunken Military Craft Act of 2004 http://www.history.navy.mil/branches/org12-12a.htm	Provides for the protection of sunken U.S. military ship and aircraft sites wherever they are located, as well as the protection of sensitive archaeological artifacts.
Antiquities Act of 1906 (16 USC 433) http://www.cr.nps.gov/history/hisnps/npsbhistory/antiq.htm	Passed to protect cultural properties and sites from damage and intentional destruction and to bring them within the preservation management of the federal government.



Papahānaumokuākea Marine National Monument is the single largest conservation area under the U.S. flag, and one of the largest marine conservation areas in the world. It encompasses 139,797 square miles of the Pacific Ocean (105,564 square nautical miles)—an area larger than all the country’s national parks combined.

The extensive coral reefs found in Papahānaumokuākea—truly the rainforests of the sea—are home to over 7,000 marine species, one quarter of which are found only in the Hawaiian Archipelago. Many of the islands and shallow water environments are important habitats for rare species such as the threatened green sea turtle and the endangered Hawaiian monk seal.

Papahānaumokuākea is also of great cultural importance to Native Hawaiians with significant cultural sites found on the islands of Nihoa and Mokumanamana.

Papahānaumokuākea boasts a rich maritime heritage encompassing hundreds of years of continuous seafaring, reaching back long before the advent of written records. Archival research indicates that there may be as many as 60 shipwreck sites and at least 61 aircraft sites in Monument waters. These sites provide a window through which we can better understand our collective seafaring past.

The Papahānaumokuākea Marine National Monument was created by Presidential proclamation on June 15, 2006.

