

Exploring the Sunken Military Heritage of Midway Atoll

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Abstract

Following the attack on Pearl Harbor in December 1941, the Japanese Imperial Navy readied their forces to secure the Pacific Theatre through one final blow to the US aircraft carrier fleet. The target of that attack was the US base at Midway Atoll, which provided support as a naval air station and submarine refit center. In June 1942, the Japanese Navy launched an aerial attack on Midway in an effort to destroy its defenses and lure the remaining aircraft carriers into combat. Although outgunned and outnumbered, US aviators surprised the Japanese fleet and succeeded in destroying four of their carriers, thereby crippling Japanese aerial defenses for the remainder of the war. Today, Midway Atoll is situated within the boundaries of Papahānaumokuākea Marine National Monument and many of its World War II naval facilities are preserved as a memorial to those who lost their lives. Recent interest in the battle has led to a renewed effort to locate and document the submerged cultural heritage of the atoll and to create outreach materials addressing both the tangible and intangible heritage of the battle. This paper provides an overview of the history of the atoll and the Battle of Midway, describes significant archaeological sites so far located there, and discusses recent survey projects focused on identifying the remains of aircraft associated with the battle.

Key words: Midway, World War II, survey, aircraft

Introduction

Located at the northwest end of the Hawaiian island chain (Fig. 1), Midway atoll is geographically isolated, sitting approximately 1300 miles northwest of Honolulu (FWS, 2000). Managed by the US Fish and Wildlife Service

(FWS) and part of the larger Papahānaumokuākea Marine National Monument (PMNM), the atoll is protected as a National Wildlife Refuge, National Memorial, and a United Nations Educational, Scientific, and Cultural Organization (UNESCO) World Heritage Site (NOAA, 2017). Furthermore, the WWII-era facilities on Eastern and Sand Islands are designated as historic structures on the US National Register of Historic Places (Thompson, 1986). Visitation to the atoll is currently restricted, limiting public interaction with the atoll's historic resources to outreach materials. As such, there has been an increased interest by PMNM (in partnership with FWS and the US National Park Service, NPS) to better understand and present the historical significance of Midway atoll to the public through archival research, archaeological site detection and documentation, site visitation, and mapping.

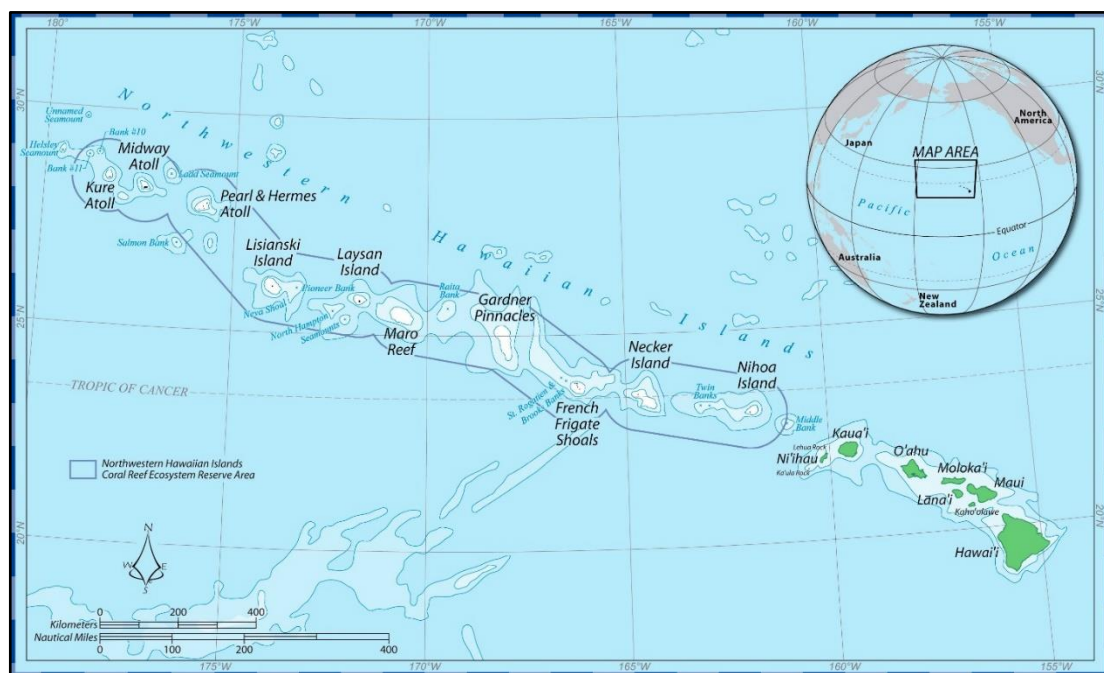


Fig. 1: Midway Atoll, located at the eastern part of the Northwestern Hawaiian Island chain. (NOAA)

Historical Background

Concerned with the increasing Japanese presence in the Pacific, the United States (US) Navy began construction on a naval air station at Midway atoll in 1938 (FWS, 2000). The two islands within the atoll soon became host to the 6th Marine Defense Battalion and the 2nd Raider Battalion when construction of the base was completed in 1941 (Thompson, 1986). As Midway was (and remains) geographically isolated, the islands' infrastructures emphasized coastal defense, fuel storage, and air transport facilities. In May 1942, the Imperial Japanese Naval code was deciphered, revealing an imminent attack on the base (Layton et al., 2006). Reinforcements of submarines, motor torpedo (PT) boats, and aircraft were sent to Midway while the US aircraft carriers sailed north of the atoll (Office of Naval Intelligence, 1943:3). Submarines and small craft began patrolling nearby waters while aircraft stationed at the base participated in daily scouting trips (Nimitz, 1942:4).

The evening of 3 June 1942, US scout bombers located Japanese ships to the west of the atoll, approximately 470 miles from the air station (Office of Naval Intelligence, 1943:9). By 6:00 a.m., on 4 June, radar stationed at the atoll had picked up numerous aircraft flying at 12,000 feet approximately 93 miles from the base (Simard, 1942:2). Targeting communications buildings, the power plant, and fuel storage areas, Japanese aviators succeeded in disrupting communications and caused substantial damage to the seaplane base (Fig. 2). Furthermore, many of the base's defenses proved useless against Japanese planes. Anti-aircraft guns were too slow to match Japanese bombers, as were American fighter planes; of the 27 Brewster F2A-3 Buffalos and Grumman F4F Wildcats which had departed Midway to meet the coming onslaught,

only a handful of planes returned unharmed (Office of Naval Intelligence, 1943).



Fig. 2: Japanese attack on Midway Atoll as depicted by Norman Bel Geddes for Life Magazine (Official U.S. Navy Photograph).

As personnel on Midway prepared for a second attack, Japanese aircraft on carriers faced an escalating emergency; bomber aircraft from US carriers had located the Japanese fleet. A carrier war emerged out of the chaos—by 7 June, US forces had destroyed the Japanese carriers *Akagi*, *Kaga*, *Sōryū* and *Hiryū* while a Japanese submarine succeeded in sinking the carrier USS *Yorktown*. A total of 332 Japanese and 147 American aircraft were lost during the battle (Office of Naval Intelligence, 1943:54; Thompson, 1986).

With the Japanese carrier fleet destroyed, the Imperial Japanese Navy was forced to retreat. Those stationed at Midway began rebuilding and strengthening the islands' defenses (Thompson, 1986:3). Publicized as the 'turning point' for war in the Pacific, the battle of Midway has become

synonymous with American valor (Thompson, 1986). However, heroes emerged on both sides of the during the attack and the battle was not without sacrifice—over 300 Americans and 2,400 Japanese gave their lives in service to their countries (Office of Naval Intelligence, 1943: 54; Thompson, 1986).

Following the battle, the Japanese Navy remained a formidable opponent. While US forces had succeeded in keeping control of the atoll, American aircraft were repeatedly out-maneuvered by their Japanese counterparts such as the Mitsubishi A6M Zero Fighter. Major Jo Warner who was stationed at Midway during the attack would later state, "...the saddest story was our fighters. The PBYs and dive bombers are slow, but the Grumman and Brewsters used by the marine fighter outfits didn't have a chance against the Zeros" (Warner, 1942:7). Following the battle, engineers strove to redesign American fighter aircraft. The resulting F6F Hellcat and F4U Corsair proved far superior to the Buffalos and remained in use through the end of the war.

Following the battle of Midway, the atoll remained important in the US Navy's Pacific strategy through the construction of a submarine base (Ellis, 2002). After WWII, it was used as a US Naval base for the Korean and Vietnam Wars. Downgraded to a Naval Air Facility in 1978, the atoll was designated a National Wildlife Refuge in 1988. In 1993, the atoll was transferred to FWS following base closure. Expansion of Papahānaumokuākea Marine National Monument (formerly the Northwestern Hawaiian Islands Marine National Monument) in 2006 placed atoll management under the jurisdiction of FWS and NOAA. Currently, the atoll is closed to visitors; as such, emphasis is currently placed on digital outreach by cultural resource managers.

Archaeological Investigations of Midway's Submerged Heritage

Archaeological investigations of Midway atoll's sunken heritage began in 1998 (Van Tilburg, 2002a). Since that time, surveys have focused on the documentation of previously known wrecked or dumped watercraft and airplanes, as well as searching particular areas in the vicinity of historically reported wrecks. Along with the many craft lost at the Battle of Midway, historical accounts indicate that a number of 19th and early 20th century vessels are known to have come to grief upon the atoll's reefs. These include the two-masted schooner *Julia E. Whalen* (1903), the schooner *General Seigel* (1886), the bark *Wandering Minstrel* (1888), the three-masted bark *Carrolton* (1906), the sloop *Helene* (1915), and an unidentified Japanese sampan lost in 1925 (Van Tilburg, 2002b; PMNM, 2011). Of those sites, only the bark *Carrolton* has been identified and thoroughly documented (Maynard et al., 1998; Van Tilburg, 2002b; Van Tilburg, 2003; Van Tilburg, 2005). Towboarding and drift diving have been the most fruitful methods for identifying underwater cultural heritage that represents many of the various events and activities that have occurred at Midway over time. Such surveys have resulted in the discovery of a range of materials and sites such as 19th and 20th century anchors and chain, WWII-era aircraft wreckage and unexploded ordinance, and sites of 20th century scientific data collection (Raupp, 2015).

USS Macaw

The wreck of the submarine rescue vessel *USS Macaw* is among the most prominent and well-known underwater archaeological sites at Midway Atoll. Situated on the eastern side of the main shipping channel, the site lies in 8-12 meters (m) (25-45 feet (ft)) of water. The wreck was first investigated in 1998 with a detailed site plan and photomosaic produced by an archaeological team from NOAA, East Carolina University, and University of Hawaii in 2003 (Van Tilburg, 2003; PMNM, 2011). In 2005,

the wreck was extensively documented using high definition video equipment and digital still photography (Van Tilburg, 2005) and monitoring surveys are conducted regularly with a focus on photographic and video documentation. Although US Navy divers attempted to reduce the ship's superstructure and clear the channel post-wrecking, substantial hull remains – including the relatively intact bow section – are scattered over an approximately 75 m (240 ft) area. Associated material culture including three large anchors, the detached rudder anchor chains, and heavy bronze artifacts remain scattered throughout the site (Van Tilburg, 2003). A Midway-based dive shop took advantage of the easy access to the site and for several years ran tours during slack tide and optimum weather conditions; however, no changes are known to have occurred to the site since salvage operations ended in 1944 (Van Tilburg, 2003a; Van Tilburg, 2003b).

The location and remains of USS *Macaw* have been further researched since the time of its wrecking. Archival data indicates that the Chanticleer class USS *Macaw* (ASR-11) was launched in 1942 in Oakland, California and received a commission by the US Navy in July 1943. The vessel first sailed to the south Pacific to participate in a hydrographic survey of uncharted coral reefs. Soon after it was sent on its first salvage mission to Midway Atoll, where in January 1944 it ran aground while attempting to assist the submarine USS *Flier* (Van Tilburg, 2003a; Van Tilburg, 2003b; PMNM, 2008). Foul weather and sea conditions thwarted the numerous efforts to extract USS *Macaw* from the reef and it was ultimately abandoned and sunk. The ship was later salvaged of useful equipment before explosives flattened the superstructure and cleared the channel (Van Tilburg, 2003a).

Vought F4U Corsair

The remains of a Vought F4U Corsair aircraft were first identified by members of the "Coral King Dive Club" in 1976 (NOAA, 2017). Resting in approximately 35 m (115 ft) of water on a sand seabed, the site is situated off the south shore runway on Sand Island. Archaeological surveys conducted between 2002 and 2008 focused on site documentation and a special photographic survey of the site was conducted in 2008 to capture data for use in the creation of a computer generated three-dimensional rendering of the site (Fig. 3)(Gleason, 2008; PMNM, 2011). The wreck site is comprised of two distinct areas situated approximately 200 m apart; one incorporates the largely inverted fuselage and wing portion of the plane with its retractable landing gear down and the other is a large and well-preserved radial engine. The fuselage and wing section is largely intact and the artifacts identified on the seabed are pieces of the plexiglass from the cockpit canopy and rolls of .50-caliber ammunition (Van Tilburg, 2002). Due to the mostly flat and featureless bottom, the site provides a wide variety of fish species with a wealth of habitats in which to shelter" (Van Tilburg, 2007:4).



Fig. 3: Photogrammetric model of the Vought F4U Corsair at Midway Atoll (Image courtesy of Bert Ho, Exploring the Sunken Heritage of Midway Atoll expedition 2017).

The distinctive bent-wing design of the wrecked aircraft make it easily identifiable as a F4U Corsair. In production between 1942 and 1952, the Corsair was powered by a Pratt and Whitney R-2800 Double Wasp air-cooled radial engine with a large Hamilton Standard propeller which produced a top speed of over 400 miles per hour (Tillman, 2001). Although the exact date for the loss of this F4U Corsair is unknown, it occurred sometime after Battle of Midway since the type was only introduced to the Pacific theater in 1943. Based on the position of the retractable landing gear, it is likely that the plane crashed either on approach or shortly after take off from the runway at Sand Island (Van Tilburg, 2002a).

F2A Brewster Buffalo

In 2012, divers from NOAA's Pacific Islands Fisheries Science Center Coral Reef Ecosystem Division located the remains of a wrecked Brewster

F2A Buffalo while conducting marine debris surveys at Midway Atoll. Located in approximately 3 m (10 ft) of water on the eastern side of the lagoon, the site consists of disarticulated military aircraft components concentrated in a discreet area of the seabed. An archaeological survey of the site by a team of researchers from PMNM produced detailed sketches of artifacts, a site plan, photographic and video records, and a photogrammetric model of the main concentration of wreckage. Reconnaissance surveys of the surrounding area found a large scatter of associated wreckage, which suggests that the plane likely broke up on impact with the water. Artifacts recorded at the site include a Wright R-1820-40 Cyclone radial engine and mangled propeller, four .50-caliber Browning machine guns, .50-caliber ammunition, cockpit canopy glass, a control column, a tail cone, and multiple components of a Buffalo's distinctive landing gear (Raupp and Green, 2012). No previous knowledge of the site or evidence of anthropogenic impacts have been located in archives or historic documents. The shallow nature of the site and the fact that no fuselage remains were identified, however, suggest that the majority of the wreckage may have been recovered sometime after impact for disposal.

Archival research did provide information on the aircraft and the wrecking event; in February 1942, a squall caused United States Marine Corps (USMC) Lt. Col. Charles W. Somers, Jr. to crash into the lagoon at Midway Atoll while trying to land at Eastern Island (TIGHAR, 2012:27). Somers survived the crash and went on to fight in the Battle of Midway. He was later appointed as the first commanding officer of VMF-214, also known as the Black Sheep Squadron (Allison, 2003:68).

P40 Warhawk

While conducting routine towboarding operations in 2014, PMNM archaeologists discovered the remains of a P-40K Warhawk fighter aircraft off the southeastern portion of Midway Atoll's barrier reef. Resting at a depth of approximately 8m (25 ft) and situated in two distinct areas within a relatively small area of the spur and groove reef system, the site is located just offshore of one Eastern Island's historic runways. Site surveys produced detailed sketches of individual artifacts and a site plan, as well as photographic and video records of the site. Identified among the scattered wreckage were a large inline engine, components of landing gear, two propeller blades, three .50-caliber machine guns, a machine gun muzzle, and .50-caliber ammunition (Gleason, 2014).

Determination of the aircraft type proved simple due to the distinct design of the motor; identified as an Allison V-1710 12 cylinder liquid-cooled engine, it was used to power the Curtiss P-40 Warhawk aircraft. Markings on some of the artifacts further supported this identification. The .50-caliber shells marked "1941" offered at date of production, and manufacturing on the muzzle indicated that was intended for use with a .50-caliber Browning machine gun (Gleason, 2014). No previous knowledge of this site or any impacts that have occurred to the wreck over time have been located. The fact that no fuselage remains were identified is unsurprising, given the large swells created by winter storms which have likely broken up and displaced the lightweight aluminum hull and deposited only heavier iron objects.

Archival research indicates that only one P-40K Warhawk is known to have wrecked off the eastern shore of Eastern Island. In February 1943, US Army Air Force (USAAF) Lt. Ray Obenshain, Jr. was forced to ditch

his P-40 and parachute to safety when the controls froze shortly after takeoff (NOAA, 2017). This plane was one of twenty-four aircraft detailed to the USAAF 78th Fighter Squadron, which set an aviation milestone when they arrived at Midway in January 1943. After equipping the planes with special belly tanks to provide extra fuel, the squadron departed Barking Sands Air Force Base on Kauai and flew 1100 miles, the longest over-water flight of a single engine, land-based airplane ever attempted (Bennett, 2009).

Aircraft Wreck SW

Components of an unidentified aircraft wreck were identified in the southwestern portion of the barrier reef in 2015. Phenomenal sea conditions allowed a team PMNM of researchers to conduct towboard surveys close to the reef in the generally difficult to operate portion of the atoll. Lying in approximately 3 m (10 ft) of water in a channel of the spur and groove reef topography, an intact three-bladed propeller, hub, shaft, gears, and other engine components were identified. Time constraints allowed for only preliminary archaeological recording of the site but produced sketches of artifacts, photographic and video records, and a photogrammetric model of the propeller and nearby artifacts. Artifacts identified in the surrounding area included a tailhook painted with alternating red and white stripes, two .50-caliber machine guns, a cylinder cover from a radial engine, rubber fittings, wiring, a loaded ammunition canister, and deteriorated portions of the plane's hull (Raupp et al., 2015).

The area was considered a priority for survey as archival research suggested a P-40 Warhawk had been lost in the vicinity (Linville, 2010:12). While the aircraft has not been identified as a Warhawk—and is in need of further archaeological and archival research—limited survey of the site suggests the aircraft hit the water and/or reef very hard,

breaking apart on impact. As with the P-40K site identified off the southeast of Midway's barrier reef, the lack of substantial fuselage remains identified in this location is unsurprising. Heavy swells appear to have displaced hull structure by forcing lightweight artifacts into crevices under the reef and depositing heavier objects on the seabed.

2017 Survey

A total of 31 WWII-era aircraft wrecks occurring within 5 miles of Midway have been identified through archival research (Linville, 2010:10-14). As only four of these sites were documented archaeologically, NOAA and NPS archaeologists (in partnership with FWS personnel) returned to Midway in 2017 (coinciding with the 75th anniversary of the battle) to continue surveying for material culture. Funded through the NOAA Office of Ocean Exploration and Research, the project was aimed at identification of submerged aircraft remains associated with the atoll's World War II heritage. Over the course of one week, 200 linear nautical miles were surveyed with a magnetometer. 102 anomalies were identified, 86 of which yielded material culture. While many of these findings date to the 19th and early 20th century, two WWII era sites were located during the survey.

The first site has been (tentatively) identified as a Pratt and Whitney Twin Wasp Engine (Ho and Keogh, 2017). While this model was prevalent during the war, an F4U Corsair was the only plane with this engine flown at Midway. As the Corsair only arrived at the atoll in October 1942, this site post-dates the battle. The second site, found during the last day of diving operations, consists of a partial radial engine. Due to the fragmented nature of the site, further research must be conducted before a positive identification can be made (Ho and Keogh, 2017).

Ongoing Research

Additional research addressing the WWII cultural heritage at Midway were conducted as part of the 2017 fieldwork. Prior to physical fieldwork at the atoll, researchers revisited archival material to assess the battle's military terrain through KOCOAA analysis (Roth and McKinnon, 2017). Widely used to interpret historic naval and terrestrial engagements, little has been done to adapt KOCOAA to historic aerial combat (Babits et al., 2011, Spennemann, 2011:360, Frye and Resnick, 2013). Thus, re-evaluating KOCOAA parameters to include aerial combat aided researchers in better understanding decisions made by pilots during the battle. Furthermore, the KOCOAA data could be presented in cartographic form (Fig. 4).

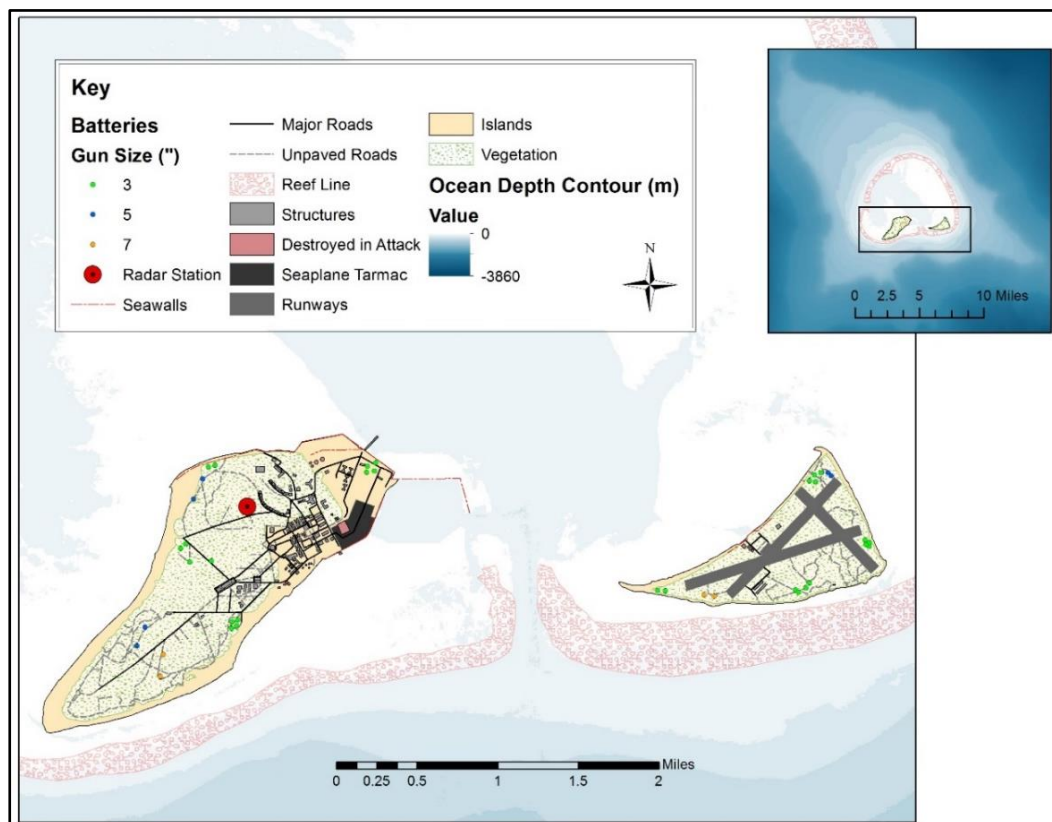


Fig. 4: WWII Era Facilities at Midway Atoll. (Authors 2017)

The resulting geo-spatial data was used in conjunction with biographies of WWII-era crash casualties at Midway (see Linville, 2017) to create an

ArcGIS Story Map. Archaeologists have found the Story Maps program is opening new avenues of interactive digital outreach (Alemly et al., 2017). Given the current constraints of visiting Midway and accessing the atoll's tangible heritage, the Story Map presents interactive content and a platform for public outreach on a global scale.

Conclusions

Aircraft wrecked within the shallow waters of Midway have undergone extensive mechanical deterioration associated with the dynamic marine environment found at the atoll. Comparative preservation of the F4U Corsair, located in a much deeper and more stable environment, suggests that offshore survey may yield sites with better preservation. Nevertheless, the 2017 survey results suggest WWII heritage remains submerged in shallower atoll waters and can contribute to the ongoing study of war in the Pacific.

Further research into the activities at the atoll post-battle may shed light on the newest WWII-era submerged sites. While none of the remains located thus far are associated with the battle, they are significant cultural resources which contribute to understanding the role Midway played in the War. Digital outreach materials addressing this history offers new ways for the public to engage with both tangible and intangible remains of a shared aviation heritage.

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Biography



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Asia, the Caribbean, and the Pacific region. He has extensive experience in public and private sector cultural heritage management, as well as diving and boating safety. Jason's research interests include historical and maritime archaeology of the Pacific Ocean, culture contact, historic fisheries, military technologies, battlefield studies, and contact-period rock art.



Madeline Roth is a current graduate student at the East Carolina University Program in Maritime Studies. Her research interests include WWII heritage, resource management, and identity construction.