



REPUBLIC OF THE MARSHALL ISLANDS
MINISTRY OF INTERNAL AFFAIRS
HISTORIC PRESERVATION OFFICE

Archaeological Survey of Wōtto Atoll
Revisited November 2020

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HPO Report 2022

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Majuro Atoll, 2022

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The research and this publication have been financed with funds from United Nations Development Programme (UNDP) and with Federal funds from the Historic Preservation Fund grant program in partnership with the National Park Service, Department of the Interior, United States of America. However, the contents and opinions expressed do not necessarily reflect the views or policies of the National Park Service, the Department of the Interior, or the Government of the United States of America, nor does the mention of trade names or commercial products constitute endorsement or recommendation by the National Park Service, the Department of the Interior, Government of the United States of America, or the Government of the Republic of the Marshall Islands.

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For bibliographic purposes this report may be quoted as:

Underbrink, Susan, 2022, *Archaeological Survey of Wōtto Atoll Revisited 2020*. HPO Report 2022. Majuro Atoll, Republic of the Marshall Islands: Historic Preservation Office.

LIBRARY CODE

KEYWORDS

Anthropology – Marshall Islands – Wōtto Atoll
Archaeology – Marshall Islands – Wōtto Atoll
History – Marshall Islands – Wōtto Atoll
Marshall Islands – Anthropology – Wōtto Atoll
Marshall Islands – Archaeology – Wōtto Atoll
Marshall Islands – History – Wōtto Atoll
Micronesia – Archaeology – Wōtto Atoll

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Forward

The following monograph is the result of research conducted November 14-20, 2020 on Wōtto Atoll, Republic of the Marshall Islands. The research consisted of non-intrusive, terrestrial archaeological reconnaissance survey. The project was sponsored by the Republic of the Marshall Islands Historic Preservation Office and funded by the United Nations Development Programme (UNDP).

My deepest thanks go to the people of Wōtto Atoll, especially Mayor Kudo Kabua, and Acting Mayor Berney Rantak. I would also like to thank Secretary Peter of the Ministry of Culture and Internal Affairs, Bertnie Phillipso from the Historic Preservation Office (RMIHPO) as well as the International Organization for Migration (IOM) especially Baron Jordan. A special thanks to Martin Romain for the help with the maps.

Susan Underbrink
Kwajalein Atoll, Marshall Islands
May 2022

I. Introduction

This report represents the results of archaeological research conducted on Wōtto Atoll, Marshall Islands November 14-20, 2020 by the Historic Preservation Office, Majuro, Marshall Islands. All field documents, including completed site survey forms, field notes, maps, and photographs are housed at the Historic Preservation Office, Majuro Atoll, Republic of the Marshall Islands. No artifacts or food remains were collected. The United Nations Development Programme (UNDP) provided funding under the Ridge to Reef Project.

1.1 Project Objectives

The purpose of the survey was two-fold. Since the original survey was done 16 years ago, we went back to check on the original sites that were recorded, and to see if we could locate any additional sites. The second was to educate the inhabitants of the atoll on the importance of protecting and preserving the sites that the team identified. As such, the Historic Preservation Office made every effort to include the local population, their elected officials, and traditional chiefs and landowners in every step of the research. Local informants and guides were used throughout the research.

1.2 Evaluation of Research Design and Methods Used

A) “Non-intrusive” reconnaissance survey

The research conducted was a “non-intrusive” reconnaissance survey. The team did not remove any artifacts and/or food remains. All sites were identified from knowledge of local guides. The sites were recorded using a Geographical Position System (GPS) unit and the data were entered into ArcView Geographical Information System (GIS) software to generate maps. Information for Site Survey Forms was entered into the GPS unit in the field and was transferred into the database software that is contained in the ArcView program. Print photographs of all sites were taken. All notes, survey forms, GPS data, and photographs are housed at the Historic Preservation Office, Majuro Atoll, Republic of the Marshall Islands.

Evaluation was based upon the Republic of the Marshall Islands site significance levels established by the RMI Historic Preservation legislation of 1992 (Spennemann 1992). Determining the definition of significance varies if the site is prehistoric, historic, or traditional. All traditional sites are determined as “significant”. Prehistoric or historic sites can be evaluated as being “very significant”, “significant”, “less significant”, “insignificant”, or “undetermined significance” [RMI Historic Preservation legislation, Regulations Governing Land Modification Activities, Section 6].

A prehistoric site was considered “very significant” if it met at least one of the Marshall Islands’ formal criteria:

- (i) the resource is the only one of its kind known on the atoll or island concerned; or
- (ii) the resource is part of an ensemble of sites, even if the individual sites as such would not be considered to be very significant; or
- (iii) the resource is rich in cultural artifacts and undisturbed by construction activities; or
- (iv) the resource is particularly well preserved; or

- (v) the resource is connected with historic events or persons or oral traditions important beyond the limits of the individual atoll or island on which the resource is located.

A prehistoric site was considered “significant” if it met at least one of the Marshall Islands’ formal criteria:

- (i) the resource is the only one of its kind known on the islet concerned; or
- (ii) the resource is rich in cultural artifacts and relatively undisturbed by construction activities; or
- (iii) the resource is well preserved; or
- (iv) the resource is connected with oral traditions.

An historic site was considered “very significant” if it met at least one of the Marshall Islands’ formal criteria:

- (i) the resource is the only one of its kind known in the Republic; or
- (ii) the resource is part of an ensemble of sites, even if the individual sites as such would not be considered to be very significant; or
- (iii) the resource is considered to be a prime example of the workmanship of a particular architect, builder or craftsman; or
- (iv) the resource is rich in cultural artifacts and undisturbed by construction activities; or
- (v) the resource is particularly well preserved and shows little or no alteration to the original appearance of the structure; or
- (vi) the resource is connected with historic events or persons or oral traditions important beyond the limits of the individual atoll or island on which the resource is located.

An historic site was considered “significant” if it met at least one of the Marshall Islands’ formal criteria:

- (i) the resource is the only one of its kind on the atoll or island concerned; or
- (ii) the resource is considered to be a good example of the workmanship of a particular architect, builder or craftsman; or
- (iii) the resource is rich in cultural artifacts and relatively undisturbed by construction activities; or
- (iv) the resource is well preserved and shows only limited alterations to the appearance of the original structure; or
- (v) the resource is connected with historic events or persons or oral traditions important for the individual atoll or island on which the resource is located.

As the survey was designed to be non-intrusive, no test excavations were conducted and no artifacts were collected. The purpose of the survey was purely to identify and record the sites in order to allow evaluation of each site’s significance level, which will be used to establish eligibility for inclusion on the RMI National Register. Future researchers can use this information in assessing which sites are deemed significant enough to warrant further research, analysis, interpretation, and/or protection and restoration. The survey followed the standards and guidelines of the United States Department of Interior National Park Service.

B) Nomenclature

In assigning sites, the system used in the Marshall Islands includes three two-letter abbreviations and then a site number. For example, the first abbreviation identifies the site as located in the Marshall Islands (MI), the second is the atoll or island, Wōtto (WO), and the third the islet name, in this case Wōtto (WO). Therefore the site MI-WO-WO-001 is the first site identified on the islet of Wōtto on Wōtto Atoll.

C) Survey Equipment and Team Members

The following equipment was used in the survey:

- 1 Garmen GPS
- 1 Canon digital cameral
- 2 5m metal tape measures
- 1 30m cloth tape measure
- Notebooks, pens and pencils
- 1 compass

Field team members included State Archaeologist, Susan Underbrink, and Historian Bertnie Phillippo both from the RMIHPO.

D) Informants/Guides

Fieldwork relied heavily on informants and guides. The informants provided information on the location and history of sites, while the guides, if not the informants themselves, led the team to the sites. Key-informants were the elders of the community, who as custom dictates were also the government leaders, and so were the most knowledgeable about atoll history. They provided a never exhausting pool of knowledge to be further investigated ethnographically. Since precisely locating sites on the various islets was problematic the use of guides was essential. Information was obtained in casual meetings throughout the duration of the fieldwork; no formal questionnaire was developed.

E) Survey Methods

The survey did not include the atoll's total landmass. Informants or guides led the team to the sites. When a site was noted, a site number was assigned, a GPS position was taken, the area was photographed, and site survey forms were filled out. In areas of dense vegetation, the GPS position was sometimes taken several meters away from the site itself. Because of an outboard motor problem, the team was unable to survey the other islets surrounding Wōtto's lagoon. Some of those islets, especially the larger ones, contain archaeological sites based on a review of the literature and according to local informants.

1.3 Limitations of Research

Although the purpose of the survey was to identify potentially significant sites, it must be remembered that the survey was non-intrusive. Shovel test pits were not conducted and given time constraints, the survey relied exclusively upon local informants and their knowledge of the

sites. The survey attempted to be as extensive as possible, but included no follow-up intensive research. As such, this report only includes those sites readily identified with the aid of an informant. Given previous research in the Marshall Islands that has included either shovel test pits or more intensive excavations, it is apparent that prehistoric archaeological sites in this type of non-intrusive reconnaissance survey will be highly underrepresented.

1.4 Previous Research

These next few sections were taken almost verbatim from the previous report.

Paul H. Rosendahl, who took part in the Kelton-Bishop Museum Expedition to Eastern Micronesia in 1977, spent only one day on Wōtto. His survey was confined to Wōtto Islet. Given the time spent in the field, and the fact that no other islet was investigated, it is not surprising that little evidence of prehistoric occupation was found:

Survey Area A, consisting of 10 ha, includes the present village area on Wotho Islet, and the area immediately inland. Much of the area is overgrown with thick brush. Only three possible surface artifacts were found, and no sites were identified. The area gave very little indication of any archaeological potential (Rosendahl 1987: 65).

Of greater significance is the report prepared for the Northern Marshall Islands Natural Diversity and Protected Areas Survey (Thomas 1989 et al.), which ranked Wōtto highest for historic preservation among the islands surveyed. Some details are provided for both Wōtto and Kapen Islets:

On Kabben the probable remains of a chief's house, paved and lined walkways and a cemetery as well as an extensive settlement (including 37 house sites) were located. Several Marshallese artifacts were recovered from the surface in this area (1989: 61).

The report continues:

...probable cultural deposits inspected and viewed on Wotho Islet within existing rubbish pits, planting holes and fresh water wells suggest the cultural deposits may extend to 3 ft (1 m) or more beneath the present ground surface (1989: 61).

An additional item located during the survey was a rare traditional Marshallese ocean-going sailing canoe near the village on Wōtto Islet. Unfortunately, this canoe no longer exists, as it was reportedly destroyed during Typhoon Gay in 1992.

Although this most recent typhoon caused much destruction, and may have contributed to the demise of some of the pits used for Giant Swamp Taro (*Cyrtosperma chamissonis*) cultivation, physical evidence of several of these pits was still clearly apparent in 2004, although it was sometimes difficult to ascertain their original shape and size because of the dense vegetation and eroded walls. First described by Fosberg during the 1952 U. S. G. S. Expedition, the center of Wōtto Islet displayed “a series of long, winding troughs and ridges”. Some of these pits had been

cleaned out and taro planted. At the time, several of the pits supported breadfruit trees, while others surrounded the pits (Fosberg 1990: 70).

1.5 A Brief History of the Marshall Islands

The people of the Marshall Islands refer to their parallel-chained archipelago as *Aelōñ Kein*, "these atolls." According to folklore, the first discoverers and settlers of the islands were a handful of wayfarers seeking an uninhabited autonomous area where they could live (Hart 1992). What little we know about early Marshallese comes from oral history and early accounts by explorers.

Marshallese autonomy was threatened as early as 1526 when the first of eight known Spanish ships passed through the area. Alonso de Salazar, commanding the *Santa Maria de la Victoria*, made the first recorded sighting, probably Bokaak, but no contact was made (Lévesque 1992a; Sharp 1960). In 1529 contact was made by Alvaro de Saavedra of the *Florida*, which laid anchor to take on provisions at Enewetak or Bikini, and stayed for eight days. He also discovered Utrik, Taka, Ujelang, and made landings at Rongelap and Ailinginae. The Spanish flagship *Santiago* and five other ships in the expedition under Ruy Lopez de Villalobos is credited for the western discovery of Wotje, Erikub, Maloelap, Likiep, Kwajalein, Lae, Ujae, and Wōtto. Landings were made on some of the islands. (Lévesque 1992a; Sharp 1960).

In 1565 Alonso de Arellano of the Legaspi expedition sighted Likiep, Kwajalein, and an island thought to be Lib (Sharp 1960) while Legaspi is credited with sighting Mejit, Ailuk, and Jemo. Some trading was done at Mejit. The following year the mutineer Lope Martin commanding the *San Jeronimo* made several sightings and was eventually stranded in the Marshalls, probably on Ujelang. Two years later the Spanish ships *Los Reyes* and *Todos Santos*, under Alvaro de Mendaña went ashore at what is probably Ujelang. Namu was also thought to be sighted. (Lévesque 1992b)

Fifty seven years passed before another vessel is reported to pass through the Marshalls. The Dutch ship *Eendracht* and ten other vessels of the Nassau Fleet, commanded by Admiral Gheen Schapenham sighted Bokaak (Hezel 1979). In spite of Spain's annexation of the Marshall Islands in 1686, the Spanish established no trading posts, trade routes, or left any lasting influence.

In 1767 Captain Samuel Wallis of the British ship *Dolphin* sighted what is thought to be Rongrik and Rongelap (Sharp 1960; Hezel 1979). Even though the Spanish were the first known westerners to see the Marshall Islands credit is given to Captain William Marshall, commander of the *Scarborough*, who together with Thomas Gilbert of the *Charlotte* for the discovery or more appropriately, the rediscovery of the Marshall Islands in 1788. Marshall and Gilbert mapped these island groups and traded with the various atolls. They are the first westerners to sight Mili, Arno, Majuro, Aur, and Nadidik (Sharp 1960). They also sighted the previously discovered Wotje, Erikub, Maloelap, and Ailuk.

Captain Henry Bond aboard the British merchantman vessel *Royal Admiral* sighted Namorik and Namu in 1792. Two years later The British ship *Walpole*, under the command of Captain Thomas Butler sighted Enewetak. Thomas Dennet was the first westerner to sight Kili

as well as reporting on Ailinglaplap, Lib, and doing some trading on Namu in 1797. Other vessels sailed through the area, the British *Hunter* and *Nautilus*, the ship *Ann & Hope* of Providence, *Ocean*, *Herald*, and *HMS Cornwallis*, to name a few. These ships sighted atolls and islands that had been previously reported but did not stop and trade. Jaluit was sighted by the *Rolla* in 1803 and again in 1808 by Captain Patterson of the British merchant brig *Elizabeth* both of which landed and did some trading (Sharp 1960, Hezel 1979; 1983).

The first scientific exploration of the Marshalls was conducted by the Russian, Otto von Kotzebue in 1816-17 and 1824. It is during this time that first significant contact between Europeans and the Marshallese was made. Von Kotzebue and his crew spent several months in the Ratak islands in 1817 and 1824, specifically Wotje, Maloelap, and Aur Atolls (Kotzebue 1821; 1830; Chamisso 1986).

The account left by this expedition provides the first early ethnographic material, including an interesting description of how Kotzebue was urged to help defeat a powerful southern Ratak chief and thus, it was said, become chief of all Ratak. Kotzebue declined the offer. Kotzebue's influence was noted. Traditional warfare practices began to change soon after Kotzebue's first visit. Metal hatchets given as gifts were attached to wooden poles. LeMari troops used these new weapons to defeat the powerful Majuro chiefs and establish control over the Ratak Chain (Erdland 1914; Krämer and Nevermann 1938).

Other ethnographic observations come from Lay and Hussey (1828) who survived the Globe mutiny at Mili Atoll and Paulding (1831) a U.S. Navy lieutenant who helped to retrieve Lay and Hussey. These early observers published accounts which give us an insight to traditional personal appearance, manners, food, and dwellings and in a lesser extent facets of political and social organization reflecting traditional practices.

The prospects of profitable trade lured the German entrepreneurs into the Marshalls in the latter part of the 19th century. Subsequent contact with outsiders gradually increased as whalers concentrated their activities. They were hunting to provide lamp oil to meet European and American demand. With the whalers, a disruptive and intolerant group as well as the English blackbirders in search of cheap labor to work the mines and plantations in the New World and Australia, encounters turned hostile. The Marshallese cut off numerous ships and the crews killed, brutal retaliations followed, and the mood of contact in the first half of the 19th century was one of brutal confrontation (Hezel 1979; 1983; Dye 1987)

The treacherous reefs, small number of whales, and the new methods of distillation of kerosene from crude oil soon put the whalers out of business. The blackbirders continued their raids until the 1870's.

In 1857 two American missionaries from the American Board of Commissioners for Foreign Missions, Congregationalists from the New England area, succeeded in setting up operations on Ebon (where as recently as 1852 a ship from San Francisco had been cut off and the entire crew killed) (Hezel 1979). Marshallese *Irooj* opposed the missionaries and the establishment of new congregations throughout the 1860s because it eroded their power. This loss of power was somewhat alleviated by establishment of permanent trading stations as the demand for copra rapidly increased. The chiefly power base gradually shifted from control over the land to control over the trade between the Marshallese and foreigners (Dye 1987). Ebon remained the mission center, from which occasional trips were made through the southern atolls, until 1880, when the station was removed to Kosrae in the Eastern Carolines.

Changes in the Marshallese way of life had been rapid and extensive. For half a century the dominant contact with the outside world had been through missionaries sent or trained by the American Board. Yet virtually no ethnographic description is to be found among the voluminous records kept by them. Instead the missionaries were “not only indifferent, but supremely scornful of the religious beliefs [of the Marshallese]. They try to extinguish them completely and destroy every trace of them” (Knappe 1888). The German ethnography summarized by Erdland (1914) and Krämer and Nevermann (1938) coincided with major structural changes in Marshallese way of life. These changes had been rapid and extensive. Writing in about 1905, the German ethnographer and Priest Erdland commented, “the present generation no longer has any exact knowledge of the inner coherence of the ancient traditions” (1914: 307).

Other factors were of course also effective in these changes. The copra trade dates from about 1860 in the Marshalls and American, Australian, and German firms often had resident traders on the various atolls. Beachcombers added to the resident white population, often filling the role of trader as well.

European political empire reached into the Pacific in the 1880s and German traders were exercising increasing influence in the Marshalls. In 1885, the Marshall Islands became a protectorate of Germany, as “the Marshall Islands were not under the sovereignty of any civilized state” (Pauwels 1936). During the German era, which lasted until 1914, the atolls were visited regularly by traders, missionaries, and administrative officials. Administration of the area was carried out by the Jaluit Gesellschaft, a trading company, from 1887 on. This firm, which resulted from a merger of companies active in the area, Robertson and Hershheim, and Deutsches Handels- und Plantagen-Gesellschaft (D.H.P.G.) (formerly Johann Godeffroy und Sohn), had exclusive trading rights in the Marshalls. Despite complaints about this monopoly by the Australian firm, Burns, Philip and Co., the New Zealand company, Henderson and MacFarlane, and others, the German government continued to act on the advice of the Jaluit Gesellschaft until 1902 when it assumed direct administration of Micronesia (Hezel 1983).

This form of administration, with primarily an economic focus, had little impact on the health and educational level of the Marshallese. In this regard, the missionaries were of greater importance. Select groups of Marshallese were educated in the German language to serve as interpreters and the services of a doctor were available on occasion. Copra was the main product of the Marshalls and production was stimulated by taxes assessed through the traditional leaders as well as through the availability of Western goods. This form of indirect rule strengthened the traditional political organization of the Marshallese, while the German administration dealt mostly with conflicts between foreigners and between the *Irooj* (Hiery 1995).

Warfare between island chiefs was eliminated, an act which froze the relative social positions of the chiefs and their clans and created a condition of inflexibility in the social system; in addition, it allowed increased trading and missionary activity and thus contributed to more rapid cultural change (Spoehr 1949). German ethnographers were active in this period and it is largely through their efforts, especially in the many volumes published on Micronesia by the German South Sea Expedition of 1908-1910, that much is known of the traditional way of life (Krämer and Nevermann 1938 is a result of this expedition).

In 1914, Japan succeeded the Germans in control of the Marshall Islands. They shifted to a system of virtual direct rule through a set of community officials and greatly expanded the

administrative staff. Traders of other nationalities were excluded and the Japanese attempted to expand copra production. Protestant and Catholic missionary activity was allowed to continue unhampered, and in general the Marshallese appear to have gotten on well with the Japanese (Spoehr 1949). The Japanese did ethnographic research however most of this material has yet to be translated.

The Japanese military, through the South Seas Defense Corps, governed the Marshalls until 1918. From 1918 until 1922, a combined civilian and military government was in charge. In 1922, Japan was awarded Micronesia as a Class 'C' mandate by the League of Nations. The terms of the mandate were upheld until 1933 when Japan withdrew from the League of Nations (although they continued to submit annual reports through 1937), and considered the Marshalls and the rest of their Micronesian mandate, an integral part of the Japanese Empire (Peattie 1988).

During the Japanese era, the administration had several goals; the economic development of Micronesia, the use of the islands as an immigrant settlement for Japan's rapidly increasing population, the Japanization of the islanders through education, language training, and enforced cultural change, and eventually, the use of the islands for military bases in anticipation of World War II (Peattie 1988).

For the Marshallese, improvements in health and sanitation were minimal. The "availability of adequate medical care was directly related to one's ability to pay" and despite a sliding fee scale, "the poorer and generally healthier native received less care" (Shuster 1978).

Education was also segregated and of differential quality. The Japanese were offered a school system identical to the one in Japan; the Marshallese received three years of primary education consisting mostly of Japanese language instruction and ethics classes, with an additional two years for the promising students (Hezel 1995).

The Japanese administration also attempted to make a number of changes in the Marshallese social and political organization. They appointed Marshallese leaders, contrary to the existing political structure, thus weakening the position of the traditional leader (Bryan 1972). The Japanese also attempted to change the Marshallese social organization of matrilineality to conform to patrilineality, more like their own system, with little success.

In early 1930s, Japan began to construct fortifications on Kwajalein, Jaluit, Wotje, Mili, and Maloelap. Marshallese were conscripted to labor on these buildings and were resettled on other atolls (Peattie 1988). World War II started in 1941. In 1944, U.S. forces concentrated on gaining supremacy in the Pacific. Kwajalein, Majuro, and Enewetak were captured within one month. All of the other atolls except Wotje, Maloelap, Mili, and Jaluit were checked for Japanese in the next two months. In those bypassed atolls, the Marshallese escaped or were removed under cover of night and resettled temporarily on Majuro, Arno, or Aur atolls (Smith 1955). The U.S. fortified Enewetak and Kwajalein atolls as military bases.

After World War II the United States took over trusteeship of the Marshall Islands. Beginning with Spoehr's work on village life in Majuro (1949), ethnographers have concentrated on community studies. The primary sources are Mason (1947) whose focus is economic organization; Kiste (1968; 1987) who deals with resettlement issues; and Davenport (1952; 1953) and Chambers (1972) concentrating on oral traditions.

1.6 Important Historical Events for the Marshalls and Wōtto Atoll

- ~0 AD The first Micronesian navigators arrive in the Marshalls, calling the atolls Aelōn Kein Ad (our islands). Dates and origins of the first settlers are still uncertain. They are thought, like most other Pacific Islanders, to have originated in Southeast Asia, via Melanesia and to have established themselves on their scattered islands centuries before European voyagers reached this area (Irwin 1992). Most early radiocarbon dates cluster around 2000 years B.P., and these appear consistent with geological and ecological reconstructions of the development of the atolls (Kirch 2000). However, there are controversial dates from Bikini Atoll that may push back settlement to 3000 years B.P. (Streck 1990). This could be attributed to the dating of old wood from drift logs of long-lived tree species, such as those found along the west coast of North America (Spennemann 1997). After initial settlement, the Marshalls continued to interact with other island groups, including southeast Melanesia, eastern Micronesia, and West Polynesia (Lum 1998; Weisler 2000; Weisler and Swindler 2002). Early accounts depict Marshallese society as having much in common with other Micronesian Islands, such as the Carolines (Oliver 1989). Chieftainship was strong and material culture, given the paucity of natural resources, was relatively advanced. Early Marshallese were regarded as superb canoe builders.
- 1494 The Treaty of Tordesillas cedes ownership of all of Micronesia to Spain.
- 1527 Three ships under Alvaro de Saavedra, sent from Mexico to seek news in the Moluccas of the Magellan and Loaisa expeditions are among the Marshalls (Sharp 1960; Lévesque 1992a).
- 1543 Wōtto Atoll is believed to have been sighted by Ruy Lopez de Villalobos (Lévesque 1992a).
- 1565 Wōtto re-discovered by Miguel Lopez de Legaspi on board the ship *San Pedro*, although no contact was apparently made with the inhabitants (Lévesque 1992b).
- 1788 The *Scarborough* (Captain John Marshall) and *Charlotte* (Captain Thomas Gilbert) sight Mili, Arno, Majuro, Aur, Maloelap, Erikub and Wotje Atolls while proceeding to China from Botany Bay. The name Marshall Islands is later applied to the group as a whole by Russian hydrographer A. J. Krusenstern (Sharp 1960).
- 1820s American whalers seeking food and water begin visiting the Marshall Islands. Some of these occasionally leave men ashore who become beachcombers and, later, traders (Hezel 1983).
- 1823 *Irooj* Lomade Juen, of the clan Rimwejoo, conquered all the islands of the Ratak and ultimately conquered Kwajalein, Lae, Ujae, Wōtto, Rongelap, Bikini, Eniwetak, and Ujelang in the Ralik (Krämer and Neverman 1938).
- 1835 The Russian transport vessel *America* under the command of Captain I.I. Schantz makes contact with Wōtto's inhabitants (Spenneman 2000c).
- 1840 Kaibuke had become the second-highest chief after he married the daughter of the paramount chief. Kaibuke was feared on account of his attacks on foreign ships. He

- attacked Kili and Jaluit and brought them under his rule (Krämer and Nevermann 1938).
- 1842 Kaiboke Lobadeo of Ebon assumes power as the *Iroojlaplap* of the southern part of the Ralik chain (Krämer and Nevermann 1938).
- 1851 70 people of Ebon (including Kaiboke's brother) are killed when an American whale ship fires at their canoes in revenge for a trader's murder. Kaiboke swears to kill all whites in revenge for his brother's murder by the whalers (Erdland 1914).
- 1852 The warship H.M.S. *Serpent* (L.U. Hammett commanding) visits Wötto (Spennemann 2000c).
- 1857 Rev. Hiram Bingham, Jr. of the American Board of Commissioners for Foreign Missions (ABCFM) creates missionary outpost on Ebon. Kaiboke supports their work (Hezel 1983).
- 1860 Wötto's population is reported as 40 (Spennemann 2000b).
- 1860s American and Hawaiian Protestant missionaries arrive, sent by the Hawaiian Evangelical Association, an auxiliary of the American Board of Commissioners for Foreign Missions. About this time, J. C. Godeffroy und Sohn, of Samoa, establishes trading stations on Mili, Aur, Jaluit, Ebon and Namorik. A few years later, two other German companies, Hensheim & Co. and A. Capelle & Co., are also in business there. Copra is their principal interest (Hezel 1983).
- 1863 Kaiboke dies of typhoid fever (Krämer and Nevermann 1938).
- 1870 After Kaiboke death, Kabua (Lebon) a *leadakkad* of Rongelap, becomes *Irooj* when he marries Limokoa, the widow of the Kaiboke of Ebon (Krämer and Neverman 1938, Erdland 1914).
- 1870 Kaibuke was *Iroojlaplap* (Krämer and Nevermann 1938).
- 1876 Loeak and Kabua fight about who should be *Iroojlaplap*. Loeak chases Kabua from Ebon (Krämer and Nevermann 1938).
- 1878 Germany enters into a treaty with inhabitants of the Ralik chain, granting special trade privileges. Kabua (Lebon) presents himself to the German government as the *Iroojlaplap*. Kabua, Lagajimi, Nelu, Loeak and Launa all sign the treaty (Krämer and Nevermann 1938)
- 1880 Loeak goes to Jaluit from Ebon to challenge Kabua in battle. After a bloodless fight, Loeak returns to Ebon (Krämer and Nevermann 1938).
- 1880 Wötto's population is 25 (Spennemann 2000b).
- 1885 Under mediation of Pope Leo XIII, German government annexes the Marshalls.
- 1886 By agreement with Great Britain, the Marshall Islands became a German protectorate.
- 1887 Germans form the Jaluit Company (Jaluit *Gesellschaft*), an entity entrusted with governance of the Marshalls. It buys out two foreign competitors based in San Francisco and Auckland. However, Burns, Philp & Co. of Sydney, which has been trading in the group for some years, continues to do so and remains until World War I (Hezel 1995).

- 1905 Wōtto's population is 30 (Spennemann 2000b).
- 1910 Wōtto's population is 74 (Spennemann 2000b).
- 1912 Wōtto's population is 51 (Spennemann 2000b).
- 1913 Wōtto's population is 50 (Spennemann 2000b).
- 1914 The Marshalls are captured from Germany by Japan.
- 1920 Marshall Islands are mandated to Japan by the League of Nations, together with the other occupied islands. The group is administered as a separate district. The Marshallese are given little voice in their own government, but the copra industry is left in their hands. But copra has to be exported to Japan at a price fixed by the Japanese (Hezel 1995).
- 1921 The Japanese take over the copra industry from the Germans, replacing the Jaluit *Gesellschaft* with *Nanyo Boeki Kaisha* (Peattie 1988).
- 1930 Wōtto's population is 25 (Spennemann 2000b).
- 1934 Japan withdraws from the League, but retains possession of the Marshalls. Fortification of the Marshall Islands begins as Japan prepares for war. The Japanese military begins building airstrips, power plants, and bunkers on Wotje, Enewetak, Jaluit, Milli, Maloelap, and Kwajalein (Peattie 1988).
- 1935 Wōtto's population is 47 (Spennemann 2000b).
- 1939 World War II begins in Europe.
- 1945 End of World War II grants effective control of the Marshalls to the U.S.
- 1945 Wōtto's population is 40 (Spennemann 2000b).
- 1946 U.S. begins its nuclear testing program in the Marshalls. Bikini atoll is evacuated to Rongrik for first tests under Operation Crossroads. Residents of Enewetak moved to Kwajalein, while those on Rongelap and Wōtto are transported to Lae.
- 1948 Wōtto's population is 31 (Spennemann 2000b).
- 1951 US Department of the Interior assumes responsibility within US Government for the TTPI from the Department of the Navy.
- 1951 Wōtto is struck by Typhoon Georgia (Spennemann and Marschner 1994-2000).
- 1952 The first hydrogen device (Operation Ivy) under the US testing program in the Marshalls is fired on Eniwetak on 1 March. The Enewetak people who live on Ujelang temporarily stay on a U.S. Navy ship. The ship takes them to a point 100 miles farther away from Eniwetak (Deines et al. 1990).
- 1954 US nuclear testing program detonates Bravo, the most powerful hydrogen bomb ever tested by the U.S., on Bikini atoll. Radiation from the test forces evacuation of Marshallese and U.S. Military personnel on Rongelap, Rongrik, Utrik, and Ailinginae (Deines et al. 1990).

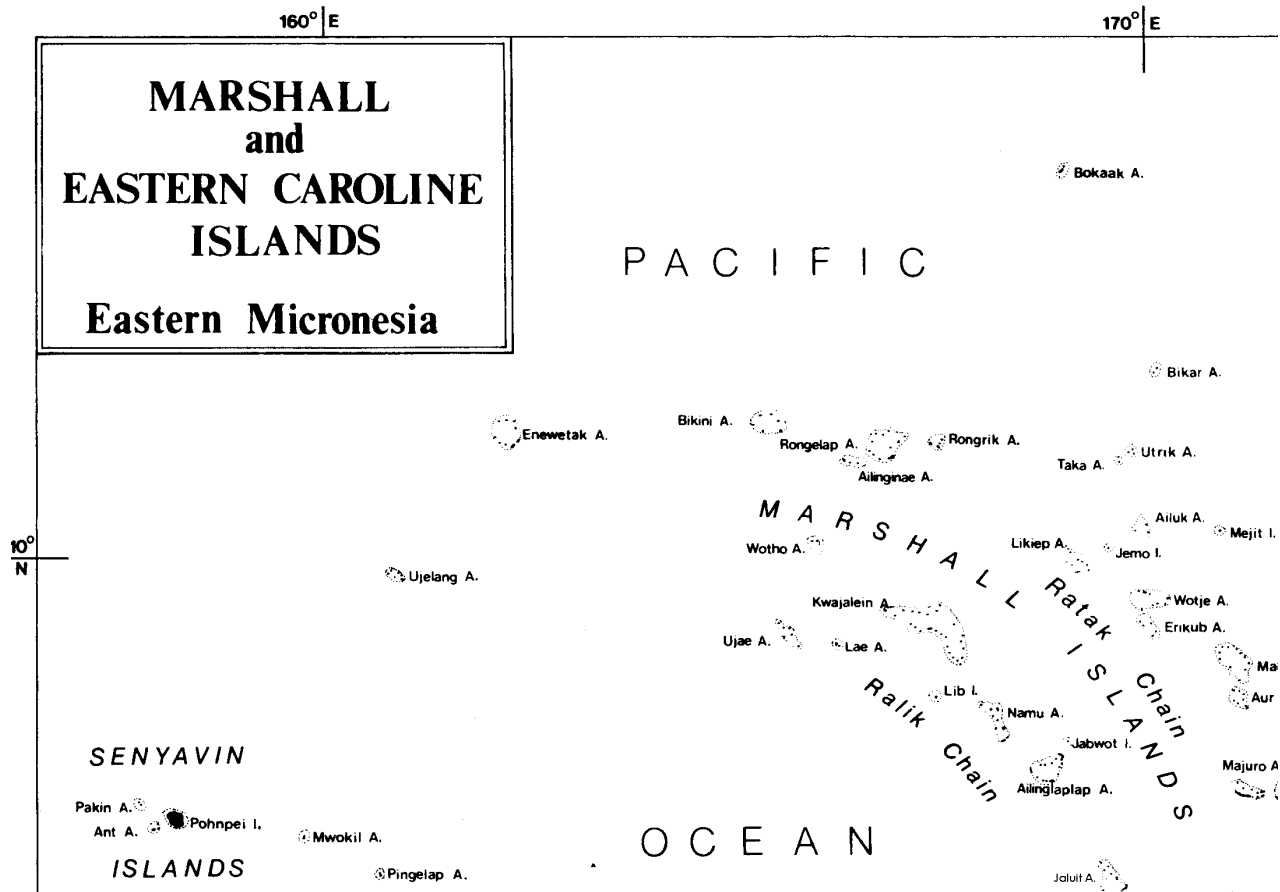
- 1956 A transmitting and receiving station is set up on Wōtto to provide the signal for the radio navigation grid prior to Operation Redwing, a 17-test nuclear weapons series, on Bikini and Enewetak (Dowdy 2002).
- 1958 Wōtto's population is 71 (Spennemann 2000b).
- 1965 The Congress of Micronesia is formed, with representatives from all of the TTPI islands. It is created by the U.S. administration in preparation for greater self-governance by Micronesians.
- 1967 Wōtto's population is 57 (Spennemann 2000b).
- 1970 Wōtto's population is 87 (Spennemann 2000b).
- 1973 Wōtto's population is 61 (Spennemann 2000b).
- 1977 Wōtto is struck by Typhoon Mary (Spennemann and Marschner 1994-2000).
- 1979 Amata Kabua is selected as the first president of the Marshall Islands.
- 1979 Government of the Marshall Islands officially established, and country becomes self-governing.
- 1980 Wōtto's population is 85 (Spennemann 2000b).
- 1982 Official name changed to the Republic of the Marshall Islands (RMI).
- 1983 Amata Kabua is selected for a second term as president.
- 1983 Voters in the RMI approve the Compact of Free Association with the United States.
- 1986 U.S. Congress approves the Compact, resulting in its entry into force. The Compact grants the RMI its sovereignty and provides for aid and US defense of the islands in exchange for continued US military use of the missile testing range at Kwajalein Atoll.
- 1987 The third election, Amata Kabua is selected as president.
- 1988 Wōtto's population is 90 (Spennemann 2000b).
- 1990s Settlement of compensation claims as a result of the US nuclear testing in the Marshalls still proceeds, and is associated with various agreements being made as part of the Compact of Free Association package. There are also outstanding court cases. Almost 5000 Islanders had sought compensation from the Nuclear Claims Tribunal and, up to September 1993, some 380 had been granted compensation totaling about \$14 million, only a quarter of which had been paid (Deines et al. 1990).
- 1990 UN Security Council terminates the RMI's Trusteeship status.
- 1990 Wōtto is struck by Typhoon Owen (Spennemann and Marschner 1994-2000).
- 1991 Amata Kabua is selected as president for his 4th term.
- 1991 RMI joins the United Nations.
- 1992 Wōtto is struck by Typhoons Brian and Gay (Spennemann and Marschner 1994-2000).

- 1994 The U.S. Department of Energy begins releasing thousands of previously classified nuclear test era documents, many of which confirm the wider extent of the fallout contamination in the Marshall Islands.
- 1994 Iroojlaplap Kabua of the Ralik Chain passes away.
- 1996 In the fifth election, Amata Kabua is selected as president, but passes away that same year.
- 1997 Imata Kabua selected to finish the late Amata Kabua's term.
- 1999 Wōtto's population is 145 (Office of Planning and Statistics 2000).
- 2001 First Compact of Free Association expires.
- 2003 New Compact of Free Association approved by U.S. government.
- 2019 Wotho Senator; David Kabua is elected President of the Marshall Islands

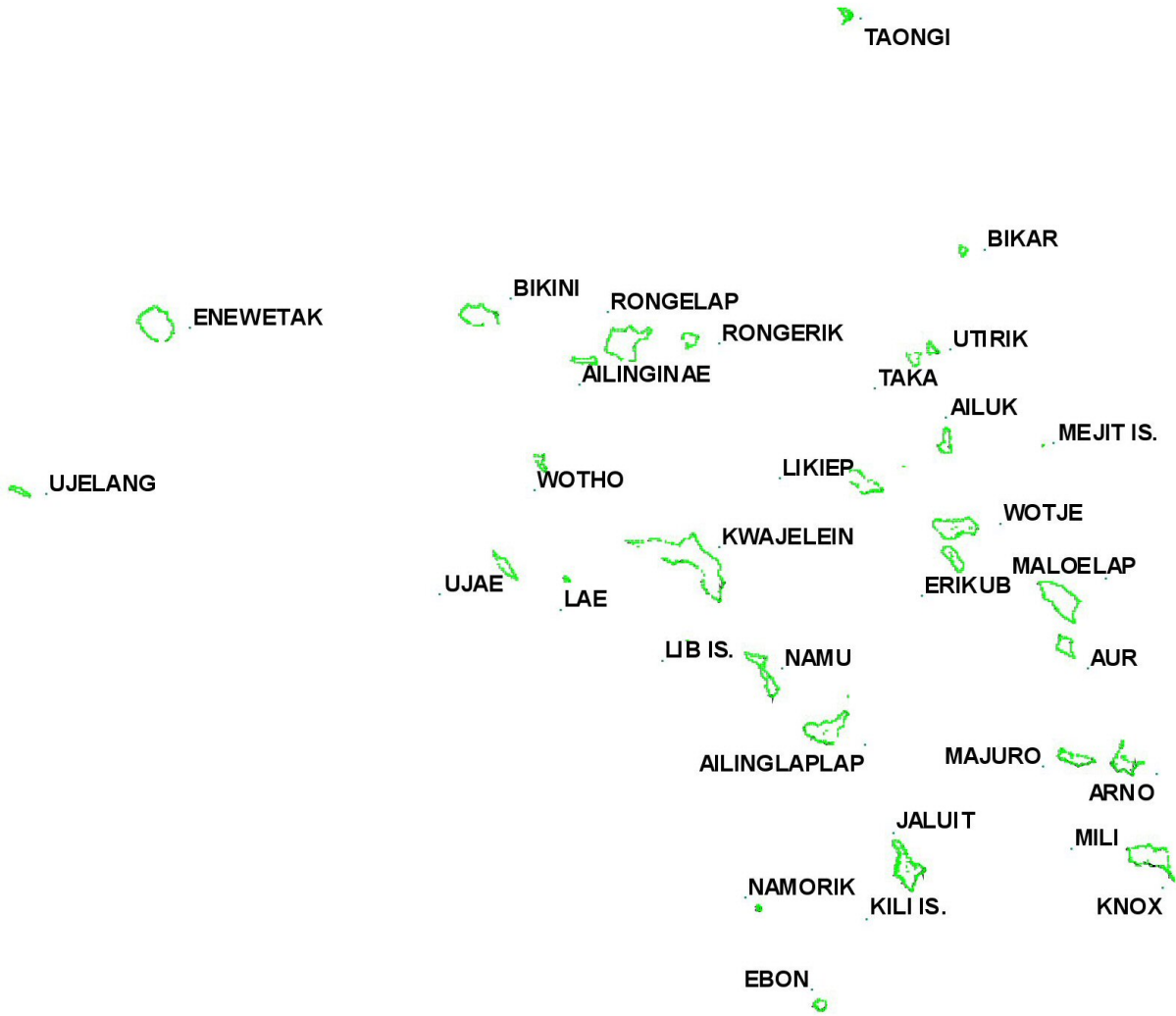
II. Environmental Settings

2.1 Physiographic and Biological Setting

Located in the central Pacific between 4° and 14° north latitude and 160° and 173° east longitude, the Republic of the Marshall Islands consists of 29 low-lying coral atolls and five independent coral islands (Maps 1 & 2). Twenty-two of the atolls and four of the islands are inhabited. The atolls and islands are situated in two almost parallel chain-like formations. The eastern group is the Ratak (Sunrise) Chain and the western is the Ralik (Sunset) Chain. Together these two chains extend about 700 miles (1130 km) north to south and approximately 800 miles (1290 km) east to west. Isolated by ocean, the Republic is more than 2,000 miles (3230 km) from the nearest trading centers, Honolulu and Tokyo.



Map 1: The Location of the Marshall Islands in Eastern Micronesia.



Map 2: The Marshall Islands.

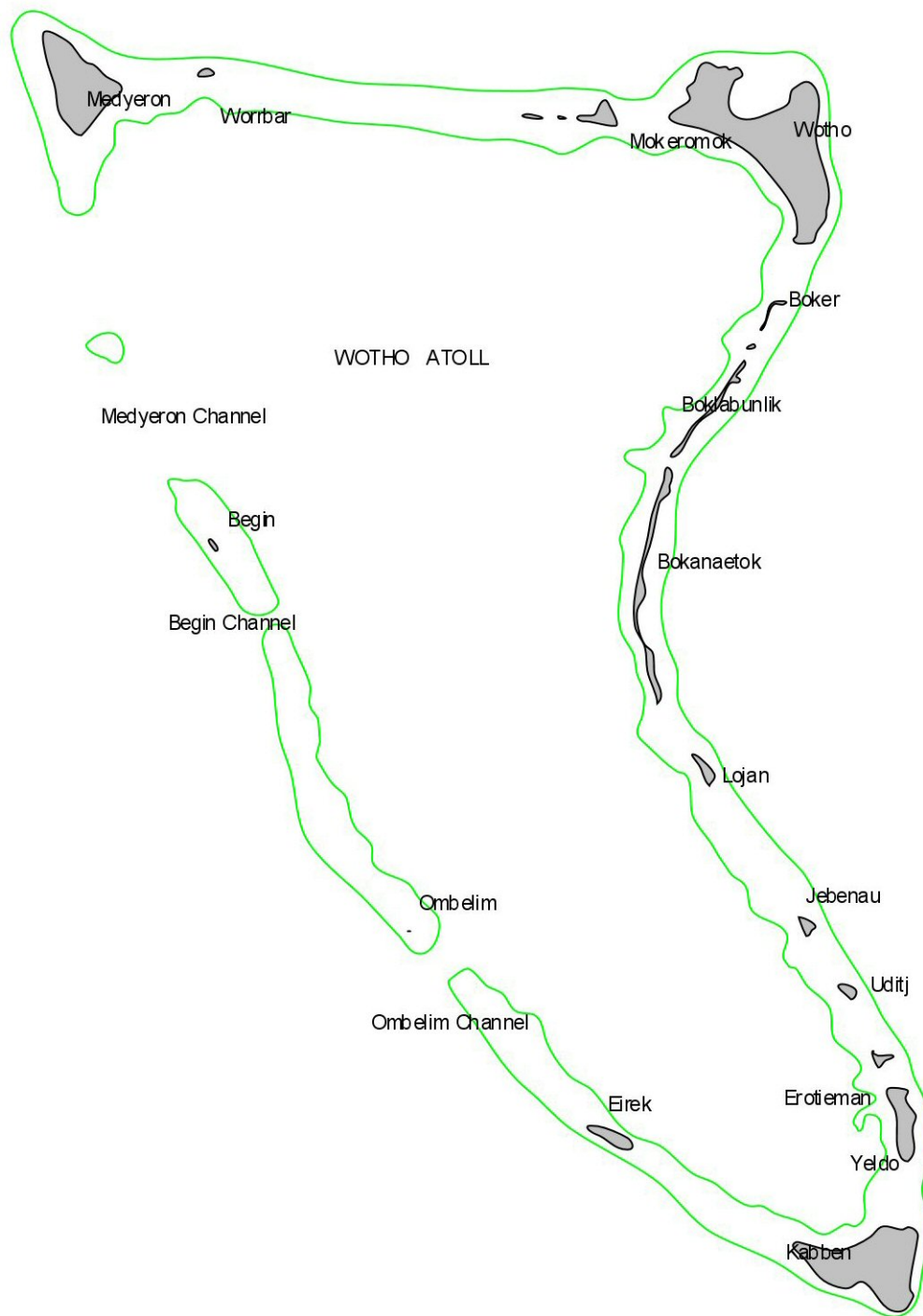
There are approximately 1,225 islets spread across an area of over 750,000 square miles (1.9 million square km). With a total land area of 70 square miles (181 square kilometers), a mean height above sea level of about 7 feet (2 meters) above sea level, and soils, which are nutrient poor, the nation's agricultural base is limited. The marine resource base is extensive, however. The combined lagoon area totals 4,037 square miles (10455 square km). Coral reefs fringe the atolls and serve as the only defense against the ocean surge. The clearance over the reef in the sections that are covered by water is usually no more than a couple of feet (Permanent Mission of the Republic of the Marshall Islands to the United Nations, 1992).

Generally speaking, an atoll consists of a series of low-lying islets and submerged reefs arranged about a central lagoon, which mixes with the open ocean via one or more channels and/or shallow passes. In the Marshall Islands, the islets composing an atoll usually form an oval shape around a central lagoon of 150 foot (45 m) average depth. The surrounding ocean depth plunges to over 5,000 feet (1525 m) within two miles (3 km), and to 10,000 feet (3050 m) within ten miles (16 km) of the typical atoll (Fosberg 1990; Wiens 1962).

Dye (1987) suggests a probable development history for the Marshall Islands. He states that approximately 70 million years ago the volcanic cores of the Marshall Island atolls erupted forming new volcanic islands. The islands, slowly subsiding but standing above sea level, were colonized by species of reef-building corals, and the process of reef flat construction began (approximately 40 million years ago).

Underwater maps show that there is also an abundance of underwater seamounts, some of which reach almost to the surface, such as Keats Bank east of Arno Atoll. Most of these guyots are aligned along the same axes as the Ralik and Ratak Chains, so that these underwater features as a whole have recently been termed Ralik and Ratak Ridge.

Wōtto is located in the Ralik Chain of the Marshalls, some 246 km (133 nautical miles) northwest of Kwajalein and about 671 km (363 nautical miles) northwest of Majuro at 10°05' north latitude and 165°50' east longitude (Map 3), and ranks 17 in land area amongst the group. The atoll consists of 18 islets (with a total land area of 4.33 km² - 1.67 square miles), which surrounds a 94.92 km² (36.65 square miles) lagoon (Bryan 1971).



Map 3: Wötto Atoll. Note: names on map may not correspond to orthography found in Abo et al. 1976.

2.2 Climate

The climate of the Marshall Islands is predominately a trade-wind climate with the trade winds prevailing throughout the year. Minor storms of the easterly wave type are quite common from March to April and October to November. The islands are not generally considered to be in the typhoon belt, but because they are low with small land masses are easily subject to flooding during storms. Tropical storms are rare but do occur. Wōtto was struck by five typhoons since 1951; the most recent one in 1992, which caused much devastation (Spennemann and Marschner 1994-2000).

Annual rainfall varies considerably from north to south. In the south, Ebon (4°) receives about 5,680 mm/year (224 inches), while at Bikini (11°30") the annual rainfall is only 1,450 mm/year (57 inches). Still further north at Bokaak (Taongi) (14° N) and Eneen-Kio (U.S.-administered Wake) (19° N), annual rainfall drops well below 1,000 mm/year (40 inches) (Merlin et al. 1997). The highest rainfall generally occurs during the *Anon Rak* season, also known the breadfruit season (May to November). Precipitation is generally of the shower type; however, continuous rain is not uncommon. During the *Anon Ean* season, also known as the pandanus season (December to April), the rainfall decreases with February noted to be the driest month of the year.

One of the outstanding features of the climate is the extremely consistent temperature regime. Daily temperatures recorded for both northern and southern atolls fluctuate between the high seventies and mid eighties with no seasonal variation. The range between the coolest and the warmest months averages less than 1 degree Fahrenheit. Nighttime temperatures are generally 2-4 degrees warmer than the average daily minimum because lowest temperatures usually occur during heavy showers in the daytime. In spite of this, the weather is always hot and humid with the average temperature of 81 degrees Fahrenheit all year around (Permanent Mission of the Republic of the Marshall Islands to the United Nations, 1992).

Wōtto is moderately wet, with an annual precipitation between 1778 and 2450 mm (70-100 inches) (Amerson 1969). Given its relatively small size and moderate rainfall, the atoll never appeared to have supported a large population since Western contact, and most likely in the past as well. Williamson and Sabath (1982) demonstrated the relationship between rainfall, land area, and population using the Marshalls as a case study. Put simply, because atolls are too low in elevation to produce orographic effects, a mesophytic index (established by multiplying land area and rainfall to obtain an index of available freshwater), is highly correlated with population size. There is little doubt, however, that Wōtto's inhabitants suffered from introduced diseases by the time of the first recorded population estimate. As elsewhere in the Pacific region, Marshallese lacked immunity to a series of afflictions, such as measles, gastric infections, and infections of the upper respiratory tract, including influenza (Carroll 1975). This is clearly illustrated by observations from German physicians in the 1890s (Mead et al. 2003). Population figures for Wōtto since 1860 are cited above, and the most recent census showed the maximum number of residents ever attained. The largest islet (2.54 km² - .980 square miles), named for the atoll, and located at its northeast corner, included the entire population of 145 people, divided among 18 households, pursuing a subsistence lifestyle, with copra production providing the main source of income (Office of Planning and Statistics 2000). Even during the German and Japanese

administrations, the number of foreign nationals on Wōtto was probably low. The atoll served as a Japanese trepang (bêche-de-mer) station (Krämer and Nevermann 1938). During the war, Wōtto was not a Japanese operational nor a fallback and minor base (Spennemann 2000a), thus supporting the suggestion that the atoll had few foreigners, whether civilian or military.

2.3 Vegetation

The highly alkaline and coarse-textured, coral derived-soils of the Marshalls, like other atolls, are among the poorest in the world. They are typically shallow with very low water-holding capacity, little organic matter, and low available macro- and micronutrients apart from calcium, sodium, and magnesium (Morrison 1990). Because the soils are alkaline, fertility is dependent on organic matter for the concentration and recycling of plant nutrients and for soil water retention in excessively well-drained soils. Organic carbon values for sub-soils are always low unless there has been considerable disturbance such as that associated with the digging of pits for the cultivation of Giant Swamp Taro. Phosphate soils, characteristic of the Jemo Series (Fosberg 1990), are slightly more acidic than the surrounding areas, and originated from guano deposits accumulated over long periods of time under groves of *Pisonia grandis*, a favored seabird rookery tree.

Because of low elevation and the porosity of the coral bedrock, there are no surface streams. Instead, rainfall soaks through the porous surface soil creating a lens (Ghyben-Herzberg lens) of often slightly brackish freshwater floating on higher density saltwater beneath it and accessible by digging pits and wells. Apart from small amounts of water that may be collected from coconut palm fronds and trunks during precipitation, the lens is the only source of freshwater. More recently, concrete cisterns have assisted in the storage of rainwater. Generally, salinity decreases from both lagoon and ocean beaches towards the center of islets. The location and degree of groundwater development influences the nature of the vegetation, as well as the location of the village wells and cultivation pits.

There is no written record of the original vegetation of the Marshall Islands. The precise date when plants first occur in the Marshall Island atolls is still debated (Dye 1987). It is possible that 44 species of plants, including various herbaceous species, shrubs, and trees, migrated to the southern Marshalls before the advent of man (Hatheway 1953). The early inhabitants probably altered the vegetation of the atolls by introducing new species. During the twentieth century, coconut plantations developed by the German, Japanese, and American administrations replaced most of the original vegetation of many atolls (Fosberg 1990). Today as much as 60 per cent of the nation's land area is covered with coconut (*Cocos nucifera*) (Office of Planning and Statistics 2000).

Many areas not dedicated to coconut plantations have been put to other uses such as cultivation of taro and other plants. Species which have been adopted are pioneer species reliant on the presence of humans for propagation (Fosberg 1990)

The vegetation that grows on the Marshall Islands includes mixed broadleaf forest composed of a small number of tree species (*Tournefortia argentea*, *Guettarda speciosa*, *Pisonia grandis*, *Pandanus tectorius*, *Allophylus timoriensis*, *Cordia subcordata*, *Hernandia Sonora*); a few shrubs (*Scaevola sericea*, *Suriana maritima*, *Pemphis acidula*, *Tournefortia*); and a layer of ground cover consisting of several species (*Lepturus repens*, *Thuarea involuta*, *Fimbristylis cymosa*, *Polypodium scolopendria*). Several mono-specific forests occur in the Marshall

Islands (*Neisosperma*, *Pisonia grandis*, *Tournefortia argentea*) (Fosberg 1990). Shrubs such as *Pemphis acidula*, *Suriana maritima*, and *Scaevola sericea* typically grow along shorelines while herbaceous plants occur mainly under forests. Limited strands of mangroves (*Bruguiera*) are found in swampy areas containing brackish water on several of the larger islands of the wet southern atolls (Stemmerman 1981). Cultivated plants (*Musa*, *Cocos nucifera*, *Artocarpus altilis*, *Cyrtosperma chamissonis*, *Pandanus tectorius*) are commonly found on the inhabited islets of the Marshalls. These various plants serve as wind breakers, salt spray repellents, food, and are used by locals for weaving and medicinal purposes.

Wōtto was reported to have retained more of the Marshalls' biodiversity than any other atoll of its size, with *Neisosperma* forest covering large areas, some *Pisonia* and large areas of mixed forests, grassland, and scrubs (National Biodiversity Team 2000) Such favorable growing conditions can be largely attributed to the atoll's annual precipitation, which is higher compared to the rest of the northern Marshalls (Gessel and Walker 1992). Much of the vegetation was severely damaged by Typhoon Gay 1992, however, and has not yet fully recovered, as evidenced by short coconut and other trees, that were replanted, especially in areas facing the lagoon shoreline. In addition, coconut crabs were said to be common, notably on the uninhabited islets, as were several bird species, a wide variety of fish, giant clams, and a turtle-nesting site.

2.4 Sea Level Changes

Due to being so low in elevation, the recent sea level rise caused by global warming or "greenhouse effect" is a critical threat to the Marshall Islands. The rising of the sea during the last two decades has devastated the low-lying atolls economically and culturally. It is estimated that the normal trend for sea level rise has been an approximate 1.3 to 3 inch increase over the span of 100 years. However, it is figured that within the next 50 years, there will be a 1.7 inch increase alone. As predicted by scientists (global warming red alert), the islands of the Marshalls are among the Pacific nations that will be affected by the rising of the sea level within the next fifteen to twenty years. Under normal conditions, coral and the other components of the coral reef can maintain a healthy landmass. At present the littoral shrub land along the coastline is visibly eroded and most of the vegetation growing in this area will soon be washed away by the incoming tide. Any archaeological sites that are located within this area will vanish and their significant historical value will be lost to the tides. The situation would be compounded by a projected increase in the frequency of typhoons associated with global warming (Spennemann 1998a).

For many years, the Marshall Islands Government has been concerned with the issue of global climate change. As the Marshall Islands lie in open ocean, the islands are very close to sea level. The vulnerability to waves and storm surges is at the best of times precarious. Although the islands have by no means been completely free from weather extremes, they are more frequently referred to in folklore as "*jolet jen Anij*" (gifts from God). The sense that Marshall Islands are a god-given sanctuary away from the harshness of other areas is therefore part of the sociocultural identity of the people. When any variation in the weather hits the Marshall Islands, the effects can be severe. When Typhoon Paka passed through Ailinglaplap in late 1997, food crops were severely hard hit and outside food had to be brought. The El Niño

induced drought that followed caused the entire Marshall Islands to be declared disaster areas, and emergency water making equipment and food supplies were shipped in from the outside.

Given the physics of wave formation and the increasing frequency and severity of storms, the Marshall Islands will likely be at even greater risk of total inundation. The relative safety that the islands have historically provided is now in jeopardy. The impacts are not limited to the Marshalls and its immediate neighbors. The Marshall Islands are often referred to as a "front line state" with regard to the climate change issue. It is important to realize that once the potentially catastrophic effects begin to appear, it is likely too late to prevent further warming that will threaten virtually all of the world's coastal regions (Permanent Mission of the Republic of the Marshall Islands to the United Nations, 1992).

III. Land Tenure

Marshallese society is composed of a number of matrilineal clans (*jowi*). The most important descent group is the lineage (*bwij*). The *Bwij* is the matrilineal system in which all land rights are passed down through the mother's side. Therefore, the whole group is descended, mother to daughter, from a common ancestor or a *jowi* (clan). The lineage head (*alab*), usually the eldest male of the senior line of the lineage, is steward of the lineage land holdings.

Control of land is the central most theme of Marshallese culture. The basic land division of the Marshall Islands, *wāto*, is a strip, which runs from the lagoon to the ocean side of an island. One or more *wātos* are held and administered by a matrilineage line. Title is divided and shared by several levels of the society. The *Irooj* (chiefs) hold title over an island or atoll. The *alab* organized and directed lineage activities and allotted lands for use to different descent lines within the lineage. The *alab* and the *drijerbal* (workers) make up the subjects or *kajur* (commoners) and render services to the *Irooj* in exchange for land use. The *Irooj* managed the land in a way that not only provided them food but also provided for the *kajur* (*alaps* and *drijerbals*). The *kajur* in return cultivated the land, harvested the waters surrounding the atoll, and performed *ekkan* (tributes) to the chiefs. The procedure is a cycle that has been repeating for hundreds of years. The common members of a lineage have land rights, although the *alab* and *drijerbal* change land ownership. The *Irooj* is the only individual with permanent land rights, unless defeated in war.

Historically an *Irooj* was able to extend his control over most of the Ralik (except Enewetak and Ujelang). Periodically the *Irooj* visited these islands to collect tribute. The Ralik chain was subsequently divided into two districts, one including Namu and the north islands, the other Jabat, Ailinglaplap, and the islands south. Although all of these islands were owned by the *Iroojlaplap* (paramount chief) he rarely visited those further north than Kwajalein and Ujae because they were isolated and somewhat impoverished (Alkire 1977). Within the northern atolls stratification was less elaborate in comparison to those in the south.

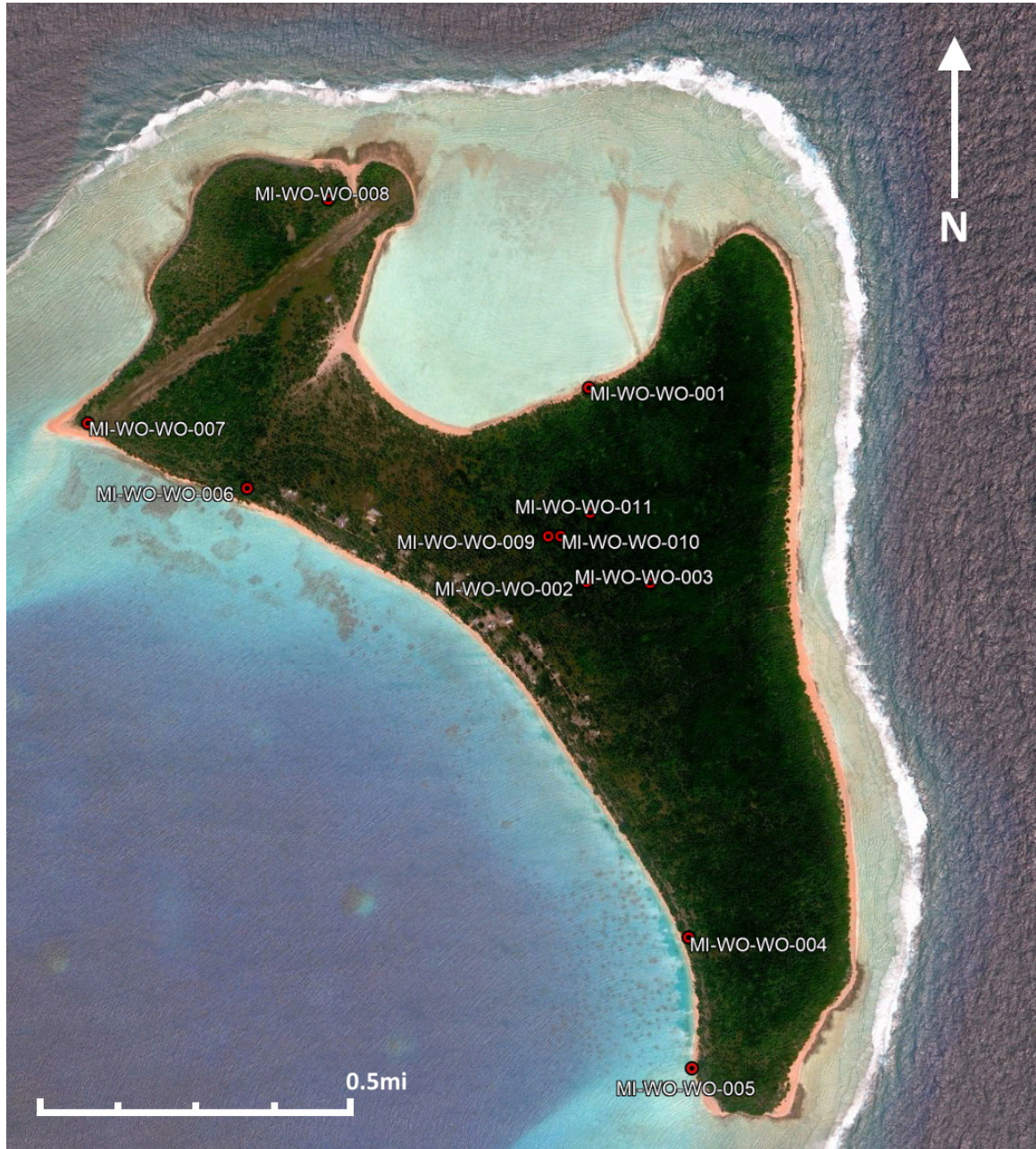
Ratak was likewise structured but far less centralized. The whole chain was never integrated under a single *Iroojlaplap*, although the *Iroojlaplap* of Maloelap was able to put the islands to the north (except for Mejit) under his rule. Majuro and Arno broke away from this union, however, and again became independent political entities. The Ralik and Maloelap alliances were unstable and varied in size as local *Irooj* tested the strength of their islands against that of the *Iroojlaplap*. This trend toward instability encouraged the *Iroojlaplap* to move his residence from island to island to make his control clearly evident to the local *Irooj*.

Wōtto belongs to a chiefdom that has ruled parts of the Ralik Chain for hundreds of years. The reigning *Iroojlaplap* (paramount chief) was and still is from the Kabua family who hold land rights on the atoll. As mentioned above, the three categories of people (*irooj*, *alab* and *drijerbal*) have certain rights to land ownership. This is in accordance with the Marshall Islands' matrilineal society (Tobin 1952) and most people are born with assured land rights. There are cases, however, where people obtain land rights through the patrilineal side or where land is given as gift or payment from the paramount chief. There are numerous ways a person can inherit or obtain land rights. Nonetheless, the distribution of land is always follows the matrilineal system. Land given to a commoner by the chief will be inherited by commoner's oldest daughter who in turn will pass it to her oldest daughter and so on.

IV Field Investigation

Wōtto Atoll

A total of 3 new sites were recorded. No new sites were found on Wōtto Wōtto. We revisited as many sites as possible.



Map 4: Sites Located on Wōtto Islet.

Site MI-WO-WO-001 (Marshall Islands – Wōtto Atoll- Wōtto Islet - Site No.001)

GPS Coordinates: N: 10°10' 18.20"
E: 166°00' 40.57"

Wāto: Monkakwe

This traditional site is located on the beach facing a large, ocean-side bay on Wōtto Islet (Photo 1). This ocean bay also marks the area where model canoes are sailed. The site is in fact a beach rock deposit called “Lādde’s Fart” (Jin en an Lādde). Lādde was swallowed by the demon Lukuarebjel. He killed the demon with his fire stick, which he was still holding. There are numerous beach rock formations along the shoreline, and this site appears to be among the highest deposits. It is roughly triangular in shape, with a “butt-shaped” depression to one side, measuring 130cm in length, 120 cm wide, and 12 cm high. The site is determined “significant”.

This site was revisited on November 16, 2020, it was completely covered in sand. The vegetation is getting closer and is quite close to the site. Unfortunately, we did not bring the tools necessary to dig it out, but it does still exist (Photo 2). At the time only a small portion could be seen, but we were told that sometimes they dig it out. The site is still determined “significant”.



Photo 1: Traditional Site “Jin en an Lādde”. Looking West (2004)



Photo 2: Traditional Site “Jin en an Lādde” (2020)

Site MI-WO-WO-002

GPS Coordinates: N: 10°10' 01.09"
 E: 166°00' 40.34"

Wāto: Mwejej

This site is a former historic swamp taro pit, now covered with dense pandanus leaves, which are used for the handicraft trade. It is located in the interior part of Wōtto Islet (Photo 3). As with other taro pits, this one was abandoned for several reasons, including repeated damage by free-roaming pigs, typhoons, especially Typhoon Gay in 1992, growing dependence on food imports, notably rice and flour, and perhaps increasing salinization of the water table associated with global warming and sea-level rise. The pit is rectangular, measuring 29 m long, 6 m wide, and approximately 85 cm deep. The site is determined “less significant”.

In 2020, there are no longer any taro pits on island. Today, this site is still covered with pandanus. No photographs were taken.



Photo 3: Historic Taro Pit Converted to Pandanus Cultivation. Looking Southeast.

Site MI-WO-WO-003

GPS Coordinates: N: 10°10' 00.99"
E: 166°00' 45.92"

Wāto: Mwejej

This former taro pit in the interior of Wōtto Islet (Photo 4) is linked to the story of Tarmelu, the woman who taught the Marshallese navigation. Her bailer was lost when sailing through the air, and it fell into this taro pit. The pit appears irregular in shape, and is 13 m long, 11 m wide, and about 3 m deep. The site is determined “very significant”.

In 2020, our local informants said there were no taro pits left on island. They could not take us to this spot. So, this site was not revisited.



Photo 4: Historic Taro Pit Associated with the Story of Tarmelu. Looking North.

Site MI-WO-WO-004

GPS Coordinates: N: 10°09' 30.54"
E: 166°00' 49.11"

Wāto: Mondroulkan

This cemetery (Photos 5 & 6) is located near the lagoon side, about 10 m inland from a pathway leading towards the southern end of Wōtto Islet. One of the people buried here is a woman by the name of Leutile, who is said to have belonged to Wōtto's first clan. After her death, she became a notorious spirit and a divination decided to bury her outside the village. There are at least three separate parallel graves (oriented N.W. S.E.) in this area covered with dense brush, which is considered off limits to local residents and the rest of the Marshallese survey crew. The burials cannot be dated with any degree of certainty. Following Western examples, Marshallese graves since the turn of the last century are marked by rectangular rows of coral slabs and headstones, although headstones are considered rare for pre-1960s burials (Spennemann 1999). No headstones were identified in this instance. Burial #1 is 2.25 m long and 1.30 m wide. Coral slabs surrounding this pebble-filled burial average about 20 cm above ground surface. Burial #2, which is also filled with coral pebbles is 2.30 m long and 1.10 m wide. Surrounding coral slabs average approximately 30 cm above surface. The coral slab at the N.W. end of this grave has collapsed. Burial #3 consists of coral slabs that have entirely collapsed. The site is determined "significant".

In 2020, this site was revisited, but this is still an area considered off limits to local residents. Our local informants just said go that way and you will find the graves. They did not accompany us. It appears much the same, very overgrown (see Photo 7). We could not see the 3rd burial, but it is probably covered in vegetation. We did not remove any vegetation. This site is still determined "significant".



Photo 5: Burial. Grave # 1. Looking Northeast (2004).



Photo 6: Burial. Grave # 2. Looking Northeast (2004)



Photo 7: Burial. Grave # 1 (2020).

Site MI-WO-WO-005

GPS Coordinates: N: 10°09' 19.28"
 E: 166°00' 49.45"

Wāto: Lokone

This is a WWII Japanese plane wreckage on the lagoon beach near the southern end of Wōtto Islet. The plane had to emergency land on the atoll. The crew subsequently committed suicide to avoid capture by American forces. At low tide, there are two visible wreckage clusters (Photos 8 & 9) of what appears to be part of an engine. These clusters are about 15 m apart, each measuring about 1.50 m in diameter. Other plane fragments are alleged to rest in the lagoon and are buried under the lagoon beach sand. This site is said to be a popular stop among the occasional cruise ship visitors to Wōtto. The site is determined “significant”.

In 2020, this site is still here, maybe a little less of it. It is only visible during low tide. Both clusters are still visible.



Photo 8: Japanese Plane Wreckage. Cluster # 1. Looking West (2004).



Photo 9: Japanese Plane Wreckage. Cluster # 2. Looking West (2004)



Photo 10: Japanese Plane Wreckage. Cluster # 1. (2020)

Site MI-WO-WO-006

GPS Coordinates: N: 10°10' 09.20"
E: 166°00' 10.27"

Wāto: Āneju

This traditional site, of what appears to be an ancient storm deposit, is located north of the main settlement on Wōtto Islet, adjacent to a former passage called Roren, about 10 m from the lagoon beach and extending over 90 m inland. Its precise length is unknown to local informants, and thus may stretch several tens of meters towards the islet's northern end. It is alleged to be the highest point on the atoll, approximately 5 m above the high water mark. The site is associated with the fallen demon, Lukuarebjel, who was killed by Lādde. Photo 11 shows the head of the demon. The site is determined "significant".

This site is still present in 2020. It remains much the same. There is a new dirt path (road) over a section of it that leads to the runwa



Photo 11: Lukuarebjel's Head. Looking West (2004)



Photo 12: Lukuarebjel's Head. Looking West (2020)

Site MI-WO-WO-007

GPS Coordinates: N: 10°10' 14.91"
 E: 165°59' 55.92"

Wāto: Āneju

This historic period site is related to Operation Redwing, a 17-test nuclear weapons series conducted on Bikini and Enewetak in 1956. The site is part of a complex of structures linked to the transmitting and receiving station set up on Wōtto to provide the signal for the radio navigation grid prior to the tests (Dowdy 2002). It consists of a section of the power plant's cement floor (Photo 13). It is located W. of the southern end of the airstrip, facing the lagoon. The remnant cement floor is 3 m long and 1.40 m wide. Three other structures used to stand in the vicinity, including a warehouse to the N.E. (Photo 14) and the communication center to the E (Photo 15). No physical evidence remains of the latter two features, although their location was indicated by informants. The entire area measures 48 x 43 m. The site is determined "significant".

In 2020, this site is no longer here. It was completely destroyed during the expansion of the runway. We could find no trace of this site.



Photo 13: Section of Power Plant Floor. Looking North.



Photo 14: Location of Warehouse. Looking North.



Photo 15: Location of Communication Center. Looking South.

Site MI-WO-WO-008

GPS Coordinates: N: 10°10' 34.92"
 E: 166°00' 17.00"

Wāto: Naloj

This site is also connected with Operation Redwing. It consists of a cement floor where the weather station used to stand (Photo 16). It is located ocean-side of the airfield runway. The area leading to the site shows evidence of sediment disturbance, undoubtedly linked to the construction of the airstrip. The square-shaped cement floor measures 8 x 8 m and is 8 cm thick. The site is determined “significant”.

In 2020, this site no longer exists. It appears to have been completely destroyed during the widening project for the runway. We could find no remnants of this site.



Photo 16: Section of Weather Station Floor. Looking Northeast.

Site MI-WO-WO-009

GPS Coordinates: N: 10°10' 05.01"
E: 166°00' 36.96"

Wāto: Mōnkio

This historic taro pit, together with Sites MI-WO-WO-10 and MI-WO-WO-011, are located in the interior of Wōtto Islet, and are associated with the story of the annań bird (Photos 17 & 18). According to tradition, several birds built a boat, which was too heavy and thus could not be launched. Only the smallest bird, the annań, could launch it. Its footsteps are the above-mentioned pits. The annań is described in oral traditions as a small, sweet-smelling bird, found living among rocks in the vicinity of the shores of the northwestern Marshall Islands (Abo et al. 1976). This bird is now said to be extinct. Krämer and Nevermann (1938), following Erland (1914) mention that the bird was extirpated by introduced cats. Spennemann (1991) believes that it may have been a small ground dwelling bird, perhaps an endemic rail. Rails are known to have become extinct in the past, such as the Wake Rail (*Rallus wakensis*) and the Kosrae Rail (*Porzana monasa*) (Owen 1977), although there is debate on whether those extinctions took place during historic times or prior to Western contact. Archaeologists currently lack detailed information on pre-contact extinctions or instances of resource reduction from atolls and other low coral islands, in contrast to the high volcanic islands (Anderson et al. 2000; Di Piazza and Pearthree 2001; Weisler 1999). With relatively low human population density on most atolls and extensive areas of lagoon and ocean side reefs, there may have been only limited impact on marine resources (Weisler 2002). The same could be said about terrestrial animals, notably birds, leading some researchers to conclude that the avian extinctions which took place most likely occurred during the post-contact period, with the recent arrival of predators, such as cats, dogs, and European-introduced rats (Olson and Ziegler 1995; Steadman 1989). A single specimen of the White-browed Rail (*Poliolimnas cinereus*) was reported from Bikini in 1930s. This is the only record of a rail from the Marshalls (Amerson 1969; Garrett and Schreiber 1988). It is interesting to note that on Ulithi Atoll in the Western Carolines a small rail, possibly *P. cinereus*, was found in taro patches shortly after the war, but that it was apparently eliminated by clearing operations. *P. cinereus* is apparently restricted to swampy areas, and may be eliminated from its habitat by drainage or clearing (Baker 1951). It is perhaps no coincidence that the annań is associated with swamp taro pits on Wōtto. The link between the alleged disappearance of this bird and the abandonment of taro pit cultivation needs to be explored further. Site MI-WO-WO-009 consists of two rectangular pits, separated by a pathway 4.60 wide. Pit # 1 is 43 m long, 12 m wide, and approximately 5 m deep. Pit # 2 is at least 20 m long, 16 m wide, and about 1.50 m deep. The precise length of this second pit could not be determined because of dense vegetation. The site is determined “very significant”.

In 2020, these sites could not be relocated. It could be that these sites are completely overgrown and not known today.



Photo 17: Historic Taro Pit # 1 Associated with Annañ Story. Looking East.



Photo 18: Historic Taro Pit # 2 Associated with Annañ Story. Looking West.

Site MI-WO-WO-010

GPS Coordinates: N: 10°10' 05.02"
 E: 166°00' 38.04"

Wāto: Mōnkio

This historic taro pit is also linked to the annań bird story (Photo 19). Like all other taro pits, it is located in the interior of Wōtto Islet. It is 12.60 m long, 6.60 m wide, and approximately 6 m deep. The site is determined “very significant”.

Again, the only taro pit that we were shown, was the previous taro pit that now has pandanus growing there. They told us that there were old pits but they weren't certain where they were anymore.



Photo 19: Historic Taro Pit Associated with Annań Story. Looking North.

Site MI-WO-WO-011

GPS Coordinates: N: 10°10' 07.06"
 E: 166°00' 40.65"

Wāto: Mōnkio

Like Sites MI-WO-WO-009 and MI-WO-WO-010, this historic taro pit is linked to the story of the annań bird. This pit is 12.60 m long, 10.10 m wide, and about 10 m deep (Photo 20). This is the last pit to have been abandoned on Wōtto (2003) as a result of damage caused A pigs. The pit contains a single taro plant. The site is determined “very significant”.

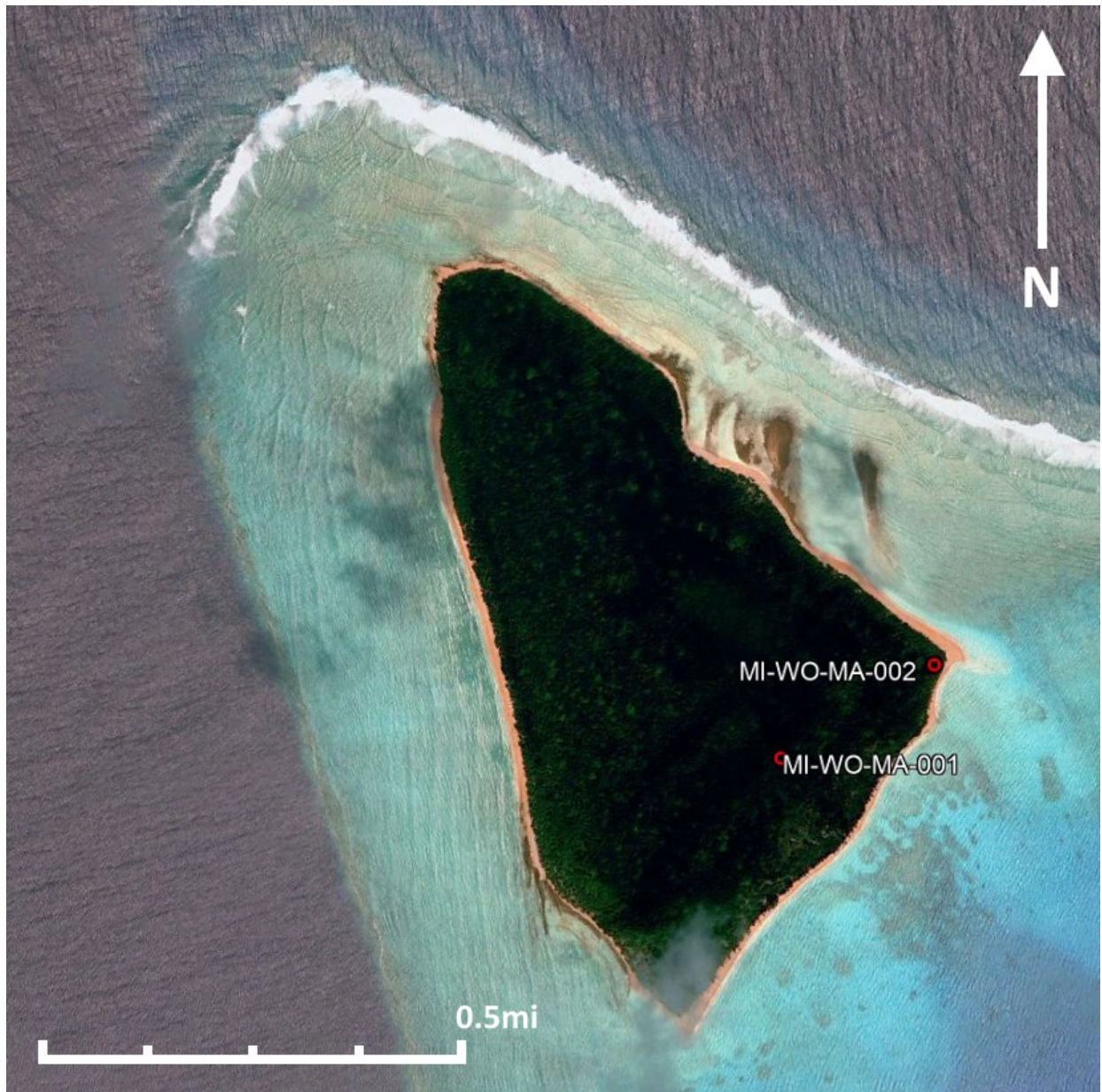
In 2020, this previous taro pit was not relocated. Probably due to the dense vegetation in the area.



Photo 20: Historic Taro Pit Associated with Annań story. Looking North.

Majurwon Islet

Two new sites were located on Majurwon Islet (see Map 5 below).



Map 5: Sites Located on Majurwon (Medyeron) Islet.

Site MI-WO-MA-001 Marshall Islands Wotto Atoll, Majurwon (also known as Medyeron) Islet

GPS Coordinates: N: 10°10'24.18"N
 E: 165°55'37.78"

Wāto: None

This is a traditional site. It consists of a minimum of 4 very large um's (underground ovens). The informants told us that these large areas were used for whales and dolphins in the past. Surprisingly these are located in what appears to be almost the center of this islet. These large depressions are not within sight of the lagoon or the ocean. One measured approximately 10 feet deep by 18 feet long and 12 feet wide. This measurement was done by pacing as the terrain was uneven and highly vegetated. The photographs did not come out well, (see Photo 21). It is possible that in the past there were more clear areas for easy access, and also they utilized the depression that was already existing. This site is deemed "significant".



Photo 21: Traditional Um site looking north.

Site MI-WO-MA-002

GPS Coordinates: N: 10° 90' 50.9"
E: 165° 55' 79.4"

Wāto: None

This is a single grave. There is no headstone or footstone, but our informants told us this was an Irooj. The grave is outlined by coral slabs that are sticking up from the ground. This gravesite is approximately 50 feet from the lagoon (see Photo 22). The grave is facing North/South. It is 39 inches by 6 feet in length. The site is determined “very significant”.



Photo 22: A historic burial site looking north.

Site MI-WO-AN-001 Anobenak

GPS Coordinates: unable to obtain Coordinates due to a storm

Wāto: None

This is a traditional site, a mee (fish weir). It is located on the lagoon side and is made from coral. This mee is still utilized. There is a Utube video of it being utilized. The link is http://youtu.be/LJrbNkH_t8 (Wotho Eaiboojoj). The mee appears around the 15-minute mark (see Photo 23). We were on our way to see the mee, when a storm popped up and we needed to return to Wotto. This site is determined “very significant”.



Photo 23: A mee (fish weir).

V. Management Plan

Cultural Resource Management (CRM) in the Republic of the Marshall Islands, while becoming an important part of archaeological work, is still in its infancy. CRM is based on the realization that cultural resources, are nonrenewable and that prudent care must be taken to utilize these resources efficiently. While the immediate goal of the HPO survey was to identify the traditional, prehistoric, and historic sites of Wōtto Atoll, the long-term goal should be the education of the local and national population on the importance of preservation of these sites. Education is still the most important tool that the HPO can use in site management and preservation.

5.1 Long range recommendations

The archaeological sites on Wōtto are valuable resources. One of the most important things for the HPO to accomplish, seems to be raising public awareness and to actively involve local governments in their preservation efforts. Throughout the Marshall Islands it has been suggested that preservation efforts should also be directed towards possible sources of income for outer island residents through tourism. Sites that have potential tourist possibilities should to be selected for restoration and possibly reconstruction. There is are still a few islets of Wōtto Atoll that have not been surveyed. Kapen has not been surveyed, and is thought to have archaeological sites. The cultural resources identified on Wōtto Islet are somewhat limited compared to some of the other atolls and islands previously surveyed. For example, the low density of war-related sites is undoubtedly linked to the fact that Wōtto was not a major theater of operations. Another factor for the paucity of prehistoric sites may relate to disturbance caused by typhoons, particularly the effects of the latest storm in 1992, which are still quite apparent even to this day. Although wind damage is not expected to disrupt subsurface stratigraphy, storm waves are known to wash away beach areas and other shorelines and nearshore areas of many islands (Fujimura and Alkire 1984). Surface remains consist mainly of coral gravel scatters (which are often indistinguishable from recently-abandoned habitation sites), coral lined platforms, burials, taro pits, and fish traps (Spennemann 1998b). Wōtto is also relatively isolated, making it rather difficult for visitors to access. Archaeological resources provide a tangible link with the past. If they can be cared for and maintained, and in some instances partly reintegrated in a modern context (Overton 1999), there may be hope for ensuring sustainable economic and social development among the citizens of the Marshall Islands.

VI. Summary and Conclusions

As mentioned in the introduction, this was a revisit survey as part of the Ridge to Reef Project funded by the UNDP. The focus was to revisit sites and to try to survey one additional islet if possible. The HPO team recorded 3 new sites including the mee. Unfortunately, given the limitations of time and gas, not every islet was visited, and that we relied on informants and the visibility of sites. No subsurface testing was conducted, and no artifacts were collected.

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