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How NOAA's Office of National Marine Sanctuaries engages the public in the ocean through the science and management of maritime heritage

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ABSTRACT

1. The US Office of National Marine Sanctuaries has a robust Maritime Heritage Program (MHP), now 13 years old.
2. MHP is a carefully created and managed part of an overall strategy to encourage ocean conservation and the creation of marine protected areas.
3. MHP utilizes a variety of strategies to engage the public, work collaboratively, and use the power of 'people stories' to connect a wide audience with the ocean.

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INTRODUCTION

NOAA's Office of National Marine Sanctuaries (ONMS) role as a United States federal agency managing submerged biological and archaeological resources had modest beginnings in the 1970s. The National Marine Sanctuaries Program was created within the equally new National Oceanic and Atmospheric Administration (NOAA) in 1972 under Title III of the Marine Protection, Research and Sanctuaries Act (now known more commonly as the National Marine Sanctuaries Act). Created to provide protection for special natural resources, the Act initially didn't expressly reference cultural resources such as submerged archaeological sites, inundated prehistoric sites, or historic shipwrecks.

However, after scientists from Duke University, the state of North Carolina and NOAA had located the remains of the Civil War ironclad USS *Monitor* in 230 feet of water 16 miles off the coast of North Carolina's Cape Hatteras questions were raised on how to protect it from looting and unwanted salvage. At that time, the site was in the high seas well outside the 3 nm US territorial and 12 nm contiguous zone (the US had asserted sovereign rights and jurisdiction over the

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continental shelf in 1945 and eventually extended control over the seas farther offshore in accord with other nations' practice and international law – a 200 nm EEZ in 1983, a 12 nm territorial sea in 1988, and a 24 nm contiguous zone in 1999 that expressly references jurisdiction over cultural heritage out to 24 nm). In 1973, realizing there was no federal law that could address this threat and offer comprehensive protection to this site, North Carolina Congressman Walter Jones Sr. recommended the application of the new sanctuary law to comprehensively protect and manage this important American historical landmark. The *Monitor* was designated as the first national marine sanctuary on 25 January 1975.

It is significant that in becoming the first National Marine Sanctuary (NMS), the wreck of USS *Monitor* was also viewed as an historical and archaeological resource. It was not until 1992, however, that these types of resources were officially written into the Act's reauthorization, highlighting their value and importance in protecting the nation's underwater cultural heritage. By 2015, the programme had grown to incorporate 14 marine protected areas, each one having legislation that allows for the protection of maritime heritage. As of the end of 2015, two new sanctuaries have been proposed for designation. Each of them is primarily a maritime heritage resource-focused site.

In 2002 the Director of ONMS, Daniel J. Basta, created the Maritime Heritage Program (MHP) to focus on and emphasize the many special values that heritage resources had to the American public, both for divers and non-divers. It was recognized that maritime heritage has a broad legacy that includes not only physical resources, such as historic shipwrecks and prehistoric archaeological sites, but also archival documents, oral histories, and traditional seafaring and ecological knowledge of indigenous cultures.

Maritime Heritage Coordinators were identified for each sanctuary while the national programme provided assets that were shared between headquarters and sanctuary site personnel. The coordinated system-wide approach gave assistance to various sites to begin surveying and identifying submerged resources, as well as reporting upon and interpreting their significance. This education and outreach ability helped the sites' communities to understand the rich heritage associated with the sea. Much of that work from 2002 to 2010 focused on surveys to locate and document historic shipwrecks, especially in the Great Lakes at Thunder Bay NMS, off the Massachusetts coast at Stellwagen Bank NMS, in California's Channel Islands NMS, in Florida at Florida Keys NMS, in the Pacific at Papahānaumokuākea Marine National Monument, and to a lesser extent at Olympic Coast NMS and Greater Farallones NMS on the Pacific Coast in Washington and California.

Other significant projects also undertaken that included exploration and documentation are RMS *Titanic*, Japanese 'midget submarines' lost in the attack on Pearl Harbor in 1941, the USS *Alligator* – an early US Navy submarine from the 19th century, the SS *Planter* found off South Carolina, another Civil War period ship intimately linked to African-American maritime history, whaling ships lost to the ice in the Arctic off the coast of Alaska, and World War II losses on both sides from the 'Battle of the Atlantic' off the coast of North Carolina in proximity to USS *Monitor* NMS.

The outcome of a 2011 workshop led MHP to shift its emphasis from a shipwreck-centred approach and adopt a 'maritime cultural landscape' approach to interpreting the overall maritime character of a sanctuary's region including Native American history and culture. This was informed, in part, by recommendations from the Department of the Interior (both the Bureau of Ocean Energy Management and the National Park Service) as well as NOAA's Marine Protected Area (MPA) Center's 'Recommendations for Integrated Management Using a Cultural Landscape Approach in the National MPA System' (Marine Protected Areas Federal Advisory Committee, MPA FAC, 2011). The cultural landscape approach serves several functions not previously addressed by the programme. It allows for the identification of the unique maritime culture of sanctuaries that were not previously known to contain submerged archaeological sites. It also permits sites to consider how historical populations confronted issues that still confound coastal communities such as climate change, environmental challenges (storm damage and erosion) and changes in available ocean resources (e.g. fisheries) (Barr, 2013; Terrell, 2014).

CHALLENGES AND OPPORTUNITIES

The discovery of submerged archaeological sites and historic shipwrecks has been accelerating over the past decades with the advancement of new technologies for ocean exploration and research. Technical mixed gas diving equipment and methods, including closed-circuit rebreathers, are technologies vastly superior to 19th century hard-hat surface-supplied diving apparatus. The new technologies offer improved mobility and efficiency, and provide access to a range of depths far beyond the standard open-circuit scuba limitation of 130 feet. Improved magnetometer and high-resolution side scan sonar, as well as multibeam sonar, are much more capable of identifying and refining targets in the remote sensing phase of underwater archaeology. Internet access to sonar and LIDAR datasets and the popularity of Google Earth allow recreational users to employ remote sensing skills as well as connect a diverse community of scientists not on board the research vessel. On the one hand, enhanced underwater discoveries and access have multiplied the number of maritime sites for investigation, adding to the field's body of knowledge and engaging more people with access to undiscovered sites. On the other hand, the capacity of states and institutions for regulating or managing the potential impacts to the sites has not increased in kind. The technology and capability for preservation management or enforcement in the marine environment has changed very little.

Site investigations have also benefited from advancements in technology. Deep sea remotely operated vehicles (ROVs) are capable of working in thousands of feet of water, and providing high-definition video imagery live-streamed from ship to satellite to shore, where scientists and others may participate remotely in real time. These systems have also been used to excavate and recover diagnostic artifacts for study. The science of materials conservation has also made great strides, adding advanced techniques to the tried-and-true methods of electrolysis and polyethylene glycol infusion. Here again, the challenge of technology is apparent in the pressure these advancements place on associated areas of the discipline. Proper museums for the long-term display and curation of objects from the sea often lack the capacity and funding to support new collections. Technology enables wonderful advancements, but the overall benefits are unevenly distributed across the related components of the maritime archaeology field.

The existing US laws that provide for the preservation of maritime heritage resources (e.g. National Marine Sanctuary Act, Abandoned Shipwreck Act, Sunken Military Craft Act, etc.) ultimately rely on enforcement capabilities in the marine environment, and enforcement at sea has always been difficult. Anonymity is the very nature of the sea; usually the first indication that an underwater property has been looted is the appearance of archaeological objects being sold through online market places. Therefore, in order to enhance resource preservation, the Office of National Marine Sanctuaries has intentionally focused on outreach and education as a long-term tool in protecting submerged sites. Ultimately, true preservation and stewardship of these special resources must come from the local community at the grass roots level, and be based on an understanding of values that go beyond short-term economic gain. Ways to promote sustainable values of submerged maritime sites include responsible heritage tourism, video products, museum exhibits and more. Increasing public awareness and 'valuation' of the resource is a direct method for enhancing community stewardship.

Public outreach via diving clubs, dive shops, and other venues is one method for raising awareness about the issue and increasing site protection. Dive shops often have a self-interest in the long-term viability of wreck sites, and may be interested in becoming site stewards, participating in a site marker programme, or offering training courses in non-invasive site survey. Educational opportunities exist at various levels from sport-diver introductory courses utilizing curriculum developed by the Nautical Archaeology Society to professional academic research at universities. ONMS supports instruction at all of these levels, promoting a 'citizen-scientist' volunteer diver model contributing to research within the national sanctuary system. Raising public awareness of underwater resources, and the benefits that come from sustainable

management, must be considered as a long-term strategy for the preservation and protection of our undersea 'treasures.'

TO RECOVER OR NOT – ONMS AND *IN SITU* PRESERVATION

In situ preservation is the preference as a matter of law and policy for a number of reasons. Sanctuaries are established with the purpose of conserving the natural and cultural heritage in a special marine area for present and future generations. Removing historic sanctuary resources from the 'underwater museum' is only done when it is determined to be in the public interest. This includes considering the purposes in establishing the sanctuary in the first place. Even outside of sanctuaries, monuments and parks, the recovery of archaeological materials must be approached with careful consideration. Archaeology can be a 'destructive' science, for once the site is excavated it can never be replaced. Poorly planned excavations have irreparably damaged numerous underwater collections due to lack of proper materials handling, insufficient transport and conservation methods, shortage of controlled storage space, insufficient funding for curation, etc.

In situ management is a goal or preference under a number of international and US laws including the National Historic Preservation Act. It provides a viable alternative to the damage caused by premature recovery. Established as a guideline by the 2001 UNESCO Convention on the Protection of the Underwater Cultural Heritage, Annex rule #1 states:

> The protection of underwater cultural heritage through *in situ* preservation shall be considered as the first option. Accordingly, activities directed at underwater cultural heritage shall be authorized in a manner consistent with the protection of that heritage, and subject to that requirement may be authorized for the purpose of making a significant contribution to protection or knowledge or enhancement of underwater cultural heritage.

Preliminary assessments of shipwrecks and other properties should be non-invasive in nature, for when left undisturbed, the underwater archaeological site can achieve very low rates of deterioration. Many non-invasive surveys glean critical information while not exposing artifacts to undue threats. The *in situ* approach can also include more active management than simply 'leaving sites untouched,' such as positive measures to protect sites from damage by inadvertent or intentional human impacts, and techniques that provide cost-effective low-impact measures for *in situ* stabilization of features and artifacts. This policy preference or 'first option' is not unlike a surgeon's policy of 'first do no harm.' This means always carefully assess the patient and consider all other means of diagnosis and treatment before advancing to more invasive procedures.

While some may have misunderstood the *in situ* preservation option as a complete prohibition, it is merely an approach to managing important resources and is not an outright ban. The 'second option' is expressly set out in the 2001 UNESCO Convention, which makes it clear that there will always be circumstances when intrusive research procedures are justified, and even recovery if it makes 'a significant contribution to protection or knowledge or enhancement' of the field. The proper research design, conservation and curation planning, and funding, etc. must of course be in place to minimize negative impacts to the resource. *In situ* management simply emphasizes the 'do-no-harm' ethic. ONMS has engaged in some limited recoveries of artifacts, and in one major exception, large-scale recovery of major structural elements of USS *Monitor*, a sanctuary established with the primary goal of *in situ* preservation.

In the case of *Monitor*, after years of debate with the dive community about its integrity and the rate of deterioration, it eventually became apparent to NOAA that the ongoing deterioration of the wreck in the ocean was in fact raising concerns that the wreck would collapse earlier than anticipated and simply become a corroded pile of iron with no resemblance to the wreck as discovered. This loss of structural integrity would compromise archaeological integrity. As a result, the decision was made at a political level to recover the warship's engines, propeller, anchor, pumps, and its singularly distinguishing feature, the rotating iron turret. The recoveries were undertaken by US

Navy salvage divers under supervision by NOAA archaeologists. The remaining portions of the wreck, including the entire hull, remain on the sea bed in the sanctuary (Broadwater, 2012). This was an extraordinary recovery project that would not have been accomplished without partners from other sectors, some appropriations from Congress and substantial funding and other support from the private sector.

The recovered structure and thousands of associated individual artifacts were placed in the USS *Monitor* Center, a $30 million (US) privately owned facility adjunct to the pre-existing Mariners' Museum in Newport News, Virginia. There, conservation to halt corrosion and enable the artifacts to be displayed out of water is an ongoing, multi-million dollar commitment. The Center displays a substantial amount of treated artifacts and interpretive reconstructions, including a full-scale steel replica of the *Monitor*. It allows for open public viewing of the ongoing conservation, which will require an estimated additional two decades to complete. While more visitors can physically 'see' the *Monitor* artifacts only a few feet away there is still a sanctuary that remains as an underwater museum. That site can be seen through a variety of mediums for visitors to understand its history and significance. There are not many visitors with the interest and technical ability to dive to 230 ft. depth at the site. However, there is now both an underwater museum and a collection of artifacts in a museum after a decades-long, multi-million dollar effort that underscores why *in situ* preservation is still a preferred management option.

THE MAJOR CHALLENGE: REVEALING RELEVANCE

A key goal of the Office of National Marine Sanctuaries is to gain support for ocean conservation. Another is highlighting the need for protecting special ocean places. To help achieve these goals, ONMS employs the Maritime Heritage Program. This means that MHP does not simply serve as an adjunct programme for managing the sites, meeting legal, regulatory and policy requirements. Nor does it solely focus on outreach, providing content and context for public awareness and appreciation of maritime heritage in the sanctuaries and adjacent waters. MHP was created to conduct meaningful work, even in at times challenging and competitive fiscal environments. Some management programmes focus on either natural or cultural heritage to emphasize a particular habitat, such as a coral reef, or a site such as the USS *Monitor*. That is appropriate in certain places. However, in some cases the focus on natural has resulted in not integrating cultural heritage into management of a sanctuary. Some even perceive cultural heritage as competing with the human and financial resources that could be available for natural heritage. The Office of National Marine Sanctuaries has been a leader in integrating natural and cultural heritage management. In the ONMS system, maritime heritage does not compete with other science needs including issues such as fish stock depletion, ocean acidification, coral die-off, global warming, sea-level rise, and other challenges faced by sanctuaries, marine protected areas, and marine parks. Maritime heritage adds leverage to the impetus for creating new sanctuaries, marine protected areas and parks.

It does so because the basic philosophy of the Maritime Heritage Program is to find synergy through integration and build bridges in the management of natural and cultural heritage and avoid the building of any 'fences' which may divide the protection of 'cultural' and 'natural' resources. At a basic level, the story of humanity's interaction with the sea (and by extension, lakes and rivers) is the focus of maritime heritage. It is not narrowly defined as a floating historic ship, a historic shipwreck, a maritime museum, or a lighthouse on a solitary shore. It is the story of people, throughout time, who lived on or by the water, who utilized it as a source of food, as a barrier for defence, as a means of transportation locally, regionally or globally, and as a place of tremendous spiritual meaning replete with marine life with cultural significance of their own. For example, the coral of the North-western Hawaiian Islands has been recognized for its outstanding universal value as natural heritage, but it has also been recognized as an important part of the

cultural heritage of the Native Hawaiian people. This recognition resulted in Papahānaumokuākea Marine National Monument in the North-western Hawaiian Islands becoming the first World Heritage mixed natural and cultural heritage marine site in the United States.

It is the realization that whales and sharks, for example, have powerful traditional meaning, as well as cultural and spiritual importance to indigenous peoples. It is the realization that because of global warming and sea-level rise after the last great ice age, vast portions of the human landscape of 10 000 years ago now lies submerged throughout the world, drowning ancient villages, hunting grounds, and the bones of our ancestors. All of this intimately ties humanity again to the sea. In the story of the seas, the importance of the seas to the human story, and an inherent understanding that in our 50 000 years on this planet we have now become a species that no longer responds to the marine environment, but now the sea responds to us.

Where a potential lack of connection may be perceived is present in the issue of historic shipwrecks. Are all wrecks relevant to all people? In particular, how would a shipwreck off the coast of North Carolina, for example, be relevant to someone who lives in the interior of the country? In these cases, we have examined the specific human/family context of wrecks. For example, if a ship was lost in wartime service off the North Carolina coast, and the family of the deceased crew was located in one of those 'land-locked' and distant states, they would likely feel a connection to that wreck as the grave of their family member. USS *Monitor* NMS has tested that assumption with the Battle of the Atlantic wrecks being investigated by ONMS. In the case of the tanker *Dixie Arrow*, torpedoed and lost in 1942, the ship's master perished heroically working to save his crew. His surviving children have been passionate advocates for ending salvage by unauthorized parties who have used explosives to gain access to the wreck. Injurious not only to the historic fabric of the vessel, such salvage operations are also harmful to the marine life that inhabits the site.

There is also one other aspect, which we have simply referred to as the 'now that we have your attention' strategy. The discovery of historic shipwrecks can engender a significant media response, and in the 21st century, that includes not only newspaper, magazine, or television stories, but also internet-based sites, blogs, videos, and more. In the past three years (2012–2015), maritime heritage related stories, especially new discoveries, have been the single largest positive news and social media generator for ONMS and NOAA.

In 2014/2015, news stories on the discovery of the historic shipwrecks SS *City of Chester*, SS *City of Rio de Janeiro*, SS *Selja*, and a 'mystery' tugboat wreck in and around Greater Farallones NMS, as well as the first sonar mapping of the World War II aircraft carrier USS *Independence* in Monterey Bay NMS generated over three billion media impressions, with front page newspaper stories in most of the world's leading cities. Perhaps more important to ONMS was the wide reporting of each find and the work of ONMS and MHP in most 'small town' and larger community newspapers through wire service coverage of the stories. The same was true in 2012 with coverage of ONMS' role in the study and management of the wreck of *Titanic* in cooperation with the US District Court and the Department of Justice, who jointly oversee ongoing work on the wreck by American private interests.

In each of these cases, the role of MHP has been to not only provide a historical, archaeological or cultural context, but to also 'seize the moment' and talk to other ocean perspectives. These can include the colonization of wrecks by marine life, conservation of the marine ecosystem, and the need for ongoing science to study the oceans, which often results in the accidental discovery of shipwrecks. Rather than focus on our own narrow interests as historians and archaeologists, we have worked with our ocean science and conservation colleagues to incorporate their messages, while we have the nation's or the world's attention. With *Titanic*, for example, the major news coverage of 2012 was the release of compelling images of modern trash, including plastics and beer cans, on the wreck site. That became a powerful message about pollution and debris in the marine environment, and the need

to take care of the oceans. Just because it is in deep water, 'out of sight' does not mean it should be out of mind. That message was heard, including a story in the New York Times.

In addition, the interest in maritime heritage and shipwreck discovery have been used to highlight the fact that in ocean science and conservation, much of the world is unknown. For a resource that covers 73% of the globe to be 95% unexplored (in its water column and bottom), the ocean truly represents a resource that begs for more exploration, better understanding, and increased protection of its fragile resources. The saga of 'discovery' also makes a powerful statement to young people who might otherwise not be drawn to ocean science and conservation. The ocean is the last true frontier on the planet. Discoveries of new life forms, deep sea volcanoes and vents, deep ocean rifts, clues to the origins of life, as well as a massive undersea museum of an estimated global population of some three million shipwrecks mean that there is much left to be done and opportunities abound for future generations to make their own positive mark. In 2010, ONMS' MHP and Thunder Bay NMS tested that assumption with Sony and Intel's sponsored 'Project Ship Hunt' in which five inner city high school students embarked on a life-changing adventure in the sanctuary. Their task was to utilize data, technology and an experienced crew of archaeologists, historians and technical divers to discover a historic shipwreck. They did not find the wreck in question. They did find two other previously undiscovered, and amazing wrecks, one a poignant one with a loss of life from more than a century ago. The impact on the five students was profound; so too was the widely distributed documentary about their experience. When it comes to maritime heritage, what has been discovered is that human stories can connect an audience with the oceans in a way separate from arguments over unique biological significance, as all marine resources do not possess the anthropomorphic charm of Nemo or Free Willy.

Engaging the public and gaining support through human interest stories and outreach, comes through community engagement. It is possible to demonstrate relevance by integrating with other ocean scientists in multidisciplinary work; and we have expanded not only our understanding of maritime heritage but reached a wider audience (and hopefully, supporters of conservation) by assessing our sites and adjacent ocean and lake areas as maritime cultural landscapes.

COMMUNITY ENGAGEMENT

As previously noted, a major component of ONMS' maritime heritage responsibility is centred on engaging and educating the public. These initiatives increase community knowledge of unique non-renewable resources, such as shipwrecks, aircraft and other cultural and prehistoric properties, leading to greater stewardship, conservation, and preservation of historical and archaeological resources, both within sanctuaries and beyond. NOAA is directed by the National Historic Preservation Act and the National Marine Sanctuaries Act to not only locate and assess its historic resources but to also enhance public awareness, responsibility and appreciation for these resources. Maritime heritage properties have the ability to rekindle public interest in ocean and lakes resources and interpreting underwater sites and landscapes in a holistic manner highlighting the connection between human activities and the environment. Community engagement not only focuses on the submerged physical resources themselves but also historical documents and unwritten oral and family histories which promote stronger bonds between current generations to their past. Three examples will be highlighted below that demonstrate the diversity and reach of ONMS' maritime heritage community engagement efforts.

Avocational archaeologists and historians

Throughout the National Marine Sanctuary system avocational archaeologists are used to supplement sanctuary professional maritime archaeologists and support staff to locate, document, and interpret maritime heritage resources. Avocational archaeologists are non-professional individuals who are trained in archaeological recording techniques and donate their time to work on

projects. Many avocational archaeologists are also scuba divers, but some are not and in that case they focus on helping with historical research or recording shipwrecks on shore or shallow water. Several National Marine Sanctuaries such as the Florida Keys, Thunder Bay, Channel Islands and Monitor National Marine Sanctuary have education and outreach programmes to train and work with various volunteer avocational archaeologists and historians and historical organizations around the country. These individuals and groups provide skilled hands to photograph, document, and monitor many shipwrecks, leading to increased information for resource managers. ONMS partnerships are mutually beneficial relationships. Volunteers can give back and contribute to the greater understanding of the maritime world, and also provide sanctuary staff with more data than they could gather on their own, resulting in the ability to better protect sensitive sites.

Closely tied to avocational engagement is assistance from students during field projects. Throughout the system, including the Hawaiian Islands Humpback Whale NMS, academic field schools utilize National Marine Sanctuary sites and staff for training with hands-on application of archaeological techniques. Future generations of scientists and archaeologists are exposed early in their careers to the wealth of resources and knowledge accessible to them, creating a new level of engagement within professional and personal communities. These sanctuary connections often lead back to multi-year projects and long-term ties that offer future opportunities for study and reflection.

Reaching new audiences through telepresence

Not all of the maritime heritage resources in National Marine Sanctuaries are easy to reach. A large number of sites are beyond the recreational scuba diving limits. While technical divers can access deeper sites, the number of people is small who have the capabilities to visit a large number of sanctuary shipwrecks. Most of the population are not divers, and other avenues are used to allow non-consumptive access to everyone, divers and non-divers alike. Technology provides the public a way to experience underwater sites without getting wet alongside research expeditions by simply logging onto the internet. Live broadcasts from divers or underwater robots streamed wirelessly back to shore and onto the internet provide a way to experience shipwrecks as tangible remnants of our history. Viewers watch high definition topside and underwater video commentated by sanctuary staff about shipwrecks located in several hundred feet of water many miles offshore. They can also communicate with the hosts through social media and chat programmes allowing a two-way discussion and making the experience interactive. Telepresence broadcasts have been conducted from Stellwagen Bank, Thunder Bay and *Monitor* National Marine Sanctuaries. Live broadcasts have a global reach and expand the boundaries of community engagement to have an international impact.

Connecting communities at sea and ashore

When opportunities arise, sanctuaries become involved in special projects such as the 38th voyage of the whaleship *Charles W. Morgan*. ONMS was a programme partner for the 38th Voyage to highlight how National Marine Sanctuaries interpret the maritime past, promote ocean and lakes preservation, and are engaged in cutting edge research to understand the marine world. The whaleship acted as an ambassador for conservation and ONMS' partnership with Mystic Seaport. It raised the visibility of National Marine Sanctuaries through local and national media coverage of the event and through on the ground community events around New England during the summer of 2014. In addition to port stops around Connecticut, Rhode Island, and Massachusetts, the last wooden whaleship afloat made three-day sails in Stellwagen Bank NMS to raise awareness about man's changing perceptions of whales from whale hunting to whale watching. Unique initiatives like this provide an 'out of the box' way of engaging new constituents and coalitions by taking advantage of non-traditional approaches.

National Marine Sanctuaries serve as living classrooms where people can see and learn about the nation's rich maritime history either in person or virtually through exhibits, live broadcasts and special interpretive outreach projects. By providing

the public with several types of engagement opportunities, there is a higher likelihood that content and key messages will be disseminated and undertaken, leading to increased public support.

MARITIME HERITAGE AND NATURAL SCIENCE: INTEGRATING A MULTI-DISCPLINARY APPROACH

The separation of natural and cultural heritage management discussed to this point may be a result of different academic disciplines for the conduct and communication of science whose practice can be so focused that it ends up being intellectually limiting and discouraging to new approaches to scientific inquiry. In recent decades, the ocean sciences have seen the collapse of barriers between, for example, physical and biological oceanography in order to better understand factors that determine the distribution and production of animals and plants.

Two historically divergent disciplines remaining in the field, however, are the maritime heritage and natural resource sciences. In fact, the natural resource sciences have largely remained separate from the study of social sciences, including economics, anthropology, and history. But maritime heritage and the ocean sciences are actually strongly connected. Maritime heritage, as the relationship of human societies, past and present, to their ocean environment and resources, has always been the enterprise that motivated, even demanded, our understanding of the ocean. It imparts knowledge on how to find, acquire, and use the ocean's resources, and passes on the lessons of the past to guide the wise use of those resources in the future. As a result, maritime heritage provides essential tools for understanding the ocean and how it is changing.

ONMS has begun to see how blending disciplines and stimulating interaction between them helps us to better understand how history created the state of the ocean's natural resources today, and what needs to be done to ensure a better future for both the ocean and society. Two examples of studies that have benefited from the blurring of boundaries between naturalists, historians, and archaeologists are the historical ecology initiative of ONMS, and a deep water shipwreck project in the Gulf of Mexico. They also have provided value to the public.

Historical ecology

Modern oceanographic methods of study have helped us understand how the oceans have changed over a large spatial scale, but only over the last few decades. However, a rich historical record that goes back much further in time can be found in places such as ship logs, explorer narratives, news items, family records, and archaeological sites. These may be the best sources of information available to determine what the unaltered, pre-industrial marine environment might have looked like. Historical ecology is relying on these and other records to reconstruct a baseline on abundance and biodiversity of life in the ocean of the past. As an example, records of whaling and fishing before the industrial revolution give an idea of the extent to which ocean resources were harvested. This allows us to follow trends retrospectively in order to understand proximate causes for long-term changes in the marine environment.

ONMS has benefited from such studies. For instance, archaeologist Torben Rick looked for clues in ancient middens in California's Channel Islands to determine the diet of the historical Chumash people and what the marine environment provided to their society (Rick, 2007). Ecologist Loren McClenachan used archives of early Spanish and English explorers of the Florida Keys and Caribbean, along with pictures of trophy fish from the last six decades, to contrast long-term and recent changes in the marine environment (McClenachan, 2008, 2009a, b). An interdisciplinary group of ecologists and historians at the University of New Hampshire applied modern statistical methods to historical commercial fishing data to describe changes in fish populations at Stellwagen Bank National Marine Sanctuary (Claesson *et al.*, 2010). In *An Unnatural History of the Sea*, Roberts (2007) does an excellent job documenting the abundance of the marine environment from the records of early European explorers, while also tracing overfishing in Europe

from the Middle Ages, to later industrialized and increasingly more distant and deeper fishing as a result of technological advances in fishing vessels and fishing gear.

These studies revealed and clearly demonstrated that our perspectives on the ocean's resource abundance are biased by how long we have been looking. Historical ecology can reset our standards for the ocean, and our relationship to it.

Shipwrecks and natural sciences

More than 1300 metres deep in the Gulf of Mexico, the remains of an early 19th century ship laden with cannons, muskets, glassware, ceramics, and medicinal and personal effects was first explored in 2012. Explorations in 2013 discovered two additional ships nearby, and it is likely that all three sank together. The cargo of each ship was distinct, and only one was armed, raising speculation that it was a privateer and the other two its prizes.

These ships are not only rich archaeological sites, but have also become habitat for a deep sea ecosystem, creating an oasis of life in an area otherwise home to a sparse population of deep sea creatures found mainly on and within bottom sediments. The expeditions to the wrecks were also broadcast live over the internet, allowing the public and experts from many disciplines to provide input to the scientists at sea from remote locations around the world. More than a million tuned in to the 2013 mission.

The shipwrecks and the expeditions not only captured the imagination of the public, many scientists, and resource managers, but they stimulated a level of investigation that would not have otherwise happened. Furthermore, they engaged the public on an unusually large scale, and exposed people interested primarily in history to issues of natural resource conservation. The missions accomplished this by first exposing the public to an intriguing mystery and the excitement of exploration. Then by allowing people to send ideas and help interpret the shipwrecks and their biota, they encouraged active involvement and stimulated interaction among different fields of science and the public.

Scientific accounts and stock assessments about overfishing can be dry and uninspiring, and often get lukewarm attention by the media. But when coupled with stories of seafaring, family and cultural histories, or ageing photographs, the interpretations can be captivating. Likewise, the popularity of shipwreck discoveries often dwarfs that of finding new species and most other stories of the natural world. The stories that command attention are those that link humans and evoke sympathy and intrigue through adventure and tragedy. Maritime heritage explores the personal relationships people have with the ocean, and at the same time creates a connection between the audience and the ocean's natural heritage.

Marine protected areas (MPAs) are becoming champions for connecting people to the ocean and increasingly highlighting the benefits of interdisciplinary efforts in fostering holistic approaches to conservation. Maritime heritage and the natural sciences diversify the ways in which MPAs attract public attention, catalyze engagement in protection efforts, and build constituencies that ensure longevity. It is thus advantageous for MPAs to protect both the natural and cultural resources found within their boundaries.

While this is a story of greater understanding through the combined efforts of the social and natural sciences, it may also be a model for problem solving as we face the great challenges of our time – problems like climate change, mass extinctions, and food security. All have solutions that will unquestionably require people and nature to work in concert.

MARITIME CULTURAL LANDSCAPES

The MPA white paper recommending a cultural landscape approach, mentioned above, signalled the beginning of a paradigm shift in MHP's and ONMS' thinking on cultural resource management and community engagement. The MPA FAC explains that this approach is analogous and complementary to ecosystem-based management (EBM), which is well-established in the natural sciences. It may also be analogous to the watershed

approach in coastal zone management. Cultural heritage, in its many dimensions, must be included before EBM can be fully realized. Conversely, an intimate understanding of ecosystem functions and natural history is required for effective and comprehensive cultural heritage management.

EBM requires understanding the human dimensions operating within ecosystems, rather than using the separated vantage points of 'natural' and 'cultural' resources. A cultural landscape approach emphasizes the historic component, as illustrated in the above examples of natural and cultural resource integration. The concept of cultural landscapes has been established for nearly a century, but its application to the management of marine resources is quite new. Cultural landscapes identify combinations of human activity and natural areas and resources that have left identifiable cultural and ecological patterns. ONMS' Maritime Cultural Landscape (MCL) initiative applies a cultural landscape approach to the coastal and marine environment, in order to more effectively and appropriately manage the resources and spaces of the sanctuary system. At its most basic, this approach is based on the understanding that humans are an integral part of the landscape, both shaping and being shaped by it. Recognizing this, we then try to use that knowledge to inform planning and future management.

There are several considerations involved in applying knowledge of place to planning and management. Recognizing the full spectrum of an MPA's cultural heritage potential requires the understanding that cultural resources can be intangible, material, or a combination of both. Furthermore, cultural resources may not be universally valued or valued for the same reasons by all cultures, stakeholder groups, or scientific and professional disciplines. MCL can identify the past and living cultural voices associated with an MPA, helping ensure the fullest possible public engagement in planning and management (MPA FAC, 2011).

An integrated and holistic approach to management is becoming increasingly critical, as coastal and marine challenges continue to grow in complexity. As summarized by Barr (2013):

> Coasts and coastal communities around the world are subject to many complex and potentially significant problems. Changing shorelines, the collapse of traditional fisheries, economic downturns, loss of wetlands, open space preservation, changing demographics, and the pressures facing communities with seasonal tourism surges in population and demands for services all present challenges. Effective solutions require the need to listen to a variety of voices, perspectives and aspirations to balance those with effective resource conservation and community sustainability. (p. 184).

Effective engagement of communities and other stakeholders is critical to help guide and inform management goals and actions. A deeper understanding of coastal communities' relationships with the environment over time can contribute meaningful context for addressing today's problems. Barr (2013) continues that 'MPAs are people's "back yards," places they know and value. … People are bound to special places' (p. 185). It is only sensible to consider the place-based knowledge, observations, and experiences of communities who have been living in proximity to current and possible future sanctuaries. This also includes the traditional knowledge of indigenous communities, which although 'different than that acquired from modern scientific methods, progress is being made in integrating and applying this indigenous knowledge to MPA management' (Kliskey *et al.*, 2009).

A great degree of thought and discussion has gone into the concept of an MCL approach, but what is actually involved in executing it? Much previous work – planning and management both within sanctuaries and elsewhere nationwide – has been problem-focused and mitigation-based, in other words, reactionary. A cultural landscape framework, by contrast, proactively engages constituent populations and constructs a knowledge base independent of specific problems or issues. This serves to build relationships based on trust and open communication, and better equip managers to address issues that do arise.

Two examples of this process are collaborative ONMS projects involving indigenous communities, funded by and conducted jointly with the Bureau of Ocean Energy Management (BOEM). Characterizing Tribal Cultural Landscapes has been working with

the Tribal Historic Preservation Offices (THPO) of the Makah Tribe of Washington, the Confederated Tribes of Grand Ronde Community of Oregon, and the Yurok Tribe of California, and the Maritime Cultural Resources Site Assessment in the Main Hawaiian Islands has been working with Native Hawaiians. Both projects are developing a model for agencies to consult with tribes more effectively and appropriately in advance of any proposed undertakings, and also for tribes and other indigenous communities to relate their interests and concepts of landscape to agencies and other land and water management entities.

These projects are demonstrating a method in which interests of an indigenous community can be recorded by that group, and summarized results and concerns can be applied in a culturally sensitive and relevant manner for use in values-based planning and management by federal agencies. Using a cultural landscape approach ensures a full coverage of interest areas and an opportunity for presenting a holistic understanding of a place and its resources as related by indigenous communities. This approach is intended to be transferable and adaptable to any tribal community that may wish to document its own significant resources and places, in order to improve effectiveness and appropriateness of agency consultation in the future.

Looking forward, the National Register of Historic Places is currently considering whether and how MCLs may be incorporated into guidance and criteria for evaluations and nominations. ONMS, BOEM, the National Park Service, and the State Historic Preservation Office (SHPO) of Wisconsin conducted a symposium in October 2015 to solicit input from representatives of federal agencies, SHPOs, THPOs, and academia regarding the characterization of MCLs, and their recognition as unique entities worthy of preservation.

CONCLUSIONS

In a soon to be decade and half of its existence, the Maritime Heritage Program of the Office of National Marine Sanctuaries has evolved from a mandate to survey, identify and recommend strategies for the management and protection of shipwrecks to a more inclusive programme that uses the power of 'people stories' and the excitement of ongoing discovery to address the 'how and why' of community involvement in MPAs, including sanctuaries and parks, and the need for ongoing science and conservation.

While the maritime heritage approach is similar to ONMS' older 'place-based management' approach, key elements of the new strategy reflect greater inclusivity and a rejection of separate management schemes and priorities for research and resource management in the sanctuary system. Rather, the model is one of multi-disciplinary, collaborative work that involves the public beyond a simple 'share' or interpretation of what we do and how we do it. Increasingly, as is the case with other programmes in NOAA, such as the Office of Ocean Research (OER), this work has utilized the tool of satellite and Internet to broadcast missions to actively engage the public in missions beneath the sea in which the diversity of resources and their inter-relationships are apparent. As well, having iconic shipwrecks or submerged archaeological sites as potential or known targets provides an obvious human link to an otherwise 'alien' environment.

Another key concept increasingly embraced in the maritime heritage community is the assessment of shipwreck sites within their larger environment. As noted, this includes them in the context of local, regional, national (and even global, if one considers subjects such as whaling) maritime cultural landscapes. In this way, not only is the larger context of how the individual wreck or wrecks fit within broader aspects of human history made clearer, but the wrecks also serve as tangible elements (evidence) of how humans have interacted with their surrounding marine environment. To that end, as seen in the discussion of interaction with the natural sciences, wrecks such as the Monterrey sites or even *Titanic*, when studied, are examined to determine not only how they have interacted with their submerged marine environment, but also how they have affected that environment. Finally, when using the larger landscape as a lens, then having the wrecks thematically and programmatically tied to the local waterfront in the nearby community through the context of the more easily visited pier from which a ship sailed, and the lighthouse built

in response to its wreck, and now a museum provides the means for the community to think beyond the shore, and beneath the water about their neighbouring sanctuary or marine protected area. Compelling stories and excursions to learn more about them in the deep, and the process of discovery and exploration make hitherto out of sight, out of mind places more relevant.

Clearly, media statistics for NOAA's Office of National Marine Sanctuaries show that media (and public) response to maritime heritage stories are the highest news generators. In 2014/2015, maritime heritage-generated stories about shipwreck surveys and discoveries in California's Greater Farallones National Marine Sanctuaries resulted in more than 3 billion media impressions, making them sanctuaries' (and NOAA's) biggest news of the year. That exposure opens the door to more dialogue and interaction, 'now that we have your attention.'

Where maritime heritage has also benefited marine conservation is the first major expansions of the National Marine Sanctuary System in decades. Between 2013 and 2015, existing sites such as Thunder Bay NMS and Greater Farallones NMS doubled, incorporating new landscapes, hundreds of shipwrecks, and vital habitat. The notice of intent to expand USS *Monitor* NMS and Flower Garden Banks NMS are now in process of review, public scoping and action within the next few years. They also include significant maritime heritage resources. Finally, in 2014, NOAA announced a new process by which communities could nominate new areas for consideration for designation as National Marine Sanctuaries. As of 2015, two nominations have been accepted. Both are maritime heritage related; the first is a collection of shipwrecks and the adjacent maritime cultural landscape of Wisconsin's side of Lake Michigan, and the other is a collection of more than 230 World War I wooden ships in a brackish tidal estuary outside of Washington, DC which, over time, have become a habitat for marine life and birds at a site known as Mallows Bay. Mallows Bay in particular is not only a maritime cultural landscape; it is a diverse laboratory of the interaction and interdependence of 'cultural' and 'natural' resources. In these nominations, and others to come, ONMS may well measure one aspect of success for the Maritime Heritage Program.

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