

Submerged whaling heritage in Papahānaumokuākea Marine National Monument

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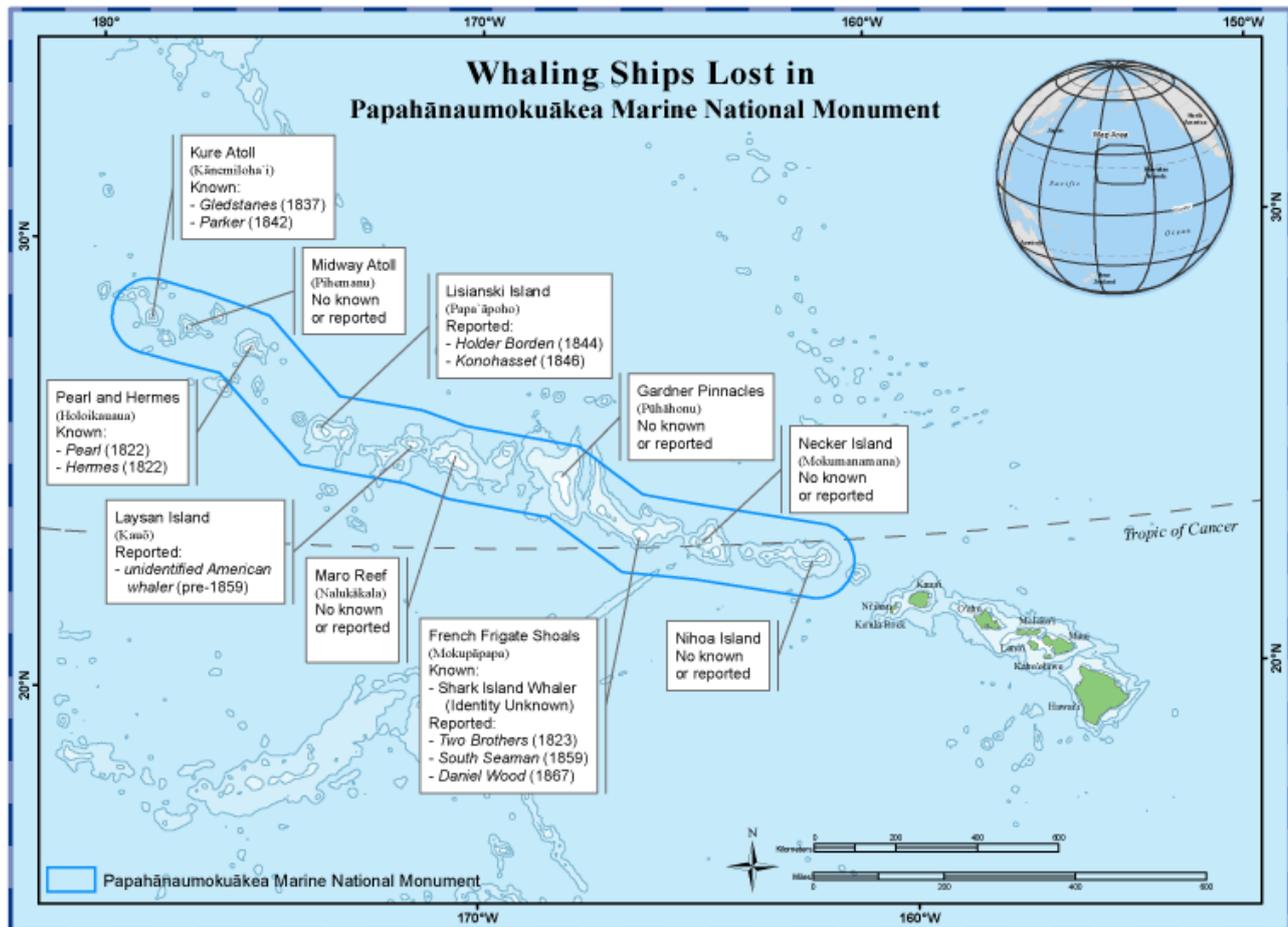


Figure 1. Location of Papahānaumokuākea Marine National Monument and known whaling shipwrecks (Image courtesy Papahānaumokuākea Marine National Monument).

Introduction

Papahānaumokuākea Marine National Monument (PMNM or Monument) encompasses the islands, atolls and reefs that comprise an area commonly referred to as the Northwestern Hawaiian Islands (NWHI). In the early 19th century whalers began venturing into the region en route to the newly discovered Japan Grounds located to the north-west of Kure Atoll. Over the decades of the early to mid-19th century, ten American and British whaling ships are known to have wrecked within the boundaries of PMNM. Information about each of these wrecks gleaned from primary source documents has provided the basis for the rediscovery and investigation of five of these sites. Due to the extremely remote location and

the protection status provided by the Monument, these sites represent well-preserved examples of the physical remains of whaling vessels that operated in the Pacific. The range of time represented by these wrecks (i.e. from the earliest period of whaling in the northern Pacific to the approximate end of whaling activities in Hawaii) offers a unique opportunity to learn more about whaling activities in the Pacific.

Whaling and 19th-century Hawaii

In the late 18th century whale ships first rounded Cape Horn and entered the Pacific Ocean, where they found new hunting grounds with seemingly endless stocks of sperm whales. Over the next century hundreds of ships

Vessel Name	Nationality	Home Port	Tonnage	Date Built	Date Lost	Approximate Location	Captain
<i>Pearl</i>	British	London	320	1805	1822	Pearl and Hermes Atoll	Clark
<i>Hermes</i>	British	London	262	1811	1822	Pearl and Hermes Atoll	Taylor
<i>Two Brothers</i>	American	Nantucket	217	?	1823	French Frigate Shoals	Pollard
<i>Gledstones</i>	British	London	428	1817	1837	Kure Atoll	Brown
<i>Parker</i>	American	New Bedford	406	1831	1842	Kure Atoll	Sherman
<i>Holder Borden</i>	American	Fall River	442	1841	1842	Lisianski Reef	Pell
<i>Konahassett</i>	American	Sag Harbor	426	?	1846	Lisianski Reef	Worth
<i>South Seaman</i>	American	Fairhaven	497	1856	1859	French Frigate Shoals	Norton
<i>Daniel Wood</i>	American	New Bedford	345	1852	1867	French Frigate Shoals	Tallman
Unidentified Pre-1859	American	Unknown	?	?	*Pre-8/30/1859	Laysan Island	?

Table 1. Historically known wrecks of whaling vessels in Papahānaumokuākea Marine National Monument.

* Wreck seen and reported by Captain N.C. Brooks of the Hawaiian bark *Gambia* on 30 August 1859.

recorded thousands of voyages from European and American whaling ports to the Pacific Ocean and islands scattered within (Finney 1999: 33). And as new whaling territories were uncovered, numerous ships came to dock at the harbours of Honolulu and Lahaina (Mrantz 1976: 4). These ports quickly became important to the industry and it in turn became vital to the early Hawaiian economy. ‘The wages of native seamen, profits on the sale of supplies, commissions on the transshipment of oil and bone from the islands to the United States, speculation in bills of exchange, and returns on all sorts of services from ship chandlery to boarding house keeping made whaling indispensable’ (Daws 1968: 169). But half a century was all that it would last; by the 1860s the Civil War in the United States, the discovery of petroleum in Pennsylvania and the growing scarcity of whales crippled the business. The final blow came in 1871, when the last remnants of the Pacific Fleet were crushed in an early Arctic freeze (Simpson & Goodman 1986: 7).

It is important to note that pelagic whaling ships rarely targeted Hawaii as a destination for hunting whales. Instead they stopped in to make repairs or to obtain crew or foreign goods which passed through the area,

or simply passed through while en route to the more densely populated fisheries of other parts of the Pacific Ocean (Lebo 2010: 23). One such area, known as the Japan Grounds, was discovered around 1820 and stretched from well north-west of the Hawaiian chain towards Japan (Richards 1999: 189).

PMNM Shipwreck Inventory

Whale ships leaving the main Hawaiian Islands and heading to the Japan Grounds soon encountered the islands, atolls and reefs of the Northwestern Hawaiian Islands. Called a ‘veritable graveyard of marine disaster’ due to the low, inconspicuous character of the islands and the incorrect or insufficient marine charts of the time (Thrum 1915: 133), many of the dangers in the region remained unknown until they were discovered by accident. Over a 55 year period, ten whaling ships are historically known to have wrecked within the boundaries of PMNM (Table 1). It is possible that others were lost during that time, but were not reported.

Pearl and Hermes

In 1822 the London whale ships *Pearl* and *Hermes* were

sailing in consort through the uncharted region. On the night of 24 April, both *Pearl* and *Hermes* ran aground and were wrecked in the northern part of the Hawaiian chain on the then unknown coral atoll that today bears both their names (Spoehr 1988: 80). 'The *Pearl* wrecked first, and the *Hermes* ran down to look after her consort, and met a similar fate' (Van Tilburg 2002: 21). *Pearl* ran straight into the spur and groove reef where it appears to have become wedged, while *Hermes* likely went broadside onto the reef and was broken up.

The *Pearl* and *Hermes* crews reached safety on a nearby island where they established a camp and developed a plan for constructing a small vessel from the wreckage. The work of breaking up and salvaging the two vessels and building a schooner, which the men called *Deliverance*, was supervised by *Hermes*' carpenter James Robinson (Taylor 1952: 11). Before he completed his task, a third British whaler came to the rescue and removed all but Robinson and eleven others who elected to stay. Together with Robinson these men sailed the newly built schooner on a successful, but long ten-week voyage back to Honolulu (Spoehr 1988: 80).

Two Brothers

Little is currently known about the early history of the Nantucket whale ship *Two Brothers*. However, this vessel is significant due to its connection to the story of the sinking of the whale ship *Essex*. The captain of *Two Brothers*, George Pollard, Jr., and two crew members were among the few survivors of the *Essex* disaster, in which the ship was stove and sunk by a whale in the South Pacific in 1820. Only five months after surviving that harrowing ordeal in which they were adrift for 93 days and ultimately resorted to cannibalism, Pollard took command of *Two Brothers* on another whaling voyage to the Pacific (Macy 1835: 249).

Descriptions of the voyage state that the trip was uneventful until February 1823, when they were cruising west of the Sandwich Islands (modern day Hawaii) on a course that would take them to the Japan Grounds (Heffernan 1981: 149). On 11 February a gale began and very soon breakers were seen. The ship struck a reef, was briefly refloated, then 'struck again so heavy as shattered her whole stern, the sea made a road over us and in a few moments the ship was full of water' (Gardner 1823: 1). It was clear that the ship was a total loss and with no time to salvage anything other than a few navigation instruments, the crew immediately launched two whale-boats and left the vessel. They drifted through the night and headed for what they thought to be a ship under full sail, but turned out to be a 50-ft (15.25 m) tall rock. Eventually the crew made it to an island, and on 13 February they were taken on board the Nantucket whaler *Martha*, 'which ship also struck on the same reef on the 11th, and got off again on the 12th' (Ward 1960: 327–333).

Though both Captain Pollard's and First Mate Eben Gardner's accounts of the event state that the reef on which they struck was unknown, it is believed that the calculations of their position were slightly off. There is no reef at the latitude and longitude they identified,

and the only place in that part of the Pacific fitting his description of the towering rock is directly to the east at the well known French Frigate Shoals (Heffernan 1982: 149). Other historical analyses that call into question the position of the wrecking include early 20th-century maps that list 'Two Brothers Reef' where there is only open ocean. Based on this data, there is a high probability that the ship was lost in French Frigate Shoals and therefore within PMNM boundaries.

Gledstanes

At 11.30 pm on 9 June 1837, the British whaler *Gledstanes* struck the northern end of the reef on Kure Atoll (Casserley 1998: 60). The Captain and crew launched three ships' boats and made landfall on Ocean Island (now known as Green Island). The following day some crew returned to the vessel and after cutting away the masts, were able to salvage some provisions. The next day the wreck broke apart in the heavy surf (*Pacific Commercial Advertiser* 29 January 1838). The crew established a makeshift camp on the island and passed their time picking up pieces of the wreckage that had been washed over the reef and into the lagoon, with the intention of constructing a vessel from those remains.

The keel of a 38-ft (11.59 m) vessel was laid two weeks after the loss of *Gledstanes*. The axes and adzes necessary for building the craft were manufactured from whale spades and augers and chisels from lances; the bellows for the blacksmith was composed principally of the compass belonging to the ship and the boat was caulked using a sort of channum (sic) made from lime and seal oil (*Sandwich Island Gazette* [SIG] 11 November 1837). After approximately three months the vessel was completed and named *Deliverance*. Captain Brown and nine others set sail for the Sandwich Islands while the rest of the crew remained on the island (*Pacific Commercial Advertiser* 29 January 1838). While en route *Deliverance* encountered the American ship *Timoleon*, who generously supplied them with much needed provisions (SIG 11 November 1837). *Deliverance* arrived at Honolulu sometime in November (1837) and the remaining crew on the island were rescued several months later sent by H.B.M. Consul in Honolulu (Woodward 1972: 4; Casserley 1998: 60).

Parker

The whale ship *Parker* of New Bedford, Massachusetts was lost on the reef surrounding Ocean Island at Kure Atoll. After battling heavy winds and seas, the vessel struck the reef on 24 September 1842 and quickly became a total wreck. An order to abandon ship was given and the crew cut away the masts, which they used to cross the reef; after eight days and seven nights of incessant labour 22 of the 26 crew succeeded in reaching the island (*Temperance Advocate and Seamen's Friend* 27 June 1843). No fresh water and only a peck of beans and twenty pounds of salt meat were saved, so the men survived by killing about 7 000 birds and 60 monk seals for food (Rauzon 2001: 176). From the wreck of the *Parker* they obtained copper, which they used to

manufacture cooking utensils (*Boston Semi-weekly Advertiser* 8 November 1843).

The survivors spent nearly seven months on Ocean Island, until the Captain and a few others were picked up on 16 April 1843 by the ship *James Stewart*. The rest of the crew remained on island until 2 May, when the whale ship *Nassau* rescued them (Van Tilburg 2006: 6). 'The *Parker* had on board when she was wrecked 3 000 barrels of sperm whale oil and 1 000 barrels of right whale oil—which along with the ship, was valued at \$82 000—of which \$55 000 was insured' (*Salem Register* 16 November 1843).

Holder Borden

The ship *Holder Borden* of Fall River, Massachusetts made only one voyage as a merchant ship to England, before sailing as a whale ship on 6 November 1842 (*Daily Mercury* 21 March 1845: 4). After refitting the ship and refreshing the crew in Honolulu, the ship sailed north and on the night of 12 April 1844 ran aground on a sandbank off Lisianski Island. Shortly thereafter it swung around and hit a coral reef from which it could not be extricated (Clapp & Wirtz 1975: 22). At daylight the crew found that they were wrecked approximately four miles from a small sand island. After attempting unsuccessfully to free the vessel, they salvaged provisions, cut away the masts to keep the vessel from falling over and rowed for the island (DuPont 1954: 358).

The crew of *Holder Borden* spent five months living on the island and survived on provisions salvaged from the ship, as well as seals, turtles and birds (Casserley 1998: 16). Measures were taken for salvaging the cargo and the crew succeeded in landing 1 400 (of 1 800) barrels of oil, anchors, cables, sails, provisions, clothing, etc. (*The Friend* 9 October 1844). Soon after landing they laid down the keel of a schooner of nearly 35 tons. Having a carpenter and blacksmith on board allowed them the expertise to build a forge (fed by coal used for the try-works) in which they constructed tools from the ships fittings and saws from hoop iron. Within five months they built a complete vessel that was painted, sheathed, and copper-fastened which they named *Hope*. Captain Pell and 24 of the crew sailed the vessel to Honolulu; once there Pell sold the schooner, procured another ship and returned to rescue the remaining crew and salvaged goods (*The Polynesian* 12 October 1844).

Konohassett

The whaling ship *Konohassett* of Sag Harbor, New York came to grief on the reef surrounding Lisianski Island on 24 May 1846. While under full sail at approximately 1.00 am the ship struck the reef about 17 miles (27.35 km) south-east of where the *Holder Borden* wrecked in 1844. After the ship bilged, the captain and crew took to the lifeboats. In the morning they returned to the ship and from that vantage point sighted the island (Clapp & Wirtz 1975: 22).

Over the next eighteen days provisions and materials were salvaged from the wreck. Captain Worth and crew constructed a schooner of 8 tons and 22½ ft (6.86 m)

which they called *Konohassett Jr.* The captain, mate and five men sailed to the port of Honolulu, where they arrived on 31 July 1844, after a passage of 42 days. The American Consul dispatched the Hawaiian schooner *Halileo* on 4 August to rescue the rest of the crew; all returned to Honolulu on 14 September 1844. The *Konohassett* was insured for \$30 000 and had no oil onboard at the time of wrecking (Ward 1960: 63–67).

South Seaman

The clipper ship *South Seaman* of Fairhaven, Massachusetts struck a coral reef at French Frigate Shoals on 13 March 1859 and quickly became a total loss. After striking, the ship pounded heavily on the bottom, and in less than half an hour the foremast broke. The ship broke up, but not until the crew saved provisions and materials to make tents (Walker 1909: 16) before taking to the boats. When the crew abandoned the vessel it stood on its sides, the bottom having completely broken up and the breakers making a clean sweep through it (*Atlas & Daily Bee* 17 May 1859).

The schooner *Kamehameha IV* was fortunately in the area sealing and guano hunting and rescued the captain and thirteen crew taking them to Bass Island and then on to Honolulu (*Atlas & Daily Bee* 17 May 1859). The wreck and stores were sold at auction to the owners of the *Kamehameha IV*, which soon returned to French Frigate Shoals to collect additional survivors, oil, and salvage the *South Seaman* (*Pacific Commercial Advertiser* 30 March 1859 & 27 April 1867; Van Tilburg 2002: 42). At the time of wrecking it had no oil on board (having shipped home about 3 500 barrels), but the provisions and stores were valued at \$12 000 and the anchors and chains at \$5 000. Altogether the loss was valued at \$55 000 (*The Daily National* 2 May 1859).

Daniel Wood

The whaling barque *Daniel Wood* of New Bedford, Massachusetts was wrecked on French Frigate Shoals on 14 April 1867. The vessel hit at 1.00 am, then drifted into the reefs where it heeled over due to the power of the breakers. Realizing that the vessel was a total loss, the masts were cut away and the boats launched towards a rock rising out of the sea on the horizon. They reached a low, sandy island with no vegetation. The following day they returned to the barque and recovered provisions and a small amount of fresh water; by the next day the vessel had broken up and not a vestige of it was visible above the water (Ward 1960: 553–563).

The crew chose their best whale boat, *Anne E. Wilson*, and began to build up its sides into what is called a 'sister gunwale and washboard' from the wreckage. Once complete Captain Richmond, the second mate and six of the crew took a small amount of supplies and embarked on the 450-mile journey to Honolulu. The boat made good headway and soon arrived at Ni'ihau, where they briefly rested and re-supplied then continued on. Upon arrival in Honolulu, USS *Lackawanna* was dispatched to rescue the remaining 27 crew (*Pacific Commercial Advertiser* 27 April 1867; Ward 1960: 553–563). At the time of loss

Daniel Wood was valued at \$45 000 and it was insured to the amount of \$37 000 (*The Daily Herald* 31 May 1867). The wreck was purchased at auction for \$18 and the schooner *Malolo* and several Hawaiian divers set out to salvage the copper, ironwork, anchor, and chains in deep water outside the reef (*Pacific Commercial Advertiser* 13 May 1867; Van Tilburg 2002: 43).

Unidentified, pre-1859

One other whaling ship is reported to have been lost at Laysan Island in the NWHI. Very little historical information about this vessel has been located and the only known reference is derived from the report of Captain N.C. Brooks of the Hawaiian Bark *Gambia* (Casserley 1998: 4). While conducting a survey for potential guano deposits in the NWHI in 1859, Brooks noted eleven shipwrecks and the islands on which they were lost. One of those listed was a 'ship, name unknown, on Laysan Island'. He further stated that the 'wreck at Daysan [sic], the name of which I was unable to ascertain, was that of an American whale ship' (*The Friend* 1859; Ward 1960: 309–310).

Archaeological investigations

Beginning with the investigation of reported wreckage that was subsequently determined to be the *Parker* wreck site, maritime archaeologists with PMNM and NOAA's Maritime Heritage Program have endeavoured to document each of these sites for both management and public interpretation purposes. Recording methods have included photographic and video surveys at all stages of investigation, baseline offsets, trilateration and measured drawings, as well as *in situ* artefact inventorying and the creation of a Global Information Systems database for each site. A small sample of artefacts has been recovered from some of the sites and following conservation these are displayed at the Monument's Mokupāpapa Discovery Centre in Hilo, Hawaii. The following is a brief discussion of the archaeological investigations that have been conducted on these whaling shipwreck sites since 2002.

Parker

The remains of a whale ship were documented by maritime archaeologists at Kure Atoll in 2002 and the site was thoroughly recorded over four field seasons. Tow boarding and remote sensing surveys of the area surrounding the site were conducted to delineate the site's boundaries. The majority of this wreck site is distributed in a line over 100 m (328 ft) in length across a section of the lagoon at Kure Atoll at depths of 6 m (19.6 ft) or less (Van Tilburg 2006: 6–7). A small number of fasteners of varying size were found on the outside on the fringing reef, which suggests that the ship hit the reef and was scattered over the reef crest and across the lagoon as it broke up.

Based on analysis of artefacts identified at the site, the remains are consistent with those of a mid-19th century whaling ship. These include two medium-sized anchors (both with rounded crowns, and one with a ring permanently attached to the top of the shank for connecting hemp cables and the other with a shackle

attached to the top of the shank for connecting chain), iron rings for wooden anchor stocks, a small boat anchor, two hawse pipes, a ship's bell, three different sizes of chain, rigging components such as deadeye strops, chain-plates and pulley blocks, iron thimbles, copper drift pins (some with patinated wood attached) and other smaller fasteners, copper sheathing and tacks, lead sheathing, and the remains of two composite (wooden and iron) windlasses. Artefacts indicating that the remains represent those of a whaling ship include try-works bricks; a large blubber hook and shackle which would have been suspended from the cutting tackle and used to lift the blanket pieces during the cutting-in process; a small blubber hook known as a junk hook and used for moving pieces of blubber on deck or in the hold; sherds of broken try-pots; and, try-works knees (Lytle 1984: 157–158).

As mentioned previously, two whaling ships are known to have wrecked at Kure; these are the British whaler *Gledstanes* (1839) and the American whaler *Parker* (1842). An historical report of *Parker's* loss states that the ship struck the reef and became a complete wreck in under an hour, and a map showing the location of where it stuck on the reef coincides with information gleaned through archaeological survey of the site. The 2008 recovery and conservation of the bell failed to provide positive identification through the possibility of an inscription. Historical and physical evidence indicates that this site is that of the New Bedford whaler *Parker*; however, the site has not yet been definitively identified (Van Tilburg 2003: 31).

Pearl

The first British whaling shipwreck located within Monument waters was identified by National Marine Fisheries Service marine debris divers in 2004. This site represents the earliest shipwreck yet located within PMNM boundaries and was first investigated by NOAA Maritime Heritage Program maritime archaeologists in 2005, at which time several diagnostic artefacts were recovered. Documentation of the shipwreck site and a site plan was completed in 2006. It lies seaward of the reef crest, but in proximity to breakers and is oriented North-South within the spur and groove topography (Van Tilburg 2006: 8). The wreck appears to have grounded bow first within a groove and deteriorated *in situ*. Some artefacts have also been located with the surf zone and a field of debris was recorded on the reef top, suggesting some scattering of the upper works of the hull.

Due to its unique depositional environment, many artefacts indicate that the remains represent those of an early 19th-century armed whaling vessel. Hull remains of the vessel are represented by wooden planks and a section of the oak keel which is buried in a small sand channel with several copper keel bolts still attached (Van Tilburg 2006: 8). Artefacts identified on the site include two anchors (both exhibiting sharply pointed crowns and large rings permanently attached to the tops of the shanks), a hawse pipe, two cannon, pig iron ballast, copper fasteners of varying sizes, copper sheathing, lead sheathing, copper

pintles and gudgeons, a grinding wheel, lead pipe and rigging components such as strops and sheaves. Try-works bricks, try-works knees used for reinforcement, four intact try-pots and various valve pieces all provide evidence of whaling activities onboard (Lytle 1984: 157–158). Other diagnostic artefacts include ceramic sherds and glass sherds from early 19th-century wine bottles (Fox 2006: 3).

This site has been identified as that of the British whale ship *Pearl*. The identity was determined through a letter written by carpenter James Robinson of *Pearl's* consort (*Hermes*), which recalls that *Pearl* wrecked to the east of *Hermes*. Artefact characteristics also directly relate to whaling activities. This information coupled with the facts that the atoll in which they are wrecked bears their names and that there are no other whalers known to have wrecked there support this identification.

Hermes

The wreck of the British whaling ship *Hermes* was also located by National Marine Fisheries Service marine debris divers in 2004; however, due to its location within a heavy surf zone it was not thoroughly documented until 2008. As described above, *Hermes* sailed in consort with *Pearl* and came to grief while attempting to assist the crew of *Pearl*. The wreck site consists of artefacts resting in small pockets in the reef which extends over an approximate 200 m (656 ft) section. The vessel appears to have been pushed over onto its side, spilling its contents over the reef before breaking up in the surf. Artefacts have also been located within the surf zone, suggesting some scattering of the ship.

Analysis of artefacts identified at the site support the wreck's identification as that of a whaler. Artefacts include two large anchors (both exhibiting sharply pointed crowns and large rings permanently attached to the tops of the shanks), a hawse pipe, copper sheathing, approximately 150 pig iron ballast bars, copper fasteners of varying sizes, two large cannon, two small cannon, approximately 30 cannonballs and musket shot. Artefacts indicating that the vessel was involved in whaling include an intact try-pot, try-pot sherds, bricks, try-works knees, a blubber hook, various copper valve pieces and fittings and a copper bailer which was used to transfer the hot oil from the try-pots to a cooling tank beside the try-works (Lytle 1984: 156). In 2005, a second intact try-pot was located and recorded in an exposed area of the reef crest; however, when the team returned to the site in 2006 the try-pot was gone, assumed to be broken up in the surf.

This site has been identified as that of the British whale ship *Hermes*. As with the *Pearl* shipwreck, historical information relating to their loss and location, as well as physical evidence gleaned through archaeological survey support this identification. In 2005, several diagnostic artefacts including musket shot and fasteners were recovered from the site for analysis and display.

Gledstanes

A second whaling vessel was located at Kure Atoll while conducting drift diving operations on the outer reef. The

site was recorded in 2008 and consists of mainly large heavy artefacts scattered over a 70 m (229 ft) section of the reef at depths ranging from 2 to 7 m. Some of the artefacts are extremely eroded suggesting that they are affected by scouring due to wave and current activities. The distribution of the site suggests that the vessel hit the fringing reef and broke up leaving artefacts resting on the reef top and in deep spur and groove channels.

Analysis of the features and artefacts indicate that the remains represent those of a mid-19th century sailing ship involved in whaling activities. Artefacts include four large anchors (three with pointed crowns and large rings permanently attached to the tops of the shanks, and one with a pointed crown and a shackle attached to the top of the shank), one small cannon and another possible cannon, a pile of anchor chain, approximately 50 pig iron ballast bars and copper fasteners of various sizes. The lower portion of a try-pot with try-works bricks inside of it and possible iron try-works knees helped to identify the remains as those of a whaler. An area of the lagoon directly in line with the wreckage was surveyed; possible try-pot sherds and non-diagnostic glass bottle sherds were identified.

These remains are thought to be those of the British whale ship *Gledstanes*. Historical accounts of the loss of *Gledstanes*, two different maps providing the approximate location of its wrecking, artefact characteristics and the fact that the only other whaler known to have been lost at Kure has been previously identified, all support this identification; however, definitive identification has not been made.

Shark Island whaler

The remains of another whaling vessel were discovered while tow boarding in the northwestern section of French Frigate Shoals. The site was preliminarily recorded in 2008 and consists of a trail of artefacts resting in small pockets in the reef and just off its northern edge at depths of between one and four meters. The distribution of the site suggests that the vessel hit the reef in a storm and was violently smashed and scattered across the reef top and over its back edge.

Analysis of artefacts identified at the site suggests that these remains represent those of an early 19th-century whaling ship. Artefacts include two large anchors (both exhibiting sharply pointed crowns and large rings permanently attached to the tops of the shanks for connecting hemp cables), two hawse pipes, rigging components such as chain-plates and deadeye strops, copper fasteners of different sizes, copper sheathing and tacks, a lead pipe, mast rings, iron rigging thimbles and deck eyes. Artefacts indicating the vessel was a whaling ship include three try-pots and a large number of try-works bricks. Other diagnostic artefacts include two trapezoidal-shaped case bottles that indicate an early 19th-century manufacture date.

As discussed previously, only three whaling ships are known to have wrecked at French Frigate Shoals. These include *Two Brothers* (1823), *South Seaman* (1859)

and *Daniel Wood* (1867). Based on diagnostic evidence, the site has been preliminarily identified as that of the Nantucket whale ship *Two Brothers*. However, since no concrete evidence yet confirms the identity, it is important to bear in mind that the wreck could also represent an undocumented whaler that wrecked on the reef around that time.

Discussion

Management, interpretation and future research directions

The main directives of the archaeological investigation of the wrecks in PMNM include management, interpretation and research. The size of the Monument (approximately 2 000 km long and 300 km wide) and its extremely remote location makes each of these objectives complex. Due to the impracticality of having archaeologists stationed in the Monument, headquarters are based on the main Hawaiian island of Oahu. Access is then provided through yearly research cruises aboard NOAA research vessels, though the permitting process to conduct research in PMNM is extensive and heavily regulated.

Management of remote wreck sites

Since 1998 archaeologists and students have conducted archival research to develop a database of ship and aircraft losses in the region. Papahānaumokuākea Marine National Monument is committed to identifying, interpreting and protecting maritime heritage resources in Monument waters and employs a full time maritime archaeologist to coordinate maritime heritage activities in PMNM. The NOAA vessel *Hi'ialakai*, which arrived in Hawaii in 2004, is able to facilitate annual maritime heritage surveys with a safe and efficient dive and survey platform. Each year teams of two to eight maritime archaeologists conduct survey and mapping operations at varying atolls and reefs; techniques have included tow boarding, drift diving, magnetometer and side scan sonar surveys. When sites are identified they are recorded using global positioning systems, traditional mapping methods, photography and video, and then left *in situ*. Only when it is necessary to assist in identification are artefacts recovered and conserved.

As with other whaling sites in remote locations of the Asia Pacific region, the biggest threat the PMNM whaling wrecks face is continued deterioration caused by natural forces. Most of the identified whaling wrecks lie in areas that are prone to heavy storm activities in the winter. In order to better understand how these environmental factors affect these sites, a program of monitoring is employed.

Interpretation and outreach

The need to provide 'access' to these sites to both the public and to researchers is obviously important. However the remote location of the Northwestern Hawaiian Islands and the highly protected status of the Monument make it nearly impossible to provide physical access to the sites. As such, Monument staff has developed innovative ways to provide information about the sites through virtual experiences. Currently the PMNM website has pages

devoted to each of the sites which include vessel histories, archaeological investigations and photographs. Other internet based methods for public involvement include expedition blogs on which day-to-day activities and the impressions of researchers are posted, and through video clips captured from the maritime heritage documentary film *Lost on a Reef* (Gordon 2010). Filmed in 2008, this documentary highlights many of the shipwreck sites (including all of the whaling wrecks) through discussions of their histories and their unique and fragile nature, and explains the need to protect them.

PMNM and NOAA Office of National Marine Sanctuaries (ONMS) archaeologists also employ more traditional methods for interpreting the sites. Through public lectures and professional conference presentations, as well as published research results in popular and professional journals, staff and collaborative partners disseminate their research results to the community. The establishment of a thematic exhibit at PMNM's Mokupāpapa Discovery Centre in Hilo (Hawaii) has also proven useful to promoting the Monument's conservation message. The exhibit incorporates the full maritime heritage documentary, displays information about whaling in the Pacific and uses fully conserved artefacts recovered from the sites, signage and photos to provide a tangible link to this period. Future outreach plans also include the development of a modular exhibit that will travel to other ONMS sites and partner exhibit locations.

Future directions for research

The whaling shipwrecks in the Monument have potential to provide insight into the pelagic whaling industries that operated in the Pacific in the early to mid-19th century. When considered as industrial sites, whaling ships are unique and can be analysed as parts of a whole extractive industry (Gordon & Malone 1994; Basberg 1998; Casella & Symonds 2005). No other marine industry was quite like pelagic whaling: a fully integrated system in which the hunting (exploration), capture (extraction), processing (cutting in), refining (trying out), storage and transportation of product all centred on the vessel. Using material remains of these wrecks, a great deal could be learned about the actual operations of these floating factories. Furthermore, because both American and British wrecks are represented, the differences between the two systems and the changing technologies that each employed might also be gleaned. Additional archival studies of the construction and history of each of these vessels, as well as of the descriptions of the operations and outfitting of the Pacific Fleets, could also reveal valuable information.

Another area where these sites could provide new information is through studies of site formation and transformation. The works of Muckleroy (1978), Murphy and Cummings (1990), Ward *et al.* (1999), McCarthy (2000), Gibbs (2006) and Richards (2008) have each proven the usefulness of such studies. The unique circumstances under which each of these sites were deposited and the subsequent cultural and natural forces

that affected them are important in understanding their current conditions. As described above, some of the vessels were wrecked and almost nothing was salvaged prior to abandonment; their remains reflect only the environmental processes which affect the sites. In other cases, the survivors of the wreck established camps and recovered large amounts of cargo, equipment and wreckage that they used to build rescue vessels; as a result both the environment and these cultural factors add to the current condition of the site.

The study of the camps set up by the survivors of these shipwrecks could also provide new information and help in understanding the wrecking events and nature of such survivor camps. Though the circumstances and locations of their wrecking differ, in almost every case there are similarities in the activities in which the survivors engaged. Authority, social structure, camp organization, relationships between wreck locations and camp locations, subsistence, material culture, shelter and structures, health, salvage and the development of a rescue strategy are all themes that can be interpreted through the study of survivor camps (Gibbs 2003). An historical ecological approach could also potentially provide information about the impacts these camps had on the local ecology.

Conclusion

The archaeological investigation of the whaling shipwreck sites found within the boundaries of Papahānaumokuākea Marine National Monument provides a tangible link to the period when whaling was a primary industry of the Pacific. No other place in the Pacific region offers such a unique opportunity to learn about the pelagic whaling industry, the technologies employed, or the abilities and perseverance of those who engaged in it. Through the protection afforded by the site's status as a Marine National Monument and recent listing as a UNESCO World Heritage Site, as well as its extremely remote location, these well-preserved sites have the potential to shed light on an industry of worldwide impact.

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