



MARITIME HERITAGE RESOURCES

National Marine Sanctuary Program (NMSP) regulations define “historical resource” as any resource possessing historical, cultural, archaeological, or paleontological significance, including sites, contextual information, structures, districts and objects significantly associated with or representative of earlier people, culture, maritime heritage, and human activities and events. Historical resources include “submerged cultural resources” and also include “historical properties,” as defined in the National Historic Preservation Act.

The term “historical resource” as used in the NMSP regulations also encompasses prehistoric archaeological sites; therefore, the NMSP’s Maritime Heritage Program prefers the term “maritime heritage resource.” “Maritime heritage resource” is defined as any shipwreck or other site or object that is of archaeological, historical, or cultural significance found in, on or under the submerged lands, including sunken State craft.

Maritime heritage resources in the Stellwagen Bank sanctuary require management as mandated by the NMSA and sanctuary regulations. In addition, there is a limited relationship of maritime heritage resources to biodiversity conservation consisting of the role that shipwreck structures serve as substrate for epibenthic organisms and shelter for fishes and invertebrates that warrants consideration.

STATUS

Uncounted prehistoric and historic archaeological sites lie within the Stellwagen Bank sanctuary. The sanctuary’s position at the mouth of Massachusetts Bay places it astride the historic shipping routes and fishing grounds for such historic ports as Gloucester, Salem, Boston, Plymouth and Provincetown. These ports have been centers of maritime activity in New England for nearly 400 years. As a result of man’s long association with the sea, the sanctuary contains a broad cross-section of this nation’s maritime heritage. The only archaeological resources identified to date in the sanctuary are shipwrecks

The Stellwagen Bank sanctuary has been actively pursuing maritime heritage research since 2000. The sanctuary has relied heavily on a partnership with NOAA’s Undersea Research Center—University of Connecticut (NURC-UConn) to access appropriate tools, including side scan sonar, remotely operated vehicles (ROVs) and skilled pilots, to investigate maritime heritage resources. The sanctuary has also benefited greatly from the generosity of independent researchers, such as John Fish and Arnold Carr of the American Underwater Search and Survey, who have provided locations or information about sanctuary maritime heritage resources.

The sanctuary’s research has been focused along two paths: locating maritime heritage resources and characterizing those resources. Prior to 2000, the sanctuary was unaware of the precise location of any such sites within its boundaries. Since 2000, the sanctuary has conducted nine research cruises that utilized side scan sonar to survey the seafloor and identify potential maritime heritage resources. These surveys have mapped 85 square kilometers (32.8 square miles) of the sanctuary’s seafloor, or approximately four percent of the sanctuary’s total area.

As potential maritime heritage resources were located, the sanctuary began to characterize the resource utilizing the appropriate technology. Maritime heritage resources shallower than 130 feet were investigated by researchers utilizing SCUBA (Self-Contained Underwater Breathing Apparatus). Divers recorded diagnostic features with still and video photography, measurements and scaled drawings. Sites monitored repeatedly were examined for changes in each vessel’s structure and artifact assemblages. Maritime heritage resources beyond recreational diving limits were investigated with an ROV carrying lights and digital still and video cameras. The ROV’s cameras recorded diagnostic features, and its scaling lasers provided dimensions of these features. The large size of several of the sanctuary’s shipwrecks, notably the *Portland* and *Frank A. Palmer/Louise B. Crary*, and the time-consuming delays to avoid entangling fishing gear on these sites, have caused site characterization to be ongoing.

Beginning in 2003, the sanctuary instituted a monitoring program for the steamship *Portland* and *Frank A. Palmer/Louise B. Crary*. Each year since, the sanctuary researchers have returned to the sites with an ROV to monitor artifacts and structures for change. At both shipwreck sites, researchers have noted changes to artifact assemblages and deterioration of wooden structure. The sanctuary also periodically revisits other maritime heritage resources to document site changes. The Stellwagen Bank sanctuary has adopted a policy of *in situ* preservation as its preferred preservation method for maritime heritage resources. This policy is recognized by the international community through the United Nations Education, Scientific, and Cultural Organization (UNESCO) Convention on the Protection of Underwater Cultural Heritage’s objectives and general principles.

Maritime heritage resources begin to deteriorate shortly after submersion in a saltwater environment. The physical

and chemical oceanographic aspects of the ocean, such as waves, currents, salinity, and pH erode and corrode cultural material, while biological and biochemical activities of organisms, such as wood boring mollusks and bacteria, contribute to the natural deterioration of archaeological sites. The specific environment in which an archaeological site is located greatly influences how rapidly the site will deteriorate. The sanctuary's low energy deep muddy basins preserve an archaeological site much longer than the much more dynamic top of Stellwagen Bank. Additionally, the composition of submerged artifacts greatly affects how long the item will remain in the archeological record. In general, organic material, such as wood and fabric, does not last as long as iron, brass or ceramics.

Archaeological sites reach equilibrium with the environment after a period of deterioration. Corrosion products enclose ironwork, insulating it from rapid oxidation. Likewise, anoxic sediment covers hull remains greatly reducing biological and biochemical consumption. Archaeological sites can last for thousands of years, as evidenced by classical Greek shipwrecks found in the Mediterranean Sea. Even though these ancient shipwrecks have deteriorated significantly since their deposition, the sites maintain archaeological integrity and can be invaluable gateways to learn about past human activities. Disturbance by human impact can upset this natural equilibrium and accelerate disintegration.

PREHISTORIC RESOURCES

Ancient geologic and glacial processes once exposed the sanctuary's seafloor to the sun, allowing it to support flora and fauna that may have been utilized by the Paleo-Indian peoples (Barber, 1979). Around 12,000 years ago, groups of migratory humans, known as Paleo-Indians, inhabited southern New England. The retreat of the Laurentide ice sheet 21,000 to 16,000 years ago allowed these people access to Stellwagen Bank, which rose above the surrounding ocean as a result of lower sea levels and the rebound of the Earth's crust after the retreat of the heavy ice sheets (Funk, 1978; Barber, 1979).

Although no archaeological evidence of Paleo-Indian inhabitation has been found on Stellwagen Bank, sea level models suggest that the bank remained accessible to the Paleo-Indians for approximately 1,000 years. During this time, people likely utilized the bank to hunt for land mammals, as a base for fishing and hunting marine mammals, and for gathering shellfish and vegetation (Barber, 1979). The possibility of finding Paleo-Indian cultural remains on Stellwagen Bank is supported by the recovery of mastodon skeletal remains by local fishermen (Carr, 1990). Further geologic study, site modeling, and sampling will be necessary to determine the potential for locating prehistoric cultural remains in the sanctuary.

Native Americans developed complex societies in New England during the approximately 12,000 years of human habitation prior to the arrival of Europeans. At the time of European contact Penobscot, Abenaki, Pequot, Massachusetts, Narragansett, Wampanoag and Confederated River

tribes inhabited the region surrounding Massachusetts Bay. These coastal tribes utilized the marine environment as their ancestors had, but it is unlikely that they ventured into the sanctuary's waters considering the wealth of resources close to shore.

Rising sea levels covered the bank within several millennia of its exposure, displacing any Native Americans living within the area to the edges of Massachusetts Bay, but not diminishing their usage of marine resources. The arrival of Europeans in the New World dramatically amplified the quantity of maritime traffic on Massachusetts Bay.

HISTORIC RESOURCES

As a result of four centuries of historic vessel traffic through the sanctuary, several hundred historic vessel losses are recorded in the sanctuary's vicinity. Primary causes of vessel loss (shipwrecks) in the sanctuary fall into four broad classes: (1) acts of war—naval engagements, piracy, law enforcement; (2) natural forces—storms (gales/hurricanes); (3) human error—seamanship, fire, collision; and (4) abandonment—for the reasons stated above, plus vessel condition and economic reasons (Fish, 1989). The sanctuary's minimum depth of 20 m (65 ft.) means that no vessel was lost in the sanctuary as a result of grounding or stranding. Vessels reported lost to either of these two causes are not considered to lie within the sanctuary.

The ambiguity of location given for most maritime disasters, and particularly for sanctuary shipwrecks, generally precludes establishing statements about impacts to specific resources. Ambiguity exists over the reported locations of shipwrecks, particularly the types of vessel losses at sea. A presumed nearest landfall is assigned when the shipwreck does not occur at a recognized landmark, i.e., on shore, on rocks, near a buoy marker or lightship. References such as off-Provincetown, off-Cape Ann, off-Massachusetts Coast, or off-New England, or "left port never to be heard of again," are frequently the only description of shipwreck locations that may be in the sanctuary. Additionally, for most colonial writers, places of loss were far less important to record than the persons and property that were lost.

Government data collection has been primarily aimed at identifying and locating man-made and natural objects that are hazards to navigation. These locations within the sanctuary are approximated and not verified, because they do not pose a hazard to navigation. Further, reliable location information is often in private hands (sport divers, researchers, fishermen), for whom personal interests generally preclude making the information public.

Most available published sources of shipwreck information concentrate on "romance of the sea" and/or major calamities and disasters; their audience is typically popular and not scholarly. Many of these works are laundry lists of shipwrecks, often published without sources. Further, many works reflect a certain selective presentation of facts, such as including only larger vessels or those carrying "valuable" cargo. Thus, precise statements of historic vessel losses in the sanctuary are not possible.

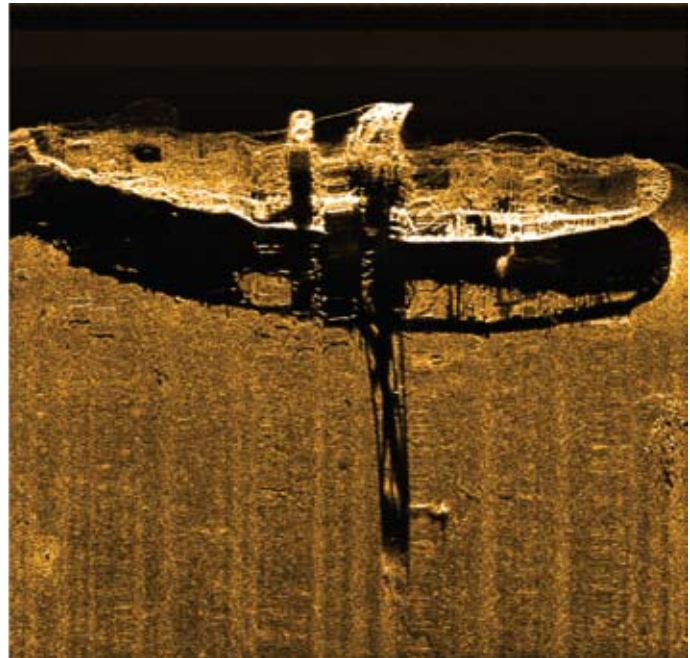
FIGURE 75. HISTORIC PHOTOGRAPH OF THE STEAMSHIP *PORTLAND* FROM 1891. THE *PORTLAND* SANK WITH ALL HANDS DURING THE *PORTLAND* GALE IN NOVEMBER 1898.

Courtesy: LARC.



FIGURE 76. THE STEAMSHIP *PORTLAND*'S LOCATION IN THE SANCTUARY WAS CONFIRMED BY NOAA SCIENTISTS IN 2002.

Depicted here is a side scan sonar image of the *Portland* showing it sitting upright on its keel with boiler uptakes and walking beam engine projecting above the main deck. Courtesy: Klein Sonar Associates, Inc.



VESSELS

Since the sanctuary began investigating its maritime heritage resources in 2000, archaeologists have located 18 historic shipwreck sites and identified four of these shipwrecks by name. Historical records indicate that several hundred more vessels sank within the sanctuary or its vicinity. Past research expeditions have used remote sensing technology, such as side scan sonar and ROVs, to locate and identify shipwreck sites. Archaeologists have also used SCUBA to investigate shallower shipwreck sites, such as the 5-masted coal schooner *Paul Palmer* that caught fire and sank off Provincetown in 1913.

In 2002, a team of NOAA scientists confirmed that a shipwreck in the sanctuary was the side paddle wheel steamship *Portland*. The wooden hulled steamship, built in 1889 by the New England Shipbuilding Company of Bath, Maine, for the Portland Steam Packet Company, ran between Portland, Maine, and Boston, Massachusetts, from 1890 to 1898 (Figure 75). At 85.6 m (281 ft.) long, the steamship was one of the largest and best-appointed vessels afloat in New England during the 1890s. The steamship sank with all hands on November 27, 1898 during a fierce storm, thereafter known as the “Portland Gale.” Historians believe that nearly 200 people lost their lives.

Remains of the *Portland* include its upright and intact wooden hull, which has survived from the main deck level down to the keel (Figure 76). Machinery assemblages such as the boilers, paddle flanges and shaft, steam engine, walking beam and wooden A-frame are articulated and in their original positions. Smaller cultural artifacts such as plates and

cups lie scattered inside and outside the hull (Figure 77). The *Portland*'s hull is draped with fishing nets and provides substrate for sponges and anemones. In 2005, the *Portland* was listed on the National Register of Historic Places.

Another visually spectacular shipwreck site is the wrecks of the 83.5-m (274 ft.) long 4-masted schooner *Frank A. Palmer* (Figure 78) and 81.4-m (267 ft.) long 5-masted schooner *Louise B. Crary* (Figure 79), which sit upright on the seafloor connected at their bows after colliding (Figure 80). Both vessels were built at the turn of the century in Bath, Maine, for the coal trade between the Chesapeake Bay and New England. While enroute to Boston, Massachusetts, from Hampton Roads, Virginia, with coal cargos, the *Frank A. Palmer* and *Louise B. Crary* collided on December 17, 1902. Eleven of the twenty-one sailors onboard the schooners perished during the accident or while awaiting rescue in a lifeboat. Both schooners are intact from keel to main deck and have portions of their masts still standing. Surveys have encountered cultural artifacts within the remains of the *Frank A. Palmer* captain's cabin (Figure 81). In 2006, the *Frank A. Palmer* and *Louise B. Crary* were listed on the National Register of Historic Places.

In addition to the *Frank A. Palmer* and *Louise B. Crary*, archaeologists have located and investigated several other collier sites with varying degrees of preservation. Similar in size to the *Frank A. Palmer*, the shipwreck of the 5-masted schooner *Paul Palmer* exemplifies the differences in site preservation as a result of the wrecking event and the environment in which the shipwreck lies (Figure 82). While

FIGURE 77. FRAGILE TEACUPS AND DISHWARE IN THE GALLEY SURVIVED THE *PORTLAND*'S PLUMMET TO SEAFLOOR IN 1898.

The shipwreck is listed on the National Register of Historical Places and is the best preserved of any New England “night boat” found to date. Source: NOAA/SBNMS, NURC-UConn, and the Science Channel.



FIGURE 78. HISTORICAL PHOTOGRAPH OF THE 4-MASTED COAL SCHOONER *FRANK A PALMER*.

The Maine built *Frank A. Palmer* was the longest 4-masted schooner ever built. Courtesy: Maine Maritime Museum.



sailing south from Maine to the Chesapeake in ballast, the schooner’s forecastle caught fire off Highland Light in 1913. Flames quickly engulfed the schooner, thwarting efforts to extinguish the flames with the schooner’s pumps. The vessel’s crew escaped the fire by boarding a tug that approached the schooner to help fight the blaze. Burned to the waterline, the schooner sank on top of Stellwagen Bank. In 2007, the *Paul Palmer* was listed on the National Register of Historic Places.

Today, the *Paul Palmer*’s remains consist of its wooden hull, intact to the turn of the bilge, keelsons, a pile of anchor chain and the schooner’s windlass (Figure 83). Ship fittings, such as bits, a davit, anchors and rigging components, lie throughout the site. While the fire likely destroyed much of the vessel’s hull, the dynamic environment on top of

Stellwagen Bank caused the schooner’s structure to degrade faster than the more static environment in which the *Frank A. Palmer* rests. The schooner’s degradation has also been hastened by impacts from commercial fishing. Evidence of these impacts is graphically demonstrated by a trawl net that has become wrapped around the shipwreck’s windlass. The sanctuary has documented recent impacts in the form of broken timbers and displaced anchors.

Other collier sites represent much smaller vessels more typical of the sailing vessels that plied the East Coast during the nineteenth and early twentieth centuries. The archaeological preservation of these smaller collier shipwrecks varies

FIGURE 79. HISTORICAL PHOTOGRAPH OF THE 5-MASTED COAL SCHOONER *LOUISE B CRARY*.

In 1902, the *Louise B. Crary*’s mate miscalculated his tack causing his vessel to strike the *Frank A. Palmer*’s bow. Courtesy: Maine Maritime Museum.



FIGURE 80. IN 2002, NOAA SCIENTISTS CONFIRMED THE LOCATION OF THE SCHOONERS *FRANK A. PALMER* AND *LOUISE B. CRARY* IN THE STELLWAGEN BANK SANCTUARY.

Depicted is a side-scan sonar image of the two intact vessels, connected at their bows, in the same orientation in which they sank. Source: NOAA/SBNMS and NURC-UConn.

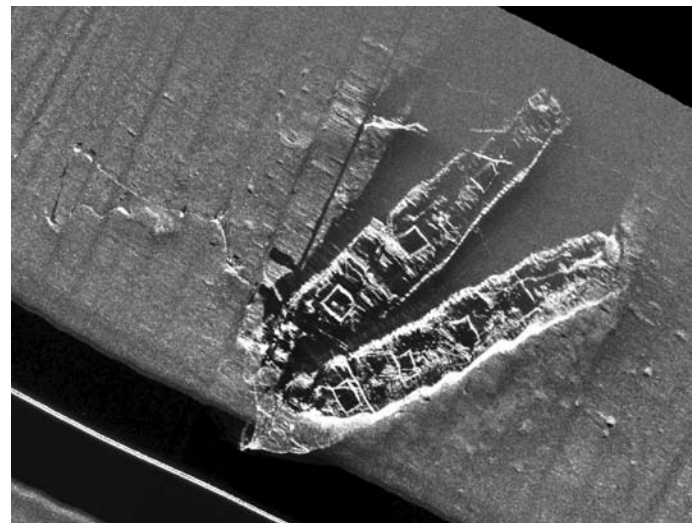


FIGURE 81. THE *FRANK A. PALMER*'S STERN CABIN CONTAINS THE REMAINS OF THE CAPTAIN'S SINK AND TOILET.

The *Frank A. Palmer* and *Louise B. Crary* are listed on the National Register of Historic Places and are the best preserved examples of New England coal schooners in the archaeological record located thus far. Source: NOAA/SBNMS and NURC-UConn.



widely. One 32 m (100 ft.) long vessel is nearly intact up to its deck level. Features of the site include copper-alloy sheathed hull planking, wooden hanging knees, and a variety of ship fittings and artifacts (Figure 84). In contrast, the hull remains of another collier are only represented by eroded frames protruding centimeters from a pile of coal 35 m (114.8 ft.) long. Very few ship fittings and no smaller artifacts were found on this site (Figure 85). Both vessels were likely two-masted schooners that carried a variety of cargos, but happened to be loaded with coal when they sank. While both vessels lie in water of similar depth, the more intact vessel lies in an area that is less frequently fished by bottom trawl gear.

FIGURE 82. HISTORICAL POSTCARD OF THE 5-MASTED COAL SCHOONER *PAUL PALMER* OFFLOADING COAL IN NEW HAMPSHIRE.

The *Paul Palmer* caught fire and sank off Cape Cod in 1913 while en-route to Virginia. Courtesy: LARC.



The granite industry is another coastal trade represented by a sanctuary shipwreck. In the remains of this sailing vessel, the cargo of granite slabs vary in size, ranging from blocks measuring 2 m long by .5 m wide, to others stretching over 3 m long. Approximately 40 slabs were contained within the vessel's hold (Figure 86). The most common slab shape measures 3 m long by 2 m wide with a manhole bored into its center. Blocks of this variety were used to cover sewer basins that captured the drainage from street gutters. The uniform shape of the manholes suggests that they were bored using a large diameter drill, a technology first used in the second half of the 19th century.

After colliers, the second most common variety of shipwreck located thus far in the sanctuary is 20th century commercial fishing vessels. Of these, wooden-hulled eastern-rig draggers represent the majority. Constructed from the 1920s through the 1970s, these side trawlers exemplify the transition from hook and line fishing to engine-powered trawling (Figure 87). Several of the eastern-rig dragger shipwrecks in the sanctuary are remarkably intact, with extant pilot houses and masts. Others are much more fragmentary as a result of damage incurred from the impact of nets and trawl doors of successive generations of fishing vessels.

AIRCRAFT

At least one aircraft crash site is believed to be located within the sanctuary. Divers reported finding a P-38 Lightning on the western edge of Stellwagen Bank. Fishermen also report recovering military aircraft parts from a site north of Stellwagen Bank (B. Lee, pers. comm., 2004).

PRESSURES

Sanctuary shipwreck sites below the zone of storm wave disturbance (~85 m) generally reside in a depositional envi-

FIGURE 83. THE *PAUL PALMER* RESTS ON TOP OF STELLWAGEN BANK WITH ITS WOODEN FRAMES AND HULL PLANKING PROTRUDING UP FROM THE SAND.

Substantial information can be learned about the role coal schooners played in the growth of New England by examining *Paul Palmer's* archaeological remains. Source: NOAA/SBNMS.



FIGURE 84. ARTIFACTS, SUCH AS THE BRASS HAND BELL AND CERAMIC DISHES SEEN HERE, ARE WELL PRESERVED ON THIS WOODEN HULLED SHIPWRECK WITH A COAL CARGO.

The sanctuary is studying this vessel to discover its identity and learn about life onboard a merchant sailing vessel in the New England coasting trade. Source: NOAA/SBNMS and NURC-UConn.



FIGURE 85. THE COAL CARGO DEPICTED IN THIS PHOTOGRAPH COVERS THE REMAINS OF A SHIPWRECK.

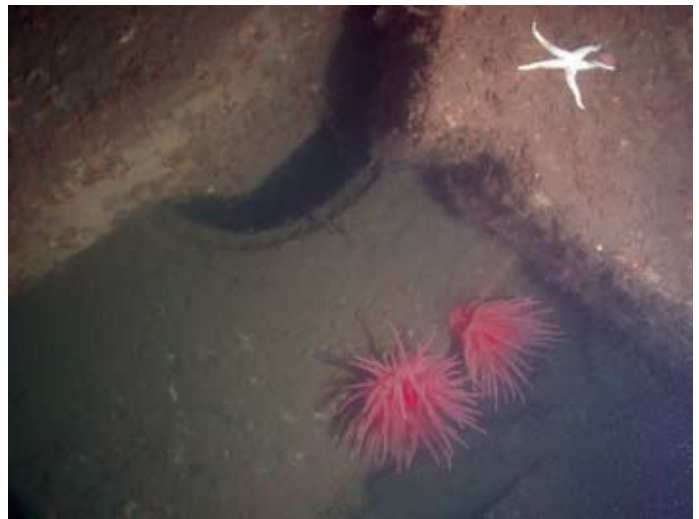
Bottom trawling has destroyed the vessel's structure above the sediment and removed all the durable artifacts, such as anchors and iron fittings. Source: NOAA/SBNMS and NURC-UConn.



ronment of little natural disturbance. Consequently, the chief impacts to archaeological sites in this realm result from fishing activities. The sanctuary's maritime heritage resources have been adversely impacted by fishing activities and are highly susceptible to future damage due largely to two factors: structural materials and fishing impacts. Every maritime heritage resource located to date is a shipwreck with a wooden hull, and much of the sanctuary's seafloor is regularly accessed by a variety of fishing gears. While the sanctuary's cold deep water helps preserve the shipwreck's organic structure, wooden hulls slowly degrade over time

FIGURE 86. THIS SHIPWRECK'S GRANITE BLOCK CARGO WAS DESTINED FOR USE IN THE CONSTRUCTION OF SIDEWALKS AND SEWER SYSTEMS.

Granite transportation supported a large fleet of sailing vessels during the 19th and early 20th centuries. Source: NOAA/SBNMS and NURC-UConn.



becoming very fragile. The ongoing characterization of the sanctuary's maritime heritage resources continues to reveal the results of past damaging interactions between historic shipwrecks and fishing gear. Other potential anthropogenic pressures on maritime heritage resources include SCUBA diving and remote sensing.

FISHING

Interactions between fishing gear (mobile and fixed gear as well as hook and line) and many of the sanctuary's maritime heritage resources have resulted in the degradation of the shipwrecks' archaeological integrity, reduction of their historical/archaeological significance, and diminishment of their aesthetic qualities. Currently, reference material mainly focuses on the impacts of fishing on marine habitats and the environment (Dorsey and Pederson, 1998; Smith *et al.*, 2003; Tudela, 2004). Marine archaeological literature has not yet adequately addressed fishing impacts to maritime heritage resources.

Many recreational and commercial fishermen intentionally target shipwrecks due to the higher density of fish typically found around structures that rise above the surrounding seafloor. By targeting these non-renewable resources, irreparable damage is done. A single impact from fishing gear can cause extensive damage, compromising the information contained within the archaeological site.

While some fishing gear impacts a site momentarily and then continues along without getting hung up, other gear may become tangled on the shipwreck, and then ultimately abandoned. The lost gear provides direct evidence of the interaction between fishing and maritime heritage resources. Eleven of the eighteen archaeological sites located within the sanctuary exhibit entangled fishing gear. The discard-

FIGURE 87. MANY EASTERN RIG DRAGGERS SIMILAR TO THE ONE PICTURED HERE SANK WITHIN THE STELLWAGEN BANK SANCTUARY AND ARE BEING DOCUMENTED BY SANCTUARY ARCHAEOLOGISTS.

This style of fishing trawler, common to the waters of Massachusetts Bay in the 20th Century, is a transitional design bridging the gap between earlier wooden sailing schooners and modern-day steel trawlers. Source: NOAA/SBNMS.



ed gear presents a serious safety and operations hazard to SCUBA divers and remote sensing equipment, such as side scan sonars, ROVs and Autonomous Underwater Vehicles (AUVs). The nets, lines and cables from lost gear close off completely or limit the site's accessibility to archaeologists, recreational SCUBA divers and the interested public. Discarded nets and line also present an entanglement hazard to marine life.

Mobile Gear Impacts

Mobile fishing gear (otter trawls, beam trawls, shellfish dredges) has had the greatest impact on maritime heritage resources. Mobile fishing gear components have been found on eleven historic shipwrecks. These towed nets or dredges, often weighing hundreds of pounds, roll or are dragged across the seafloor. When the net encounters a wooden shipwreck rising above the seafloor, it interacts with the shipwreck in one of three ways:

- 1) The gear breaks apart the shipwreck's structure;
- 2) The gear rolls over the shipwreck, damaging fragile structure; or
- 3) The gear catches on the shipwreck, stopping the vessel. If the gear can be pulled free it usually results in partial destruction of the shipwreck. Oftentimes, pieces of the net are left behind. Less frequently, the gear is so entangled

with the shipwreck's structure that entire nets and even trawl doors are lost.

Considerable damage to the shipwreck's structure results in all three situations. In addition, trawl nets often remove artifacts from the site. Fishermen frequently snag and recover anchors, windlasses, pumps and other assorted ship fittings. The removal of this material is particularly harmful to the site's archaeological integrity. In many cases, fishermen using mobile gear seek to avoid shipwrecks; however, some fishermen choose to tow their nets as close as possible to the shipwreck to catch fish inhabiting the shipwreck. This behavior has the potential to damage or destroy artifacts surrounding the shipwreck, damage the shipwreck through contact with the trawl doors, and potentially damage or entangle the main shipwreck structure.

Two examples of negative mobile fishing gear impacts are found on the steamship *Portland* and the schooner *Paul Palmer*. The *Portland* has a complete otter trawl net, including rollers and a trawl door, wrapped around its bow and starboard side. The wire tow rope has cut deeply into the steamship's stempost, while one of the trawl doors lies on the main deck (Figure 88). The net is tangled with and extends nearly the length of the starboard side forward of the boiler uptakes. More wire rope is draped across the top of the boiler uptakes. The trawl net has damaged portions of the wreck and greatly hampers the sanctuary's ability to

archaeologically investigate the shipwreck. The net and its wire tow rope present a severe entanglement risk for the ROV vehicle used to study the site.

The schooner *Paul Palmer* also had a trawl net wrapped around its bow. The net and rollers were entangled with the site's windlass and chain pile, and likely altered the orientation of the windlass when it was snagged (Figure 89). The net posed an entanglement hazard for SCUBA divers and marine life. NOAA divers removed the net in September 2006.

Fixed Gear Impacts

Fixed fishing gear (gillnets and lobster trawls) has also negatively impacted sanctuary maritime heritage resources. Fixed fishing gear components have been found on six historic shipwrecks. The initial placement of the gear may damage a resource if the gillnet anchor or lobster pot falls directly on a maritime heritage resource or its associated artifacts; however, the greatest damage results when fishermen attempt to recover their gear. If the gear has not already become entangled in the shipwreck's structure, pulling the gear to the surface can ensnare it. Once gear is firmly entangled, a fisherman will likely use the full power of his or her net or pot hauler and boat to free the gear. The high tension exerted on the lines easily snaps fragile wooden structure.

Entangled fixed gear continues to degrade the shipwreck by blocking access to the resource. SCUBA divers cannot safely approach the gillnet, for example, and researchers are unable to document the resource and share the information with the public. The *Frank A. Palmer* and *Louise B. Crary* have been negatively impacted by gillnets that are entangled on the shipwrecks. The *Louise B. Crary's* bow is enshrouded with a gillnet that covers the forecastle and forward deck house (Figure 90). The net prevents the archaeological examination of this area. A gill net *also* stretches between the two schooners preventing the archaeological examination of the collision point.

Hook and Line Impacts

Hook and line gear has been found on four historic shipwrecks. Hook and line bottom fishermen often target wrecks to catch the fish inhabiting the shipwrecks' structure. Boats often anchor to maintain position, risking anchor damage to the shipwreck and any surrounding

debris fields. Heavy lead jigs, weighing up to two pounds are repeatedly raised and lowered to attract fish (Figure 91). When a jig comes into contact with a maritime heritage resource, it has the potential to break fragile artifacts made from glass or ceramics. Frequently, fishermen snag their tackle on the shipwreck's structure. Attempts to free the line may damage the resource. If the jig is firmly stuck, the fisherman will break or cut the line, which may then fall across the shipwreck. Lost fishing line limits access to a shipwreck

FIGURE 88. WIRE ROPE ASSOCIATED WITH A TRAWL NET CUTS INTO THE STEAMSHIP *PORTLAND'S* BOW.

The negative impacts of commercial fishing activities are well documented on the wreck of the *Portland*. Source: NOAA/SBNMS and NURC-UConn.



FIGURE 89. THIS LARGE TRAWL NET WAS ONCE WRAPPED AROUND THE SCHOONER *PAUL PALMER'S* WINDLASS, WHERE IT WAS A HAZARD TO SCUBA DIVERS AND MARINE LIFE.

In 2006, NOAA divers removed the net to facilitate the documentation of the schooner's windlass. Courtesy: Tane Casserley, NOAA Maritime Heritage Program.



FIGURE 90. GILLNETS COVER THE SCHOONER *LOUISE B. CRARY*'S BOW.

The fishing gear entangled in this shipwreck prevents archaeologists from documenting most of the wreck's bow area and main deck space. Source: NOAA/SBNMS, NURC-UConn and the Science Channel.

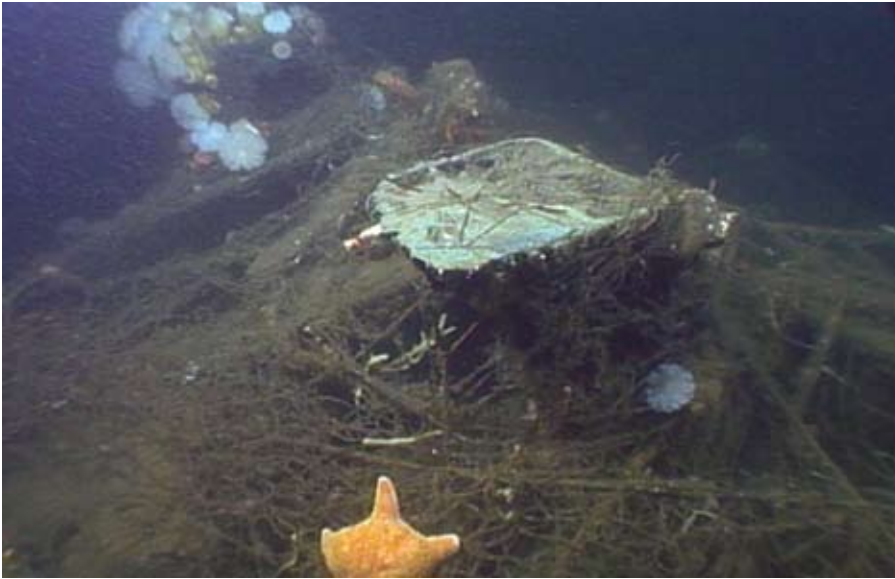


FIGURE 91. JIGS ARE EVIDENCE OF HOOK AND LINE FISHING ACTIVITY ON THE SCHOONER *PAUL PALMER*.

Lost fishing gear poses a hazard to divers and degrades the archaeological integrity of the shipwreck. Source: NOAA/SBNMS.



in much the same way a trawl net or a gillnet limits access to a shipwreck. Additionally, single strands of fishing line are difficult to see underwater, making entanglement of an ROV or a SCUBA diver a possibility.

An example of the impact of lost fishing line on a shipwreck is found on the *Frank A. Palmer*. A 2004 archaeological investigation of the site encountered no lost fishing lines crossing the aft deckhouse space. Returning to the same

area in 2005, researchers found several fishing lines crossing the area (Figure 92). The lines prevented the researchers from maneuvering their ROV into the area to investigate the artifacts contained within the cabin. Additionally, an unseen fishing line entangled and fouled a ROV thruster, preventing its operation and forcing termination of the dive.

DIVING

While SCUBA diving will not necessarily damage a shipwreck, certain diving practices and activities have the potential to impact the sanctuary's historical integrity (Edney, 2006). In comparison to the rocky shorelines and near shore waters of Massachusetts, the sanctuary has been visited by considerably fewer SCUBA divers. However, many divers have communicated their interest in visiting the sanctuary's shipwrecks. When SCUBA diving is conducted in the sanctuary, the dive location is usually near or on a maritime heritage resource.

The techniques and practices, both above and underwater, associated with SCUBA diving on a shipwreck may negatively impact the site and its historic resources if not done with care and resource preservation in mind. To access sites, boats carrying divers may drag their anchor across the seafloor and through the debris field of the archaeological site. The anchor may catch on the structure of the maritime heritage resource. Anchors or down weights dropped from a boat can plummet directly onto a fragile wooden hull and/or the associated artifacts, causing damage. Repetitive anchoring on, or securing a down line to, a maritime heritage resource can increase its rate of structural deterioration and reduce the site's archeological and historical significance.

Once underwater, divers' actions can be low-impact, such as observing the shipwrecks and their marine life or photographing, videotaping the site. But high-impact actions, such as souvenir

collecting, remove artifacts and reduce the archaeological significance of the sites. Divers who remove tightly secured artifacts often damage or destroy larger areas of the sites. While prohibited by sanctuary regulations, artifact collecting still occurs in National Marine Sanctuaries (*Craft, Ferguson, Jernigan, King, Parrott, Stocks, and Wilson v. NOAA*, 6 O.R.W. 150 United States Department of Commerce, 1990; *Craft, Ferguson, Jernigan, King, Parrott, Stocks, and Wilson*

v NPS, NOAA, and National Marine Fisheries, 34 F.d 918. United States Court of Appeals, 1994).

Artifacts lose their provenance once removed from a site and are no longer able to provide as much information about their history. Additionally, artifacts recovered from the marine environment deteriorate if not properly conserved and thus lose their ability to educate the general public. Artifact collecting also deprives future SCUBA divers of the excitement of exploring an “untouched” shipwreck.

REMOTE SENSING

Remote sensing allows individuals to use technology to explore the underwater environment without personally entering the water. Technologies vary from side scan sonar to ROVs and AUVs. Most remote sensing technologies are not designed to physically interact with maritime heritage resources and can do damage if unintentional contact is made.

Towed sensors, such as side scan sonars, drop cameras and magnetometers, can cause damage by striking or becoming entangled in a maritime heritage resource. Damage to the resource is then exacerbated when a remote sensing operator attempts to free an entangled piece of expensive marine technology. Remotely operated vehicles are designed to operate in proximity to maritime heritage resources and are capable of interacting with the resources using manipulator arms. Remotely operated vehicle operators can remove or disturb archaeological resources in a manner similar to divers.

Entanglement risks for ROVs are especially great in the Stellwagen Bank sanctuary due to derelict fishing gear that entangles many of the shipwreck structures. Freeing an ensnared ROV will likely damage a maritime heritage resource. Submersibles, manned underwater vehicles, pose the same hazards to maritime heritage resources as ROVs.

CURRENT PROTECTION

The sanctuary’s mandate to protect and manage maritime heritage resources arises from various federal regulations and laws. The sanctuary boundary encompasses an 842-square mile area of seafloor outside of the territorial sea of Massachusetts Bay and does not overlap with the jurisdiction of the Commonwealth of Massachusetts.

The protection of maritime heritage resources is provided through the following laws and regulations:

- Antiquities Act of 1906
- Historic Sites Act of 1935
- Archaeological and Historic Preservation Act of 1960
- National Historic Preservation Act (NHPA) of 1966 (16 U.S.C. § 470 et seq.)
- Department of Transportation Act of 1966 (section 4(f))
- Presidential Order 11593 of 1971
- National Environmental Policy Act (NEPA) (Section 101(b)(4))
- National Marine Sanctuaries Act (NMSA) of 1972 (16 U.S.C. § 1432 et seq.)
- Stellwagen Bank National Marine Sanctuary Regulations of 1992 (15 C.F.R § Subpart N)

The NMSA mandates that the National Marine Sanctuary Program manage maritime heritage resources in a fashion that protects the resources while facilitating compatible public and private use of the resources. National Marine Sanctuary Program regulations incorporate all laws and regulations of the Federal Archaeology Program, such as the National Historic Preservation Act. These regulations require that a heritage resource inventory and management program be developed for each site, that federal activities that may affect historic and cultural resources be undertaken in such a way as to prevent harm to historic resources, and that the Sanctuary Program nominate potentially eligible sites to the National Register of Historic Places.

The Sanctuary Program must also ensure mitigation of any federally-funded activity that might threaten historical and cultural resources under its control to facilitate the protection of these resources. The Sanctuary Program is required by Section 106 of the National Historic Preservation Act of 1966 to allow the Advisory Council on Historic Preservation an opportunity to comment on all sanctuary actions affecting historic resources in the sanctuary.

FIGURE 92. BRAIDED AND MONOFILAMENT FISHING LINE IS CAUGHT AROUND THE FRANK A. PALMER’S STEERING WHEEL.

Fishing line stretched across the schooner’s stern prevents the complete documentation of this area, which would provide important information about the vessel’s crew. Source: NOAA/SBNMS and NURC-UConn.



Current sanctuary regulations prohibit moving, removing or injuring, or attempting to move, remove or injure a sanctuary historical resource except as an incidental result of traditional fishing operations. These regulations also prohibit drilling into, dredging or otherwise altering the seabed of the sanctuary; or constructing, placing or abandoning any structure, material or other matter on the seabed of the sanctuary, except as an incidental result of an anchoring vessel, traditional fishing operations; or the installation of navigational aids. Lastly, sanctuary regulations prohibit possessing within the sanctuary (regardless of where taken, moved or removed from), except as necessary for valid law enforcement purposes, any historic resource.