

RESEARCH ON GOOD PRACTICE IN THE
PROTECTION AND MANAGEMENT OF WW
II-RELATED UNDERWATER CULTURAL
HERITAGE IN THE PACIFIC SMALL ISLAND
STATES AND TERRITORIES

EDITED BY JUN KIMURA, BILL JEFFERY, SUNNY O. NGIRMANG AND
CALVIN T. EMESIOCHEL

Produced for UNESCO APIA

Contract No. 4500273439

December 2015

Contents

Preface	2
1. Executive summary	3
2. An overview of to the WWII UCH management and issues	7
4. World War II Underwater Cultural Heritage Issues in Hawai'i	21
5. Submerged WW II sites in Chuuk, Pohnpei and Yap	33
6. Fact finding mission report on Palau Republic approaches to WWII wreck sites	61
7. Recommendations	75



Above: Group photo during the 2013 Palau Underwater Archaeological Training

Preface

The Pacific Ocean was a significant path for exploration, immigration, colonization, and trades, as well as the setting for naval battles and warfare. Underwater Cultural Heritage (UCH) in this region varies in time periods from the Prehistoric time to World War II (WWII). Of the identified UCH, vessels assigned to the WWII period occupy a large proportion. For example, over 3,800 WWII wrecks are in the registry of the Pacific Ocean Pollution Prevention Program with a combined tonnage of 13.5 million tons. The wrecks include the remnant of submarines to aircraft. New wrecks are being discovered constantly.

Some of the WW II UCH present certain risks such as Unexploded Ordinances (UXO), toxic weaponry and crude oil that threaten not only visiting tourists but the local community. At the 2011 Pacific Islands Forum Leaders Meeting, leaders called on relevant international bodies and development partners to assist in addressing UXO in the region and called for the safe removal of oil from shipwrecks. On the other hand, a number of these WW II UCH have become well known tourism and educational places. Apart from the USS Arizona Memorial which is the large number of visitors and important destination in Hawaii, sites such as the sunken Japanese fleet in the Chuuk lagoon in Federation State of Micronesia, UCH trails in Saipan, and the Helmet Wreck and other vessels in the Palau are some of the examples that provide communities with significant economic benefits from tourism in the Pacific nations.

Considering this situation, a research on good practice in the protection and management of WW-II UCH is deemed necessary to provide models for a broad range of stakeholders involved. The joint-research led by maritime archaeologists and heritage officers from Bureau of Arts and Culture, Republic of Palau with a support from the UNESCO Apia undertook a feasibility study of WWII UCH in the Pacific region for their protection and sustainable use with a focus on tourism and education, UXO, entombed human remains.

1. Executive summary

Sunny O. Ngirmang, Calvin T. Emesiochel, and Jun Kimura

1). Background

Along with the growth of interest in cultural resources beneath the waters among the Pacific countries, the UNESCO Apia has led workshops and study to identify and address the issues of UCH widely with international experts and cultural heritage officers in the region. The chronological outline of the milestone activities follows:

- Organizing “Workshop: Towards the Protection of Underwater Cultural Heritage in the Pacific”, held from 16 to 18 December 2009 in Honiara, Solomon Islands
- Publishing *Underwater cultural heritage in Oceania* in 2010 in consultation with UNESCO in Paris.
- Commissioned a feasibility study project, *Feasibility study on a Pacific Underwater Cultural Heritage capacity* to Maritime Archaeology Program of Flinders University reported in 2011.
- Providing sponsorship to the “2nd Asia-Pacific Regional Conference for Underwater Cultural Heritage” held in Hawaii in 2014.
- Organizing a series of activities in conjunction with the United Nation’s 3rd International Conference on Small Island Developing States (SIDS) held from 1 to 4 September 2014 in Apia, Samoa.

The last event specifically aimed to promote UCH safeguarding in relevant to the sustainable development of SIDS and the activities organized during the Conference included an introductory course on underwater archaeology, a presentation at Youth Space, a full-day parallel event, and two side events. In the end of these activities, the establishment of the Pacific UCH Partnership (PUCHP) was proposed at a meeting participated by regional stakeholders and international experts. PUCHP is a regional alliance to enhance the member countries’ strong cultural and historical connection to the sea, represented by UCH related to early human colonization, ancient sunken villages, ancient fish traps, and wrecks. Of these sites, those sunken vessels dated to WWII are important, but giving a view as they are venerated underwater cemetery sites there are number of issues that PUCHP must consider. UNESCO Apia committed the implementation of a basic study about WWII UCH to the Republic of Palau.

2). Objectives

The joint-research aimed to review practices in the protection and management of World War

II UCH in Pacific nations. One of the aims of the research is to provide a foundation on which SIDS and territories can implement the sustainable use of cultural resources underwater with their appropriate protection. The increase of awareness on the significance of UCH has already been recognized among practitioners and stakeholders increased in many Pacific countries with understanding vulnerabilities of UCH. The identification of threats and human activities that impacts on UCH is considered to be key to maintain public access to underwater sites and increase community benefit. The outcome of the research will be a compilation of good practices and recommendations for a way forward. The research was launched in 2015 with the following main objectives:

- developing a sophisticated understanding of problems inherent in WWII remains in Pacific SIDS and island territories.
- expanding the knowledge base about good practices in the protection and management of WW II UCH in some of Pacific SIDS and island territories.
- proposing recommendations for the development of concepts and rules which Pacific SIDS and island territories can enhance capacity in the sustainable use and lasting protection of UCH as marine cultural resources.

The research will be carried out through the Pacific UCH Partnership (PUCHP) that was formed at the 3rd SIDS Conference in Samoa in 2014 which is a part of the Pacific Ocean Alliance facilitated by the Pacific Ocean Commissioner.

3). Research Members of the WWII UCH Feasibility Study Group

Dr. Bill Jeffery	Assistant Professor Division of Humanities College of Liberal Arts and Social Sciences University of Guam
Dr. Jun Kimura	Junior Associate Professor Dept. of Maritime Civilizations School of Marine Science and Technology Tokai University
Dr. Jennifer F McKinnon	Assistant Professor Department of History, Program in Maritime Studies East Carolina University
Sunny O. Ngirmang	Director/HPO
Calvin T. Emesiochel	Deputy Historic Preservation Officer Bureau of Arts and Culture/ Palau Historic Preservation Office Ministry of Community and Cultural Affairs Republic of Palau
Dr. Hans K Van Tilburg	Maritime Heritage Coordinator NOAA Office of National Marine Sanctuaries National Oceanic and Atmospheric Administration U.S. Department of Commerce

Selected study areas – SIDS nations, island territories, and Pacific regions.

The following areas were elected to be studied for a bench mark to identify problems in the current UCH protection and management and understand policies and regulations to be adopted by government agencies.

- Federated States of Micronesia (Chuuk, Yap, and Pohnpei)
- Republic of Palau
- Northern Mariana Islands (Saipan), commonwealth of the United States
- Hawaii

4). Methodology

Desktop study used various sources to identify the key problems of sunken military craft from WWII periods, including Japanese and US governments' approaches to naval vessels, including both ships and airplanes. The comprehensiveness and veracity of the sources has been reviewed. The research collected what is available online as well as sources produced by

governmental agencies through the contacts of the contributors.

Contributors wrote up a country report based on expertise from preceding fieldwork and projects the contributors have been engaged in. The detailed reports regarding the state of the four countries and areas above have been produced. The state of the Republic of Palau was assessed in this study through a fact finding mission to investigate a UXO issue and WWII wreck site diving tourism in the nation.

5). Results

Significant outcomes and perspectives were obtained from the accomplished research. These include: (1) summery information about legislative framework of the U.S. governments on sunken military craft and Japanese government body recovery missions on the lost soldiers and civilians at WWII sites; (2) understanding the importance of applying appropriate heritage trail system to WWII wreck diving tourism industries; (3) clarification of the importance of government initiative and involvement on the sustainable management of the WWII UCH (4) clarification of the state of ongoing UXO disposal missions in the Republic of Palau and new government regulation for this issue.

The results have led the research members to identify several priorities that are considered vital to protect and utilize the WWII UCU in the Pacific regions:

- Developing “Code for Ethics” for divers who intend to access to WWII period’s UCH.
- Sharing methodologies for the disposal of UXO at WWII wreck sites for their sustainable use.
- Enhancing techniques to protect and monitor the WWII wreck site with reasonable methodology in terms of human resources and budget, such as photogrammetry recording.

2. An overview of to the WWII UCH management and issues

Jun Kimura

There are a number of sunken Japanese and U.S. vessels from World War II in the waters of the Pacific Ocean. This research has briefly reviewed the administrative policy of the two countries regarding the protection and management of such vessels. The scope of the review includes the jurisdiction of national government agencies and a legislative framework, which may apply to military and sovereign vessels from these countries sunken in the Pacific countries.

1). Japanese Government Policies to WWII sites

Ministry of Education, Culture, Sports, Science and Technology (MEXT)

None of Japanese governmental agencies take legally-mandated responsibilities for the protection and management of the Japanese related-WWII cultural heritage outside country, including was remains both in land and underwater. Neither there is a legislative framework to protect sunken state vessels outside territories.

MEXT in conjunction with the Agency for Cultural Affairs, however, has developed a policy for the protection of war heritage, and the historical importance of the WWII period's heritage has been recognized more than twenty years ago. There are several war heritage sites that are registered or protected under the heritage management system. Of the registered war heritage, caves located in Haeburu town in Okinawa Prefecture are, for example, designated as a first historic site in 1990 by a municipal office of the town.

The Law for Cultural Properties mandates the protection of cultural properties domestic with the historic site designation system, defining them either as *tangible cultural property*, *intangible cultural property*, *folk cultural property*, *monuments*, *cultural landscape*, *groups of traditional buildings*, *conservation techniques for cultural properties*, and *buried cultural property*. The Law was amended in 1995 with the revision of a criterion for the designation of a historic site in order to register the Atomic Bomb Dome (Genbaku Dome) in the Hiroshima Peace Memorial Park to the nationally designated historic site. Hence, the Japanese legislative system has capacity to preserve WWII period's sites at a national level. However, it functions only as part of stewardship of a historic asset of the nation for the public. The designation system is applied to rather a monumental site, not to craft or vehicle. Moreover, because of historical and legal sensitivity, military craft and vehicle owned by the Japanese Imperial Force and Navy at the time of the Second World War are in difficult condition to be protected.

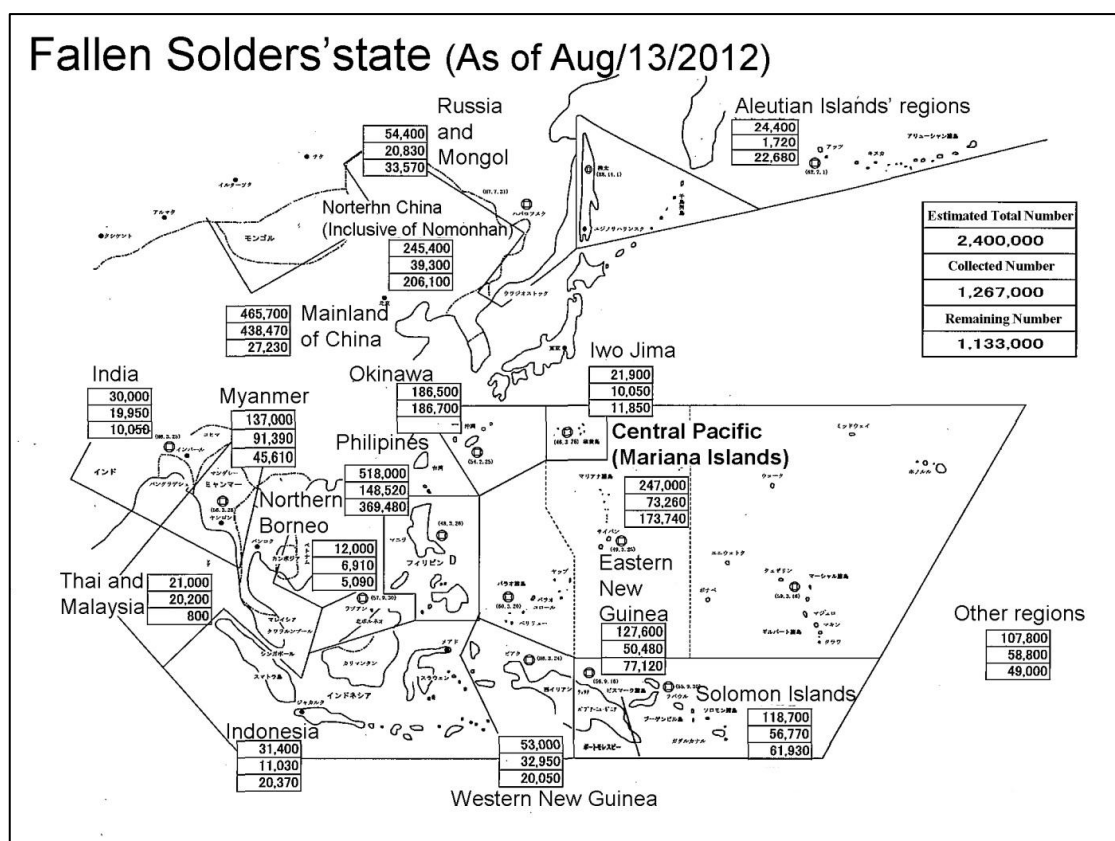


Figure 2-1. Current state of the recovered number of body remains in areas in the Asia-Pacific. It is not explicit if the number includes the recovery of civic victims. *After a press-release source by the Ministry of Health, Labor, and Welfare* (<http://www.mhlw.go.jp/stf/2r9852000002hgp9.html>), accessed on January 20, 2012

Complicated matters related to the aftermath of the WWII partially underlie an issue of less recognition of battlefields and battle sites as cultural heritage. Even though over 70 years have passed since the end of the war as of the year 2015, many Japanese people consider there are still unsolved issues from the War, taking into account that the body remains of many soldiers and civilians have not recovered yet from several battlefields and craft in the Asian and Pacific regions and Russia. Ministry of Health, Labor, and Welfare (MHLW) is an organization responsible for various matters related to post-war processes, including the war bereaved recovery issue. Planning Division of War Victims' Relief under the Social Welfare and War Victims' Relief Bureau is an agency responsible of the lost Japanese during the War. MHLW provides assists to groups and individuals who are engaged in the collection of the remains of Japanese war dead. The formal missions started in 1952, following the effectuation of the San Francisco Peace Treaty. As of the year 2013, about 1,260,000 remains out of 2,400,000 war dead abroad and those who died in Iwo Jima and Okinawa have been collected, according to MHLW (Figure 2-1.)

As of the year 2015, it is the latest information about the state of the Recovery of the Remains of War Dead mission, available on the web-site of the MLHW. According to the Planning Division of War Victims' Relief of the MLHW (<http://www.mhlw.go.jp/seisaku/2009/01/06.html>), there is the decrease of information related to unidentified body remains in some regions in recent years. Some regions, including Russian, areas of New Guinea, and Iwo Jima, however shows the larger number of the recovery than the other regions, This is due to the circumstance that body recovery missions commenced actively in these regions in recent years. The body recovery missions of remains from the WWII have presented an unprecedented and unsolved problem to the Japanese government. MLHW reports that there are approximately 3,000 Japanese military shipwrecks of the WWII period in the Asia - Pacific regions and over 300,000 body remains are still left inside these vessels (Figure 2-2.).

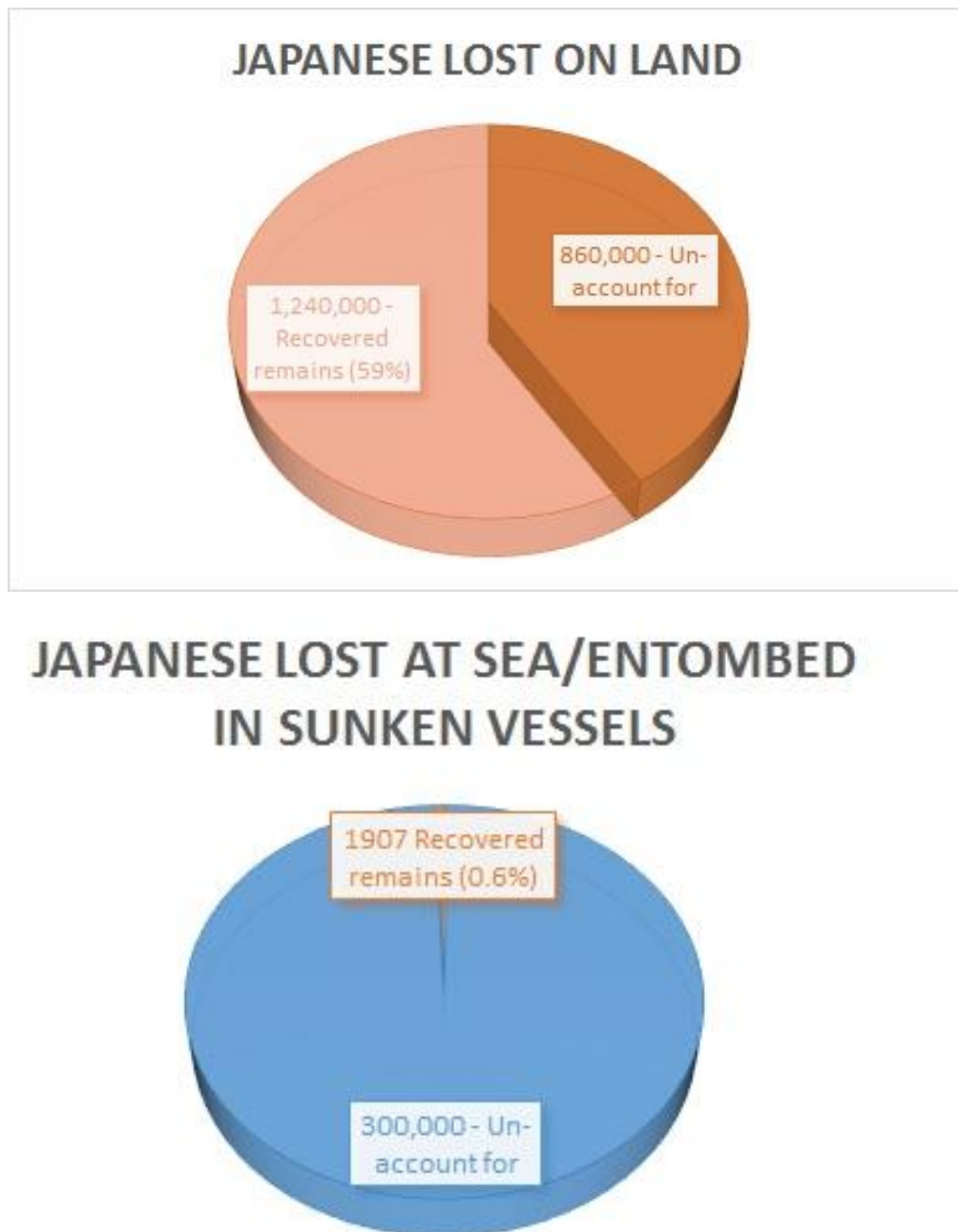


Figure 2-2. Statistical data of the lost Japanese during the WWII.

Japan Ministry of Defense (JMD) and National Institute for Defense Studies (NIDS)

It is a disputable issue whether JMD is entitled to possess the owner of the sunken military vessels possessed and operated by the Imperial Japanese Navy. There is a view that the Japan Maritime Self-Defense Force (JMSDF) is not regarded as the complete succession of the former military body of the nation. A JMD policy is not explicit if the Imperial Japanese Navy's properties are under their jurisdiction. This state is different from what the Federal

Republic of Germany considers on the German military vessels sunken during the WWII. According to the German Foreign Office' statement on the U-576 which was located by a joint-archaeological mission to survey and document vessels lost during WWII off the North Carolina coast by the National Oceanic and Atmospheric Administration and the Bureau of Ocean Energy Management (BOEM),

In legal succession to the former German Reich, the Federal Republic of Germany, as a rule, sees itself as the owner of formally Reich-owned military assets, such as ship or aircraft wreckages.

(NOAA: http://www.noaanews.noaa.gov/stories2014/20141021_ww11_vessels.html)

JMSDF does not play an active role on the protection of sunken state vessels overseas as cultural heritage, except for commemoration missions and events to pay homage to war dead in foreign countries. There was a memorial event associated to the finding of the M24 Japanese midget submarine that was sunken in Sydney Harbor in 1942 and found in 2006. The New South Wales Heritage Act and Commonwealth Historic Shipwreck Act were applied to the M24 and NSW Heritage office enforced the protection zone around it. The area is secured by a monitoring system consisting of high-technology digital surveillance buoys with a camera. The system prevents disturbance from boating and diving enthusiasts with considerations on the historical importance of the site as well as the possibility of body remains of two Japanese submariners entombed inside the hull. The Royal Australian Navy held a ceremony for honoring the courage of the attackers of Sydney Harbor with participation of the family members of the submariners and the Japan Maritime Self-Defense Force. The Japan Times has reported this was an unpublicized event (<http://search.japantimes.co.jp/news/2007/02/24/national/fallen-submariners-honored-in-australia/#.VirWMH7hDIV>).

The Military History Division of the National Institute for Defense Studies (NIDS) under the Japan Ministry of Defense is a custodian for historical documents about the Imperial Army and Navy, available for the public. The Division is part of Center for Military History which serves as the nation's sole military history research center. For those who are interested in conducting Japanese military history including the records of sunken war ships, the

Other institutes

The findings of remarkable Japanese warships occurred in the U.S. and the Philippines lately. In Hawaii, the positions of the midget submarine and Japanese super-submarine I-400 are located by the NOAA lately. Based on personal communication with officers in NOAA, it is

curtained that the discoveries were reported to the Japanese embassy. The discovery of the battleship *Musashi* in the waters of the Philippines by a group of an ex-Microsoft CEO in 2015 was frequently covered by the mass media. The National Museum of the Philippines, which is in charge of the administration of underwater cultural heritage domestic waters, must have consulted to the Japanese embassy in Manila. In the two cases in Hawaii and Manila, it seems that the Japanese embassies transferred the rights for administering the sunken vessels to the local authorities.

4). U.S. Policy on Sunken State Vessels

Underwater Archaeology Branch (UAB) of Naval History and Heritage Command (NHHC)

The Underwater Archaeology Branch (UAB) of the Naval Historical Center (NHC) under the U.S. Department of Navy (DON) manages the wrecks of warships, military aircraft, and other government vessels. The UAB establishment dates back to 1990s along with the development of a wreck databased funded by the Department of Defense Legacy Resource Management Program. The databased based archival sources contains some 3,000 ships and 14,000 aircraft wrecks all over the world. While the numbers of the ships include U.S. Army shipwrecks such as troop transports and Confederate wrecks, the aircraft wrecks are composed of only US Navy planes. As the DON center of expertise and specialized unit to study, conserve, and curate its submerged cultural resources, the UAB conducts:

- The scientific implementation of underwater archaeology consisting of the identification, research, analysis, interpretation, conservation, inventory of Navy's historic ship and aircraft wrecks and their associated contents.
- The safeguarding and management of the DON sunken military craft.

The four pillars of the UAB activities are presented on Table. 2-1.

ARCHAEOLOGICAL RESEARCH
• Conducts scientific research. • Oversees, permits, and supports third-party research. • Encourages research and development in related science and technology fields.
ARTIFACT CONSERVATION & CURATION
• Oversees an archaeological conservation laboratory and provides guidance on conservation and curation. • Inventories, conserves, curates, and provides access to an artifact collection of over 2,500 artifacts for research, analysis, and museum exhibition. • Maintains an archaeological artifact loan program with over 11,000 artifacts currently on loan to national and international museums.
HISTORIC PRESERVATION & POLICY DEVELOPMENT
• Insures Navy compliance with federal laws. • Develops, coordinates, reviews, and implements policy. • Maintains a Geographic Information System (GIS) and a database of over 3,000 ship and 14,000 aircraft wrecks for management and research.
EDUCATION / PUBLIC RELATIONS / INFORMATION DISSEMINATION
• Disseminates information to the Navy, the general public, and academia through scientific and popular publications, lectures, the NHHU UA web-site, in-person visits, the artifact loan program, and underwater archaeological exhibits. • Support of USNA midshipmen and student research through an academic internship program.

Table. 2-1 UAB duties and responsibility (Courtesy of UAB, Dr. Neyland, Dr. Schwarz, and Dr. Catsambis).

Sunken Military Craft Act

The management of Navy's ship and aircraft wrecks by the Underwater Archaeology Branch (UAB) of Naval History and Heritage Command (NHHC) is conducted in accordance with the National Historic Preservation Act (NHPA), which is a procedural statute designed to ensure that the U.S. agency takes into account the effect of the undertaking on historical places. A more recent legislative addition, the National Defense Authorization Act for Fiscal Year 2005, generally referred to the Sunken Military Craft Act (SMCA) is critique to the management of WWII UCH in the Pacific regions. This law applies to sunken U.S. military craft wherever located around the world.

The 2001 Presidential Statement on United States Policy for the Protection of Sunken State

Craft states that sunken state vessels are not considered to have been abandoned and the passage of time does not change their ownership. Hence, the SMCA was enacted to codify the sovereign status of protected sunken military craft and permanent ownership. The U.S. Navy Sunken Military Craft defined here includes:

- Any sunken warship, naval auxiliary, or other vessel that was owned or operated by a government on military non-commercial service when it sank.
- Any sunken military aircraft or military spacecraft that was owned or operated by a government when it sank.
- The associated contents of such sunken military craft, including equipment, cargo, as well as remains and personal effects of the crew and passengers within the craft and its debris field.

The purpose of the SMCA is primarily to protect sunken military vessels and aircraft, and associated contents from unauthorized disturbance with consideration on physical variability of such. Unauthorized artefacts recovery at the sunken military craft is illegal activities and are prohibited at U.S. as well as non-U.S. sunken military craft. The same legislative statutes to prevent irreversible harm to reduce the potential for irreversible harm to U.S. owned submerged resources applies to the jurisdiction of the Pacific nations.

There are other concerns with the shipwrecks besides the historical and archaeological value. A norm that sunken military craft serve the grave of lost military personnel and such grave sites should be accorded the highest respect and protection. The concept is incorporated into the SMCA that protect the remains of the crews from unauthorized activities. The activities potentially causes oil spilling, damage to unexploded ordinance, or other hazardous materials. The contaminants potentially danger to the environments and general public is a growing concern. The SMCA mitigates the risk by requiring review and approval of intrusive work at the sites and authorization of permitting program is part of the scope of the law. The permitting program information is available on the following link of the SMCA: <http://www.history.navy.mil/research/underwater-archaeology/policy-and-resource-management/current-permitting-program.html>

3. WWII UCH Feasibility Study: Saipan Case Study

Jennifer McKinnon

Target Areas

1). Tourism

Prior to the development of the WWII Maritime Heritage Trail: Battle of Saipan, no organized underwater cultural heritage (UCH) tourism existed. Of all the WWII sites available in the

lagoon, only two were frequented with any regularity by tourist divers – *Shoan Maru*, a Japanese freighter and a Kawanishi H8K Japanese seaplane. The Kawasaki was misidentified, or at least misnamed, regularly by divers as “the B29.” This misnomer and several others were corrected when the interpretive and historical materials for the trail were produced and distributed.

The development of a UCH tourism in Saipan was conceptualized as an inclusive and collaborative effort to include academia, nonprofit, government agency, and the local community in the study of Saipan’s WWII submerged heritage. By taking this approach, it was hoped that more could be accomplished with fewer resources and a sense of stewardship for long-term preservation would take hold of the island.

The WWII Maritime Heritage Trail: Battle of Saipan consists of nine stops with a total of twelve vehicles. Three US Sherman tanks, two Japanese landing craft, a Japanese Aichi E13A aircraft, a Japanese Kawanishi H8K aircraft, a US PBM Martin Mariner Aircraft, a US Avenger aircraft, a possible Japanese submarine chaser, a US Landing Vehicle Tracked (LVT), and a Japanese freighter comprise the trail. Their locations vary from very nearshore in shallow water (2–3 ft) up to 30 ft of water on the barrier reef. Some of the sites can be accessed from shore via snorkel, making it accessible to those who are not scuba certified. Site selection was informed by consulting with the diving industry as well as diversity in vehicle type and ethnic association (i.e., Japanese and American) (McKinnon 2015a:8).

Two types of public outreach products were created as part of a larger plan to aid in the preservation and protection of UCH sites that were already being impacted through diver visitation: printed “hand out” materials consisting of posters and underwater dive guides that visitors could take with them or download from the internet and an 18-minute interpretive film, which is shown at the National Park Service visitor center. The printed materials were produced in English and Japanese languages (McKinnon 2015a:9).

Tourism on UCH remains unregulated and unrecorded. No permits or licenses are needed by dive operators or diver to visit sites, no numbers of visitors to sites are kept and site inspections by the Historic Preservation Office are not undertaken. This is mostly due to a lack of regulatory requirements and staff and funding. In what may be a unique problem, the majority of impacts to Saipan’s submerged sites are a direct result of visitation, specifically anchor or mooring damage, looting, moving artifacts, and acts of vandalism (McKinnon 2015b). This presents a challenge for managers who have limited staff, time, and funding.

Within the Mañagaha Marine Conservation Area where there are restrictions on anchoring,

steps to prevent damage have been underway since the heritage trail was developed in 2009. The CRM office is in the process of installing mooring buoys at the more heavily visited sites including the Kawanishi H8K site (which now has two moorings) and repairing and replacing moorings on the Japanese merchant ship. Plans are currently in the works for installing more moorings on heritage trail sites within the conservation area (McKinnon et al. 2014a:41).

However, for those sites outside of the Marine Conservation Area there is no mandate or support for installing moorings so anchor damage is a greater risk. Conversations with a local boat driver disclosed that a TBM Avenger aircraft landing gear is regularly used as a boat mooring for local surfers (Sheldon Preston personal communication, 2010). The effects of mooring are seen on the landing gear where exposed metal is obvious. Continued use of the landing gear as a mooring will eventually cause severe damage if the boats collide with the aircraft or break the landing gear during rough swell conditions (McKinnon et al. 2014a:41).

Looting and the movement of artifacts on site are probably the most common and most destructive impacts. By their very nature modern, war-related sites have a considerable amount of associated small portable objects. For many years divers have been removing artifacts or simply rearranging them on site. Because this activity impacts the historical and archeological context or fabric of a site, it can make identification more difficult and also affects the information that can be learned from the way in which the site was created (i.e. crashing, sinking, and dumping). Of the nine sites on the trail, four have had some form of looting or movement of artifacts (McKinnon et al. 2014a:43).

Vandalism, whether intentional or unintentional, also impacts submerged sites. Local tour boats frequent the Sherman tanks and “banana” boats pull passengers by for a closer look. Tour operators were observed demonstrating how to climb on the tanks and/or swing off the gun barrels, a dangerous and destructive activity. Graffiti has been etched into the mucilaginous layer on the aluminum surface of the Kawanishi H8K aircraft on the wing of the aircraft and the gun turret (McKinnon et al. 2014a:47).

The process of memorialization affects the sites in Saipan through the addition of outside material, aggregation of moveable objects, potential damage to buried artifacts, and altering the overall integrity and “feeling” of a site. Two monuments on the Kawanishi wreck site are dedicated to those lost during the battle (McKinnon et al. 2014a:49).

Certain tourist services have a direct impact on UCH sites. The WWII U.S. Sherman tanks are subjected to an enormous amount of “foot traffic” when Jet Skis and banana boats pass nearby. These vehicles typically create wakes that wash over the tanks causing a cyclical pattern of

wetting and drying. This affects the immediate site environment by increasing oxidation levels in the water that in turn increase corrosion (McKinnon et al. 2014a:48).

Unightly rubbish, while not a serious impact, is found at UCH sites. Because the Sherman tanks are located just offshore from several large resorts and locally popular picnic beaches, rubbish including plastic bags, beer and soda cans, plastic forks and fishing line accumulate. Not only can trash present hazards to snorkelers and divers, but they certainly have an impact on marine life. Turtles and fish may ingest pieces of plastic; an adverse impact that is well documented elsewhere (McKinnon et al. 2014a:48).

Another tourism service impact that affects both the environment (i.e. marine organisms) and cultural heritage is the operation of the local tourist submarine. *Shoan Maru* is on the tour and as it moves towards the shipwreck the submarine disperses large quantities of fish feed including rice to attract fish to the wreck. No information is available on the impacts of repeated discharges of rice or other non-marine organics into the water in the vicinity of the wrecks. Does this lead to higher rates of pollution and therefore deterioration? More concerning are the submarine's thrusters that blow onto the shipwreck as it makes its turn. Because the thrusters are powerful enough to move portions of the iron plating up and down, this will almost certainly lead to increased deterioration in those areas and significant impacts (McKinnon et al. 2014a:48).

2). UXO

Unexploded ordinance underwater in Saipan appears to be less of a problem for safety and divers than it is in other areas of the Pacific. Because sites are in shallow water, it is assumed that much of the UXO that might have been underwater after the Battle was recovered during post-Battle salvage operations. Only one site is known to have UXO on the site – the possible Japanese submarine chaser – which has three or four unexploded shells. The UXO was reported in 2009 to CRM and DEQ when located on the site during archaeological survey. CRM and DEQ are the offices that deal with these types of finds. A second large UXO projectile was located isolated on the seabed during a tow board survey and subsequently reported to CRM and DEQ (photographs and location). Unfortunately, it is not known what deep shipwrecks occur outside of the lagoon and whether they contain UXO and would be a hazard to health.

3). Human Remains Repatriation (Japanese)

Human remains on Saipan UCH is rare mainly due to exposure to the elements. The UCH sites have been exposed in the lagoon to marine elements which can have negative impacts on human remains survival. No underwater excavations have taken place on UCH, thus it is not

known if the conditions are conducive to preservation in a buried environment. However, there is one known site which produced human remains – the site of a Japanese LVT in intertidal waters. The site was reported by locals to the Historic Preservation Office and the human remains were removed from the site. It is not known what happened to the remains and whether they were turned over to the Japanese bone collection missions, which frequent Saipan regularly.

In 1952 the Japanese government initiated teams to visit major battlefields to collect the human remains of deceased Japanese; these are known as “bone missions” in the Pacific. The Ministry of Health, Labor, and Welfare (MHLW) is the organization responsible for various matters related to post-war processes, including the human remains recovery effort. The Planning Division of the Social Welfare and War Victims’ Relief Bureau is the primary contact and the agency that collects information about Japanese remains. MHLW carries out the Memorial Projects for War Dead which consists of five major components (<http://www.mhlw.go.jp/english/wp/wp-hw4/08.html>). These components are: DNA analysis on remains of war dead abroad, pilgrimages for memorial services and visits to burial sites, friendship and goodwill memorial project, erection of monuments to the war dead, and recovery of remains of the war dead (McKinnon et al. 2014: 56-57). MHLW provides assistance to groups and individuals who are engaged in the collection of Japanese human remains. The formal missions started in 1952 after the San Francisco Peace Treaty came into effect. As of the year 2013, approximately 1,260,000 bodies out of 2,400,000 reported dead abroad, along with those who died in Iwo Jima and Okinawa, have been collected.

When remains are recovered they are cremated on the island from which they are recovered. The ceremony takes place outside and the mass cremation is conducted using firewood. The ashes are brought back to Japan, and most of the ashes are placed into the Chidorigafuchi National Cemetery, which was the national Japanese cemetery for unidentified remains of WWII. The body recovery missions have presented unresolved problems for the Japanese government because most of the remains are not identified. DNA analysis on recovered human remains only began very recently in Japan. The first government meeting on this issue was announced by MHLW on 11 June 2001 in a press release (<http://www.mhlw.go.jp/houdou/2003/06/h0623-1a.html>). Because all of the remains recovered from Saipan are cremated during the MHLW missions, no individuals have ever been identified by the DNA analysis. No specific remains from an underwater context are known to have been collected or repatriated.

4). Research

Much of the UCH research conducted in Saipan has been undertaken specifically on WWII

sites. The first report to mention WWII in Saipan was conducted as a result of a National Park Service survey in the late 1980s and served as the baseline for what we know about WWII sites in the Pacific (Carrell 1991). Remote sensing surveys comprise the bulk of the remaining “research” into UCH sites; although, these surveys were mostly driven by regulatory needs for harbor improvement and do not necessarily reflect a research-driven framework (Burns 2008a, Burns 2008b, Lord and Plank 2003, Miculka et al. 1984, Miculka et al. 1983, Pacific Basin Environmental Consultants 1985, Thomas and Price 1980).

The largest research project to date has been undertaken by researchers from Flinders University, South Australia and Ships of Exploration and Discovery Research, Inc., a non-profit in the U.S. in the development of the WWII Maritime Heritage Trail. As a result of university and non-profit partnerships with the Historical Preservation Office and other regulatory bodies on island several publication (book, book chapters, articles, theses, etc.) and presentations have been produced and presented at academic and public forums. However, there is much more research to be conducted – the research conducted thus far has barely scratched the surface.

References

- Burns, J. (2008a). Archaeological survey of lagoons of on the West Coast of Saipan, commonwealth of the Northern Mariana Islands. Report Prepared for the CNMI Department of Community and Cultural Affairs, Division of Historic Preservation, Saipan, by Southeastern Archaeological Research, Pensacola, FL.
- Burns, J. (2008b). Archaeological survey of Tanapag Lagoon Saipan, Commonwealth of the Northern Mariana Islands. Report Prepared for the CNMI Department of Community and Cultural Affairs, Division of Historic Preservation, Saipan, by Southeastern Archaeological Research, Pensacola, FL.
- Carrell, T. L. (Ed). (1991). Micronesia submerged cultural resources assessment. Santa Fe, NM: National Park Service Submerged Cultural Resources Unit.
- Lord, C, & Plank, C. (2003). Surveys of abandoned vessels: Guam and the Commonwealth of the Northern Mariana Islands. A Report Prepared for National Oceanic and Atmospheric Administration, National Ocean Service, Office of Response and Restoration by Research Planning, Columbia, SC.
- McKinnon, J.F. (2015a). Underwater Archaeology of a WWII Battlefield. In J.F. McKinnon and T. Carrell (eds.), *Underwater Archaeology of a Pacific Battlefield: The WWII Battle of Saipan*. Springer Press, New York, pp. 1-14.
- McKinnon J.F. (2015b). Memorialization, Graffiti and Artifact Movement: a Case Study of Cultural Impacts on WWII Underwater Cultural Heritage in the Commonwealth of the Northern Mariana Islands. *Journal of Maritime Archaeology* 10.1:11-27.

- McKinnon, J. F., & Carrell, T. L. (2014a). Management plan and public outreach for WWII submerged resources in Saipan. Report to the American Battlefield Protection Program, Washington, DC. Santa Fe, NM: Ships of Exploration and Discovery Research, Inc.
- McKinnon, J. F., Carrell, T. L., Burke, H., Cabrera, G., Raupp, J., Mushynsky, J., and Kimura, J. (2014b). A Preservation Plan for the Protection of WWII-Related Caves on Saipan, CNMI. Report to the American Battlefield Protection Program, Washington, DC. Santa Fe, NM: Ships of Exploration and Discovery Research, Inc.
- Miculka, J. E., Carter, K. J., & Ichihara, N. (1984). Submerged cultural resources assessment Saipan Lagoon 03–05 December 1984. Hagåtña, GU: War in the Pacific National Historical Park.
- Miculka, J. E., & Manibusan, R. S. N. (1983). Submerged cultural assessment American Memorial Park. Hagåtña, GU: War in the Pacific National Historical Park.
- Pacific Basin Environmental Consultants, (1985). Underwater survey of Tanapag Lagoon for historic properties. A Report Prepared for Community and Cultural Affairs, Historic Preservation Office, Saipan, by Pacific Basin Environmental Consultants, Hagåtña, GU.
- Thomas, M., & Price, S. (1980). Cultural resources reconnaissance report for the Saipan small boat harbor study area. A Report Prepared for US Army Corps of Engineers Pacific Ocean Division by Pacific Studies Institute Hagåtña, GU.

4. World War II Underwater Cultural Heritage Issues in Hawai‘i

Hans Van Tilburg

Hawai‘i has a long history of intensive maritime activity, beginning with original discovery some 1,500 years ago or more by Polynesian voyagers, then western sandalwood and whaling enterprises, inter island commerce on schooners and plantation-era steam ships, and military activities. And yet, despite this activity, Hawai‘i possesses few natural harbors or safe anchorages, and therefore possesses large potential for Underwater Cultural Heritage. The majority of UCH sites consist of submerged aquaculture sites (stone fish ponds and fishing sites), commercial interisland sailing and steam vessels (plantation era), and military vessels (ships, submarines and aircraft). The UCH cultural landscape in Hawai‘i also includes submerged stone structures like Hawaiian heiau (temples), ko‘a (fishing structures), navigational aids, pier and wire rope landings, anchorages, communication cables, etc. With the high energy marine environment dominant in the central North Pacific, many shallow water sites in Hawai‘i are broken and scattered, and sometimes difficult to access due to rough water. Deep water sites tend to be relatively intact.

Maritime archaeology provides the tools for the systematic interpretation of these cultural properties, revealing the skills of the shipwrights and the evolution of nautical technology, as well as patterns of cargo and trade and details of seafaring life. The UCH field, however, is much more interrelated and intertwined with multiple issues in the marine environment than just the evaluation of individual wreck sites. The following explores some of these connection in Hawai‘i.

1). Tourism and WWII UCH in Hawai‘i

Pearl Harbor, Hawai‘i, is home to the wreck site of the battleship USS *Arizona*, sunk during the December 7th 1941 attack with the loss of 1,177 casualties. Today the *Arizona* visitor center, run by the National Park Service, draws more than 1.8 million visitors each year, but no public diving is allowed. The *Arizona* is the focus of an ongoing maritime archaeology monitoring program into site deterioration, led by the National Park Service’s Submerged Resources Center. This ongoing study is providing data on WWII site deterioration and impacts to the immediate environment. Management practices dictate that diving archaeologists do not penetrate the wreck out of respect for the site’s war grave status. The NPS Submerged Resources Center, based in Denver Colorado, provides all maritime archaeology expertise for the wrecks of the USS *Arizona* and the USS *Utah* in Pearl Harbor (part of the WWII Valor in the Pacific National Monument), as well as the other national parks throughout the NPS system.

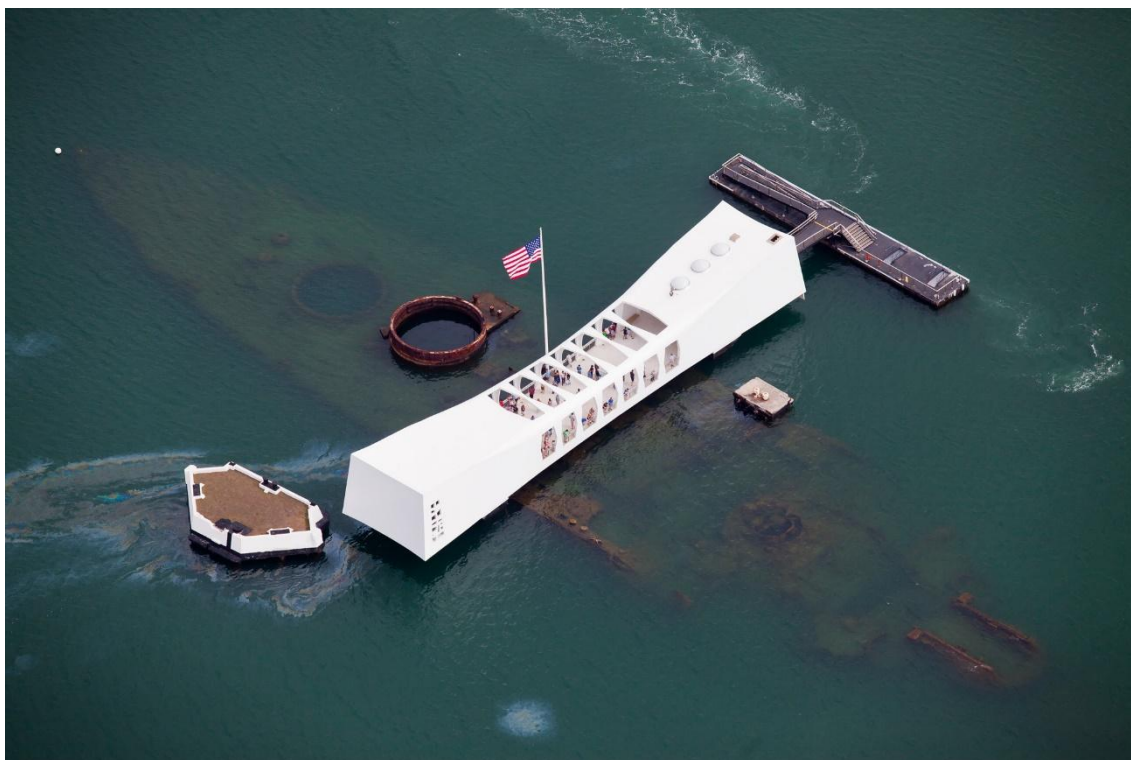


Figure 4-1. USS *Arizona* lies beneath the memorial at Pearl Harbor. Courtesy National Park Service.

Intensive naval aviation training activities took place in Hawai‘i during WWII. Over 1,485 naval aircraft have sunk in the vicinity of the Hawaiian archipelago, and dozens of these have been located. Many of these crash sites may also be war graves, and UXO may be present. Identifying these aircraft has become a popular pursuit for local sport and technical divers, particularly as diving technology has advanced, allowing the public to access deeper sites. Multiple landing craft and amphibious assault vehicles were also lost during intensive amphibious training operations near Hawaiian beaches during the war, and many of these are known dive sites as well. Establishing a trusting relationship with dive shops and local divers has led to collaboration in identifying many of these sites.

NOAA’s (National Oceanic and Atmospheric Administration’s) Office of National Marine Sanctuaries initiated its Maritime Heritage Program in 2002, aiming to discover, interpret, and protect America’s submerged heritage resources. Maritime Heritage Program staff teach introductory courses in maritime archaeology aimed at recreational public divers. The curriculum, designed by the Nautical Archaeology Society (NAS) in the United Kingdom, provides an international training standard in the theory and practice of maritime archaeology. Best Management Practices should feature collaboration with the public in a “citizen-scientist” model.

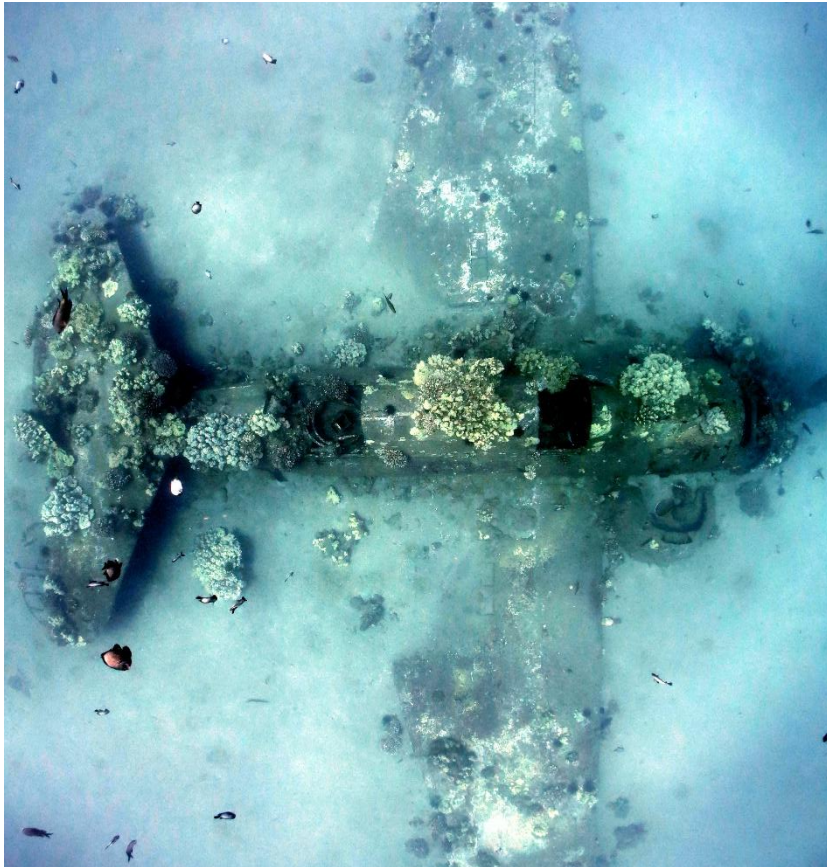


Figure 4-2. SB2C-1 Helldiver aircraft, ditched during combat training in August 1944. The site is now a tourist destination. Courtesy NOAA ONMS.

The Maritime Heritage Program is also considering eight WWII landing craft/aircraft sites near the island of Maui as a possible WWII Maritime Heritage Trail (see DEIS/MP below). These sites have been surveyed and inventoried, and are in the process of being evaluated for suitability as part of an enhanced national marine sanctuary. Shipwreck trails provide interpretive materials and coordination among participating diving operations, and have the advantage of being relatively simple to implement, though they may lack the greater capacity for hands-on engagement found in some larger underwater archaeological parks.



Figure 4-3. Seaplane in murky water. Sometimes significant WWII UCH sites do not possess the environmental qualities needed for being a popular recreational location. Courtesy NOAA ONMS.

Although the U.S. is not a signatory to the UNESCO 2001 Convention on the Protection of the Underwater Cultural Heritage, NOAA's Office of National Marine Sanctuaries supports the Convention's Annex rules as a working set of Best Management Practices. The Annex describes practical guidelines for all activities aimed toward underwater cultural heritage, including guidance on in situ preservation, research design, environmental impacts, required expertise, funding, conservation, curation, publication, etc.

The Papahānaumokuākea Marine National Monument, encompassing low pacific atolls across the Northwestern Hawaiian Islands, is today a World Heritage Site of combined natural and cultural heritage values. Remote Midway Atoll is part of the Monument. The atoll served as a naval air station and submarine base during WWII, and there have been a number of recent discoveries there of WWII UCH. The Monument has plans for Midway to become the entry point to the area for the public.

With the exceptions of the USS *Arizona* and some sport diver interest in identifying submerged WWII wrecks, Hawai‘i is actually not very well known as a tourist destination for WWII UCH. Other vessels sunk as artificial reefs, along with the natural ecosystem features, are the predominant diving locations due to easier accessibility. The vast majority of WWII heritage tourism is land-based. Connecting land heritage to UCH sites is therefore an important challenge to best management of the resources.

Some sport divers in Hawai‘i remain unaware of the federal laws which protect sunken military craft (see SMCA below) and some looting has occurred. Enhancing UCH protection through community awareness (dive shops, clubs etc) is one approach. Establishing clear preservation regulations and addressing enforcement remains critical to management. The diving operations which do take tourist divers to submerged aircraft sites provide general briefings on prohibited activities.

Submerged military properties in Hawai‘i are protected by the Sunken Military Craft Act 2004 (SMCA). The US Navy’s UCH resource managers reside at the Washington DC Naval Yard, under the Naval History & Heritage Command. Damaging or looting sunken military craft sites is strictly prohibited, but diving such sites in a non-invasive manner is permissible. NOAA and the Department of the Navy have recently entered into an Interagency Agreement providing for coordinated site research and management.

Ref: Draft EIS/Management Plan for Hawaiian Islands Humpback Whale National Marine Sanctuary (“Maritime Heritage Action Plan”) at http://hawaiihumpbackwhale.noaa.gov/management/mpr_documents.html

2). UXO and WWII UCH in Hawai‘i

Unexploded ordnance in the ocean, either lost on sunken vessels or aircraft or intentionally dropped during training exercises or disposed as obsolete material, is an important issue in the Hawaiian Islands. Snorkelers and divers have found UXO in near shore settings, including 50cal, mortar rounds, and other types of ordnance. Some sites are commonly known locally for the presence of UXO (eg “Ordnance Reef”).

Research diving agencies like NOAA have established internal regulations for NOAA divers requiring safety buffer zones around UXO when it is discovered underwater. General guidelines promulgated statewide by the U.S. Army Technical Center for Explosives Safety recommend to the public the three R’s approach: “Recognize (recognize when you may have encountered a munition)...Retreat (do not touch, move or disturb it, but carefully leave the area)...and Report (immediately notify the police if on land, or the U.S. Coast Guard, if at sea)” (see Safety Guide below). Notification of the property owner, appropriate resource management agency, and Hawai‘i State Department of Land and Natural Resources is recommended.

Ref: Defense Ammunition Center USATCES Explosives Safety Guide for Hawai‘i.

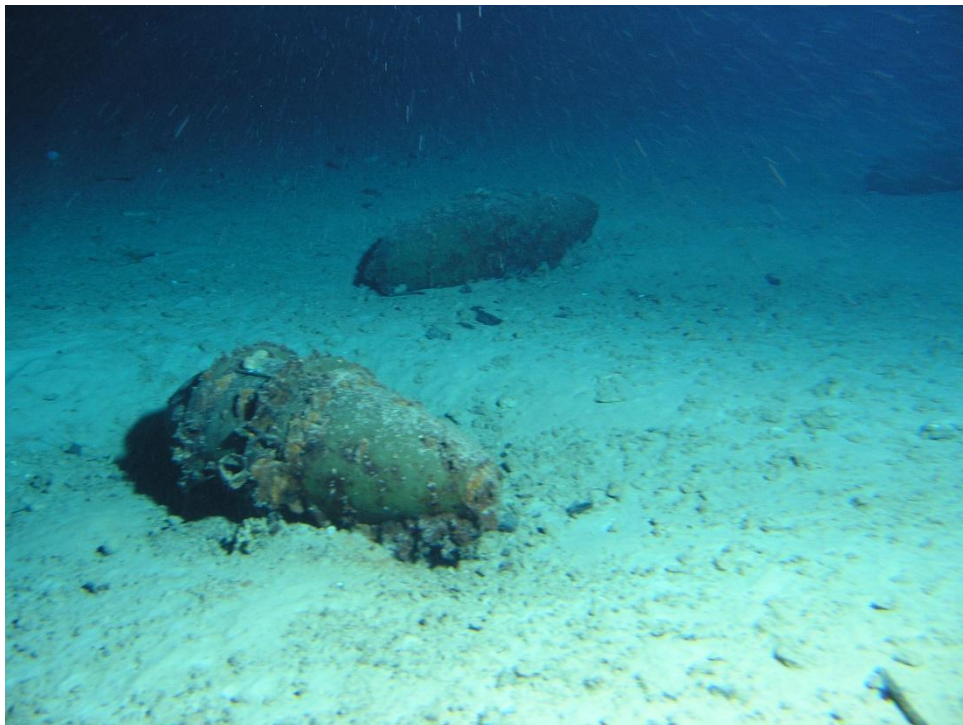


Figure 4-4. Unexploded battleship shells, disposed at sea, litter the sea floor. *Courtesy NOAA ONMS*



Figure 4-5. AMTRACK exercise, Maui 1944. Beaches around the islands were once used for intensive training during World War II. *Courtesy National Archives*

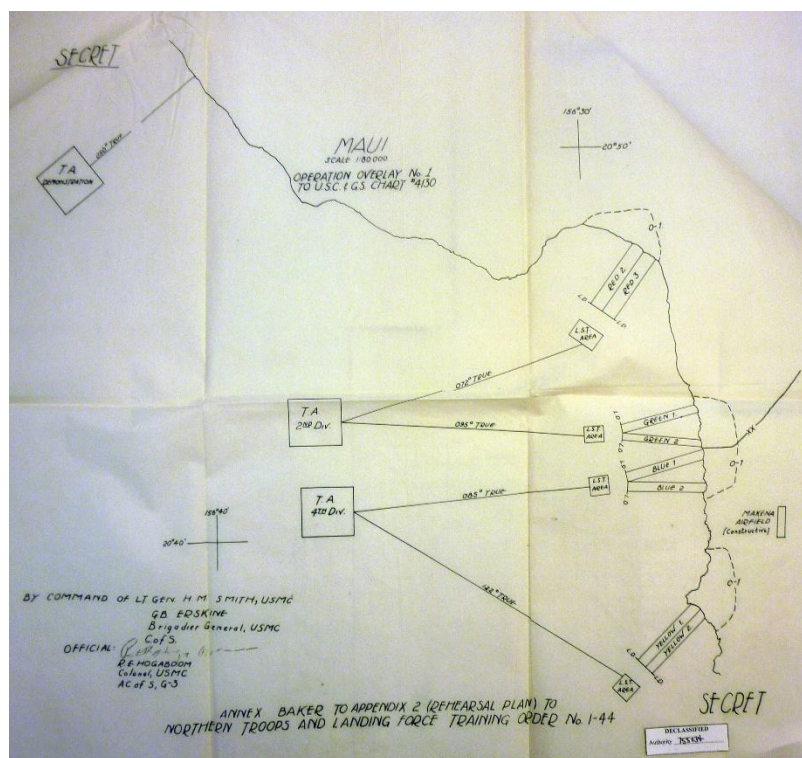


Figure 4-6. Maui amphibious training map, showing the deployment and assault lanes for the training exercise. These are the areas where UCH, and UXO, can sometimes be found. *Courtesy National Archives*

3). Human Remains Repatriation and UCH in Hawai'i

Recovery and identification of the remains of U.S. servicemen falls to the Defense

POW/MIA Accounting Agency (formerly Joint POW/MIA Accounting Command) at Joint Base Pearl Harbor Hickam on the island of O‘ahu. DPAA’s mission includes fulfilling its national obligation to maximizing the number of missing personnel accounted for while providing timely, accurate to their families.

Human remains, particularly Native Hawaiian remains, have a special significance in Hawai‘i. The North American Graves Repatriation Act (NAGPRA) regulates the return of human remains to the native communities from which they originated. In Hawai‘i, Hui Malama I Na Kupuna O Hawai‘i Nei (“Group Caring for the Ancestors of Hawai‘i”) and Office of Hawaiian Affairs (OHA) are two groups which may receive iwi kūpuna (ancestral remains). The State government has established five island burial councils, which play a crucial role in the care of iwi kūpuna found in Native Hawaiian burial sites. Island burial council members meet on a monthly basis to:

- Determine whether previously identified Native Hawaiian burial sites will be preserved in place or relocated.
- Assist the Department of Land and Natural Resources (DLNR) and its State Historic Preservation Division in developing an inventory of Native Hawaiian burial sites.
- Make recommendations regarding appropriate management, treatment, and protection of Native Hawaiian burial sites, and on any other matters related to Native Hawaiian burial sites.

It is the practice of UCH resource management agencies like the National Park Service and NOAA to avoid undue disturbance to human remains on UCH sites (UNESCO Convention Annex rule #5), and not distribute or otherwise publicize images of human remains. Acting with “due proper respect” towards human remains is an important protocol, one considered carefully on a case-by-case basis. Though the regulations governing UCH generally do not offer clear guidance with respect to human remains found at UCH sites, specific projects have defined some procedures for the archaeological recovery of human remains. NOAA, together with the military’s Central Identification Lab Hawai‘i (CILHI), established specific Best Management Practices during the recovery of materials from the USS *Monitor* site, as detailed in the article by Hershey 2015 (see below).

Ref: Peter Hershey 2015 “Regulating Davy Jones: The Existing and Developing Law Governing the Interaction with and Potential Recovery of Human Remains at Underwater Cultural Heritage Sites.”

4). Research and WWII UCH in Hawai‘i



Figure 4-7. LVT-4 personnel carrier, lost near Maui, being documented by University of Hawai‘i students. *Courtesy NOAA ONMS*

The National Park Service and NOAA are two resource management agencies which have supported UCH research in Hawai‘i for years, focusing on their marine areas of national parks and national marine sanctuaries respectively, as well as specific projects in other state and federal waters. Additionally, the University of Hawai‘i Marine Option Program and the University’s Hawai‘i Undersea Research Lab have conducted numerous shallow water and deep water maritime archaeology projects. Resource management, education and research make up the template for UCH efforts in the State. The majority of research activities have been conducted as joint UCH management/education projects between NOAA’s Office of National Marine Sanctuaries and the University of Hawai‘i (UH). Basing UCH management and research strongly in education allows site inventory work and UCH capacity-building to be achieved simultaneously.

The UH Marine Option Program provides hands-on marine education experiences for undergraduate students from any field of study, operating across the ten-campus university system. The Program’s maritime archaeology component was initiated in 1987 as a local maritime archaeology symposium. In 1996 the university launched a larger graduate certificate program (minor degree) in maritime archaeology and history, led by an instructor trained at East Carolina University’s Maritime Studies Program. The certificate program ended in 2002, but the maritime archaeology initiative at UH continues today as a two-week diving field survey class for university students taught by a NOAA maritime archaeology instructor. This NOAA/UH partnership continues inventory work throughout the main

Hawaiian Islands (19 site projects conducted to date), and supports the annual Symposium on the Maritime Archaeology and History of Hawai‘i and the Pacific, now in its 27th year. (Abstracts for this symposium series may be found at http://www.mahhi.org/previous_abstracts.html.) In 2104 NOAA and the University of Hawai‘i hosted the Second Asia Pacific Regional Conference on Underwater Cultural Heritage (APCONF) in Honolulu. Providing public and professional venues highlighting UCH is an important part of enhancing local voluntary preservation efforts, and creating a working relationship with local divers.

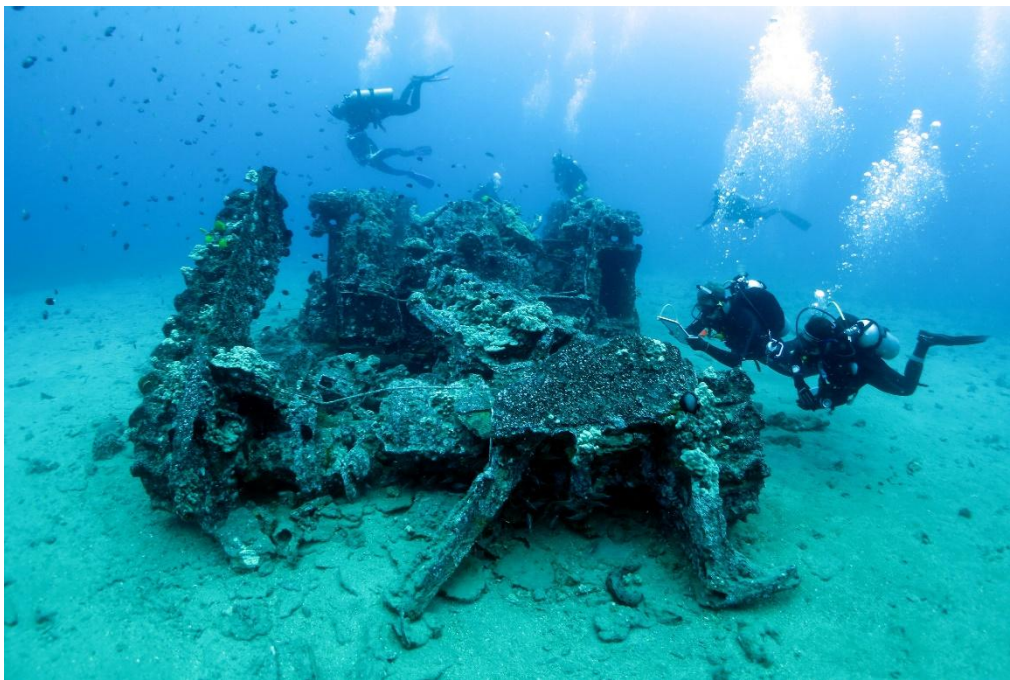
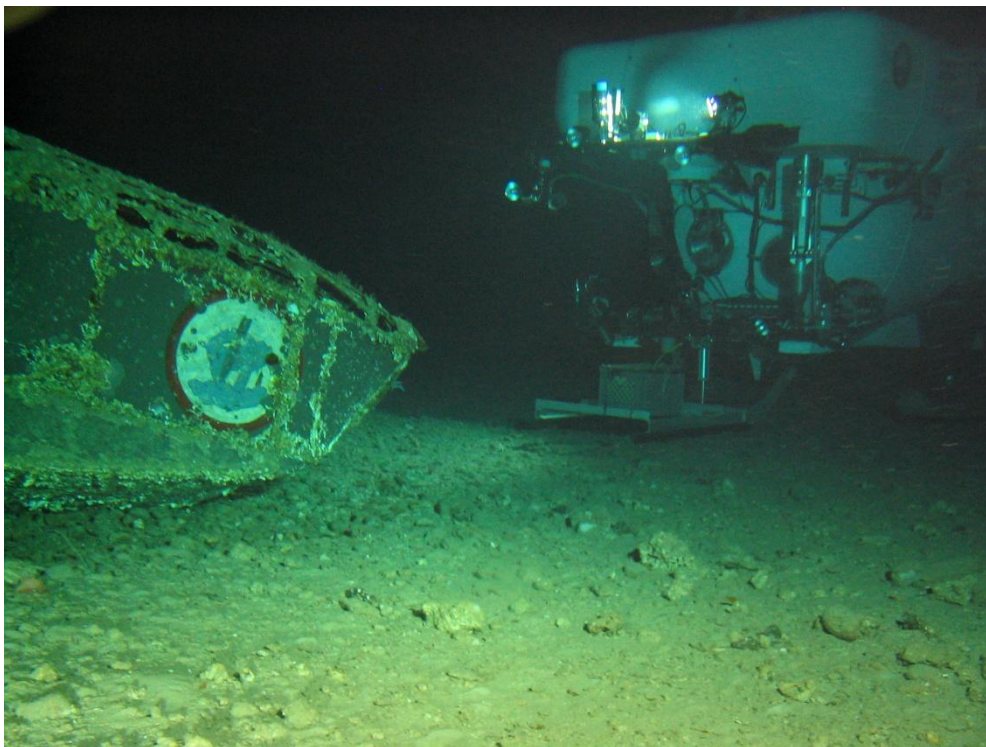


Figure 4-8. LVT(A)-4 armored assault vehicle, lost near Maui, being documented by University of Hawai‘i students. *Courtesy NOAA ONMS*



Figure 4-9. PBV-5 flying boat, strafed and sunk on December 7th 1941, Kaneohe Naval Air Station (now Marine Corps Base Kaneohe). *Courtesy UH Marine Option Program*



Deep water UCH survey is often prohibitively expensive, but a collaborative and interdisciplinary approach can often reveal opportunities to add a UCH component to other compatible research plans. The University of Hawai'i Undersea Research Lab, with two three-person submersibles *Pisces IV* and *Pisces V* (rated to 2000m depth), must conduct annual

test and training dives prior to each season of research. During these test dives, HURL pilots “economically” survey deep ocean aircraft, landing ships, and even Japanese WWII submarines, and share these opportunities with NOAA’s Maritime Heritage Program, which assists in archaeological interpretation and in publicizing these discoveries. The test dives and opportunistic survey are compatible. In a similar fashion, side scan and multibeam data gathered on seafloor mapping missions can be equally of interest to archaeologists. Best Management Practices should include multidiscipline collaboration for making maximum use of limited funding.

5. Submerged WW II sites in Chuuk, Pohnpei and Yap

Bill Jeffery

1). Introduction

This paper is primarily focused on the submerged World War II (WWII) sites in Chuuk, given they are by far the largest number of sites in the Federated States of Micronesia. In regard to sites in Pohnpei and Yap, while both had Japanese bases and airstrips, and were regularly bombed by U.S. aircraft (Pohnpei by naval bombardment as well), neither contain significant shipwrecks that are sought after by divers. Some Japanese aircraft remains can be found on both islands, and a number of aircraft are known to exist in deep water off the Yapese reef flat but not dived. In Ulithi, an outer island of Yap can be found remains of USS *Mississinewa*. The vessel was carrying 2.8 million gallons of oil when the Japanese sank it in November 20, 1944. In April 2001, sport divers located the shipwreck and shortly after oil began to leak into the lagoon. From January to March 2003, the USA Navy recovered 99% of the oil from the vessel, a total of 1.8 million tons. The oil was sent to Singapore, where it was sold and reused. The shipwreck is located in c. 30-40 meters of water and it is unknown if it continues to be visited by sport divers.

Chuuk Lagoon (formerly Truk Lagoon) is well known amongst shipwreck diving enthusiasts, Japanese war survivors, and United States of America (U.S.) military historians. The 50+ shipwrecks, many retaining considerable integrity, located in a lagoon of warm, clear water have become a diver's paradise and are advertised as such through numerous websites, publications and films. They are also the final resting place for about 4,000 Japanese. The shipwrecks also contain many munitions, including torpedoes, sea mines, thousands of small caliber ammunition, and many larger caliber artillery shells of various size. To the U.S., the shipwrecks are important historic sites associated with the U.S. pushing back the Japanese military on their way to finalizing the War in the Pacific in 1945. They are a major economic resource to many Chuukese through dive tourism, dynamite fishing and artefact souveniring which causes much conflict in their management. These conflicts are a result of the different site values and uses in addition to past colonialism and neo colonialism; issues that have been explored by the author (Jeffery 2007).

The aim of this paper is to consolidate the current knowledge of the submerged WW II sites, taking into account some 'new' sites that have been investigated, and others that are alluded to in historic documents. A number of submerged WW II sites have also been investigated in regard to their condition and corrosion, and their health as artificial reefs and these issues are documented in this paper. Another issue that raises questions about the future of the sites is the oil that has been leaking from some of them. Oil and gasoline have leaked from the sites since the day they were sunk, and recently oil leaking from more modern shipwrecks and

faulty oil wells in other parts of the world have caused considerable ecological damage, bringing into sharp focus the question about the consequences of oil leaking in Chuuk Lagoon.

Although the Chuuk State of the Federated States of Micronesia (FSM) has had specific legislation aimed at protecting and managing the submerged WW II sites since 1971, and additional support from the U.S. National Park Service's (NPS) Historic Preservation Fund, site management has not been effective. This is not surprising given the ever-changing issues associated with the sites but it is indicative of how site management should be dynamic and capable to keep up with these issues. Some suggestions on how this could be implemented are summarized later in this paper.

2). Background

During WW II, Chuuk was a strategic advance base for supplying Japanese ships, aircraft, stores and military personnel for the Japanese south-east expansion as well as a major communication centre for the region.¹ It was a vital base outside of the Japanese homeland and the U.S. Navy considered Chuuk the 'strongest naval base in the Pacific with the exception of Pearl Harbor' (United States Strategic Bombing Survey (U.S.SBS) 1947: 2).

During 17 and 18 February 1944, the U.S. attacked Chuuk with aircraft launched from a fleet of four carriers and supported by about 70 ships sinking over 50 Japanese ships, destroying over 300 aircraft and many of the land military facilities including its five airfields. A total of 1,250 aircraft attacks were flown, followed on 30 April and 1 May 1944 with a further 2,200 aircraft attacks from the same naval fleet (Carrell 1991: 237; U.S.SBS 1947: 14). In conjunction with the continual bombing of the base from B-24 and B-29 aircraft with over 6,000 tons of bombs, the Chuuk base was taken out of the war, without any amphibious assault and major loss of American life. As a comparison, the Japanese attack on Pearl Harbor launched over 350 aircraft which sank or damaged 21 vessels, destroying 75% of U.S. aircraft, and killing over 2,500 Americans. The U.S. promoted the bombing of Chuuk as a payback for the Japanese bombing of Pearl Harbor (*Naval Aviation News* October 1, 1945: 10). Their air raids killed and injured over 5,000 Japanese (about 4,000 in the ships) and 123 Chuukese, although more than a 1000 Chuukese were killed during the war (Denfield 1981: 51). The U.S. considered dropping the atomic bomb on the Japanese fleet in Chuuk but decided against it when conventional warfare was found to have been successful (Delgado et al. 1991: 14; Stewart 1989: 97).

¹ Chuuk is located about 3,700 km south-east of Tokyo and about 4,000 km north of Sydney

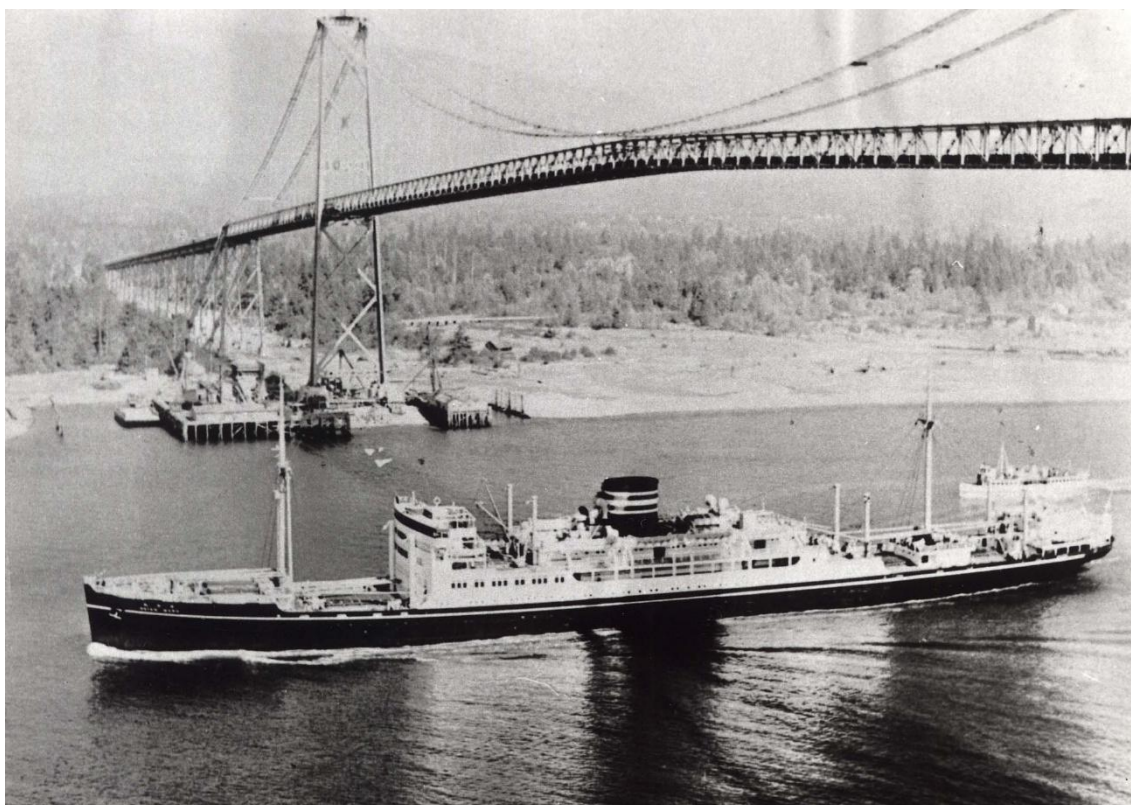


Figure 5-1. The largest vessel sunk in Chuuk Lagoon, the 11,600 ton *Heian Maru* was drafted from NYK line, shown here passing under the Lions Gate Bridge, Vancouver in 1930. Source, Captain Nozaki, NYK Museum.

Many of the ships sunk in Chuuk were merchant ships. The naval vessels, including the 62,000 ton battleship *Musashi* were aware that an attack was imminent and departed on 10 February 1944. Chuuk was one of the three main bases used by the merchant marine to supply materials and personnel during the war. The loss of 266,083 tons of merchant marine ships in February 1944 was the second greatest monthly loss during the entire war, virtually cutting off the access of personnel and equipment to other parts of Micronesia, the Solomon Islands and Rabaul in New Guinea (Parillo 1993). Morison (1975: 329-32) who compiled the official history of the US Navy in WW II stated that, 'the strike on Truk demonstrated a virtual revolution in naval warfare; the aircraft carrier emerged as the capital ship of the future, with unlimited potentialities.'

The WW II shipwrecks and aircraft located in Chuuk Lagoon are not unique. Over 3,000 Japanese Navy and merchant ships (10,583,755 tons) were sunk during WW II and the majority are scattered throughout the Pacific (United States Joint Army-Navy Assessment Committee (JANAC), 1947) (Figure 5-1.). The terrestrial WW II sites also are not unique in this region of the world. The Marshalls, Pohnpei, Palau and others have terrestrial sites related to WW II. What is distinctive about the underwater and terrestrial sites in Chuuk is

their exceptional quantity and quality. Denfield (1981: vii) found that Chuuk ‘has *in situ* as many guns as all of Europe’ and prominent cinematographer Al Giddings (in Lindemann, 1982) stated that the Chuuk Lagoon shipwrecks are ‘one of the great undersea wonders of the world.’

What contributes to the value of the Chuuk Lagoon shipwreck sites is that they are located in an environment that has provided them with considerable natural protection and made them easily accessible to divers. When diving the shipwrecks, the nature of the remaining material and the damage inflicted from the U.S. bombing is evident and one can gain a strong sense of what happened when the ships were sunk. It is possible to envision the massive explosions that caused them to sink, and to examine what material the Japanese needed and carried on-board. There is no more dramatic way to appreciate the power, devastation and tragic nature of war than viewing these shipwrecks and there are probably no other sites on land or underwater anywhere else that can do this. In addition, the rich and diverse (and potentially unique) marine flora and fauna adds to the great appeal as an underwater spectacle. These values caused the author to investigate whether they meet the criteria for World Heritage Site listing (see Jeffery 2004) (Figure 5-2.).

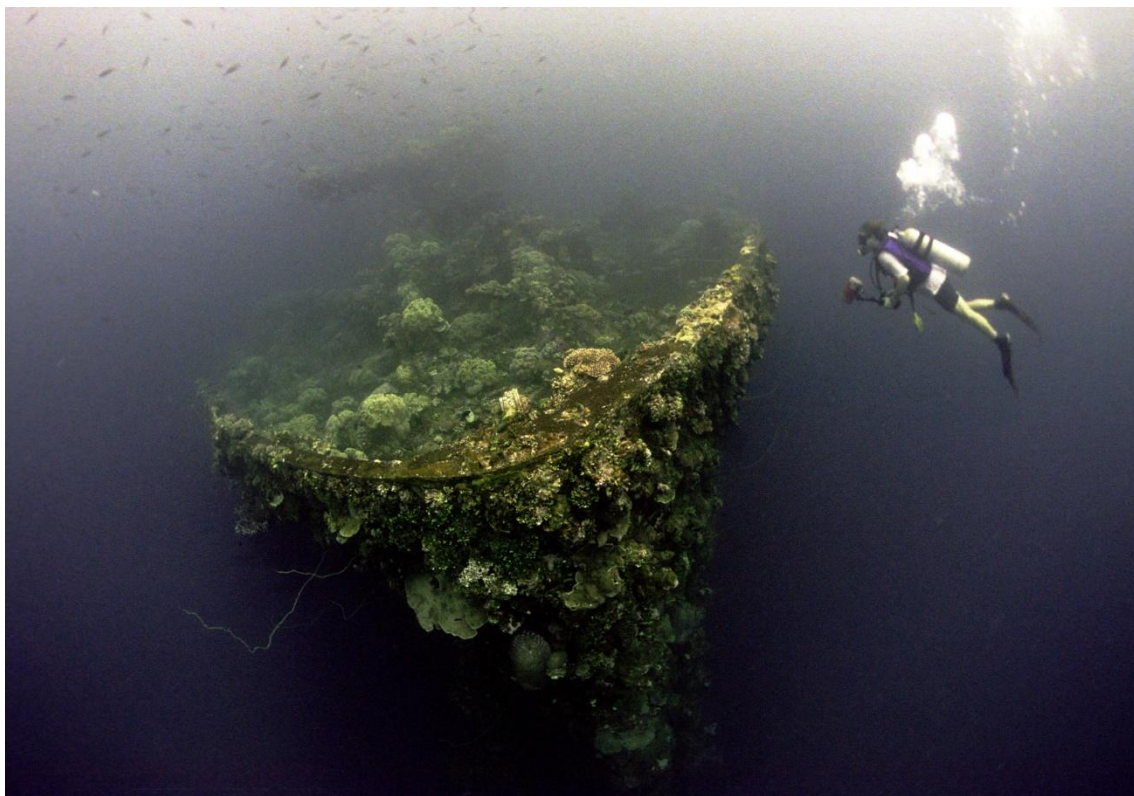


Figure 5-2. The 7,000 ton aircraft transport vessel *Fujikawa Maru*. Photograph by Greg Adams 2002.

The war was a terrible time for Chuukese. They were forced out of their homes, away from the land and islands and pressed into working for the Japanese war effort. They suffered the greatest loss of life in all the Carolines from the almost daily bombing (Poyer et al. 2001: 147). Turner and Falgout (2002: 112) concluded: ‘Those who experienced the intense suffering during the Japanese military buildup and the American campaign describe it as the greatest hardship they ever endured’. Similarly, Poyer et al. (2001: 14) found that ‘WW II in Micronesia meant, in short, both terrible suffering and momentous change. Nothing would ever be the same again’. Chuuk has been home to indigenous people for about 2,000 years. Traditions, customs, cultural practices, the extended family, land, food, magic and folk lore are very important aspects of Chuukese life (Ashby 1985; Gladwin and Sarason 1953; Hezel 1992; King and Parker 1984). For Chuukese, traditional sites and intangible heritage are more important than most WW II sites, although the terrible suffering associated with terrestrial WW II sites can invoke a ‘sense of belonging’ to these sites. This has caused conflict in the management of the submerged WW II sites. To some Chuukese involved in the tourism industry, they are regarded as a valuable tourism resource, but in terms of significant sites in their history, they play a minor role, if any at all to most Chuukese. The sites are also dynamite fished and are a source of souvenirs; in other words they are a valuable economic resource (Figures 5-3., -4., -5.). Arimichy Rudolph a Chuukese colleague from Chuuk Historic Preservation Office (HPO) explained that the submerged WW II sites ‘tell us about the bad time in the history of Chuuk’, and the terrestrial WW II sites are significant ‘because they tell about the hardship our parents went through at that time’ (Jeffery 2007: 229). This is an interesting distinction between the two types of WW II sites, the terrestrial sites have a more personal, family connection and therefore providing a ‘sense of belonging’ for many Chuukese.



Figure 5-3. Artefacts collected and stacked in *Shinkoku Maru* in 1978. Photograph by Colin Hodson, 1978.

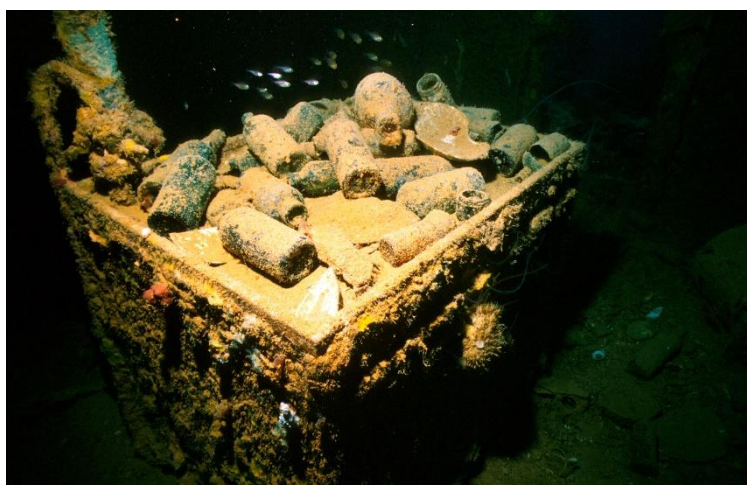


Figure. 5-4. Artefacts collected and stacked in the same area in *Shinkoku Maru* in 2000. Photograph by Colin Hodson, 2000.



Figure 5-5. Photo-mosaic of the bridge face of *Fujikawa Maru* showing the impact of dynamite fishing. This area should be totally covered with corals and sponges but many have been killed by dynamite fishing which also greatly weakens the iron structure and renews corrosion. Photograph and mosaic by Bill Jeffery 2006. In 2012, Dianne Strong, frequent visitor to Chuuk reported that the bridge has now collapsed in the middle.

The Japanese also have a different view of the sites; they regard them as ‘war graves’, and a ‘continual source of national sorrow’ since the shipwrecks are ‘open war graves’ (Bailey 2000: 3). Japanese groups have recovered some human remains but some still exist on the shipwreck sites. Although the Japanese government acknowledge that the shipwreck tourism industry is a valuable source of revenue for Chuuk, many Japanese are not happy with it. Some believe that there is still the need for ‘end of war processes’, such as the recovery of

personal effects and human remains, the ‘holding of services, consoling of souls and the need to promote recovery’.² A number of Japanese war veterans and younger folk also believe the submerged WW II sites have value in interpreting the futile and tragic nature of war for the benefit of younger Japanese so similar things do not happen in the future (Jeffery 2007: 244).

To the U.S. the submerged WW II sites are important sites associated with the victory of WW II, and a valuable diving destination. In the nomination for National Historic Landmark (NHL) designation the significance assessment focused on the historic significance of the Japanese shipwrecks and aircraft, their destruction by the U.S. Navy’s carrier fleet and aircraft, and how the ‘legendary invulnerable Truk’ was destroyed (United States National Park Service (U.S. National Park Service (NPS) 1985). The NHL nomination included a statement about its value to dive tourism, ‘the “underwater fleet” at Truk, festooned with an infinite variety of marine life and containing the honoured remains of the Japanese warriors, is one of the world’s underwater wonders’, a ‘Mecca for divers worldwide’ (U.S. NPS 1985).

Chuuk proclaimed legislation to protect the submerged WW II sites in August 1971. The legislation has been amended three times, the last time in February 2000 when it was incorporated into the *Draft Chuuk State Code, Title 25. Maritime and Marine Resources* and documented as *Chapter 8, Chuuk Lagoon Monument*. The law has changed only marginally; it has essentially remained a law prohibiting the removal of artefacts and with a provision that allows for funds to be collected through a mandatory dive guide and the payment of a \$30 annual fee per diver (Jeffery 2007: 247). The U.S. government placed the sites on the National Register of Historic Places in 1976, and declared the sites to be a National Historic Landmark (NHL) in 1985, one of 2,300 sites throughout the U.S. and its territories, and one of only two NHL sites in the FSM. The submerged WW II sites have therefore been recognized as significant shipwreck sites at a FSM state and U.S. federal level. In 2002, the submerged WW II sites were given a threatened status by U.S. NPS because of ‘significant deterioration, vandalism and looting’.³

As previously stated the conflicts in the uses, values and management of the submerged WW II sites have been explored elsewhere by the author (Jeffery 2007). In 1989, the U.S. did explore different approaches to management through an investigation into an FSM National Park but this does not appear to have been acted upon (U.S.NPS 1989). Another consideration could be to incorporate the management of the Chuuk Lagoon submerged WW

² From an interview conducted by Mohri, Yachiyo of a war veteran who stated, ‘In our Buddhist thought, unless cremating those that die, their spirits lose their way to nirvana so they would be wondering around forever’ (Mohri, Yachiyo 2004 pers.comm.).

³ See <http://tps.cr.nps.gov/nhl/detail.cfm?ResourceId=1708&ResourceType>, Accessed 8 June 2012

II sites or its Park into the *War in the Pacific National Park* based in Guam, given its role in managing and interpreting all sites associated with the War in the Pacific. Whatever direction is taken, it needs to be thought through comprehensively given the current association the Chuukese government and the community have in managing the sites. These issues are further discussed at the end of the paper since some other developments regarding the value and management of the Chuuk Lagoon WW II sites should be explored beforehand. This includes some new sites, and research implemented on the condition and longevity of many of the known sites (Figure 5-6.).

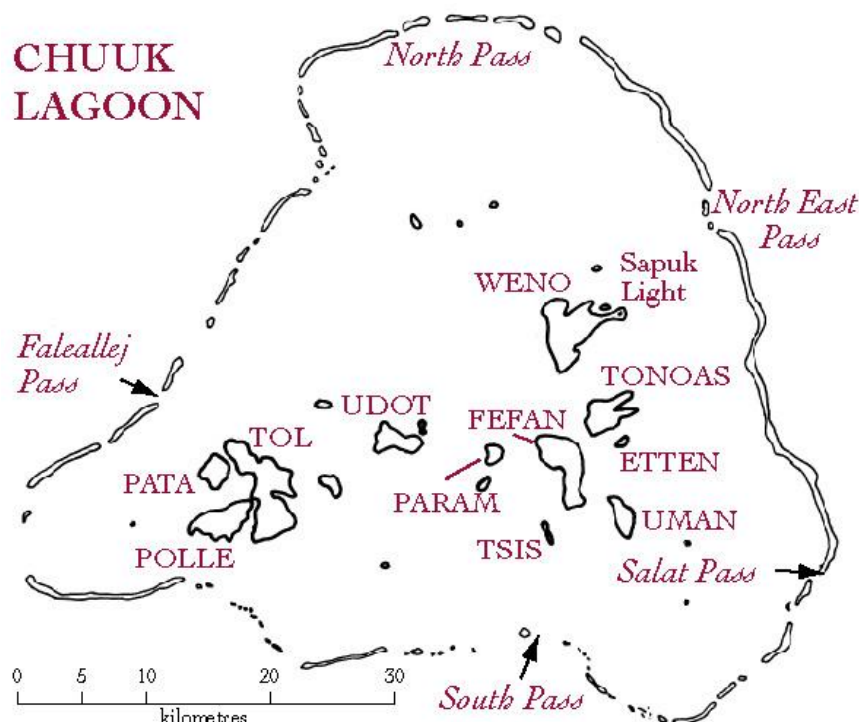


Figure 5-6. Chuuk Lagoon showing some of the major islands and the passages through the barrier reef (Courtesy Judi Francis)

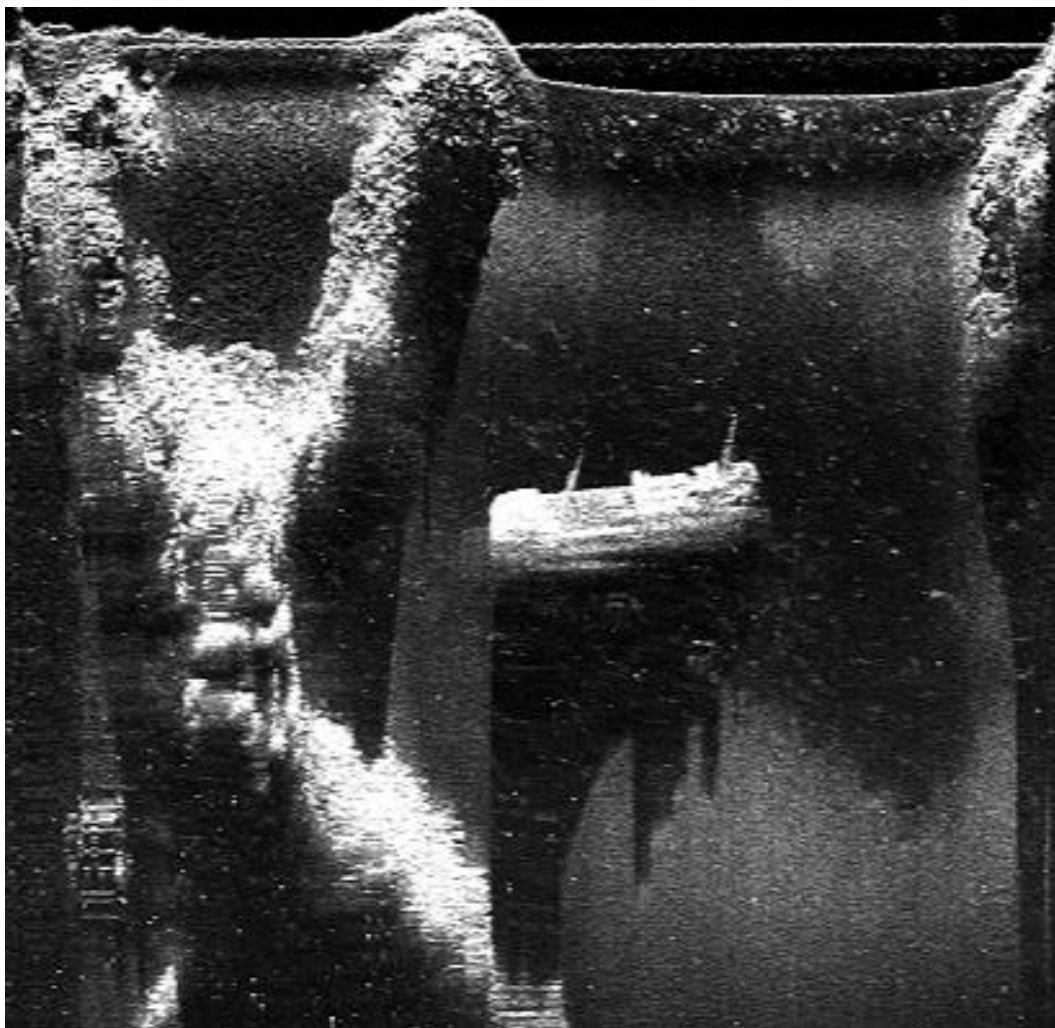
3). Site Documentation

Appendix 1 shows the results of research carried out by the author (using four primary and four secondary historical sources), and field surveys, in conjunction with additional information obtained from oral histories. A number of new sites, or additional site information have been included, namely: *Sapporo Maru*, ‘Unknown D’ site, No. 47 (comprising four landing craft, vehicle and aircraft remains), Gunboat (‘Unknown E’ site, No. 48), ‘Unknown F’ site, No. 49 (unidentified wreckage at 70 metres), converted bonito fishing vessel (‘Unknown G’, No. 50) and *Muraki Maru*. It is considered an up-to-date list of the submerged WW II sites in Chuuk Lagoon.

Further information is provided about *Sapporo Maru* and the recovery of the vessel's bell—an example of what can happen with the discovery of a new site in Chuuk.

Sapporo Maru

In February 2002, a search for *Sapporo Maru* was conducted in an area of about one square kilometre to the south-west of *Kiyosumi Maru*. Toward the end of the survey, a shipwreck site was found which a diver survey confirmed was the *Sapporo Maru* (Green 2002: 119-130) (Figures 5-7).



Figures 5-7. *Sapporo Maru* can be seen to the right of middle in this side scan sonar image. The vessel is sitting upright and intact with a slight list to starboard (right). The bow is to the left, forward and stern masts can be seen lying to starboard, and the start of the bridge is clearly evident about half way back along the vessel. The relief of the vessel has caused the seabed to the left of the vessel to be in shadow. Other seabed features (in white) are natural reef. Source, Jeremy Green 2002.

The vessel was a small ship, 44 m in length, 7.3 m in breadth, 361 tons, built in 1930 as a refrigerated fish carrier, and used by the Japanese Navy as a deep-sea fishing trawler (*Lloyd's Register of Shipping 1940-41*).



Figure 5-8. *Sapporo Maru* bell. Photograph by Dan Bailey, 2004.

A second dive on the site on 19 February with Ansito Walter (Governor of Chuuk), Dan Bailey and others located the ship's bell in its original position on the outside of the bridge. Within 24 hours of this inspection, the bell was taken from its position on the bridge, damaging part of the bridge in the process. Police investigations revealed that a Chuukese dive guide had taken it, but they concluded there was no breach of the law as it was still located (hidden) on the site which was verified by the author during a dive on the site. It was subsequently ascertained that the dive guide took the bell off the bridge to keep it from falling into the hands of a foreign diver and therefore leaving the country. The bell has since been recovered and found its way into a local collection that is planned to be exhibited. The bell reveals the name of the vessel, *Sapporo Maru* and its date of construction (Figure 5-8).⁴

4). Chuuk Lagoon's submerged WW II aircraft

From primary and secondary documents it is believed that 453 Japanese aircraft from WW II

⁴ Mohri, Yachiyo translated the text on the bell, being: 'Sapporo Maru' and 'Shouwa 5 nenn 11 gatsu' (November in the 5th year of Shouwa period—November, 1930).

were damaged and many could remain in Chuuk today (Jeffery 2007: 162-163). Many of the air losses may be over the lagoon or islands, and therefore the remains could be located in the lagoon waters or on the islands. Some of the aircraft losses may also be located outside of the lagoon. It has also been ascertained that 37 American and one to four British aircraft were lost during the fighting (Jeffery 2007: 163).⁵ At the commencement of the author's 2001 survey, seven Japanese aircraft remains were known within the lagoon (Figure 5-9, -10.). While some anecdotal information alluded to a number of other aircraft that might be located in the lagoon, the only site investigated was of a U.S. aircraft which was investigated in association with the 'U.S. Navy Historical Center, Underwater Archaeology Branch' in Washington. It was identified it as a Douglas SBD-5 Dauntless.⁶

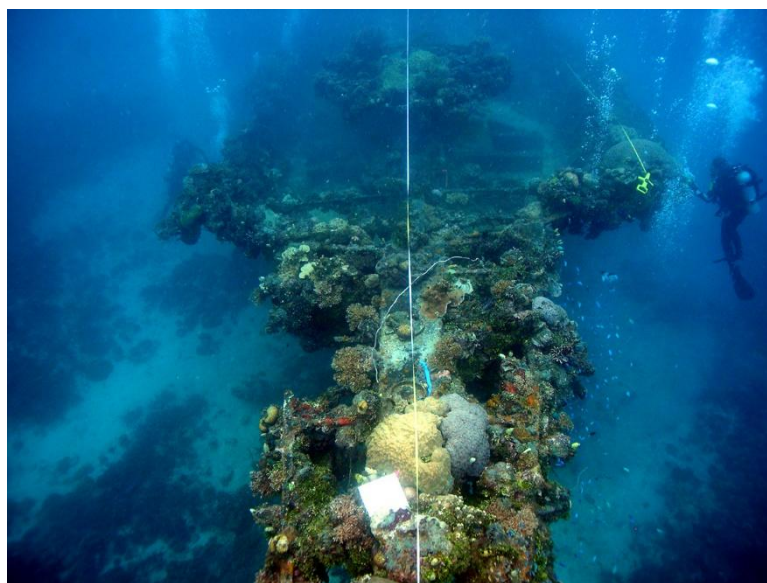


Figure 5-9. The bow showing the bowsprit, sponsons on the port side and the bandstand on 'Unknown G' site. Photograph by Bill Jeffery, 2006.

⁵ A British carrier fleet attacked the base in June 1945, inflicting little damage but serving as training exercise for the new units of the British Naval Fleet

⁶ Details of this site came from Chuuk State Historic Preservation Officer, David Welle who as a child used to sit in the cockpit and he described U.S. markings on the fuselage



Figure 5-10. The *Tubastrea micantha* coral. Photograph by Bill Jeffery, 2006.

5). Corrosion Survey

An aim of this survey was to ascertain the current state of corrosion and estimate the longevity of the submerged WW II sites. The primary metal of the sites is iron, steel and/or aluminium. Ferrous metals are highly prone to corrosion in a marine environment and although concretion can build-up to slow down corrosion rates, natural and human related interference can change and accelerate it, leading to structural collapse. This collapse may be a justified part of site management, if based on the values of a site in association with a conservation assessment. This is an issue that site managers of USS *Arizona* have, and continue to investigate (Lenihan 2001). Given the diverse values and issues inherent in some of the submerged WW II sites in Chuuk and throughout the Pacific (war graves, tourism, oil pollution), allowing vessels to collapse as part of their management, needs to be considered comprehensively and critically assessed.

Data collected from corrosion surveys can also play a role in technical and scientific research. They have become a standard approach worldwide, in order to understand rates of corrosion and what is influencing site condition. Through these studies, it is possible to ascertain site stability and longevity—an important issue from diving tourism and environmental (oil leakage) points of view. It is unknown how much oil is still trapped in the lagoon sites, or if it has dissipated gradually over the last 60+ years as is suggested by Earle and Giddings (1976: 603). While renewed metal corrosion is visible in areas of dynamite fishing it is not known to what degree this is accelerating and diminishing the integrity of the ship's structure. Corrosion surveys allow this to be measured and monitored. Coupled with the impacts from infrequent typhoons, the potential collapse of some ships is real and if oil is released in large

quantities, it could have a devastating impact on the marine environment.



Figure 5-11. Ian MacLeod and Chuuk HPO field assistant Arimichy Rudolph taking corrosion measurements on the hull of Kensho Maru. This part of the vessel was in poor condition as can be seen by the corrosion plume that was produced by drilling into the hull. Photograph by Bill Jeffery, 2007.

An initial corrosion survey of ten shipwrecks and four aircraft was conducted by MacLeod in 2002 (2003, 2005, 2006a, 2006b) (Figure 5-11.). The methods used in the survey, the analysis and findings can be found in Macleod's (2003: 8-9) report. Some of his key findings were:

Based on this provisional estimate of perforation times, many of the wrecks in Chuuk Lagoon will retain their existing integrity for only the next ten to fifteen years before they begin to undergo significant collapse. This has major implications for the management of the sites and for the safety of divers undertaking penetration dives. Analysis of the corrosion behaviour on the wrecks has shown up irrefutable evidence of the damaging effects of episodic changes to the microenvironment of the wrecks. Such changes are consistent with major microenvironment damage that is consistent with physical impact of either shockwaves from dynamite fishing or from massive tropical storms. The periodic shedding of the protective layers of marine concretion cannot be allowed to continue, since this will inevitably result in an increased rate of decay of the

shipwrecks.

The corrosion analysis was achieved through determining the annual corrosion rate of the metals (depth of graphitisation of a cast iron object divided by the number of years a vessel had been submerged). This algorithm has a direct relationship with corrosion potential or voltage (relative to a reference electrode) which can be measured from other metals such as wrought iron and steel. Through investigating the thicknesses of various metals found in ship's specifications in *Lloyds Register*, and measuring their corrosion potential, it is possible to determine their corrosion rate. MacLeod (2003: 8) found *Fujikawa Maru* structurally intact and in the best condition in relation to overall corrosion damage compared to the 13 other shipwrecks and aircraft. He also found that the Chuuk submerged WW II sites are 'corroding at 26-30% slower than the open ocean wrecks at the same depth' (MacLeod 2003: 79).

6). Earthwatch project 2006-2008

This project allowed for further collaboration with Ian MacLeod, and initiated collaboration with a marine ecologist, Maria Beger; marine biologists, Mandy Hengeveld and Mike Emslie; and conservation scientist, Vicki Richards.⁷ The project proposed to implement a multi-disciplinary investigation of the submerged WW II sites through the involvement of various specialists supported by volunteers from around the world and a renewed and increasing involvement with Chuuk government agencies, particularly the Department of Marine Resources which is the key agency administering the Chuuk legislation protecting the submerged WW II sites. The project had a number of research questions, but a major aim was to assist the Chuuk government with information on the tangible values, health and longevity of the sites, all of which would be useful in their management. The Earthwatch (EW) project was also considered some recompense for the help many Chuuk government and dive shop staff provided in the earlier research that commenced in 2001. The project allowed the investigation of such issues as evidence of oil leaking and the structural integrity of the shipwrecks, which could support the Chuuk government in soliciting funds and support for remedial work. Maria Beger and Mandy Hengeveld proposed in the EW Project to investigate:

The coral reef communities, diversity and health in Chuuk, although considered very rich, is poorly documented. For instance, while the expected number of scleractinian corals is 391, only 92 are presently recorded in the IUCN-WCMC database for the

⁷ Jeffery, Berger and MacLeod were Principal Investigators of the Earthwatch project and a number of other maritime archaeologists, marine ecology and conservation specialists were involved in the project who supervised the EW volunteers.

Federated States of Micronesia (Spalding et al. 2001). Practically no specific coral reef data exist. The most recent 'Status of Coral Reefs of the World' report describes Chuuk as the largest exporter of commercial reef fish species, and notes that destructive fishing practices with explosives from the shipwrecks have caused reef damage in the lagoon (Wilkinson 2002). No information about coral reef health or the status of the artificial reefs, the shipwrecks, was presented. By comparing reef communities and diversity on natural reefs with those on the shipwrecks, predictions about colonization processes, human impacts and future marine resource development can be made. Conservation of coral reef communities will be of great benefit to maintain economic values of sites and biophysical function of the ecosystem. There has been no recent survey of the current status and diversity of coral reefs in Chuuk, thus this survey will provide much needed data to local and regional authorities for management.

Marine biologist Sylvia Earle made similar comments on the value of the marine biology and the need for further studies during a 1975 survey of the submerged WW II sites (Earle & Giddings 1976: 578-602)

Site surveys commenced in July 2006 and five teams (each containing six EW volunteers and team leaders) implemented biological and corrosion surveys on 11 selected sites (Jeffery 2007a). Tangible outcomes included the compilation of a marine invertebrate and vertebrate species databases (including a comparison with island reefs and the barrier reef). A total of 266 species from 33 families of reef fishes were recorded and surprisingly two of the shipwrecks, *Kensho Maru* and *Fujikawa Maru* had the highest density of reef fishes from the ten sites (including three natural reefs) surveyed (Emslie et al. 2007: 5-11). The reef around the South Pass (channel through the barrier reef) revealed the lowest density of any site surveyed, although it was found this reef had the greatest variety of species. While *Kensho Maru* and *Fujikawa Maru* contained the largest number of reef fish in the transects surveyed, it was found that many species of larger fish normally found in reef communities, did not exist on the shipwrecks. This is considered to be a consequence of over-fishing, most likely associated with dynamite fishing practices. Other issues of concern recorded by Emslie (et al. 2007: 7-9) were the numerous signs of damage from crown-of-thorns starfish (*Acanthaster planci*), to an extent that would be considered 'plague proportions on Australia's Great Barrier Reef', and a number of large *Lobophyllia* colonies that had been damaged, presumably by anchors. Comparative surveys were implemented on the barrier reef in regard to the impact of dynamite fishing in 2006 and 2008 and it was found many areas had been greatly impacted and had large areas of dead coral (Hengeveld, Mandy 2008 pers. comm.).

On a more positive note, a rare scleractinian coral, *Acropora pichoni* was found on *Fujikawa Maru*. Ten individuals were found at depths between 13-20 meters which is significantly shallower than its purported depth range. Rare species are not common on artificial reefs and it 'highlights the potential of artificial reef habitat to act as a refuge for rare coral reef species, and also emphasizes the need of protecting the Chuuk wrecks for biodiversity conservation' (Beger and Richards 2006). An investigation into the relationship of benthic material and metal corrosion on many of the submerged WW II sites, in which the rugosity (the roughness of growth on the concreted metal surfaces) influences corrosion—biodynamic interaction—was initiated in 2006 and continued during 2007 and 2008 (MacLeod et al. 2007: 51-54) (Figure 5-12.). 'The increased surface roughness brings about increased water flow or turbulence over the wreck and this increases the flux of dissolved oxygen to the surface and thus the amount of corrosion increases' (Emslie et al. 2007: 17). During the 2007 fieldwork, MacLeod found the thickness of the concretion on the *Susuki* patrol boat and *Fujikawa Maru* to be significantly less and in combination with more acidic pH values (which reflected localized corrosion rates) concluded the sites had been impacted by dynamite fishing, and were 17% and 46% respectively more corroded, since his initial survey in 2002. This work is the first quantification of the impact of dynamite fishing and diving tourism activities, such as tying off on wrecks and concretion damage / souveniring by divers (MacLeod et al. 2011). The summary paper also noted that increased corrosion rates observed shortly after dynamite fishing events recover relatively quickly and begin to revert to the long term values as the damaged areas become once again covered by marine organisms. The work is leading to the development of corrosion and biodynamic interaction models that will further the understanding of the corrosion and longevity of the sites and assist in their future management (Emslie et al. 2007: 22; MacLeod et al. 2007: 51-54).



Figure 5-12. EW Volunteers Joy Dittberner and Tom Peters recording benthic material within a quadrat on *Kensho Maru*, Photograph Bill Jeffery 2007.

The EW volunteers (the majority being Americans) were very keen to dive the submerged WW II sites, but they knew little about Chuuk, its people, and the many social and political issues they face today. Broadening the context of the sites, from symbols of U.S. victory and unequalled dive destinations, to their social relevance to Chuukese and Japanese people during the war and today, were some of the other objectives of the EW project. From the personal comments received, and the discussions had with some of the EW volunteers, it was felt that this had been partly achieved as can be seen in some of the formal EW feedback from two of the 2007 volunteers:

I've gained a greater understanding of the people of Chuuk, and reasons for their indifference to the wealth of WW II shipwrecks in their lagoon. I've also gained an appreciation of how difficult it may be to preserve these wrecks, given the fact that the Chuukese in general do not regard these as a resource or as treasure, but rather as reminders of a painful time during which they were innocent bystanders in a war between superpowers;

and

I have a much greater appreciation for the environmental, social and cultural issues facing Chuuk and the wrecks in Truk Lagoon. It is an extremely complicated issue that will take a multi-dimensional approach to finding a solution. This awareness will allow me to speak more intelligently to others interested in helping be a part of the solution.

The EW project followed on from some maritime archaeology capacity-building conducted by the author over a number of years in Chuuk for Historic Preservation Office (HPO) staff from the four FSM states (Pohnpei, Kosrae, Yap and Chuuk). This culminated in an intensive program in 2006 where the U.S. Historic Preservation Fund provided additional funds to purchase diving, recording (GPS) and photographic equipment for each of the states. This work was enhanced in 2007 when the various specialists involved in the EW project developed an archaeological, ecological and conservation recording package to be used by FSM HPO staff (and volunteers) in recording and monitoring the values and health of underwater cultural heritage sites (Jeffery et al. 2007).⁸ The package could be used on similar sites anywhere in the world with minor modifications.

During the 2007 EW field work an investigation of a site reported to be leaking oil (*Hoyo Maru*) was conducted. Although no effects of oil pollution could be found on the site, a one-two km long slick was witnessed being blown toward an area of mangroves on Tonoas. A water sample was collected and passed onto the Chuuk Department of Marine Resources, as was a full report on the project's findings (Emslie et al. 2007).

In 2008, this slick was noticed again along with bubbles of oil rising from the shipwreck. This was filmed and documented in a report for the Chuuk and Federated States of Micronesia governments and U.S. National Park Service. EW generated considerable international publicity about this issue and it continues to attract media interest given the worldwide concern for marine oil spills.⁹ On my return to Chuuk in 2008, I was castigated for allowing this publicity to generate given the detrimental impact it could have on the Chuuk tourism industry. This subsided when officials could see it was a potential problem

⁸ This was also funded by the U.S. Historic Preservation Fund

⁹ Earthwatch Institute, <http://www.earthwatch.org/europe/newsroom/science/news-3-truk.html>, New Scientist, http://www.newscientist.com/article/dn14645?DCMP=ILC-hmts&nsref=news1_head_dn14645, Australian Broadcasting Commission (ABC) Foreign Correspondent documentary, April 2011, <http://www.abc.net.au/foreign/content/2011/s3189254.htm>. Accessed 3 June 2012.

and resources could be obtained to investigate the issue. The nature of the report indicated that the oil leakage was a potential problem and that it should be more thoroughly investigated. Chuuk Lagoon contains three Japanese oil tanker wrecks (*Hoyo Maru*, *Fujisan Maru* and *Shinkoku Maru*) that have the potential to carry up to 32,000 tons of oil (Bailey 2000). Preliminary research suggested that the oil from the other tankers was transferred to *Hoyo Maru*, the one now leaking (Takuya Nagaoka 2009, pers. comm.). In 2008, Japanese interests asked a local diver in Chuuk to investigate the matter but it is unknown what he found or reported (Aisek, Gradvin 2008, pers. comm.). It is unknown if the U.S. government has investigated the matter. The Secretariat of the Pacific Regional Environment Program (SPREP) followed up with a Strategic Environmental Assessment, which was conducted ‘to model the possible direction and impacts of any spills from the *Hoyo Maru*.’ They concluded if oil was released from the shipwreck it could reach Fefan within one hour, ‘thus allowing for limited response options’ (Talouli et al. n.d.: 2). No-one appears to have dived the site as part of this investigation and they recommended ‘an in-depth assessment of the *Hoyo Maru* be carried out to determine extent of corrosion and amount of possible oil left on board’ (Talouli et al. n.d.: 37). This had already partly been implemented during the EW project. Unfortunately communication between the authors of the SPREP report and the author of this report (and MacLeod and Richards) did not occur; otherwise their report would have been much more informative.

Oil leaking from the USS *Mississinewa* in Ulithi Atoll in Yap in August 2001, demonstrated the vulnerability of submerged WW II sites to corrosion and deterioration caused by storms (Monfils et al. 2006; Smith 2004).¹⁰ Subsequently SPREP was commissioned to develop a regional strategy on the issues associated with oil release in an uncontrolled manner from submerged WW II sites throughout the Pacific and East Asia. Phase I of their study involved data collection and risk assessment of oil contamination. They have developed a database of over 3800 WW II shipwrecks lying throughout the Pacific and East Asia including 330 tankers and oilers (Monfils et al. 2006). Research suggests that the oil still contained in the WW II shipwrecks (world-wide) could vary from 2.5 to 20 million tonnes; as a comparison the Deepwater Horizon oil well in the Gulf of Mexico released about 1.2 million tonnes.¹¹ Phase II of the SPREP marine pollution strategy from WW II shipwrecks has not been developed; Talouli (et al. n.d. : 5) reported that SPREP ‘would have no further action on the strategy, and that further developments be undertaken bilaterally between the flag state and

¹⁰ A total of 1.8 million gallons of the estimated 19 million litres of oil and gasoline was removed from the *Mississinewa* in 2003, <http://www.supsalv.org/Salvreports/Mississinewa%20Oil%20Removal%20Operations>, Accessed 13 October 2015

¹¹ New Scientist article, <http://www.newscientist.com/article/mg20727763.100-defuse-this-oil-time-bomb.html>, Accessed online, 9 October 2015.

the coastal state’.

On 23 September 2011, the President of the Federated States of Micronesia, H.E. Emanuel Mori appealed to the 66th United Nations General Assembly in New York for assistance in this matter:¹²

Oil from some of the shipwrecks in my state of Chuuk has already started leaking. Any disaster could have a devastating effect on the environment, our food chain, and the surrounding reefs that serve as breeding grounds for many fish species. It will also adversely impact our tourism industry which depends largely on coral and shipwreck diving. In this respect, and to avoid a major environmental disaster, I am now appealing to the international community for immediate assistance.

7). Conclusions

There is considerable conflict in the management of the Chuuk Lagoon shipwrecks. Dynamite fishing, tourism, potential oil pollution, and safeguarding of human remains are some of the main issues although it would appear many of the human remains have been recovered. Some divers will pay the Dive guides an additional fee if they can see a human skull, and a few have been hidden, to be revealed for such occasions.

Dynamite fishing is an illegal and totally destructive fishing practice, and while the scale of it in Chuuk has diminished, it nevertheless is still practiced. Dynamite fishing not only kills edible fish, but all living animals and in the case of the shipwrecks, it strips away the protective layer of marine concretion, renewing and accelerating corrosion (Macleod 2003: 10). While it is an unknown issue, other munitions, mines and bombs could also be seriously impacted, possibly leading to their decay and detonation underwater. In 1976-77 explosions were heard on Uman Island and thought to have come from the *Gosei Maru*. This shipwreck contains a number of torpedoes and upon investigation it was found that the ‘high pressure vessels inside the torpedo body were deteriorating to the point that they would rupture and the high pressure gas would be released’ (Bailey 2000: 318). In 1977, intentional detonations were carried out on the remaining torpedoes but further explosions were reported to have occurred in 1998. Detonations were also carried out on the *Fujikawa Maru* in the 1970s for similar reasons to which Bailey (2000: 289) laments: ‘The resulting explosion was highly damaging to animal and plant life on the wreck; the amount of marine life today is only a fraction of the prolific growth that was present before’. There are many other types of munitions on many of the shipwrecks which could be equally as dangerous—not only for the fabric but also for all divers. There are different views on this though, some say the picric

¹² http://www.fsmgov.org/fsmun/ga66_main.htm, Accessed 9 October 2015.

acid which the Japanese used to detonate the explosives is dissipating slowly into the sea rendering them harmless (Earle and Giddings 1976: 603). Others regard the munitions as potentially very dangerous. Another view is that the explosive material is still useable and they are not benign, although the picric acid in sea water should crystallize and not detonate, unless knocked (Utley, Bill 2007 pers.comm.).

Dynamite fishing could eventually cause some ships to collapse, resulting in the destruction of habitats and the complete loss of edible fish, and it could lead to the demise of the tourism industry. Its value as an economic initiative is therefore short-lived with consequences on other values of the sites and the broader marine environment. It is interesting to note that Aisek, as a former Mayor of a local municipality, and who runs a profitable tourism business based on the submerged WWII sites, which would eventually suffer from their demise, appears powerless to stop dynamite fishing.

Dynamite fishers have greatly impacted the integrity of *Fujikawa Maru*, *Nippo Maru* (which has lost all its sea mines) and *San Francisco Maru*, in recovering munitions for making their small bombs (Hezel and Graham 1997: 31-34). The additional impact of dynamite fishing is that it is not limited to the shipwrecks—bombs are thrown onto the reefs killing everything in its sphere of influence. During the December 2006 Earthwatch expedition, marine biologist Mandy Hengeveld investigated a small section of the barrier reef near the North East Pass, and found the area to be greatly impacted by dynamite (Hengeveld, Amanda 2006 pers.comm.). The Chuuk government has legislation that prohibits dynamite fishing but enforcement does not appear to be reducing its operations. It is an activity that, although it provides considerable short term financial rewards, is in conflict with the health and well-being of some Chuukese, and with the government and community who need to provide ongoing care to those maimed.

The submerged WW II sites in Chuuk Lagoon are arguably of ‘outstanding universal value’ and World Heritage Site listing may be justified. In 2006, the Chuuk State government began to look into this possibility, incorporating the cultural heritage values with the natural heritage values of Chuuk Lagoon and the adjacent smaller Kuop Atoll. The major impediment in realising this goal is the current ineffective management and the large impact of dynamite fishing on the marine flora and fauna throughout Chuuk Lagoon.

Any single country would find the effective management of 50+ shipwrecks and hundreds of aircraft related to WW II daunting. Given the quite different site values between the Chuukese, Japanese and Americans, the current conflicts in these values and uses, and the potential concerns regarding the longevity of the sites and oil leaking and polluting the

marine environment, a more collaborative and effective management approach is not only required but essential. This can only come if all stakeholders join together and put adequate resources into it; Chuuk and the Federated States of Micronesia do not have the resources. The \$30 diver fee appears not to have been used in site management. Instead, it seems to have been spent in employing Chuukese in government jobs, arguably a justifiable action when unemployment is about 22%. Japan has formally declared an ongoing interest in their shipwrecks, and in collaboration with the U.S., the FSM and Chuuk it would seem the most effective partnership in managing this important heritage and come to terms with the many daunting issues (United States Department of State (U.S. DS) 2004). It seems totally incongruous to have a small, developing country whose people were innocent bystanders in a war between two large super-powers now wear the burden of their conflict.

In Australia, the Dutch shipwrecks located off Western Australia have been effectively managed through a cooperative arrangement between the governments of Western Australia, Australia and the Netherlands. There are also a number of arrangements between countries in relation to particular shipwrecks, including *Titanic*¹³ and the American CSS *Alabama* which sank off France (Guerout 1997). There will probably be many more given the current peak international agreement on managing underwater cultural heritage, the *UNESCO Convention on the Protection of Underwater Cultural Heritage 2001*, encourages these types of bilateral and multi-lateral agreements (UNESCO 2001).

The concept of the FSM National Park raised by the USA National Park Service (U.S.NPS 1989) could be revisited as part of these considerations. It is, therefore, time for some serious multi-national discussions on how the submerged WW II sites can be effectively managed for the benefit of all stakeholders and the broader international community. *In situ* site preservation of the submerged WW II sites in Chuuk Lagoon allows divers from all nations to view the tragedies and destruction caused by war, and stimulates them to think of the futility of war. They can also serve to help people understand how indigenous communities were impacted by the war and of their ongoing relations with various nations; issues that could be investigated not just in Chuuk but also throughout the Pacific. A determined effort into better management of these sites must be made, before it is too late.

References

- Ashby, G. (ed.), 1985, *Some things of value: Micronesian customs and beliefs*. Rainy Day Press, Pohnpei.
- Bailey, D.E., 2000, *World War II Wrecks of the Truk Lagoon*. North Valley Diver Publications,

¹³ Negotiations about the management of the *Titanic* have been ongoing for several years and an agreement was signed by the UK (2003) and the USA (2004) <http://www.gc.noaa.gov/documents/05varmer2006an.pdf>

- Redding.
- Beger, M., Richards, Z., 2006, Rare coral colonizes new artificial niche. In: Jeffery, B., (ed.), Chuuk Lagoon World War II submerged sites: Earthwatch project report, July 3 to December 9, 2006. Chuuk: 4.
- Carrell, T., 1991, *Micronesia: Submerged Cultural Resources Assessment*. Submerged Cultural Resource Unit, National Park Service, Santa Fe.
- Delgado, J.P., Lenihan, D.J., Murphy, L.E., 1991, *Archaeology of the Atomic Bomb: A Submerged Cultural Resources Assessment of the Sunken Fleet of Operation Crossroads at Bikini and Kwajalein Atoll Lagoons*. United States Department of the Interior, National Park Service, Santa Fe.
- Denfeld, D. Colt, 1980, *Field Survey of Truk: World War II features*. Micronesian Archaeological Survey Number 6, Historic Preservation Office, Trust Territory of the Pacific Islands, Saipan.
- Earle, S.A. and Giddings, A., 1976, Life springs from death in Truk Lagoon. *National Geographic*, **149**. 5: 578-613.
- Emslie, M., Jeffery, B., MacLeod, I., Maynard, J., 2007, Chuuk Lagoon World War II submerged sites: Earthwatch project report, July 30 to August 11 2007. Chuuk.
- Gladwin, T. and Sarason, S.B., 1953, *Truk: Man in Paradise*. Wenner-Gren Foundation for Anthropological Research, New York.
- Guerout, M., 1997, CSS Alabama. In: Delgado, J.P. (ed.), *Encyclopedia of Underwater and Maritime Archaeology*. British Museum Press, London: 23.
- Hezel, Francis X., 1992, The Expensive Taste of Modernity: Caroline and Marshall Islands. In: Robillard, A.B. (ed.), *Social Change in the Pacific Islands*, 203-219. Kegan Paul International, New York. Accessed online www.micsem.com, 6 September 2005.
- Hezel, F. and Graham, C., 1997, *Truk Underwater Archaeology*. Micronesia Resources Study. United States National Park Service, San Francisco.
- Imperial Japanese Navy (IJN), 1945a, Eastern Branch 'Toubu Shicho' Office 1944-45: Ship Plate Inspection Department Record. Microfilm. NARA Record Group No. 313. In file titled 'A12-1-Captured Documents and War History'. NARA, San Francisco.
- Imperial Japanese Navy (IJN), 1945b, Report regarding the Murakimaru. Memorandum to Commander-in-chief of the 4th Fleet from Commander Occupation Forces Truk and Central Carolines 1945. NARA Record Group No. 313. In file titled 'A12-1-Captured Documents and War History'. NARA, San Francisco.
- Jeffery, B., 2004, World War II underwater cultural heritage sites in Truk Lagoon: Considering a case for World Heritage Listing. *The International Journal of Nautical Archaeology*, **33**.1: 106-121.
- Jeffery, W.F., 2007, *War graves, munition dumps and pleasure grounds: A post-colonial perspective of Chuuk Lagoon's submerged WW II sites*. Doctoral dissertation, James

- Cook University, Townsville. Available online <http://eprints.jcu.edu.au/2068/>
- Jeffery, B., 2007a, Chuuk Lagoon World War II submerged sites: Report on 2006 Earthwatch project. *Newsletter of the Australasian Institute for Maritime Archaeology*, **26.1**: 22-25.
- Jeffery, B., Beger, M., MacLeod, I., Richards, V., Hengeveld, M., Carpenter, J., 2007, Guidelines in recording and monitoring the natural and cultural attributes of submerged historic sites in the Federated States of Micronesia. National Historic Preservation Office. Pohnpei.
- King, T.F. and Parker, P.L., 1984, *Pisekin Nóómw Nóón Tonaachaw. Archaeology in the Tonaachaw Historic District, Moen Island*. Occasional Paper No. 3. South Illinois University at Carbondale: Center for Archaeological Investigations, U.S.
- Lenihan, D., 2001, *USS Arizona Memorial and Pearl Harbor National Historic Landmark*. Submerged Cultural Resource Unit, National Park Service, Santa Fe.
- Lindemann, K.P., 1982, *Hailstorm over Truk Lagoon*. Maruzen Asia, Singapore.
- Lindemann, K.P., 1990, *Hailstorm over Truk Lagoon Supplement*. Pacific Press Publication, Jakarta.
- Lloyd's Register of Shipping 1940-41*. Lloyds, London.
- MacLeod, I.D., 2003, Metal Corrosion in Chuuk Lagoon: A survey of iron shipwrecks and aluminium aircraft. Chuuk Historic Preservation Office. Chuuk.
- MacLeod, I.D., 2005, A new corrosion mechanism for iron shipwrecks in seawater: a study of the *Fujikawa Maru* (1944) in Chuuk Lagoon, Federated States of Micronesia. Preprints for ICOM-CC Triennial Meeting, Den Haag, The Netherlands, September 2005, Volume II: 310-316.
- MacLeod, I.D., 2006a, In-situ corrosion studies on wrecked aircraft of the Imperial Japanese Navy in Chuuk Lagoon, Federated States of Micronesia. *International Journal of Nautical Archaeology*, **35.1**: 128-136.
- MacLeod, I.D., 2006b, Corrosion and conservation management of iron shipwrecks in Chuuk Lagoon. *Conservation and Management of Archaeological Sites*, **7**: 203-223.
- MacLeod, I.D., Beger, M., Richards, V., Jeffery, B., and Hengeveld, M., 2007, Dynamic interactions of marine ecosystems with wrecks in Chuuk Lagoon, Federated States of Micronesia. In: Degryny, C., Ankersmit, B., Yolanda, I., and van Langh R. (eds.), *Metal 07, Preprints of the ICOM-CC Metals Working Group meeting, Amsterdam*, **3**: 51-54.
- MacLeod, I.D., Richards, V.L., & Beger, M., 2011, 'The effects of human and biological interactions on the corrosion of WWII iron shipwrecks in Chuuk Lagoon'. 18th International Corrosion Congress, Perth, November 2011, No. 124, 1-12.
- Monfils, R., Gilbert, T., Nawadra, S., 2006, Sunken WW II shipwrecks of the Pacific and East Asia: The need for regional collaboration to address the potential marine pollution

- threat. *Ocean & Coastal Management*, **49**: 779-788. Accessed online www.sciencedirect.com, 12 October 2006.
- Morison, S.E., 1975, *History of United States Naval Operations in World War II. Volume VII: Aleutians, Gilberts and Marshalls, June 1942-April 1944*. United States Navy, Boston.
- Parillo, M.P., 1993, *The Japanese Merchant Marine in World War II*. Naval Institute Press, Maryland.
- Poyer, L., Falgout, S., Carucci, L.M., 2001, *The Typhoon of War: Micronesian experiences of the Pacific War*. University of Hawaii Press, Honolulu.
- Stewart, W., 1989, *Ghost Fleet of Truk Lagoon*. Pictorial Histories Publishing Co., Missoula.
- Smith, R., 2004, *Multibeam Surveys – Ulithi Atoll and Yap Harbour, Yap State, Federated States of Micronesia*. SPOAC Technical Report 366, South Pacific Applied Geoscience Commission, Fiji.
- Talouli, A., Gilbert, T., Monfils-Gilbert, R., n.d., Strategic environmental assessment and potential future shoreline impacts of the oil spill from WW II shipwreck *Hoyo Maru*, Chuuk Lagoon, Federated States of Micronesia. Secretariat of the Pacific Regional Environment Program. Accessed online http://www.sprep.org/att/publication/000851_SEA_HoyoMaru_ChuukLagoon.pdf, 3 June 2012.
- Turner, J. W. and Falgout, S., 2002, Time Traces: Cultural Memory and World War II in Pohnpei. *The Contemporary Pacific*, **14.1**:101-131. University of Hawaii Press, Honolulu.
- UNESCO, 2001, Convention on the Protection of Underwater Cultural Heritage. Accessed online 10 April 2012, <http://www.unesco.org/new/en/culture/themes/underwater-cultural-heritage/>
- United States Department of State (U.S. DS), 2004, Office of Ocean Affairs; Protection of Sunken Warships, Military Aircraft and Other Sunken Government Property. *Federal Register*, **69.24**: 5647-5648. Public Notice 4614, February 5, 2004. U.S. Government Printer, Washington.
- United States Joint Army-Navy Assessment Committee (JANAC), 1947, *Japanese Naval and Merchant Shipping Losses during World War II by all causes*. U.S. Government Printer, Washington.
- United States National Park Service (U.S.NPS), 1985, Truk Lagoon Underwater Fleet, Truk Atoll. Nomination for U.S. National Historic Landmark. Chuuk Historic Preservation Office, Chuuk.
- United States National Park Service (U.S.NPS), 1989, Truk Lagoon Historical Park Study. Draft report for Federated States of Micronesia, State of Truk. Photocopy from Micronesian Seminar, Pohnpei.
- United States Navy (U.S.N), 1945, *ONI 208-J Supplement No. 2 Far Eastern Small Craft*.

U.S. Government Printer, Washington.

United States Strategic Bombing Survey (U.S.SBS), 1947, *The Reduction Of Truk*. Pacific War Series No. 77. U.S. Navy, Washington.

Yeowart, R., 1943, Truk Reconnaissance, January 9, 1942. Interview with Flight-Lieutenant Robert Yeowart. Brisbane 24 August 1943. AWM Record No. PR91/73 Yeowart, Australian War Memorial File Number 419/120/015. Australian War Memorial, Canberra.

Appendix 1: A list of shipwrecks in Chuuk Lagoon compiled by Jeffery 2007.

Site Name	Site No.	Recorded site length (metres)	Measured site length (metres)	Gross Tonnage	Latitude	Longitude	Located by Side Scan Sonar
Aikoku Maru	1	152	Broken in two (106)	10438	7.37	151.91	Yes
Amagisan Maru	2	137	133	7620	7.29	151.86	Yes
CHA 29	3	49		420	7.51	151.84	No
CHA 46	4	26		130	7.43	151.92	No
CHA 66	5	26		130	7.40	151.85	No
Ei-sen No. 761	6	34	34	300	7.37	151.86	Yes
Fujikawa Maru	7	133	133	6938	7.34	151.88	Yes
Fujisan Maru	8	150		9524	7.42	151.89	No
Fumitzuki	9	97	95-100	1590	7.41	151.73	Yes
Futagami	10	40	40	625	7.37	151.85	Yes
Gosei Maru	11	83	80	1931	7.31	151.88	Yes
Hanakawa Maru	12	112		4739	7.33	151.64	No
Heian Maru	13	156	160	11614	7.38	151.85	Yes
Hino Maru No. 2	14	61	60	998	7.30	151.87	Yes
Hoki Maru	15	137	108	7112	7.35	151.91	Yes
Hokuyo Maru	16	109	101	4217	7.36	151.90	Yes
Hoyo Maru	17	144	146	8691	7.37	151.84	Yes
I-169	18	103	99	1785	7.38	151.84	Yes
Katsurigisan Maru	19	87		2427	7.49	151.95	No
Kensho Maru	20	117	116	4862	7.37	151.84	Yes
Kikukawa Maru	21	108	88	3833	7.35	151.91	Yes
Kiyosumi Maru	22	138	143	8614	7.37	151.84	Yes
Kotohira Maru	23			30?	7.41	151.83	No
Minsei	24	41		378	7.55	151.85	No
Momokawa Maru	25	108	55-74	3829	7.37	151.90	Yes
Muraki Maru	26			15	7.12	151.95	No
Nagano Maru	27	105	151	3824	7.36	151.91	Yes
Nippo Maru	28	108	93	3764	7.38	151.91	Yes
Oite	29	100		1523	7.61	151.83	No

Ojima	30	49	Debris field up to 200m	812	7.35	151.91	Yes
Reiyo Maru	31	122	106	5446	7.36	151.91	Yes
Rio de Janeiro Maru	32	141	138	9626	7.30	151.89	Yes
San Francisco Maru	33	117	132	5831	7.36	151.90	Yes
Sapporo Maru	34	44	49	361	7.36	151.83	Yes
Seiko Maru	35	120	126	5385	7.36	151.90	Yes
Shinkoku Maru	36	152	154	10020	7.40	151.77	Yes
Shotan Maru	37	87	68	2829	7.36	151.91	Yes
Susuki	38	84	72	935	7.37	151.85	Yes
Tachi Maru	39	82		1891	7.37	151.80	No
Taiho Maru	40	98		2827	7.30	151.85	No
Taijun Maru	41			1278	7.44	151.83	No
Unkai Maru No. 6	42	101	104	3220	7.31	151.88	Yes
Unknown A	43	39		350?	7.30	151.86	No
Unknown B	44			250?	7.30	151.87	No
Unknown C	45	30		90	7.30	151.86	No
Unknown D	46			?	7.36	151.85	Yes
Unknown E	47		19	20?	7.38	151.86	No
Unknown F	48		67	?	7.37	151.91	Yes
Unknown G	49		35	c.150	7.38	151.85	No
Yamagiri Maru	50	134	137	6438	7.38	151.82	Yes
Yamakisan Maru	51	113	95	4776	7.29	151.86	Yes
Yubae Maru	52	93	90	3217	7.30	151.86	Yes

6. Fact finding mission report on Palau Republic approaches to WWII wreck sites

Jun Kimura

1). Introduction

This chapter provides the result of the short term fieldwork in the Republic of Palau to evaluate country's approaches to the effective protection and promotion of war periods' cultural remains beneath the waters. The waters of Palau encompasses a great number of sunken cultural heritage related to World War II, consisting of shipwrecks, vehicles, and aircraft. While these remains are not defined as underwater cultural heritage, according to the 100-year time limit in Article 1 of the UNESCO Convention 2001 which excludes the remains from World War II, the country fully recognize the particular historical significance of the relics from the period. A legal framework for the protection of cultural heritage is applied to WWII underwater cultural heritage (UCH). Government agencies' missions include the safeguarding of war heritage beneath the sea. However, like some of the Pacific countries, Palau still faces difficulty in the implementation of the appropriate management of WWII wrecks due to the rapid increase of site visitors and wreck divers, whose behavior cause the potential damage of the site and disturb the stabilization of the sites in some cases (Figure 6-1.). In addition, the finding (or re-location) of war heritage sites by non-professionals are still remarked and whether such private explorations report their findings appropriately is controversial. Moreover, the fact that the Republic of Palau once was the battlefield still shows a need for the clearance of unexploded ordnance (UXO) on land as well as in underwater at identified and unidentified wrecks present-day (Ngirmang and Emesiochel 2014). It is lately reported that the Japan Mine Action Service (JMAS), which a non-profit organization specialized for explosive ordnance disposal, attempted the clearance of unexplored ordnance at the *Helmet Wreck* site. To evaluate the implementation of safeguarding of WWII UCU in Palau in relation to the above, a short period's fieldwork was conduct in 2015. This chapter reports the result of the field basis activity in Palau as part of feasibility study.

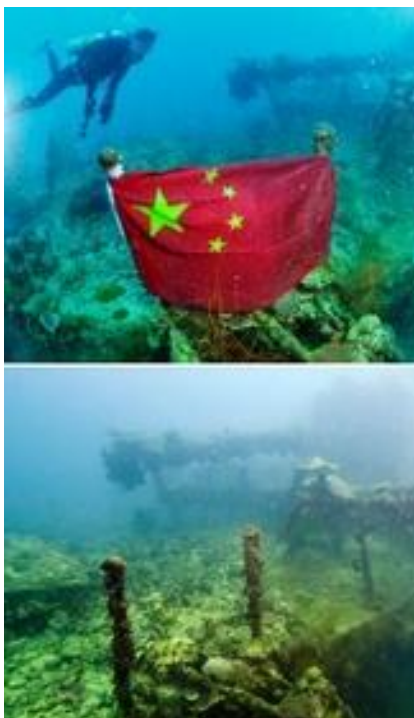


Figure 6-1. A Chinese National Flag tagged possibly by SCUBA divers at a sunken Japanese supply ship Iro. The divers behave potentially causes the physical damage to the ship. *Kyodo 47 News, March 23rd 2015*

<http://this.kiji.is/39846076816195585?c=39546741839462401>

2). Aims and activities

Objects

In 2015, Palau Historic Preservation Office (HPO) of the Bureau of Arts and Culture under the Ministry of Community and Cultural Affairs commissioned the Department of Maritime Civilizations, School of Marine Science at Tokai University to undertake a review of the World War II (WWII) wreck sites' management and protection of the Palau Republic as part of the feasibility study on WWII UCH in the Pacific countries.

The object of the review is to:

- document Palau HPO's policy development and management system for WWII wreck sites that have been opened to the public.
- evaluate Palau Republic's mitigation strategies and actions against the risk of unexploded ordinance (UXO) leftover sunken WWII vessels.

Methodology

The fact finding missions were accomplished by:

- having a consultation meeting with government officials of selected bureaus for hearing about the status of WWII shipwrecks, including their sustainable use and preservation.
- conducting diving inspection at the *Helmet* shipwreck which still contained UXO inside.

Dates and activities of fact missions

The short field trip was conducted from September 1 to 4 in 2015.

- Day 1 Flying out from Nagoya (Japan) to Koror (Palau)
- Day 2 Consultative meeting with officials from Historic Preservation Office, Bureau of Tourism, and Palau Visitor Authority. Formal meeting with Director of the Bureau of Arts and Culture.

Sunny Ngirmang	Palau Historic Preservation Office (HPO), Bureau of Cultural and Historical Preservation, Ministry of Community and Cultural Affairs
Calvin Emesiochel	
Ray Marino	Bureau of Tourism
Dorothy Ueda	Ministry of Natural Resources, Environment & Tourism
Anna Hidei	
Kadoi Ruluked	Palau Visitor Authority

Table. 1 Consultative meeting attendees

- Day 3 SCUBA diving inspection of the *Helmet* shipwreck. Dive assistant, boat and equipment hiring:

CRUISE CONTROL

P.O.BOX 10061Koror, Republic of Palau 96940

call 680-488-6691

- Day 4 Formal meeting with a Japanese Ambassador at the Japanese Embassy in Koror.

3). Palau regulations on cultural heritage, human remains, and UXO

According to Title 19 of the Palau National Code (PNC), HPO ensures that cultural heritage, including historical sites and cultural properties both on land and in underwater are protected from destruction, removal, damage, or alternation. Title 19 of PNC authorizes HPO to implement a permitting program for all projects that may create adverse effects on the heritage. The Bureau of Arts and Culture is responsible of the assessment of submitted project proposals (Ngirmang and Emesiochel 2014). The detailed procedures for assessment were first developed by referring to the section 106 of U.S. National Historic Preservation Act and are in accordance with Title 19 of the PNC. In overall, it follows flows, as outlined on a schematic diagram on Figure 6-2..

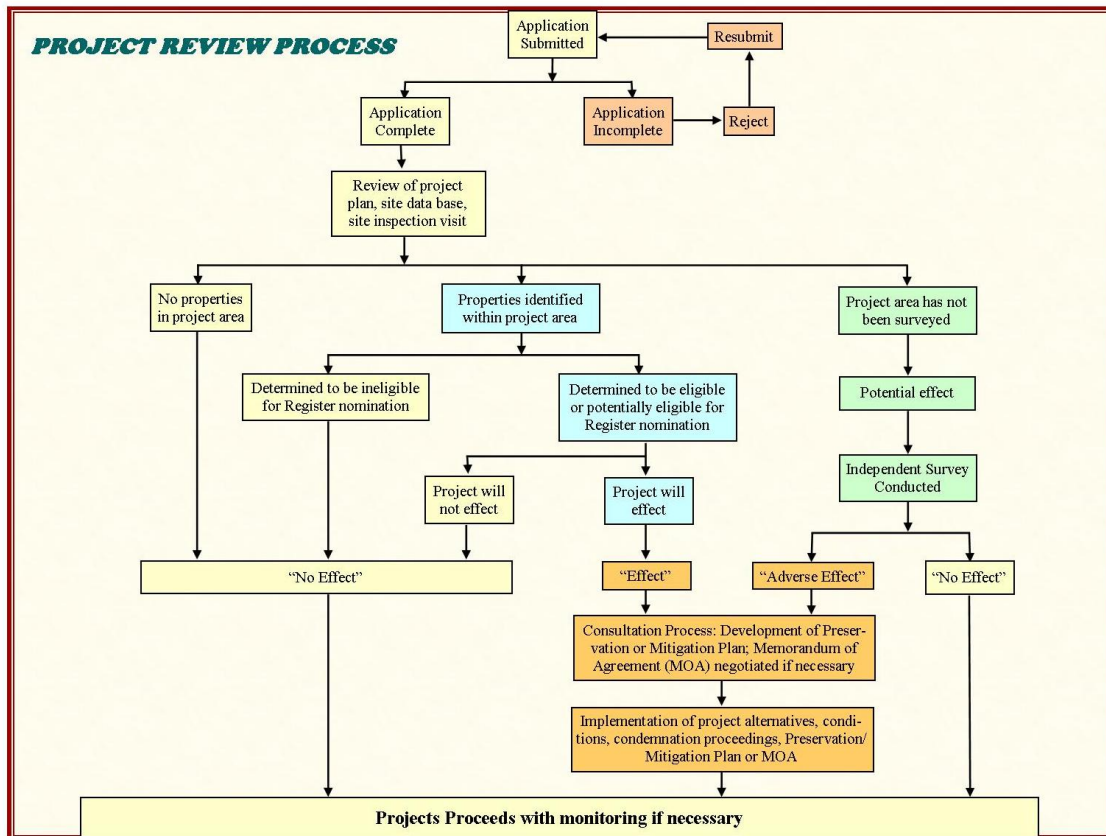


Figure 6-2. Approval processes of a projects application possibly impacts on Palau cultural relics protected by Title 19 of the Palau National Code

To accomplish this, HPO has issued related regulations concerning the appropriate treatments of artefacts and human remains at sites:

Regulations regarding Palau Cultural and Historical Artifacts (2005)

The Regulations consist of a main body of five sections which composed of several clauses concerning the scope and generic provision of the regulation in relation to Title 19 of PNC, procedures for removing artefacts from a site, artefact ownership, penalties, and artefact repository.

Regulations Regarding the Treatment and Disposition of Human Remains and Burial Furnishings (2005)

The Regulations developed with the nature of cultural prohibitions and respect for ancestral spirits in Palau. It aim to prevent burial sites, human remains and associated burial furnishings from authorized disturbance work. The Regulations consist of a main body of thirteen sections. They are primarily concerned with the protection and treatment of human body remains in development work, consultative processes to deal with human

remains and burial furnishings, consideration on human remains at both known sites and suspected areas possibly to contain human remains, relation of human remains, sensitivity to exhibit human remains, and penalty.

Palau government recognizes in-place Unexploded Ordnance (UXO) that were left over from the WWII widely on island grounds and in the surrounding waters. The Explosive Remnants of War (ERW) are substantial threats to the public and visitors. The country have yet had enough ability to identify and dispose UXO by own. Alternatively Palau's strategic plan is an international cooperation with other countries. On November 19, 2007, Palau ratified the Ottawa Treaty or the Convention on the Prohibition of the Use, Stockpiling, Production and Transfer of Anti-personnel Mines (Mine Ban Treaty). The Convention gives a scheme to the country to receive funding assistance for clearing and demining of unexploded ordinances.

Palau government has expressed a concern on UXO against the country development. According to Palau Statement on Clear at the meeting of the Convention in Genova in 2010, it was reported, "US military records show that 2,800 tons of ordnance was fired, and with failure at 20-30%..."

<http://www.apminebanconvention.org/fileadmin/APMBC/MSP/10MSP/day4/10MSP-Item11b-2Dec2010-Palau-en.pdf>

Under the circumstance, Palau government commissioned Cleared Ground Demining (CGD) to evaluate the state of UXO problems and since then the British non-profit organization has been engaged on the clearance of unexploded anti-personnel mines in Peleliu and Angaur States. Up to 2010 an explosive ordinance disposal team has cleared 8,415 items weighting about eight tons.

Palau government is undertaking an inter-agency approach to maximize the ability to deal with the problem of the unexplored ordinance. In 2011, UXO (Mine Action) Working Group consisting of the Ministry of State, Bureau of Public Safety, and HPO was established to determine its national UXO Strategy. Following the current state that UXO destruction projects are increasing in the country, a new regulation for the UXO clearance is an urgent matter to be developed. In 2015, Palau is in a final process of formulating the Palau's Mine Action Plan. As in-place UXO that endangers cultural activities and personal working at historical monuments and places, HPO plays in a key role on the developing the regulation. The regulation does not segments the issue of UXO in waters from left landmines and anti-personnel mines on islands, considering the existence of a substantial number of UXO in sunken vessels and in surrounding seabed. It will be an important guideline for explosive ordinance clearance in seawater environments with a scope of investigation, locating, marking,

identification, and reporting.

4). Overview on the WWII UCH in Palau and issues

A number of sunken military craft in the Palau waters are associated to the Imperial Japanese Navy (IJN). The Palau was once an economic and political center of the Japanese colonies in the Pacific. As a result from the end of World War I, Japan was entrusted with Micronesia (Micronesia Islands of Japanese Mandated Territory), including modern Northern Mariana Islands, Federated States of Micronesia, Marshall Islands, and the modern Palau Republic. The South Pacific Mandates (Nanyocho) was established in Koror as the headquarter of several mandates to rule the Japanese Mandated Territory in the Pacific region. Toward the end of the WWII, the Palau once became an important anchorage in terms of the military strategic point, followed by the withdrawal of the main naval force of IJN from Chuuk Lagoon (Truk Lagoon) after the loss of Marshall Islands. The IJN naval fleet including battleship *Musashi* was assembled in Palau but further withdraw from Palau. While IJN brought out the major battleships to the Philippines, many of oil tankers, merchant ships, repairing ships, and supply ships were left in the Palau Harbor. On March 30 and 31 in 1944, an intensive U.S. air raid carried out. While many Japanese soldiers were lost on the Palau islands, it is said that over 60,000 conscripted sailors who used to have been engaged mainly on ship transport were seriously injured and lost during the raid. The number of the lost conscripted sailors is greater than that of combatants of the IJN.

The exact number of the lost Japanese and sunken vessels is disputable. Ishimura (2011) has listed over forty Japanese vessels were sunken in the water of Palau during the WWII (Figure 6-3.). Ishimura's research has outlined that the most of the sunken Japanese vessels are not the battleship of Japanese Imperial Navy or Army but converted vessels originally built for non-combat purposes. The depth of their location ranges from 2-3m to more than 30m. Salvage missions were attempted at some of these wrecks after the WWII. The Akashi (9,000t.), a repair ship of the IJN, was sunken during the US air-raid in the shallow waters of North Urukthapel Anchorage with a depth of 12m. Over 700 combatants and non-combatants were on board. In 1957, a salvage operation for the reuse of iron as metal resource recycling was undertaken and a total of 201 body remains were recovered during the salvage. Ishimura (2010a; 2010b) has reported a mission of the human remains recovery at the *Iro* which was an oil supply ship and sunken with a depth of more than forty meters in West Urukthapel Anchorage. The body recovery mission was initiated by the team of the Japan Ministry of Health, Labour and Welfare with a survivor of the *Iron* and an archaeologist, though none of human remains have been identified.

Ishimura (2011) has pointed out despite the Palau's legal protection on the sunken vessels,

they are still under threats from souvenir hunting. An illegal activity at the *Chuyo maru* was reported. The *Chuyo maru* was a freighter requisitioned by the Japanese Imperial Army, and she was sunken by the US bombing with nine soldiers and twelve crews of the ship. The ship was relocated at a depth of 40m by wreck hunters. In May 2006, a British man took some relics from the shipwreck and this was reported as an important incident offended against the cultural heritage law in the country.

No.	Name of Vessel	Type	Affiliation	Tonnage	Length	Destroyed Date	Depth	State
1	Akashi	Navy repair ship	Combined Fleet	9000	158.5	44.03.30	12	SDF
2	Iro	Navy oil tanker	Combined Fleet	14050	143.48	44.03.30	43	SP
3	Sata	Navy oil tanker	4th Fleet	14050	143.48	44.03.30	35	SP
4	Ose	Navy oil tanker	Combined Fleet	7987	138.9	44.03.30	Unknown	SDF
5	Wakatake	Navy destroyer	No. 1 convoy fleet	1113	84	44.03.30	30	SDF
6	Samidare	Navy destroyer	No. 2 destroyer flotilla	2075	105.8	44.08.26	9	SDF
7	LST Type 1	Navy first-class carrier	Combined Fleet	1500	96	44.07.27	35	SP
8	Asashio Maru	Navy first-class oil tanker	Combined Fleet	5141	118.1	44.03.30	40	S
9	LST Type 150	Navy SB carrier	Unknown	950	70.9	Unknown	Unknown	SDF
10	Amatsu Maru	Navy oil tanker (converted)	Nihon Kaiun	10567	153	44.03.30	40	SP
11	Urakami Maru	Navy repair/salvage ship (converted)	Fukuyo Kisen	4317	109.73	44.03.30	35	SP
12	Kamikaze Maru	Navy minelayer (converted)	Yamashita Kisen	4918	111.5	44.03.30	35	SP
13	Chuyo Maru	Army carrier (converted)	Toyoi Kisen	1941	82.3	44.03.30	35	SP
14	Nagisan Maru	Navy carrier (converted)	Mitsui Senpaku	4391	110	44.03.30	35	SP
15	Bichu Maru	Army carrier (converted)	Nihon Yusen	4667	112	44.03.30	35	SP
16	Gozan Maru	Navy carrier (converted)	Kuribayashi Shosen	3213	91.5	44.03.30	18	SDF
17	Shoei Maru	Army carrier (converted)	Sanko Kisen	1878	81.5	44.03.30	Unknown	SDF
18	No. 5 Nissho Maru	Navy general-purpose vessel (converted)	Marusho Kaiun	782	54	44.03.30	Unknown	SDF
19	No. 18 Shinsei Maru	Navy oil tanker (converted)	Hara Shoji	2711	96.4	44.03.30	Unknown	S
20	No. 2 Unyu Maru	Army oil tanker (converted)	Tojo Kisen Kogyo	634	53	44.03.30	Unknown	S
21	Raizan Maru	Navy general-purpose vessel (converted)	Tsurumaru Kisen	2838	98	44.03.30	35	SP
22	Kibi Maru	Army carrier (converted)	Hinode Kisen	2759	93	44.03.30	30	SP
23	Teshio Maru	Army carrier (converted)	Mitsui Senpaku	2840	93	44.03.30	30	SP
24	Ryuko Maru	Navy carrier (converted)	Taiyo Kogyo	2764	93	44.03.30	35	SP
25	Goshu Maru	Navy carrier (converted)	Kawasaki Kisen	8592	132.9	44.03.30	20	SDF
26	Akebono Maru	Navy oil tanker (converted)	Nihon Kaiun	10182	151.4	44.03.30	Unknown	S
27	Hokutai Maru	Army carrier (converted)	Kitagawa Sangyo Kaiun	5220	120.1	44.03.30	unknown	SDF
28	Daihatsu landing craft	Landing craft	Unknown	17	14.88	unknown	2	SP
29	Daihatsu landing craft	Landing craft	Unknown	unknown	unknown	unknown	7	SP
30	Buoy #6 Wreck	Submarine chaser (ex- bonito fishing boat)	Unknown	unknown	ca. 30	unknown	25	SP
31	Helmet Wreck	Minelayer	Unknown	unknown	ca. 58	44.03.30	35	SP
32	Unknown	Unknown (ex- whaling boat)	Unknown	ca. 300	ca. 36	unknown	10	SDF
33	Unknown	Unknown	Unknown	unknown	unknown	44.03.30	unknown	S
34	Unknown	Unknown (ex- cargo ship)	Unknown	>1000	>60	44.03.30	15	SP
35	Unknown	Unknown (former cargo-passenger boat)	Unknown	unknown	unknown	44.03.30	10	SP
36	Unknown	Unknown (submarine chaser or patrol boat)	Unknown	unknown	unknown	44.03.30	12	SDF
37	Unknown	Unknown (ex- cargo-passenger boat)	Unknown	>1000	unknown	44.03.30	6	SP
38	Unknown	Unknown (ex- cargo ship)	Unknown	unknown	ca. 40	unknown	27	SDF
39	Unknown	Unknown (ex- water tanker)	Unknown	unknown	ca. 36	unknown	12	SP
40	Unknown	Unknown (cargo ship or patrol boat)	Unknown	unknown	ca. 30	44.07.25	3	SP
41	Tugboat Wreck	Unknown	Unknown	unknown	unknown	unknown	2	SDF
42	Unknown	Unknown	Unknown	ca. 3000	unknown	44.08.22	3	SDF

State: S=Salvaged completely SP=Salvaged partially SDF=Salvaged completely; debris field

Figure. 6-3 A list of sunken Japanese vessels in the Palau's waters (Ishimura 2011)

UXO clearance operations at the Helmet wreck

Helmet Wreck

A UXO clearance operation at the *Helmet Wreck* by the Japan Mine Action Service is a benchmark case as an example of aid for in-place disposal of UXO in an underwater environment. At over 165 depth charges remain at the *Helmet Wreck*. The historical background of the *Helmet Wreck* has yet been clarified, but was used by the Imperial Japanese Navy as a freighter and more obviously as a minelayer with a presence of many depth charges before sunken by air-raid and a torpedo attack on March 30-31th in 1944. The well-preserved hull was relocated in the Malakal Harbor in 1990 by Dan E. Bailey who is a wreck hunter and has actively detected the WWII sunken vessels in the Palau's waters

(Bailey 1991). The length of the hull measures approximately 58m. The hull sits on seabed with a cant; a depth around the bow is 35m, while the stern part lies in a depth of 15m. The shipwreck was named after the state that a large number of helmets used to have been scattered under the upper deck portside, but pillage at the wreck appeared to have caused the substantial loss of the helmets and other miscellaneous artefacts. The ship has three holds; the first hold is a cargo room where engines for the Mitsubishi A6M Zero are left and the second and third holds are loaded with arms and antisubmarine depth charges. There is a large opening on the starboard side around the aft third hold in which a torpedo hit. The ribs are exposed on the opening part in which a number of depth charges were scattered, while many depth charges are still aligned in original position inside the second and third holds up to date in 2015.

NGOs worked for unexplored ordinance clearance

The government of Palau had to tackle the problem of imminent dangers of UXO at the *Helmet Wreck*: the removal of in-place fuzed depth charges and the leakage of explosive composites from depth charges in the holds. Two non-profit organizations, CGD and JMAS have been involved on the clearance of the risks of the depth charges.

JMAS, established in 2001 and has conducted several ERW clearance missions mostly in Asian countries, was primarily in charge of the elimination of the fuzed depth charges and mitigation of the leakage. The operations have been conducted between 2012 and 2014 with a financial aid of the Japanese government's Official Development Assistant (ODA). JMAS's brief operational reports for the operations are available online in Japanese on the web-site of the Ministry of Foreign Affairs of Japan:

http://www.mofa.go.jp/mofaj/gaiko/oda/data/zyoukyou/ngo_m/pacific/palau/121204.html

The government of Palau further commissioned the assessment of the hazard of the depth charges to the Geneva International Centre for Humanitarian Demining (GICHD). A technical report, *Assessment Report: Depth charges at the 'Helmet Wreck' in Koror harbour* has been published. The GICHD assessment report provides a compressive overview on the JMAS's operations as well as a technical perspective on the hazard level of the left depth charges before and after the aid. In terms of risk assessment with ERW expertise, GICHD has classified fuzed depth charges fall into a moderate risk category, while the unfuzed fall into a low risk category. It was concluded that "by only removing the two fuzed depth charges from the wreck, the risk from the explosive hazards will be dramatically reduced" (Tollefsen and Hovik 2013). Both the JMAS operational reports and the GICHD assessment reports are important resources to address how the UXO problem at a WWII shipwreck in a Pacific country was approached.

Depth charges' clearance operations

The JMAS underwater operations are divided into two major parts: i). preventing the toxic explosive chemicals from spilling and ii). removing depth charges with fuzes that sit in the drop racks of starboard and portside. JMAS has reported that a total of 165 depth charge remains at the *Helmet Wreck* (GICHD has identified 167). GICHD has pointed out that these depth charges are almost equivalent to a net explosive quantity of 27 metric tonnes of high explosives (Tollefsen and Hovik 2013, p.7). In the GICHD report, a major type of the depth charges at the *Helmet Wreck* has been identified as the Type II depth charge while the explosive components of the depth charges has been specified as a Type 98 explosive used by the IJN (Tollefsen and Hovik 2013, p.11, p.33). Type 98 consists of a chemical composition of a mixture of Trinitroanisole (60%) and Hexanitrodiphenylamine (40%), and it is known that Type 98 was used for *kaiten* which was manned torpedoes for suicide attack. Trinitroanisole and Hexanitrodiphenylamine form picric acid. The JMAS operational report does not specify either the type of the depth charge or their explosive substance, but the leaking substance from the crack of the deteriorated depth charges has been identified as picric acid. Picric acid is toxic for human and natural environments. JMAS has identified 77 depth charges show leaking problem, which caused substantial damages to marine life and water pollution in the concerned area.

The flow of the JMAS operation for sealing the seam and cracks is presented on Figure. 6-4. What is visible on the photos taken by JMAS is that the leakage of a large amount of picric acid heavily polluted the water around the wreck and endangered divers' working environments due to toxic condition and low visibility. It has been reported that the JMAS mainly used epoxy resins for sealing. GICHD has reported this is environmental safe method for marine life and mechanism (Tollefsen and Hovik 2013, p.11). The JMAS started the underwater operation in April 2014 and as a result of the successful operation by February 2015, the water condition was substantially improved and pH level dropped down to normal.

Of them two depth charges that had been fuzed to be ready for use have been sitting in the drop racks. The JMAS operation flow for the removal of the two depth charges is presented on Figure 6-5.. The fuzed depth charges were trapped in the rack that have been heavily colonized by marine organs. The dead hard corals removal operation with an underwater air hammer drill started in May 2014. The operation competed in July 2015 and the removed depth charges were left on the deck to be dispatched to a demolition ground. Presumably, it is suggested that CGD play an active role in the destruction processes of the depth charges.



1. Crack along the welding seam



2. Sealing operation by a JMAS diver



3. Exposed crack before sealing



4. After sealing with epoxy resins



5. Water condition in April 2014



6. Water condition in February 2015

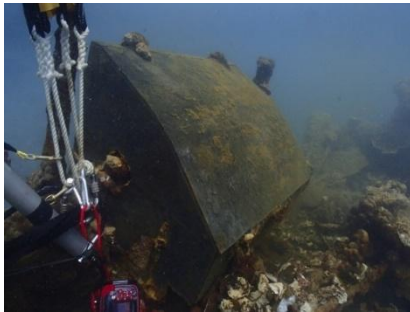
Figure 6-4. Sealing operation and its result at the Helmet Wreck site. *photos taken by JMAS and provided by Palau HPO*



1. A rack covered by coral



2. Coral cleaning with an air hammer drill



3. Rack after cleaning



4. Exposed fuzed depth charge inside



5. Removal work with an air saw



6. Lifted depth charge from the rack



7. Covered with plastic wrap



8. Extra sealing with epoxy resins

Figure 6-5. Removal processes of the fuzed depth charge. *photos taken by JMAS and provided by Palau HPO*

In 2015, with an authorization from HPO, author inspected the condition of the *Helmet Wreck*. While the site was closed during the JMAS operations, but after the completion of the successful operations, the access to the site is not prohibited. Based on understanding on the increase of risks by divers' disturbance, HPO takes into consideration the establishment of a relevant site access policy. It is still observed that the explosive chemical substance is still continuously leaking caused by deterioration time over (Figure 6-6.). The deteriorated depth charge shell would be easily damaged by any physical contacts.



Figure 6-6. Picric acid leaking observed during 2015 diving investigation

At the meeting with the Bureau of Tourism under the Ministry of Natural Resources during the 2015 fact finding mission, Environment & Tourism and Palau Visitor Authority, it was informed about Tour Guide Certification established by the Koror State Government. The *Tour Guide Certification Program Manual* is a basis for those certified tour guides are encouraged to follow, and the substantial part of the contents cover diving regulations. Yet the issue of the lack of ruling diving activities at the WWII wreck sites was addressed at the meeting.

Conclusion

Palau government has taken a holistic tactic to major issues of in the protection and management of sunken WWII vessels for their sustainable use. The representative issues are associated to difficulty on the awareness rising of the archaeological and historical significance of the WWII UCH as cultural heritage among the public and visitors, the sensitivity of human remains, and UXO that remain at the sites. All these issues have been identified and addressed at a national level through an inter-agencies' workshops and regular communications. Regulations to control the issues are already effective or being under issuing processes. The Historic Preservation Office is one of key stakeholders with expertise and professions in preserving cultural resources beneath the waters. The active engagement of the HPO on the legislative framework development can be recognized.

Despite the country agencies' efforts, on the other hand, the sunken WWII vessels are still under some threats, which relate the lack of understanding on the scope of the legal

protection of UCH as much as cultural heritage on land. Under the circumstance beyond the legislative framework, Palau as a leading country may consider the enhancement of the awareness rising on UCH, in particular targeted for divers and visitors for marine tourism from overseas.

In order to achieve this, the inter-agencies approaches may be further propelled by:

- publishing a well-summarized rule book and dive leaflet that explains the heritage value of sunken WWII vessels,
- a cooperation with local diving industries for safe and fun diving at the wreck sites can be propelled in conjunctive with a scheme of the growth of appropriate wreck diving tourism and wreck monitoring driven by local dive shops.

HPO as a professional agency responsible of locating, investing, recording, and managing UCH may seek the opportunity for:

- improving inventory of identified and unidentified UCH in territorial waters and adjacent waters.
- disseminating the concept of Shared Maritime Heritage to clarify further the value of the WWII UCH.
- developing professional skills for recording and monitoring the sunken WWII vessels, such as photogrammetry recording technique.

Acknowledgements

While conducting my research in Palau, I obtained full support from the staff of the Historic Preservation Office. I would like to express my gratitude to Sunny O. Ngirmang and Calvin T. Emesiochel.

References

- Bailey, D. E., 1991. *WW II Wrecks of Palau*, California: North Valley Diver Publications.
- Ishimura, T., 2010a. Research on the WW II sites and the cultural heritages of the Japanese Mandate Territory period in Palau”, *Bulletin of Nara National Research Institute for Cultural Properties*, pp. 12-13. [in Japanese]
- Ishimura, T., 2010a. Memories and sites of the war in Palau: archaeology and recovery of Japanese soldier remains, in *Kindai Koko* 66, pp. 1-3. [in Japanese]
- Ishimura, T., 2011 Investigation of abandoned WW II wrecks in Palau, In *Asia-Pacific Regional Conference on Underwater Cultural Heritage Proceedings*, eds. M. Staniforth, J. Craig, S. C. Jago-on, B. Orillaneda, and L. P. Ligaya, The MUA Collection, Manila: National Museum of the Philippines:
- <http://www.themua.org/collections/files/original/1f42121bd817329122697cb27d0b98e1.pdf>

Ngirmang, S. O. and Emesiochel, C. T., 2014. Preservation and Management of Underwater Archaeological Resources: Role of Agency, In *Proceedings of the 2nd Asia-Pacific Regional Conference on Underwater Cultural Heritage*, eds. H.V. Tilburg, S. Tripathi, V. W. Vadillo, B. Fahy, and J. Kimura. The MUA Collection, <http://www.themua.org/collections/files/original/16378bc7e931a762a60360a7432408ab.pdf>

Tollefsen, E. and Hovik, M.-A., 2013. *Assessment Report: Depth charges at the 'Helmet Wreck' in Koror harbor*, Geneva: GICHD.

7. Recommendations

1. that further study of the World War II underwater cultural heritage management state of other SIDS in the Pacific regions, in particular, the status of UCH (wreck diving) tourism, the protection of human remains, and the remnants and leakage of explosive components and other hazardous substance that endangers human and environments is assessed before encouraging access to UCH.
2. that because of their historical and archaeological significance sunken World War II vessels in the Pacific UCH Partnership (PUCHP) be subject to proper underwater cultural heritage management and protection as follows:
 - Appropriate management policies and legislations
 - Inter-agencies approaches
 - Regular site monitoring
 - Maintaining and brining a site inventory/database up to date
3. that expanding knowledge base about threats to sunken WWII vessels in the waters of SIDS derived from cultural heritage management, underwater archaeology, public archaeology, marine geophysics and other research with a focus on coastal and offshore developments, fishery activities, and diving tourism.
4. that developing a program for awareness of, and capacity building in, the Pacific UCH Partnership (PUCHP) members to implement appropriate underwater archaeological survey, investigation, recording and locating work of maritime and underwater cultural heritage with relevant and reasonable methods, such as underwater photogrammetry.
5. that the Pacific UCH Partnership (PUCHP) members should pursue the balance between site open access and protection in the sustainable use of UCH by encouraging divers to follow relevant rules. For this, codes of ethics for the public may be considered to be developed.
6. that in order to exchange information, knowledge, and experience, the Pacific UCH Partnership (PUCHP) members and SIDS country are highly recommended to establish an extensive communication network and regular meeting opportunity perhaps along the occasion of international conferences on UCH.