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MINISTRY OF INTERNAL AFFAIRS

HISTORIC PRESERVATION OFFICE

# *Anthropological Survey of Wotje Atoll*

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HPO Report 2001/09

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The following monograph is the result of research conducted between February 15 and 20, 2000 at Wotje 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 Historic Preservation Fund, National Park Service, Department of the Interior.

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# I. Introduction

This report represents the results of archaeological and anthropological research conducted on Wotje Atoll, Marshall Islands between February 14 and 20, 2000 by the Historic Preservation Office, Majuro, Marshall Islands. All field documents, including completed site survey forms, field notes, maps, photographs are housed at Historic Preservation Office, Majuro Atoll, Republic of the Marshall Islands. No artifacts or food remains were collected. The US National Park Service Historic Preservation Fund grant provided funding.

## *1.1 Project Objectives*

The purpose of the survey was two-fold. The first was to identify, record, and evaluate the historic, prehistoric, and traditional sites located on the atoll in accordance with the survey and inventory program area of the Historic Preservation Office. 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 and formal and informal lectures covering the activities of HPO staff were conducted at the schools, town halls, and churches.

## *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. The sites were identified through either a walking survey or from knowledge of local guides. The sites were recorded using a Geographical Position System (GPS) unit and that data was 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. Slide photographs as well as digital photos of all sites were taken. All note, 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. A site was considered very significant if it met at least one of the Marshall Islands' formal criteria [RMI Historic Preservation Legislation, "Regulations Governing Land Modification Activities, Section 6(2)(a)]:

(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 alterations 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 on which the resource is located.

As the survey was designed to be intensive and 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 grantor, the United States Department of Interior National Park Service Historic Preservation Fund.

## B) Nomenclature

In assigning sites, the system used in the Marshall Islands includes three two-letter abbreviations and then a site number. The first abbreviation identifies the site as located in the Marshall Islands (MI), the second is the atoll, Wotje (WJ), the third the islet, Wotje (WJ). Therefore the site MI-WJ-WJ-001 is the first site identified on the islet of Wotje in the Wotje Atoll.

## C) Survey Equipment and Team Members

The following equipment was used in the survey:

1 Trimble GPS unit with Pathfinder Office 2.02 software
ArcView 3.0a GIS software
1 Sony Mavica MVC-FD83 digital camera
1 Canon EOS Rebel 2000 SLR camera with slide film
2 5m metal tape measures
1 30m cloth tape measure
1 roll of flagging tape
Notebooks, pens and pencils
1 compass

Field team members included Staff Archaeologist, Richard Williamson; Assistant Archaeologist, Hemley Benjamin; Staff Ethnographer, Donna K. Stone; and Video Technician Ninbo Frank.

## 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, lead the team to the sites. Key-informants[1] were the elders of the community, who as custom dictates

[1] Ethnographically defined as individuals who have been interviewed intensively or over an extensive period of time for the purpose of providing a relatively complete ethnographic description of the social and cultural patterns of the group. In the present case "key-informant" refers to those individuals who provided general and specific information on almost every site investigated.

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 total landmass of each islet visited. When informants or guides could not lead the team to the potential sites on the islets the following method was applied. The crew was distributed at five to eight meter intervals and surveyed the islets from north to south or east to west. Areas of the extremely dense vegetation were left out due to the lack of appropriate clearing tool (machetes). 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.

### *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 and money constraints, much of the survey relied heavily upon the local informants and their knowledge of historic sites. The survey attempted to be as extensive as possible, but included no follow-up intensive research. As such, this report should be considered preliminary and only includes those sites readily identified either visibly or 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. This is especially true in the Marshall Islands where the lack of durable artifacts such as ceramics is lacking.

A further limitation was encountered with the generation of maps using the GPS unit and ArcView GIS software. Problems encountered were two-fold. First, it was impossible to remove the selective availability that the US Department of Defense uses to "scramble" GPS coordinates, thus giving some error in the recording of exact locations of the sites. Second, the digitized map of the Marshall Islands used by the HPO is one that was originally made by the Japanese during their administration of the Republic. The map was updated by the U.S. during the Trust Territory of the Pacific Islands administration, but still prone to many errors. While most of these errors were external, there were instances of internal inaccuracies. Unfortunately, this was still the most up-to-date map available at the time of the research. However, in recording the GPS readings in the field, the GPS unit that was used did allow for the recording of a series of readings (120 points were recorded) that averaged out to one reading per site. This should remove some of the inaccuracy caused by the selective availability. Regarding the maps, as the data is stored electronically in ArcView GIS software, when an updated map of the Marshall Islands is available, the new digitized map can be replaced for the older version. For the purpose of this report, the maps cannot give much more than a "general" location of each site. However, in the section describing the sites, the GPS coordinates for each site are provided.

### *1.4 Previous Research*

The first scientific research of Wotje was conducted by Otto von Kotzebue and his Russian expedition of 1816-1817. Kotzebue decribed the biology, animals, and plants of the atoll as well as ethnography (Kotzebue 1821, 1830; Chamisso 1986). A Japanese expedition in 1884 studied Wotje and the Japanese also collected data during the 1920s and 1930s but little is published regarding their findings (Nakajima 1984; Suzuki 1892, 1983; Takeshita 1943).

The comprehensive study carried out under the leadership of Paul H. Rosendahl (1979, 1987) during March-June 1977 included Wormej Islet on Wotje Atoll. That expedition, which became known as the "Louis L. Kelton-Bishop Museum Expedition to Eastern Micronesia," covered parts of Majuro, Mili, Arno, Aur, Maloelap, Wotje, Likiep, Wotho, Lae, Namu, Ailinglaplap, and Ebon Atoll, as well as, Lib Island in the Marshall Islands. No sites were noted on Wormej and there were very few surface arifacts.

Spenneman (1992) summarized the geography, natural history, and cultural history information on Wotje. He also wrote a preliminary report on the submerged cultural resources of Wotje (1991). Research was conducted on Wotje by Henrik Christsen (1994) as part of an Office of Territorial and International Affairs Grant (OTIA Grant MAR-48) study to establish a record of World War II sites on Taroa, Jaluit, and Mili.

Previous researchers of other Marshall Island atolls have included general overviews of the history and prehistory of the Marshall Islands. Some of the better overviews include Beardsley's 1994 report (1994: 1-28) and the Historic Preservation Plan United States Army Kwajalein Atoll (1996: 3.3-3. 21).

### *1.5 A Brief History of the Marshall Islands*

The people of the Marshall Islands refer to their parallel-chained archipelago as *Aelon 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. The first recorded sighting, probably Bokak, was made by Alonso de Salazar, commanding the *Santa Maria de la Victoria*, but no contact was made (Levesque 1992a, Sharp 1960). In 1529 contact was made by Alvaro de Saavedra of the *Florida* which laid anchor to take on provisions at Enewetok or Bikini and stayed for eight days. He also discovered Utirik, 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 Wotho, landings were made on some of the islands. (Levesque 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 Mendana went ashore at what is probably Ujelang. Namu was also thought to be sighted. (Levesque 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 Bokak (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 Rongerik 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 *Scarbough*, 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 Eniwetok. Thomas Dennet was the first westerner to sight Kili as well as reporting on Ailinglapalap, Lib, and doing some trading on Namu in 1797. Other vessels sailed through the area, the British snow *Hunter*, the British brig *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 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, Kramer and Nevermann 1938).

Other ethnographic observations come from Lay and Hussey (1828) who survived the Globe mutiny at Mili Atoll and Paulding (1970) 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. Numerous ships were cut off by the Marshallese 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 Kusaie 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 Kramer 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 Hernsheim, 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 (Kramer 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 unhealthier 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, 1954) whose focus is economic organization; Kiste (1967, 1974) who deals with resettlement issues; and Davenport (1952, 1953) and Chambers (1969, 1972) concentrating on oral traditions.

### *1.6 Important Historical Events for Wotje Atoll*

~500 BC - 2000 BC The first Micronesian navigators arrive in the Marshalls, calling the atolls Aelon Kein Ad (our islands). Dates and origins of the settlers are still uncertain. Relatively little is known about the prehistory of the people. They are thought, like other Pacific Islanders, to have originated in Southeast Asia and to have established themselves on their scattered islands centuries before European voyagers reached this area. Early accounts depict Marshallese society as having much in common with other Micronesian Islands, such as the Carolines. 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, Levesque 1992a).

1542 26 December, Spanish flagship Santiago and five other ships under the Ruy Lopez de Villalobos expedition landed on Wotje to take on food and water (Hezel 1979, Sharp 1960, Levesque 1992a ).

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).

1788 29 June, British transport ships Scarborough and Charlotte, commanded by Captains Marshall and Gilbert, sight Wotje (Hezel 1979, Sharp 1960).

1788 On 29 June 1788 the British transport ships *Scarborough* and *Charlotte*, under the commands of William Marshall and Thomas Gilbert, sighted **Wotje** (Sharp 1960).

1800 Before German times Likiep was temporarily uninhabited, but was visited by **Wotje** people from time to time for fishing, turtle and bird catching or for wood supplies (Kramer and Nevermann 1938).

1800 Wotje, Utrik, Mejit, Maloelap are allied with Aur and Irooj Lomade against Arno, Majuro, etc.

1817 Kotzebue met up with Irooj Lomade who told him he was a native of Arno who had gained his power by murdering all of the Irooj of Aur, Maloelap, and Utirik (Chamisso 1986).

1817 Lomade, the Iroojlaplap over Aur, Maloelap, and Wotje, desired to attack his enemies of Majuro, Arno, and Milli under Latete. Captain von Kotzebue gave him some lances and grappling hooks, for which he received in return six bundles of preserved pandanus. The new weapons put and end to the war in six days. Of the several hundred persons engaged only five had fallen. When Kotzebue visited the second time in 1824, he found Wotje was again at war, occasioned by disputes among the chiefs, whose armed forces the common people had to join (Finsch 1893).

1817 On 4 January,the Russian brig *Rurick, commanded by Lt. Otto von Kotzebue,* sailed into Wotje lagoon. On 8 January, Kotzebue took ashore seeds and yams, chickens, and goats. He named this bit of land Goat Island. Also Ormed Island which seemed long-settled. he meets Rarick, the captain of a Marshallese canoe who greets him (Rarick is a local of Wotje, Wotje Atoll). Kotzebue makes friends with Lagediack (a navigator) who draws maps of Wotje, Erikub, Ailuk, Utirik, Bikar, Likiep, Maloelap, Aur, Majuro, Arno, and Mili (Chamisso 1986).

1817 31October, Rarick and most of the male inhabitants of Wotje had accompanied Lomade to make war upon the islanders of Arno (Chamisso 1986).

1817 The Rurick re-entered the Marshalls on Oct. 30 at Wotje. Kotzebue was disappointed to discover that Irooj Lebenbit of Aur had come to Wotje, and taken most of the donated iron and goats. A few months later, Irooj Lomade had come and had taken the rest (Chamisso 1986).

1817 Wotje's population is 100 (Chamisso1986)

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 Rimwejoor, conquered all the islands of the Ratak and ultimately conquered Kwajalein, Lae, Ujae, Wotho, Rongelap, Bikini, Eniwetak, and Ujelang in the Ralik (Kramer and Neverman 1938, RMI Ministry of Education1996).

1824 Kotzebue returns to Wotje for a brief visit. He discovers that Irooj Lomade had come again and taken everything missed the first time. The people of Wotje had then raided Maloelap and are now expecting Lomade to retaliate (Chamisso 1986).

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).

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, Hernsheim & Co. and A. Capelle & Co., are also in business there. Copra is their principal interest (Hezel 1983).

1860 Wotje's population is 300 (Spennemann 2000).

1870 The first Christian Church comes to Wotje.

1874 British warship HMS Rosario, under Captain A.E. Dupuis visited Wotje (Hezel 1979).

1877 The Ketch E.A.Williams, owned by Capelle Co., visited Wotje on 25 October (Hezel 1979).

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 (Kramer and Nevermann 1938)

1878 A map published in 1879 by Friedrichsen shows that there was a trading station on Wotje.

1878 Wotje's population is 300 (Krämer & Nevermann 1938).

1884 Early in 1884, a party of Japanese pearl divers returning from Australian waters were blown off course and cast ashore on the atoll of Lae. Nakajima Suzuki Tsunenori's biographer, tells us that Suzuki and Goto spent most of October 1884 based in a tent on **Wotje** atoll, from which they carried out through investigations of the topography, anchorage's, and peoples of **Wotje** and Ailinglaplap (Peattie 1988).

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).

1898 The *Irooj* of the Ratak Islands, with the exception of the *Iroojlaplap,* Murjil of Maloelab, command authority only over the islands of a single atoll and have no

ships. Murjil, claims possession of Aur, **Wotje**, Ailuk, and Utirik, (Germany Reichstag, [1898-99] 1900).

1905 Wotje's population is 350 (Spennemann 2000).

1910 Wotje's population is 321 (Spennemann 2000).

1912 Wotje's population is 254 (Spennemann 2000).

1913 Wotje's population is 260 (Spennemann 2000).

1914 The Marshalls are captured from Germany by Japan.

1918 Until 1935 the Japanese build Buddist temples and Shinto shrines, geisha houses, and public baths on Jaluit, Wotje, Kwajalein, Milli, Maloelap, and Eniwetak (RMI Ministry of Education 1996).

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).

1920 Wotje's population is 260 (Bryan 1972).

1921 The Japanese take over the copra industry from the Germans, replacing the Jaluit *Gesellschaft* with *Nanyo Boeki Kaisha* (Peattie 1988).

1921 Japanese administration erected a new wireless station on Wotje Island; Imperial Navy practiced minesweeping in Wotje lagoon; Japanese crusier with a sea plane entered lagoon and conducted practice flights (Peattie 1988)

1930 Wotje's population is 544 (Spennemann 2000).

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, Eniwetak, Jaluit, Milli, Maloelap, and Kwajalein (Peattie 1988).

1935 Wotje's population is 590 (Bryan 1972).

1939 World War II begins in Europe.

1939 Japanese prisoners brought to Wotje for construction of airfield (Peattie 1988)

1942 1 February, U.S.forces bomb Wotje, scoring hits on runways, fuel storage tanks, and on a large auxillary boat (Christiansen 1994).

1943 15 December, 10 B-24s bomb Wotje Atoll (Office of Air Force History 1973).

1943 23 December, 9 B-24s bomb Wotje Atoll (Office of Air Force History 1973).

1943 24 December, 18 B-24s bomb Wotje Atoll (Office of Air Force History 1973).

1943 26 December, 16 B-24s bomb Wotje Atoll (Office of Air Force History 1973).

1943 7 Dec, U.S. B-24s, hit targets bomb Wotje Atoll (Office of Air Force History 1973).

1944 10 August, B-24s flying out of Kwajalein Atoll, hit Wotje (Office of Air Force History 1973).

1944 10 February, B-25s hit bomb Wotje Atoll (Office of Air Force History 1973).

1944 10 March, A-24s, P-40s, and B-25s attack airfields, AA positions and radio installations at bomb Wotje Atoll (Office of Air Force History 1973).

1944 10 May, B-25s raid bomb Wotje Atoll (Office of Air Force History 1973).

1944 12 February, B-25s hit bomb Wotje Atoll (Office of Air Force History 1973).

1944 12 March, B-24s bombbomb Wotje Atoll (Office of Air Force History 1973).

1944 12-14 May, Marshallese scout for the U.S., Emelik, was sent to Wotje. He reported the conditions of the Japanese and Marshallese located there (Christiansen 1994).

1944 13 January, 9 B-25s attack harbor shipping at bomb Wotje Atoll (Office of Air Force History 1973).

1944 14 August, B-24s bomb Wotje Atoll (Office of Air Force History 1973).

1944 14 January, 3 B-25s fly a mission against at Wotje Atoll; 2 of the B-25s attack 2 small vessels, sinking one and damaging the other; the other B-25 bombs a runway and building on the south part of Wotje (Office of Air Force History 1973).

1944 14 March, B-25s hit bomb Wotje Atoll (Office of Air Force History 1973).

1944 16 February, B-25s bomb Wotje Atoll (Office of Air Force History 1973).

1944 16 March, B-25s pound Wotje and Ormed Islands, Wotje (Office of Air Force History 1973).

1944 18 July, 5 B-24s, flying out of Kwajalein Atoll, hit bomb Wotje Atoll (Office of Air Force History 1973).

1944 19 February, B-25s bomb Wotje Atoll (Office of Air Force History 1973).

1944 19 January, planes from the Saratoga struck at Wotje, Taroa, Utirik, and Rongelap (Smith 1955, Office of Air Force History 1973).

1944 2 May, During the day B-25s hit Wotje (Office of Air Force History 1973).

1944 20 February, 9 B-25s bomb the airfield at Wotje Atoll (Office of Air Force History 1973).

1944 20 January, 13 B-24s bomb Wotje Atoll (Office of Air Force History 1973).

1944 21 April, B-24s from Kwajalein Atoll hit bomb Wotje Atoll (Office of Air Force History 1973).

1944 21 May, 53 B-24s from Kwajalein Atoll bomb various targets in Wotje Atoll; 41 B-25s, based on Makin Island, follow up with bombing, cannonading and strafing attack on the atoll (Office of Air Force History 1973).

1944 22 January, 9 B-25s bomb shipping and shore installations at bomb Wotje Atoll (Office of Air Force History 1973).

1944 23 April, B-24s based at Kwajalein Atoll hit bomb Wotje Atoll (Office of Air Force History 1973).

1944 23 January, 23 B-24s bomb Wotje Atoll (Office of Air Force History 1973).

1944 23 July, B-24s flying out of Kwajalein Atoll, hit Wotje (Office of Air Force History 1973).

1944 24 April, B-25s hit bomb Wotje Atoll (Office of Air Force History 1973).

1944 24 February, B-25s pound the airfield on bomb Wotje Atoll (Office of Air Force History 1973).

1944 24 January, 8 B-25s bomb the airfield on bomb Wotje Atoll (Office of Air Force History 1973).

1944 24 May, B-25s pound Wotje (Office of Air Force History 1973).

1944 25 April, Kwajalein Atoll-based B-24s during the day hit Wotje while B-25s also bomb Wotje (Office of Air Force History 1973).

1944 25 February, B-25s hit bomb Wotje Atoll (Office of Air Force History 1973).

1944 25 June, B-24s based on Kwajelein Atoll hit bomb Wotje Atoll (Office of Air Force History 1973).

1944 26 April, B-25s hit bomb Wotje Atoll (Office of Air Force History 1973).

1944 26 February, B-25s bomb Wotje Atoll (Office of Air Force History 1973).

1944 27 April, B-25s hit bomb Wotje Atoll (Office of Air Force History 1973).

1944 27 February, B-25s bomb Wotje Atoll (Office of Air Force History 1973).

1944 27 January, 9 B-25s bomb Wotje Atoll (Office of Air Force History 1973).

1944 27 March, B-25s and B-24s hit bomb Wotje Atoll (Office of Air Force History 1973).

1944 28 February, B-25s pound the airfield on bomb Wotje Atoll (Office of Air Force History 1973).

1944 28 January, B-24s carry out several hours of strikes against bomb Wotje Atoll (Office of Air Force History 1973).

1944 29 February, B-24s bomb Wotje Atoll (Office of Air Force History 1973).

1944 29 January, as a US invasion force approaches the Marshall Islands, B-24s maintain day and night attacks (both multiple-plane missions and single-plane attacks at intervals) against Wotje Atoll. 9 B-25s also carry out a strike against shipping and shore installations at Wotje (Office of Air Force History 1973).

1944 29 May, photo mission operation over Wotje (Office of Air Force History 1973).

1944 3 May, B-25s from Kwajalein Atoll bomb Wotje Atoll while others, based at Makin Island, strike both Jaluit and Wotje Atolls, using Majuro Atoll as a rearming base between raids (Office of Air Force History 1973).

1944 30 March, B-25s strike Wotje (Office of Air Force History 1973).

1944 31 Jan/1 Feb, 8 B-24s, attacking at intervals, bomb Wotje Atoll (Office of Air Force History 1973).

1944 4 February, B-24s bomb Wotje (Office of Air Force History 1973). B-25s also hit Wotje (Office of Air Force History 1973).

1944 4 March, B-25s bomb airfield installations and runways in bomb Wotje Atoll (Office of Air Force History 1973).

1944 4 May, 12 B-25s, pound Wotje Atoll, using Majuro as a shuttle base for rearming between the strikes (Office of Air Force History 1973).

1944 4 September, B-24s flying out of Kwajalein Atoll, hit Wotje (Office of Air Force History 1973).

1944 5 May, 10 B-25s hit Wotje Atoll, using Majuro Atoll as a rearming base between the attacks (Office of Air Force History 1973).

1944 6 August, B-24s flying out of Kwajalein Atoll, hit Wotje (Office of Air Force History 1973).

1944 6 February, B-24s hit bomb Wotje Atoll (Office of Air Force History 1973).

1944 6 March, B-25s bomb Wotje Atoll (Office of Air Force History 1973).

1944 6 May, B-25s from Makin Island and Kwajalein Atoll hit bomb Wotje Atoll (Office of Air Force History 1973).

1944 7 February, B-25s hit bomb Wotje Atoll (Office of Air Force History 1973).

1944 7 January, the last Japanese food supply ship arrives at Wotje for the garrison (Christiansen 1994).

1944 7 May, B-25s bomb Wotje Atoll (Office of Air Force History 1973).

1944 8 January, B-24s bomb Wotje Atoll (Office of Air Force History 1973).

1944 8 March, B-25s bomb Wotje Atoll (Office of Air Force History 1973).

1944 8 May, B-25s bomb Wotje Atoll (Office of Air Force History 1973).

1944 8 September, B-24s flying out of Kwajalein Atoll, hit Wotje (Office of Air Force History 1973).

1944 9 April, B-24s fly over Wotje on a photo reconnaissance mission (Office of Air Force History 1973).

1944 9 May, B-25s bomb Wotje Atoll (Office of Air Force History 1973).

1944 During a dusk-to-dawn operation on 9/10 Feb, B-24s operating at intervals maintain strikes against Wotje Atoll (Office of Air Force History 1973).

1944 During the night of 13/14 Feb, B-24s operating individually at intervals, bomb Wotje Atoll (Office of Air Force History 1973).

1944 During the night of 21/22 Apr, B-24s from Kwajalein Atoll bomb Wotje Atoll; other B-24s from Kwajalein follow with another raid on Wotje during the day (Office of Air Force History 1973).

1945 End of World War II grants effective control of the Marshalls to the U.S.

1945 September, On Wotje, by the end of the war, of the nearly three-thousand-man Japanese garrison, just 1,070 survived. They heard of Japan's surrender on a broadcast from Australia (Peattie 1988).

1945 Wotje's population is 458 (Bryan 1972).

1946 U.S. begins its nuclear testing program in the Marshalls. Bikini atoll is evacuated to Rongerik for first tests under Operation Crossroads.

1948 Wotje's population is 320 (Spennemann 2000).

1951 US Department of the Interior assumes responsibility within US Government for the TTPI from the Department of the Navy.

1952 The first hydrogen device (Operation Ivy) under the US testing program in the Marshalls is fired on Eniwetak on 1 March. The Eniwetak 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, Rongerik, Utirik and Ailinginae (Deines et al. 1990).

1958 Wotje's population is 361 (Spennemann 2000).

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 Wotje's population is 396 (Spennemann 2000).

1970 Wotje's population is 357 (Bryan 1972).

1972 In December Wotje is hit by Typhoon Violet (Spennemen and Marschner 1994-2000).

1973 Wotje's population is 419 (Spennemann 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 The Airline of the Marshall Islands (AMI) begins operation, serving eight locations; Eniwetak, Bikinni, Kwajalein, Mille, Likiep, Maloelap, Wotje, and Majuro.

1980 Wotje's population is 535 (Spennemann 2000).

1982 Official name changed to the Republic of the Marshall Islands (RMI).

1983 Amata Kabua selected second time as president.

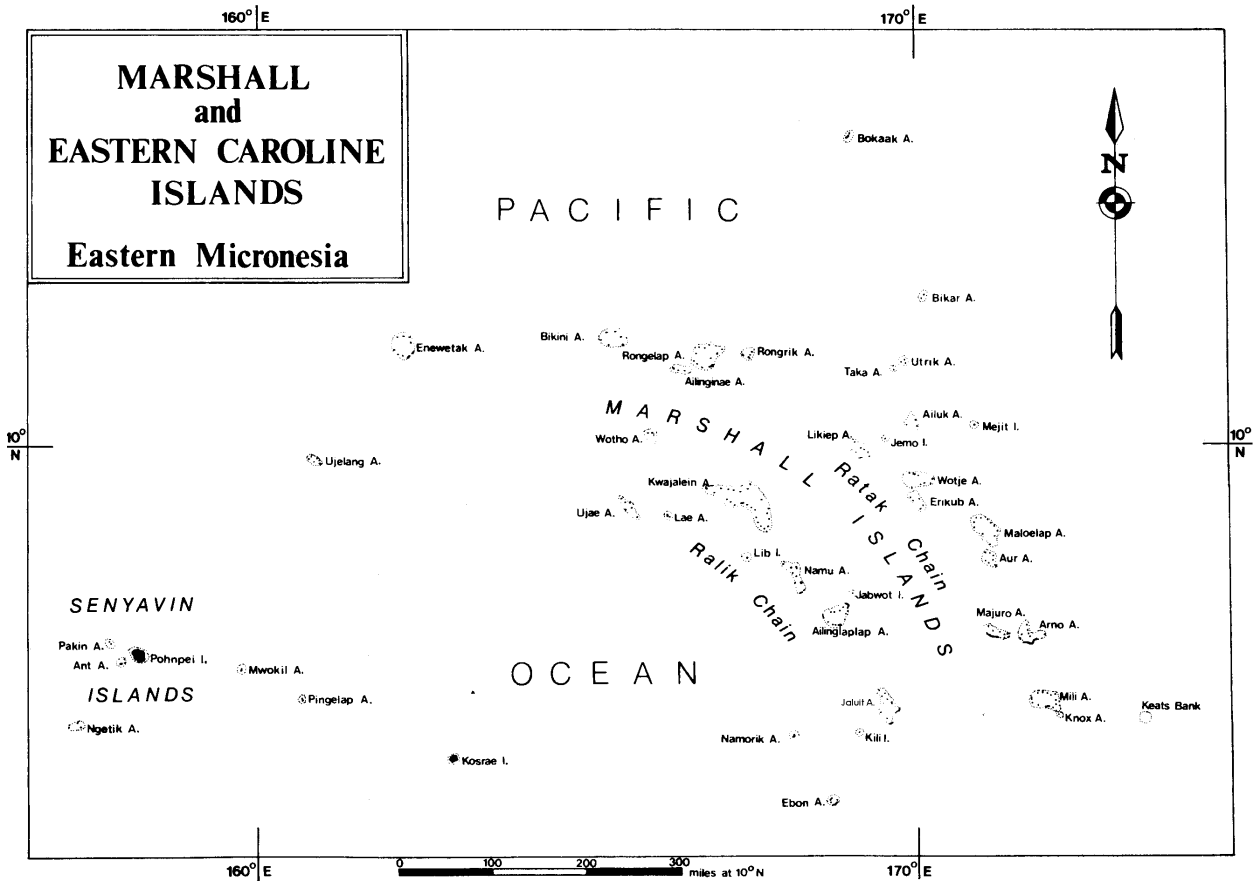
1983 Voters in the RMI approve the Compact of Free Association with the United States.

| | |
|---|---|
| 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 | In third election, Amata Kabua is selected as president. |
| 1988 | Wotje's population is 646 (Spennemann 2000). |
| 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. |
| 1991 | In fourth election, Amata Kabua is selected as president. |
| 1991 | RMI joins the United Nations. |
| 1991 | Tropical Storm Zelda (which later developed into a typhoon) makes its way to Wotje (Spennemen and Marschner 1994-2000). |
| 1992 | Typhoon Gay strikes Wotje (Spennemen 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. |
| 1996 | Amata Kabua dies. |
| 1996 | In fifth election, Amata Kabua is selected as president. |
| 1997 | Imata Kabua selected to finish the late Amata Kabua's term. |
| 2000 | Kessai Hesa Note selected as president. |
| 2001 | Current Compact of Free Association expires. |

## 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 (Map 1). Twenty-two of the atolls and four of the islands 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. It's nearest neighbors are Kiribati to the south and the Federated States of Micronesia to the west.




Map 1: Republic of the Marshall Islands

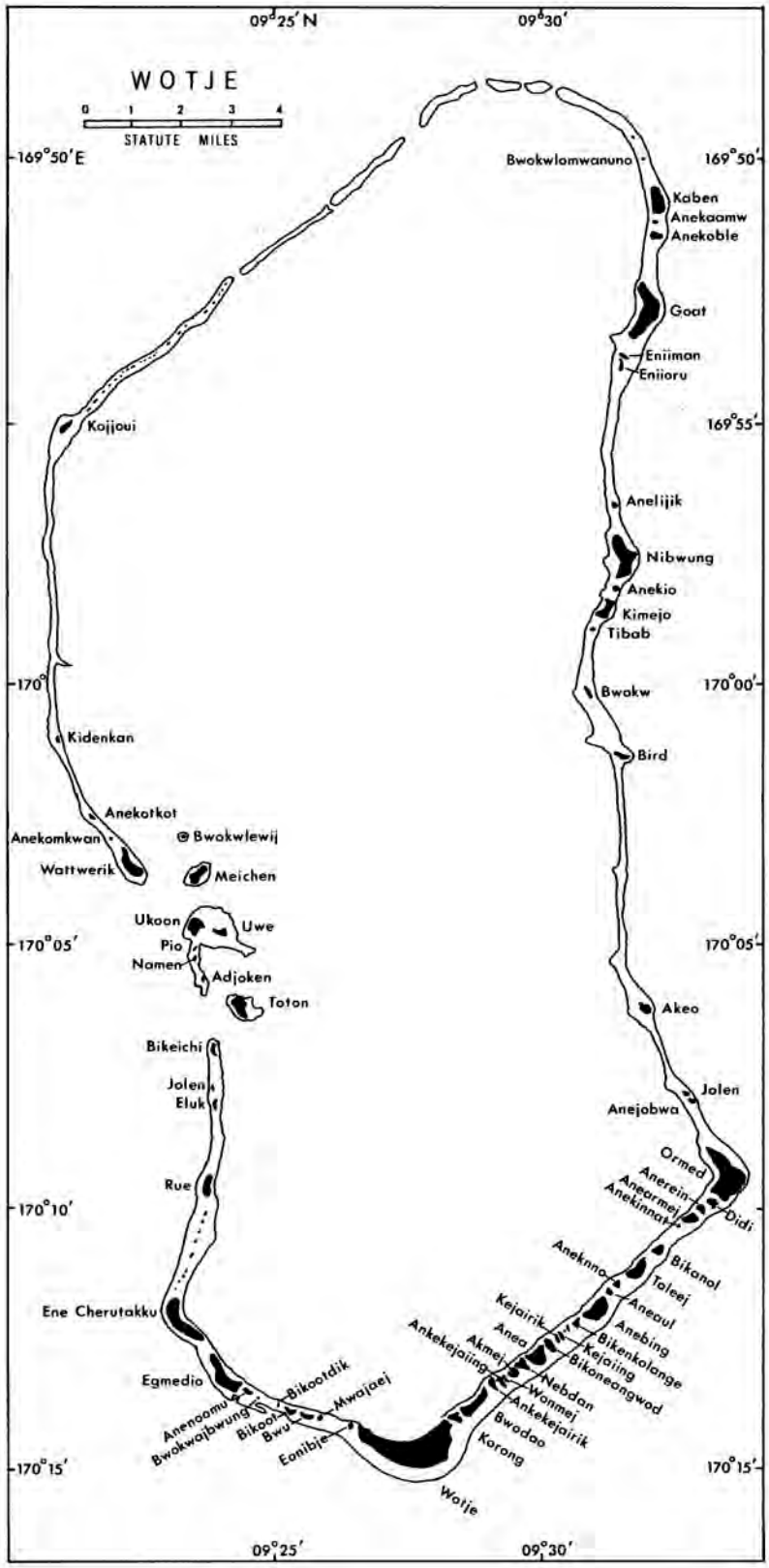
There are approximately 1,225 islets spread across an area of over 750,000 square miles (1.2 million square km). With a total land area of 70 square miles (110 square kilometers), a mean height above sea level of about 7 feet (2 meters) above sea level, and soils which are nutrient poor, the nation's agricultural base is limited. The marine resource base is extensive, however. The combined lagoon area totals 4,037 square miles (6511 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 (Spennemann 1993).

Wotje Atoll is part of the Ratak Group of the archipelago of the Marshall Islands (Map 2). It is located $9.5^{o}$ north latitude and $170^{o}$ east longitude. The atoll contains approximately 75 islands. It is a large atoll about 26 miles long and 11 miles wide. It has a land area of 3.16 square miles and a lagoon area of 241.06 square miles. The lagoon is deep with several ship passages. These are located in the western and southern parts of the atoll. The reef surrounding Wotje Atoll is equally divided into a eastern half which dries at spring low tide, and a western half, which remains about one meter under water at low tide.




Map 2: Wotje Atoll.

### *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. In December of 1972 Wotje was hit by Typhoon Violet and in 1991 Tropical Storm Zelda (which later developed into a typhoon) made its way to Wotje. Typhoon Gay struck in 1992. (Spennemen and Marschner 1994-2000).

The only atoll for which complete weather data exists is Majuro, where a U.S. National Oceanic and Atmospheric Administration Weather Station is located. Annual rainfall varies considerably from north to south; the southern atolls receiving 120-170 inches (300-430 cm), and the northern atolls receiving 40-70 inches (100-175 cm) (NOAA 1989) The highest rainfall generally occurs during the *Anon Rak* season, also known the breadfruit season (June to October). Precipitation is generally of the shower type; however, continuous rain is not uncommon. During the *Anon Ean* season, also known as the pandanus season (January to March), 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).

### *2.3 Vegetation*

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*) (OPS 1991).

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 include 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 maritama, Pemphis acidula, Tournefortia*); and a layer of ground cover consisting of several species (*Lepturus repens, Thuarea involuta, Fimbristylis cymosa, Polypodium scoloprendria*). Several mono-specific forests occur in the Marshall Islands (*Neisosperma, Pisonia grandis, Tournefortia argentea*) (Fosberg 1990). Shrubs such as *Pemphis acidula, Suriana maritama*, 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 altilus, Cyrtosperma chamisonnis, Pandanus tectoris*) 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.

The vegetation of Wotje Island consists of coconut trees, bananas, breadfruit, papaya, and pandanus. Oceanside vegetation consists of a mixed broadleaf forest of a few trees and many shrubs. *Scaveola sericea* covers the coastline. *Hibiscus tiliaceus* are scattered over the entire island (Spennemann 1992).

### *2.4 Sea Level Changes*

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. As predicted by scientists (global warming red alert), the archipelago of the Marshalls is among the Pacific nations that will be affected by the rising of the sea level within the next fifteen to twenty years.

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 was a god-given sanctuary away from the harshness of other areas is therefore part of the sociocultural identity of the people. However, 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

Land is the most highly prized possession in the Marshall Islands therefore control of land is the central most theme of Marshallese culture. With slightly less than 70 square miles of land in the entire archipelago and prime settlement areas being extremely limited, land has long been highly valued.

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*) is steward of the lineage land holdings. The majority of land is matrilineally inherited, *bwij* members tracing descent from a common *Alap* ancestress (Tobin 1958).

The basic land division of the Marshall Islands is composed of sections of varying width which run from ocean to lagoon. These ownership parcels, called *wetos*, are usually two to five acres in area. The *wetos* are held communally and administered by matrilineal lineage (*bwij*) members who traditionally cleared and tended the land for subsistence agriculture. Social position is derived according to both present and future land ownership rights.

Title is divided and shared by several levels of the society. Typically, each member of the *bwij* holds one of four recognized social positions with respect to the *weto*, being either the *iroojlaplap* (paramount chief of certain lands), the *iroojedrik* (lesser chief of certain lands), the *alap* (person with immediate management responsibility for the land), or *drijerbal* (worker on land).

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 k*ajur* 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 (Tobin 1952)

Historically an Irooj was able to extend his control over most of the Ralik (except Eniwetak 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 the were isolated and somewhat impoverished (Alikire 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*.

Traditional rights of land tenure are unequivocally preserved in the Constitution, and the traditional requirement of consensus decision making, in which all persons with land rights to a certain weto must agree on questions of land transfer is retained.

The traditional land tenure system confounds Western-style efforts of historic preservation. Landowners are accustomed to exercising ultimate control over land use and access, and are therefore generally unaccepting of regulations which might restrict the usage of their property.

## IV Field Investigation

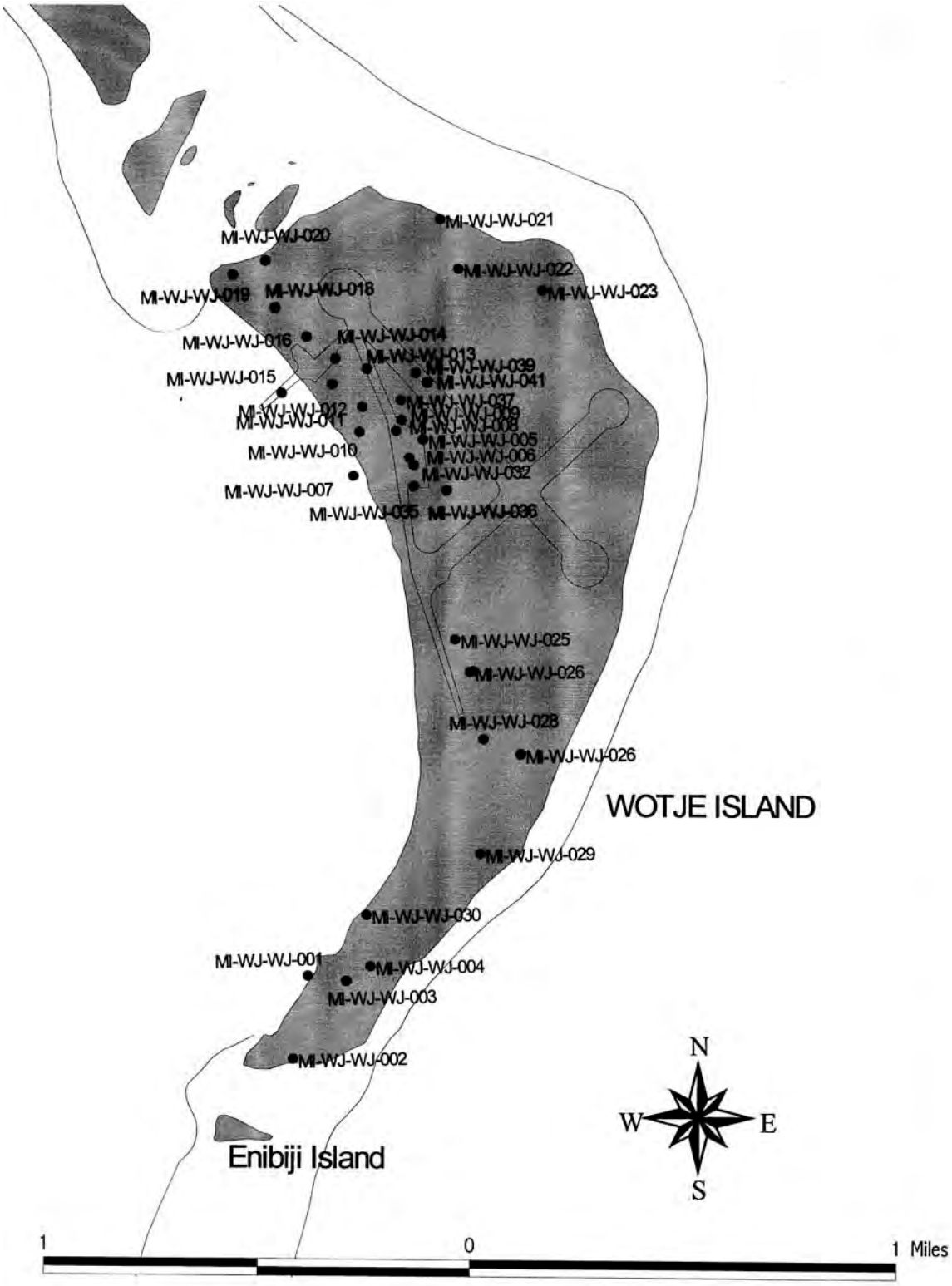
### *Wotje,Wotje*

Wotje, the main island of Wotje Atoll, is peppered from one end to the other with WWII remains. Huge Japanese-built structures, some bombed out, others still habitable are scattered through Wotje. The lagoon is also full of wreckage, including a few ships of interest to wreck divers. Forty-one sites were recorded on Wotje Island (Map 3).

Henrik Christiansen surveyed the WWII remains in 1994. Part of the focus was to return to Wotje to determine how much deterioration had taken place. We also wanted to test the results of the Conservation Project conducted in 1993 to see how the painted gun had held up.

Following are the corresponding site numbers from Christiansen's report and this survey:

| **Site Numbers** | **Christiansen's corresponding Site Numbers (1994)** |
|---|---|
| MI-WJ-WJ 001 | C426 |
| MI-WJ-WJ 003 | C731 |
| MI-WJ-WJ 004 | C518, C524, C507 |
| MI-WJ-WJ 005 | D793 |
| MI-WJ-WJ 006 | D594 |
| MI-WJ-WJ 007 | D586 |
| MI-WJ-WJ 008 | D590 |
| MI-WJ-WJ 010 | D750 |
| MI-WJ-WJ 011 | D614 |
| MI-WJ-WJ 012 | D633 |
| MI-WJ-WJ 013 | D620 |
| MI-WJ-WJ 014 | D643 |
| MI-WJ-WJ 015 | D657 |
| MI-WJ-WJ 018 | D709 |
| MI-WJ-WJ 020 | D714 |
| MI-WJ-WJ 021 | A101 |
| MI-WJ-WJ 022 | A73 |
| MI-WJ-WJ 025 | C733, C372, C282, C731 |
| MI-WJ-WJ 027 | A402, C405, C410 |
| MI-WJ-WJ 028 | C390 |
| MI-WJ-WJ 029 | C448, C451, C453 |
| MI-WJ-WJ 033 | D581 |
| MI-WJ-WJ 035 | D561 |
| MI-WJ-WJ 037 | D577 |




Map 3. Map of Wotje with Sites.

Site MI-WJ-WJ-001 (Marshall Islands - Wotje Atoll - Wotje Island -Site No.001)

GPS Coordinates N: 9° 26' 17.71"
E: 170° 13' 52.33"

Remnants of what was once a combined blockhouse and pillbox (Photo 1). It was located on the southeast end of the island and had three gun ports separated and protected on the outside by low triangular walls. It had four heavy air ventilation shafts and one entrance. According to Christiansen, the site had no internal walls between the gun ports as was normally seen in the blockhouses. It was soundproofed by wooden walls.

Photo 1 Blockhouse/Pillbox.

Site MI-WJ-WJ 002

GPS Coordinates N:9° 26' 06.88"
E: 170° 13' 49.77"

Fragment of Observation Tower (Photo 2).

Photo 2 Observation Tower

Site MI-WJ-WJ 003

GPS Coordinates N:9° 26' 16.83"
E: 170° 13' 57.45"

Site MI-WJ-WJ 003 is a memorial site located at the south tip of the island (Photo 3). It was built by a Japanese bereaved organization after the war in memory of convict prisoners who died there even before the fighting began.. It consists of two concrete stone pillars with Japanese writing sitting on a concrete base. The monuments measure 1.75 x 1.25 x 1.55. The pillars are approximately 5.5m apart.

Photo 3 One of the two Japanese memorials.

Site MI-WJ-WJ 004

GPS Coordinates N: 9° 26' 18.60"
E: 170° 14' 00.60"

This is a WWII radiostation site. It is located in the southern end of the island. The main structure was a two story building measuring 33m x 13m (Photo 4). The second floor is missing. The floor section consisted of two rooms and an annex. One room in the end of the building had a direct hit causing the walls and roof to collapse. The remaining room was undamaged. The floor was divided into several small sectors as rows of horizontal concrete beams divide the floor at a distance of 80cm – 1m apart (Photo 5). A wooden floor had rested upon these beams.

Also parts of this site are the mast footings which anchored the radio tower. They are concrete blocks set in a triangle. The lower part of the masts are still attached to the footings as are two of the winches of the radio tower (Photos 6 & 7).

Photo 4 Radio station.

Photo 5  Inside view of Radio station.

Photo 6  One of three winches, part of radio tower complex.

Photo 7 Winch and concrete port (Radio tower).

Site MI-WJ-WJ 005

GPS Coordinates N: 9° 27' 27.24"
E: 170° 14' 09.55"

This is a 12 Cm Coast Defense Gun is located next to the church in the central habitation area on Wotje on the Lukon *weto*. It originally was located on a cargo ship *Goyotsu Maru*, which was beached in 1942 off Kimejo Island. It was recovered from the wreck and placed on the northwest point of the island but later removed and placed it on it's current position in the 1970s.

In 1992 as part of the RMIHPO Conservation Management Plan, the gun was cleaned, primed, and painted to aid preservation. Corrosion was removed by hand using scraping, wire-brushing, and sanding. Zinc-rich primer was used on the middle section of the barrel and red-lead primer was used on the remainder of the gun. Two coats of primer were applied followed by two coats of finish paints. Two different colors of finish paint was used. The color taffy was chosen as the final color (Look and Spenneman 1993).

As demonstrated by the photos, the zinc-rich paint (light blue color) which was applied to the middle section of the gun was not very effective. The red-lead paint (light green color), used on the front and back sections worked very well (Photos 8-13).

It is recommended that the gun be cleaned and repainted again using the red-lead paint. The gun should be painted every 3-5 years to prevent further damage.

Photo 8  12cm Gun showing the zinc-rich and red-lead primer areas painted in 1992.  The light green color at the opposite ends of the gun is the red-lead primer.  The blue color in the middle is the zinc-rich primer.

Photo 9  12cm Gun showing the zinc-rich and red-lead primer areas painted in 1992.  The light green color at the opposite ends of the gun is the red-lead primer.  The blue color in the middle is the zinc-rich primer.

Photo 10  12cm Gun showing the red-lead primer area painted in 1992.  The rust is where the zinc-rich primer was applied.

Photo 11  12cm Gun showing the zinc-rich primer area painted on the barrel in 1992.

Photo 12  12cm Gun showing part of the red-lead primer area painted in 1992.

Photo 13  12cm Gun showing part of the red-lead primer area painted in 1992.

Site MI-WJ-WJ 006

GPS Coordinates N:9° 27' 25.04"
E: 170° 14' 07.71"

This is a warehouse site (Photo 14). It measures 21m x 20m x 4.10m. We did not go inside as it is occupied as a living residence. Christiansen (1994) described it as having seven rooms divided by internal concrete walls. There is also a hallway and a set of small gutters along the edge of the building. This warehouse was used as a rice polishing plant (Christian 1994).

Photo 14 Rice Polishing Plant.

Site MI-WJ-WJ 007

GPS Coordinates N: 9° 27' 22.64"
E: 170° 14' 00.35"

This is a WWII pier site. It extends approximately 260m into the lagoon and is 12m wide (Photo 15). It has a sand and gravel fill supported by concrete sides. The end of the pier has collapsed although there is still rubble of a large crane (Photo 16) and a machine gun nest (Photo 17).

Photo 15 Main dock.

Photo 16  Crane remains.

Photo 17  Machine Gun Nest.

Site MI-WJ-WJ 008

GPS Coordinates N: 9° 27' 29.82"
E: 170° 14' 06.79"

This site is building which was the land-base air control center (Photo 18). It is a square concrete building located on the Jikbidu *weto*. The columns on the north, south, and west sides are intact except for a few bullet holes; on the east front two pillars have been partially destroyed by bullet holes. Rebar is seen protruding from the remaining pillars (Photo 19).

Photo 18 Air Control Center, North side.

Photo 19 Air Control Center, South and part of west sides.

Site MI-WJ-WJ 009

GPS Coordinates N: 9° 27' 28.53"
E: 170° 14 ' 06.05"

This is a Fuel Storage site and it is located at the northwest area of the island near the lagoon. It is also on the Jikbidu *weto*. The horizontal steel tanks (Photo 20)are reinforced by a layer of concrete. The tanks are 10m long with a diameter of 6m. There is a reinforced earth embankment along the sides and a concrete service alley in front of the tanks (Photos 21 & 22).

Photo 20 Fuel Storage, Site MI-WJ-WJ 009.

Photo 21  Fuel Storage and concrete service alley.

Photo 22  Close-up of concrete service alley.

Site MI-WJ-WJ 010

GPS Coordinates N: 9° 27' 28.53"
E: 170° 14' 01.27"

Site MI-WJ-WJ 010 is five 15cm Field Artillery Gun Emplacements (Photo 23), three of which were located on Likbidu *weto* and two others on Awao *weto*. These are empty concrete revetments made for 15cm mobile field guns which consist of two concrete ammunition boxes which measured approximately 1m x 2.5m x 1.4m. A one meter low wall approximately 30cm thick connects the two boxes. The wall facing the ocean is semicircular. The last two had been partially destroyed; one in the late 1960s and the other in the late 1970s when a wave hit it.

Photo 23 Gun revetment.

Site MI-WJ-WJ 011

GPS Coordinates N: 9° 27' 31.66"
E: 170° 14' 01.73"

This is a Fuel Storage site similar to site MI-WJ-WJ 011. It is located on the Torko *weto*. The horizontal steel tanks are reinforced by a layer of concrete. The tanks are 10m long with a diameter of 6m. There is a reinforced earth embankment along the sides and a concrete service alley in front of the tanks. The tanks are covered with machine gun holes.

Site MI-WJ-WJ 012

GPS Coordinates N: 9° 27' 34.70"
E: 170° 13' 57.86"

Site MI-WJ-WJ 012 is the *Kiko* School compound, ran by the Japanese. Marshallese children went to this school from grades 1-3. Grades 4-6 were sent to school in Jabor, Jaluit. The schoolhouse is a red brick building located next to the lagoon on the northwest side of the island (Photo 24). Two walls, a door and five windows are all that survived the bombing of Wotje.

The remnants of the cook-house and water catchment are located behind the school. This site is on the Ekmoumj *weto*.

Photo 24 Kiko Schoolhouse.

Site MI-WJ-WJ 013

GPS Coordinates N: 9° 27' 36.54"
E: 170° 14' 02.46"

Radio station. This is one of two radio stations on Wotje (the first one is site MI-WJ-WJ04). This is a WWII radio station site that is located on Jenma *weto*. The main structure was a two story, T-shaped building containing a reinforced communication center (14.5 x 7.6 m) at one end and a staff section (45.5 x 12.5) on the other end which has collapsed (Photo 25). The roof has collapsed onto the floor of the second story (Photo 26). The area containing the toilets and kitchen area has also collapsed. There are also three radio towers bases, which are concrete blocks arranged in a triangle. The lower parts of the masts remain as does the winches. The steel beams of the towers are scattered over a wide area.

Photo 25 Radio Station, Site MI-WJ-WJ 013.

Photo 26  Inside the Radio Station.

Site MI-WJ-WJ 014

GPS Coordinates N: 9° 27' 38.01"
E: 170° 14' 58.32"

. This was the Air Control Center for seaplane operation. The building is a concrete square (Photo 27). The four pillars on the north and east sides are intact except for bullet holes. The southwest side of the building was damaged. The south side is missing it's southwestern pillars. The west side is partly intact except where the roof over the outer hall has collapsed. All steel doors and windows remain in place.

Photo 27 Seaplane Air Control Center.

Site MI-WJ-WJ 015

GPS Coordinates N: 9° 27' 33.78"
E: 170° 14' 51.24"

This is a 230m seaplane ramp, a hard-surface apron, and a large hanger which is located on the Monkiden *weto* (Photo 28). A taxiway connected the seaplane ramp to the NW turning circle. The ramp is 230m long, 21m wide near land, and 33m wide where it slopes into the lagoon (Photo 29).

Photo 28 Seaplane Ramp.

Photo 29 Seaplane Ramp.

Site MI-WJ-WJ 016

GPS Coordinates N: 9° 27' 40.95"
E: 170° 14' 54.73"

This is a pillbox located on Monkiden *weto*. It is facing the beach. The gun port is semicircular and enabled the gunner to sweep the beach at almost 180˚. It measures approximately 4m x 4m (Photo 30).

Photo 30 Pillbox.

Site MI-WJ-WJ 017

This is the site of the pilots wooden barracks located near MI-WJ-WJ 016. It has been completely destroyed.

Site MI-WJ-WJ 018

GPS Coordinates N: 9° 27' 44.82"
E: 170° 14' 50.78"

This structure was used as a hospital. It is a semi underground, long rectangular, concrete building with dimensions of 19m x 6m with 30cm thick walls (Photos 31 & 32). It rose to a height of 1.86m above ground. The roof is 56cm thick, supported by steel beams. Entrances were located on both ends. It is located on the Monlomar *weto*.

Photo 31 Hospital.


Photo 32 Hospital, side view.

Site MI-WJ-WJ 019

GPS Coordinates N: 9° 27' 49.32"
E: 170° 14' 45.26"

This is a blockhouse (Photo 33) located on the Lorkom *weto*. Blockhouses were heavy reinforced circular strongholds with three or four firing ports for 13mm or 20mm guns. These ports were protected by steel frames or steel shutters which could be controlled from the inside by steel cables and counterweights pulleys.

Photo 33 Blockhouse/Pillbox.

Site MI-WJ-WJ 020

GPS Coordinates N: 9° 27' 51.07"
E: 170° 14' 49.58"

This is a kitchen/food storage/laundry compound is located at the north edge of the Pilots compound, also on the Lorokom *weto*. What remains is a rectangular concrete foundation running north-south which has a cooking area on it's east side with 16 holes for pots including fireplaces (Photo 34 & 35). A water cistern (Photo 36), measuring 2m x 2m x 80cm, is located

in the south-central part of the building, while a gutter runs down the middle of the building under the water cistern. A well (Photo 37) is located on the south side of the cistern. At the north end of the building is three rooms which is divided by inner walls (Photo 38). Another structure which was used to store food is located to the east of the kitchen building.

Photo 34 Cooking area.

Photo 35 Close-up of cooking area.

Photo 36  Water Cistern and drainage.

Photo 37  Well.

Photo 38 Rooms located north of cooking area.

Site MI-WJ-WJ 021

GPS Coordinates N: 9° 27' 55.78"
E: 170° 14' 12.68"

This site is a well preserved concrete Ammunition Storage structure measuring 19.5m x 16.2m x 6m (Photo 39). The structure has no windows and a set of double steel doors protected by a reinforced concrete wall and roof (Photo 40). This structure is used as a residence so we did not go inside. It is located on Lokem *weto.*

Photo 39  Ammunition Storage

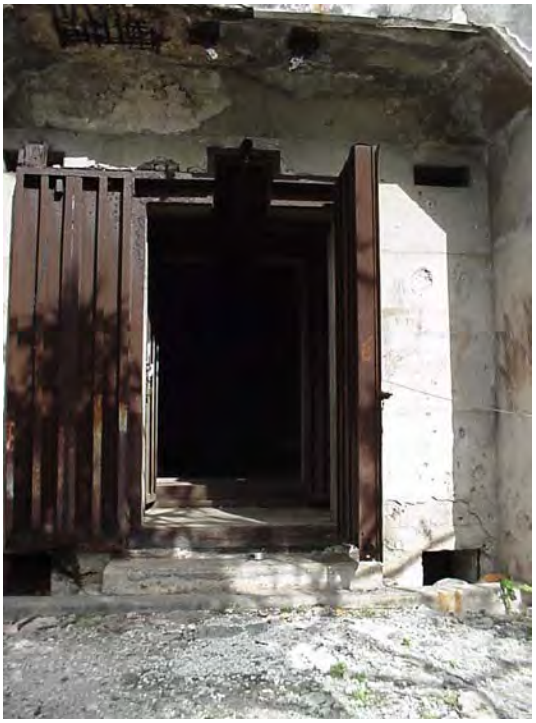


Photo 40  Steel door of Ammunition Storage.

Site MI-WJ-WJ 022

GPS Coordinates N: 9° 27' 49.22"
E: 170° 14' 14.84"

This square building, which was used for ammunition storage, has a steel door on each side (Photo 41). Inside it is supported by 4 large pillars. At present it is being used as a dorm for 43 local high school boys. It is located on Dolnan *weto*.

Photo 41 Ammunition Storage.

Site MI-WJ-WJ 023

GPS Coordinates N: 9° 27' 46.30"
E: 170° 14' 25.93"

This structure was originally used as an ammunition storage building. It took a direct hit by a bomb and is severely damaged. The entire site is overgrown with vegetation. A steel door on the north side has fallen off it's hinges. Inside the ceiling is collapsed. Rusty oil drums litter the interior. Informant Langwos Lakjohn stated that his father had mentioned that the drums were for airplane fuel (Photo 42).

Photo 42 Storage facility.

Site MI-WJ-WJ 024

GPS Coordinates N: 9° 27' 56.78"
E: 170° 14' 15.18"

Site MI-WJ-WJ 024 is another ammunition storage facility. It is located on the Awao *weto*, approximately 500 meters to the south of MI-WJ-WJ 023.

Site MI-WJ-WJ 025

GPS Coordinates N: 9° 27' 00.87"
E: 170° 14' 13.08"

This site was the main powerplant compound on Wotje during the Japanese period. The powerplant (Photo 43) is located in the central part of the island on the Eded *weto*. It is a two-story concrete building measuring 16.77m x 21.3m x 9m. The site took a direct hit by a bomb. The explosion blew the main doors out and the roof up. When the roof settled it broke four of the six concrete pillars leaving the structure beyond repair. The roof was resting on top of two large generators which remain inside. The remaining two walls were standing in their original position (Photos 44-46).

Photo 43  Main Powerplant.

Photo 44  Inside Powerplant.

Photo 45  Generator inside Powerplant.

Photo 46  Inside Powerplant.

Behind the powerplant (toward the west) is a fuel storage facility (Photo 47). It is a square concrete building measuring 12m x 16m. It contains 12 large steel drums that measure 3m x 2.5m (Photo 48). The structure has a steel door on each end and 4 steel windows on both sides.

Photo 47 Fuel Storage.

Photo 48 Tanks inside Fuel Storage.

Directly to the north of the fuel storage facility is a cooler-tank building which provided water to cool the diesel engines which ran the generators (Photo 49). The cooler-tank building took a direct hit by a bomb and sustained damage (Photo 50). The floor is buckled (Photo 51), the ceiling has dropped and the southern and eastern walls are collapsing.

Photo 49 Fuel Storage (building on left) and Cooler-tank (on right).

Photo 50 Cooler-tank building.

Photo 51 Inside Cooler-tank Building.

To the south of the powerplant is a large open water catchment (Photo 52) and south of that is the torpedo storage area (Photo 53). The concrete foundation measures 74m x 18m and remained together with 11 steel racks for storage of torpedoes. There is also a crane for lifting the torpedoes and a compressor room with two large generators and three oxygen tanks (Photo 54). The torpedo assembly is located on Lomor *weto*.

Photo 52  Water Catchments (on left) and Powerplant (on right).

Photo 53  Torpedo Racks.

Photo 54 Compressors and Oil tanks.

Site MI-WJ-WJ 026

GPS Coordinates N: 9° 27' 56.67"
E: 170° 14' 14.51"

We were told that this compound was for high ranking officers. It is also located on the Lomar *weto*. The foundation and generators shown in Photo 55 was supposedly the General's House. The remains of a gun are immediately in front of what would have been the house. To the north and south of the foundation are water catchments. To the east are barracks. The remains of approximately 5 buildings remain. There is also a Japanese shrine on the compound (Photo 56).

To the north of the compound is a hanger and service apron which is located on the south end of a taxiway projecting south from the southwest runway turnaround. The doors of the hangar were sliding and small pillars, built into the foundation wall at a distance of 2.4m, supported the steel girders for the roof (Photo 57).

Photo 55  Compressor at Officers Barracks.

Photo 56  Japanese shrine at Officers Compound.

Photo 57 Hangar foundation and drainage.

Site MI-WJ-WJ 027

GPS Coordinates N: 9° 27' 45.56"
E: 170° 14' 21.17"

Site MI-WJ-WJ 027 is an ammunition storage and gun batteries located on the southeast side of the island on the Buaj *weto*. The structure measured 13.3m x 7.77m x 6m. It was built in relation to the gun batteries to the east The building has a single steel door on the east side and an air ventilation shaft (Photo 58) on the west side. It was heavily reinforced by three large walls made of coral stones, built in a herringbone pattern (Photo 59). Two of these walls were next to the entrance, measuring 2.4m x 3.4m x 6m, while the third was placed in front of the door and the walls, measuring 9m x 3.5m x 6m.

The 127mm dual purpose battery was located to the east of the ammunition storage. We were told that there were three revetments in the battery. Because of dense vegetation, only one gun and revetment was cleared enough to locate (Photo Photos 60-61).

Photo 58 Ammunition Storage (facing west).

Photo 59 Ammunition Storage (southeast corner).

Photo 60  Revetment for 127mm Gun.

Photo 61  127mm Gun.

Site MI-WJ-WJ 028

GPS Coordinates N: 9° 27' 47.78"
E: 170° 14' 16.45"

Site MI-WJ-WJ 028 is a Navy housing compound. All that remains are pillars and steps of structures (Photo 62) and a few foundations, one of which is the shower room/toilet (Photo 63).

Photo 62 Pillars for Navy housing.

Photo 63 Showerhouse and Toliet foundation.

Site MI-WJ-WJ 029

GPS Coordinates N: 9° 27' 32.93"
E: 170° 14' 15.48"

This site is Coast Defense Battery made up of three 150mm guns located on Lainej *weto*. One of the barrels is in a slightly elevated position (Photos 64 & 65). The muzzle of another gun was in a horizontal position (Photos 66 & 67). We were told of a third gun but due to dense vegetation we were unable to examine it.

Photo 64 150mm Gun (south view).

Photo 65 150mm Gun (north view).

Photo 66  150mm Gun.

Photo 67  Close-up of 150mm gun barrel and shell.

Site MI-WJ-WJ 030

GPS Coordinates N: 9° 27' 25.44"
E: 170° 14' 00.21"

This battery is located in the southwest section of the island (Photo 68). Two of the guns survived (Photos 69 & 70) although their revetments were damaged. A third was destroyed although pieces of it remain scattered. There is also a ammunition storage building to the east of the battery although it has been badly damaged (Photo 71). There is also part of a collapsed sea wall laying in the lagoon.

Photo 68 Anti Aircraft Gun Battery.

Photo 69 Anti Aircraft Gun with lagoon in background.

Photo 70  Anti Aircraft Gun.

Photo 71  Ammunition Storage.

Site MI-WJ-WJ 031

This site is a large underground water catchment (Photo 72). Water fed into the cistern from gutters along the runways. This site measures approximately 3m x 10m. On the northwest corner a modern foundation has been raised. This catchement is no longer in use although water continues to seep in.

Photo 72 Underground Water Catchment.

Site MI-WJ-WJ 032

GPS Coordinates N: 9° 27' 23.87"
E: 170° 14' 08.12"

This is a foundation found on Mojbwe *weto*. A building from the WWII period originally was built on it. It has recently been disturbed by an addition of a modern well (Photo 73).

Photo 73  Building Foundation.

Site MI-WJ-WJ 033

This site is the refrigerator plant located on Loned *weto* (Photo 74).  It as nine rooms divided by inner walls and a hallway.  Vegetation has overtaken the back of the structure (Photo 75).  There is a long hall at the entrance and the rooms are located on each side.  One room has two generators (Photo 76), another a crane and a lift (Photo 77).  The remaining rooms were empty.  The building measures 22m x 26m x 4.10m.  A large water catchment is also on the site.

Photo 74  Refrigerator Plant.

Photo 75  Refrigerator Plant (back view)

Photo 76  The generators in the refrigerator plant..

Photo 77  Crane and Lift.

Site MI-WJ-WJ 034

This site is a concrete foundation. The Wotje Catholic School was built on the foundation. It is located on Elolen *weto*.

Site MI-WJ-WJ 035

GPS Coordinates N: 9° 27' 21.23"
E: 170° 14' 08.12"

This is a fuel storage site which consists of 2 large unprotected vertical steel tanks approximately 8m x 6m (Photo 78). This site is located on Elolen *weto*.

Photo 78 Fuel Storage Tanks.

Site MI-WJ-WJ 036

GPS Coordinates N: 9° 27' 20.54"
E: 170° 14' 12.43"

This site is a large underground water catchment which is fed by the service apron runoff, piped in from the drainage (Photo 79). It has the same dimensions as MI-WJ-WJ 031. There are 3 circular openings leading into the cistern. Today it is used for washing. It is located on the Monkin *weto*.

Photo 79 Underground Water Catchment.

Site MI-WJ-WJ 037

GPS Coordinates N: 9° 27' 32.33"
E: 170° 14' 06.60"

This is a hangar located next to the service apron and taxiway. It is located on the Awao *weto*. The dimensions are 31.75m x 41.2m. It had sliding doors and small pillars which were built into the foundation wall at a distance of approximately 2.4m, supported the steel girders for the roof. (Photos 80 & 81).

Photo 80  Hangar (rails for sliding doors).


Photo 81  Hangar Wall and Roof foundation.

## Site MI-WJ-WJ 038

This site is a large underground water catchment which is fed by the service apron runoff. It is completely covered with vegetation. It is not in use.

## Site MI-WJ-WJ 039

GPS Coordinates N: 9° 27' 35.80"
E: 170° 14' 08.96"

This is another large catchment being fed by the service apron runoff.

## Site MI-WJ-WJ 040

This site is a Japanese plane that was shot down by site MI-WJ-WJ 036 and was thought to be moved (Photo 82).

Photo 82 Japanese plane remains.

Site MI-WJ-WJ 041

GPS Coordinates N: 9° 27' 34.69"
E: 170° 14' 10.21"

This is the remains of a Japanese plane which was shot down. It has since been moved to this location (Photo 83).

Photo 83 Japanese Plane Remains.

## 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 historic sites of Wotje Atoll, the long-term goal should be the education of the local and national population on the importance of preservation of these sites. While the Historic Preservation Legislation of 1992 has codified CRM into law, the cultural traditions of the Marshall Islands, namely the importance of land rights to individual landowners, makes the practice of CRM difficult to legislate. And while the Act has established that developers are responsible for the costs involved in conducting archaeological investigations prior to the commencement of construction, there is no precedent case for developers being prosecuted due to violations of that law. Therefore, 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 Wotje Atoll are valuable resources. As such, they warrant an active preservation effort. Primary concern must be the stabilization of the sites. After successful completion of the physical preservation of archaeological remains, further use of these resources has to be planned. The best move for the HPO seems to be raising public awareness and to actively involve local governments in their preservation efforts. Those 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.

The whole landmass of Wotje Island is an excellent showcase of the Pacific war. Partial restoration or simple clearing of the sites and footpaths would allow tourists to visit actual sites associated with real events in WW II. Guided tours and handouts would generate the revenue needed to restore more sites and yield potential employment for local residents. In addition, the numerous underwater sites would be possible tourist destinations. A tourism management plan for Wotje seems to be a valuable investment for the future

### *5.2 Short range recommendations*

The primary goal of every preservation action should be the proper stabilization of sites being threatened by natural forces or human impact. This is especially true for sites that have been determined to be of significance to Marshallese history. At those sites where significance could not be ascertained due to the limits of the survey, a more detailed study needs to be executed. Intensive survey, including detailed recording and limited test excavations, are recommended as the most appropriate immediate course of action.

## VI. Summary and Conclusions

As mentioned in the introduction, the objectives of the present project were very clear and focused on site survey and inventory and education. The present work at the HPO is focusing on surveys of all the atolls within the Republic in order to produce a complete site inventory and National Register. Unfortunately, given the limitations of a reconnaissance survey it must be remembered that only visible historic and traditional sites were recorded. A more intensive survey and possibly limited test excavations are still required.

Part I of this report acquainted the reader with the research design, scope of work, and methodology involved in solving the pre-stated problems. It gave information on previously conducted research, as well as, a critical evaluation of the sources and techniques used.

Part II described the environmental setting of Wotje. Typhoons can drastically alter the landscape of low lying atolls in the Pacific. Sea level changes pose additional threats to atoll environments. It is predicted that the global warming trend will have a tremendous impact on atoll communities within the next century. Information provided on vegetation and soil types was not only used as necessary background information in order to complete RMI National Register Forms, but also provided clues to the likelihood of areas primarily used for agriculture.

Gaining knowledge on land tenure and subsistence strategies was important for evaluating the significance of sites concerning their standing in time and space. Part III also provided valuable information on the artifacts and archaeological data most likely to be uncovered in the field investigations. Although no subsurface testing was conducted, a predictive model could be derived on the basis of this information.

Part IV reported the results of the field investigations. A total of 41 sites were recorded. All were located on Wotje Island.

Part V listed possible long-term and short-term management plans for the preservation of the sites on Wotje.

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## Appendix 1: Traditional Histories

Traditional sites are natural features in the environment to which oral traditions are attached. Prehistoric Marshallese culture was largely an oral society where information was passed down by word of mouth from generation to generation. Knowledge was embodied in stories and chants.

The themes of Marshallese stories are universal: good versus evil; heroism and success of the underdog; the repercussions for children of disobedience; family respect; and sibling and peer rivalry. They are flavored with demons, ghosts, giants, and personified fish and animals. Supportable historical fact is often combined with mythology in the same story.

In all of the stories, morality prevails, and acceptable behavior and traits of character are exemplified so that they may be passed on from old to young, past to present, and hopefully from generation to generation.

There are many variations in the creation accounts. Regardless, the different versions introduce key characters import to Marshallese cosmology.

According to Erdland's sources the Ralik version of creation begins with a being Lowa (or Loa) who lived on the sea, which was bounded by an extensive, low table reef in the south and a swamp in the north. Lowa spoke to the sea, 'See your island reef' and the reef formation appeared. The he said, 'See your sand', and the earth appeared on the reef. Again he spoke: 'See your plants', and plants were growing. Again he spoke, 'See your birds', and they appeared. One of the birds, a white gull, flew up and, while circling, spread out the sky, like a spider weaving its web between two bushes. When Lowa finally said: 'See your human beings' four human beings appeared, one in each direction: Irojrilik, in the west); (LoKomraan) Lakameran (Daymaker) in the east; (Lorak) Rerek in the south, Lajiminanmen (Lajbuineamuen or Lalikian) in the north.

Then a boil grew on the leg of Lowa, from which, when it burst open, emerged Wulleb and Limdunanij. Limdunanij gave birth to two male beings; Lanej (Master of the Heights), and Lewoj (Master of the Middle of the Island).

Wulleb and his sister's children sat down one day on a stalk of an arrowroot. Which, growing up to the vault of the sky, enabled them to ascend. Their peaceful companionship, however, was of short duration. Soon the brothers plotted to kill their uncle, and Wulleb, Lanej, and Lewoj waged war in the dome of the sky. After they had observed each other mistrustfully for several nights, Wulleb's retina tore, and he fell down from the dome of the sky on Imroj. Thus, matrilinearity begins.

When he sighed aloud as the result of his fall, Iroijrilik awoke, came to him and spoke: 'Well, this is Wulleb, and he has fallen from the sky!' Wulleb answered: 'My nephews and I watched one another by night; then when my retina tore, I fell down.' Iroijrilik then spoke, 'Let us go into the hut'. They went into it and three months passed.

When Wulleb had spent some time with Iroijrilik, a large and extremely painful boil developed on the extensor side of his leg. After it became ripe it broke open, two little boys issued from it, the elder of whom was called Jemeliwut, and the younger Edao.

Wulleb sent them to Lijbage (Tortoise woman) on Bikar Island in order to get magical tortoise shell from her. Lijbage – who, with her granddaughter Lijwei, had come from the Gilbert Islands – gave Edao a magical potion which he drank despite all his disgust. By doing so, he became a crafty hero who not only conquered several atolls, but also embittered the life of his brother, Jemeliwut that the latter settled on Majuro Atoll, married there, and finally changed into a silver tree. Edao went everywhere seeking adventure and met sudden death in the Gilbert Islands.

According to Reymond (1899) in Das Weltall, the Ratak version of creation starts with two serpents (or worms), the male was called Wulleb and and the female, Lejman (Woman Rock). They developed into human form in a shell. To make a larger world Wulleb lifted the arch of the shell, using a stick to expand it to the present height of the sky and width of the oceans.

From a boil on Wulleb's forehead emerged Lewoj and Lanej, who were sent to the sky by Wulleb in order to put up the stars. Lejman also had two female offspring, Lino (tidalwave) and Ni (coconut).

Then Wullip collected in a coconut shell the blood from a cut on his leg, and from this blood came Etao (one with the white eyebrow, the powerful, the crafty, the favored one) and Jemelud (father of the rainbow). They went out to conquer. Prior to the conquest of the islands they had already ascended to the vault of heaven in order to defeat their older brothers. That their ascent in the north was successful is clearly shown by the fact that the Northern Hemisphere is less inhabited (studded with stars) by far than the Southern Hemisphere. A bird flew to tell one of the sky gods their plans to defeat their brothers. This god captured Edao's small son, set him impossible tasks, which the son accomplished, then lowering himself to earth on a thread. Edao had settled on Mejit. Bikar was formed by a rock with Etao threw at the bird which had come to spy on him.

For clarification, from the Ralik chain the cosmological genealogy is as follows:

Lowa

Wulleb — Limdunanij

Jemaliwut, Edao — Lanej, Lewoj

From the Ratak chain the cosmogonic genealogy is as follows:

Wulleb — Lejman

Jemaliwut, Edao, Lanej, Lewoj — Lino, Ni

Other accounts add information, some contradictory. According to Knappe the frist being was Wulleb who lived with his wife on the invisible island of Eb. One day a tree grew from Wulleb's head, split his skull, and out came Edao and Jemeliut. Edao quarreled with his father and went away, flying through the air with a basket of earth some of which spilled through

a hole, so that the islands came into existence in the sea. Then Edao planted the land, created land and sea animals, and married his mother. Then the bird Babuk came with the female sexual organ in his beak. Etau hid it. Lejman found it and put it on. Neither wore clothes at this time but Lejman became ashamed and took two mats as covering (beginning of clothing). From there union came the first people. In this version it is Edao who is credited with creating the animals and plants. According to Knappe (1888) the woman wasn't ashamed at her nakedness but because she had an incestuous relationship with her son.

Davenport's version states that Lowa sent a man who put all the islands in a basket and arranged them, first the Carolines, then the two chains of the Marshalls, Namorik was dropped out of order. The basket was eventually thrown down and became Kili.

In several versions Lowa sent two men to tattoo (on Ailinglaplap) all the living creatures', thus giving them colors and markings (Davenport 1953, Chambers 1969, Buckingham 1949). Lowa sent two men down to Bikini with measurements for the first canoe (Buckingham 1949, Davenport 1953). A woman bore a son and a coconut. At his request she buried the coconut, which grew into the first coconut tree. Again at his request she husked a coconut and the husks floated to Iroijirilik, who made sennit with them. The sennit was taken by a bird and flew into the air with the rope making a net and widening and raising the sky, holding it up. Rain is water separated into drops falling through the net (Kramer and Neverman 1938, Buckingham 1949, Chambers 1969) Everyone went to Namu to honor Liwatonmour, founder of the Irooj clan. From this gathering came all clans, with *Irooj* as the highest (Chambers 1969).

There are many other stories which explain the origin of the sailing canoe (Liktanur and her son's canoe race) (Kramer and Neverman 1938, Erdland 1914, Buckingham 1949, Davenport 1953), the origin of navigation (Buckingham 1949), origins of animals, breadfruit (Mackenzie 1960); taro (Bikajle 1960).

Wotje Atoll during the War by Tarwoj Lakjohn[2]

To me, life on Wotje before the war, was a good life. Prices of goods were cheap, copra rates were high, our jobs easy and didn't require much manual labor. This was before the war and with the Japanese. When I was about eight years old, I began my education with the Japanese here on Wotje. I spent three years here on Wotje, then went to school on Jaluit for another two years before I graduated and returned home.

Going to school with the Japanese wasn't very difficult. As I look back my time with the Japanese wasn't that difficult. The rules and laws they enforced were in my opinion, just and appropriate. Sometimes, we got punished for doing something wrong. Nevertheless, our lives were good, their rules and regulations were right and fair. Before the war started, some of them returned home, and some stayed with us during the war. After about one year into the war, more Japanese arrived on Wotje to begin construction on the military base here. And after about another year, more Japanese troops arrived. There were about a total of 8,000 laborers at that time who were convicted felons and criminals. They were sent over to help build the military base. We were also instructed to help the Japanese with their work. Many Marshallese were brought in from Aur, Maloelap, Ailuk, Likiep, and Utirik. I worked with on of the Japanese companies as a sort of Liason Officer, and also served with the Military Police as a translator for the people. I was also given a salary for the work I did.

[2] Tarwoj Lakjohn was interviewed by Langinbo Frank. Kenny Paul provided the English translation.

One day, while we were working, four airplanes flew by Wotje Atoll. They didn't drop any bombs or fire any shots, they just circled the island. We suspected they were taking photographs of the atoll. After about three times around they left. About two weeks later the Americans arrived. They dropped bombs and fired many shots. They were demolishing all of Wotje. The first U.S. assault of bombs really frightened me since it was the first time I had witnessed such a terrifying incident. The bombs had such a huge impact that dirt and the water came flying out of the ground and created such large and deep craters that we were able to swim in them. I was so afraid during that time that there was to be another war, the fox holes which we hid in would be pointless but the only hopeful thing to do would be to accept Christ as our Savior and to have faith. I was in my twenties during the war and all the Marshallese remained on Wotje until it was over.

One Sunday afternoon we weren't doing anything because it was our day off, all of a sudden three airplanes could be seen approaching the island. The Japanese probably thought the planes were their own, running test flights, but actually they were Americans, because we could see the American flag painted on the bottom of the planes. They dropped fire and burned the entire area.

Some Marshallese living on one of the small islets said they saw a submarine surface near a large coral during the evening. The name of the cora is Laera. They said they could see it just floating there but when night fell they had no idea where it went. The Japanese couldn't see it because the sun would shine in their eyes as they looked out towards the sea. We assumed that the vessel belonged to the Americans since they were at war with the Japanese and we never reported this to the Japanese because we feared we'd get punished for just seeing it.

The Japanese prisoners were sent back to Japan when the war started, but construction workers who built and maintained the base remained for the duration of the war.

We hid in our fox holes as the island was being bombarded by the Americans. Whenever a bomb would land near us, the ground would cave in, and bury us but eventually we would manage to dig ourselves out. Only two Marshallese died on Wotje during the war. A man named Nito and a lady named Bertha. They probably got shot by accident by the Americans when all were flying to another part of the atoll.

Amidst all the bombarding Wotje received, many Japanese soldiers died or suffered severe injuries. They gathered all the dead bodies to an other small islet and burned them.

The Japanese never came to where we fled to. We looked for our own food and so did they. They just remained at the base or at their stations. There was no contact or communications between the Americans and Marshallese, to reach an understanding of where we Marshallese were or where we were going.

We were also very careful in which direction we took when traveling in canoes for we feared the Japanese might shoot us. I didn't actually see the Japanese soldiers get killed by the bombings, but at the beginning of the attack, I saw the bombs destroy the fuel tanks which caused a very large explosion, to the big guns, and basically the whole military base.

When we returned to Wotje from Majuro after the war, the remaining Japanese soldiers were being rounded up and taken to prison. About two weeks later a large ship anchored in the lagoon and took away the prisoners. One of the prisoners escaped before he could be boarded

onto the ship. The next day we searched for him and found him. We took him back with us to wait for the next ship which eventually arrived and took him away.

Of the estimated 6,000 Japanese soldiers who fought on Wotje during the war, about 2,000 of them died. There were many Japanese war planes here, at least 30 of them, and they also had quite a few sea planes.

The school I attended was located on Wotje, Wotje. It is the building with the red bricks. When I returned to Wotje after the war, my main concern was the survival of my family. Our food supply after the war consisted mainly of fish and u, a mature coconut with a fruit like center. Our food sources had been reduced considerably, we would either cook in an underground oven or prepare soup.

All of our houses on Wodmej, had also been destroyed. No single house was left standing except a few on Wotje, Wotje.

When I first saw my home island after the war, I felt very sad and heartbroken. The American were very resourceful in battle with the Japanese. They had special weapons that llit up all of Wotje at night so that you could see the distant islands all the way across the lagoon.

The Americans gave us food and clothes. We were very delighted since these were items we desperately needed. Yes, I know an American Bogan. He helped us Marshallese a lot. He helped negotiate our needs and acted as a messenger between us Marshallese and the Americans. He offered words of comfort and encouraged us to sell our handicrafts so that we could have money to buy things. He lived on Majuro and spent most of his days on Likiep. Bogan began his conduct with Marshallese about three years after the war was over.

During the later stages of the war, contact with the Americans had already been established and they secretly gave us food and other goods. One day the Japanese shot down an American plane over Wotje. The two pilots survived and ended up on Erikup, an island near Wotje. There were two Marshallese men on Erikup with a lot of U.S. canned goods. They were too afraid of the Japanese to return to Wotje. The two American pilots stayed with the two Marshallese on Erikup until they were rescued the following day. Life is quite good nowadays although things have changed altogether. These days everything is very expensive. With the Japanese a pack of cigarettes was only 10 cents each; a pound of flour or sugar was 10 cents each, and a yard of clothing material was about 20 cents. These are the main differences I see today.

I'm not sure if the Japanese put any taxes on the products we bought but I don't think they did. There were not only Japanese owned companies but there were also some companies owned by Marshallese. They also sold products such as food, clothing, and other items. They received their goods from a large Japanese company called *Nan'yo Boeki Kaisha*, the Marshallese just called it BK.

The Japanese highly respected and very much liked our chief, Tomeing. He often played a popular Japanese game *jerbang* with them. Tomeing would play with them all night long and he could also speak their language fluently.

The Americans too, showed great respect for our chief. They would first get permission to come onto Wotje and also to do anything else while they were on Wotje.

My wife passed away last year. We have seven children and about 30-50 grandchildren. I have so many grandchildren, even my grandchildren have kids.

After the war I made copra for a living. Then I went to Majuro to work with the public works division and also helped construct the MIECO building. After a while my mother who was still on Wotje got ill so I returned to Wotje to look after her since I was an only child. My mother passed away and I never returned to Majuro. I remained here spending my days making copra, planting crops, and fishing.