Phase Two Survey and Inventory of Submerged Cultural Resources in Portions of Maloelap Lagoon, Republic of the Marshall Islands

July 6-13-2003

MI-Ml-004: Suspected Japanese merchant ship off Taroa

Final Report
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Submitted by
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ABSTRACT

In July 2003 the Republic of the Marshall Islands Historic Preservation Office (RMIHPO) contracted with the Department of Anthropology, University of Hawaii at Manoa, to conduct a Phase Two survey of the submerged cultural resources within Maloelap Atoll. The majority of this material dates from World War II, when the Japanese established an airbase on the main island of Taroa. During the weeklong survey, July 6-13, 2003, the survey team documented ten sites and conducted magnetometer surveys in four areas. Seven out of ten are circa World War II. The remaining three are either late 19th-century or 20th century. This report discusses the findings from the survey and offers recommendations for the future protection and preservation of these historic cultural resources.

Information concerning the exact location of each site is intentionally missing from this report at the request of the RMIHPO. Geographical Positioning System (GPS) data is included in a separate file to the RMIHPO as per mutual agreement. Anyone interested in acquiring this information must request permission from the RMIHPO to access the coordinates.

INTRODUCTION

This is the final report of findings from the archeological survey and inventory of submerged resources in Maloelap Lagoon, Republic of the Marshall Islands, conducted July 6-13, 2003. Funding was provided by Historic Preservation Funds from the National Park Service, Department of the Interior and by an in-kind contribution from the Department of Anthropology, University of Hawaii. The Department of Anthropology, University of Hawaii at Manoa, was contracted to perform the survey. While originally identified as a Phase Two survey of previously identified sites in the lagoon, no Phase One survey of Maloelap was actually conducted prior to the Phase Two survey. Hence, this survey served as both a Phase One and a Phase Two survey of two priority areas near islands in the lagoon and two adjacent locations. As such the survey was more extensive rather than systematic. Our focus was to identify submerged cultural resources using primarily local sources from the islands surrounding the lagoon, as well as historical charts found in Hamilton Library, University of Hawaii at Manoa. In addition, we conducted limited systematic surveying in selected areas.

We were fortunate to have the assistance of the acting mayor of Maloelap, Kiat Benjamin, during our stay. Mr. Benjamin was a young boy during World War II and he shared with us several stories he remembered from that time. This is significant because most of the submerged cultural material found at Maloelap can be traced to the World War II era when the island of Taroa was one of five Japanese air and seaplane bases in the Marshall Islands. This airbase suffered the most losses of the five: nearly two-thirds of the Japanese military and civilian personnel on Taroa died before the end of the war from starvation, suicide or air attacks (Adams, et al. 1997).

In addition to the survey and inventory of visible sites within the lagoon, a magnetometer survey was conducted in several areas within the lagoon to determine what material might be preserved either buried in the sand or beyond diving depth. Mike Tuttle of Panamerican Consultants, Inc. conducted the magnetometer survey. The results of this survey are included in this report.

BACKGROUND

The Marshall Islands has a rich maritime heritage, beginning with the first visitors arriving in ocean voyaging canoes to settle the area and continuing today with commercial fishing, tourism and local maritime activities. (Figure 1) European interest in the area began with the Spanish in the 16th century, although Maloelap does not appear definitively in the records until the British began recording the islands in the late 18th century. The first documented sighting of Maloelap was the British transport ship *Scarborough* in 1788 (Hezel 1979:114). The atoll was charted in 1799 by the British brig *Nautilus* (Hezel 1979:114).

Traffic continued in the 19th century, primarily from whalers and traders transiting through the area.

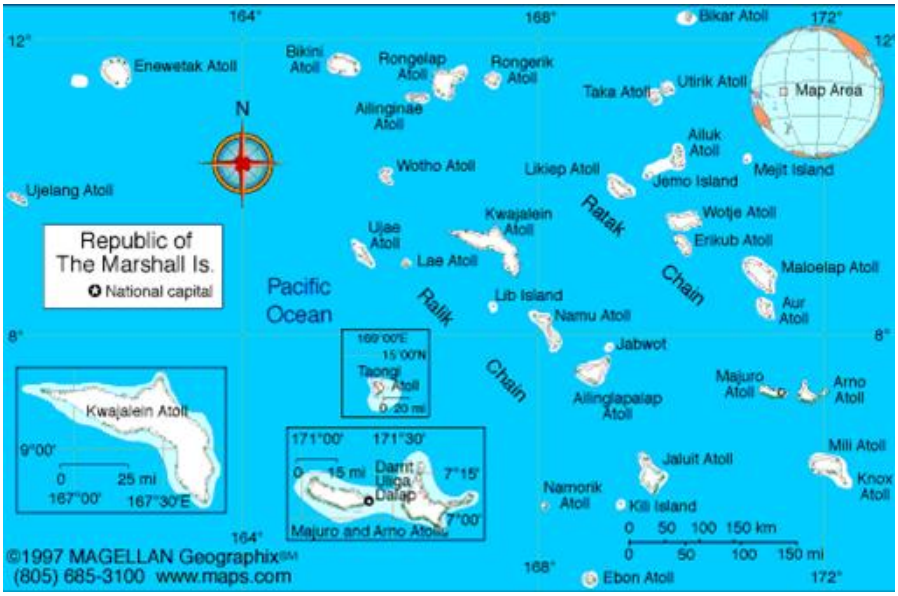


Figure 1. Map of the Republic of the Marshall Islands

The first detailed description of the atoll came in 1817 when the Russian explorer Kotzebue spent two weeks at Maloelap (Poyer 1997:21). By the end of the 19th century the Marshall Islands was under the protection of Germany and Maloelap was involved with the copra trade. Well-known traders Capelle and deBrum established a trading station there (Poyer 1997:21). German influence continued until 1914 when the Japanese established control over the Marshall Islands at the start of World War I (Poyer 1997:22). (Figure 2)

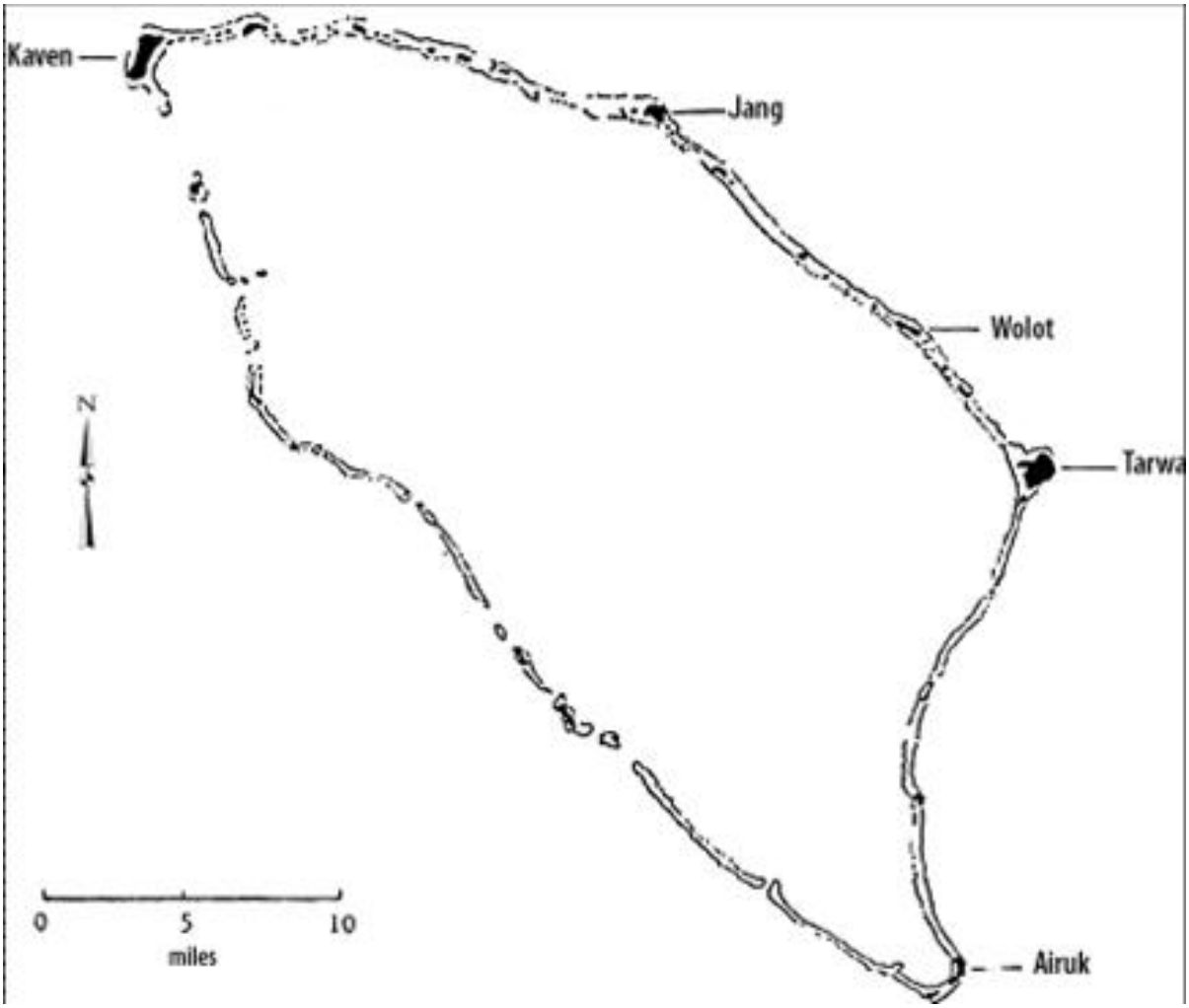


Figure 2. Map of Maloelap showing major islets. From http://marshall.csu.edu.au/html/atolls/maloelap.html.

By far the largest concentration of historic cultural material in the area comes from World War II when the Japanese held many of the islands and built an airstrip at Maloelap Atoll. Terrestrial evidence from this period has been examined in prior archeological surveys and excavations (Adams, et al. 1997; Christiansen 1994). (Figure 3) (Figure 4) The purpose of the underwater survey is in part to supplement these terrestrial excavations with information concerning submerged material from the WWII-era. Maloelap was the location of a large airbase and there is still a great deal of material on Taroa that attests to this.

Figure 3. Aircraft debris from Japanese airbase, Taroa

Figure 4. Aircraft debris on Taroa

> The construction program [on Taroa] would eventually replace [the pre-war structures that were torn down] …with nearly 400 buildings, 10.5 miles of coral-surfaced road, an airfield with two intersecting runways, each more than 4,000 feet long, and shoreline defenses (Poyer 1997:26).

The pier that is used for small boats at Taroa was also made during the Japanese era, probably pre-war. The shoreline defenses, some of the buildings and a slightly visible outline of the unused runway were still evident during the 2003 survey.

At the height of Japanese occupation there were over 3,000 Japanese military and civilian laborers living on Taroa, constructing and operating a major airbase in the Marshall Islands (Poyer 1997). This was one of seven airbases (the others were at Mili, Wotje, Kwajalein, Eniwetok, Nauru and Wake) and one seaplane base (Jaluit) operated by the

Japanese in the Marshall Islands (Poyer 1997:28)[1]. Maloelap, in particular Taroa island, was heavily bombed during 1944 by American planes and ships. As with many locations in the Pacific this mass of incendiaries and explosives has repercussions to the present with unexploded ordnance found both on land and underwater. During the 2003 survey the team encountered ammunition of varying gauges scattered through the near shore survey areas. More was identified on land during informal tours of the area. (Figure 5)

Figure 5. Example of unexploded ordnance at Taroa, photographed in July 2003

The Taroa Documentation Project collected stories from many people at Maloelap during the war. These stories explain that Taroa remained uninhabited for several years after the war ended and the Japanese had left the atoll in large part because of the unexploded ordnance scattered around the atoll (Poyer 1997:32). It was not until the late 1970s, when the Trust Territory government cleared much of the ordnance off the island that Marshallese began resettling Taroa (Poyer 1997:33). Today the population on Taroa is about 200.

Information about the in-water targets destroyed by American bombardment is very sketchy. A list of dates when American bombers and fighters attacked the atoll contains minor information about land targets hit but nothing about ships sunk at the atoll

[1] Five of the seven airbases were on islands now part of the Republic of the Marshall Islands (RMI). Nauru and Wake are part of the area known as Micronesia but not part of the RMI today.

[http://marshall.csu.edu.au/html/atolls/AAF_Maloelap.html; accessed 06/28/2003]. There are still some people who live at Maloelap Atoll who can recount stories based on their eyewitness accounts or the accounts of their parents but this information is also incomplete.

PREVIOUS ARCHEOLOGICAL INVESTIGATION

The U.S. National Park Service conducted a comprehensive survey of Micronesia as part of the transition from the Trust Territory government to the independent and freely associated nations today (Carrell 1991). This was the first archeological assessment of submerged cultural resources within the region. A separate survey was conducted at Bikini Atoll, primarily to document the remains of the fleet used as part of the nuclear testing of the 1950s (Delgado, et al. 1991). In 1999 a terrestrial and underwater survey was conducted at Jaluit (Deurnert, et al. 1999). This was followed by surveys of Wotje, Kwajalein and Majuro (Holly 2000a, 2000b, 2000c)[2]. The survey at Maloelap was the last in a series of underwater surveys proposed by the RMI Historic Preservation Office intended to document the extent of submerged cultural resources at atolls used by the Japanese in World War II.

Previous archeological work at Maloelap Atoll has focused on Marshallese and colonial terrestrial sites on the ring of islands, or islets, surrounding the lagoon. In 1977 Paul Rosendahl recorded three prehistoric sites at Maloelap: two on Airik and one at Kaven (Dye 1987). These sites are the first to be entered into the RMIHPO database for the atoll. Sites MI-Ml-001 and MI-Ml-002 are both on Airik and consist of shell middens with shallow deposits, some surface artifacts and coral pavings (Dye 1987:24, 56-57). Site MI-Ml-003 is on Kaven and contains more surface artifacts, a shell midden and more coral pavings (Dye

[2] A survey of Mili Atoll was also reportedly conducted but the RMIHPO did not have a copy of that report, or else did not provide one, when the survey team visited the office in 2003. There is also no record of a separate underwater survey of Eniwetok.

1987:59). Photos of sites 1 and 3 are on file with the Trust Territory of the Pacific Archives. In the 1990s Marshall Weisler conducted several surveys, focusing on atoll agriculture and the prehistoric settlement patterns of the Marshallese, and conducting excavation on the larger islands of Kaven, Taroa and Airik (Weisler 1999, 2001).

By far the largest amount of archeological information concerns the World War II-era remains of the Japanese airbase at Taroa. Three surveys, one conducted as an informal survey in 1986 and published in the quarterly British publication *After the Battle* (Bartsch 1986) and two funded through the U.S. Department of the Interior (Adams, et al. 1997; Christiansen 1994) document the remains of the Japanese airbase, including buildings, gun emplacements and aircraft destroyed by the U.S. bombing of the island in 1944-1945. Hundreds of sites are recorded. This information clearly indicates that Taroa was a significant airbase for the Japanese in the Marshall Islands. There is ample evidence of the monetary and labor investment on the island with permanent structures for housing, three hospitals, a laundry, and an infrastructure that included electricity, roads and even a small railroad (Adams, et al. 1997). (Figure 6)

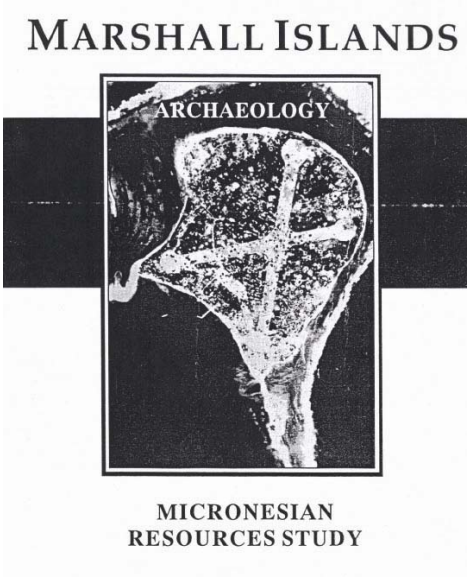


Figure 6. Photograph of Japanese airbase as it looked in the 1940s. Cover for Adams et al report (1997)

One key observation gleaned from the three surveys is how quickly environmental and human factors are causing the sites to deteriorate. Much of the sites identified in 1986 are now completely covered with vegetation. Based on the photos in Bartsch (1986) and personal

observations during the 2003 survey it appears that many of the large structures are obscured by dense overgrowth. The smaller sites were no longer visible at all beneath the vegetation. Moreover, some of the material is in varying stages of adaptive reuse by the local population: one of the landing strips is used today for planes landing on Taroa, the pier built by the Japanese is used today for boats and fishing, and smaller material is moved around and used by families in day-to-day activities. (Figure 7) (Figure 8) (Figure 9)

Figure 7. Japanese airstrip, now used as modern runway

Figure 8. Anvil, likely leftover from Japanese airbase, Taroa

Figure 9. Section of Japanese era pier, deteriorating but still in use today

All three surveys make mention of the shipwreck directly off the beach from the pier (MI-Ml-004) but none include measurements or photographs of the material below the surface. Bartsch and Adams et al claim the ship was partially destroyed in the 1970s when the Navy blew up explosives in one of the holds (Adams, et al. 1997:48; Bartsch 1986:41) and Bartsch and Christiansen have a photo of the wreck from circa 1946 in their surveys (Bartsch 1986:41; Christiansen 1994). However, none of this material is sourced so it is unclear where the information comes from.

Unfortunately the information contained in the three surveys is not easily coordinated. Bartsch (1986) recorded 67 sites during his week long survey of the island. Adams et al

(1997) list nearly 500 sites but located only a small fraction of these during a month of surveying in 1989. Christiansen (1994:37) lists an incredible 868 sites, locating only 238 during his five-week survey in 1992. In order for this information to be truly useful for cultural resource management the surveys must be combined into one comprehensive survey that contains the locations of extant sites on Taroa.

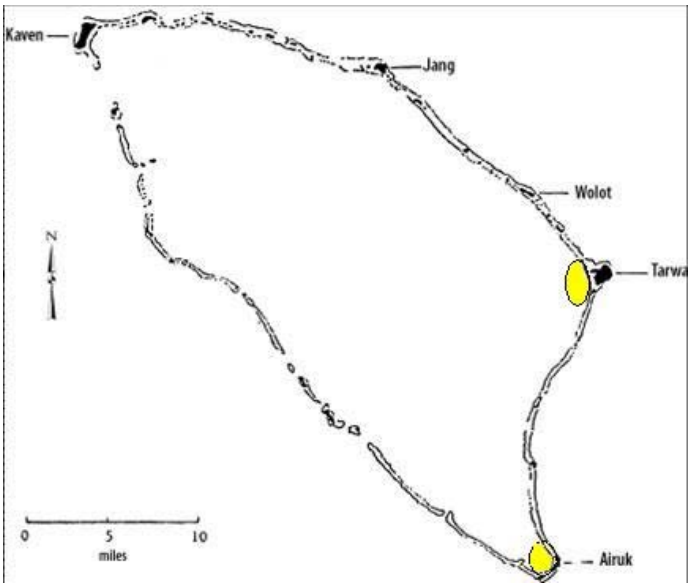


Figure 10. Map of Maloelap showing priority parcels used during survey [not to scale]

RESEARCH DESIGN

This is a Phase Two site identification survey, which involves identification of cultural material within the project area, in this case portions of the lagoon at Maloelap Atoll, and documentation of accessible material, with no excavation or artifact recovery. Although small-scale artifact recovery, primarily for diagnostic analysis, is sometimes a component of Phase Two surveys, collection was not authorized or included in this survey.

The lagoon covers a large area, measuring over 973 square kilometers (375 square miles). (Figure 10) The size of the lagoon, coupled with budget and time constraints necessitated the development of priority parcel areas, those locations where material had been previously identified on historic charts and where the Japanese concentrated their resources during World War II. For this survey we identified two priority parcel areas in

advance of the trip, and two locations where submerged resources were known or thought to occur.

Priority Parcel One is the harbor area directly adjacent to Taroa (Tarwa). This area was in heavy use during the Japanese occupation and the remains of a shipwreck are visible rising just offshore. This area also includes a pier used during the Japanese occupation and extensively bombed by the U.S. during World War II as well as a landing craft (LCU-1250) more recently abandoned by the RMI government. The landing craft is now located along the beach north of the Japanese pier. Priority Parcel One is estimated to be nearly 2 square kilometers (0.7 square miles) in area.

Priority Parcel Two is the shallow area off the island of Airik (Airuk), the southernmost island of the atoll. Historical charts identified a wreck located on the reef flat adjacent to the island. These charts indicated that the wreck would be visible above water and was a logical location for a priority area. Priority Parcel Two covered approximately 1 square kilometer (0.4 square miles) in area.

Two secondary locations were added to the survey based on information provided by local consultants and in relative close proximity to the priority areas. Locality A lies just north and west of Parcel One; Locality B is northwest of Airuk. Locality A measured approximately 12 square kilometers (5 square miles) and was primarily limited to previously identified shipwrecks and airplane crashes. Locality B measured approximately 1 square kilometer (0.4 square miles).

Late in the planning for the project funds were included for a magnetometer survey. A proton magnetometer identifies subsurface magnetic anomalies and when systematically distributed across an area, it can locate places where metallic deposits or materials may

occur. Magnetometers are valuable non-visual survey aids in underwater settings, even when materials are buried. A magnetometer is a valuable tool for investigating large areas quickly and efficiently and is ideal for an atoll environment that has a natural low metallic composition. For the purposes of this survey the magnetometer was used to investigate both priority parcels as well as the two secondary locations thought to be the location of World War II activity.

Because this was an inventory of submerged cultural resources within the lagoon our research questions were very basic at the start of the survey. Our primary interests were:

1. What kinds of submerged resources might occur within the lagoon? With whom would these resources be associated?

2. What remains of World War II-era ships and aircraft are there within the parcels?

3. How specifically can the World War II-era remains be identified? Are these fixed submerged features?

4. Are the remains of U.S. aircraft to be found within the lagoon, in addition to the Japanese aircraft known to be there?

5. Are there any cultural materials older than World War II preserved in the surveyed parcels and what are they?

6. Are there traditional Marshallese cultural resources submerged within the lagoon?

7. How can these submerged cultural materials be preserved and protected for the future?

8. Are there any properties that are likely to qualify for the U.S. National Register of Historic Places?

In an article describing the dichotomy between islander versus outsider responses to historic sites and features, Poyer examines the relative value non-Marshallese, in particular Americans and Japanese, place on the relics from World War II versus the attitude of

Marshallese who live with these relics (Poyer 1997). The extensive remains of the Japanese airbase on Taroa, and the associated submerged cultural materials in the lagoon are not of compelling cultural or historical significance for local Marshallese (Poyer 1997) "Tôrwa [Taroa] residents think of their island's war debris as an obstacle to using the land rather than as a window into the past" (Poyer 1997:86). Part of the goal of any inventory of potentially significant historic or archeological sites should be to interpret these sites in terms of local perspective. In the remote atolls of the RMI it is the local population that serves as the main line of defense for the protection of significant cultural resources. Without their understanding and support there is little to stand in the way of opportunistic scavenging or reuse of materials, both of which can destroy the integrity of a culturally significant site.

This inventory focused on the submerged cultural resources recognized as potentially significant by "outsiders," shipwrecks and submerged airplanes of Japanese, American or European origin, especially circa World War II. The local Marshallese knew the location of most of these sites prior to the start of the survey. Sites recognized as culturally significant by the Marshallese, or those containing traditional Marshallese artifacts were not evident either in the survey areas or in the information gathered from local sources. Despite the relative unimportance placed on these non-traditional sites by the local population, the Marshallese recognize that these locations are significant to non-Marshallese and are willing to watch over the sites. Though not a part of Marshallese cultural identity, these sites constitute a potential inventory of materials that may benefit the Maloelap Atoll population as other similar locations have for Micronesians, for example in Chuuk with the dive industry in Truk Lagoon.

METHODOLOGY

Methodological considerations were divided between the magnetometer survey and the visual inspection and documentation of sites. Mike Tuttle of Panamerican Consultants, Inc. was hired to conduct the magnetometer survey and handled all the logistics of that survey. The results from the magnetometer survey are included in the following section of this report.

For the visual inspection and documentation of sites the survey team snorkeled to sites that were shallow (9 meters/30 feet) or above the surface along the reef, and used scuba equipment where the sites were too deep to reach with snorkeling. This was in accordance with the dive plan approved by the Diving Safety Office at the University of Hawaii. Our maximum approved depth for this project was 100 feet (~30 meters). The investigation of the interior holds of the ships was not a component of this survey due to safety considerations and time constraints.

A Sony TRV-900 digital video camera was used to document the sites. Measurements were taken using metric tapes and rulers and recorded, as were GPS readings at each site catalogued. This information was then processed using a cultural resource examination report developed for the project after a similar form found in the Midway Atoll National Wildlife Refuge Historic Preservation Plan (Speulda, et al. 1999).

Each site investigation proceeded within the same parameters. The team would learn of a location from a local source or locate a magnetic anomaly during the magnetometer survey. Next we would conduct an exploratory snorkel search of the area to determine whether this was a verifiable site. If cultural material was present at the site the team would gather the camera and other surveying gear and document the area.

Our operational platform was the *Lona,* a 52-foot, wood and fiberglass single engine motor cruiser chartered from Robert Reimers Enterprises (RRE) for the week we were conducting research at Maloelap. The *Lona* was a multi-purpose platform, providing accommodations and storage, transportation to the survey sites and a stable platform for the deployment of the magnetometer. The *Lona* carried a compliment of three, a captain, an engineer and a deck hand.

For one day we split the group, taking the *Lona* to one site for a survey dive and deploying the magnetometer on a 16-foot fiberglass boat rented for the day from one of the residents of Taroa. The use of a small open boat was not optimal for the magnetometer as some of the equipment needs to stay dry but the survey was accomplished without incident.

The remote-sensing survey was conducted with equipment and procedures intended to facilitate the effective and efficient search for magnetic anomalies and acoustic targets and to determine their exact location. The positioning system used was a Trimble Navigation DSM212H, Integrated 12-channel Global Positioning System (GPS) and Dual-channel MSK Beacon receiver for differential (dGPS) capabilities.

Remote-sensing instruments included a Marine Magnetics Sea Spy proton spin resonance principle magnetometer. This is an instrument that measures the intensity of magnetic forces. The sensor measures and records both the Earth's ambient magnetic field and the presence of magnetic anomalies (deviations from the ambient background) generated by ferrous masses and various other sources. These measurements are recorded in gammas, the standard unit of magnetic intensity (equal to 0.00001 gauss[3]). The Sea Spy is capable of sub-second repeatability, but data was collected at one-second intervals both digitally and

[3] A gauss is the unit for a magnetic field

graphically, providing a record of both the ambient field and the character and amplitude of anomalies encountered. This data was stored electronically in the navigation computer.

The ability of the magnetometer to detect magnetic anomalies, the sources of which may be related to submerged cultural resources such as shipwrecks, has caused the instrument to become a principal remote-sensing tool of marine archeologists. While it is not possible to identify a specific ferrous source by its magnetic field, it is possible to predict shape, mass, and alignment characteristics of anomaly sources based on the magnetic field recorded. It should be noted that there are other sources, such as electrical magnetic fields surrounding power transmission lines, underground pipelines, navigation buoys, or metal bridges and structures, which may significantly affect magnetometer readings. However it was considered the atoll environment would be considered sterile of these obvious cultural influences and any indication of an anomaly would be considered a potential cultural resource.

Processing post-field involved further research and interpretation based on the visual information collected. Several photo mosaics were created to help identify key features on some of the larger wreck sites. Video of the recorded sites was edited into a short compilation of the recorded sites to be used for quick reference to the results of the survey.

Ten sites were recorded at the atoll. Nine of these were found using the information from local informants, the tenth one was found after a magnetometer anomaly was located in shallow water near another site. A large magnetometer anomaly was recorded but was too deep to confirm visually. This area is included as part of the magnetometer survey but was not recorded as a site.

MAGNETOMETER SURVEY

The magnetometer survey was designed to compliment the visual survey of the priority parcels and localities determined at the start of the fieldwork. In one instance the magnetometer was used exclusive of a visual survey as the location of the site was beyond the maximum depth allowed by the dive plan.

Specifically there were four survey work areas located within Maloelap Atoll. The southern search area of the project area was located at the southern point of the atoll off the island of Airik. The next area investigated was to the west at the south opening of the atoll in the area of a reported vessel loss. In fact two fingers of the opening were investigated at the opening. The third area examined was off the island of Taroa, on the eastern side of the atoll. The final area examined was off the island of Pigeeyatto to the north of Taroa.

Approximately 150 kilometers of survey line were run over 122 survey transects. The four areas were thoroughly examined. Depths encountered during the project ranged from a shallow of 9 feet (2.7 meters) to a depth of over 140 feet (43 meters). Survey coordinates are in Universal Transverse Macerator (UTM), based on WGS84 ellipsoid and all coordinates are represented in meters. The magnetometer was run on each survey transect spaced at 30-meter (100 foot) intervals. This transect spacing was considered enough to insure the project area was fully covered for any potential World War II shipwreck site. Due to the large areas covered for some portions of this project, magnetic gradients appeared in the survey areas. These expressed themselves on the magnetometer data. The gradients appeared in numerous portions of the project areas. In general the gradients were moderate, shifting slowly, and exhibited themselves as gradual rises and drops recorded on a single survey transect. Generally they were more apparent on north-south runs than east-west runs.

Each of the areas identified for remote-sensing survey in the atoll were fully examined at 30-meter (100 foot) intervals. In total, thirteen distinct magnetic anomalies or anomaly clusters were identified. Two of the sites are considered to be shipwreck sites. One of the sites, RMIHPO #MI-Ml-004, known locally as the *Torishima Maru* was obvious and visually inspected, while the other was not inspected since it exceeded the maximum approved depth of the dive plan (<100 feet/30 meters). One anomaly cluster is suspected to be portions of the debris field of RMIHPO #MI-Ml-005, the so-called "English wreck" off Airik. The final 10 anomalies and clusters have the potential to be other significant cultural resources. These anomalies have the potential to represent aircraft, unexploded ordnance, or smaller vessels.

One unexpected result encountered during the project was the coordinate orientation on the maps used. The maps are copies of material compiled by the U.S. Army and U.S. Navy between 1944 and 1946. The maps appear to be very good representations of the land features and their orientation relative to each other. The problem encountered was that everything relative to the map appeared to be off, when compared to GPS locational data. This difference was first noticed while conducting a test run of the equipment of Taroa. The difference was also noticed off Airik and Pigeeyatto. In order to quantify the offset, points along stable features were selected from the map on Taroa and Pigeeyatto and their positions were also noted with a Trimble dGPS and Garman GPS unit. While the Trimble and Garman units produced results within 2 meters of each other, their data were well off the map coordinates. The difference was noted to be approximately 745 meters (2444 feet) east and 395 meters (1295 feet) north. Later both Finney and Langmoir noted that the maps of the islands have been known to be off and it is a common occurrence to find such differences

between maps and reality. Also on the maps themselves it states, "Map not field checked." With this noted all locational information presented here is based upon the Trimble dGPS unit and not the island maps[4].

Results for three of the four survey areas are described here. Maps of these survey areas are located in Appendix 2 at the end of this report. Information about the fourth survey was supplied to the RMIHPO in a separate report pending additional research.

Airik Project Area

The Airik project area was rectangular in shape with its long axis running east-west. Depth of water encountered in this area ranged from approximately a depth of 120 feet (36 meters) in the center of the atoll to a shallow of approximately 10 feet (3 meters) along the reef edges, and the seabed was relatively uniform with some coral heads. The magnetometer indicated the presence of one magnetic anomaly that could indicate a submerged cultural resource. The area examined had a magnetic background of approximately 33,725 gammas. There was also a slowly shifting magnetic gradient that can be seen in the magnetic contour map. Several contour lines on the map represent this shift.

Anomaly A-1 is in approximately 35 feet (10.6 meters) of water. The anomaly has a maximum duration of roughly 30 meters (100 feet) and is represented on a single survey transect. The anomaly has a monopole signature with a maximum deviation of 3 gammas. Given the gamma deviation, duration, and presence on a single survey transects, relative to other magnetometer readings, the anomaly does not appear to represent a significant cultural resource. The minor gamma deviation may represent a small ferrous object and may be associated with anomaly A-2. In general a target with a magnetic deviation of under 10

[4] Detailed locational information for the magnetometer survey as well as the visual surveys was provided to the RMIHPO under separate cover as per agreement. Anyone interested in obtaining this information should contact the RMIHPO directly.

gamma would merit nothing, but the rarity in the area examined and the proximity to the only other anomaly recorded suggested that this anomaly should be noted.

Anomaly A-2 is located in approximately 10-20 feet (3-6 meters) of water and corresponds with RMIHPO #MI-Ml-006.

Anomaly	Gamma Intensity	Duration	Type	Line(s)	Depth (ft)	Comment
A-1	3	31	M	14	35	Unknown source
A-2	161	128	C	10, 11, 12	20	MI-Ml-006

Taroa Project Area

The Taroa project area was irregular in shape with its base to the south and long axis running north-south. The magnetometer indicated the presence of one large and several small magnetic anomalies in this area. The large anomaly is a known shipwreck site, MI-Ml-004, known locally as the *Torishima Maru*. The area examined was approximately 1.5 kM (5000 feet) long north-south and had a shifting magnetic gradient that ran between approximately 33,165 gammas in the north and 33,080 gammas in the south. Thus there are several contour lines on the map, which represent this shift. Also, the survey of this area took place on two separate days and there are the affects of diurnal variation exhibited in the north central portions of the map.

Anomaly	Gamma Intensity	Duration	Type	Line(s)	Depth (ft)	Comment
T-1	59	24	D	31	20	Single line anomaly
T-2	17	19	D	34	15	Single line anomaly
T-3	56	34	C	32	20	Single line anomaly
T-4	21, 531	320	C	23-34	40	MI-Ml-004
T-5	43	26	M	34	15	Single line anomaly
T-6	14	26	M	33,34	15	Single line anomaly
T-7	9	24	M	34	10	Single line anomaly
T-8	154	68	D	26, 27, 28	50	Three line anomaly
T-9	14	23	M	34	10	Single line anomaly
T-10	18	100	D	4, 5, 6	100	Three line anomaly

Most of the anomalies are in close proximity to MI-Ml-004 and are probably associated with that shipwreck. With the exception of the shipwreck the anomalies are not visible on the surface. Because of their size, more intensive searching for these small objects was not recommended due to the strong possibility that these are unexploded ordnance buried under the sandy bottom. Poyer notes that the clean up of Wotje atoll involved 32 tons of mines and 4200 pounds of other ordnance (Poyer 1997:82). Maloelap has not been subject to a comprehensive clean up of ordnance and unexploded ordnance is still visible throughout Maloelap atoll, making the search for small anomalies under the surface potentially hazardous.

Pigeeyatto Project Area

The Pigeeyatto project area was rectangular in shape with its long axis running approximately northwest-southeast. The magnetometer indicated the presence of no magnetic anomalies in the project area. A slight gradient is represented on the magnetic contour map. The area examined approximately 1kM (3300 feet) long and had a shifting magnetic gradient that ran between approximately 33,090 gammas in the north and 33,060 gammas in the south. The magnetic background in the center of the project area was approximately 33,075 gammas. Thus there are a few contour lines on the map that represent this shift.

FINDINGS

Of the ten sites recorded at the atoll only two fall outside the circa World War II/ Japanese occupation era. Each site was recorded using a cultural resource examination report, included as an appendix at the end of this report (Appendix 1). RMIHPO provided site database numbers for each site. Based on this information it appears that none of the recorded

sites had been previously documented[5]. Site database numbers begin **MI** for Marshall Islands, **Ml** for Maloelap and the site number. Photographs, photo mosaics and a video log were also collected and can be found in the appendices included with this report. Video footage (VHS), including an edited 12:40 minute segment highlighting the recorded sites, was included with this report to the RMIHPO.

Site database numbers for this survey begin with MI-Ml-004. As mentioned above sites MI-Ml-001 through MI-Ml-003 are terrestrial prehistoric sites on Airik and Kaven. Information concerning these sites can be found in the Bishop Museum monograph *Marshall Islands Archaeology* (Dye 1987).

RMIHPO #MI-Ml-004

This site is located directly off the beach at Taroa Island, parallel to the pier, and is a steel hulled ship lying upright in shallow water with a maximum depth of 45 feet (14 meters) at the stern and a minimum depth of 20 feet (plus surface protrusions) (6 meters) at the bow. Dimensions are 61 meters (200 feet) in length, 9 meters (30 feet) beam. The ship leans slightly to the port and the hull is largely intact except at the bow, which is torn almost completely away from the rest of the ship. Damage here is evident and likely caused from an explosion. The propeller (possibly brass) is intact with rudder. Two large holes at the stern also indicate explosions. The ship is visible from shore due to two masts still attached to the ship that rise above the water.

This is likely a Japanese cargo/merchant ship sunk circa 1943-1944. There are several large cargo holds and no evidence of armament or guns. The bridge is located closer to the

[5] As mentioned previously, MI-Ml-004, the shipwreck at Taroa, is mentioned in the literature prior to 2003 but did not receive a site number prior to this survey.

stern. Everyone on Taroa identifies the ship as the *Torishima Maru*[6]. The residents of Taroa describe the ship as the last supply ship to Maloelap during the war. According to the well-known story, American planes bombed the ship in December 1943. After this the Japanese spent the next year and half (1944-1945) without reinforcements or resupply, leading to disease and starvation that claimed nearly two-thirds of the personnel on Taroa.

Information from Bartsch (1986) and Adams et al (1997) indicate that the damage to the hull is from the 1970s demolition of the ship, resulting in the removal of much of the superstructure. It is hard to tell if this was indeed the case. Adams et al (1997:48) explains the demolition as necessary to remove old explosives in the cargo holds, yet the visual evidence from 2003 does not appear to support this. The cargo interiors appeared relatively intact.

The identification of the ship as the *Torishima Maru* cannot be substantiated. There is no record of a ship by that name at Maloelap, although there is a ship by that name in a list of Japanese merchant ships from this era (website http://www.history-on-cdrom.com/if108.htm). Although everyone knows the ship by this name and the name is found on websites that describe the wreck (Spennemann 1995), the identity of the ship remains unconfirmed.

RMIHPO #MI-Ml-005

This site is located on the reef flat adjacent to Airik at the southernmost point of Maloelap Atoll and contains the remains of an iron hulled sailing vessel. The reef flat is covered with disarticulated pieces of iron, scattered over an area approximately 30 square

[6] The spelling of this name varies and is written as Toreshima, Torishima, Toroshima in the literature (e.g. Adams et al 1997, Christiansen 1994, Spennemann 1995). Information about identification includes all variable spellings.

meters (322 square feet). The survey team identified an iron mast, windlass, rudder, anchor chain still in the anchor locker, hawse pipe, a section of the bow and a section of the stern. No anchor was found. The hull is riveted and a nameplate on one beam reads "Danver." The chain is stud linked, a design manufactured beginning in the 19th century. There is no evidence of a propeller or engine.

The site is known locally as the "Spanish wreck" or the "English wreck." Those who identify it as Spanish seem to be referring to Spanish galleons, perhaps owning to the fact that there is no machinery associated with the wreck, while those who call it the "English wreck" refer to some time prior to the Japanese occupation. No one at the atoll seriously claims it is the remains of a Spanish galleon but there is no information as to how the site acquired that name. Iron hulled sailing vessels were active in the late 19th, early 20th century. Some survive to this day such as the *Falls of Clyde* at the Hawaii Maritime Center in Honolulu, Hawaii and the *Star of India* at the San Diego Maritime Museum.

Attempts to find information about this wreck were unsuccessful. This does appear to be the remains of an iron hulled sailing vessel from the late 19th century but without additional information the identity of the ship remains unknown.

RMIHPO # MI-Ml-006

This site is located in the lagoon in 10 feet (3 meters) of water directly off the reef flat from MI-Ml-005. It is a disarticulated, coral encrusted metal, probably iron, cylinder lying on the sand. Dimensions are 30 inches (80 cm) diameter by 4 feet (1.2 meters) length. This object was the only visible feature of a large magnetic anomaly identified during a magnetometer survey of the shallows next to Airik. Due to its close proximity to the previous

site we suspect it is part of the same wreck. The debris scatter from the reef leads in the same direction.

Additional survey of the area for subsurface material was not recommended due to time constraints and the potential risks from unexploded ordnance still to be found in these waters.

RMIHPO #MI-Ml-007 and RMIHPO #MI-Ml-008

MI-Ml-007 is a steel hulled ship 29.5 meters (96 feet) in length (31 meters to bowsprit) and 5.8 meters (19 feet) in beam. It lies upright on a sandy bottom on a slight slope with the bow facing the shore. Maximum depth is 17 feet (5.1 meters) at stern; minimum is 13 feet (4 meters) at the bow. The wreck is in good condition with some coral encrustation, loose debris on deck and in holds. There is no local name for this wreck. It appears to be another merchant/cargo ship circa World War II. Based on historical information we suspect this is a Japanese merchant ship that was sunk either by the regular American bombardment in 1944-1945 or possibly scuttled by the Japanese. There does not appear to be much damage to the hull, as one would expect from a bombardment.

The argument for scuttling is strengthened by the close proximity of a second ship (RMIHPO #MI-Ml-008), which lies directly astern, also upright and seemingly undamaged. This second wreck is 32 meters (105 feet) in length, and 6 meters (20 feet) in beam. Maximum depth of this wreck is 70 feet (21 meters); minimum is 36 feet (11 meters). This ship is coral encrusted in some areas with loose debris on deck and in holds. It is in excellent "predisturbance" condition, i.e. divers and souvenir hunters have not looted the site. This ship still has an anti-aircraft gun on the bow and intact portholes with glass.

There is no local name or information about these wrecks, as there is for the *Torishima Maru.* A cursory examination of Japanese websites for ships sunk at Maloelap reveals the names of seven ships sunk or reported lost at the atoll but the information does not contain specific locations[7]. (Table 1) Moreover, the first six ships are listed as lost on the same day, January 31, 1944. This may indicate the records are not complete and this loss date is estimated based on the available information. Without further investigation into the Japanese records from this era it is difficult to confirm the identity of any of these wrecks.

船名 [ship name]	船主 [owner]	形式 [ship type]	進水年 [launch date]	終末 [information about loss]
海昌丸 Kaishō Maru	日本真珠	採貝船	昭和12年12月	昭和19年１月31日マロエラップで空襲戦没
第１和丸 Daiichi Wa Maru	日本真珠	採貝船	昭和12年２月	昭和19年１月31日マロエラップで空襲戦没
第２那智丸 Daini Machi Maru	日本真珠	採貝船	昭和13年３月	昭和19年１月31日マロエラップで空襲戦没
事代丸 Kotoshiro Maru	個人	漁船	昭和16年３月	昭和19年１月31日マロエラップで空襲戦没
海幸丸 Kaikou Maru	荘内遠洋	漁船	昭和８年２月	昭和19年１月31日マロエラップで空襲戦没
清勝丸 Seishou Maru	個人	漁船	昭和９年８月	昭和19年１月31日マロエラップで空襲戦没
＃１昭福丸 [Daiichi Shōfuku Maru]				東和汽船雷撃南洋群島ﾏﾛｴﾗｯﾌﾟ

Table 1. List of Japanese ships lost at Maloelap

丸 = maru/ship　　マロエラップ = Maloelap

Sources: http://boatsparrowhawk.hp.infoseek.co.jp/wbg.htm [accessed 3/19/2007] for all but the last entry
http://www.ric.hi-ho.ne.jp/senbotusen/siryo-deta/senbotukisenlist.pdf [accessed 3/19/2007] for last entry

[7] It should be noted that the name *Torishima Maru,* with any of the varied spellings from previous publications, is not listed here.

RMIHPO #MI-Ml-009

This site is located in shallow water, less than two feet (0.6 meters) deep. It is the remains of an aluminum aircraft with one engine and most of the wing partially buried. The wingspan is 11 meters (36.5 feet). It is partially embedded with coral rubble on top of the reef. The engine is a 6-cylinder radial engine with a 3 bladed counter-rotating prop and 'hershey bar' wing. The propeller blade is 1.4 meters (4.5 feet) long and 25.4 cm (10 inches) at the widest point. There are bullet holes visible on the propeller.

The counter rotating prop, prop strike and retracted flaps all point to a crash or forced landing. Based on this information, historical records and the design of the material we believe this is a Japanese fighter plane known as a Mitsubishi A6M3 Model 22A, or "Zero." We know that these planes were stationed at the Maloelap airbase on Taroa and we know that fighting between American and Japanese planes led to the loss of several Zeros. The fact that the propeller was rotating when it hit the shallow water is an indication that the plane crashed. Bartsch recorded this plane during his 1986 survey (Bartsch 1986:39). At that time the plane was at the water's edge, demonstrating the increase in sea levels in the last twenty years.

This is one of two airplane wrecks examined during the survey. Local informants did not have any information about this plane wreck

RMIHPO #MI-Ml-010

This site is located in shallow water, less than three feet (1 meter) deep. There is also scattered debris on shore nearby this site that we suspect is associated with the material in the water. The debris field measures roughly 20 square meters (215 square feet). There are two

large 10-cylinder radial engines face down on substrate, relatively intact. The engine cowling is gone on both. Copper wiring, lockwires and cotter pins are intact and show little corrosion. There is a serial number identification plate still attached to one engine identifying this engine as manufactured for "Consolidated Aircraft Corp" for a USN PBY floatplane (see text below). There is evidence that someone has tried to pry this plate loose from the engine.

MANUFACTURED FOR
CONSOLIDATED AIRCRAFT CORP
DWG. NO. 28P5142-3R SER. NO. 404
CONTRACT NO 91876 US 12A
MATL CRS MODEL PBY
MFC BY RYAN AERONAUTICAL CO
LINDBERGH FIELD, SAN DIEGO CALIFORNIA

The identification of these remains as a PBY float plane coincide with a story told by the acting mayor, Kiat Benjamin, of a PBY fired upon by Japanese anti-aircraft guns and forced to make an emergency landing. The propeller blades are not evident at this site and there is no clear indication that the plane crashed. The story told by Mr. Benjamin states that the plane did not crash, but made a forced landing instead.

According to information from the Naval Historical Center, a PBY Catalina is reported as lost at Maloelap. The policy of the U.S. Navy is to maintain ownership of ships and aircraft; therefore information about this wreck will be forwarded to the Naval Historical Center to include in their database.

RMIHPO #MI-Ml-011

This site is located at Taroa and is a concrete pier currently in use as the main pier for Taroa. The pier is shaped as a backwards "L" and reaches a maximum depth of about 2.1 meters (7 feet) at the short end facing the lagoon. It is 70 meters (230 feet) wide at the lagoon side. The exterior wall is concrete reinforced with iron in the shape of a backwards "L." Within this the pier was filled with sand and coral rubble to increase the operational area.

The pier is in a state of disrepair, dating all the way back to World War II when it was bombed by the U.S. over the course of several months. Bomb damage and the resulting erosion have resulted in deterioration. There have been attempts to refill the pier but without repair of the supporting wall the interior continues to erode.

There is a possible anti-aircraft gun in pieces embedded in a damaged section near shore. There is so much damage to this area that it was not possible to clearly determine exactly what was there. The lagoon side wall is completed with concrete blocks of a style one local informant indicated was common Japanese construction. Small concrete blocks were put in place to form the base, then larger blocks put on top and filled in to form the pier. The blocks were formed so that two men could carry them slung between them and easily manipulate them into place. Further investigation into this type of engineering construction is warranted. This pier is known locally at the "Japanese pier," and is generally estimated to have been built by the Japanese prior to World War II. (Figure 11) (Figure 12)

There seems little doubt that this pier was in fact built by the Japanese, or by the Marshallese to Japanese specifications. The concrete blocks observed along the lagoon side are potentially diagnostic if information can be collected from Japanese sources about pre-war colonial construction techniques. (Figure 13) (Figure 14)

Figure 11. Outer wall of pier, Taroa. Note the extensive deterioration of sections

Figure 12. Pier section at Taroa

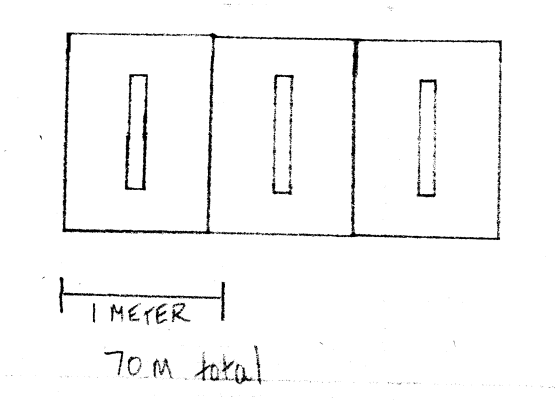


Figure 13. Sketch of pier construction detail. This is the bottom layer of concrete blocks.

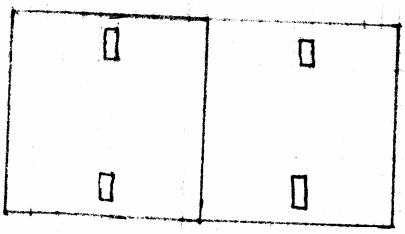


Figure 14. Sketch of pier construction detail. These are on top of the other layer. The scale is the same for both.

RMIHPO #MI-Ml-012

This site is located on the reef flat at the northern end of Taroa, within site of the "Japanese pier." It is an anti-aircraft gun (150 mm coastal defense gun), fused in place facing north. Aside from the rust the gun appears to be in good condition. The reef flat becomes slightly submerged during high tides but the gun is on a platform that keeps it above the

water line. This is one of several on the island and is the most intact. There is a lot of unexploded ordnance of varying calibers scattered around the reef flat, and fragments of a machine gun in the waters next to the gun. Bartsch (1986) Adams et al (1997) and Christiansen (1994) include this site in their terrestrial surveys of the island.

Although this site may not technically fall within the parameters of an underwater survey, the site marks the northern boundary of an area of concentrated cultural material, including the Japanese pier (MI-Ml-011) and the shipwreck known as the *Torishima Maru* (MI-Ml-004), and as such was included in the survey. Local informants recall this gun being used by the Japanese against American planes during World War II. There seems little doubt that this is a Japanese anti-aircraft gun from World War II.

The final site recorded during the survey is within this area as well, but is a modern vessel, abandoned by the RMI government.

RMIHPO #MI-Ml-013

This site is located north of the Japanese pier, grounded on the beach at Taroa. It is a landing craft utility (LCU) vehicle, number LCU-1250. Local sources say the RMI government abandoned it at Taroa in the 1980s. However it appears to be visible on an aerial photo from 1976 so this may be a rough estimate. (Figure 15) It is 30 meters (100 feet) long and still has much of its super structure. The bow or landing section is down and in the water. The chains connecting the bow to the hull are no longer connected. The RMI government inherited many of these from the U.S. and used them to carry cargo between the atolls. This is a post-WWII LCU, probably constructed in the 1950s. According to informants, it is not unusual to see these abandoned at various atolls. Children use this site as a playground. This

site is a derelict and is not considered historically significant. However, due to its proximity to other historically significant sites at Taroa the survey team decided to record it as a feature.

Figure 15. Section of an aerial photograph of Taroa taken in 1976. Although difficult to see, the LCU appears to be along the beach below the pier. [Marshall Islands District, Taroa Flight Line No. 2, Photo 193. From the Trust Territory Archives]

In addition to the ten recorded sites, the survey team collected two oral histories from acting mayor Kiat Benjamin. Mr. Benjamin was a child at Maloelap during World War II and recounted two stories he remembered from that time that may have bearing on the sites we documented during the survey. The first story was about the forced landing of the PBY plane after it had been hit by Japanese anti-aircraft fire from nearby Taroa. The second story concerned a Japanese troop ship lost with all but seven survivors after striking a Japanese mine while entering the lagoon. Neither of these stories has been verified. The taped interview of Mr. Benjamin, in Marshallese, is included on the video with this report.

RECOMMENDATIONS

The sites documented in this survey, and the magnetometer anomalies, are all categorized as European, American or Japanese in origin. The Marshallese retained a pre-industrial society during the European era of exploration and colonization. There was no source of iron or ferrous materials used in Pacific voyaging. Therefore any anomaly recorded has the potential to represent the early contact period between European and native islanders, as well as material through the World Wars. It is true that the anomaly source could be modern materials, but the extremely light modern navigation patterns in the area, and the intensive reuse of modern materials observed on the island would work against this theory, at least for shallow water wrecks. The local population on Taroa was observed reusing material leftover from World War II in unique and varying ways. It is felt that any modern material that could be recycled and reintroduced into the local economy would be so. Therefore, any material represented in the remote sensing record would more than likely represent materials from the World War II period or earlier.

The ten sites documented as part of the Maloelap Lagoon survey illustrate the variety of materials to be found in the Pacific as a whole. Early 20th century shipwrecks, aircraft wreckage and World War II-era detritus are found on many islands and atolls. This does not diminish the significance of the cultural material found at Maloelap. Several of the sites appear to meet the criteria for nomination to the U.S. National Register of Historic Places (NRHP).

In their book *The Invention of Tradition*, Hobsbawm and Ranger discuss the importance of interpretation when assigning value to culturally significant sites.(Hobsbawm and Ranger 1983) This is true in the Marshall Islands where the Marshallese understandably

do not perceive many World War II-era artifacts as important, since they represent a historical conflict between outsiders in which they played a very small part. This is in contrast to the traditional Marshallese sites, which are accorded respect.

Any recommendation for the protection, preservation or interpretation of these sites must include the support of the local population at Maloelap. The first line of defense for the prevention of damage to historically significant sites in remote atolls in the RMI is the local population. In order to provide a deterrent to vandals, souvenir hunters or careless tourists the local population must be invested in the protection of these historic sites in a way that places value on these sites the local population can understand. A major obstacle to any recommendation is the chronic lack of a monitoring system that can implement and maintain a submerged cultural resource management plan for the long term. By utilizing an informed and supportive local population, long term monitoring of significant features can be realized without incurring major costs.

As stated in the National Register Bulletin 15, *How to Apply the National Register Criteria Evaluation* (U.S. National Park Service n/d), and Bulletin 20, *Nominating Historic Vessels and Shipwrecks to the National Register of Historic Places* (U.S. National Park Service 1985), "the quality of significance in American history, architecture, archeology, engineering, and cultures is present in districts, sites, buildings, structures, and objects that possess integrity of location, design, setting, materials, workmanship, feeling and association." To be considered significant and therefore eligible for nomination to the NRHP, the property must meet one or more of the four National Register criteria:

A. Be associated with events that have made a significant contribution to the broad patterns of our history; or

B. Be associated with the lives of persons significant in our past; or

C. Embody the distinctive characteristics of a type, period, or method of construction, or that represent the work of a master, or that possess high artistic values, or that represent a significant and distinguishable entity whose components may lack individual distinction; or

D. Yield, or likely to yield, information important in prehistory or history (U.S. National Park Service 1985:5-6)

A vessel's significance, as stated in Bulletin 20, is based on a "representation of vessel type and (its) association with significant themes in American history and comparison with similar vessels" (U.S. National Park Service 1985:4). Bulletin 20 defines "shipwreck" as "a submerged or buried vessel that has foundered, stranded, or wrecked. This includes vessels that exist as intact or scattered components on or in the sea bed, lake bed, river bed, mud flats, beaches, or other shorelines, excepting hulks" (U.S. National Park Service 1985:3). Keeping these considerations in mind, an assessment as to their historical significance can be recommended.

Site RMIHPO #MI-Ml-005 may perhaps be the most intriguing find as it appears to be the remains of an iron sailing vessel from the early 20th century. Iron sailing vessels without incidental steam engines were only built for about three decades and were never very numerous. More common were iron hulled steam engine ships with sails for backup propulsion in the early days of steam power on the high seas. The *Falls of Clyde* at the Hawaii Maritime Center in Honolulu is an example of an iron hulled sailing vessel that was

converted with the addition of an engine. Archeologists have investigated several other iron hulled sailing vessels[8] so there would be some comparative information from the archeological record. Further investigation should indicate conclusively if this is what we have at this site. If this is the case then a nomination to the NRHP under criterion C and/or D may be in order for this site.

Site RMIHPO #MI-Ml-011 is also worthy of nomination to the NRHP. The so-called Japanese pier has served the island of Taroa since World War II as their primary dockage area for small boats transiting through the area. In addition it was one of the primary targets for the American bombers during their campaign to destroy the airbase here. Bullet holes are still evident in the concrete. The construction of the pier is also unusual. Further investigation into this type of pier construction is warranted. This would be a good area to consider for renovation in the event tourism is considered for the area in the future and also to provide a working pier for the local residents while still maintaining its historic integrity.

Sites MI-Ml-004, MI-Ml-011 and MI-Ml-012 are all Japanese era features or sites in close proximity. Their proximity supports the argument for creating a historic zone that includes the entire harbor of Taroa and nearby shoreline. We know that Taroa was the site of a large Japanese airbase with over 3,000 people stationed there during the war. The island had electricity from several generators, a waste water system that is still visible on the island, a huge airstrip and nearby floatplane bases. Over two-thirds of the Japanese died here when the supply line was cut and they were left to fend for themselves for over a year. Most died of starvation. (The Marshallese living on Taroa fled to other islands for the duration of the war.) This makes Taroa site of the worst casualty rate for any Japanese base in the Marshall

[8] For example the *Inga* in England, the *Dunotter Castle* in the Northwestern Hawaiian Islands, and the *Avanti* in the Dry Tortugas.

Islands. This statistic alone heightens the significance of the place and creates further justification for nomination of the harbor as a significant historic site.

MI-Ml-013 is a recently abandoned LCU (landing craft utility) also in the potential historic zone mentioned in the last paragraph. This vessel was likely built in the 1950s, after the war and is thus not a strong candidate for nomination. However, because landing craft of a similar type were used during World War II a case could be made to include LCU-1250 to any nomination for Taroa harbor. As a recent derelict, however, and one that may be responsible for an increase in the erosion levels along the adjoining beach (Adams et al 1997, Christiansen 1994) it lacks the integrity of the other features that were involved in the action at Taroa in World War II. Additional research might help complete a chronology of this LCU that would allow it to be considered part of the historic zone. Otherwise the best option would be to remove it from the beach to strengthen the integrity of the overall area. This is probably not a serious option due to the exorbitant costs that would no doubt be incurred from such an undertaking.

The following is a detailed list of recommendations for the protection and preservation of these sites based on the results from this survey.

1. Consideration should be made for the nomination of Taroa Island, including surrounding shoreline, to the U.S. National Register of Historic Places, and comparable RMI register.

Clearly the entire island and surrounding shoreline, with the extensive remains of the Japanese airbase still evident in terrestrial and submerged environments, meets the criteria for nomination to the NRHP. It is the location of a significant historic event and it contains

features and artifacts that are unique to a significant event or period of time. Caution should be noted, however, as it is important to gain the support of the local population prior to the nomination of any significant portion of the island or surrounding shoreline or near shore sites. Many people equate historic properties with an uncompromising series of regulations prohibiting the improvement or renovation of such sites. In the case of Taroa Island plans were underway for the rebuilding of the pier during the period of the survey in 2003, although it is not known at the time of this writing whether any repairs had been completed. This was not the first time the pier had been filled in according to local sources. However, erosion caused by the deterioration of the external wall eventually leads to the weakening of the interior repairs and the pier begins to fall apart again. If the pier were to be nominated to the NRHP, funds may then be available for a more complete reconstruction of the pier, maintaining its historic integrity while giving the people a fully operational pier.

2. The other sites not located at Taroa should be examined to determine if they meet the criteria for nomination to the NRHP.

While Taroa is the strongest candidate for nomination to the NRHP, the sites identified during the survey that occur in the lagoon should also be considered viable nominees. In particular the debris on the reef at Airik should be evaluated. This may require additional documentation to determine the identity of this vessel using archival research and further on-site surveying for potential diagnostic features. The name "Danver" found on one of the beams at the site is a good starting point for further investigation and is a key diagnostic feature.

3. A proposal for introducing (or re-introducing) sustainable tourism to the area, focusing on special marketing techniques and the importance of historic preservation, should be considered by the RMIHPO.

Visitors to Majuro were once able to visit Maloelap on a day excursion, flying into Taroa in the morning and spending the day touring the airbase remains. If there was a renewed interest in offering these tours, the RMIHPO should develop interpretive materials that include information about the near shore features as well as the terrestrial remains. Independent travelers, often sailing around the islands for diving or snorkeling opportunities, would also benefit from the publication of interpretive material that includes information about conservation and preservation efforts and proper conduct for divers when looking at historically significant sites such as those at Maloelap.

4. Prior to trying to increase tourism, careful attention should be made to current waste management practices at Maloelap, in particular the depositing of refuse directly into the lagoon.

While not within the scope of this survey, team members were concerned by the apparent lack of a waste management program for non-biodegradable materials such as plastics. The pristine state of the waters in the lagoon means visibility is currently excellent and there is a lack of refuse such as one would find in more populated areas, like Majuro. Ideally, an environmental assessment examining the impact of tourism on the atoll, with particular attention to the increase in refuse such tourism might cause, should be a feature of any resource management plan.

5. A site management plan, including a schedule for site visits to ensure that looting or damage is kept to a minimum, should be considered by the RMIHPO. Such a plan may or may not include further investigation and documentation of some of the more inaccessible sites.

Given the time constraints of the survey it was not possible to document all of the key features for each site. In addition, information may be available concerning the Japanese losses in archives in Japan. These archives typically require the assistance of someone who not only reads Japanese but also has experience working with these archives. Information about Japanese losses, especially when they occurred in the outer boundaries of Japanese territory during World War II are incomplete due to the destruction of many records toward the end of the war. Still, if funds were made available, research into these archives could prove valuable.

6. Special training opportunities for historic preservation officers should be identified so that these officers can monitor the sites and check for looting or environmental stresses or changes to the sites.

Central to the implementation of the above suggestions is the proper training of Historic Preservation Officers in dealing with submerged cultural resources. Training opportunities could include advanced diving instruction focusing on multi-tasking while monitoring a site, site formation processes, analysis of the deterioration of metals such as aluminum and steel in salt water and how deterioration might be mitigated, identifying military ships and aircraft from World War II, underwater photography and videography, and development of publications aimed at visitors to the RMI. Addressing the issues of looting

and treasure hunting at these sites, and how to minimize the impact of these activities, should also be a component of this training.

7. Additional interviews should be conducted with the older members of the population to determine other potential submerged sites of historic significance.

For the inventory and documentation of submerged sites there is no better source than local informants, especially fishermen and/or free divers who become very familiar with underwater obstructions. Eyewitness accounts of Japanese activity at Maloelap as it pertains to events that took place in the lagoon are also a valuable source of information for the continued collection of information about this area.

CONCLUSION

Maloelap is a unique resource for cultural resource managers. Not only does the main island, Taroa, contain a significant amount of features remaining from the Japanese airbase circa World War II, the lagoon is a repository, albeit accidentally, of historically significant cultural material, dating back over one hundred years. Its low population, remote location and lack of infrastructure (electricity, running water) have kept it free from many of the pollutants and environmental stressors found on other atolls in the Pacific.

The high number of relics from World War II in the RMI is both a boon and a limiting factor in preparing a preservation plan for one atoll. Choices must be made; criteria must be developed to help resource managers prioritize sites within the nation as a whole. It is simply impractical and prohibitively expensive to accord all World War II-era sites the same measure of protection.

One way to mitigate concerns about protecting sites over such a large area is to include local populations on these atolls in management decisions. The local inhabitants can act as stewards for these sites for future generations. They are the first people who will notice any change to or be aware of people disturbing sites. They may also be the ones to bring unidentified sites to the attention of the RMIHPO.

Based on the evidence gathered during just one week of surveying a portion of the 973 square kilometer lagoon, we can see that Maloelap Atoll is a valuable resource for submerged cultural material from several significant periods in the history of the Marshall Islands and the world at large. It is the final recommendation of this report that the RMIHPO incorporate the findings from this survey into the inventory from other atolls as the next step toward protecting these valuable and finite resources.

Bibliography

n/d-a http://marshall.csu.edu.au/html/atolls/AAF_Maloelap.html. Accessed June 28, 2003.

n/d-b http://www.history-on-cdrom.com/id108.htm. Accessed October 13, 2005.

Adams, W. H., R. E. Ross, E. L. Krause and D. H. R. Spennemann
1997 *Marshall Islands Archaeology: The Japanese Airbase on Taroa Island, Republic of the Marshall Islands, 1937-45: An Evaluation of World War II Remains*. Micronesian Resources Study. Micronesian Endowment for Historic Preservation, U.S. National Park Service, San Francisco.

Bartsch, W. H.
1986 Unknown Maloelap. *After the Battle* 54:28-41.

Carrell, T. L., (editor)
1991 *Submerged Cultural Resources Assessment of Micronesia*. Submerged Resources Center Professional Report No. 10. U.S. National Park Service, Santa Fe, NM.

Christiansen, H.
1994 *The Archaeology of World War II in the Marshall Islands. Volume 1: Torwa*. Historic Preservation Office, Republic of the Marshall Islands, Majuro.

Delgado, J. P., D. J. Lenihan and L. Murphy
1991 *The Archaeology of the Atomic Bomb: A Submerged Cultural Resources Assessment of the Sunken Fleet of Operation Crossroads at Bikini and Kwajalein Atoll Lagoons, Republic of the Marshall Islands*. Submerged Resources Center Professional Report No. 11. U.S. National Park Service, Santa Fe, NM.

Deurnert, B., L. Frank, L. Harris, M. Harris, K. Lynch, L. M. Roberts, D. K. Stone, R. Williamson and J. Zebedy
1999 *Anthropological Survey of Jaluit Atoll: Terrestrial and Underwater Reconnaissance Surveys and Oral History Recordings.* HPO Report 1999/02. Republic of the Marshall Islands: Historic Preservation Office, Majuro Atoll.

Dye, T. (editor)
1987 *Marshall Islands Archaeology*. Pacific Anthropological Records, no. 38. Department of Anthropology, Bernice Pauahi Bishop Museum, Honolulu.

Finney, S. S. and J. Stephen
2005 Photomosaics in Shallow Water Environments: Challenges and Results. In *Maritime Heritage and Modern Ports*, edited by R. M. i. Barbe, C. A. Brebbia and J. Olivella, pp. 195-203. Wessex Institute of Technology, Southampton.

Hezel, F. X.
1979 *Foreign Ships in Micronesia: A Compendium of Ship Contacts with the Caroline and Marshall Islands 1521-1885*. Trust Territory Historic Preservation Office and the U.S. Heritage Conservation and Recreation Service, Saipan.

Hobsbawm, E. and T. Ranger (editors)
1983 *The Invention of Tradition*. Cambridge University Press, Cambridge.

Holly, M. B.
2000a *Archaeological Survey and Inventory of Submerged Cultural Resources in the Lagoon of Kwajalein Atoll: Sites on the South and Eastern Sides of Kwajalein Atoll*. HPO Report 2000/02. Republic of the Marshall Islands: Historic Preservation Office, Majuro Atoll.

2000b *Archaeological Survey and Inventory of Submerged Cultural Resources in the Lagoon of Majuro Atoll*. HPO Report 2000/01. Republic of the Marshall Islands: Historic Preservation Office, Majuro Atoll.

2000c *Archaeological Survey and Inventory of Submerged Cultural Resources in the Lagoon of Wotje Atoll*. HPO Report 2000/03. Republic of the Marshall Islands: Historic Preservation Office, Majuro Atoll.

Poyer, L.
1997 *Marshall Islands Ethnography: Ethnography and Ethnohistory of Taroa Island, Republic of the Marshall Islands*. Micronesian Resources Study. Micronesian Endowment for Historic Preservation, U.S. National Park Service, San Francisco.

Spennemann, D. H. R.
1995 Taroa, Maloelap Atoll. A brief virtual tour through a Japanese airbase in the Marshall Islands. URL: http://marshall.csu.edu.au/Marshalls/html/japanese/Taroa/Taroa.html. Accessed October 13, 2005.

Speulda, L. A., A. Raymond and V. Parks
1999 *Midway Atoll National Wildlife Refuge Historic Preservation Plan*. U.S. Department of the Interior Fish and Wildlife Service, Region 1, Sherwood, OR.

U.S. National Park Service
1985 *Nominating Historic Vessels and Shipwrecks to the National Register of Historic Places*. National Register Bulletin 20.

n/d *How to Apply the National Register Criteria Evaluation*. National Register Bulletin 15.

Weisler, M.
1999 The Antiquity of Aroid Pit Agriculture and Significance of Buried A Horizons on Pacific Atolls. *Geoarchaeology* 14(7):621-654.

2001 Precarious Landscapes: Prehistoric Settlement of the Marshall Islands. *Antiquity* 75:31-32.

APPENDICES

Appendix 1. Cultural Resource Examination Reports for Sites Identified During the Survey

Description: Contains the preliminary information collected on site during the survey. This information was recorded on forms prepared in advance using a template from Speulda et al (1999). These formed the basis for the final results included in the report and were included in the preliminary report sent to RMIHPO at the conclusion of the survey. Each report includes a representative photograph of the site for quick reference. GPS coordinates are not included in this report as per the request of the RMIHPO.

Appendix 2. Magnetometer maps of survey areas off Taroa, Airik and Pigeeyatto

Description: Contains maps showing the survey lines and anomalies referenced in the text.

Appendix 3. Photographs

Description: Contains a representative sample of photographs of each site captured from the digital video recorded during the survey. These stills, coupled with the raw video footage and the photo mosaics, provide an inventory of the cultural material found at each site and should be used as the baseline for further investigation into environmental deterioration and possible looting or vandalism of sites. These photos are included in a separate file on the CD-ROM.

Appendix 4. Photo Mosaics

Description: Contains information about the photo mosaics created for some of the sites. These photo mosaics are included in a separate file on the CD-ROM. Due to the time constraints of the project and the environment of some of the survey areas, photo mosaics of every recorded site are not available. See the article by Finney and Stephen for more information about the photo mosaics created as part of this project (Finney and Stephen 2005).

Appendix 5. Video Log

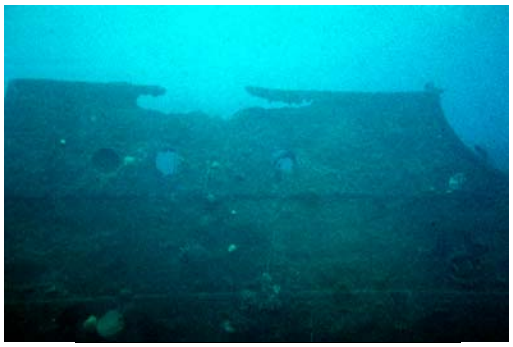
Description: Contains an inventory of the video footage on the videotape accompanying this report. Raw footage and a short edited section are included.

Cultural Resource Examination Report: Maloelap Atoll, Republic of the Marshall Islands

Local/Common Name of Site: ____*Torishima Maru*_____ Site #: _MI-Ml-004__

Brief Description: _Japanese cargo/merchant ship recorded lost

Approximate Date of Wreck/Site: ____1943_____



Landmarks/Compass Readings: __directly off beach_____

Nearest Charted Island: ___Taroa_____

Depth: Max: 45 feet/14 m_ Min: 20 feet (+ surface protrusions)/6 m_ Average: 25 feet/7.6 m___

Dimensions/Area: _200 feet (61 meters) length, 30 feet (9 meters) beam

Disposition/Orientation: _leans port, largely intact from stern to bow except for bomb damage

Primary Material Type: _____steel_____

Secondary Material Type: _____iron, brass_____

Condition of Materials: _corroding but relatively good wreck condition; some coral growth

Environment: ___lagoon, protected, great visibility_____

Hazards?: ___sharks, sharp edges, restricted overhead in holds, possible ordnance

Description of Materials/Artifacts: __propeller (possibly brass) intact with rudder; two large holes at stern indicate explosion; bow torn almost completely away from rest of ship

Diagnostic Features: ___none evident during survey_____

Recorder: _Finney, Muse_____ Date: __7 July 03_____ Mag Survey? YES

Cultural Resource Examination Report: Maloelap Atoll, Republic of the Marshall Islands

Local/Common Name of Site: __English wreck_____ Site #: _MI-Ml-005__

Brief Description: __iron sailing vessel_____

Approximate Date of Wreck/Site: ___early 20th century___

Landmarks/Compass Readings: _visible from shore_____

Nearest Charted Island: _____Airik_____

Depth: Max: _3 feet/1 m_____ Min: __above surface__ Average: __2 feet/0.6 m_____

Dimensions/Area: __@ 322 square feet (30 square meters)_____

Disposition/Orientation: _bow section closest to ocean; stern section W of bow section

Primary Material Type: _____iron_____

Secondary Material Type: _____

Condition of Materials: _scattered, disarticulated but some large pieces still identifiable

Environment: _on reef flat directly west of Airik_____

Hazards?: _waves, surge, current, sharks, sharp edges_____

Description of Materials/Artifacts: _iron mast, windlass, rudder, anchor chain still in locker (?), hawse pipe, no anchor seen, chain is stud linked_____

Diagnostic Features: _riveted hull, lack of propeller or engine pieces, nameplate on one beam reads Danver (?)

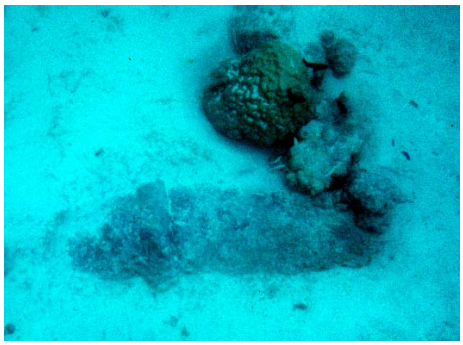
Recorder: _Finney, Muse, Langmoir_ Date: _8-9 July 03_____ Mag Survey? NO

Cultural Resource Examination Report: Maloelap Atoll, Republic of the Marshall Islands

Local/Common Name of Site: _n/a_____ Site #: _MI-Ml-006__

Brief Description: _disarticulated iron cylinder located just off reef

Approximate Date of Wreck/Site: ____n/a_____



Landmarks/Compass Readings: _____ _____

Nearest Charted Island: ___Airik_____

Depth: Max: _10 feet/3 m____ Min: ____10 feet/3 m_____ Average: ___10 feet/3 m____

Dimensions/Area: __one piece, 30 inches (80 cm) diameter x 4 feet (1.2 meters) long

Disposition/Orientation: __coral encrusted lying on sand_____

Primary Material Type: _____iron_____

Secondary Material Type: _____

Condition of Materials: ___fair_____

Environment: ____lagoon, just off reef_____

Hazards?: ___sharks, current_____

Description of Materials/Artifacts: _material is suspected to be more of the large iron shipwreck (Site #MI-Ml-005) on the nearby reef. Debris scatter from reef leads directly to this point. Only visible feature of large magnetometer anomaly.

Diagnostic Features: _none_____

Recorder: _Finney, Muse_____ Date: __9 July 03_____ Mag Survey? YES

Cultural Resource Examination Report: Maloelap Atoll, Republic of the Marshall Islands

Local/Common Name of Site: __Shallow wreck (Japanese)___ Site #: _MI-Ml-007__

Brief Description: __Japanese merchant ship_____

Approximate Date of Wreck/Site: ____1944_____

Landmarks/Compass Readings: __visible from surface – off beach _____

Nearest Charted Island: ____Ollot_____

Depth: Max: __17 feet/5.1 m_____ Min: ____13 feet/4 m_____ Average: ___15 feet/4.6 m___

Dimensions/Area: _96 feet (29.5 meters) length (31m to bowsprit); 19 feet (5.8 meters) beam

Disposition/Orientation: ___upright on sand – bow toward beach_____

Primary Material Type: _____steel_____

Secondary Material Type: _____iron_____

Condition of Materials: _____good_____

Environment: _____shallow lagoon_____

Hazards?: _sharks, current, possible unexploded ordnance, sharp edges, restricted overhead

Description of Materials/Artifacts: __coral encrusted, loose debris on deck and in holds, wreck is in fairly good condition and does not appear to have been much disturbed_____

Diagnostic Features: ____none_____

Recorder: _Finney, Muse_____ Date: _10 July 03_____ Mag Survey? NO

Cultural Resource Examination Report: Maloelap Atoll, Republic of the Marshall Islands

Local/Common Name of Site: __Deep Wreck (Japanese)_____ Site #: _MI-Ml-008__

Brief Description: __Japanese merchant ship_____

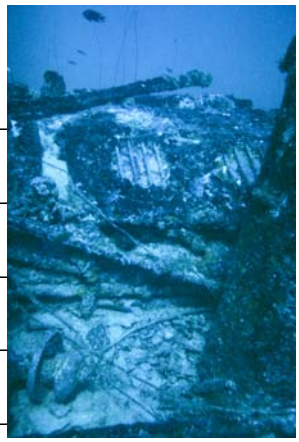
Approximate Date of Wreck/Site: ___1944_____

Landmarks/Compass Readings: _directly behind (downslope) Site #MI-Ml-007_____

Nearest Charted Island: __Ollot_____

Depth: Max: __70 feet/21.3 m_____ Min: ___36 feet/11 m_____ Average: __55 feet/16.7 m___

Dimensions/Area: _105 feet (32 meters) length, 20 feet (6 meters) beam



Disposition/Orientation: ___upright on sand, bow toward beach_____

Primary Material Type: ____steel_____

Secondary Material Type: __iron_____

Condition of Materials: ____good_____

Environment: __lagoon_____

Hazards?: _sharks, current, restricted overhead, possible unexploded ordnance

Description of Materials/Artifacts: __coral encrusted in some areas; loose debris on deck and in holds; wreck is in excellent "predisturbance" condition i.e. has not been looted by divers; gun on bow and glass in portholes still intact

Diagnostic Features: ___gun on bow?_____

Recorder: _Finney, Muse_____ Date: __10 July 03_____ Mag Survey? NO

Cultural Resource Examination Report: Maloelap Atoll, Republic of the Marshall Islands

Local/Common Name of Site: __aircraft wreckage_____ Site #: _MI-Ml-009__

Brief Description: __one engine and most of wing partially buried_____

Approximate Date of Wreck/Site: ___1944_____

Landmarks/Compass Readings: _____ _____

Nearest Charted Island: ___Ollot_____

Depth: Max: __2 feet/0.6 m_____ Min: above surface____ Average: __surface_____

Dimensions/Area: _36.5 feet length (wingspan) [@ 11 meters]

Disposition/Orientation: _partially embedded, coral rubble on top of reef_____

Primary Material Type: ___aluminum_____

Secondary Material Type: ___engine parts_____

Condition of Materials: ___fair_____

Environment: __reef_____

Hazards?: _waves, surge, sharp edges_____

Description of Materials/Artifacts: _engine is a 6-cylinder radial engine with a 3 bladed counter-rotating prop and 'hershey bar' wing. Propeller blade is 4.5 feet long and 10" at widest point

Diagnostic Features: counter rotating prop, bullet holes in propeller blade, prop strike, flaps retracted

Recorder: _Muse, Finney_____ Date: _10 July 03_____ Mag Survey? NO

Cultural Resource Examination Report: Maloelap Atoll, Republic of the Marshall Islands

Local/Common Name of Site: __aircraft wreckage_____ Site #: _MI-Ml-010__

Brief Description: _two large engines and scattered debris on shore_____

Approximate Date of Wreck/Site: ___1944_____

Landmarks/Compass Readings: _____ _____ _____

Nearest Charted Island: ___Chierumarokku_____

Depth: Max: __2 feet/0.6 m_____ Min: _above surface___ Average: ___surface____

Dimensions/Area: __200 square feet_(@ 20 square meters)_

Disposition/Orientation: ____partially embedded in sand

Primary Material Type: __engine block materials_____

Secondary Material Type: _aluminum_____

Condition of Materials: good-copper wiring, lockwires, cotter pins no corrosion/intact

Environment: __reef flat, coral, sand, coral rubble_____

Hazards?: _sharks, surge, unexploded ordnance_____

Description of Materials/Artifacts: _10 cylinder radial engines (2) face down on substrate/ Relatively intact. Engine cowling gone. Disarticulated pieces scattered along shoreline and near interior of island.

Diagnostic Features: Serial No. ID plate on one engine, # of cylinders, English writing on plates, USN insignia

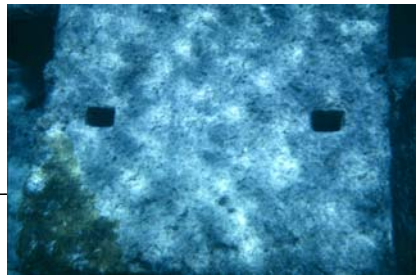
Recorder: _Muse, Finney_____ Date: _11 July 03_____ Mag. Survey? NO

Cultural Resource Examination Report: Maloelap Atoll, Republic of the Marshall Islands

Local/Common Name of Site: __Japanese pier_____ Site #: _MI-Ml-011__

Brief Description: _"L" shaped concrete pier currently in use as main pier for Taroa

Approximate Date of Wreck/Site: _WW II era and Japanese occupation prior to WW II



Landmarks/Compass Readings: _____ _____

Nearest Charted Island: _____Taroa_____

Depth: Max: __7 feet/2 m_____ Min: above surface____ Average: _surface_____

Dimensions/Area: _230 feet (70 meters) max. width

Disposition/Orientation: _connected to shore_____

Primary Material Type: __concrete_____

Secondary Material Type: ____iron_____

Condition of Materials: _fair, bomb damage and erosion have resulted in deterioration

Environment: __shore_____

Hazards?: _falling off; concrete breaking apart_____

Description of Materials/Artifacts: _pier is in state of disrepair dating to the WW II era when it was bombed by the US over the course of several months. Possible anti-aircraft gun in pieces at shore end

Diagnostic Features: __concrete block construction_____

Recorder: _Finney, Muse_____ Date: _11 July 03_____ Mag Survey? YES

Cultural Resource Examination Report: Maloelap Atoll, Republic of the Marshall Islands

Local/Common Name of Site: _Japanese gun_____ Site #: _MI-Ml-012__

Brief Description: __Japanese anti-aircraft gun_____

Approximate Date of Wreck/Site: ___WW II_____

Landmarks/Compass Readings: _____ ___

Nearest Charted Island: ____Taroa_____

Depth: Max: ___---_____ Min: _____---_____ Average: __on reef_____

Dimensions/Area: _____

Disposition/Orientation: _gun facing north still on base_____

Primary Material Type: ___iron_____

Secondary Material Type: _____

Condition of Materials: _good, gun rusted in place but intact_____

Environment: ___reef flat_____

Hazards?: _unexploded ordnance_____

Description of Materials/Artifacts: _Japanese anti-aircraft gun used during WW II against US planes. One of several on the island and the most intact._____

Diagnostic Features: _____

Recorder: _Finney, Muse_____ Date: _12 July 03_____ Mag Survey? NO

Cultural Resource Examination Report: Maloelap Atoll, Republic of the Marshall Islands

Local/Common Name of Site: __LCU-1250_____ Site #: _MI-Ml-013__

Brief Description: _Landing craft utility abandoned by RMI__

Approximate Date of Wreck/Site: ____1980s_____

Landmarks/Compass Readings: _____ _____

Nearest Charted Island: ____Taroa_____

Depth: Max: _2 feet/0.6 m_____ Min: __above surface__ Average: _above surface

Dimensions/Area: __100 feet (30 meters) length_____

Disposition/Orientation: ____beach_____

Primary Material Type: ____steel_____

Secondary Material Type: _____

Condition of Materials: _good, much of super structure appears intact_____

Environment: ___shore/beach_____

Hazards?: _sharp edges_____

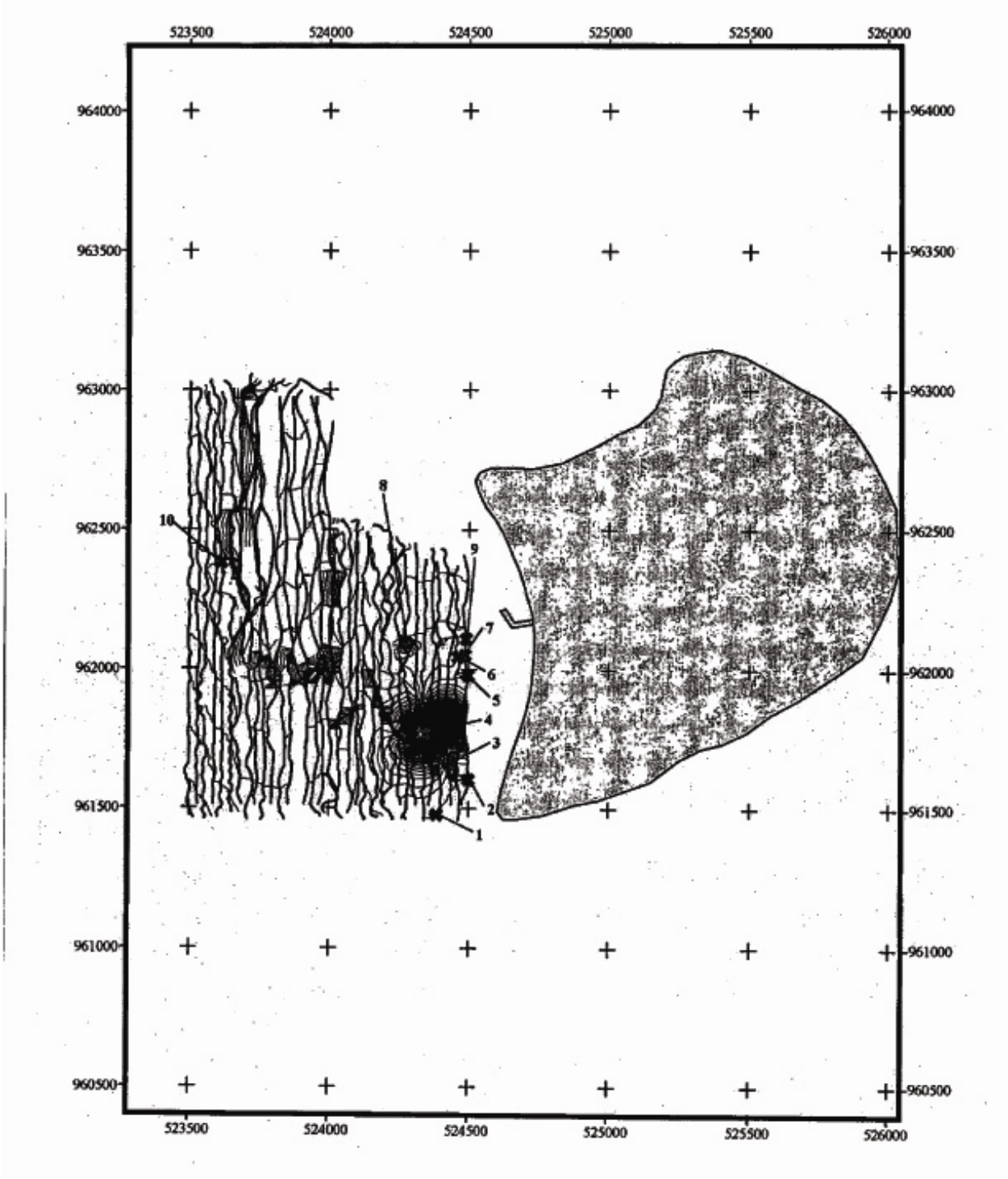
Description of Materials/Artifacts: _bow (landing) section down and in water, chains no longer connected between bow section and rest of hull. Abandoned by RMI government which has many of these._____

Diagnostic Features: __LCU-1250 painted on bow_____

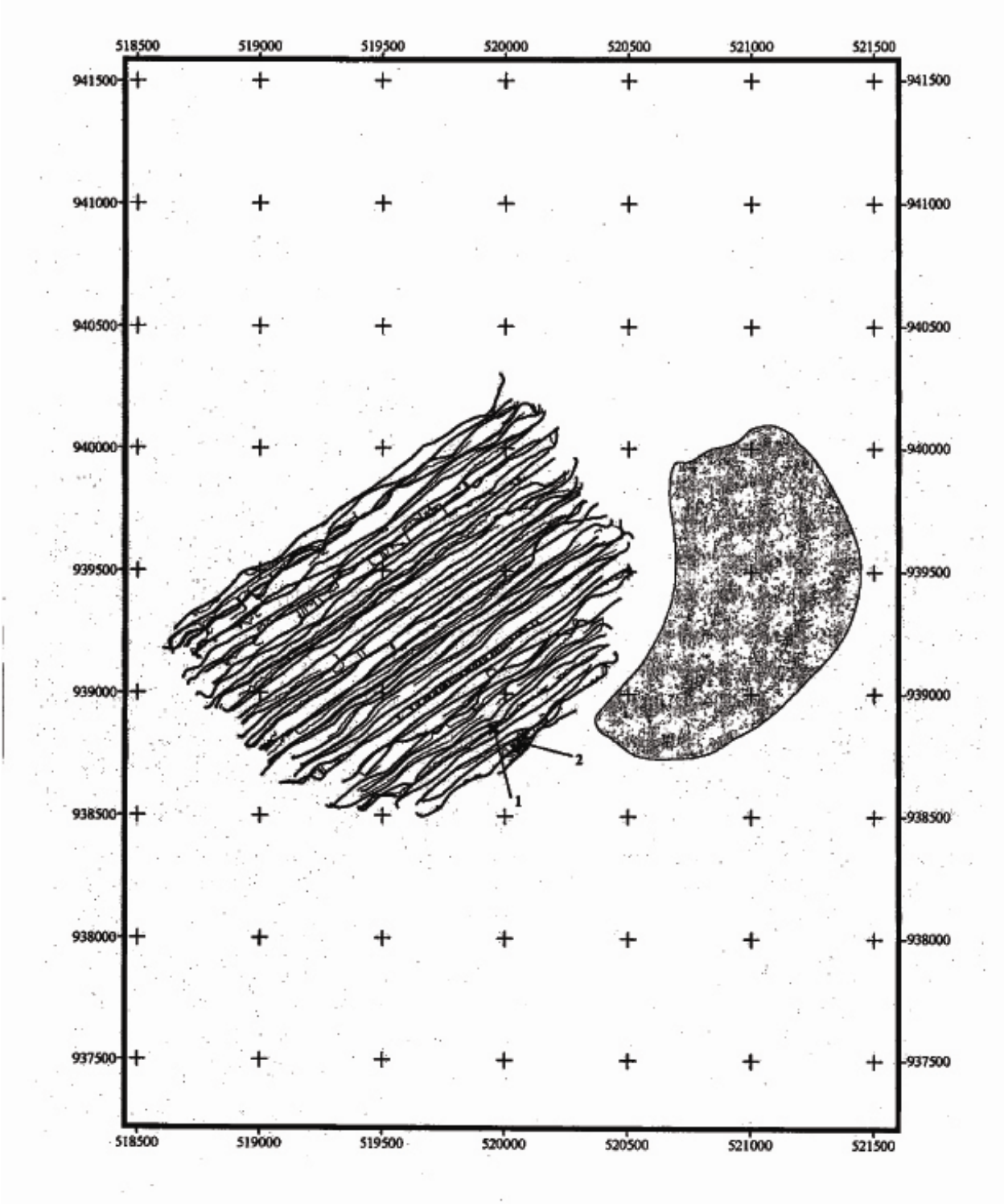
Recorder: _Finney, Muse_____ Date: _12 July 03_____

Magnetometer Surveys of Areas off Taroa, Airik and Pigeeyatto

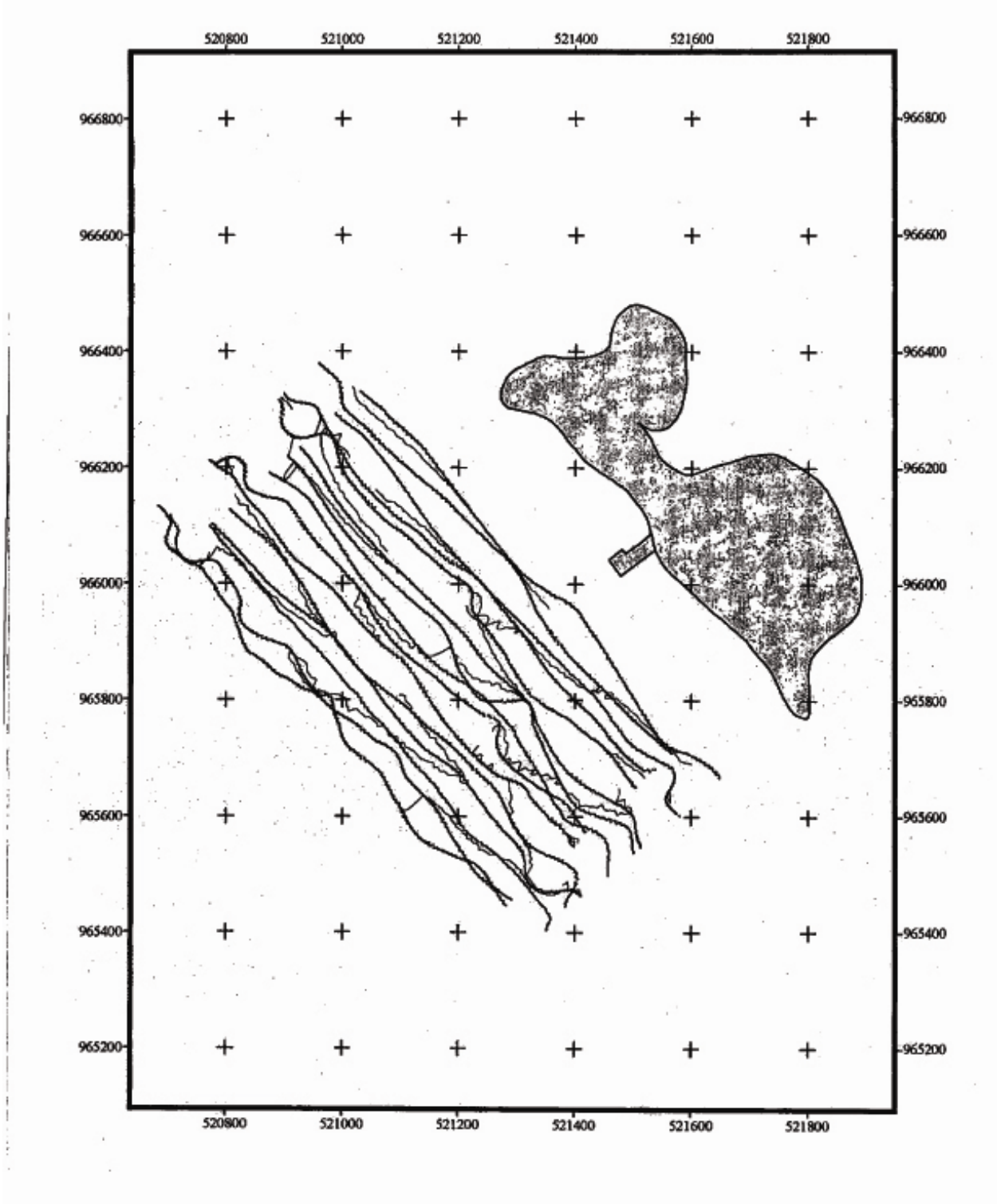
Taroa Survey



Airik Survey



Pigeeyatto Survey



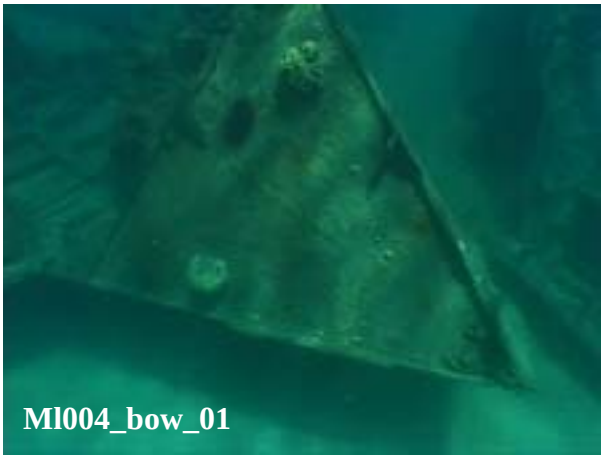
Photographs

RMIHPO #MI-Ml-004


Ml004_deck detail_04


Ml004_deck detail_02


Ml004_deck detail_01


Ml004_bow_01


Ml004_bow_02

RMIHPO #MI-Ml-005


Ml005_mast_01


Ml005_mast_02


Ml005_rudder_01


Ml005_surface protrusions_01


Ml005_windlass_01


Ml005_riveted plating_01

RMIHPO #MI-Ml-006

RMIHPO #MI-Ml-007


Ml007_bow_01


Ml007_bow_02


Ml007_deck detail_01


Ml007_port_01


Ml007_deck detail_02


Ml007_deck detail_03

RMIHPO #MI-Ml-008

RMIHPO #MI-Ml-009

RMIHPO #MI-Ml-010


Ml010_02


Ml010_detail_01


Ml010_01


Ml010_associated material_02


Ml010_associated material _01

RMIHPO #MI-Ml-011

RMIHPO #MI-Ml-012

RMIHPO #MI-Ml-013

Ml013_stern

Ml013_bow

Photo Mosaics

File Name	File Size	File Type	Description
Ml004_bow mosaic	200 kb	JPEG	Bow section of *Torishima Maru* showing extensive damage to area.
Ml004_plan view mosaic	41,954 kb	PDF	Very large file. Plan view of *Torishima Maru* showing deck details. Incomplete.
Ml004_port mosaic	73 kb	JPEG	Port side of *Torishima Maru.*
Ml007_plan views	10,964 kb	PDF	Plan view of shipwreck showing deck details. Incomplete.
Ml008_bow and bow gun views	8,144 kb	PDF	Multiple images of details from bow section of shipwreck.
Ml008_starboard mosaic	3,169 kb	PDF	Starboard side of shipwreck showing some deck details.
Ml009_multiple views	5,302 kb	PDF	Collection of photos from site. Not a photo mosaic.
Ml011_mosaic	63 kb	JPEG	South wall of pier.
Ml013_and harbor mosaic	2,431 kb	PDF	LCU-1250 and mosaic of harbor area from the Ml013 site. Ml012 is visible on the right side.

Video Log

Edited Segments

Site	Minutes	Notes
MI-Ml-004	3	Portion of plan view
MI-Ml-005	2	Includes rudder and plating
MI-Ml-006	1	
MI-Ml-007	2	
MI-Ml-008	2	
MI-Ml-009	1	
MI-Ml-010	1	
MI-Ml-0011 MI-Ml-012 MI-Ml-013	:40	Pan view of all three sites
TOTAL MINUTES	**12:40**	

Raw Footage*

Minute	Site	Notes
13:00	MI-Ml-004	Begin snorkel survey of site at bow section/debris field
14:45	MI-Ml-004	Pan starboard side bow to stern
18:00	MI-Ml-004	Pan deck [plan view] stern to bow
28:45	MI-Ml-004	Pan port side bow to stern
32:30	MI-Ml-004	Rudder close up
33:00	MI-Ml-005	Wreck site debris field
36:00	MI-Ml-005	Close up of rudder
38:45	MI-Ml-005	Bow section
41:00	MI-Ml-005	Close up of stamped lettering “Danver”
44:15	MI-Ml-006	
45:25	MI-Ml-004	Anchor directly off pier at Taroa
46:00	MI-Ml-008	Pan port side stern to bow
47:00	MI-Ml-008	Pan starboard side bow to stern
48:15	MI-Ml-008	Pan deck [plan view] stern to bow
49:30	MI-Ml-008	Bow gun detail
52:30	MI-Ml-007	Pan port side stern to bow
54:20	MI-Ml-007	Bow
54:30	MI-Ml-007	Pan starboard side bow to stern
56:00	MI-Ml-007	Pan deck [plan view] stern to bow
57:20	MI-Ml-008	Details of some of the artifacts noted at wreck site
58:00	MI-Ml-009	
62:00	MI-Ml-010	
65:00	MI-Ml-010	Identification plate located on one engine

72:00	MI-Ml-010	Associated material
75:00	MI-Ml-011	Taroa Harbor
76:00	MI-Ml-013	LCU 1250 and pan of harbor
78:00	MI-Ml-012	
79:30		Interview with Kiat Benjamin, Story #1
91:00		Interview with Kiat Benjamin, Story #2
96:00	MI-Ml-004	Pan of harbor area and pier at Taroa
97:00		ENDS

*Video footage is not time stamped so times listed are estimates and may vary between tapes and video recorders