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The Archaeology of Nan Madol and Temwen Island, Pohnpei

**Site Distributions,
Architecture and Early
Agricultural Features,
Pohnpei, Federated States of
Micronesia**

Ayres, Levin, and Seikel 2015

The Archaeology of Nan Madol and Temwen Island

Site Distribution, Architecture, and Early Agricultural Features Madolenihmw, Pohnpei, Federated States of Micronesia

Submitted to the Pohnpei State Historic Preservation Office,
and the FSM Historic Preservation Office
Federated States of Micronesia

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Submitted 2015
© Ayres, Levin, Seikel

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and the University of Oregon

The Archaeology of Nan Madol and Temwen Island

Site Distribution, Architecture, and Early Agricultural Features Madolenihmw, Pohnpei, Federated States of Micronesia

William Ayres and Maureece Levin
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and Katherine Seikel
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Executive Summary:

Archaeological study in the field and the laboratory represents a fundamental way that we gain new information about the human past. This project at Nan Madol and adjacent areas of Madolenihmw undertaken during 2011 provides much additional evidence about site characteristics, ages, and conservation issues for the internationally-known Nan Madol complex as well as for many lesser-known sites on Temwen. The field program included survey examination of islets at Nan Madol and other land areas to locate places of archaeological and cultural importance. The results of the recording and laboratory studies--including details concerning stone architecture and artifacts, as well as paleoethnobotanical remains related to early cultivation--are significant in that they improve our knowledge of early human colonization of Micronesia, of the changing material culture on Pohnpei over a period of 2,000 years, and of natural environmental changes as well as the human induced ones. We note that Pohnpei's archaeological record is complex because of more than 2000 years of human occupation and the thousands of archaeological sites. In addition, the poor preservation of artifacts resulting from environmental conditions is a factor. This work reported here has helped clarify Nan Madol's position in the Pohnpeian context and in the prehistory of central Micronesia. We can now recognize the great differences in preservation needs for sites within Pohnpei and can pose specific conservation plans for individual islets at Nan Madol. These needs exist as well for the archaeological places found on Temwen and elsewhere throughout Pohnpei. The distinction between sites of national as compared to local significance represents a further issue. Importantly, the evidence reported here helps the Historic Preservation Office, and the people of Pohnpei more generally, make decisions about cultural remains and places worthy of long term conservation and protection.

The Archaeology of Nan Madol and Temwen Island

Site Distribution, Architecture, and Early Agricultural Features Madolenihmw, Pohnpei, Federated States of Micronesia

Ayres, Levin, and Seikel

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The Archaeology of Nan Madol and Temwen Island
Site Distribution, Architecture, and Early Agricultural Features
Madolenihmw, Pohnpei, Federated States of Micronesia

W. Ayres, M. Levin and K. Seikel

I. Introduction to Pohnpei Archaeology and the Nan Madol Project

Project Scope

Archaeological investigations on the island of Pohnpei, Micronesia, have been done professionally for decades; however, the record of human colonization and subsequent culture change on the island is still understood only in general terms. This is in part because thousands of cultural remains are found in stone constructions and other sites around the island, because people have been living on Pohnpei for more than 2000 years, and because conditions for preservation of archaeological materials are poor. Thus, a complex record has been created and this creates the need for continued study of archaeological sites. This report describes the results of a field project conducted from September to November 2011. Preliminary reports were submitted in 2012 and a final one in 2013 (of which this represents an expanded version). This work is part of a continuing archaeological and environmental study that focuses on selected localities around the island and, especially, the site of Nan Madol and adjacent areas of Madolenihmw Municipality, principally Temwen. Its general purpose is to improve our record of how people lived on Pohnpei in the past and to understand how the cultural landscape of the island changed. The scale of Nan Madol as an archaeological complex means that its interpretation and assessment is necessarily a long-term and systematic task. It is also one that requires a coordinated effort.

The project staff conducted archaeological field survey, mapped architectural features, examined surface and subsurface artifacts, and collected sediment and botanical samples concerning archaeological sites and early agriculture practices on

Pohnpei. This work was undertaken in cooperation with the Pohnpei State Historic Preservation Office and the national office of the Federated States of Micronesia, as well as the traditional leadership and local landowners in Madolenihmw. The work at Nan Madol continues earlier field studies of the artificial islets forming the complex, including work done by Ayres and co-researchers since 1977 (especially Ayres 1979, 1985; n.d. a; n.d. b; Ayres et al. (n.d./1983); Ayres and Mauricio 1997; Kataoka 1991, 1996) and recently in 2008 (Ayres et al. 2009). Other researchers providing new data and perspectives on Nan Madol include Athens (1980, 1984, 1990), Saxe (Saxe et al. n.d./1980), and Kataoka (Kataoka 2002, 2006; Kataoka et al. 2012; Kataoka and Nagaoka 2015). The University of Oregon studies have been aimed at developing archaeological evidence essential for conservation of distinctive sites that are nationally important as well as ones that are locally significant. Most sites recorded were not previously known to the archaeological community, and thus results--coupled with oral history--are valuable for developing a comprehensive record of archaeological resources on the island. This is essential for individual site conservation and historic preservation, as well as for land use planning.

Archaeological field survey and mapping of early sites that represent stone ruins at Nan Madol and adjacent areas of Temwen Island, Pohnpei, Federated States of Micronesia, as well as preliminary survey efforts at Sekeren, Madolenihmw, were conducted by a research group that included field staff from the University of Oregon and The Australian National University. The work was done from September to November, 2011, and is a continuation of our more recent field studies of Nan Madol (for example, Ayres, Seikel and Levin n.d./2009). It was accomplished with the support of the US National Park Service in cooperation with the Historic Preservation programs of Pohnpei State and the FSM government.

Archaeology and the Historic Record for Pohnpei

Historic preservation efforts in Micronesia have a long history and have provided many positive results. Almost all sites that are under protection today have

at one point been examined as archaeological sites and evidence from artifacts, features and other details has been systematically collected to do this. Many of these sites fall chronologically into a period that is historically documented, that is, written records pertaining to these sites are known and provide details that make the sites significant from the standpoint of historic preservation (see. e.g., Hanlon 1988). This includes archaeological remains from the Spanish, German, Japanese and U.S. periods in Micronesia. However, most sites are “prehistoric,” meaning that no written documentation (considered history) exists, and our knowledge of those places comes from detailed archaeological and, often, environmental study. Importantly, many of the sites from the more recent periods are also known from oral history; that is, traditional oral accounts pertaining to specific sites or areas that are part of contemporary Pohnpeian knowledge (or memory culture) or ones that were written down within the last 150 years or so (e.g., Bernart 1977). This source of information is traditionally highly valued within Pohnpeian society, as well elsewhere in Micronesia, and forms a significant component of site records created by archaeologists and historic preservation specialists. It plays a particularly important role in deciding about site values and significance for purposes of conservation. This project continues the approach of recording direct archaeological evidence as well as taking into account oral and written documentation about places that may be significant to Pohnpeians.

Pohnpei and the Micronesian Setting

Pohnpei, a volcanic high island in the central-eastern Carolines, represents a major Micronesian cultural setting because of its population size, continuous occupation, and political significance (Fig. I-1, I-2). Pohnpei is the largest volcanic island in eastern Micronesia with a land mass of approximately 334 square kilometers. It has a population today of approximately 34,500 people and houses the national government of the Federated States of Micronesia. Located at 7 degrees North latitude, the island receives 4,000-5,000 millimeters of rain yearly and is covered with lush vegetation. Beyond the basic archaeological significance of sites such as Nan

Madol (Yawata 1932; Hambruch 1932-36; Ayres 2003; Kataoka 2009; Kataoka and Nagaoka 2015) and Lelu on Kosrae (Cordy 1983; 1986; Graves 1986) for understanding early Micronesian colonization (Davidson 1967; Shutler et al. 1977; Takayama 1981; Sinoto 1984; Mauricio 1987; Intoh 1997; Galipaud n.d./2000; Weisler 2001), these two site complexes in particular represent major resources for the study of cultural complexity and development of chiefly societies in the Pacific Islands (Alkire 1980; Hughes 1982; Lichtenberk 1986; Petersen 1992; Peoples 1993; Keating 2000; Dietler and Hayden 2001; Clark et al. 2008). The need for broader comparisons of

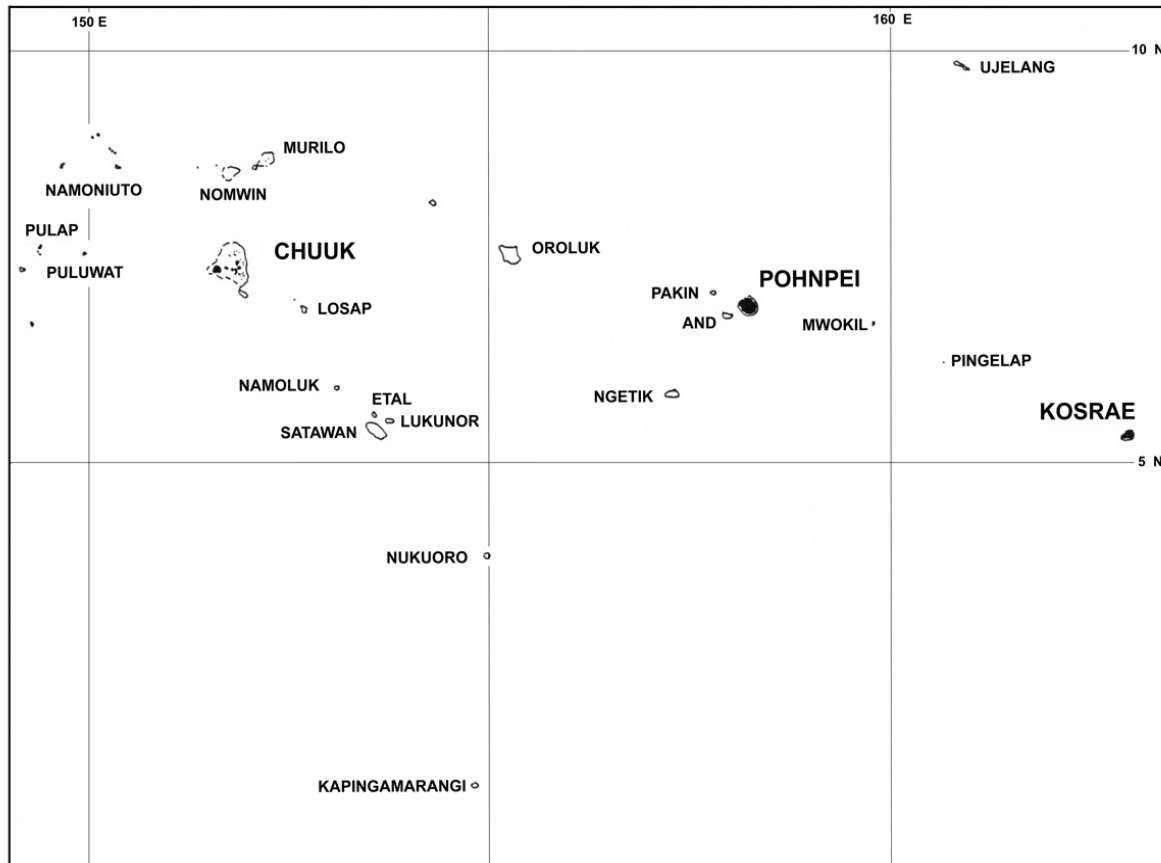


Figure I-1. Map of the Eastern Caroline Islands, Micronesia, showing Pohnpei's location within the neighboring island groups. [image W. Ayres].

chiefly societal developments in the Pacific, especially with Polynesia (Earle 1993; Sand 2002; Kirch and Rallu 2007; Clark et al. 2008), represents a major reason these sites are internationally significant from the perspective of understanding long-term social change in the Pacific.

Research Topics

The specific research topics for this project are 1) the architectural sites of Nan Madol and adjacent areas, including mortuary structures in particular, and 2) evidence of early food production found in old gardening areas, food storage systems, and other agricultural sites. Site documentation work concentrated on sites on Temwen Island and Nan Madol's outer seawall—a continuation of our 2008 project—and included as well re-examination and reconnaissance survey of inland islets within the Nan Madol complex. A basic hypothesis concerning the first topic concerns the use of the Nan Madol seawall for burial and posits that the primary function of the NE seawall was a burial function. This is suggested by oral history (e.g., Fischer et al. 1977; Bernart 1977) and prior archaeological observation.

The purpose is to document how such structures were built and used and what chronological patterns can be distinguished. Through this study, maps of critical stone architectural features at Nan Madol were created, documentation of surface remains (e.g., artifacts, food remains) and construction features was undertaken, and selected features were photographed. This research builds on prior field studies done mostly over the last 30 years by Ayres, Saxe, and Athens (see reference list) at Nan Madol and elsewhere and provides insights into possible status differences and variation reflecting location, architectural style, and surface remains associated with mortuary and other structural remains found on Nan Madol's 100 artificial islets. A basic issue continues to be the definition of the Nan Madol site boundaries and the extent of "Greater Nan Madol" (see Fig. I-3).

To study Nan Madol architectural sites, we cleared selected features on the seawall and mapped them as a continuation of the work done in 2008 on the section of

the Nan Madol seawall from Karian to Angeir at the NE corner of the site. This work was done under the direct supervision of Katherine Seikel. Detailed mapping of Feature 1 at Angeir was one specific result of this work (see Section III). This structure was a burial enclosure (lolong in Pohnpeian) and the results contribute to other evidence related to the nature of earlier mortuary practices for the island. Two other previously recorded lolong on Temwen Island were mapped at a scale of 1:100

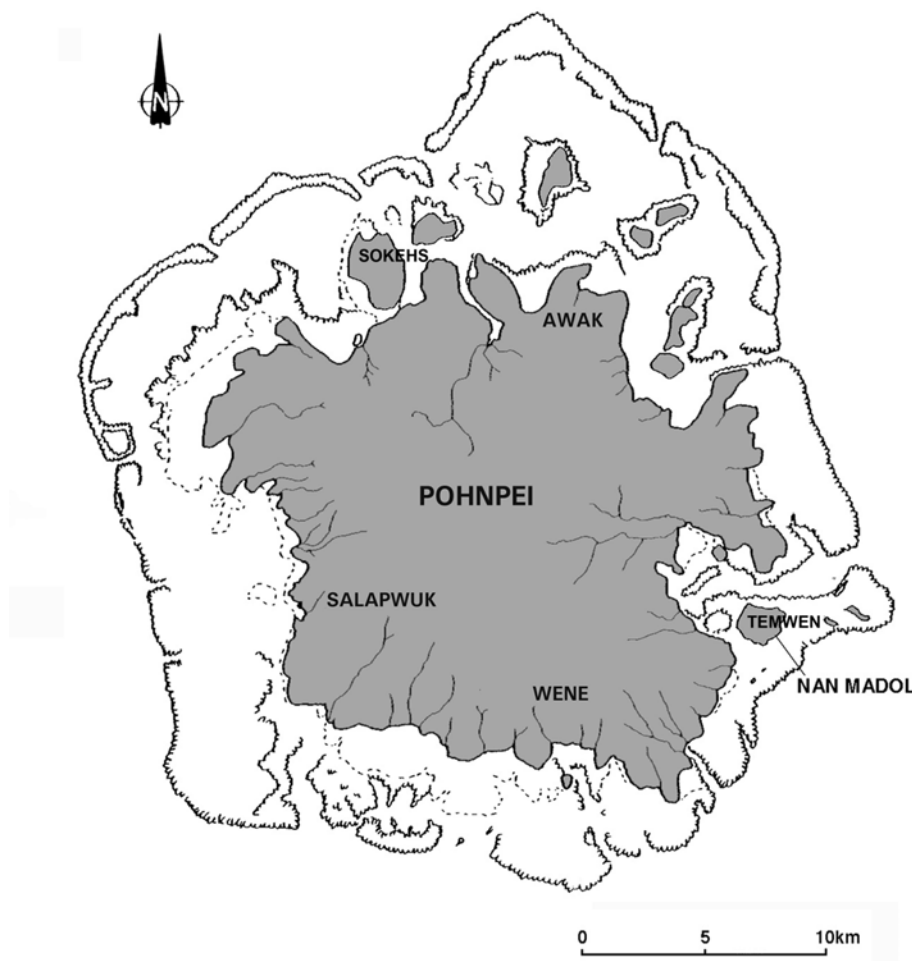


Figure I-2. Pohnpei Island, Federated States of Micronesia. A volcanic high island in the Caroline Islands, Pohnpei shows archaeological evidence of a long process of cultural adaptation to the island and of chiefly societal development. Locations of field studies are shown; Nan Madol, Temwen Island, and other locations in Madolenihmw Municipality are important in this report. [image W. Ayres]

metric and this evidence contributes to understanding the evolution of this mortuary style. Given the importance of funerary constructions at Nan Madol and on Pohnpei in general (Seikel n.d./2008, 2011), and the artifact content of mortuary sites (Ayres 1990; Ayres and Takayama n.d.), this is a significant contribution to understanding Pohnpeian culture in the past.

The second component of the present project included field study of sites and locations where information about early food production, including traditional gardening, arboriculture, field systems, food storage facilities, and water control devices could be collected. The core hypothesis is that Temwen served as an important residential and cultivation area to support activity at Nan Madol. Based on this, we predicted that evidence for agricultural intensification should be evident especially in the areas of Temwen Island adjacent to Nan Madol. We conducted field survey and site assessment and concentrated on land areas and archaeological sites located on the east slope of Temwen Island. The site survey, accomplished under the field direction of Maureece (Reecie) Levin, resulted in 52 new sites located, new site descriptions and excavations, as well as samples collected for laboratory analysis (see Section IV).

Overall, this project contributes to site documentation on Pohnpei and specifically to developing detailed maps and accompanying data for Nan Madol and Temwen sites. Finishing the islet mapping project at a metric scale of 1:100 is essential before longer-term planning for site conservation can be accomplished fully. The Nan Madol work is part of a larger goal to locate stone structures and other burial sites throughout Nan Madol in order to better conserve them. Nan Madol cannot be understood in isolation, that is, its interpretation requires that we know about other developments in settlement and stone architecture around the island. Also, gardening and other agricultural activities represent a fundamental aspect of Pohnpeian life today as in the past, and being able to trace their evolution and varying functions represents a significant historic preservation goal. Again, information about the scientific as well as traditional values associated with such sites improves our ability to make decisions about their conservation.

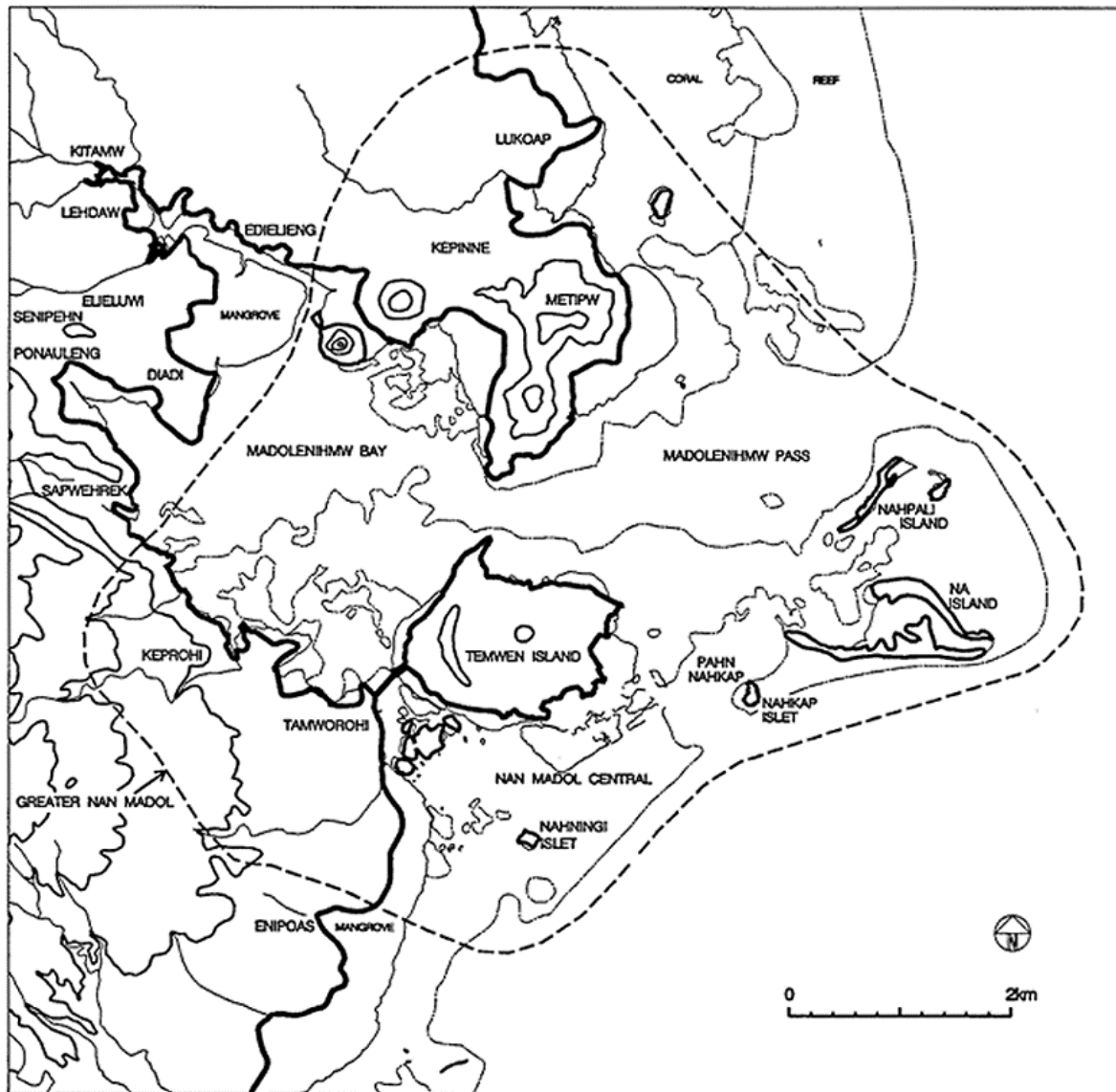


Figure I-3. Map of the proposed "Greater Nan Madol" area, including Nan Madol Central and nearby regions covering approximately 18 sq km (after Saxe et al. n.d/1980; Ayres n.d./1993 and Kataoka's work at Metipw). Topographic contour interval is 50 meters. The focus of the current research is on Nan Madol Central and adjacent Temwen Island.

Historic Preservation Training and Program Development

We continued in the project to help expand an understanding of archaeology and to develop expertise in field methods by carrying out studies on sites of all time periods. As archaeologists, we work with the Historic Preservation Office staff and follow the thinking expressed in earlier cultural resource management project reports and in an article written by Ayres and Eperiam (2001). The research reported here adheres to that tradition (see also, Ayres and Haun 1980; Ayres and Mauricio 1997; Ayres et al. n.d./2009; Ayres 2006, 2013). Also, training local residents to participate in field projects such as ours and to increase awareness of the importance of archaeological study as a means, along with historical documents and oral history, to better understand the origins of Pohnpeian culture were important results as well. This in turn may encourage the younger participants in particular to eventually study archaeology and historic preservation and to engage in cultural conservation for their own island.

II. Research and Documentation Plan

W. Ayres, Maureece Levin, and Katherine Seikel

Overview

This project was designed to carry out archaeological field survey, map architectural features, collect surface and subsurface artifacts as well as sediment and botanical samples, and recover information concerning site features related to early agriculture practices on Pohnpei. This study was proposed in cooperation with the Pohnpei State Historic Preservation Office, the national office of the Federated States of Micronesia, the traditional leadership of Madolenihmw, and local landowners. The research at Nan Madol and on Temwen continues earlier field studies of many artificial islets, including work done by S. Athens and by W. Ayres since the 1970s. Ayres's research has continued in a number of key areas of Nan Madol, and most recently in 2008 (Ayres, Seikel and Levin n.d./2009). Overall, this project was planned to contribute to identification of culturally-significant places and sites and to develop a comprehensive record of archaeological resources useful for land use planning, historic preservation, and conservation of specific sites.

Research at Nan Madol and Temwen Island

We did archaeological field survey and mapping in two areas: 1) on Temwen and at Nan Madol, Madolenihmw, especially for architectural sites and mortuary structures, and 2) areas on Temwen Island adjacent to Nan Madol for agricultural features, and reconnaissance around Madolenihmw Bay. Major concerns were to build on field studies done in 2008 (and in prior seasons) concerning the seawall structures and their burial stonework features, as well as to review the status of surface remains on older interior islets at Nan Madol.

Part 1 – Mortuary Architecture and Related Structures in Nan Madol

Approximately half of the artificial islets at Nan Madol have been archaeologically mapped in detail. The unmapped islets need plan view documentation at a drawn scale of 1:100 metric (as done by previously by Ayres and co-researchers); this allows for a detailed depiction of major architectural features and stonework to best represent what the structures were and to gain an idea of how the islets and stone foundations and walls were used. We observe that Nan Madol islet maps completed at scales smaller than 1:100 (such as 1:200 or 1:500) make it difficult to record differences among distinct kinds of building materials and features. For example, columnar basalt building stones should be distinguished from other, non-columnar, elongated construction materials because such differences represent chronologically and functionally important attributes of islet construction. Completing such detailed mapping of individual stone features is necessary also because much archaeological information is being lost due to erosion and visitor impacts; this project addressed some of those concerns. We had proposed that the Pohnpei State Lands and Survey Office provide GPS control points for surveying; these were to complement data established in 2008 and could be integrated into data obtained in the present field study.

A major interest for the present project was in continuing the mapping and architectural analysis of a series of structures and artificial islets in the eastern seawall called Angeir, Sapwuhtik B, and Lukepenkarian. These were the subject of preliminary survey in the 2008 project (see Report 08-1, Ayres, Seikel and Levin n.d./2009), which identified five mortuary structures in addition to ten other architectural features in need of further analysis to enable assessment and conservation. The 2011 fieldwork focused on detailed mapping, architectural analysis, photography, and site conservation status (Figure II-1).



Figure II-1. An aerial map view of the southeastern portion of Temwen Island, Pohnpei, and the Nan Madol islet complex, showing sections of Nan Madol where field studies were conducted. This included research at the seawall islets: parts of Angeir (ANG), Sapwuhtik B (SWUB), Lukepenkarian (LPK); inner Nan Madol islets: Sapwenpwe (SPW), Sapwaka (SWW), Sapwohng (SOE), Sapwudir (SWD), Nihmokemok (NIM), and Likinpei A and B (LIPA,B), as well as observations on Pahn Kadira, Dorong, Pahnwi and Temwen Island. The place names are from Pohnpeian oral traditions and are part of the Pohnpei HPO-University of Oregon site designation system. [base image Google Earth]

We examined the potential for constructing a relative chronology of mortuary practices for Nan Madol. Given the importance of funerary constructions at Nan Madol and on Pohnpei in general, this will be a significant for a better understanding of Pohnpeian society in the past.

A second component of the Nan Madol part of the project was to analyze selected islets from the perspective of stabilizing architectural remains and protecting surface and sub-surface archaeological deposits. This preliminary study identified and laid out a conservation plan for the site features and artifactual remains found on the islets. Field studies at Nan Madol were to include observations at several other islets, including some detailed surface mapping of features and recording the presence and distribution of artifacts and food remains at islet sites. As shown by our earlier work at Nan Madol, older islets of this sort in the interior of Nan Madol (Ayres et al. 1983), such as PoC3-1-DPK (Ayres n.d./1993; Fig. II-2 here), are particularly important because they contain evidence related to the early development of Nan Madol as a coastal residential and administrative site.

An aspect of this work at Nan Madol was to survey selected islets with conservation in mind. This perspective is critical for planning ahead to enable stabilization of architectural remains, and the protection of surface and sub-surface archaeological deposits. This study incorporated a number of previously mapped islets distributed throughout Nan Madol to provide a representative sample of the site as a whole. The islet survey identified potential conservation issues for each islet and commented on the preservation status of site features and artifact distributions (see Section V and Appendix E). The factors impacting Nan Madol do not affect the site uniformly, due to varying environmental factors. It is important to incorporate this variability to any future site management plan.

In addition to the continuing documentation program at Nan Madol, this project incorporated the mapping and documentation of mortuary structures on nearby Temwen Island. Detailed mapping and excavation at two structures provided valuable data for comparison with information from similar structures at Nan Madol



Figure II-2. View of the eroded islet surface of PoC3-1-DPK, Dauahdpeidak Islet, an interior islet within Nan Madol. Low coral-fill structures such as this represent early constructions near the Temwen shore. The alignment of basalt boulders at the right defines the original south wall of the artificial islet. Scale bar is 1 meter. [image: W. Ayres]

and elsewhere on Pohnpei. This comparison has the potential to construct a relative chronology of architectural forms linked to mortuary practices for the entire island. This project also furthers our understanding of Nan Madol in relation to the rest of Pohnpei. Given the importance of funerary constructions at Nan Madol and on Pohnpei in general, this will be a significant contribution to a better understanding of Pohnpeian society in the past.

Part 2 – Agricultural Survey and Excavations

Archaeological site survey with special attention to evidence of early agriculture was planned for parts of Temwen Island and other selected areas of Pohnpei. This provided a comprehensive record of site types and distributions within selected land areas. The information from Temwen will allow us to document how land areas adjacent to Nan Madol were related to the construction and use of the site. This work is a follow-up study of breadfruit storage pits examined on Temwen by M. Levin in the 2008 project (see Ayres, Seikel, and Levin n.d./2009).

The primary aim for this research is to understand early food production and food storage systems on Pohnpei. We are interested in agricultural development, including prehistoric changes, and how this affected social complexity and the environment. This builds on research started by Ayres and Haun (1985, 1990) and Haun (1984), which examined agricultural systems and their relationship to social stratification and population change.

This part of the project initially focused on reconnaissance and intensive survey to locate and document breadfruit pits, terraces, and gardens through photography and mapping (see Section IV). After initial survey, excavations of selected archaeological features, including the breadfruit pits, terraces, and gardens were conducted and sediment samples were obtained for analysis of plant remains. While samples are being examined for preserved plant macroremains, the focus is on microremains, particularly phytoliths and starch. These analyses have been conducted in the archaeology laboratories at the University of Oregon in Eugene. Because little archaeobotanical analysis has yet been done on Pohnpei and phytolith and starch studies are still rare in eastern Micronesia, this project has the potential to add significantly to knowledge of prehistoric agriculture both on Pohnpei and throughout the region. With agriculture and food being central components of Pohnpeian culture, knowledge of prehistoric agriculture is crucial to understanding and preserving the Pohnpeian past.

Field survey, sediment sample collection, and botanical reference sample collection took place primarily on Temwen Island and on the coast of Madolenihmw. Permission was obtained from local landowners before beginning the study. In addition, we consulted with the Pohnpei State Botanic Gardens to obtain additional information on local economic plants. Some modern reference samples were collected on Pohnpei in order to complement a larger reference collection from across the Pacific. When conducting paleoethnobotanical research, reference materials provide invaluable information for both identification and comparison. Materials from both Pohnpei and other areas of the Pacific will provide crucial information for understanding prehistoric Pohnpeian agriculture. The reference collection being developed will also continue to be useful for future studies on Pohnpei as well as elsewhere in the Pacific.

Preliminary Studies at Imwinsapw-Pahn Sekeren-Sakarakapw, Madolenihmw

As a preliminary investigation, and as identified in our project proposal, we initiated reconnaissance survey of archaeological resources in a valley system on the south side of Madolenihmw Bay (see Figure II-3). This small valley, here referred to using the names of three important places, Imwinsapw, Pahn Sekeren, and Sakarakapw, and its associated watershed together represent a useful sample of residential and settlement systems for the Madolenihmw Bay area. Reconnaissance was undertaken to estimate the nature and extent of archaeological sites in the valley, an area relevant for understanding the larger Nan Madol region. This area and the land around Madolenihmw Bay has been referred to by some archaeologists as “Greater Nan Madol” (for example, Saxe et al. n.d/1980). Dense vegetation represents a significant problem for field study, but a future project to do the detailed survey in this area is being considered.

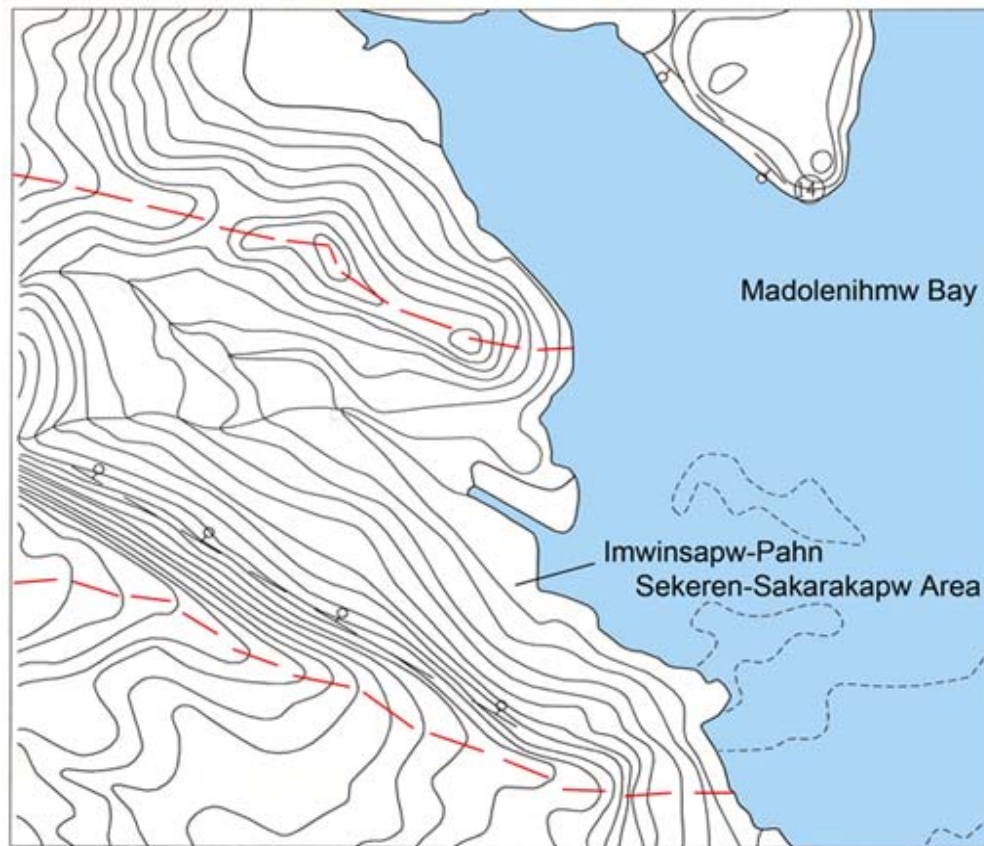


Figure II-3. Topographic map of the Imwinsapw-Pahn Sekeren-Sakarakapw area of Madolenihmw. Information about archaeological sites in this area will be useful for understanding the spatial scope of Nan Madol as a settlement and political entity. Reconnaissance survey in this naturally-bounded zone was planned as part of this project. The red line defines the watershed area. [image: w. ayres]

Project Personnel

Project field staff included 13 field participants working at Nan Madol and Temwen Island. Several others helped conduct laboratory analysis of samples and aided with drafting and other aspects of analysis and report preparation.

The field staff included Maureece Levin (Project Co-director), Katherine Seikel, Alexander Craib, Danielle Stanszak, and William Ayres as visiting archaeologists. Mr. Mordain David, Chief, Jason Lebehn, Adam Thompson, and Roseder Albert, Research Staff of the Historic Preservation Office, Pohnpei State, were the Historic

Preservation personnel directly involved. Mr. Gus Kohler, Head of Archives and Historic Preservation, FSM government, was helpful in completing final project arrangements. Local residents of Temwen and Pohnpei who were instrumental in the success of the project include the following field assistants: Wendolin Lainos Jr., Aliwis Rudolph, Jackson Silbanuz, Floyd Silbanuz, Burney Ringlin, Norman Stevenson, Jr., Jason Amor, and Joseph Silbanuz. Individual landowners whose land we worked on were Masao Silbanuz, Myleen Mathias, Petrick Ringlin, and Bernardehna Silbanuz.

The following lists the field and laboratory personnel associated principally with the University of Oregon:

William S. Ayres, Professor, Department of Anthropology, University of Oregon, Eugene, Oregon USA (PI).

Maureece Levin, Ph.D. student in archaeology, Department of Anthropology, University of Oregon, Eugene, Oregon USA (Co-PI, Field Director).

Katherine Seikel, Ph.D. student in archaeology, Research School, Australian National University, Canberra ACT, Australia (Field Archaeologist).

Danielle Stanszak, BA student in archaeology, Department of Anthropology, University of Oregon, Eugene, Oregon USA (Staff Archaeologist).

Alexander Craib, BA student in archaeology, Department of Anthropology, University of Oregon, Eugene, Oregon USA (Staff Archaeologist).

Melisa McChesney, BA student in archaeology, Department of Anthropology, University of Oregon (drafting).

Devon Martin, BA student in archaeology, Department of Anthropology, University of Oregon (lab analysis).

Anthony Russell, BA student in Architecture, University of Oregon (drafting).

Shweta Thakur, MA student in Architecture, University of Oregon (drafting).

Adina Tudorach, MA student in Architecture, University of Oregon (drafting).

Ratana Suon, MA student in Architecture, University of Oregon (drafting).

Project Schedule in Brief

The project field study was for 10 weeks from September to November 2011, with laboratory and cartographic work to follow. The general sequence of activities is listed below, and the overall field schedule is included in Appendix B.

Efforts during the first week, beginning 10 September, included consultations with Pohnpei State Historic Preservation Office staff and arranging local logistics. Preliminary visits to set things up on Temwen and examine the condition of selected islets within Nan Madol were accomplished in the following week. Reconnaissance and intensive survey began immediately thereafter on Temwen and at the Karian-Angeir seawall islet within Nan Madol. During the period from late September to early November, excavations in selected sites were accomplished and consultation with staff at the Agricultural Experiment Station and other resource people on Pohnpei was done as well. By the last week of the field project, site data and forms and an end-of-field report were completed as well. After departure from Pohnpei on the 15th of November, laboratory analysis and drafting were undertaken until the end of the project period.

Resulting Report Products

Documentation completed at the end of the project includes site descriptions, a photographic record, and site forms based on forms used by the Pohnpei Historic Preservation Office (also see Ayres and Mauricio's report on Salapwuk, 1997). There was very little artifactual data recovered in this project because of the nature of the sites investigated; however, there was extensive soil and sediment sampling done, recovery of datable materials such as charcoal from a variety of site contexts, and detailed sites plans of numerous sites. Examples of these have been included here. Information collected in this project is part of graduate research for Maureece Levin and Katherine Seikel, both of whom at the time were working on their Ph.D.

degrees in archaeology. Project reports and copies of field documents have been submitted to the Historic Preservation Office and to the US National Park Service.

III. Archaeological Survey and Architectural Analysis: Nan Madol and Temwen

K. Seikel and W.S. Ayres

Introduction:

Pohnpei is home to Nan Madol, the largest prehistoric monumental site complex in Micronesia. As an archaeological and environmental site it provides some of the best evidence of how Pohnpei and other Eastern Caroline islands changed environmentally and culturally over a period of nearly 2,000 years. The site of Nan Madol covers approximately eighty hectares on the reef flats adjacent to Temwen Island on the Southeast side of Pohnpei (Figure III-1). It is comprised of over 100 artificial islets constructed primarily over a 1,000-year period (Fig. III-2).

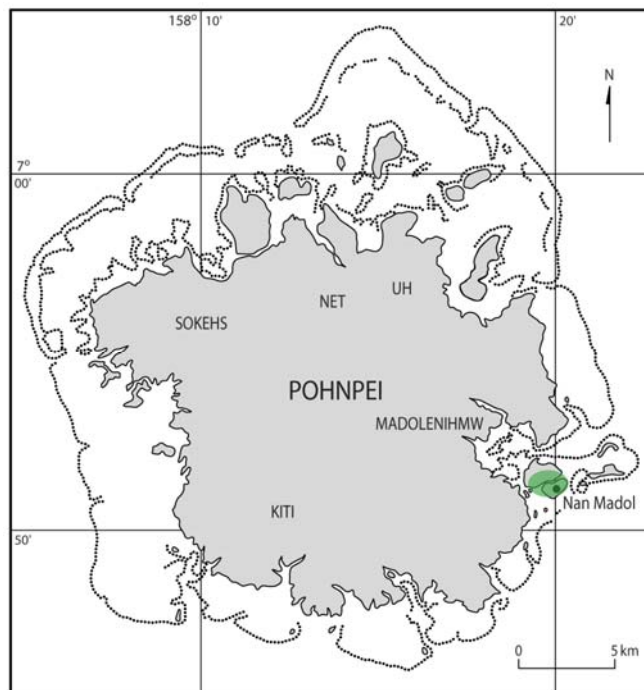


Figure III-1: Pohnpei Island showing the research area highlighted in green.



Figure III-2. Base map of Nan Madol (based on original by W. Ayres).

Since initial Euro-American contact with Pohnpei around 1820, Nan Madol has drawn attention of a multitude of travellers and scholars discussing its design and function in the culture history of Pohnpei. The link between Nan Madol and the major social and political shifts recorded in traditional Pohnpeian oral history has contributed to considerable archaeological study being focused on the site since the late 19th century (Athens 1980, 1984, 1990; Ayres 1983, n.d.a, n.d.b; Ayres and Scheller 2003; Ayres et al. 1983; Christian 1899; Hambruch 1936; Saxe et al. n.d./1980). Discussions of social structure on Pohnpei are all tied to the role of Nan Madol as an administrative and political center, although work has been completed as well in other districts (e.g. Ayres and Mauricio 1997; Ayres et al. 1981; Bath 1984a, b; Bath and Athens 1990; Streck n.d.). Major socio-political shifts linked to

the development of Nan Madol, which is heavily reliant on oral traditions and ethno-historic accounts, characterise the definition of Pohnpeian periods and the overall sequences.

The amount of effort that has been invested in Nan Madol has resulted in only half of the site complex being mapped in architectural detail. The research objectives of this project included doing maps of individual islets at Nan Madol, and survey and mapping of site features on nearby Temwen Island. Architectural maps are integral to the documentation of sites and are valuable for conservation purposes that include monitoring impacts on the site and its components. They also allow for the comparison of structures over a wide geographic area, including elsewhere on Pohnpei and on other islands. Mapping on Temwen, in addition to Nan Madol, contributes to future architectural comparisons. A secondary objective of this project was to complete a short survey of previously mapped islets at Nan Madol to report on their state of preservation (see Section V).

Site Documentation and Mapping:

During the two months of fieldwork, a total of four detailed, 1:100 scale architectural maps were completed: two mortuary complexes (*lolong*) on Temwen and a *lolong* and one burial platform on the seawall at Nan Madol. Mapping was completed using surveying instruments (including tape and compass) in order to obtain highly detailed maps and keep associated field costs down (Figure III-3).

Temwen Research

Site PoC3-5 is a *lolong* tomb complex, referred to as “*Peinlohloh*,” consisting of a platform and an enclosing wall (Fig. III-4). The burial platform itself is approximately 4 meters square and is constructed in the header-stretcher style with structural fill comprised primarily of small basalt rubble (Fig. III-5). There are small pieces of coral rubble incorporated in the fill of the platform; the significance and



Figure III-3. Mapping in progress at PoC3-5. (Photo by Adam Thompson).

function of coral-infill in main island structures has not been fully explained. The enclosing wall is constructed primarily of basalt boulders and rubble and topped and faced in some places with basalt columns. The enclosing wall is approximately 25 meters by 19.5 meters and is an average of 1 meters thick. The Northwest corner was built around a very large bedrock boulder, which is visible on the map. There is no clear constructed entrance in the enclosing wall. An additional foundational support surrounds the enclosing wall, particularly along the Eastern wall and the Northwest corner, and soil was brought in to level the surface of the enclosure.

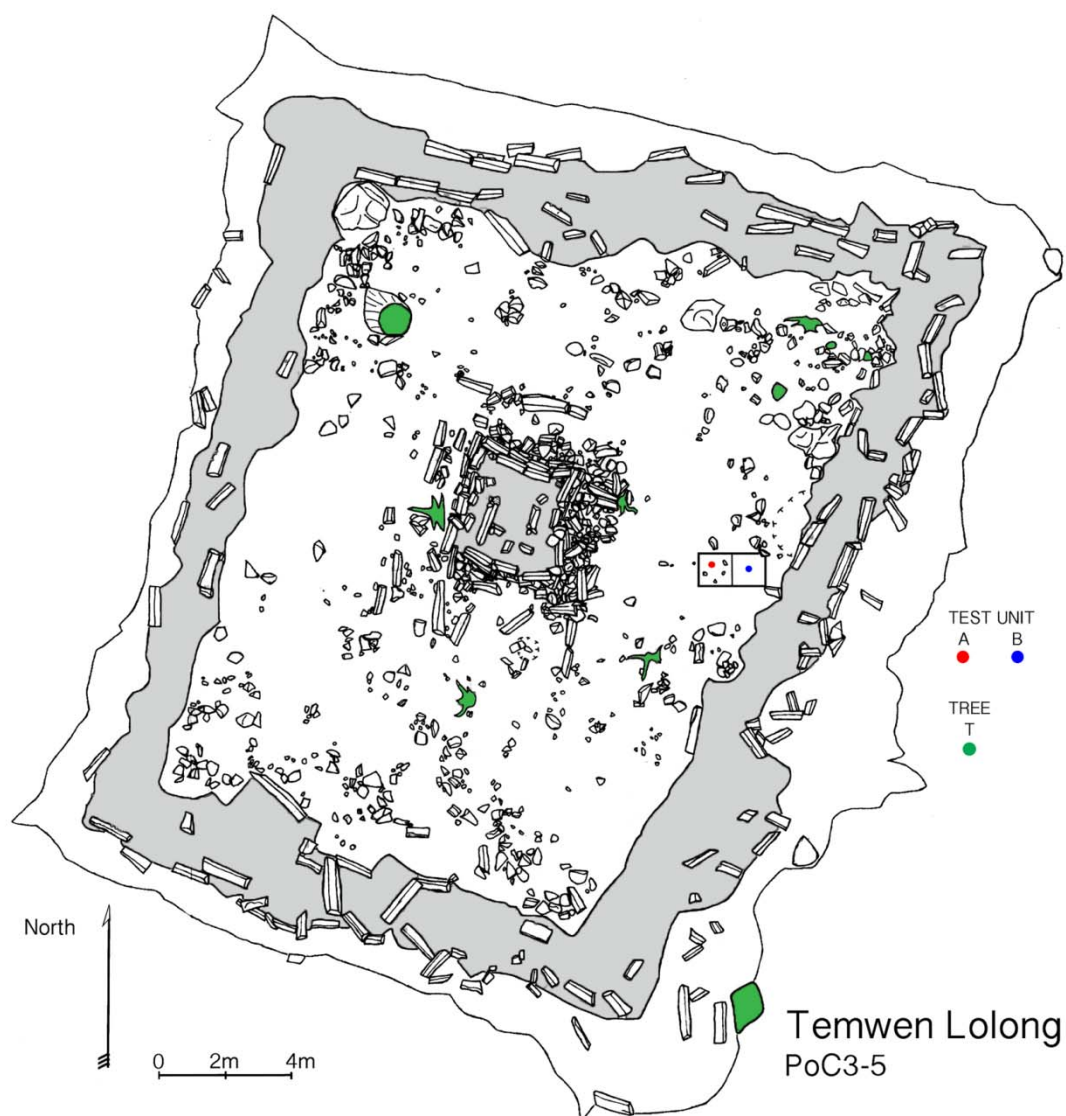


Figure III-4: Site PoC3-5, Temwen Island, Pohnpei, “*Peinlohloh*.” This plan view shows a large enclosure and central platform employing columnar rock. [drafting: K. Seikel, A. Russel]

Site PoC3-8 is a *lolong* built inland and uphill from PoC3-5. According to the landowner, this *lolong* was never completed. Seikel recorded that the recognized name is “*Peinpohnapap*.” (see also, Kataoka and Nagaoka 2015). The burial

platform is comprised of small to medium sized basalt rubble and looks to be more of a foundation than an actual platform. The 'platform' is approximately 6 meters by 7 meters and rises around 35 centimeters above the surrounding enclosure surface. The enclosing



Figure III-5: Site PoC3-5, "Peinlohloh." Shows the burial platform with the enclosing wall in background.

wall is constructed of basalt boulders and rubble, and is approximately 14.5 meters by 11.5 meters. Columnar basalt isn't present in this structure, and this appears to be the way it was originally constructed. An alternative is that this type of rock has been collected for use in more recent constructions. Like Site PoC3-5, soil was added to the enclosure to create a level surface.

Architectural Mapping in Nan Madol

With the exception of the burial platform and portions of the Eastern wall at PoC3-5, the Temwen *lolong* were not constructed in the standard header-stretcher style, which is most common at Nan Madol (Fig. III-6). Of the two mortuary structures, only one contained header-stretcher construction features (Feature 1, PoC3-5). Unlike the large *lolong* at Nahndauwas and Karian within Nan Madol, the header-stretcher construction at Feature 1 does not continue through to the interior walls of the structure; it contains an interior wall fill of coral rubble. The architectural variability in the documented mortuary structures in the Nan Madol area suggests that it is likely that there is chronological patterning in architectural conventions and in the amounts of available raw materials for construction.



Figure III-6. Nan Douwas islet exemplifies header-stretcher construction at Nan Madol.

The Temwen *lolong* are largely intact, although columnar basalt may have been taken from these structures for use in other nearby structures. The primary preservation issue on Temwen and the mainland is recycling of basalt from existing structures for use in new ones and the modification of enclosures for horticultural purposes. Within Nan Madol, Angeir Features 1 and 2, which were mapped in a previous project (Ayres, Seikel, and Levin nd/2009) are primarily threatened by tidal weathering and flooding (Fig. III-7,8); this causes wash-outs and degradation of the coral rubble fill over time. The vines and creepers (defined here as a plant, such as the ivy or periwinkle, that grows by creeping) cleared from these structures may actually assist in their preservation by preventing the stone and rubble from shifting significantly.

The burial platforms mapped in detail in the 2011 project are located on the seawall islet of Angeir at Nan Madol. They were designated Features 1 and 2 on Angeir (ANG) during a previous field season. These features are important because they are within sight of two other *lolong*, which suggests that they may have been associated with a complex of mortuary practices. Figure III-7 shows the overall plan of the Angeir-Karian seawall section (Ayres, Seikel and Levin n.d./2009).

Angeir Feature 1 is a small *lolong*, approximately 12 meters by 8.5 meters (Fig. III-8). The structure is constructed of coral rubble and basalt columns. The exterior walls were built in the header-stretcher style, while the interior walls are primarily constructed of coral rubble with some basalt. The *lolong* is comprised of a burial platform occupying the northeast half of the enclosure and a coral platform attached to the southern side of structure. The coral platform may have been disturbed by digging and its eastern side has eroded out. Three shell beads of approximately 20 mm diameter were located in the southern corner of the Northern chamber, and were the only artifacts identified within this structure.

Figure III-7a. Likinangeir to Sapwuhtik B section, detail:

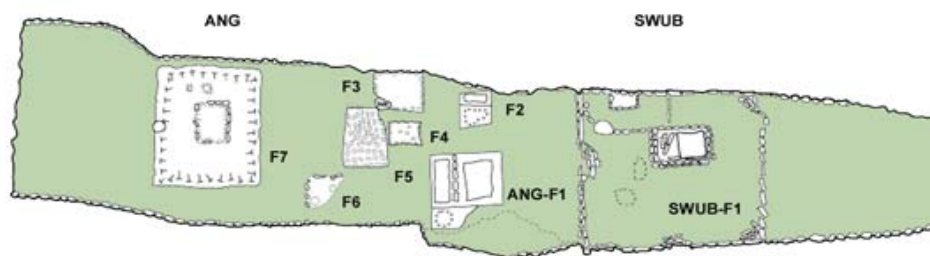
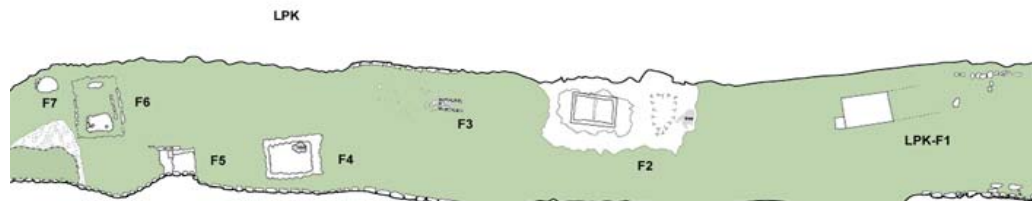


Figure III-7b. Lukepenkarian section, detail:



Angier - Sapwuhtik B - Lukepenkarian - Karian Islets Nan Madol, Pohnpei

LEGEND
■ tree
F# Feature designation

PRELIMINARY MAP
University of Oregon

0 20 m

Figure III-7. Overall plan of the islet set from Angeir (ANG) to Karian (KAR) that forms the northern section of the Nan Madol eastern seawall (after Ayres, Seikel and Levin n.d./2009, Fig. 7). The lower figure extends from the right end of the upper map view. Feature ANG-F1 was mapped in detail during this field project (see Fig. III-8). [drafting: W. Ayres, J. Kennan, D. Balmforth, M. Levin, K. Seikel]

PoC3-1-ANG
Feature 1

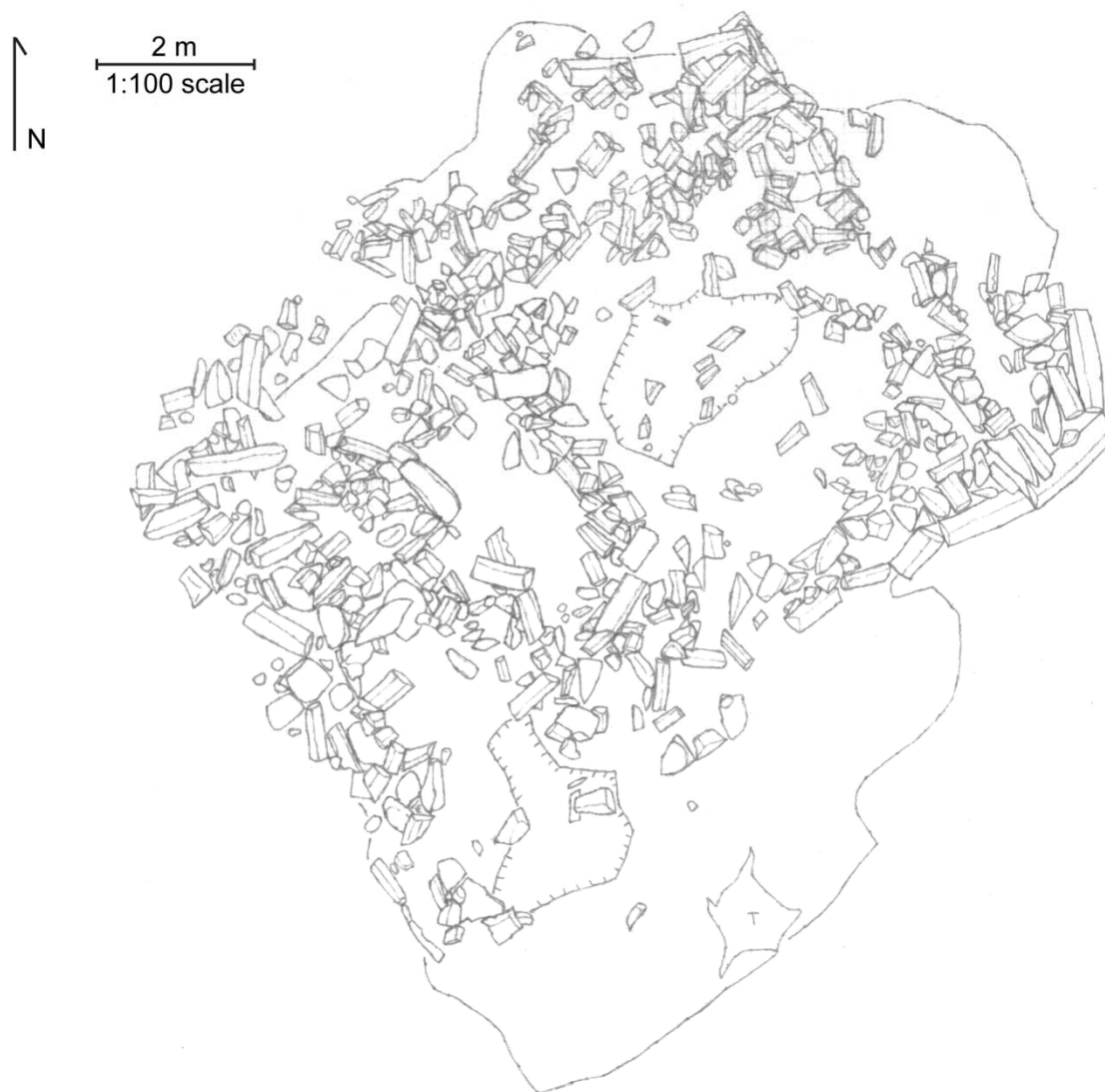


Figure III-8. Site PoC3-1. Feature 1 from Angeir. The rectangular pit in the left center is Feature 1a; the disturbed depression to the NE is Feature 1b. The disturbed depression in the northeast is the burial chamber (Fea. 1b).

Angeir Feature 2 is a tomb platform located on the northern side of Angeir, 3 to 4 meters northwest of Feature 1 (Fig. III-9). The platform is constructed of basalt

and coral rubble and measures 7 meters by 5.8 meters. It may have been a double-chambered platform, but only one chamber was identifiable due to deflation and/or disturbance of the southern portion of the structure. Human cranial fragments were identified in the tomb chamber along with shellfish remains.

Excavations and Sampling:

Test excavations were completed in the Temwen *lolong* in order to gain an understanding of potential subsurface architectural features near the enclosing walls. The PoC3-5 excavation was a 1 by 2 meter test unit just inside the Eastern wall (Figure III-10). Excavation went to a depth of a meter, where the presence of basalt rubble precluded further excavation without expanding the excavation area. The depth of the rubble and soil within the enclosure fill was not determined since the B-horizon was not uncovered during excavations. It is at least 1 meter deep in the sampled area.

A 1 by 1 meter excavation was placed in the southern corner of the Site PoC3-8 enclosure. The excavation terminated between 40 and 70 centimeters due to the presence of a large bedrock boulder surface. As with the PoC3-5 excavation, the B-horizon was not uncovered during excavation. At present, then, the lack of a B-horizon in both test excavations limits what can be said about the stratigraphic deposits at these sites.



Figure III-9: Site PoC3-1. Feature 2 on Angeir is shown in the showing post-clearing (top) stage and as flooded at high tide (lower photo).



Figure III-10. Site PoC3-5 excavation at depth of 1 meter.

Both excavations produced charcoal, which have provided additional information on when these structures were constructed and used. Six charcoal samples (Fig. III-11) were submitted for AMS dating at the ANU Radiocarbon Laboratory. PoC3-5 securely dates to between AD 1219 and 1385. The earlier dates from this context are sandwiched between the two later dates, which supports the hypothesis that the soil was brought in to level the surface of the enclosure. Site PoC3-8 dates between AD 1300 and 1600. These dates are consistent with results from *Iolong* in Awak and at Nan Madol.

Site	Context	Conventional Age	Calibrated Age	Lab Code
PoC3-5	F1, 21-33 cm	695 +/- 25	AD 1266-1385	ANU 29906
PoC3-5	46 cm	980 +/- 35	AD 993-1155	ANU 29910-8704
PoC3-5	63 cm	995 +/- 30	AD 986-1154	ANU 29909
PoC3-5	63 cm**	1025 +/- 30	AD 900-1147	ANU 29910-8705
PoC3-5	82 cm	725 +/- 40	AD 1219-1385	ANU 29907
PoC3-8	33 cm	405 +/- 30	AD 1433-1624	ANU 29904
PoC3-8	51 cm	600 +/- 25	AD 1298-1407	ANU 29905

* Calibrated using InCal in OxCal online program.

** This sample was run as a duplicate for research purposes at the ANU Radiocarbon Dating Centre.

Figure III-11. Radiocarbon dates from PoC3-5 and PoC3-8.

No other cultural material was recovered from the excavations, primarily because of limited activities at this kind of site and the acidic nature of the soils. There was a Japanese shell casing on the ground surface of the PoC3-8 excavation unit, which was deposited with the HPO.

A project to collect rock samples from structures on Temwen and at Nan Madol was listed in the original project proposal. A number of samples were collected from Site PoC3-5 on Temwen for comparisons, but rock sampling at Nan Madol was not approved for this project. The PoC3-5 samples are in the process of being analyzed using portable X-ray Fluorescence (pXRF) in order to determine the number of potential sources for the columnar material used in the structure.

Conclusions

The major objectives of this project were met in the field, and significant new data were recovered, but more work needs to be done toward documenting Nan Madol and related sites on Temwen. Continuing this work on architectural types and their variability will clarify Nan Madol's position in the prehistory of central Micronesia and the importance of the site as a part of the wider Pohnpeian context. It will also allow for opportunities to make regular observations on the site's preservation status.

This work does make significant contributions towards the creation and implementation of a comprehensive plan for site conservation at Nan Madol.

From a conservation standpoint, the Temwen *lolong* are largely intact, though columnar basalt may have been taken from these structures for use in other nearby structures. The primary preservation issue on Temwen and the mainland is harvesting of basalt from existing structures for use in new structures and the potential modification of enclosures for horticultural purposes. Angeir Features 1 and 2 are primarily threatened by tidal weathering and flooding (see Section V), which causes wash-outs and degradation of the coral rubble fill over time. The vines and creepers cleared from these structures may actually assist in their preservation by preventing the stone and rubble from shifting significantly.

There are a number of things from this project that will be incorporated into proposed future studies. The maps have been digitized for upcoming spatial analyses and illustrative purposes. As noted earlier, the basalt samples are currently being analyzed geochemically.

IV. Early Temwen Food Production Systems

M. Levin and W. Ayres

Temwen Island, separated from mainland Pohnpei by a narrow strait, is located in the southeastern portion of Pohnpei. It is directly adjacent to the large Nan Madol site. The focus of this portion of the project here is Pohnpei's food production systems. Social hierarchies are deeply embedded in these systems (e.g., Ayres and Haun 1985, 1990, 1992, n.d.; Balick 2009; Bascom 1948, 1965; Petersen 1977) in the form of what Bascom calls a "prestige economy." As Temwen Island is located adjacent to Nan Madol and is part of the traditional Madolenihmw *wehi* or district, we predicted that food production systems on Temwen would be especially sensitive to changes in Pohnpeian social hierarchies. Thus, we have chosen Temwen Island as the locale for our survey.

Background

Pohnpeian food production systems are well known ethnographically and ethnohistorically (e.g. Balick 2009; Bascom 1948, 1965; Hunter-Anderson 1991; Petersen 1997; Ragone 2002), and some archaeological work has been done as well (Ayres and Haun 1985, 1990; Ayres et al. 1983; Ayres et. al n.d./2009; Haun 1984; Kataoka 1996). In historic and modern times, most Pohnpeians have lived and produced their food in a mixed managed forest between the coastal strand ecological zone and an interior rainforest. The Pohnpeian food production removes around two major seasons: *rahk* and *isol* (Balick 2009; Merlin et al. 1992). *Rahk*, lasting from March to September, focuses on breadfruit (*Artocarpus altilis*) production, and *Isol*, lasting from September to March, focuses on yam (*Dioscorea alata*) production. Other important food plants historically known to be of major importance are bananas (*Musa* spp.), coconut (*Cocos nucifera*), taro (*Cyrtosperma merkusii*, *Colocasia esculenta*, *Alocasia macrorrhizos*, *Xanthosoma sagittifolium*), *sakaul*/kava (*Piper*

methysticum) and pandanus (*Pandanus* spp.). The Pohnpeian food system includes both subsistence production and “prestige” production (Bascom 1948).

The subsistence economy revolves around plants consumed on an everyday basis, while the prestige economy focuses on food production for feasting events. Most plants (with the exception of *sakau*) play a role in both, although there are some notable characteristics of production for prestige purposes. Growing yams to very large sizes (in excess of 100kg) is common, as are fermenting breadfruit in large pits and producing *sakau*. Some of these characteristics can be recognized through archaeological features such as *sakau* pounding stones and large fermentation pits. Plant remains in archaeological contexts can also provide clues to local vegetation and past use of sites.

Archaeological work on Pohnpeian food production consists of work started by Ayres and Haun (Ayres and Haun 1985, 1990; Haun 1984) in the 1980s in Awak and Wene, and was continued with our 2008 project (Ayres et al. n.d./2009). In parallel work, S. Athens has examined swamp cores for evidence of environmental change by documenting the pollen and plant macrofossil records (for example, Athens and Stephenson 2012). Ayres et al. (1983) and Kataoka (1985) have also studied zooarchaeological remains, which contributes to knowledge of Pohnpeian subsistence in terms of marine exploitation. In their work beginning in the 1980s, Ayres and Haun located 250 terraces and over 100 artificial pits, many of which are related to food production. They conducted excavation at agricultural features, supplemented by swamp coring at Leh en Luhk to gather paleoecological data. This research allowed them to map out a timeline of subsistence production on Pohnpei. Occupation on the island began around 2500 BP, with early occupation being characterized by swiddening. Between 1600-1000 BP there was a shift towards permanent cultivation and horticulture; features on the landscape around this time also indicate the beginnings of a prestige economy. This became more prominent in later prehistory. Our 2008 work involved excavating a late prehistoric breadfruit

fermentation pit on Temwen Island (PoC3-10) dating to 505-330 BP (2σ) at the date of initial construction. The 2011 field project significantly expands on the work done in 2008.

Site Survey

Methods

We chose to conduct intensive survey on four landowner plots on eastern Temwen Island (Fig. IV-1). All sites and features located were photographed with a digital Nikon Coolpix color camera, drawn, and described. Locations were then recorded with a hand held Garmin Oregon 450 GPS Unit; all locations were measured in UTM UPS coordinates. The two island UTM datum points (at the College of Micronesia in Palikir) were also taken with the same GPS unit to allow conversion to local island points. As small features were dense on the landscape, features were grouped into sites using geographic proximity as a primary consideration, and feature type as a secondary consideration. We selected several features for detailed mapping, and a few for excavation.

Survey Results

Survey results include a range of yam cultivation and other gardening features, as well as breadfruit storage pits, and a number of architectural features (see Fig. IV-2 for site distribution). Enclosures or pits for yam cultivation were the most common feature identified in the survey; we located and described a total of 85 likely yam cultivation enclosures or pits. Seven of these enclosures were mapped in greater detail. Ten breadfruit fermentation pits were located; one had been described and excavated in 2008; we documented the additional breadfruit pits, mapping and excavating three. We also located and excavated one cooking area site.

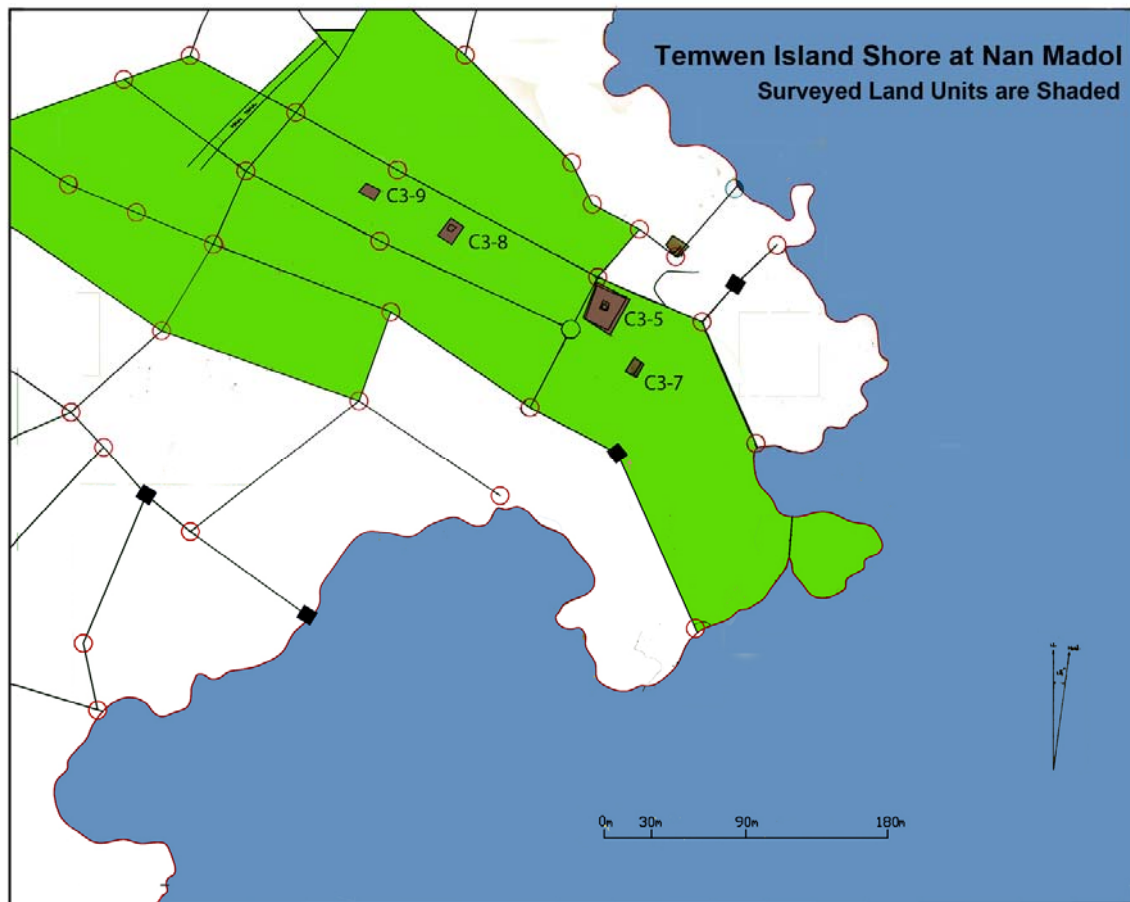


Figure IV-1. Map of survey area, Temwen Island, Madolenihmw.

Multiple other features were also identified and recorded. Ayres and colleagues had identified several features in the area in previous field seasons. Newly described features include 14 boulder alignments, many of which are probably related to terracing; seven stone platforms or enclosures; four stone walls; one *lolong* (tomb structure); a very large depression; four large basalt slabs in a square aligned directly north; a potential historic latrine; and several artificially altered clusters of basalt cobbles and/or boulders. Sites recorded on this survey not included in the architectural section or in the 2008 report are detailed below. In most cases, features

have been grouped together with other geographically nearby features to define a site cluster. UTM coordinates are listed in the appendix.

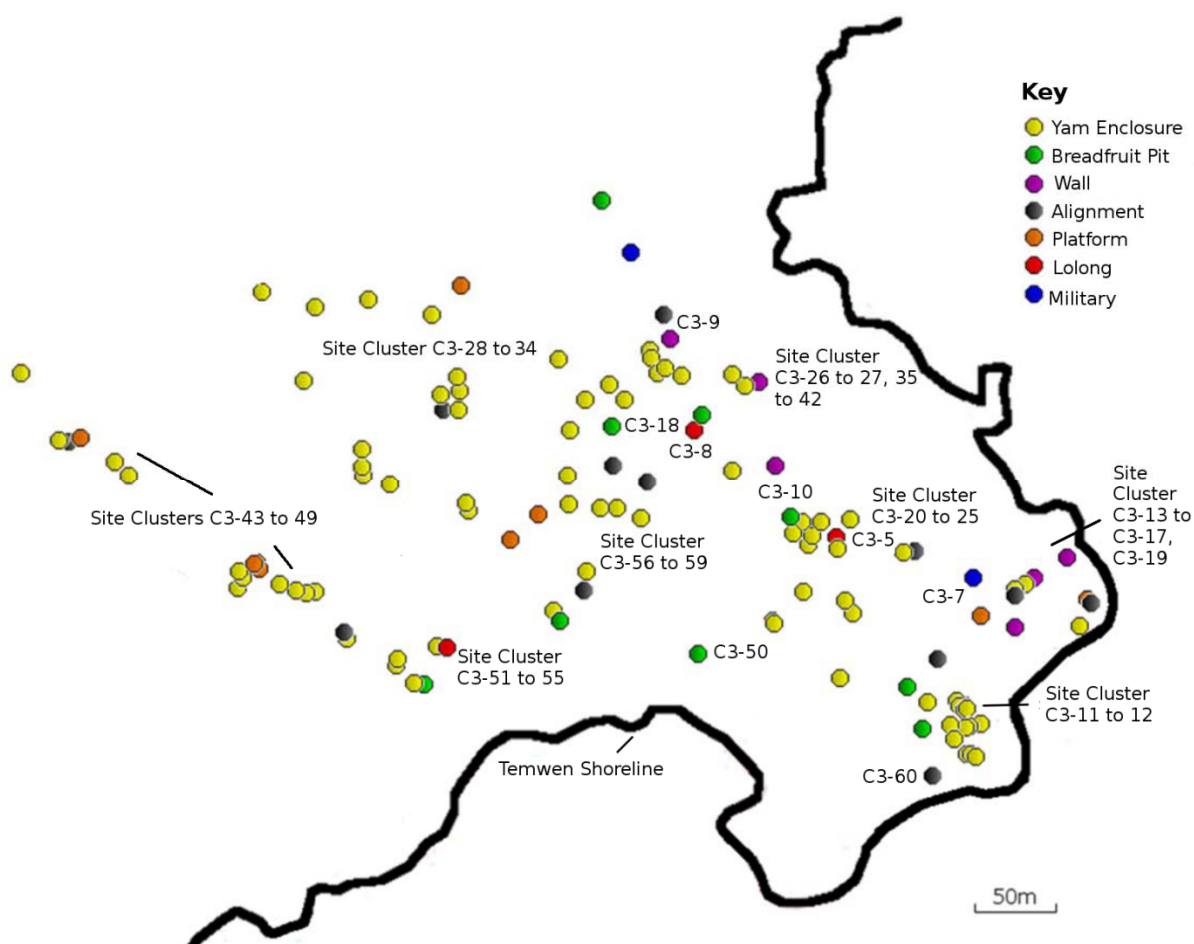


Figure IV-2. Map of the Southeast Temwen coast, Pohnpei, showing the distribution of the major feature types within the agricultural survey area.

Site PoC3-1-PDH-Feature. An Isolated feature near Peidoh

This feature is a stone alignment of basalt boulders and cobbles, measuring 4.6m from SW to NE, and 3.7m from SE to NW, with a corner in the NW. There are

several cobbles in the corner, and one larger boulder nearby, just SE of the structure. It appears to be disturbed. The stone remains are now included within the site designation for Peidoh Islet, Nan Madol.

Site PoC3-7

Site PoC3-7 was first described during 1989 Temwen survey (Ayres and Tasa, field report). During the present survey, we reassessed this site. It was originally described as a “house platform;” it is unclear if the platform is a dwelling, or if it has some other function, as we could not locate a clear central hearth. The southwest side is a steep slope, with basalt columns lining the base and the top of the “ramp,” which is 4.2m in length. At the top is a platform lined with basalt cobbles and boulders; there is a roughly rectangular shape to the structure, although there are also boulders strewn around the edges and it is clearly disturbed. The structure is a total of 14.5m long (including “ramp” and platform) and 8.5m wide.

Feature 2 was described in 1989 as a historic pig fence, which was how it had been described to Ayres and Tasa by a local resident. It is built in a trench and lined with basalt boulders and cobbles. It is possible that this trench was initially built by the Japanese military during WWII.

Site PoC3-9

Like PoC3-7, Site PoC3-9 was first described during the 1989 Temwen survey. At the time, however, only Feature 1 was included. We have reassessed the state of Feature 1 and added five additional features in the surrounding area to the site to make this a multi-feature site.

Feature 1 consists primarily of an exterior wall constructed of basalt cobbles and cobbles, ranging from 30-80cm in height. Currently, there are walls on both the east end (10.2m) and south end (7.3m). On previous survey (Ayres and Tasa, field report), there were two other walls recorded, although they were not visible in this

survey. There is a *sakau* stone at the NW corner (Fig. IV-3), and we took surface samples for microremain analysis. A few boulders and cobbles extend out east from this *sakau* stone approximately 2.9m from the east wall of the structure, parallel to the south wall. There are also a few wooden planks present at the southeast end of the structure.



Figure IV-3. Site PoC3-9, Feature 11. *Sakau* stone. [photo M. Levin]

Feature 2 is a yam cultivation enclosure, consisting of basalt cobbles arranged in a roughly circular fashion (Fig. IV-4). It is larger than average, with a diameter of 1.9m. We excavated a test pit into this feature; this is described further below.

Feature 3 is a depression approximately 1.7m in diameter, with a large cobble at the east end. The size and shape of the depression suggest that this feature represents yam removal from the soil.

Feature 4 consists of four basalt rocks, rectangular in shape, planted solidly into the ground. They are placed evenly apart at 2.45-2.50m, and at exactly N-S-E-W corners. The function of this feature is unknown, although it could be a historical feature used as assistance for finding direction.

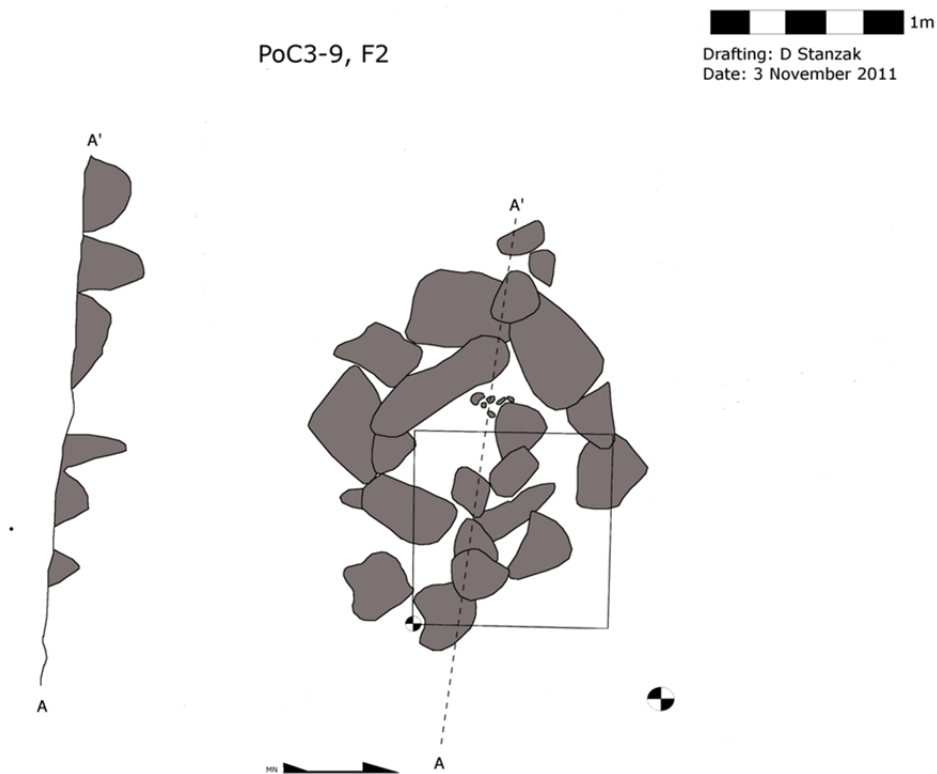


Figure IV-4. PoC3-9, Feature 2 plan.

Feature 5 is a yam cultivation enclosure composed of basalt cobbles, approximately 1.5m in diameter.

Feature 6 is also a yam cultivation enclosure composed of basalt cobbles, approximately 1.5m in diameter.



Figure IV-5. PoC3-9, Feature 4.

Site PoC3-11

Site PoC3-11 is a multi-feature site (Fig. IV-6). Features 1-15 are circular basalt cobble enclosures approximately 1m in diameter likely used for yam cultivation. Feature 16 is likely also a yam enclosure, although it is highly disturbed. Feature 17 is an alignment of four boulders, approximately two meters long, arranged in a straight line.

Feature 18 is a circle of rocks surrounding a hibiscus tree; it is possible that this may also be a disturbed yam enclosure. The site borders the eastern edge of Temwen Island, near Nan Madol. The land is on a moderate SE slope.

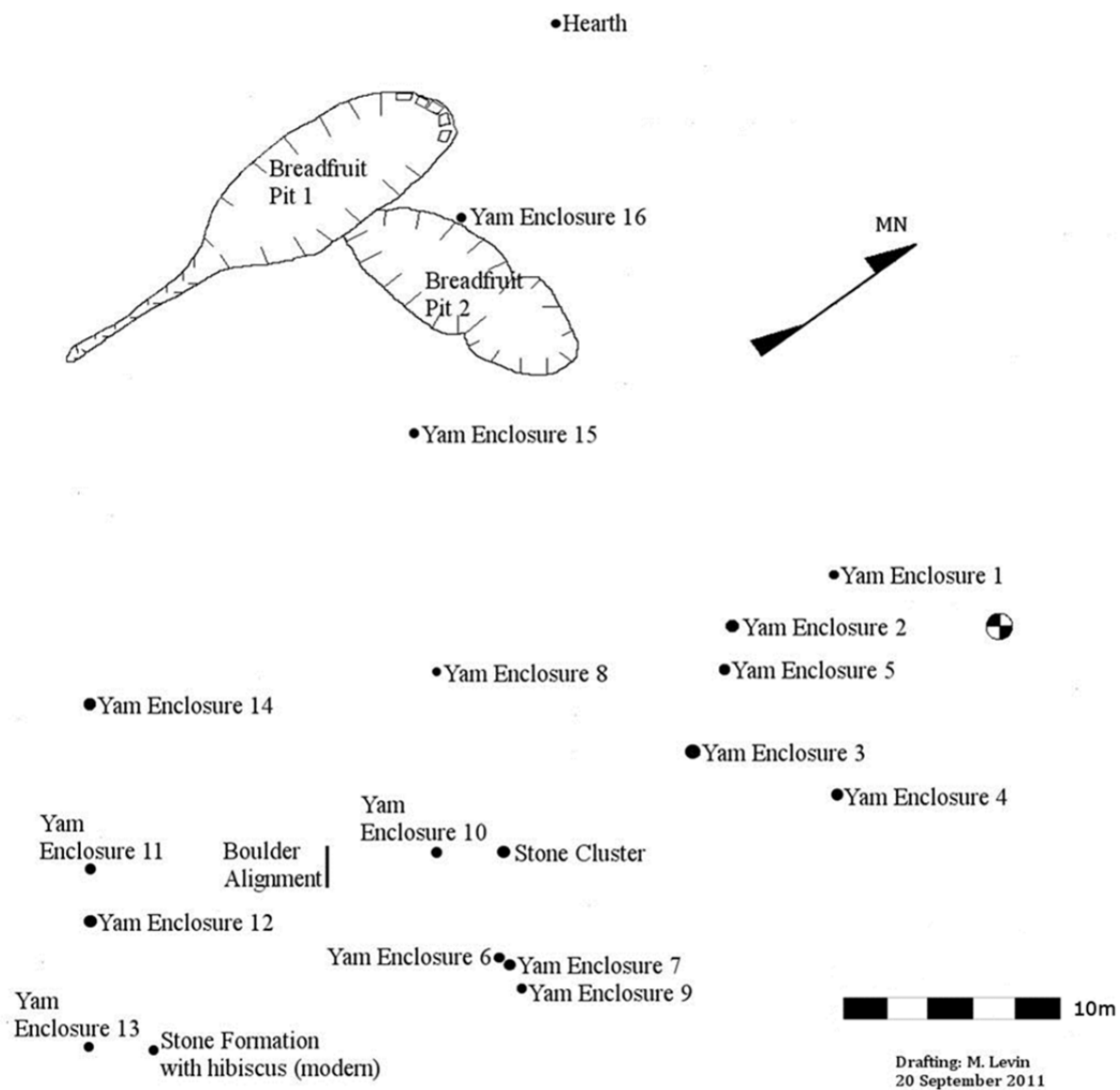


Figure IV-6. Site PoC3-11 and PoC3-12 plan

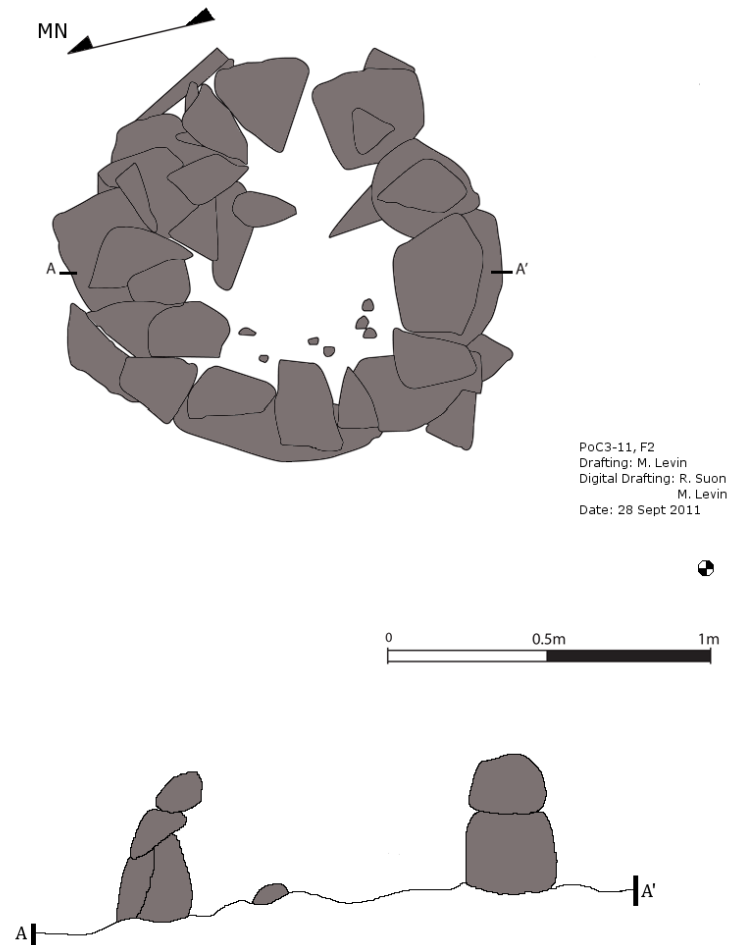


Figure IV-7. PoC3-11, Feature 2 plan.

Site PoC3-12

This site consists of four features. Features 1 and 2 are large depressions (11m x 4.3m and 15m x 5m respectively) that are, from their structure, believed to have been used in breadfruit fermentation (see Fig. IV-8). Feature 3 is a circular basalt cobble enclosure thought to have been used as a yam enclosure; it borders the western edge of Feature 2. Feature 4 is a darkened patch of soil that likely represents a historic cooking area. Features 2 and 4 were excavated and results are

detailed in the next section. This site is located approximately 10m east of a modern dwelling.

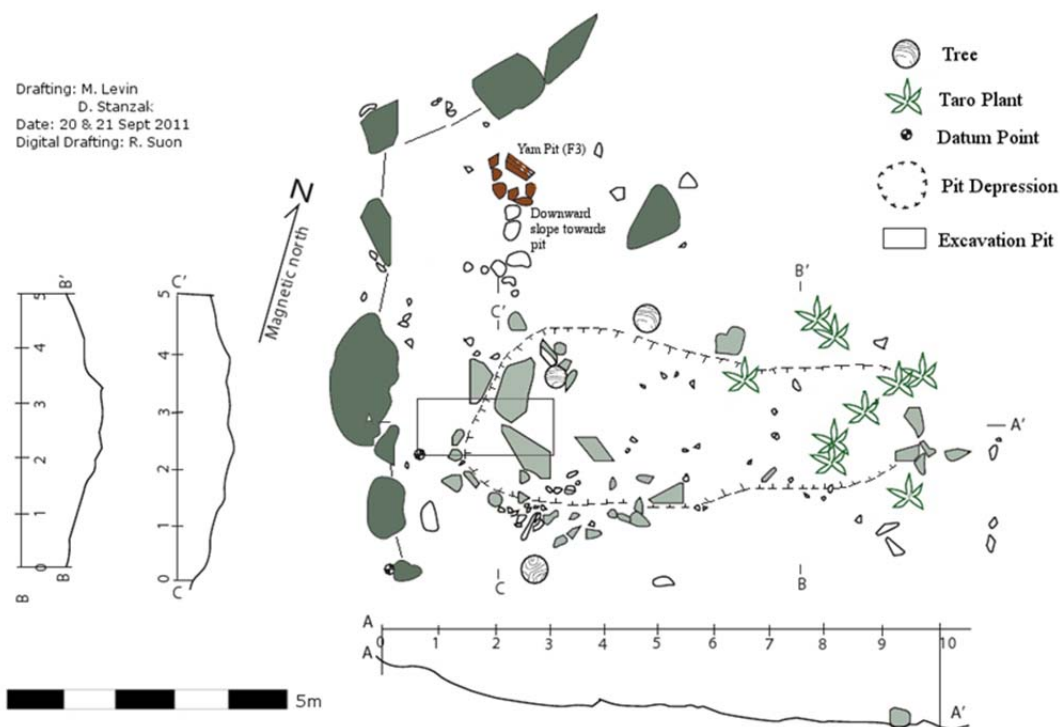


Figure IV-8. PoC3-12 Features 2 and 3, plan

PoC3-13

This site is a stone alignment composed of basalt cobbles and columns that extends along the edge of the land bordering the mangrove swamp in eastern Temwen Island, directly adjacent to Nan Madol. It is approximately two or three cobbles in height, varying by location. It was likely constructed as a barrier to prevent erosion.

PoC3-14

Site PoC3-14 consists of two features. Feature 1 is a stone platform composed of basalt cobbles and boulders. It measures 5.85m x 2.75m, and is angled to the NW. It has a slight elevation of approximately 0.5m from the base to the center. Feature two is a set of parallel stone alignments composed of basalt cobbles measuring 7m long, facing NW, with a 2.35m gap between them. It is located to the SW of Feature 1.

PoC3-15

This site consists of two features. Feature 1 is a semi-circular structure made of basalt cobbles and boulders, as well as an adjacent row of basalt cobbles and boulders facing NE. The semi-circular structure is 5m long at its widest part. The structure appears to be highly disturbed and is likely some sort of collapse. Feature 2 is a circular enclosure of basalt cobbles approximately 1m in diameter, likely used as a yam growing enclosure. Unlike Feature 1, Feature 2 is well-preserved; it is likely that Feature 1 is much older than Feature 2.

PoC3-16

This site is a long wall covered in deep vegetation; we estimate the length to be approximately 100m, although it is not measurable at this time. It is construction of basalt boulders and cobbles, and is approximately 2m high at its highest point. The wall stretches roughly SW to NE. There is a S downward slope at the SW end, over which many basalt boulders and cobbles are strewn in a roughly semi-circular fashion.

PoC3-17

This site consists of a stone alignment located on a hillside, composed of basalt cobbles. It measures 10m S-N, and has two perpendicular stone lines jutting out of the middle, one which is 2.68m long, the other approximately 1.5m long. This

could be a type of architectural feature, or it could represent terracing. However, it appears disturbed.

PoC3-18

This site is a likely breadfruit fermentation pit (Fig. IV-9). It measures approximately 5.3m x 7.9m, and is roughly “L” shaped. The depression is approximately 0.5m deep, and cobbles, mostly underground, line the bottom of the depression. There are a few cobbles on the exterior of the depression. This site was excavated and results are discussed in the next section.

Site PoC3-19

This is a multi-feature site. Feature 1 and Feature 2 are yam enclosures constructed of basalt cobbles, 1m and 0.9m in diameter respectively. Feature 3 is an L-shaped alignment of large boulders, approximately 8.8m north to south, and 6m west to east on the south end.

Site PoC3-20

This is a multi-feature site with three features included. Feature 1 is an oval-shaped yam enclosure constructed of basalt cobbles, 1.9-2.3m in diameter. Feature 2 (Fig. IV-10) is also oval-shaped yam enclosure, approximately 1.2-1.6m in diameter. Feature 3 is a small collection of basalt cobbles, roughly oval-shaped and ranging from 85cm-1m in diameter. It is unclear if this is a yam cultivation enclosure, although it is very unlikely to be a natural outcrop.

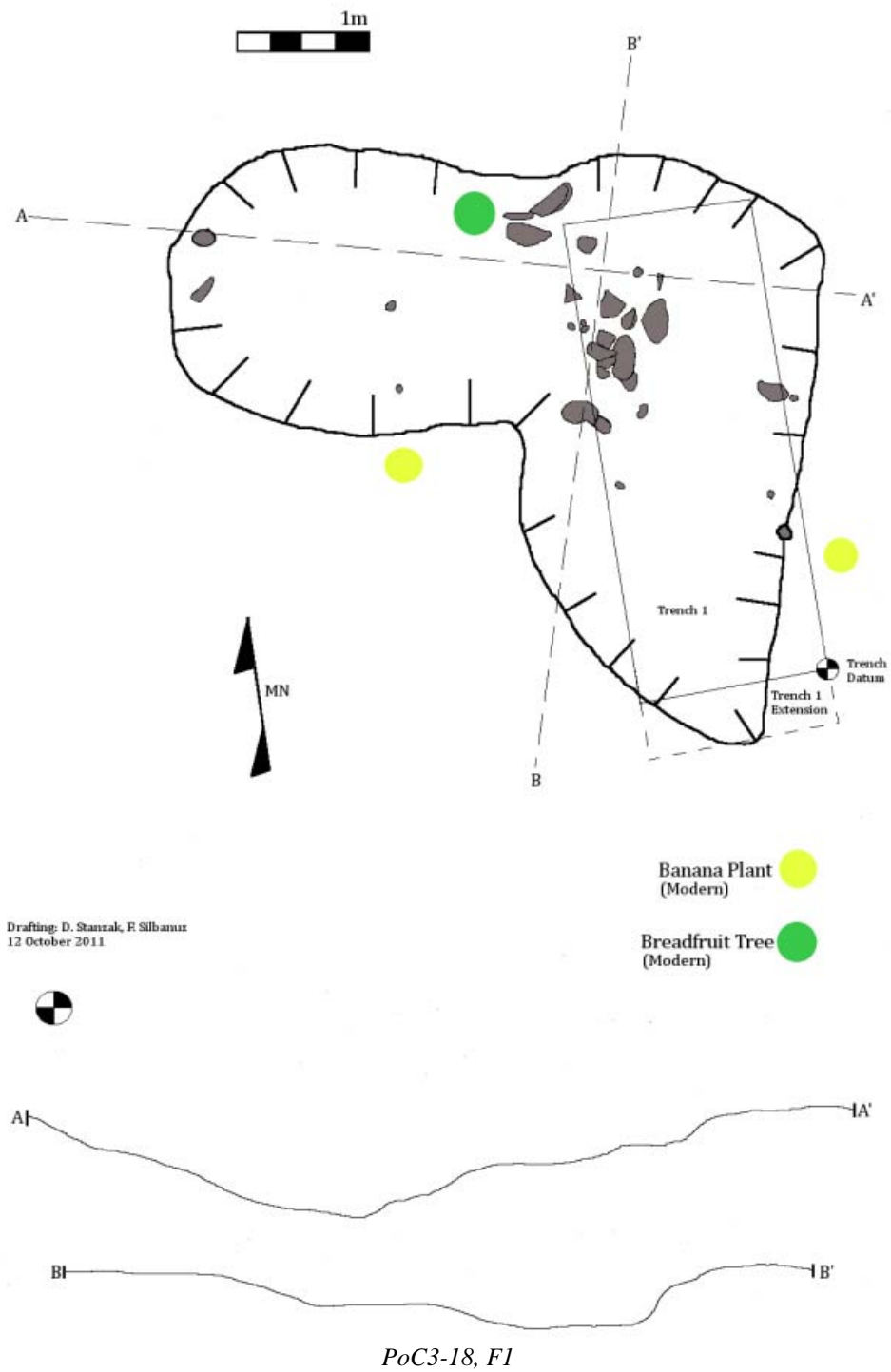


Figure IV-9. PoC3-18. Plan. Stone cobbles are shaded gray. [drafting D. Stanzak, F. Silbanuz]



Figure IV-10. Site PoC3-20, Feature 2. A protective enclosure for yam cultivation.

Site PoC3-21

A small yam enclosure constructed of basalt cobbles that is approximately 85-90cm in diameter was assigned site designation PoC3-21. It is not particularly close to any other archaeological feature. It is northwest of a modern taro patch.

Site PoC3-22

Two yam enclosures form this site cluster. Both cultivation enclosures are constructed of basalt cobbles. Feature 1 is approximately 1.1m in diameter, and Feature 2 is approximately 1m in diameter.

Site PoC3-23

This site consists of two features, both yam cultivation enclosures constructed of basalt cobbles close in location to each other. They are approximately the same size; Feature 1 and Feature 2 are both 1-1.2m in diameter.

Site PoC3-24

A multi-feature cluster consisting of four yam cultivation enclosures constructed of basalt cobbles close to each other in location, forms PoC3-24. Feature 1 is a disturbed enclosure, and forms a semicircle that is approximately 1.65m on the longest perpendicular line. Feature 2 is an oval-shaped enclosure, ranging from 1-1.2m in diameter. Feature 3 is a smaller oval-shaped enclosure, approximately 85cm to 1m in diameter. Finally, Feature 4 consists of a smaller circular enclosure of basalt cobbles approximately 1m in diameter, and a larger oval enclosure of basalt boulders ranging from 2.2-2.8m in diameter. The slope of the land is roughly to the SE.

Site PoC3-25

This is a multi-feature site consisting of three different types of features. It is located next to the road leading to Nan Madol, approximately 400m northwest of the coastline. Feature 1 is a cluster of basalt boulders, approximately 4.7m x 3.4m. It is not a natural outcrop, but it is highly disturbed, and the function is unclear. Feature 2 is a large stone wall stretching from roughly NW to SE, constructed of basalt boulders (Fig. IV-11). It is 17.7m long, 1.5m in height, and ranges from 1.7 to 4.6m in width. This feature is visible from the modern road. Feature 3 is a circular depression in the ground approximately 1.8m in diameter, lined with a few basalt cobbles. It is likely to have been previously used for yam cultivation.

Site PoC3-26

This site has one feature, a depression measuring approximately 3.95m x 5.1m. There are basalt boulders along the edges. This makes the feature characteristics of a breadfruit fermentation pit. There is a modern yam cultivation enclosure containing a yam on the southwest side, and a large tree on the northern side. It appears that the tree has disturbed the interior of the feature. This feature is located approximately 400m northwest of the coastline.



Figure IV-11. Site PoC3-25, Feature 2, with D. Stanszak.

Site PoC3-27

This site has one feature, an enclosure of basalt cobbles with a diameter of approximately 1.8m. At the NW end, there is a large basalt boulder approximately 0.6m long. This site was likely used for yam cultivation. It is relatively isolated from other sites, approximately 400m from the coastline.

Site PoC3-28

This is a large boulder platform that forms a rectangle. It is 12.4-13.4m long on the NE and SW sides, and 8m long on the SE and NW sides. It is approximately 2m in height. The function of this platform is not clear, but it is clearly a purposefully built structure. It is located just west of a branch road off the Temwen main road, near the turn-off for the road that leads directly to Nan Madol. The area in which it is located is noticeably grassier than other areas in the surrounding environment. It is north of PoC3-18.

Site PoC3-29

This is a one feature site, an isolated circular enclosure approximately 1-1.25m in diameter, composed of basalt cobbles. It appears to be a yam cultivation enclosure that has collapsed.

Site PoC3-30

This is a three-feature site. Feature 1 is a collection of basalt cobbles, ranging from 0.75-1.5m in diameter (Fig. IV-12). There is a small enclosure area. It appears to be a collapsed yam cultivation enclosure. Feature 2 consists of two small depressions, each approximately 0.25m wide. One is approximately 1m long, and one is approximately 0.5m long. The larger of the two depressions contains two wooden planks with nails on each end. They are lined up lengthwise and separated by about 0.1m. It looks somewhat like a yam cultivation area, but it is too narrow for this and a yam cultivation area would not have wooden planks; it has been suggested that this is a historic latrine. Feature 3 is a round depression, approximately 1m in diameter. Given its dimensions, we suggest it served as a yam cultivation area, where the yam was removed from the soil. The entire site is located in a relatively flat area of agroforest.

Site PoC3-31

This site has six features, all likely related to plant cultivation. Feature 1 is a small yam cultivation enclosure, 0.75m in diameter. Feature 2 is a larger yam enclosure, ranging from 1-1.42m in diameter. Feature 3 is a crescent of basalt cobbles and boulders on a hillside. It consists of two lines of cobbles, one 2.4m long, and one 2.6m long, separated by a small (less than 0.5m) gap. It likely represents some type of agricultural terracing. Feature 4 is a another yam enclosure, approximately 1.3m in diameter. Feature 5 is a yam cultivation enclosure 1.2m in



Figure IV-12. Site PoC3-30, Feature 1 [photo: J. Silbanuz].

diameter, with some disturbance on the east side. Finally, Feature 6 is an oval yam cultivation enclosure, 1.8m across at its widest. It appears to be collapsed. All cultivation yam cultivation enclosures are constructed of basalt cobbles. The site is located in a managed agroforest on a moderate southeast slope.

Site PoC3-32

This is a single feature site, consisting of one basalt cobble enclosure approximately 1.2m in diameter, likely a yam cultivation enclosure. It is relatively isolated from other features on the land plot.

Site PoC3-33

This is a single feature site, consisting of one stone alignment. This alignment consists of 5 basalt boulders stretching roughly SW to NE. It is 2.7m long. The

purpose of the feature is unknown; due to the size of the boulders and the lack of slope in the local area, it is unlikely to represent terracing.

Site PoC3-34

This site has six features, most of them likely related to yam cultivation. It is on a SE slope, west of the branch road in the area. Feature 1 is a circular depression approximately 1.2m in diameter, enclosed by a circle of basalt boulders, approximately 2.3m in diameter. This is likely a former yam cultivation enclosure, where the yam was removed. Feature 2 is a circular enclosure of basalt cobbles 1m in diameter, likely used for growing yams. Feature 3 is another circular basalt cobble enclosure, approximately 2m in diameter, making it a large yam enclosure. Feature 4 is also a yam cultivation basalt cobble enclosure, approximately 1.4m in diameter; it is located 2m away from Feature 3. Feature 5 is a concentration of large boulders. It is likely that these boulders were deliberately moved to this location, but the function is unclear. Feature 6 is an oval-shaped depression, measuring approximately 2.6m x 1.8m, lined with basalt cobbles. It is most likely an area where a yam was removed from the soil, although it is somewhat larger than most of these depressions.

Site PoC3-35

This is a large depression located approximately at the corner of the road leading to Nan Madol and the branch road that connects to the Temwen main road. There are no visible cobbles, but it is an appropriate size for a small breadfruit fermentation pit, ranging from 3-4.8m in diameter. There is a local SE slope.

Site PoC3-36

This site consists of two features. Feature 1 is a large circular depression approximately 12.3m long. It is currently being used for garbage disposal, which inhibited depth measurement, but it is estimated at 5m. The size and shape of the depression are not indicative of agricultural use. Feature 2 is an area of collapsed

boulders strewn down a north slope. Boulders were likely deliberately moved to this location, but the purpose is unknown.

Site PoC3-37

This site is a likely yam cultivation area, consisting of five features. Feature 1 is a yam enclosure approximately 1m in diameter consisting of basalt cobbles. Feature 2, which is 3m away, is another yam enclosure 1m in diameter. Feature 3 is a basalt cobble yam enclosure 1.3m in diameter. Feature 4 is a pit depression approximately 1m in diameter, where a yam was likely removed. Finally, Feature 5 is a pit depression approximately 1.3m in diameter, from which a yam was also likely removed.

Site PoC3-38

This site consists of a single large feature, a basalt boulder and cobble wall near the road to Nan Madol. It is approximately 5m from the road, and runs roughly parallel. There is a northwest slope behind the wall with large boulders strewn across the area. The wall is approximately 45m long and 2m high, and ends about 10m from the eastern boundary of the landowner plot. The surrounding environment is located in a managed agroforest.

Site PoC3-39

This is another yam cultivation site, consisting of two features. It is located to the north of PoC3-38. Feature 1 is a collection of basalt cobbles, roughly circular and approximately 90cm in diameter, probably used for yam cultivation. Feature 2 is a smaller collection of basalt cobbles, approximately 70cm in diameter; it appears to be a disturbed yam enclosure. There is a steep northwest slope to the northwest of the site.

Site PoC3-40

This is a long, relatively short boulder wall. It is approximately 1m in height and runs from north to south for approximately 25m. There is a steep downward slope to the east of the wall. Given this local slope, it is possible that it represents some form of erosion control.

Site PoC3-41

This site consists of one feature, a set of boulder alignments. The first one is an alignment of smaller boulders on a northwest slope 8.4m in length. It meets up with the second alignment in a perpendicular fashion; this second alignment consists of larger boulders embedded into the slope and is of similar length. The purpose is unclear, although it could be for erosion control or terracing.

Site PoC3-42

This is a trench-like depression that is a likely breadfruit fermentation pit. It is 9.8m long, and 4m wide at its widest. It is teardrop-shaped, with a rounded west end, and an east end that tapers off. It is located on a fairly flat area of land next to the road leading to Nan Madol. It is clearly visible from this road.

Site PoC3-43

This site consists of three features, all of which appear to be related to yam cultivation. Feature 1 is a circular enclosure of basalt cobbles approximately 1.8m in diameter. There is a large depression in the center of the enclosure that likely indicates yam removal. Feature 2 is an oval enclosure of basalt cobbles, approximately 2.3m x 1.9m. Like Feature 1, it has a central depression. It is located 1m to the north of Feature 1. Feature 3 is a circular enclosure of basalt cobbles approximately 1m in diameter. It was likely used for yam cultivation, although there is no evidence yam removal in this particular feature. This feature is located about 10m to the northwest of the Temwen Island branch road in the survey area.

Site PoC3-44

This site consists of a single feature, a relatively flat rectangular platform of basalt cobbles and boulders (Fig. IV-13). It measures 8m x 10.5m. There is a clear outer edge on four sides measuring approximately 1m in width, and boulders and cobbles strewn throughout the middle. Stones are clustered more towards the northwest end, and there is a seemingly rectangular platform structure on this end. However, it is unlikely that this structure is a lolong, given that it is not built up, and in most places is just a single level of stones placed directly on the ground. It is located in a relatively flat area of managed agroforest, about 10m northwest of the branch road. There is a modern dwelling about 10m to the northwest of the site.

Site PoC3-45

This site consists of two features, both related to yam cultivation. Feature 1 is a circular cluster of basalt stones approximately 1m in diameter. There is not a clear central area, but it is possible the feature could have collapsed. Feature 2 is a circular enclosure of basalt cobbles approximately 1.1m in diameter. It was also likely used as a yam enclosure. This site is located north of a modern fence, and to the northwest of a modern taro patch.

Site PoC3-46

This site contains four features in close proximity, of varying structure and function. Feature 1 is a stone platform constructed of basalt cobbles and boulders lying flat in a trapezoidal fashion. The uneven sides are 6.2m and 4m oriented northwest; there is 7.8m between these sides. There is only a single layer of stones, and they are more concentrated at the southwest end. Feature 2 is a single file, unstacked line of boulders and cobbles that is 10.3m long, stretching roughly north to south (Fig. IV-14). These stones are deeply embedded in the ground; it is possible that this represents terracing. Feature 3 is a cluster of cobbles approximately 70cm



Figure IV-13. The central area of Feature 1, Site PoC3-44.

diameter. It is likely that this was a small yam enclosure, although there is no central growing area, so it has likely collapsed. Feature 4 is a small circular arrangement of cobbles approximately 50cm in diameter. These cobbles are very small and this feature is unlike most yam enclosures; the function of this structure is unknown. This site is located in a managed agroforest on a northeast slope.

Site PoC3-47

This is a single-feature site likely related to yam cultivation. It consists of a circular enclosure constructed out of a combination of concrete, metal, and basalt cobbles, and it is 1.1m in diameter. The inclusion of the metal places the date of this



Figure IV-14. Site PoC3-46, Feature 2, central area.

structure firmly in the history era, and given the shape and markings on the metal, it may be possible to determine the origins and date of this particular part of the structure. It is located in the northwest area of its land plot, and there are no other adjacent features.

Site PoC3-48

This is a multi-feature agricultural site. Feature 1 is a circular enclosure constructed of basalt cobbles that was likely a yam cultivation enclosure. It is 1.6m in diameter. There are boulders strewn haphazardly in the surrounding area. Feature 2 consists of two linked depressions, likely related to breadfruit fermentation (Fig. IV-15). The entirety of the depression is 7.3m long northwest to southeast, and 3.5m northeast to southwest. There are boulders lining the outside of the two depressions, and one separating the two in the middle, with a few cobbles in the southwest depression. The northwest depression is unusually deep, with about an 85cm difference between the top edge and the bottom of the depression. Feature 2 was

mapped in more detail and excavated. The excavation is discussed below. The entire area is densely wooded and on a steep south slope, in an area that is transitional between managed agroforest and swamp.

Site PoC3-49

This is another agricultural site. Feature 1 is a stone alignment on a southeast slope, stretching southwest to northeast. It is 15m long, and is likely indicative of terracing. Feature 2 is a roughly circular arrangement of basalt cobbles measuring 1.5m in diameter. It was likely used for yam cultivation. This feature is located at the northeast end of Feature 1. The site is located on a northeast slope.

Site PoC3-50

This is a single-feature site consisting of one very large depression that was likely used for breadfruit fermentation. The pit is 17m long and 5.4m across in its widest parts. It has steep, boulder-lined walls about a meter high at their highest. The north end is wide and deep; the pit then narrows and flattens out into a drainage ditch at the south end. The overall shape is keyhole-like. This site is located in a swampy area that, because of extensive vegetation, a steep southeast slope, and extremely muddy sediment, was largely otherwise unsurveyable. However, the site itself is located in an area when the slope flattens. There are a large number of trees in the area.

PoC3-48, Feature 2

Drafting: M. Levin
Date: 4 November 2011

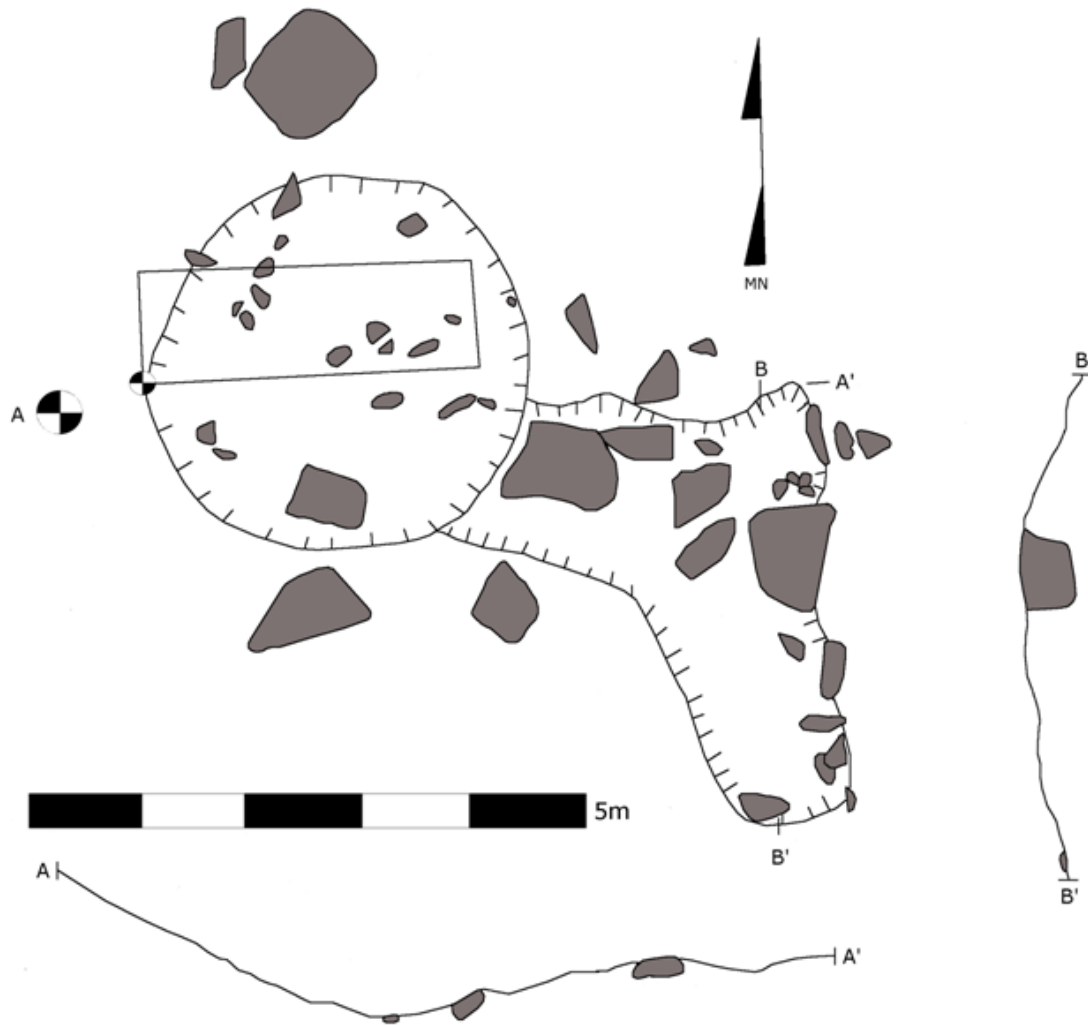


Figure IV-15. Site PoC3-48, Feature 2 Plan. Boulders and cobbles are shaded gray. Depressions are outlined with ticked lines.

Site PoC3-51

This is a two-feature site, with features being connected because of their spatial proximity. Feature 1 is a large structure with four exterior walls that are raised approximately 1m each, and a central raised platform containing some columns. Most of the exterior wall and most of the platforms are constructed of basalt boulders.

The structure is highly suggestive of a *lolong*. It is oriented southwest, with the central platform located closest to the northwest wall. The structure measures 14.2m southwest to northeast, and 18.2m northwest to southeast. Feature 2 is a roughly oval collection of basalt cobbles with a clear central area, approximately 2.5m x 2m. It appears to be a former yam cultivation enclosure that is highly disturbed. The site is located on a slight southeast slope; it is about 50m south of a modern dwelling.

Site PoC3-52

This is a five-feature site, with all features likely being related to agricultural practices. Feature 1 is a roughly circular collection of basalt cobbles approximately 2m in diameter. It was likely used as a yam growing enclosure, although it is disturbed. Feature 2 is a long (15.6m), narrow (1-2m) depression characterized as a breadfruit fermentation pit. The west end is the widest and the depression tapers to the east in what appears to be water drainage. The depression is surrounded by basalt cobbles and boulders, characteristic of breadfruit fermentation pits. Feature 3 consists of two parts, Feature 3a and Feature 3b. This feature is located to the west of Feature 2. Feature 3a is a yam cultivation enclosure with a basalt cobble in the middle; Feature 3b is south of Feature 3a and is empty in the middle. The two subfeatures border each other. The entire feature is approximately 2.5m north to south, and each enclosure is about 1m in diameter.

Feature 4 is an alignment located slightly to the north of Feature 1. It is a 10.7m alignment of basalt boulders and cobbles running northeast to southwest. The entire site is located on a mild southeast slope, and this feature is indicative of terracing. Feature 5 is located 2.1m northwest of Feature 4. It is an enclosure of basalt cobbles approximately 1.8m in diameter, likely used for yam cultivation purposes. The surrounding environment is managed agroforest, but it is relatively more open than much of the land in this project's survey.

Site PoC3-53

This site consists of one feature, which contains in its interior one subfeature. The site consists of a large rectangular stone enclosure, measuring 13.1m x 10m. The walls are constructed of basalt cobbles and boulders, and range from 0.5-1m in height. There is no paving on the interior of the enclosure, although there are some basalt cobbles and boulders strewn around the interior in a haphazard fashion. Subfeature 1a is a circular enclosure of basalt cobbles about 1m in diameter, likely used for yam cultivation. It is located near the northeast corner of the stone enclosure. The site is located on a relatively flat area south of a branch road.

Site PoC3-54

This is a two-feature agricultural site. Feature 1 is a circular enclosure of basalt cobbles and boulders 1.8m in diameter, likely a yam cultivation enclosure. Feature 2, which is north of Feature 1, consists of two alignments of basalt boulders and cobbles lined up in a perpendicular fashion. The first alignment is 9.2m long and runs roughly northwest to southeast. The second alignment starts perpendicular to the first alignment roughly in its center, and runs from northeast to southwest for 5.4m. It probably represents a form of terracing, although this is uncertain, as the local southeast slope is mild.

Site PoC3-55

This is a four-feature site, with all features likely related to yam cultivation. Feature 1 is a basalt cobble enclosure approximately 1m in diameter likely used for yam cultivation. Feature 2 is also a basalt cobble enclosure 80cm in diameter. Feature 3 is constructed the same way and is 1.1m in diameter. Finally, Feature 4 is also a basalt cobble enclosure, 1.3m in diameter. Feature 4 also contains a small piece of coral. The site is located to the south of the branch road on relatively flat ground. A modern yam enclosure is also located near this cluster of features.

Site PoC3-56

This is another site with four features related to yam production located close to the branch road. Feature 1 is a 2.1m basalt cobble enclosure. Feature 2 is a 1.3 meter enclosure; there is currently wild taro growing in the center. Feature 3 is a 1.5m enclosure, and there is a crab hole in the center, which has significantly disturbed the area. Finally, Feature 4 is a basalt cobble enclosure 1.3m in diameter.

Site PoC3-57

This is a two-feature site, also related to yam cultivation. Feature 1 is a basalt cobble enclosure approximately 1.5m in diameter; Feature 2 is a similar enclosure 1.1m in diameter. Both were likely used for yam cultivation. They are located on a southeast slope.

Site PoC3-58

This feature is a large stone platform of raised basalt cobble and boulder walls, ranging from 0.5-1m in height with a partially paved interior of basalt cobbles. It measures 9m x 6m. The southeast wall is collapsing, probably due to a large tree near the wall, but the other walls seem to be in good condition.

Site PoC3-59

This feature is a large structure of basalt boulders and cobbles, measuring 16.5m x 13.5m. It is walled on all four sides, with walls approximately 1-1.5m in height, depending on location. There are a few basalt columns strewn around the center. The function of the structure is unclear; however, it does not have the central platform characteristic of *lolong*. The vegetation at this site is very thick; it is located on a southeast slope.

Site PoC3-60

Site 60 refers to a stone alignment of basalt boulders and cobbles that measures 4.6m from SW to NE, and 3.7m from SE to NW; it has a corner in the NW. There are several cobbles in the corner, and one larger boulder nearby, SE of the structure. It appears to be disturbed.

Excavations

In order to collect additional data on site stratigraphy, vegetation and plant use, and dates of use, we excavated several of the sites with a suspected relationship to food production or storage. This includes three breadfruit fermentation pits, one yam cultivation enclosure, one garden area adjacent to a yam cultivation enclosure, and a darkened patch of soil likely used as a cooking area in a historic context. Previously, three breadfruit pits have been excavated and described on Pohnpei, one on Temwen (Ayres et al. 2009) and two in Wene (Haun 1984). As the soil stratigraphy described in the previously excavated pits is similar, additional excavations can potentially provide more information on fermentation pit construction and use. Furthermore, samples collected for plant macroremains recovery and microremains analysis can provide further information on pit usage (see, e.g., Hather 1992, 1996).

Concurrently with excavations, on-site flotation was performed with four of the six excavations. We collected 10L flotation samples at every 10cm level and used a manual flotation system similar to that described in Pearsall (2010). A nylon mesh was used to capture light fractions, and heavy fractions were captured with a 1mm sieve.

Breadfruit Pits

Site PoC3-12, F2

PoC3-12, F2 is a probable breadfruit fermentation pit. The structure contains one large depression, with additional slightly further depressed areas in both the west and east ends of the depression (Fig. IV-8). We put a 2.5m x 1m trench running roughly west to east through the west side of the pit. It was placed to allow us to expose stratigraphy and collect samples from both the exterior and the interior of the depression (see Fig. IV-16). We chose the west side as taro is growing in the east side of the pit, and thus the sediments are much more likely to be disturbed.

We collected small sediment samples (approximately 20-50ml) for plant microremains analysis at arbitrary 10cm levels. When both sides of the trench were fully exposed, we took samples from both sides at these levels. Additionally, we took three 1L bulk samples representing different areas of the trench. There was no charcoal in the excavation unit. Because breadfruit pits are unlikely to contain charred macrobotanical remains, we chose not to conduct flotation at this excavation unit.

The interior of the trench contained many large boulders, which we recorded in a plan view (Fig. IV-17). The soil was also quite hard. We identified three major sediment layers, as follows:

Layer Ia (humic layer, exterior of pit): Medium brown crumbly clay, loosely packed. 10YR 3/4

Layer Ib (humic layer, interior of pit): Brown/black clay, containing many leaves and roots. 10 YR 2/1

Layer II (sediment lens, exterior of pit): Light-to-medium brown clay. 10 YR 3/6

Layer III (all sediments below 1 & 2): Reddish-brown clay with flecks of black rock, similar in color to Layer II, but extremely hard packed 5 YR 4/6.

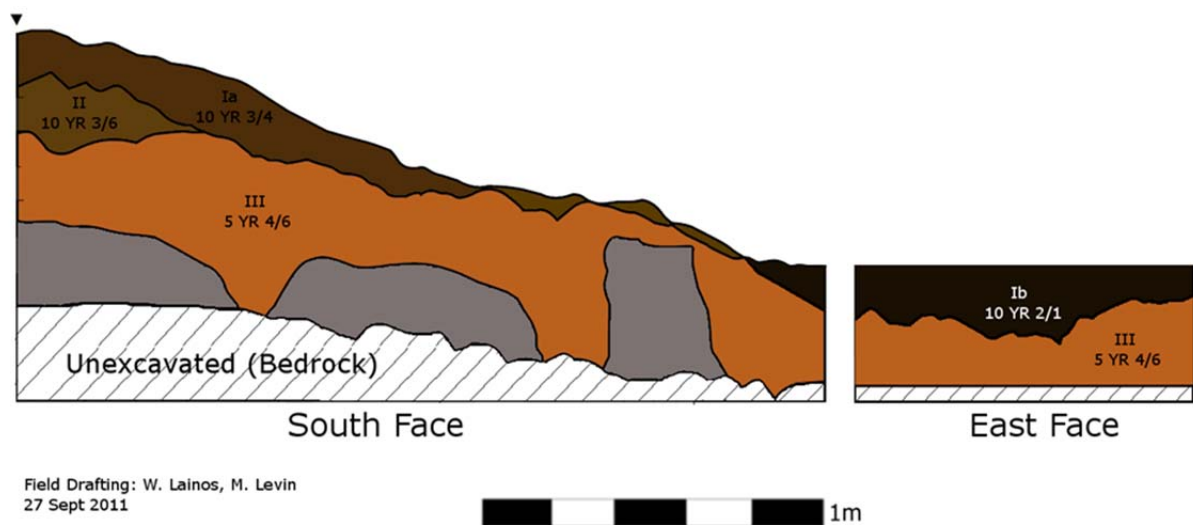


Figure IV-16. PoC3-12, Feature 2, Soil Profiles.

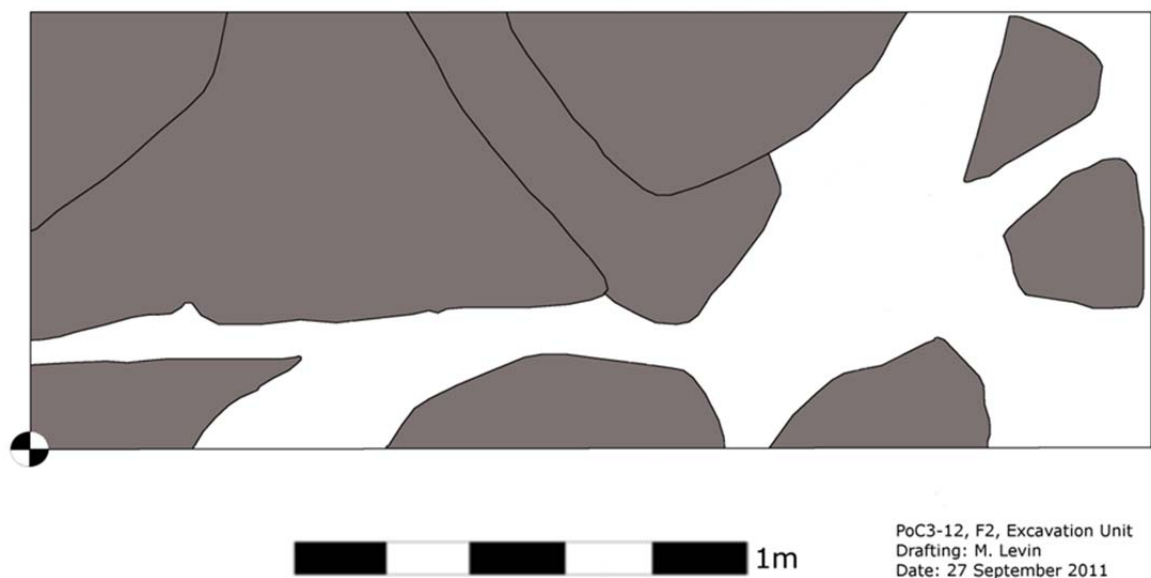


Figure IV-17. PoC3-12, Feature 2. Trench Plan. Boulders and cobbles are shaded gray.

Site PoC3-18, F1

PoC3-18, F1 is a possible breadfruit pit, although its stratigraphy is not typical (see Fig. IV-18) and the phytolith assemblage, detailed in the next section, does not seem to suggest breadfruit fermentation. The structure contains one large depression. We put a 3.5 x 1m trench running south to north through the east side of the pit. It was placed to allow us to expose stratigraphy and collect samples from the both exterior and the interior of the depression, as with PoC3-12, F2. In addition, a 50cm extension was added onto the south side of the trench exclusively for the collection of flotation samples.

We collected small sediment samples (approximately 20-50ml) for plant micro-remains analysis at 10cm levels within stratigraphic units. Where both sides of the trench were fully exposed, we collected samples from both side at every level. We also collected bulk 1L sediment scatter samples from every 10cm level. Due to the high quantity of charcoal in the deposit, we also collected 10L flotation samples from each 10cm level. In the first 4 levels these came from the trench extension; in all remaining levels they were scatter samples. Fifty-two charcoal samples for AMS dating were collected with provenience data throughout the deposit.

In terms of sediments, the stratigraphy of the pit contains just two layers: the humic layer (I), and the subsurface layer (II). They can be described as follows:

Layer I: Medium brown clay, loosely packed. 7.5 YR 3/3

Layer II: Light brown reddish clay of medium to hard density, becoming more hard-packed closer to the bottom of the layer. 7.5 YR 4/3

This excavation unit contained multiple alignments of basalt cobbles. The 50-60cm level served as the base for alignments of cobbles near the southeast, southwest, and northeast corners. As the basalt cobbles in these alignments all rested on the same surface and did not seem to be distributed randomly throughout the deposit, it is likely that their placement was deliberate. It should also be noted that the ground surface in the low point of the pit was at 48cm, so the top of some of the cobbles at the north end was visible pre-excavation. However, they were resting on the same surface as the definitively covered cobbles at the south end of the

deposit. In the northeast corner are two layers of cobbles, one with a surface in the 90-100cm level, and one with a surface in the 100-100cm level; they appear to have been stacked on top of each other. If this pit was used for breadfruit fermentation, the placement of the cobbles seems to follow logically, as the organic material in the fermentation pit is typically covered with stones and sediment (Balick 2009). This seems to suggest that the pit may have been used for breadfruit fermentation. However, it should be noted, that based on the stratigraphy of other breadfruit pits on Temwen (see PoC3-12, F2 and PoC3-50, F2 in this report; also Ayres et al. 2009) and elsewhere on Pohnpei (Haun 1984), the sediment layers appear atypical. However, the changes in sediment layers in breadfruit pits on Temwen tend to be subtle, so breadfruit fermentation cannot be ruled out based on this alone.

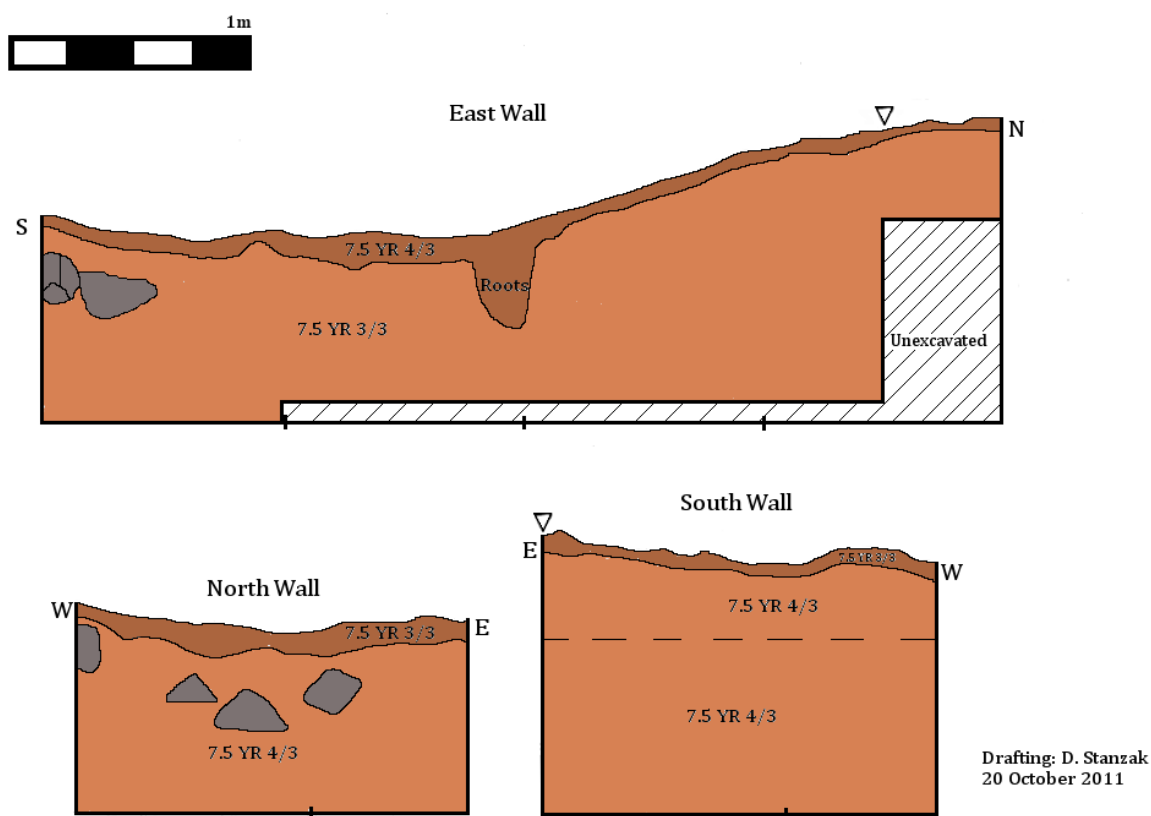


Figure IV-18. Site PoC3-18, Soil Profiles. Cobbles are shaded gray.



Figure IV-19. PoC3-18 Trench

Site PoC3-48, F1

This site, a likely breadfruit pit, was excavated in a similar manner to the sites described above in order to examine stratigraphy and collect samples for plant microremain analysis. After finishing a detailed plan map of the site, we set up a 1 x 3m trench in the northwest depression, which is more circular and further uphill. This trench runs from just outside the pit in the west, directly east to the interior of the depression. We collected 1L bulk sediment samples, as well as smaller (20-50ml) sediment samples for microremain analysis at arbitrary 10cm intervals. No charcoal was observed in the deposit. The water table in this location was higher than at other sites, inhibiting our ability to reach the full depth of the suspected breadfruit fermentation area. Nevertheless, we were able to excavate to 1m and record valuable information on stratigraphy.

There were three layers recorded at this site, described as follows:

Layer I: Dark brown, root-saturated humic layer. 10 YR 2/2

Layer II: Light brown soft clay containing some roots. 10 YR 3/2

Layer III: Light brown hard clay. 10 YR 4/6.

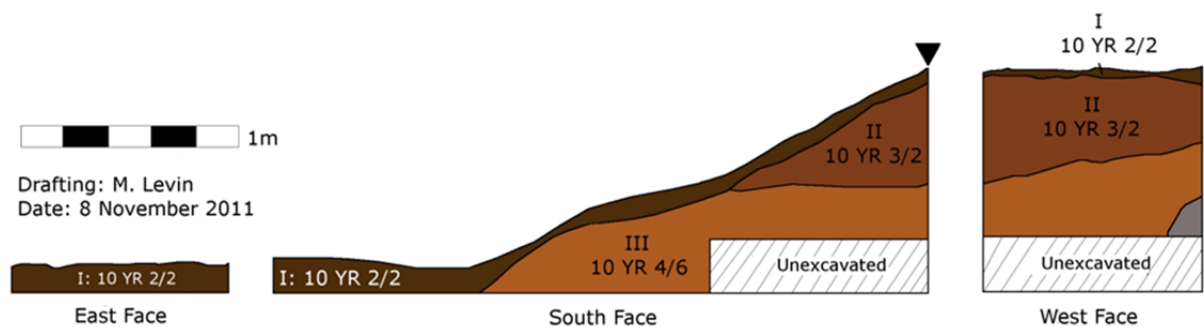


Figure IV-20. Site PoC48, Feature 2. Soil Profiles.

Layer I is present throughout the excavation deposit, as a top layer 5-20cm in depth. Due to the steepness of the pit and the quantity of water, we were unable to excavate past Layer I at the east end of the pit. Layer II is a lens that exists only in the area that is outside of the pit depression, extending less than a meter out from the west side of the trench. Layer III, the bottom layer, starts at approximately 50cm of depth on the west end. There is also a large boulder in the northwest corner that takes up a significant portion of the trench excavation unit. These layers are similar to those described for PoC3-12, F2, as well as for other excavated breadfruit pits (Ayres et al. 2009; Haun 1984).

Yam Plant Enclosures

Site PoC3-9, F2

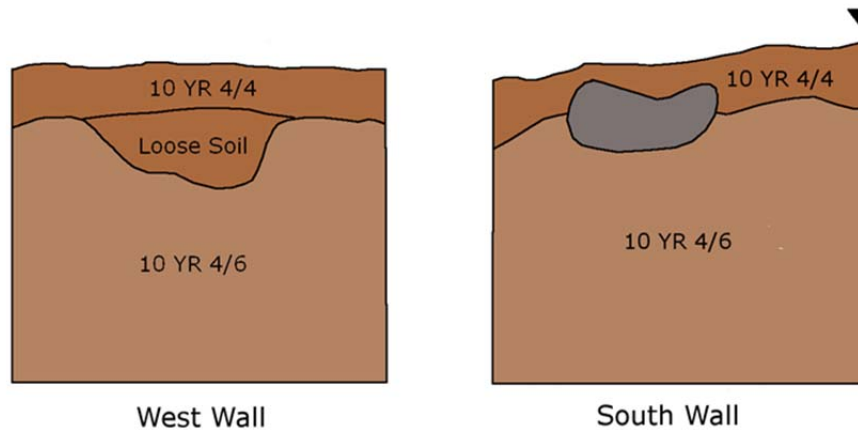
This yam enclosure excavation was designed to track the effect of yam cultivation on immediate stratigraphy in the enclosure unit, as well as to track local vegetation. We opened up a 1 x 1m test pit directly through the center of this feature

that extends to the outside. We took 1L bulk sediment samples, smaller (20-50ml) sediment samples, and 10L flotation samples at arbitrary 10cm intervals. The deposit contained some charcoal, which we collected for AMS dating. We completed excavation at 90cm, at which point no charcoal had been recorded for approximately 1.5 levels and there was no other change in stratigraphy. Two sediment layers were recorded as follows:

Layer I: Medium brown humus and clay containing a large quantity of roots. 10 YR 4/4

Layer II: Medium-light brown clay. 10 YR 4/6.

In most places, Layer I was approximately 10-20cm in depth, while Layer II was present throughout the rest of the unit below Layer I. However, the west wall, the wall that cut through the center of the yam pit, is a notable exception. In this area, Layer I dips to approximately 40cm in the middle of the unit, and the soil is loose. This is highly suggestive of past yam cultivation.



Drafting: A.C. Craib
Date: 10 November 2011

Figure IV-21. Site PoC3-9, Feature 2. Soil Profiles.

Garden Area Adjacent to Yam Enclosure

Site PoC3-11, F1

In order to examine the effect of a yam enclosure on surrounding stratigraphy and to examine changes in the local vegetation over time, we put a 1 x 1m test pit directly adjacent to this feature. We took 1L bulk sediment samples, smaller (20-50ml) sediment samples, and 10L flotation samples at arbitrary 10cm intervals. The deposit contained a notable amount of charcoal; we collected charcoal for AMS dating wherever possible. We completed excavation at 100cm, at which point no charcoal had been recorded for two levels and a large boulder in the southwest corner filled most of the excavation unit.

Two sediment layers were recorded as follows:

Layer I: Dark brown clay containing a large quantity of roots. 10 YR 4/3
Layer II: Reddish brown clay, friable, containing some roots. 5 YR 3/4.

Layer I ranges from 10-20cm in depth; layer II extends to the bottom of the excavation unit. Also notable was a metal bar, potentially a piece of rebar, at 5cm in the northwest corner of the excavation unit at 5cm depth.

The stratigraphy of the unit does not suggest disturbance from yam cultivation outside the confines of the yam enclosure. Phytolith and macroremain analysis, currently being completed, can provide more details about the surrounding environment throughout time.

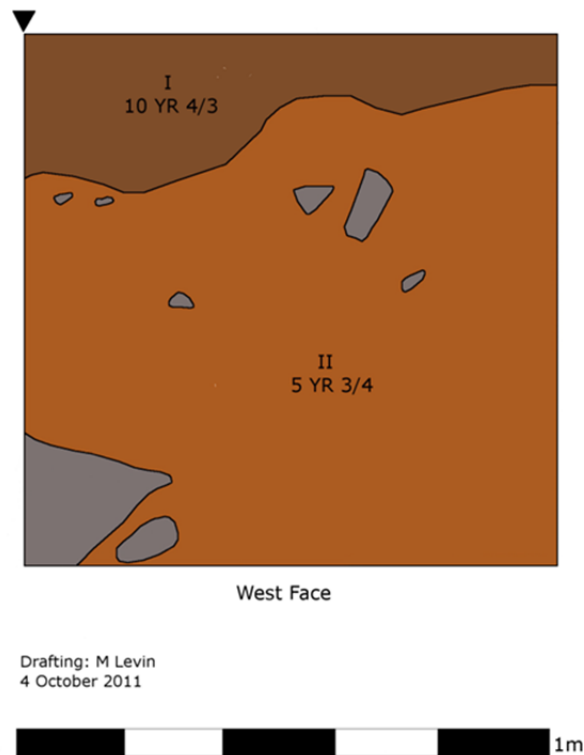


Figure IV-22. Site PoC3-11, Feature 1. Soil Profile. Boulders and cobbles are shaded gray.

Cooking Area

Site PoC3-12, F4

This site was excavated using a 1 x 1m test unit. The main marker of this feature is a distinctive brown/black soil, so it was not mapped. We took smaller sediment samples (20-50ml) as well as 10L flotation samples at arbitrary 10cm intervals. We also took charcoal samples from the abundant quantity of charcoal for AMS dating. Excavation continued to 80cm, as the lowest charcoal was at 63cm and the unit appeared to be culturally sterile after this point.

We recorded three sediment layers (one of which is divided into two sublayers) as follows:

- Layer I: Very dark organic-rich clay containing many roots. This layer contains a significant quantity of charcoal. 10 YR 2/1
- Layer II: Light brown moisture-rich clays. 10 YR 3/4

Layer IIIa: Reddish brown hard-packed clay, with some streaks of black rock.
10 YR 3/6

Layer IIIb: Brownish red clay. 5 YR 4/4.

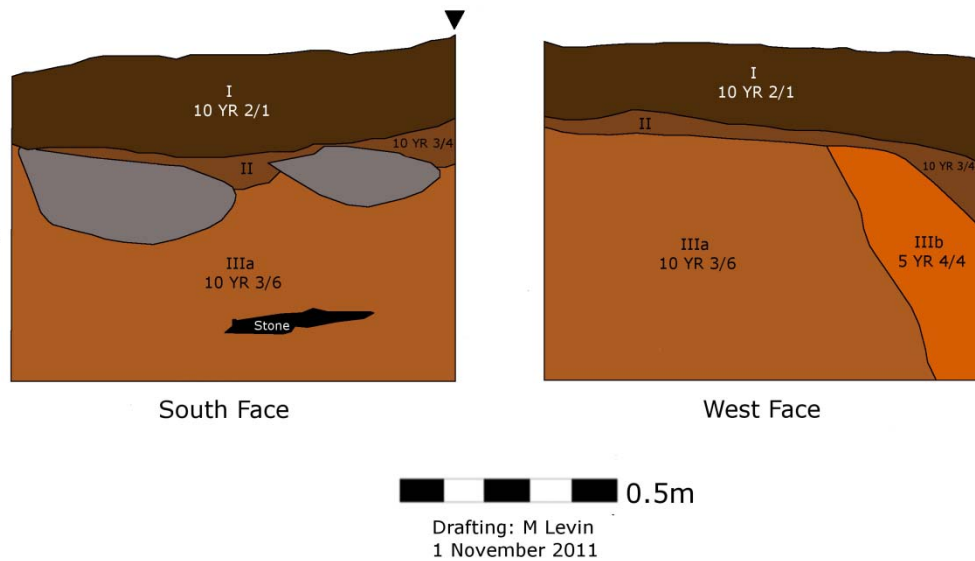


Figure IV-23. PoC3-12, Feature 4. Soil Profiles.

Layer I is approximately 20-30cm in depth, and contained all of the artifactual material recovered from the site. Layer II ranges from about 5cm to 40cm in depth, being thicker on the north and east walls, and thin on the south and west walls. Layer IIIa comprises most of the rest of the deposit below Layer II; Layer IIIb is a lens in the northwest corner extending vertically from Layer II to the bottom of the excavation unit.

This excavation unit contained all of the artifactual material recovered during this project. Artifacts recovered include eleven nails (Fig. IV-25), four linoleum tile fragments, three plastic container fragments, two glass fragments, one cloth fragment, and one piece of metal. Artifacts were recovered from the top 30cm using

a screen and by hand. It is likely, given the contents of this assemblage, that this area was used for cooking exclusively during the historic period. There was also one small-medium mammal bone recovered, which is likely either dog or pig. The vast majority of cultural material recovered from the top 30cm, however, was charcoal, which was very thick in Layer I.



Figure IV-24. PoC3-12, Feature 4. Post-excavation.

Botanical Analysis

Plant remains in archaeological sites can inform us of the previous use of the sites, as well as past local vegetation. This analysis focuses on two forms of botanical data: phytoliths and plant macroremains. Phytoliths are formed when plants absorb silica (SiO_2) naturally present in soils, depositing it in their cells. The patterns in which silica accumulates in plant cells are unique for many specific plant taxa, most often at the family level, but sometimes at the levels of genus and species.

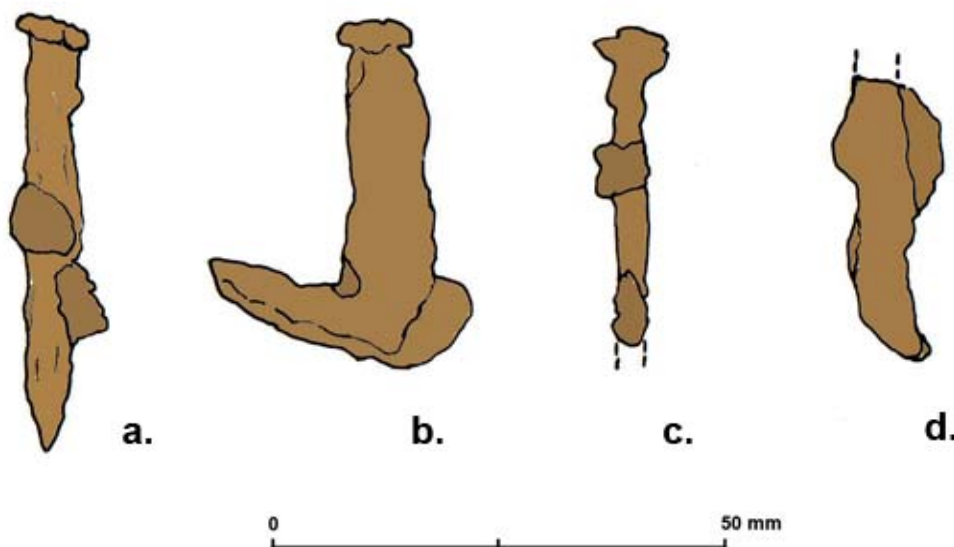


Figure IV-25. Historic artifacts from Site PoC3-12, Fea. 4, Layer I (0-20cm), Temwen Island, Pohnpei. These iron nails are from a set of 11 cataloged nail fragments and 2 other historic pieces excavated from the cooking area. These machine-made wire nails probably date to after 1950. Only one of these is well preserved to show actual length and head form (Cat. PoC2-12-2700.1. It appears to be closest to a 6d (2" or 51 mm) nail of common form in US manufacture. a). nail, Cat. PoC3-12-2700.1; b). bent nail, Cat PoC3012-2700.4; c). nail fragment, Cat PoC3-12-2700.10; d) nail fragment, Cat PoC3-12-2700.11.

When a plant dies and disintegrates, these inorganic silica compounds can remain in soils for long periods of time, thus suggesting presence or use at a particular archaeological site. Silica absorption varies by plant family, with some plants producing large quantities of phytoliths, and some plants producing none at all (Piperno 2006). Important economic plant families that produce large quantities of phytoliths on Pohnpei include Moraceae (breadfruit), Musaceae (bananas), and Arecaceae (coconuts, betel nut). Important economic plant families that produce none include Dioscoreaceae (yams) and Araceae (taro). Thus, phytoliths have the potential to be important for identifying food production activities, though they alone cannot describe the full range of plant-based activities in archaeological sites. Only a

small amount of soil is required for phytolith analysis; 5-50g is standard (Piperno 2006). Thus, samples for phytolith analysis were collected minimally at every arbitrary 10cm level in every excavation.

All of the plant macroremains collected were preserved through charring, by far the most common type of plant macroremain preserved. Plant macroremains provide another angle from which to look at plant use in archaeological contexts. As flotation samples are large (10L in this case) and on-site flotation is time-intensive, flotation samples to collect macroremains were taken at sites where charred remains could be reasonably expected to be preserved; they were not taken at two of the three breadfruit fermentation pits.

Reference Material Collection

In addition to collection of materials from soil, we also collected modern plant materials as reference for our botanical analysis. Focusing on economic plants and using Balick 2009 as a guide, we collected approximately 40 different specimens of 29 different taxa. As phytoliths are mainly produced in the leaves of plants, we always collected leaves, and collected other parts of the plant where possible. We pressed specimens using a plant press and dried them at the Conservation Society of Pohnpei.

Phytolith Analysis

Phytolith analysis is ongoing. However, some preliminary data from one of the breadfruit fermentation pits, PoC3-18, Feature 1, are described here.

Phytoliths were processed using a modified version of a procedure described in Piperno (2006). We first treated 10g of each sediment sample in a 10% HCl solution to remove carbonates from the soil and washed the samples with distilled water. Then, we treated samples with a 30% H₂O₂ solution and heated them to remove organic materials, then washed with distilled water. H₂O₂ does deflocculate soils, but they were further deflocculated by being mixed with a solution of NaHCO₃

(baking soda). Clays were then settled out using gravity sedimentation. This step is especially important with clay-rich Pohnpeian soils. Finally, when the clays were removed, phytoliths were separated from the sediment using a solution of Sodium Polytungstate ($\text{Na}_6\text{H}_2\text{W}_{12}\text{O}_{40}$, abbreviated SPT) with a specific gravity of 2.35. Phytoliths were mounted in Eukitt and viewed using a Nikon AZ 100 at 400x magnification. They were photographed using NIS-Elements software. Phytoliths were counted to 200 in each level when possible, and identified to plant family when possible.

Site PoC3-18

Phytoliths from PoC3-18 exhibit some general trends. There are three focal areas: surface and sub-surface levels, the areas around the stone alignments in the deposit, and the area below the stone alignments. Samples from surface and subsurface layers are heavily dominated by Arecaceae (Palm) and Poaceae (grass) phytoliths. While both of these families are present in the surrounding environment, this is an overrepresentation; however, since they also both produce large amounts of phytoliths (Piperno 2006), this is not unexpected. Around the stone alignments, eudicot taxa increase, as indicated by the presence of hair cell phytoliths, as well as the presence of wood phytoliths. Some of these hair cells are hook cells, and a few appear to be armed hair cells, which would both suggest the presence of Moraceae, of which breadfruit (*Artocarpus altilis*) is a part; however, they are not present in large concentrations. In lower levels, the concentration of phytoliths drastically decreases. Banana phytoliths are present, but in low concentrations throughout the deposit.

Breadfruit is generally peeled and wrapped in banana leaves before being covered with cobbles and sediment for fermentation (Balick 2009). While peeled breadfruit is unlikely to produce large quantities of phytoliths, leaves do, and thus a concentration of banana phytoliths would be expected, a phenomenon that was not observed. This does not rule out the potential use of the depression for breadfruit fermentation, but it makes that use less likely. As the phytolith assemblage around

the stone alignments does differ from the surface assemblage, it is possible that this is a surface that was exposed in the past, when there was a different local vegetation. It is possible that the materials used in the breadfruit fermentation process, if that did take place in this location, were removed and did not leave a significant phytolith signature, and that the phytoliths represent local vegetation.

More counting will need to be done from this site to identify rarer species and reduce potential bias, as well as increase counts for lower levels. It is clear, however, that phytolith analysis has utility on Pohnpei, as a diversity of diagnostic phytoliths are preserved in Pohnpeian soils.

Macroremain Analysis

Flotation samples were separated into light and heavy fractions using a manual flotation system in the field described in the above excavation section. Analysis of macroremains is ongoing. Light fractions are sorted using a standard geological brass sieve. They are then observed and sorted at a magnification of 10-40x through a light microscope. Then, photographs are taken using a Nikon AZ 100 and NIS-Elements software.

Site PoC3-18

Sorting and analysis of plant macroremains from this site are underway. Photographs of examples have been included below.

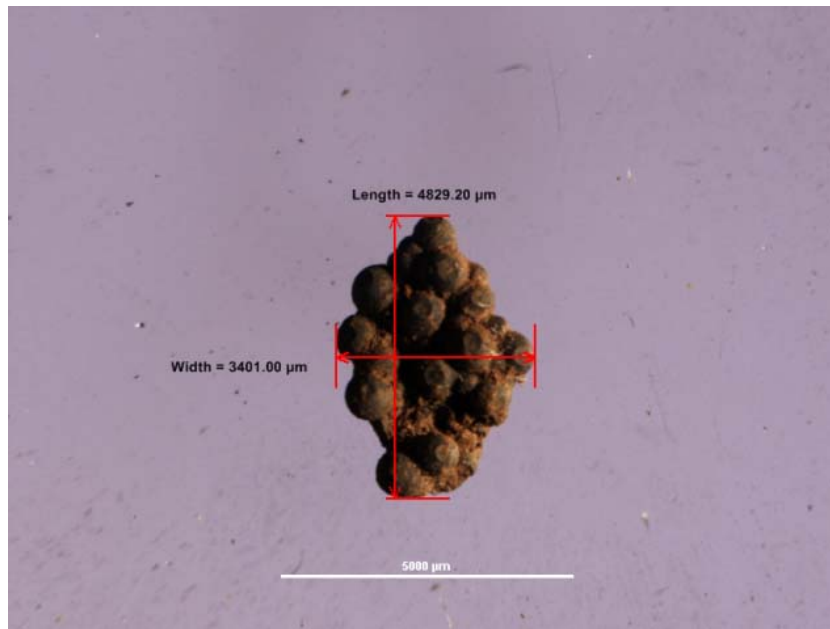


Figure IV-26. Charred plant remain from PoC3-18, 50-60cm. [image: A. Balbona]

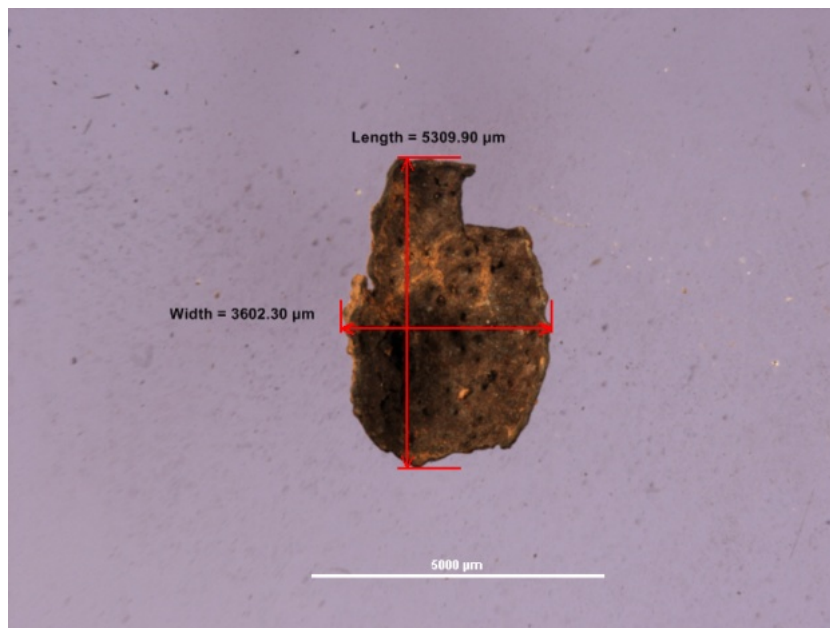


Figure IV-27. Charred seed from PoC3-18, 50-60cm. [image: A. Balbona]

V. Site Conservation Status Survey at Nan Madol

K. Seikel and W. Ayres

Introduction

Status reports about the conservation status of structures at Nan Madol have been a regular part of mapping and documentation of prehistoric architecture for decades. However, initial documentation cannot tell the whole story of what happened to a site or structure and long-term monitoring is required. In order to understand how sites have been impacted, it is necessary to re-survey locations to gain a better picture of the factors affecting site preservation. The main seawall at Pahnwi (PWI) has been examined regularly for structural collapse by the University of Oregon group, and one islet in particular, Dauahdpeidak (DPK; see Fig. II-2 here), has been the subject of multi-year monitoring for damage created by tidal flooding (Ayres and Eperiam 2001). Kataoka and colleagues report on a recent islet survey as well (Kataoka et al. 2012).

The purpose of status survey at Nan Madol is to track changes to the site over time. The examination in 2011 included re-visits to seventeen previously mapped islets to record any significant changes or major impacts at the site. These islets include ones mapped by J.S. Athens and W.S. Ayres in the 1980s to 90s. In addition to these islets, three structures surveyed in our 2008 project were revisited both to do detailed architectural mapping and look at short term impacts on the area.

Islet Survey

The following islets were chosen for the status survey because of the detailed maps already produced, their variable sizes and ages, and their wide distribution across the site, including the Nan Madol Powe and Pah sections. Although time did

not permit for all islets to be surveyed from edge to edge, multiple features on each islet were documented.



Figure V-1. Distribution of islets field checked in this project at Nan Madol.

Peinering (PEE; Hambruch 101)

The islet of Peinering is located in an area with consistent tidal water flow and is little impacted by mangrove growth compared with other areas at Nan Madol. The platform located on the eastern side of the islet (Feature 1) is well preserved and looks to be cemented together to prevent deterioration; it is clear of vegetation. The central platform (Feature 2) does not seem to have been significantly impacted since it was mapped, though there is some vegetation growing along one side of the structure. The western platform (Feature 3) was not examined in detail, but there is

significantly more vegetation on the western side of the enclosure. This may be one reason local residents say that birds nest here at Peinering and nearby islets. The wall enclosing the islet seems to be much in the same condition as in 1984, though the areas designated as washed out may have expanded a bit in recent years.

Peinioar (PEO; Hambruch 102)

Mangroves are located around the periphery of Peinioar and are taking over the north or northeast side of the islet. Being a low lying islet, Peinioar is regularly flooded at high tide, though the southern side seems to be less impacted by the flooding. The features designated by Athens are still intact and are preserved, though further mangrove growth may pose an issue in the coming years.

Pohndauwas (POA; Hambruch 114)

The proximity of Pohndauwas to Nahndauwas, the most visited islet at Nan Madol, has meant that it has been more regularly visited and cleared than other islets. Preservation is good, but rising tides have flooded the low areas, particularly around Feature 19 and the southern side, at high levels. Though the structures are currently solid, they will need to be stabilized in the future as these tidal effects may degrade the coral rubble fill and weaken the islet base.

Pahndauwas (PDA; Hambruch 113)

Much like Pohndauwas, Pahndauwas is also significantly impacted by tidal flooding and the same concerns for long term preservation apply. Differential sand deposition on the East side represents a conservation concern.

Likinpei (LIPB; Hambruch 88)

Likinpei, designated Likinpei B by Athens, is mostly clear of vegetation and is generally well preserved. There is some mangrove growing on the islet and it floods at high tide. The only major difference between the 1984 map and our survey in 2011 is that there is a more-elaborate constructed footpath along portions of the

northeast side of the islet. In general, these remodelled walkways and other recent constructions affect the archaeological values of the site, the preserved evidence, the site stability, and the cultural landscape.

Sapwohng (SOE; Hambruch 85)

Sapwohng, designated Likinpei A by Athens, is partly overgrown by trees and vines, and floods during high tide. Some confusion exists about the names of two small islets in this area of Nan Madol. The platform (Feature 1) is almost completely overgrown. The footpath heading towards Likinpei on Athens' map is still in place although part of it has been covered by silt and sand from tidal shifts.

Lemenkou (LEM: Hambruch 129)

The exterior or seaward side of Lemenkou has numerous washouts as noted in Athens' 1984 map. As shown on his map, Feature 18 was significantly impacted by a washout on the south side of the islet. The structures on Lemenkou are generally well preserved, though those along the exterior side are more likely to have been impacted by wave action. Mangrove grows along the western side of the islet. The southern and southeast areas of Lemenkou are covered in trees and vines. The Feature 1 enclosure is partially covered in thicket and creepers, as are Features 7 and 22. The northwest side of the islet around Features 23, 15, and 16 is mostly clear of vegetation.

Pahnwi (PWI; Hambruch 9)

Portions of the lower elevations on north side of the Pahnwi have been taken over by mangroves, though not all of the north side was surveyed in the present project. Feature 29 seems to be in reasonable condition, although the southern wall may not be as completely preserved as it seems to be in Ayres' map; the enclosure is filled with trees and vines. Creepers dominate the rest of the islet.

Sapwuhdir (SWD; Hambruch 77)

Sapwuhdir islet, located in Nan Madol Powe, is impacted by tidal flooding and mangrove encroachment. As well, a large tree has taken over a portion of the southeast side of the islet. The area around Features 8 and 9 should be inspected further to address the impact of the tree. Even with the flooding and vegetation growth, most of the structures seem to be in similar condition to the map produced by Athens.

Sapwenpwe (SPW; Hambruch 72)

The islet of Sapwenpwe is covered in a scatter of trees and vines (Fig. V-2), and tidal flooding is a major issue. Flooding seems to have deposited silt on the islet surface. There is a thicket growing in an area which was likely constructed to connect the two islets that became Sapwenpwe. In some areas the islet edge isn't clearly



Figure V-2. Detail of the state of Sapwenpwe Islet, Nan Madol (PoC3-1-SPW), showing present-day vegetation (uncleared), a stone platform (Fea. 15), and selected surface artifacts and occupational refuse. Historic artifacts shown are tidal float residue. [image: K. Seikel]

defined, which is also noted in Athens' original map from 1984 (see additional discussion of SPW in Appendix E).

Nihmokemok (NIM; Hambruch 78)

There are more trees and vines growing on the east side of the Nihmokemok islet than the west, which is largely clear aside from some encroaching mangrove spikes. There is evidence of tidal flooding, which is more marked on the west side of the islet (Fig. V-3). The small washed-out area on the northeast corner of the Nihmokemok seems more pronounced than noted on Athens' map. A fallen tree lies on the southeast side of the islet near the *sakau* stone marked on the 1984 map.



Figure V-3. Mangroves encroaching on Nihmokemok Islet (PoC3-1-NIM). The surface is deflated by tidal action.

Sapwendau (SPD; Hambruch 75)

We only traversed this islet to reach another, but there are a number of large trees growing on the islet surface. Further survey is necessary to establish the status of the whole islet.

Sapwuhtik A (?) (SWUA; Hambruch 76)

There are trees and vines scattered across this islet and mangrove encroaching along its edges, particularly the east side. The vegetation is thicker on the northwest side of the islet. The islet floods during high tide.

As an aside, identifying the correct islet named Sapwuhtik has been difficult, given the vegetation, the numerous small islets, and their deflated condition in this section of Nan Madol. In this case, either the preservation of Sapwuhtik A isn't particularly good--which is unlikely considering the rest of the survey results--or we visited Peiniap islet (PIA) instead. Unfortunately, we did not have time to visit the small neighboring islets to confirm which islet was which before the end of our work.

Dorong (DOR; Hambruch 50)

Dorong Islet, located in Nan Madol Pah, is surrounded by mangrove and it has penetrated portions of the islet interior. The islet today is covered in trees and vines, which prevent creepers from growing for the most part. We tested the depth of sediment accumulation within a meter of the lake edge and noted that it was approximately 30 centimeters in depth; it is deeper in the middle as recorded in a complete transect done by Ayres and colleagues in 1988. In general, Dorong seems to be in good condition, though the exterior walls to need to be checked around the islet to confirm this for all areas.

Pahn Kadiria (PKI: Hambruch 33-36)

Mangrove surrounds the north and northwest sides of Pahn Kadiria, a key islet in Nan Madol Pah. The vegetation brings to mind that of the main island more than that of an artificial islet. Preservation is good, though many of the walls are covered in moss and creepers. There are crab burrows in some areas where there is little vegetation due to shade from surrounding trees.

Idehd (IDE; Hambruch 42-43)

The area around the footpath marked on Athens' map of Idehd is still largely clear. The enclosure walls are coated in creepers and even with the trees and vegetation growing on the midden mound, the midden is largely intact. There is a tree growing out of Feature 5 (Athens' designation), though most of the trees grow on the west side of the islet. Mangrove grows just off the southeast side of Idehd.

Karian (A and B) (KAR; Hambruch 121-122)

During our fieldwork the entire exterior of Karian A had been completely cleared, likely for the filming of a television production. Otherwise, both islets were still covered with vines and creepers with an occasional tree. The interior side of the enclosing wall of Karian A is still much in the same condition as it was in 2008 and the collapsed area doesn't seem to have deteriorated beyond that mapped in 1984. The lower islet, Karian B, floods at high tide.

The following islets were chosen for the status survey to examine short term impacts on the seawall of Nan Madol. Tidal fluctuations impact this portion of the site more significantly than others and the mangrove is encroaching along the edges of these islets as well.

Sapwuhtik B (SWUB; Hambruch 126)

The vegetation cut back in 2008 has not fully re-appeared and this allowed for relative ease of inspection. Sapwuhtik B is still much in the same condition as it was during survey undertaken in 2008. Stabilization of the underlying islet surface is the primary concern for the preservation of this islet. Tidal inundation and wave action are the culprits of coral degradation, however slow the process may be. Tides and storms between 1910 and 2008 have washed sand into the channel between Sapwuhtik B and Lukepenkarian. It may be decades before the coral degradation becomes a major issue, but it is one that should be addressed soon. Visitor disturbance of tombs in this section of the Nan Madol seawall has been noted.

Lukepenkarian (LPK; Hambruch 123, 125)

This islet stretches from Karian A to Sapwuhtik B. Much of the vegetation cut back in the 2008 survey has grown back. Feature 2, which was cleared of a vegetation in 2008, has almost entirely been reclaimed by the thicket. Tides and wave action also pose a major long-term threat to Lukepenkarian through coral degradation and sediment transport.

Angeir (ANG; Hambruch 127)

Angeir has the same conservation problems as Sapwuhtik B and Lukepenkarian with coral degradation and collapse of seawall architecture. In addition to this, its slightly lower elevation also causes significant flooding during high tide. The mangrove is encroaching around the islet and there are some large trees which have had significant impacts on the islet; one of which has taken a large *sakau* stone near Feature 2 into its roots.

Conservation Issues and Recommendations

Tidal Flooding

Tide levels during this project were higher than observed levels at Nan Madol during previous projects, including one in 2008. High tides often covered significant portions of the tourist walkway to Nan Douwas from Temwen. On occasion a couple of the footbridges connecting the islets along the walkway would be washed out by the tides.

Tidal flooding elsewhere at the site has had varying impacts. The seawall islets, of course, seem to be the most heavily impacted by flooding. There are damaged areas scattered along the seawall, where waves and storm surges have washed-out portions of islet fill (Fig. V-4). At high tide some of the lower lying areas on the seawall islets become completely flooded, which degrades the islet fill. The small islets within the mangrove swamp near the coast of Temwen are partially flooded by tides, and this causes deflation, the displacement of surface artifacts, and

creates structural weaknesses. This flooding plays a role in the deposition of silts on some islet surfaces, and, in general, the seawall and low lying islets are most heavily impacted by tidal flooding.



Figure V-4. A disturbed area along E seawall of Nan Madol (Angeir-Sapwuhtik B) This reflects a combination of wave damage, remodeling, and settling of architectural fill.

Vegetation

The Nan Madol site area is covered by a low forest composed of woody plants (trees and shrubs) adapted to areas affected by ocean tides. This is primarily mangrove forest (*naniak*) growth today, but there are representatives of plants and vegetation integrated into several other microenvironments as well. The mangrove forest vegetation is, in general, particularly destructive to the archaeological resources of Nan Madol and, while not confirmed, it seems likely that it has been a major element of the coastal vegetation at the time of the early Nan Madol settlement and throughout its growth period. At the same time, the mangrove root structure has

been significant in stabilizing sediments and stone formations and this has had a counter-balancing effect of structural stability. The diversity of mangroves within the Nan Madol area is considerable (see Fujimoto et al. 1995; Krauss et al. 2007), as reflected in the species list developed by Merlin et al. (1992):

*Mangrove Trees Common in the Nan Madol Site Area**

<u>Pohnpeian Name</u>	<u>English Term</u>	<u>Species Name</u>
<i>Akapah</i>	Mangrove	<i>Rhizophora apiculata</i>
<i>Akelel</i>	Mangrove	<i>Rhizophora mucronata</i>
<i>Koatoa</i>	Mangrove	<i>Sonneratia alba</i>
<i>Parem</i>	Nipa Palm	<i>Nypa fruticans</i>
<i>Pwulok</i>	Cannon-Ball Tree	<i>Xylocarpus granatum</i>
<i>Sohmw</i>	Oriental Mangrove	<i>Bruguiera gymnorhiza</i>
<i>Weingal</i>	Mangrove	<i>Lumnitzera littorea</i>

Trees, shrubs, vines and mangroves have varying effects across Nan Madol. The mangrove, which is certainly the most pervasive damaging agent at the site, is currently managed through occasional cutting programs and the maintenance of canals through some sections of the site. Even with these mitigation measures in place the mangroves still have made significant impacts on the site. Low lying sections of islets in particular are prone to mangrove encroachment regardless of the islet's location within the site (see Fig. V-3; Fig. V-5). This being said, mangrove growth is denser, and a more mature forest, closer to Temwen's shoreline. Trees, shrubs, and vines are common throughout the site, though the vines may do as much to protect some of the structures as they damage them.



Figure V-5. Katherine Seikel and co-workers examine an interior Nan Madol islet surface showing sediment deflation due to tidal flooding and mangrove incursion into the surrounding canals. The islet surface at the edges is at or near the level of tidal muds. [photo: A. Craib].

The surfaces of the islets forming the seawall architecture are quite different from islets in the interior of Nan Madol. Exposed coral rubble creates very irregular surfaces superimposed on a coral and sand substrate (Fig. V-6). Strand vegetation typical of Micronesian islands dominates in these site areas in contrast to the more dense mangrove dominated islets.



Figure V-6. View of seawall structural remains and existing strand vegetation, Site PoC3-1, Nan Madol. [image: K. Seikel].

Bioturbation

Site disturbance by animals (bioturbation) is extensive at Nan Madol with crabs and other marine animals being the most common. Evidence of crabs burrowing has been identified on most islets, but the impact of smaller marine organisms has not been specifically studied for the site. Rats represent another animal impact on site fill, but this is not as common as damage from crabs. Pigs have been observed on the inner islets, but are not a persistent problem. Otherwise, there are islets where birds supposedly nest during the year but no related impacts have been recorded.

Human Impacts

Human impacts at the site are easier to track. The largest amount of disturbance is in areas with the highest number of visitors; typically, along the tourist

walkway (Fig. V-7). The tourist walkway is constructed from material taken from the site itself. There are few surface remains alongside the walkway in most areas, which may be a combination of the walkway construction and curio hunting by visitors. Often, areas a short distance from the walkway still have preserved surface remains. At present, there is no signage at the site stating that it is a protected site. Aside from the walkway related issues, other human impacts at Nan Madol are uncontrolled surface collecting of artifacts, unauthorized digging, structural collapse from visitors walking on fragile stone works, and activities related to subsistence practices. A few local families have breadfruit and coconut trees planted on certain islets; these are linked to family use-leases issued during the German administration of Pohnpei. These tree plantings in some cases have had a significant impact on stone architecture and the root systems of coconut palms have a different impact than other kinds of trees. On the other hand, these were mostly planted some time ago and many other trees and shrubs grew up naturally. A detailed assessment of vegetation impacts on the site should be undertaken. On the seawall there is evidence of coral rubble being moved to build fires to cook fish, and in some locations the grilling grates and some trash have been left behind. Sand is also being mined from the reef flats and beaches adjacent to the seawall islets.

Natural impacts have had a more widespread impact on the Nan Madol archaeological remains, but that does not lessen the significance of human activities on the site. Interpretive signage, which should include information on the site's protected status, needs to be instituted for the site. This can also be a means to educate visitors about how they can minimize their negative effects. As for natural impacts, site stabilization is a priority that needs to be seriously considered at this time.



Figure V-7. Site PoC3-1, Nan Madol. Tourist walkway bridge between Usendau and Dau Islets. [image: Alex Craib].

VI. Project Results, Conclusions and Recommendations

W. Ayres, K. Seikel, and M. Levin

Overview

Archaeological investigations on Pohnpei continue to improve our knowledge of the initial human colonization of this area of Micronesia, of the changing material culture found on the island over a period of 2,000 years, and environmental changes induced by and endured by past residents of the island. Coupled with this is increasingly clear evidence of the timing and elaboration of social and political complexity on the island. Pohnpei's archaeological record is complex because of the magnitude of the archaeological remains, the long period of occupation, and the environmental conditions affecting preservation.

This project concentrates on Nan Madol and adjacent areas because of the long sequence of settlement there and the elaboration of stone architecture rivaling that anywhere else in the Pacific. Information from historical documents study, including oral historical ones, as well as basic archaeological information from artifacts, site plans and feature details, as well excavated sediments provide a wealth of information about life in the past on Pohnpei. This work has helped clarify Nan Madol's position in the prehistory of central Micronesia and the importance of the site as a part of the wider Pohnpeian context. Importantly, this evidence helps the Historic Preservation Office and the people of Pohnpei more generally, make decisions about sites and places worthy of long-term conservation and protection.

From September to November 2011, field studies were done at Nan Madol and on Temwen Island, Madolenihmw to collection additional information about interrelated sites forming the record of past settlement in this part of Pohnpei.

The work at Nan Madol accomplished two things: 1) detailed mapping of stone structural sites recorded in our 2008 project, and 2) information about the preservation conditions for individual islets scattered across the 100-islet complex. Both kinds of information are essential for long-term site conservation and for decision making about which parts of this huge site are in the greatest danger of collapse or other structural deterioration and for understanding which places are most important for the information, such as artifacts, they contain. Related to the survey in Nan Madol Central was mapping and analysis of related architecture on Temwen Island done by K. Seikel. Burial structures there, and elsewhere around the island—as previously studied in Awak (Uh), Imwinsapw (Sokehs), Wene (Kitti), and Nett--represent an important comparison to those found within Nan Madol itself.

The second focus of the research was Temwen Island, that is, settlements clearly related to Nan Madol because of their geographical proximity and because they are mostly contemporaneous with the islet-building and post-Nan Madol phases. A major part of the Temwen work focused on evidence for early food production, especially gardening and food storage systems used on the island. This kind of information is essential for determining population sizes and the mobilization of labor forces in prehistory. The paleoethnobotanical study helps identify patterns of vegetation and other environmental change that illustrate how earlier Pohnpeians developed a food production system capable of supporting a dense population.

With regard to the specifics of site conservation, the research allows us to propose plans of conservation for individual islets in the case of Nan Madol and for various sites on Temwen. Some of these places are identified in the Appendices to this report. We see several factors that make each site distinct in terms of what should be done to conserve it in the face of increased environmental and visitor impacts. Some sites are of significance locally. In the future, the staff of the Historic Preservation Office will be able to devise plans for conservation that are based on a known archaeological record for a variety of kinds of archaeological sites within the Nan Madol complex as well as elsewhere on Pohnpei.

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**The Archaeology of Nan Madol and
Temwen Island**

**Site Distribution, Architecture, and Early
Agricultural Features
Madolenihmw, Pohnpei,
Federated States of Micronesia**

Ayres, Levin and Seikel

Appendices

Appendix A.

Site Numbering System for Nan Madol and Temwen

Site recording is a fundamental aspect of historic preservation efforts, and data about specific sites, clearly established site designations, and information to relocate sites are all critical. The system that is used for archaeological and historic site numbering for Pohnpei provides a way to systematically record and add new sites to the Pohnpei State inventory in a way that is consistent with internationally-recognized procedures. The numbering system is one that has been used generally within Micronesia and elsewhere in the Pacific Islands.

For archaeological sites, including both “prehistoric” ones and “historic” ones-- ranging from small, isolated surface scatters of food remains to large complexes of stone structures and other archaeological remains, such as Nan Madol-- the designation includes the island name (“Po” for Pohnpei in this case); the traditional district or municipality (*wehi*, “C” for Madolenihmw); the section number designation representing a smaller area (*kousapw*, a subunit of the *wehi*) within which the site is located; and finally a sequential number series for sites as these are discovered and described (see Ayres and Mauricio 1997). *Kousapw* are numbered consecutively extending away, or down (*pah*), from Nan Madol within each *wehi* or District/Municipality, and like the *wehi* are traditionally important chiefly land divisions that remain in use today. Nan Madol, for example, has been given the site designation PoC3-1, meaning: “Pohnpei, C for Madolenihmw, 3 for the Nan Wei *kousapw*, and site number 1. We tentatively assign site numbers for Temwen sites in this report and these can be confirmed by the Pohnpei Historic Preservation Office.

Appendix B.

Time Table and Research Effort

Project Schedule

The project was conducted for a period covering approximately two and a half months from September to November 2011 (The original proposed project startup date was June 2010). The overall sequence of planned field activities was as follows:

Week 1	Consultation with Historic Preservation Office staff and making local arrangements.
Sept 10-12:	Arrive, Consult with Historic Preservation Office, and Project logistical Planning.
Sept 13-17	Temwen and Nan Madol
...	
Week 2	Reconnaissance and beginning intensive survey-
Sept 18-25:	Temwen and Nan Madol
Week 3 to Week 12	Doing site definitions, field recording and mapping.
Sept 26-Nov 12:	Field studies at Nan Madol and on Temwen. Mapping and excavations in selected sites; Sekeren reconnaissance, visit to Agricultural Experiment Station, plant sample collecting.
Week 13	Finishing field recording, consolidating field data, submitting field report to HPO office, and storing samples and equipment.
Nov 12-15:	Finalize project details with HPO and Packing supplies and samples.
Remaining time, 2011-2014:	Lab analysis, consultant reporting, drafting, report writing.

Appendix C.

Summary of Sites and Features Recorded

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Summary Site Features Identified for Temwen, Madolenihmw

Summary Site Features Identified for Temwen Island:

Temwen Site PoC3-5 – *Lolong* tomb complex

Feature 1 – Burial platform – 4m²

Feature 2 – Basalt column alignment surrounding Feature 1

Feature 3 – Enclosing wall – 25m x 19.5m

Feature 4 – Large basalt boulders and rubble acting as foundational support for enclosing wall

Feature 5 – Depression against East wall

Feature 6 – Yam cultivation enclosures

Feature 6a – Yam cultivation enclosure

Feature 6b – Yam cultivation enclosure

Temwen Site PoC3-7 (1989)

Feature 1 – Platform (house platform?)

Feature 2 – Pig fence/trench

PoC3-8 – *Lolong*

Feature 1 – Burial platform/foundation – 6m x 7m

Feature 2 – Enclosing wall, approximately 14.5m x 11.5m

Feature 3 – Yam cultivation enclosures

Feature 3a – Yam cultivation enclosure in southern portion

Feature 3b – Yam cultivation enclosure along eastern wall

Feature 3c – Yam cultivation enclosure in Northeast corner

Temwen Site PoC3-9 (1989, 2011)

Feature 1 – Architectural enclosure – 10.2m x 7.3m

Feature 2 – Yam pit, yam removed – 1.7m in diameter

Feature 3 – Yam cultivation enclosure – 1.1-1.9m in diameter

Feature 4 – Four rectangular basalt rocks placed at N-S-E-W corners of square, 2.5m apart

Feature 5 – Yam cultivation enclosure – 1.5m in diameter

Feature 6 – Yam cultivation enclosure – 1.5m in diameter

Temwen Site PoC3-10 (2008)

Feature 1 – Breadfruit Storage Pit

Sub-Feature 1: Southeastern Depression – approx. 1.5m – 2m in diameter

Sub-Feature 2: Southwestern Depression – approx. 1m in diameter

Sub-Feature 3: Northern Depression – approx. 1m in diameter

Temwen Site PoC3-11

Feature 1 – Yam cultivation enclosure

Feature 2 – Yam cultivation enclosure

Feature 3 – Yam cultivation enclosure

Feature 4 – Yam cultivation enclosure

Feature 5 – Yam cultivation enclosure

Feature 6 – Yam cultivation enclosure

Feature 7 – Yam cultivation enclosure

Feature 8 – Yam cultivation enclosure

Feature 9 – Yam cultivation enclosure

Feature 10 – Yam cultivation enclosure

Feature 11 – Yam cultivation enclosure

Feature 12 – Yam cultivation enclosure

Feature 13 – Yam cultivation enclosure

Feature 14 – Yam cultivation enclosure

Feature 15 – Yam cultivation enclosure

Feature 16 – Yam cultivation enclosure, highly disturbed – 1m in diameter

Feature 17 -- Alignment of four boulders – 2m long

Feature 18 – Circle of rocks surrounding hibiscus tree/disturbed yam cultivation enclosure

Temwen Site PoC3-12

Feature 1 – Breadfruit fermentation pit – 15m x 5m

Feature 2 – Breadfruit fermentation pit – 11m x 4.3m

Feature 3 – Yam cultivation enclosure

Feature 4 – Cooking Area

Temwen Site PoC3-13

Feature 1 – Wall on the edge of Temwen Island

Temwen Site PoC3-14

Feature 1 – Stone platform – 5.85m x 2.75m

Feature 2 – Parallel stone alignments – 7m long

Temwen Site PoC3-15

Feature 1 – Basalt cobble/boulder arc – 5m max length
Feature 2 – Yam cultivation enclosure – 1m in diameter

Temwen Site PoC3-16

Feature 1 – Long wall – approx. 100m long, 2m in height at highest

Temwen Site PoC3-17

Feature 1 – Basalt stone alignment – 10m long

Temwen Site PoC3-18

Feature 1 – Breadfruit fermentation pit – 5.3m x 7.9m

Temwen Site PoC3-19

Feature 1 – Yam cultivation enclosure – 1m in diameter
Feature 2 – Yam cultivation enclosure – 0.9m in diameter
Feature 3 – Large boulder alignment

Temwen Site PoC3-20

Feature 1 – Yam cultivation enclosure – 1.9-2.3m in diameter
Feature 2 – Yam cultivation enclosure – 1.2-1.6m in diameter
Feature 3 – Collection of basalt cobbles, potential yam cultivation enclosure

Temwen Site PoC3-21

Feature 1 – Yam cultivation enclosure – 85-90cm in diameter

Temwen Site PoC3-22

Feature 1 – Yam cultivation enclosure – 1.1m in diameter
Feature 2 – Yam cultivation enclosure – 1m in diameter

Temwen Site PoC3-23

Feature 1 – Yam cultivation enclosure – 1-1.2m in diameter
Feature 2 – Yam cultivation enclosure – 1-1.2m in diameter

Temwen Site PoC3-24

Feature 1 – Yam cultivation enclosure, disturbed – 1.35-1.65m in diameter
Feature 2 – Yam cultivation enclosure – 1-1.2m in diameter
Feature 3 – Yam cultivation enclosure – 85cm-1m in diameter
Feature 4 – Yam cultivation enclosure surrounded by larger boulder enclosure – 1m in diameter and 2.2-2.8m in diameter, respectively

Temwen Site PoC3-25

Feature 1 – Cluster of basalt boulders

Feature 2 – Large stone wall – 17.7m long, 1.5m high, and 1.7-4.6m across

Feature 3 – Yam pit, yam removed – 1.8m in diameter

Temwen Site PoC3-26

Feature 1 – Breadfruit fermentation pit – 3.95-5.1m in diameter

Temwen Site PoC3-27

Feature 1 – Yam cultivation enclosure – 1.8m in diameter

Temwen Site PoC3-28

Feature 1 – Large boulder platform – 12.4m x 13.4m, 2m in height

Temwen Site PoC3-29

Feature 1 – Yam cultivation enclosure – 1-1.25m in diameter

Temwen Site PoC3-30

Feature 1 – Yam cultivation enclosure – 0.75-1.5m in diameter

Feature 2 – Two linked depressions – 0.25m wide, 1m and 0.5m long

Feature 3 – Yam pit, yam removed – 1m in diameter

Temwen Site PoC3-31

Feature 1 – Yam cultivation enclosure – 0.75m in diameter

Feature 2 – Yam cultivation enclosure – 1-1.4m in diameter

Feature 3 – Crescent-shaped boulder alignment – 2.4-2.6m long

Feature 4 – Yam cultivation enclosure – 1.3m in diameter

Feature 5 – Yam cultivation enclosure – 1.2m in diameter

Feature 6 – Yam cultivation enclosure – 1.8m in diameter

Temwen Site PoC3-32

Feature 1 – Yam cultivation enclosure – 1.2m in diameter

Temwen Site PoC3-33

Feature 1 – Boulder alignment – 2.7m long

Temwen Site PoC3-34

Feature 1 – Yam pit, yam removed, surrounded by basalt boulders – depression is 1.2m in diameter, boulder enclosure is 2.3m in diameter

Feature 2 – Yam cultivation enclosure – 1m in diameter

Feature 3 – Yam cultivation enclosure – 2m in diameter

Feature 4 – Yam cultivation enclosure – 1.4m in diameter

Feature 5 – SE slope with many large boulders

Feature 6 – Yam pit, yam removed – 1.8-2.6m in diameter

Temwen Site PoC3-35

Feature 1 – Small breadfruit fermentation pit – 3-4.8m in diameter

Temwen Site PoC3-36

Feature 1 – Large circular depression – 12.3m in diameter, 5m deep

Feature 2 – collapsed boulders on a north slope

Temwen Site PoC3-37

Feature 1 – Yam cultivation enclosure – 1m in diameter

Feature 2 – Yam cultivation enclosure – 1m in diameter

Feature 3 – Yam cultivation enclosure – 1.3m in diameter

Feature 4 – Yam pit, yam removed – 1m in diameter

Feature 5 – Yam pit, yam removed – 1.3m in diameter

Temwen Site PoC3-38

Feature 1 – Large basalt wall – 45m long

Temwen Site PoC3-39

Feature 1 – Yam cultivation enclosure – 90cm in diameter

Feature 2 – Yam cultivation enclosure – 70cm in diameter

Temwen Site PoC3-40

Feature 1 – Boulder Wall – 25m long

Temwen Site PoC3-41

Feature 1 – Boulder alignment – 8.4m long

Temwen Site PoC3-42

Feature 1 – Breadfruit fermentation pit – 9.8m x 4m

Temwen Site PoC3-43

- Feature 1 – Yam pit, yam removed – 1.8m in diameter
- Feature 2 – Yam pit, yam removed – 1.9-2.3m in diameter
- Feature 3 – Yam cultivation enclosure – 1m in diameter

Temwen Site PoC3-44

- Feature 1 – Basalt platform – 8m x 10.5m

Temwen Site PoC3-45

- Feature 1 – Yam cultivation enclosure – 1m in diameter
- Feature 2 – Yam cultivation enclosure – 1.1m in diameter

Temwen Site PoC3-46

- Feature 1 – Stone platform, trapezoid shape 6.2/4m x 7.8m
- Feature 2 – Stone alignment – 10.3m long
- Feature 3 – Yam cultivation enclosure – 70cm in diameter
- Feature 4 – Small cobble arrangement – 50cm in diameter

Temwen Site PoC3-47

- Feature 1 – Yam cultivation enclosure, includes concrete and metal, in addition to basalt – 1.1m in diameter

Temwen Site PoC3-48

- Feature 1 – Yam cultivation enclosure – 1.6m in diameter
- Feature 2 – Breadfruit fermentation pit, two linked depressions – 7.3m long in total

Temwen Site PoC3-49

- Feature 1 – Stone alignment – 15m long
- Feature 2 – Yam cultivation enclosure – 1.5m in diameter

Temwen Site PoC3-50

- Feature 1 – Breadfruit fermentation pit – 17m x 5.4m

Temwen Site PoC3-51

- Feature 1 – *Lolong* – 14.2m x 18.2m
- Feature 2 – Yam cultivation enclosure, disturbed – 2.2-5m in diameter

Temwen Site PoC3-52

- Feature 1 – Yam cultivation enclosure – 2m in diameter
- Feature 2 – Breadfruit fermentation pit – 15.6m x 2m

Feature 3 – Yam cultivation enclosures

Subfeature 3a – Yam cultivation enclosure – 1m in diameter

Subfeature 3b – Yam cultivation enclosure – 1m in diameter

Feature 4 – Boulder alignment – 10.7m long

Feature 5 – Yam cultivation enclosure – 1.8m in diameter

Temwen Site PoC3-53

Feature 1 – Rectangular stone enclosure – 13.1m x 10m

Subfeature 1a – Yam cultivation enclosure within Feature 1 – 1m in diameter

Temwen Site PoC3-54

Feature 1 – Yam cultivation enclosure – 1.8m in diameter

Feature 2 – Perpendicular stone alignments – 9.2m and 5.4m

Temwen Site PoC3-55

Feature 1 – Yam cultivation enclosure – 1m in diameter

Feature 2 – Yam cultivation enclosure – 80cm in diameter

Feature 3 – Yam cultivation enclosure – 1.1m in diameter

Feature 4 – Yam cultivation enclosure – 1.3m in diameter

Temwen Site PoC3-56

Feature 1 – Yam cultivation enclosure – 2.1m in diameter

Feature 2 – Yam cultivation enclosure – 1.3m in diameter

Feature 3 – Yam cultivation enclosure – 1.5m in diameter

Feature 4 – Yam cultivation enclosure – 1.3m in diameter

Temwen Site PoC3-57

Feature 1 – Yam cultivation enclosure – 1.5m in diameter

Feature 2 – Yam cultivation enclosure 1.1m in diameter

Temwen Site PoC3-58

Feature 1 – Stone platform – 9m x 6m

Temwen Site PoC3-59

Feature 1 – Large walled platform – 16.9m x 13.5m, walls 1-1.5m in height

Temwen Site PoC3-60

Feature 1 – Stone alignment – 4.6m long

Summary Site Features Identified for Nan Madol Islets

Summary Site Features Identified for the ANGEIR-KARIAN Islet set:

LUKEPENKARIAN ISLET (PoC3-1-LPK) – 2008 Project

Feature 1 - Stone Alignment

- Sub-Feature 1: Partial square stone alignment~19 m W of Karian
- Sub-Feature 2: Square alignment that shares the W portion of SF1
- Sub-Feature 3: Small square alignment that shares the Southern portion of the W boundary of SF2
- Sub-Feature 4: Small paving just N of the NE corner of SF3
- Sub-Feature 5: 2 Sakau stones at NE end of the alignments

Feature 2 - *Lolong*

- Sub-Feature 1: Wall enclosing the area around the tomb chamber and adjacent area to the E of the tomb
- Sub-Feature 2: Burial platform
- Sub-Feature 3: Small enclosure adjacent to burial enclosure
- Sub-Feature 4: Probable original *lolong* entrance in the far Western wall
- Sub-Feature 5: Sakau stone at the N end of the enclosed area adjacent to the *lolong*

Feature 3 - Paving and Walkway

- Sub-Feature 1: Rectangular basalt paving ~15 m W of Feature 2
- Sub-Feature 2: Basalt walkway extending W of the paving

Feature 4 - Platform

- Coral platform with a slight depression in the center

Feature 5 - Platform

Feature 6 - Platform Complex Sub-Feature 1: Low coral platform outlined by basalt columns

- Sub-Feature 2: Raised basalt platform at the N end of SF1

Feature 7 – Platform; Coral

SAPWUHTIK B ISLET (PoC3-1-SWUB) – 2008 Project

Feature 1 – *Lolong*

- Sub-Feature 1: *Lolong* enclosing wall
- Sub-Feature 2: Burial platform
- Sub-Feature 3: High coral and basalt platform built into the Northern portion of the enclosing wall

- Sub-Feature 4: Stone alignment in the Northern half of the enclosure
- Sub-Feature 5: Sakau stone near western curve in the stone alignment
- Sub-Feature 6: Grouping of basalt cobbles near the SW corner of SF3

ANGEIR ISLET (PoC3-1-ANG) – 2008 Project

- Feature 1 - Burial Platform (multi-chambered)
 - Sub-Feature 1: Eastern burial chamber
 - Sub-Feature 2: Western burial chamber
 - Sub-Feature 3: Coral platform area south of the W burial chamber
- Feature 2 - Burial Platform
 - Sub-Feature 1: Burial chamber to the North
 - Sub-Feature 2: Disturbed area to the south of SF1
- Feature 3 - Platform
 - Coral platform outlined with basalt
- Feature 4 - Platform
 - Coral platform outlined with basalt that has a shallow central depression
- Feature 5 - Paving Large basalt paving to the west of Angeir feature 4
- Feature 6 - Platform
 - Coral and basalt platform with 2 small depressions (1 at the NE and 1 at the SW)
- Feature 7 - *Lolong*
 - Sub-Feature 1: *Lolong* enclosing wall
 - Sub-Feature 2: Burial platform
 - Sub-Feature 3: Basalt lined cyst just to the N of SF2
 - Sub-Feature 4: Basalt lined cyst just to the E of SF3

Appendix D. Site Survey Forms

PoC3-1 through 59

HISTORIC SITE INVENTORY FORM

POHNPEI STATE

Site No.: PoC3-1-ANG

1. Island: POHNPEI **2. Municipal/Village:** Madolenihmw, Nan Madol

3. Common Name(s) of Site: Angeir

4. Historic Name(s) of Site:

5. Components: ☒ Multi-Component ☐ Single Component

6. Cultural Component(s) (check all that are appropriate):

- | | |
|--|--|
| <input checked="" type="checkbox"/> 1. Prehistoric | <input type="checkbox"/> 6. Japanese |
| <input type="checkbox"/> 2. Precolonial | <input type="checkbox"/> 7. WWII-Japanese |
| <input type="checkbox"/> 3. Both Prehist/Precol | <input type="checkbox"/> 8. WWII- United States |
| <input type="checkbox"/> 4. Spanish | <input type="checkbox"/> 9. Nonmilitary after WWII |
| <input type="checkbox"/> 5. German | |

7. Map Coordinates:

8. Map References: Nan Madol base map

9. UTM Grid (if known):

10. Location relative to Permanent Features: approx. 250 m. Southwest of Karian

11. Approximate Elevation: 0-3 m; islet surface varies from approximately 1 to 2 m in elevation

12. Distance from Coastline (if application): 300 m to shore of Temwen Island

13. Site Function: ☒ Multiple Function ☐ Single Function

14. Prehistoric Site Type(s) (check all that are appropriate):

- | | |
|--|---|
| <input checked="" type="checkbox"/> 1. Platforms | <input type="checkbox"/> 8. Surface Scatter |
| <input type="checkbox"/> 2. Nahs | <input type="checkbox"/> 9. Pictograph/Petroglyph |
| <input checked="" type="checkbox"/> 3. Burials | <input type="checkbox"/> 10. Midden |
| <input type="checkbox"/> 4. Other Ritual | <input type="checkbox"/> 11. Alignment |
| <input type="checkbox"/> 5. Agricultural | <input type="checkbox"/> 12. Quarry |
| <input type="checkbox"/> 6. Other Terrace | <input type="checkbox"/> 13. Subsurface Deposit |
| <input type="checkbox"/> 7. Rockshelter | <input checked="" type="checkbox"/> 14. Other: Paving |

15. Historic Site Type(s) (check all that are appropriate):

- | | |
|---|--|
| <input type="checkbox"/> 1. Structure | <input type="checkbox"/> 6. Surface Scatter |
| <input type="checkbox"/> 2. Midden | <input type="checkbox"/> 7. Subsurface Deposit |
| <input type="checkbox"/> 3. Object | <input type="checkbox"/> 8. Agricultural Feature |
| <input type="checkbox"/> 4. Fortification | <input type="checkbox"/> 9. Other: |
| <input type="checkbox"/> 5. Landmark | |

16. Description (add additional pages as necessary):

Feature 1 is a multi-chambered tomb platform located approximately 12 m. southwest of Sapwuhtik B on the southern side of the islet. It is constructed of coral rubble and basalt columns. The feature is comprised of two tomb chambers (east: sub-feature 1 and west: sub-feature 2) and a coral platform (sub-feature 3) attached to the southern side of the tomb platform. Sub-feature 3 has been dug into and its eastern side has eroded out. Sub-feature 1 accounts for two-thirds of the tomb platform's size. Three nickel sized shell (or coral) beads were located in the southern corner of sub-feature 1. These were the only artifacts identified within feature 1. There were shellfish remains present around feature 1.

Feature 2 is a tomb platform located on the northern side of Angeir, 4 to 5 m. northwest of feature 1. It may have been a double chambered platform, but only one chamber (sub-

feature 1) was identifiable due to deflation and/or disturbance (sub-feature 2) of the southern portion of the platform. Human cranial fragments were identified in the tomb chamber along with shellfish remains.

Feature 3 is located on the northern side of Angeir 5 m. west of feature 2. It is a coral rubble and basalt column platform with a shallow depression in the western portion of the structure.

Feature 4 is a small coral rubble platform outlined with basalt columns. It is located approximately 1m. south of feature 3. It has a shallow central depression.

Feature 5 is a large basalt cobble paving directly to the west of feature 4. It extends to feature 6 to the south and within 2 m. of feature 7 to the west.

Feature 6 is a platform on the southern side of Angeir located approximately 11.5 m. south of feature 3. The platform is constructed of coral rubble supported by basalt columns. It has two depressions, one at the northern corner and one at the southern corner. A fragmentary shell adze was located along the northwest side near the northern depression.

Feature 7 is a coral *lolog* located 7.5 m. southwest of feature 6. The enclosing wall (sub-feature 1) is largely intact with the exception a disturbed segment in the center of the southwestern wall. There were shellfish remains located in the central tomb platform (sub-feature 2), which has been disturbed. Two small cysts constructed of basalt columns are located to the northwest of the tomb chamber (sub-features 3 and 4).

17. **Aspect:** The northwest side of Angeir is bordered by the mangrove swamp, while the southeast and southwest sides are bordered by the lagoon. The final side borders Sapwuhtik B.

18. **Site Slope:** Approximately 0 overall

19. **Approximate site size (sq. meters) and boundary shape:** Rectangular shape, approx. 84m. x 24.7m. or approx. 2085 m. squared.

20. **Vegetation at the site:** Various trees and vines.

21. **Environmental Zone:**

- | | |
|---|--|
| <input checked="" type="checkbox"/> 1. Lagoon | <input type="checkbox"/> 5. Managed Secondary Forest |
| <input checked="" type="checkbox"/> 2. Mangrove | <input type="checkbox"/> 6. Upland Forest |
| <input type="checkbox"/> 3. Strand Vegetation | <input type="checkbox"/> 7. Montane Forest |
| <input type="checkbox"/> 4. Freshwater Swamp | |

22. **Topographic Setting:** The site is an artificial islet on the reef flat off Temwen Island.

Main Island:

Outer Islands/Atoll

- | | |
|---|--|
| <input type="checkbox"/> 1. Mangrove | <input checked="" type="checkbox"/> 7. Coastal Beach |
| <input type="checkbox"/> 2. Alluvial Flats | <input type="checkbox"/> 8. Coastal Flatlands |
| <input type="checkbox"/> 3. Stream/River Valley | <input type="checkbox"/> 9. Interior Swamp |
| <input type="checkbox"/> 4. Lower Elevation Forest | <input type="checkbox"/> 10. Rocky Coral Brim/Coast |
| <input type="checkbox"/> 5. Steep Slope Zone | <input checked="" type="checkbox"/> 11. Mangrove |
| <input type="checkbox"/> 6. High Elevation Slope, Ridges and Plateaus | |

Nearest Water Source: lagoon/mangrove swamp; there is no fresh water

24. ☒ Permanent ☐ Seasonal

25. **Date of Construction (if known):** unknown

26. **Depth of Deposits:** Unknown; no buried deposits other than the islet fill and sediment in the tomb chamber floor were observed.

27. **Type of Soil Visible on the Surface:**

- | | |
|-----------------------------------|----------------------------------|
| <input type="checkbox"/> 1. Humus | <input type="checkbox"/> 4. Silt |
| <input type="checkbox"/> 2. Sand | <input type="checkbox"/> 5. Loam |

- ☐ 3. Clay ☒ 6. Other: coral rubble
- 28. Cultural Material Observed or Reported (number of each):**
- ☐ 1. Prehistoric Pottery ☐ 5. Historic Ceramic
☒ 2. Shell Implements (1) ☐ 6. Metal
☐ 3. Food Refuse ☐ 7. Glass
☐ 4. Stone Implements ☐ 8. Other: shell (or coral) beads (3)
- 29. Cultural Material Collected (use number from above):** One broken shell adze was collected from midway along the northwestern side of Feature 6. It was located approx. 40 cm from the edge of the platform. Only the proximal portion of the adze was recovered.
- 30. Type of Previous Research Name/Principle Investigator Date:**
- ☒ 1. Reconnaissance Survey: Ayres, Seikel, Levin with PHPO 2008; Ayres, Levin, Seikel with PHPO 2011
☒ 2. Intensive Survey: Ayres, Seikel, Levin with PHPO 2008; Ayres, Levin, Seikel with PHPO 2011
☒ 3. Surface Collection: Seikel and Levin with PHPO 2008
☐ 4. Subsurface Excavation:
- 31. Bibliography for Previous Research:** Hambruch 1936, Athens 1980 for work at Karian Islet.
- 32. Present Location(s) of Materials:**
- 33. Radiocarbon Dates (if any):**
- 34. Site Integrity:** ☐ Good ☒ Fair ☐ Poor
- 35. Site Condition:** ☒ Disturbed ☐ Undisturbed ☐ Semi-disturbed:
- 36. Present Use:**
- ☐ 1. Residential ☐ 5. Commercial
☐ 2. Agriculture/Farming ☒ 6. Not in Use
☐ 3. Pasture ☐ 7. Unknown
☐ 4. Park/Recreation ☒ 8. Other: some areas with fishing cook fires
- 37. Threats to Site:**
- ☒ 1. Deterioration ☒ 3. Other: Probable Looting
☐ 2. Development
- 38. Cultural or Historical Significance:** Angeir seems to have served a range of purposes based on the variety of structures found. As a burial site, it is significant in the information it can provide in the wide range of mortuary practices at Nan Madol based on the variability in burial structures. The non-burial structures may be related to residential and/or ritual functions.
- Curio hunting and unauthorized digging has damaged the site. The shell beads that were found in feature 1 were likely only part of a necklace or bracelet; the others may have been taken. It is also possible that human remains have been taken from some of the burial chambers, since no identifiable human remains exist in features 1 and 7. It is unclear how many items have been removed from the site in the past.
- 39. Ownership:** ☒ Public ☐ Private ☐ Both
- 40. Ownership Address:** Pohnpei State and traditional leadership
- 41. Occupant:** No current residential or other activities.
- 42. Name(s) of Photographer(s):** K. Seikel and M. Levin; K. Seikel
- 43. Date of Photographs (if any):** August 5-7, 2008; October 12-November 1, 2011
- 44. View(s):**
- 45. Negatives on File:**

46. **Additional Comments:**

47. **Site Recorder:** **Organization:** University of Oregon-Pohnpei Archaeological Survey

48. **Site Recommended for FSM Register Nomination:** ☐ Yes ☐ No

49. **Review Board Comments:**

SITE FORMS: TEMWEN

Temwen: Site PoC3-5

HISTORIC SITE INVENTORY FORM

POHNPEI STATE

Site No.: PoC3-5

1. **Island:** POHNPEI
2. **Municipal/Village:** Madolenihmw, Temwen
3. **Common Name(s) of Site:** Pein Lohloh
4. **Historic Name(s) of Site:** none known, other than Peinlohloh
5. **Components:** ☐ Multi-Component ☒ Single Component
6. **Cultural Component(s) (check all that are appropriate):**
- | | |
|--|--|
| <input checked="" type="checkbox"/> 1. Prehistoric | <input type="checkbox"/> 6. Japanese |
| <input type="checkbox"/> 2. Precolonial | <input type="checkbox"/> 7. WWII-Japanese |
| <input type="checkbox"/> 3. Both Prehist/Precol | <input type="checkbox"/> 8. WWII- United States |
| <input type="checkbox"/> 4. Spanish | <input type="checkbox"/> 9. Nonmilitary after WWII |
| <input type="checkbox"/> 5. German | |
7. **Map Coordinates:** UTM UPS 57 N 0426022, E 0756735
8. **Map References:**
9. **UTM Grid (if known):** WGS 84
10. **Location relative to Permanent Features:** approx. 1.8m SW of Land Survey boundary
11. **Approximate Elevation:** 28m
12. **Distance from Coastline (if application):** n/a
13. **Site Function:** ☐ Multiple Function ☒ Single Function
14. **Prehistoric Site Type(s) (check all that are appropriate):**
- | | |
|---|--|
| <input type="checkbox"/> 1. Platforms | <input type="checkbox"/> 8. Surface Scatter |
| <input type="checkbox"/> 2. Nahs | <input type="checkbox"/> 9. Pictograph/Petroglyph |
| <input checked="" type="checkbox"/> 3. Burials | <input type="checkbox"/> 10. Midden |
| <input checked="" type="checkbox"/> 4. Other Ritual (?) | <input type="checkbox"/> 11. Alignment |
| <input type="checkbox"/> 5. Agricultural | <input type="checkbox"/> 12. Quarry |
| <input type="checkbox"/> 6. Other Terrace | <input checked="" type="checkbox"/> 13. Subsurface Deposit |
| <input type="checkbox"/> 7. Rockshelter | <input type="checkbox"/> 14. Other: |
15. **Historic Site Type(s) (check all that are appropriate):**
- | | |
|---|---|
| <input type="checkbox"/> 1. Structure | <input type="checkbox"/> 6. Surface Scatter |
| <input type="checkbox"/> 2. Midden | <input type="checkbox"/> 7. Subsurface Deposit |
| <input type="checkbox"/> 3. Object | <input checked="" type="checkbox"/> 8. Agricultural Feature |
| <input type="checkbox"/> 4. Fortification | <input type="checkbox"/> 9. Other: |
| <input type="checkbox"/> 5. Landmark | |
16. **Description (add additional pages as necessary):**

PoC3-5 is a lolong tomb complex. It is not entirely constructed in the header-stretcher style that is common to this type of structure on Pohnpei. Soil was brought in to level the surface of the enclosure.

Feature 1 is the burial platform. It is approximately 4 meters square and is constructed in the header-stretcher style with fill comprised primarily of small basalt rubble. There is coral incorporated in the fill of Feature 1. The platform rises approximately 1 meter above the surrounding ground surface. This feature is somewhat depressed in the center and the East side isn't completely intact.

Feature 2 is an alignment of basalt columns, which surrounds at least the North, West and South sides of Feature 1. The columns lay a maximum of 1.5 meters away from the platform, and usually less than 1.5 meters away. The purpose of this alignment is unknown.

Feature 3 is the enclosing wall, which is constructed primarily of basalt boulders and rubble and topped/faced with basalt columns. The wall is approximately 25 meters by 19.5 meters and is an average of 2 meters thick. It rises between 0.6 and 1.8 meters above the surrounding ground surface. The Northwest corner seems to be built around a very large bedrock boulder, which is visible on the map. There is no clear architectural entrance in Feature 3.

Feature 4 is constructed with large basalt boulders and rubble. This feature acts as an additional foundational support around the enclosing wall, particularly along the Eastern wall and the Northwest corner. Portions of Feature 4 along with North, South and West walls are no more than stone alignments. Its dimensions are approximately 24 meters by 27 meters and the width ranges between 1 and 3 meters.

Feature 5 is a depression up against the East wall, where a banana tree has been planted. There are a couple other depressions on the south side of the enclosure that are likely related to current taro plantings or past horticultural activities, which are not given feature designations.

Features 6a and 6b are round stone alignments located between Feature 1 and the North wall of Feature 3. They may have been used in yam plantings and both are approximately 1 meter in diameter. Two similar features were found just south of PoC3-5.

17. **Aspect:** The trail to the Silbanuz's modern residence runs alongside the Northeast wall of the enclosure. The other three sides of the enclosure are surrounded by secondary agroforest.

18. **Site Slope:** Approximately 0 degrees interior; Hillslope outside enclosure approx. 2 degrees (running EW)

19. **Approximate site size (sq. meters) and boundary shape:** Rectangular shape, approx. 27m by 24m (~ 648m²)

20. **Vegetation at the site:** Various trees (coconut, banana, breadfruit), taro plantings, ferns and other low-lying vegetation.

21. **Environmental Zone:**

- | | |
|---|---|
| <input type="checkbox"/> 1. Lagoon | <input checked="" type="checkbox"/> 5. Managed Secondary Forest |
| <input type="checkbox"/> 2. Mangrove | <input type="checkbox"/> 6. Upland Forest |
| <input type="checkbox"/> 3. Strand Vegetation | <input type="checkbox"/> 7. Montane Forest |
| <input type="checkbox"/> 4. Freshwater Swamp | |

22. **Topographic Setting:** The site is located on a gradual hill just above the coastal flats on Temwen.

Main Island:

- | | |
|---|--|
| <input type="checkbox"/> 1. Mangrove | |
| <input type="checkbox"/> 2. Alluvial Flats | |
| <input type="checkbox"/> 3. Stream/River Valley | |
| <input checked="" type="checkbox"/> 4. Lower Elevation Forest | |
| <input type="checkbox"/> 5. Steep Slope Zone | |
| <input type="checkbox"/> 6. High Elevation Slope, Ridges and Plateaus | |

Outer Islands/Atoll

- | |
|---|
| <input type="checkbox"/> 7. Coastal Beach |
| <input type="checkbox"/> 8. Coastal Flatlands |
| <input type="checkbox"/> 9. Interior Swamp |
| <input type="checkbox"/> 10. Rocky Coral Brim/Coast |
| <input type="checkbox"/> 11. Mangrove |

Nearest Water Source: Fresh water stream

24. ☒ Permanent ☐ Seasonal

25. **Date of Construction (if known):** Unknown

26. Depth of Deposits: Soil fill used to level enclosure surface. Total extent unknown: excavation in East side of enclosure to depth of 1m without reaching non-cultural layers. Deposits are likely shallower on West side due to site's location on a sloping hill.

27. Type of Soil Visible on the Surface:

- | | |
|--|------------------------------------|
| <input checked="" type="checkbox"/> 1. Humus | <input type="checkbox"/> 4. Silt |
| <input type="checkbox"/> 2. Sand | <input type="checkbox"/> 5. Loam |
| <input checked="" type="checkbox"/> 3. Clay | <input type="checkbox"/> 6. Other: |

28. Cultural Material Observed or Reported (number of each):

- | | |
|---|--|
| <input type="checkbox"/> 1. Prehistoric Pottery | <input type="checkbox"/> 5. Historic Ceramic |
| <input type="checkbox"/> 2. Shell Implements | <input type="checkbox"/> 6. Metal |
| <input type="checkbox"/> 3. Food Refuse | <input type="checkbox"/> 7. Glass |
| <input type="checkbox"/> 4. Stone Implements | <input type="checkbox"/> 8. Other: |

29. Cultural Material Collected (use number from above):

30. Type of Previous Research Name/Principle Investigator Date:

- | |
|---|
| <input checked="" type="checkbox"/> 1. Reconnaissance Survey: Ayres, Levin, Seikel with PHPO 2011 |
| <input checked="" type="checkbox"/> 2. Intensive Survey: Ayres, Levin, Seikel with PHPO 2011 |
| <input type="checkbox"/> 3. Surface Collection: |
| <input checked="" type="checkbox"/> 4. Subsurface Excavation: Ayres, Levin, Seikel with PHPO 2011 |

31. Bibliography for Previous Research: Tasa 1989 - fieldnotes

32. Present Location(s) of Materials:

33. Radiocarbon Dates (if any):

34. Site Integrity: ☒ Good ☐ Fair ☐ Poor

35. Site Condition: ☐ Disturbed ☐ Undisturbed ☒ Semi-disturbed:

36. Present Use:

- | | |
|---|--|
| <input type="checkbox"/> 1. Residential | <input type="checkbox"/> 5. Commercial |
| <input type="checkbox"/> 2. Agriculture/Farming | <input type="checkbox"/> 6. Not in Use |
| <input type="checkbox"/> 3. Pasture | <input type="checkbox"/> 7. Unknown |
| <input type="checkbox"/> 4. Park/Recreation | <input checked="" type="checkbox"/> 8. Other: Non-intensive horticulture |

37. Threats to Site:

- | | |
|--|---|
| <input checked="" type="checkbox"/> 1. Deterioration | <input checked="" type="checkbox"/> 3. Other: Horticulture – plantings of sakau, taro |
| <input type="checkbox"/> 2. Development | |

38. Cultural or Historical Significance: As a burial site, it is significant in the information it can provide in the wide range of mortuary practices on Pohnpei. This lolong does not conform to the header-stretcher construction type common to Nan Madol and elsewhere on Pohnpei, rather it is constructed primarily of basalt rubble/boulders with columnar basalt facing. There are two other lolong nearby, which may make surrounding area significant for ritual purposes.

Aside from evidence of horticultural practices in the enclosure, the structure is well preserved. Some basalt has been moved to create boundary areas around taro, yam and tree plantings throughout the enclosure. Sakau was planted in the enclosure after mapping and excavation were completed in 2011.

39. Ownership: ☐ Public ☒ Private ☐ Both

40. Ownership Address: Masao Silbanuz

41. Occupant: No current residential activities.

42. Name(s) of Photographer(s): K. Seikel, A. Craib

43. Date of Photographs (if any): September 20-October 13, 2011

44. View(s):

45. Negatives on File:

46. Additional Comments: see also Kataoka and Nagaoka (2015).

47. **Site Recorder:** **Organization:** University of Oregon-Pohnpei Archaeological Survey
48. **Site Recommended for FSM Register Nomination:** ☐ Yes ☐ No
49. **Review Board Comments:**

HISTORIC SITE INVENTORY FORM

Site Number: PoC3-7

Site Type: Multi-feature architectural

Features (descriptions and UTM coordinates, if available):

This site was originally described by the UO Pohnpei Archaeological Survey (Dr. Guy Tasa) in 1989.

F1:

UTM 57 N0426103, E0756678

This was originally described in 1989 as a "house platform." It is unclear if this is a platform for a dwelling, or if it has some other sort of function. The SW side has a steep slope, with basalt columns lined along the base and the top of the "ramp," which is 4.2 m from the base to the top of the main platform. At the top is a platform lined with basalt cobbles and boulders; there is a roughly rectangular shape to the structure, although there are also boulders strewn around the edges and it is decidedly disturbed. The structure is a total of 14.5m from the base to the back of the platform, and 8.5m wide at the base.

F2: This was described in 1989 as a historic pig fence, confirmed by a local resident during the 1989 field season. It is built in a trench (possibly a WWII military trench) and lined with basalt boulders and cobbles. This is a historic feature.

Approximate Elevation: 15-20m

Vegetation and Environment (description): This structure is located in an area that has some strand vegetation (closer to F1) and managed agroforest (in much of F1, and in F2). The surface of the ground is largely covered with basalt cobbles and boulders. An intermittent stream passes between the two features, and it is somewhat marsh-like.

Soil Type: Humic, clayey

Artifactual or other cultural material (if any): None

Site integrity (good, fair, poor): Fair

Site condition (disturbed, undisturbed): Disturbed

Threats to site: Vegetation, natural degradation

Land Ownership: Masao Silbanuz

Photos: F1 - 2099, 2100, 2101

Temwen (cont): Site PoC3-8

HISTORIC SITE INVENTORY FORM

POHNPEI STATE

Site No.: PoC3-8

1. **Island:** POHNPEI

2. **Municipal/Village:** Madolenihmw, Temwen

3. **Common Name(s) of Site:** Pein Pohnapap (sp?)

4. **Historic Name(s) of Site:**

5. **Components:** ☐ Multi-Component ☒ Single Component

6. **Cultural Component(s) (check all that are appropriate):**

☒ 1. Prehistoric

☐ 6. Japanese

☐ 2. Precolonial

☐ 7. WWII-Japanese

☐ 3. Both Prehist/Precol

☐ 8. WWII- United States

☐ 4. Spanish

☐ 9. Nonmilitary after WWII

☐ 5. German

7. **Map Coordinates:** UTM UPS 57 N 0425936, E 0756801

8. Map References:

9. UTM Grid (if known):WGS 84

10. Location relative to Permanent Features:

11. Approximate Elevation: 44m

12. Distance from Coastline (if application): n/a

13. Site Function: ☐ Multiple Function ☒ Single Function

14. Prehistoric Site Type(s) (check all that are appropriate):

- | | |
|--|--|
| <input type="checkbox"/> 1. Platforms | <input type="checkbox"/> 8. Surface Scatter |
| <input type="checkbox"/> 2. Nahs | <input type="checkbox"/> 9. Pictograph/Petroglyph |
| <input checked="" type="checkbox"/> 3. Burials | <input type="checkbox"/> 10. Midden |
| <input type="checkbox"/> 4. Other Ritual | <input type="checkbox"/> 11. Alignment |
| <input type="checkbox"/> 5. Agricultural | <input type="checkbox"/> 12. Quarry |
| <input type="checkbox"/> 6. Other Terrace | <input checked="" type="checkbox"/> 13. Subsurface Deposit |
| <input type="checkbox"/> 7. Rockshelter | <input type="checkbox"/> 14. Other: |

15. Historic Site Type(s) (check all that are appropriate):

- | | |
|---|---|
| <input type="checkbox"/> 1. Structure | <input type="checkbox"/> 6. Surface Scatter |
| <input type="checkbox"/> 2. Midden | <input type="checkbox"/> 7. Subsurface Deposit |
| <input type="checkbox"/> 3. Object | <input checked="" type="checkbox"/> 8. Agricultural Feature |
| <input type="checkbox"/> 4. Fortification | <input type="checkbox"/> 9. Other: |
| <input type="checkbox"/> 5. Landmark | |

16. Description (add additional pages as necessary):

PoC3-8 is a lolong built of basalt boulders and rubble. Soil was added to the enclosure to create a level surface. According to the landowner, the lolong was never completed. The burial platform (Feature 1) looks to be more of a foundation than a platform. Columnar basalt, which may have been harvested for use in other structures, isn't present in this structure.

Feature 1 is the burial platform/foundation. It is approximately 6m by 7m and is located in the northern portion of the enclosure. Feature 1 is primarily constructed of small to medium sized basalt rubble. It rises around 35cm above the surrounding enclosure surface.

Feature 2 is the enclosing wall, which is constructed of basalt boulders and rubble. The wall is approximately 14.5m by 11.5m. It rises between 0.6 and 1.5 meters above the surrounding ground surface.

Features 3a-c are circular stone alignments, referred to as yam pits. Feature 3a is located in the southern portion of the enclosure. It is the only feature of this type that is currently in use. Feature 3b is located midway along the eastern wall and Feature 3c is located near the Northeast corner of the enclosure. They range in diameter between 1 and 1.5 meters.

17. Aspect: The driveway to the Silbanuz house runs alongside the Northeast wall of the enclosure. The other three sides of the enclosure are surrounded by secondary agroforest.

18. Site Slope: Approximately 0 degrees interior; Hillslope of ~6 degrees outside enclosure (running EW)

19. Approximate site size (sq. meters) and boundary shape: Rectangular shape, approx. 14.5m. by 11.5m. (approx. 166.75m²)

20. Vegetation at the site: Various trees (palm, mango), pineapple, ferns and other low-lying vegetation.

21. Environmental Zone:

- | | |
|---|---|
| <input type="checkbox"/> 1. Lagoon | <input checked="" type="checkbox"/> 5. Managed Secondary Forest |
| <input type="checkbox"/> 2. Mangrove | <input type="checkbox"/> 6. Upland Forest |
| <input type="checkbox"/> 3. Strand Vegetation | <input type="checkbox"/> 7. Montane Forest |
| <input type="checkbox"/> 4. Freshwater Swamp | |

22. Topographic Setting: The site is located on a gradual hill above the coastal flats on Temwen.

Main Island:

- ☐ 1. Mangrove
- ☐ 2. Alluvial Flats
- ☐ 3. Stream/River Valley
- ☒ 4. Lower Elevation Forest
- ☐ 5. Steep Slope Zone
- ☐ 6. High Elevation Slope, Ridges and Plateaus

Outer Islands/Atoll

- ☐ 7. Coastal Beach
- ☐ 8. Coastal Flatlands
- ☐ 9. Interior Swamp
- ☐ 10. Rocky Coral Brim/Coast
- ☐ 11. Mangrove

Nearest Water Source: Fresh water stream

24. ☒ Permanent ☐ Seasonal

25. **Date of Construction (if known):** Unknown Estimated to fall into the “traditional Pohnpeian, or “Isohkelekel Phase cultural period.

26. **Depth of Deposits:** Soil fill used to level enclosure surface. Total extent unknown: excavation in Southeast corner of enclosure to depth of approximately 70 cm before hitting bedrock boulder.

27. **Type of Soil Visible on the Surface:**

- ☒ 1. Humus
- ☐ 2. Sand
- ☒ 3. Clay
- ☐ 4. Silt
- ☐ 5. Loam
- ☐ 6. Other:

28. **Cultural Material Observed or Reported (number of each):**

- ☐ 1. Prehistoric Pottery
- ☐ 2. Shell Implements
- ☐ 3. Food Refuse
- ☐ 4. Stone Implements
- ☐ 5. Historic Ceramic
- ☐ 6. Metal
- ☐ 7. Glass
- ☒ 8. Other: WWII anti-aircraft shell frag.

29. **Cultural Material Collected (use number from above):**

30. **Type of Previous Research Name/Principle Investigator Date:**

- ☒ 1. Reconnaissance Survey: Ayres, Levin, Seikel with PHPO 2011
- ☒ 2. Intensive Survey: Ayres, Levin, Seikel with PHPO 2011
- ☐ 3. Surface Collection:
- ☒ 4. Subsurface Excavation: Ayres, Levin, Seikel with PHPO 2011

31. **Bibliography for Previous Research:** UO-Pohnpei Arch. Survey- Tasa 1989 - fieldnotes

32. **Present Location(s) of Materials:** WWII shell fragment at PHPO

33. **Radiocarbon Dates (if any):**

34. **Site Integrity:** ☒ Good ☐ Fair ☐ Poor

35. **Site Condition:** ☐ Disturbed ☐ Undisturbed ☒ Semi-disturbed:

36. **Present Use:**

- ☐ 1. Residential
- ☐ 2. Agriculture/Farming
- ☐ 3. Pasture
- ☐ 4. Park/Recreation
- ☐ 5. Commercial
- ☐ 6. Not in Use
- ☐ 7. Unknown
- ☒ 8. Other: Non-intensive horticulture

37. **Threats to Site:**

- ☒ 1. Deterioration
- ☐ 2. Development
- ☒ 3. Other: Horticulture – yam planting

38. **Cultural or Historical Significance:** As a burial site, it is significant in the information it can provide in the wide range of mortuary practices on Pohnpei. This lolong does not conform to the header-stretcher construction type common to Nan Madol and elsewhere on Pohnpei,

rather it is constructed primarily of basalt rubble/boulders and appears to be unfinished. There are two other lolog nearby, which may make surrounding area significant for ritual purposes.

Aside from the use of some small basalt rubble to construct yam pits, the structure is well preserved. If the structure was faced with columnar basalt at one time, it has been taken for use elsewhere prior to the current landowners tenure on the property.

39. **Ownership:** ☐ Public ☒ Private ☐ Both

40. **Ownership Address:** Masao Silbanuz

41. **Occupant:** No current residential activities.

42. **Name(s) of Photographer(s):** K. Seikel, A. Craib

43. **Date of Photographs (if any):** October 17-November 1, 2011

44. **View(s):**

45. **Negatives on File:**

46. **Additional Comments:**

47. **Site Recorder:** **Organization:** University of Oregon-Pohnpei Archaeological Survey

48. **Site Recommended for FSM Register Nomination:** ☐ Yes ☐ No

49. **Review Board Comments:**

HISTORIC SITE INVENTORY FORM

Site Number: PoC3-9

Site Type: Architectural, agricultural

Features (descriptions and UTM coordinates, if available):

F1 has been previously described by the UO Pohnpei Archaeological Survey (Dr. Guy Tasa). F2, F3, F4, F5, and F6 are additional features located in the surrounding area.

F1: UTM 57 N 0425879, E0756820

This feature consists primarily of an exterior wall constructed of basalt boulders and cobbles, ranging from 30-80cm in height. Currently, there are walls on both the east end (10.2m) and south end (7.3m). In previous survey (Tasa field notes 1989) there were two other walls recorded, although these were not observed in this survey. There is a kava (*sakau*) stone at the NW corner, from which we took samples for microremain analysis. A few boulders and cobbles extend out east from this sakau stone approximately 2.9m from the east wall of the structure, parallel to the south wall. There are also a few wooden planks present at the southeast end of the structure.

F2: UTM 57 N 0425883, E0756829

This is a depression approximately 1.7m in diameter, with a cobble at the east end. The size and shape of the depression suggest that a yam was removed from this area (Yam Removal 2 in notes).

F3: UTM 57 N 0425892, E0756819

This feature is a yam cultivation enclosure (Yam Pit 34 in notes). It ranges from 1.1-1.9m in diameter and consists of basalt cobbles. We excavated a test pit destructive to this particular feature; it cut through the middle of the unit, revealing stratigraphy indicating previous yam growth. Flotation, microremain, and bulk samples were collected for the unit and will be used for plant microremain analysis.

F4: 57 N 0425865, E0756814

This feature is composed of four basalt rocks, rectangular in shape, planted solidly into the ground. They are placed evenly apart at 2.45-2.5m, and at exactly N-S-E-W corners. The function of this feature is unknown.

F5: 57 N 0425868, E0756819

This feature is an enclosure composed of basalt cobbles, approximately 1.5m in diameter in total. It was used for yam cultivation (Yam Pit 35 in notes).

F6: 57 N 0425859, E0756801

This feature is an enclosure composed of basalt cobbles, approximately 1.5m in diameter. It was likely used for yam cultivation (Yam Pit 36 in notes).

Vegetation and Environment (description): This site is located in a fairly flat area of tropical managed agroforest. The local road leading to Nan Madol is located to the north of the site.

Soil Type: Humic

Artifact or other cultural material (if any): none observed

Site integrity (good, fair, poor): F1 – fair; F2, F4, F5, F6 – good; F3 – good

Site condition (disturbed, undisturbed): F1 is disturbed; F2, F3, F4, F5, and F6 are undisturbed

Threats to site: vegetation overgrowth, although this appears to be minor at this particular site

Land Ownership: Masao Silbanuz

Photographs: F1 – 2144, 2145, 2146, 2147, 2148; F2 – 2149; F3 – 2150; F4 – 2151, 2152, 2153; F5 – 2154; F6 – 2155

HISTORIC SITE INVENTORY FORM

Site Number: PoC3-11

Site Type: Multi-feature agricultural, some alignments

Features (descriptions, UTM coordinates, if available):

F1-F15: All yam enclosures. These structures are roughly circular rings of basalt stones approximately one meter in diameter, and approximately 25-75cm in height.

F1: UTM 57 N 0426094, E0756636

F2: UTM 57 N 0426096, E0756635

F3: UTM 57 N 0426100, E0756630

F4: UTM 57 N 0426102, E0756630

F5: UTM 57 N 0426096, E0756632

F6/F7: UTM 57 N 0426109, E0756622

F8: UTM 57 N 0426100, E0756619

F9: UTM 57 N 0426109, E0756621

F10: UTM 57 N 0426102, E0756619

F11: UTM 57 N 0426100, E0756603

F12: UTM 57 N 0426103, E0756603

F13: UTM 57 N 0426106, E0756601

F14: UTM 57 N 0425093, E0756612

F15: UTM 57 N 0426091, E0756620

F16: UTM 57 N 0426106, E0756625

This is a small cluster of rocks close to the ground, approximately one meter in diameter. It is possible that this is a highly disturbed yam pit.

F17: UTM 57 N 0426100, E0756633

This is an alignment of four boulders, approximately 2m long, arranged in a straight line.

F18: 57 N 0426118, E0756598 This is a circle of rocks surrounding a hibiscus tree. It may be a disturbed yam pit.

This site was mapped, along with PoC3-12, at a 1:200 scale.

Approximate Elevation: Sea level (site borders water), with an upward slope. GPS readings suggest approximately 30m above sea level, which is incorrect.

Vegetation and Environment (description): Site is located in a tropical managed agroforest. Canopy is breadfruit, hibiscus, coconut; bananas lower; floor dominated by various vines, grasses, sedges. Soil has thick humic layer and is clay rich. The site borders the coast on the SE, and a stream runs along the NE edge.

Soil Type: Organic-rich clays, humic soils

Artifactual or other cultural material (if any): None observed

Site integrity (good, fair, poor): Good

Site condition (disturbed, undisturbed): Some features appear disturbed, some are undisturbed

Threats to site: Modern gardening and animal husbandry activities.

Land Ownership: Masao Silbanuz

Photos: F1 - 2072, 2078, 2079, 2080, 2081, 2082, 2082

HISTORIC SITE INVENTORY FORM

Site Number: PoC3-12

Site Type: Multi-feature agricultural

Features (descriptions and UTM coordinates, if available):

F1: UTM 57 N 0426066, E0756644

This feature is a large oval depression that is attached to a trench on one end. It appears to be lined along the edges with boulders and large size cobbles. We believe that it is a breadfruit fermentation pit. It is approximately 15m at its longest and 5m at its widest.

F2: UTM 57 N 0426073, E0756618

This feature, to the east and perpendicular to Feature 1, also appears to be a breadfruit fermentation pit. It is an oval depression lined with large cobbles approximately 11m x 4.3m; the east end of the feature, however, is not like a typical depression in that it does not slope back up; it may be shaped this way for rainwater runoff. We mapped this feature and excavated a 1mx2.5m trench. From the excavation we took bulk samples and sediment samples for microanalysis. It is located on a SE slope.

F3: This feature is located directly adjacent to the NW of Feature 2, and is also included on the Feature 2 plan map. It consists of small to medium sized cobbles arranged in a circular fashion, some stacked on top of each other. The feature is approximately 1m in diameter. It is believed to be a yam growing enclosure.

F4: This feature is located to the west of Features 2 and 3. It is characterized by a dark humic layer distinctive from most of the surrounding soils. A 1x1m test pit revealed significant quantities of charcoal, multiple historic artifacts (listed below), and one small mammal bone (either dog or pig).

Approximate Elevation: 14m

Vegetation and Environment (description):

This site is located in a secondary managed tropical agroforest. Surrounding vegetation consists of breadfruit, coconut, and hibiscus trees, banana plants, taro, and some grasses. It is approximately 50 meters NW of the coast and is located to the SW of a stream. The entire site is on a SE slope.

Soil Type: Humus, clay. Below the humic layer soil is very hard-packed

Artifactual or other cultural material (if any): All artifactual material recovered was in F4. This includes 4 linoleum tile fragments, 3 plastic container fragments, one cloth fragment, 2 glass fragments, 11 rusted nails, and 1 piece of metal.

Site integrity (good, fair, poor): fair

Site condition (disturbed, undisturbed): disturbed (small taro patch located in part of site, trees growing through cobble alignments).

Threats to site: Erosion, modern taro patch, other vegetational disturbance

Land Ownership: Masao Silbanuz

Photos: F2 – 2005, 2006, 2007, 2008, 2009, 2010, 2011, 2012, 2013, 2014, 2036, 2037, 2038, 2039, 2052, 2053, 2054, 2055, 2056, 2057; F3 – 2040, 2041; F4 – 2307, 2308, 2309, 2310, 2311, 2312, 2313, 2314, 2315, 2316, 2317, 2318, 2319, 2321, 2322, 2323, 2324, 2325, 2326, 2327, 2328, 2329, 2330

HISTORIC SITE INVENTORY FORM

Site Number: PoC3-13

Site Type: Wall along edge of land

Features (descriptions and UTM coordinates, if available):

F1: UTM 57 N 0426162, E0756722

This is a wall composed of basalt cobbles and columns that extends along the edge of the land bordering the mangrove swamp. It is approximately two or three cobbles or columns in height, varying by location. It was likely constructed as a barrier to prevent erosion.

Approximate Elevation: 0m

Vegetation and Environment (description):

The surrounding vegetation consists of managed agroforest on one side and mangrove swamp on the other side. It is directly adjacent to Nan Madol and the lagoon.

Soil Type: Humic

Artifactual or other cultural material (if any): none observed

Site integrity (good, fair, poor): fair

Site condition (disturbed, undisturbed): disturbed in places by local vegetation

Threats to site: vegetation overgrowth

Land Ownership: Masao Silbanuz

Photos: F1 - 2084

HISTORIC SITE INVENTORY FORM

Site Number: PoC3-14

Site Type: Multi-feature architectural

Features (descriptions and UTM coordinates, if available):

F1: UTM N 0426174, E0756697

This feature is a stone platform composed of basalt cobbles and boulders. It measures 5.85m x 2.75m, and is angled to the NW. It has a slight elevation of approximately 0.5m from the base to the center.

F2: UTM N 0426177, E0756694

This feature is a set of parallel stone alignments composed of basalt cobbles measuring 7m long, facing NW, with a 2.35m gap between them. It is located to the SW of F1.

Approximate Elevation: 1m

Vegetation and Environment (description): Managed tropical agroforest. This site is located approximately 10m from the edge of the mangrove swamp and lagoon in eastern Temwen.

Soil Type: humic

Artifactal or other cultural material (if any): none observed

Site integrity (good, fair, poor): good

Site condition (disturbed, undisturbed): Disturbed. A significant amount of local vegetation covers both features

Threats to site: Vegetation

Land Ownership: Masao Silbanuz

Photos: F1 – 2085, 2086; F2 – 2087, 2088

HISTORIC SITE INVENTORY FORM

Site Number: PoC3-15

Site Type: Architectural and agricultural

Features (descriptions and UTM coordinates, if available):

UTM N 0426170, E 0756681

F1: This consists of a semi-circular structure made of basalt cobbles and boulders, as well as an adjacent row of basalt cobbles and boulders facing NE. The semi-circular structure is 5m long at its widest part. The structure appears to be highly disturbed and likely some sort of collapse.

F2: This feature consists of basalt cobbles in a circular enclosure approximately 1m across. It is likely a yam growing enclosure (Yam Pit 17 in notes).

The differential in preservation suggests that F2 is much younger than F1.

Approximate Elevation: 1m

Vegetation and Environment (description): Tropical managed agroforest. The surrounding environment is fairly flat and is close to the lagoon edge of Temwen Island.

Soil Type: Humic, clayey

Artifactal or other cultural material (if any): N/A

Site integrity (good, fair, poor): F1 – poor; F2 – good.

Site condition (disturbed, undisturbed): disturbed

Threats to site: local vegetation
Land Ownership: Masao Silbanuz
Photos: 2089, 2090, 2091, 2092

HISTORIC SITE INVENTORY FORM

Site Number: PoC3-16

Site Type: Architectural

Features (descriptions and UTM coordinates, if available):

F1: UTM N 0426131, E0756680

This site consists of a long wall (approximately 100m, although due to vegetation restraints, it could not be accurately measured at this time) composed of basalt boulders and cobbles, approximately 2m high at its highest point. The wall stretches roughly SW to NE. There is a S downward slope at the SW end, over which many basalt boulders and cobbles are strewn in a roughly semi-circular fashion.

The UTM coordinates refer to the SW end of the wall.

Approximate Elevation: Close to shoreline, a few meters above sea level

Vegetation and Environment (description):

Managed tropical agroforest

Soil Type: Humic, clayey

Artifactal or other cultural material (if any): none observed

Site integrity (good, fair, poor): fair

Site condition (disturbed, undisturbed): disturbed; the strewn boulders and cobbles were likely part of the wall itself at one time. Much of the wall is covered in heavy vegetation and an effort to completely clear the wall would need to be very substantial

Threats to site: Vegetation overgrowth

Land Ownership: Masao Silbanuz

Photos: F1 – 2093, 2094, 2095, 2096, 2097, 2098

HISTORIC SITE INVENTORY FORM

Site Number: PoC3-17

Site Type: Architectural

Features (descriptions and UTM coordinates, if available):

F1: UTM N 0426084, E0756661

This is a stone alignment located on an E slope, composed of basalt cobbles. It measures 10m S-N, and has two perpendicular stone lines jutting out of the middle, one 2.68m long, the other approximately 1.5m long. This feature is likely architectural, but it appears highly disturbed, and the use is unknown.

Vegetation and Environment (description):

Managed tropical agroforest, near a modern pig pen and household

Soil Type: Humic, clayey

Artifactal or other cultural material (if any): none observed

Site integrity (good, fair, poor): poor

Site condition (disturbed, undisturbed): disturbed

Threats to site: erosion, vegetation

Land Ownership: Masao Silbanuz

Photographs: F1 – 2102, 210

HISTORIC SITE INVENTORY FORM

Site Number: PoC3-18

Site Type: Agricultural – breadfruit fermentation pit

Features (descriptions and UTM coordinates, if available):

F1: UTM N 0425775, E0756872

This is a likely prehistoric breadfruit fermentation pit. It measures 5.3mx7.9m. The depression is approximately 0.5m deep, and cobbles, mostly underground, line the bottom of the depression. There are few cobbles on the exterior of the depression. A 4mx1.5m excavation trench was opened through the exterior cutting into the interior. Excavation revealed cobble formations and a significant quantity of charcoal. Bulk, flotation, and smaller sediment samples were collected at 10cm intervals throughout the excavation.

Vegetation and Environment (description):

Managed tropical agroforest. The vegetation in this area is slightly less dense and woody than the areas directly to the east.

Soil Type: Humic on the surface; very clay-rich soil in lower layers that gradually becomes hard and tough to excavate

Arifactual or other cultural material (if any): none observed

Site integrity (good, fair, poor): Good

Site condition (disturbed, undisturbed): undisturbed

Threats to site: tree growth nearby

Land Ownership: Masao Silbanuz

Photographs: 2164, 2165, 2186-2220

HISTORIC SITE INVENTORY FORM

Site Number: PoC3-19

Site Type: Agricultural, architectural

Features (descriptions and UTM coordinates, if available):

F1: UTM N 0426137, E0756706

This is a collapsed yam enclosure (Yam Pit 18 in notes) composed of basalt cobbles. It measures approximately 1m in diameter.

F2: UTM N 0426131, E0756703

This is a circular enclosure likely used for yam cultivation (Yam Pit 19 in notes) composed of basalt cobbles. It measures 0.9m in diameter.

F3: UTM N 0426131, E0756699

This is an alignment of large boulders, approximately 8.8m N-S and 6m W-E on the south

Vegetation and Environment (description): Managed tropical agroforest

Soil Type: Humus

Arifactual or other cultural material (if any): none observed

Site integrity (good, fair, poor): fair

Site condition (disturbed, undisturbed): disturbed

Threats to site: vegetation

Land Ownership: Masao Silbanuz

HISTORIC SITE INVENTORY FORM

Site Number: PoC3-20

Site Type: Agricultural

Features (descriptions and UTM coordinates, if available):

F1: UTM N 0426069, E0756726

This is an oval of basalt cobbles likely used as a yam enclosure (Yam Pit 20 in notes), ranging from 1.9 to 2.3m in diameter.

F2: UTM N 0426063, E0756726

This is a yam enclosure (Yam Pit 21 in notes) that ranges from 1.2 to 1.6m in diameter, constructed of basalt cobbles.

F3: UTM N 0426057, E0756730

This is a small collection of basalt cobbles, approximately 1m N-S and 85cm W-E. It is not clear if this is a yam pit or some other sort of feature. However, it is unlikely to be a natural outcrop.

Vegetation and Environment (description): Managed tropical agroforest

Soil Type: Humic

Artifactal or other cultural material (if any): none observed

Site integrity (good, fair, poor): fair

Site condition (disturbed, undisturbed): F1 and F2 are relatively undisturbed; F3 is likely disturbed

Threats to site: vegetation

Land Ownership: Masao Silbanuz

Photographs: F1 – 2114, 2115; F2 – 2116; F3 -2117

HISTORIC SITE INVENTORY FORM

Site Number: PoC3-21

Site Type: Agricultural

Features (descriptions and UTM coordinates, if available):

UTM N 0426023, E0756649

This is a small yam growing enclosure (Yam Pit 22 in notes) that is approximately 85-90cm in diameter. It is not particularly close to any other features, thus it has been defined as its own site.

Vegetation and Environment (description):

Managed tropical agroforest, NW of taro patch

Soil Type: humus

Artifactal or other cultural material (if any): none observed

Site integrity (good, fair, poor): good

Site condition (disturbed, undisturbed): undisturbed

Threats to site: vegetation growth

Land Ownership: Masao Silbanuz

Photographs: F1 - 2120

HISTORIC SITE INVENTORY FORM

Site Number: PoC3-22

Site Type: Agricultural

Features (descriptions and UTM coordinates, if available):

F1: UTM N 0436032, E0756688

This is an enclosure constructed of basalt cobbles approximately 1.1m in diameter that probably functioned as a yam growing enclosure (Yam Pit 24 in notes).

F2: UTM N 0426026, E0756696

This is an enclosure constructed of basalt cobbles approximately 1m in diameter that probably functioned as a yam growing enclosure (Yam Pit 25 on Masao's property in notes).

Vegetation and Environment (description): Managed tropical agroforest

Soil Type: Humus

Arifactual or other cultural material (if any): none observed

Site integrity (good, fair, poor): good

Site condition (disturbed, undisturbed): undisturbed

Threats to site: vegetation growth

Land Ownership: Masao Silbanuz

Photographs: F1 -2123; F2 - 2124

HISTORIC SITE INVENTORY FORM

Site Number: PoC3-23

Site Type: Agricultural

Features (descriptions and UTM coordinates, if available):

F1: UTM 57 N0425983, E0756684

This is a round basalt cobble enclosure, approximately 1-1.2m in diameter, likely used for yam cultivation (Yam Pit 28 in notes).

F2: UTM 57 N0425984, E0756683

This is a round basalt cobble enclosure, approximately 1-1.2m in diameter, likely used for yam cultivation (Yam Pit 29 in notes).

Vegetation and Environment (description): Managed tropical agroforest

Soil Type: Humic

Arifactual or other cultural material (if any): none observed

Site integrity (good, fair, poor): good

Site condition (disturbed, undisturbed): undisturbed

Threats to site: vegetation growth

Land Ownership: Masao Silbanuz

Photographs: F1 – 2128; F2 - 2129

HISTORIC SITE INVENTORY FORM

Site Number: PoC3-24

Site Type: Agricultural

Features (descriptions and UTM coordinates, if available):

F1: UTM 57 N 0425007, E0756736

This feature consists of basalt cobbles aligned in a semi-circular fashion, approximately 1.35m between the two edges of the semicircle, and approximately 1.65m on the longest perpendicular line. This feature appears to be a highly disturbed yam growing pit (Yam Pit 30 in notes).

F2 : UTM 57 N 0426013, E0756744

This feature consists of a roughly oval-shaped cluster of basalt cobbles, ranging from 1-1.2m in diameter. It was likely a yam growing pit (Yam Pit 31 in notes).

F3: UTM 57 N 0426001, E0756744

This feature is an oval-shaped enclosure of basalt cobbles, approximately 85cm-1m in diameter. It was likely a yam growing pit (Yam Pit 32 in notes).

F4: UTM 57 N 0425995, E0756737

This feature consists of an enclosure of basalt cobbles approximately 1m in diameter, surrounded by an oval enclosure of basalt boulders. The larger oval ranges from 2.2-2.8m in diameter. The inner enclosure was likely a yam growing pit (Yam Pit 33 in notes).

Vegetation and Environment (description): Managed tropical agroforest on a roughly SE downward slope. The shoreline is approximately 300m to the E.

Soil Type: Arifactual or other cultural material (if any): none observed

Site integrity (good, fair, poor): good

Site condition (disturbed, undisturbed): partially disturbed. F1 is definitely disturbed.

Threats to site: vegetation growth

Land Ownership: Masao Silbanuz

Photographs: F1 – 2130; F2 – 2131; F3 – 2132; F4 - 2133

HISTORIC SITE INVENTORY FORM

Site Number: PoC3-25

Site Type: Architectural and agricultural

Features (descriptions and UTM coordinates, if available):

F1: UTM N0426977, E0756762

This is a cluster of basalt boulders, approximately 4.7m S-N and 3.4m E-W. It is not a natural outcrop of boulders, but it is highly disturbed, and the function is unclear.

F2: UTM N0425984, E0756779

This is a large stone wall stretching from roughly NW to SE, constructed of basalt boulders. It is 17.7m long, 1.5m high, and ranges from 1.7m to 4.6m across. It is visible from the modern road.

F3: UTM N0425959, E0756776

This is a depression in the ground approximately 1.8m in diameter, lined with a few basalt cobbles. It appears to have been previously used for yam cultivation (Yam Removal Area in notes).

Vegetation and Environment (description): Managed tropical agroforest, on a roughly E downward slope.

Soil Type: Humic

Arifactual or other cultural material (if any): none observed

Site integrity (good, fair, poor): good

Site condition (disturbed, undisturbed): F1 is highly disturbed; F2 and F3 are less so.

Threats to site: Vegetation growth and erosion

Land Ownership: Masao Silbanuz

Photographs: F1 – 2134; F2 – 2135, 2136; F3 - 2137

HISTORIC SITE INVENTORY FORM

Site Number: PoC3-26

Site Type: Agricultural

Features (descriptions and UTM coordinates, if available):

F1: UTM 57 N0425885, E0756803

This feature is a depression measuring approximately 3.95m x 5.1m. There are basalt boulders along some of the edges. There is a modern yam cultivation enclosure (contains yam) on the southwest side, and there is a large tree on the northern side. It is likely a breadfruit fermentation pit.

Vegetation and Environment (description): This site is located in a managed tropical agroforest and gardening area. There is a large tree growing on the northern side of the site.

Soil Type: Humic, organic-rich soil

Arifactual or other cultural material (if any): none observed

Site integrity (good, fair, poor): good

Site condition (disturbed, undisturbed): disturbed (vegetation growth)

Threats to site: large tree at northern end and modern yam cultivation

Land Ownership: Masao Silbanz

Photographs: 2142

HISTORIC SITE INVENTORY FORM

Site Number: PoC3-27

Site Type: agricultural

Features (descriptions and UTM coordinates, if available):

F1: UTM 57 N0425853, E0756845

This feature is an enclosure of basalt cobbles with a diameter of approximately 1.8m. At the NW end, there is a large basalt boulder approximately 0.6m long. This was likely a yam cultivation enclosure (Yam Pit 37 in notes). Due to its relative isolation from other sites, it is designated with its own site number.

Vegetation and Environment (description): managed tropical agroforest

Soil Type: humic

Arifactual or other cultural material (if any): none observed

Site integrity (good, fair, poor): good

Site condition (disturbed, undisturbed): undisturbed

Threats to site: Modern gardening and animal husbandry activities.

Land Ownership: Masao Silbanuz

Photographs: 2156, 2157

HISTORIC SITE INVENTORY FORM

Site Number: PoC3-28

Site Type: Architectural

Features (descriptions and UTM coordinates, if available):

F1: UTM 57 N 0435793, E0756890

This is a large boulder platform that forms a rectangle. It is 12.4-13.4m on the NE and SW sides, and 8m long on the SE and NW sides. It is approximately 2m in height. The function of this platform is not clear, but it is clearly a purposefully built structure.

Vegetation and Environment (description): This platform is located next to a modern dirt road, in a managed tropical agroforest. The area in which it is located is noticeably grassier than other areas in the surrounding environment.

Soil Type: Humic

Arifactual or other cultural material (if any): none observed

Site integrity (good, fair, poor): good

Site condition (disturbed, undisturbed): semi-disturbed

Threats to site: vegetation growth

Land Ownership: Masao Silbanuz

Photographs: NE Wall – 2162, 2162; Top of platform – 2158, 2159, 2160

HISTORIC SITE INVENTORY FORM

Site Number: PoC3-29

Site Type: Agricultural – Yam Enclosure

Features (descriptions and UTM coordinates, if available):

F1: UTM 57 N0425696, E0756831

This is a circular enclosure approximately 1-1.25m in diameter, composed of basalt cobbles (M Yam Pit 1 in notes). It appears to be a collapsed yam cultivation enclosure.

Vegetation and Environment (description): The surrounding land is flat and wooded; it is located in a managed agroforest/garden.

Soil Type: Humic

Arifactual or other cultural material (if any): none observed

Site condition (disturbed, undisturbed): undisturbed

Threats to site: Modern gardening and animal husbandry activities.

Land Ownership: Myleen Mathias

Photographs: 2222, 2223

HISTORIC SITE INVENTORY FORM

Site Number: PoC3-30

Site Type: Multi-functional

Features (descriptions and UTM coordinates, if available):

F1: UTM 57 N0425704, E0756876

This is a collection of basalt cobbles, ranging from approximately 0.75m-1.5m in diameter.

There is a small enclosure area. It appears to be a collapsed yam cultivation enclosure (M YP 2 in notes).

F2: UTM 57 N0425707, E0756879

This feature consists of two small depressions, each approximately 0.25m wide. One is approximately 1m long, and one is approximately 0.5m long. They are lined up lengthwise and separated by about 0.1m. The larger of the two depressions contains two wooden planks with nails on each end. It looks somewhat like a yam cultivation area, but it is too narrow for this and a yam cultivation area would not contain wooden planks. It has been suggested that this may be a historic latrine.

F3: UTM 57 N0425735, E0756881

This feature is a round depression, approximately 1m in diameter. Given its dimensions, we suggest that this served as a yam cultivation area, where the yam was removed from the soil (Myleen Yam Removal Pit 1 in notes).

Vegetation and Environment (description): Managed agroforest/garden. The land here is relatively flat in slope.

Soil Type: Humic

Arifactual or other cultural material (if any): Wooden planks in F2

Site integrity (good, fair, poor): F1 – poor; F2 – fair; F3 – good

Site condition (disturbed, undisturbed): undisturbed

Threats to site: vegetation

Land Ownership: Myleen Mathias

Photographs: F1 – 2224, 2225; F2 – 2226, 2227, 2228, 2229; F3 – 2230, 2231

HISTORIC SITE INVENTORY FORM

Site Number: PoC3-31

Site Type: Agricultural, primarily yam cultivation

Features (descriptions and UTM coordinates, if available):

F1: UTM 57 N0425670, E0756886

This feature is a small circular enclosure of basalt cobbles that likely represents a yam cultivation area (M Yam Pit 3 in notes). It is approximately 0.75m in diameter.

F2: UTM 57 N0425782, E0756813

This feature is a circular enclosure of basalt cobbles that likely represents a yam cultivation area (M Yam Pit 4 in notes). It is approximately 1.42m wide at its widest part; the opening of the enclosure is just under 1m.

F3: UTM 57 N0425784, E0756817

This feature is a crescent of basalt cobbles and boulders on a hillside. It likely represents some type of agricultural terracing. It consists of two lines of cobbles, one 2.4m long, and one 2.6m long, separated by a small (less than 0.5m) gap.

F4: UTM 57 N0425791, E0756814

This feature is a circular enclosure of basalt cobbles likely representing a yam cultivation area (M Yam Pit 5 in notes). It is approximately 1.3m in diameter.

F5: UTM 57 N0425791, E0756825

This feature is a circular enclosure of basalt cobbles likely representing a yam cultivation area (M Yam Pit 6). It is approximately 1.2m in diameter. There appears to be some disturbance of the cobbles on the E side.

F6: UTM 57 N0425790, E0756833

This feature is an oval enclosure of basalt cobbles likely representing a yam cultivation area (M Yam Pit 7 in notes). It is approximately 1.8 across at its widest part. It also appears to be collapsed.

Vegetation and Environment (description): This site is located in a managed agroforest, on a moderate slope.

Soil Type: Humic, somewhat muddy

Arifactual or other cultural material (if any): none observed

Site integrity (good, fair, poor): fair-good

Site condition (disturbed, undisturbed): undisturbed

Threats to site: Modern gardening and animal husbandry activities.

Land Ownership: Myleen Mathias

Photographs: F1 – 2232; F2 – 2235; F3 – 2233, 2234, 2236, 2237; F4 – 2238, 2239; F5 – 2240; F6 – 2241, 2242, 2243

HISTORIC SITE INVENTORY FORM

Site Number: PoC3-32

Site Type: Agricultural

Features (descriptions and UTM coordinates, if available):

F1: UTM 57 N 0425857, E0756773

This feature is an enclosure of basalt cobbles approximately 1.2m in diameter (Myleen Yam Pit 8 in notes). It was likely used as an enclosure for growing a yam.

Vegetation and Environment (description): managed tropical agroforest

Soil Type: Humic

Arifactual or other cultural material (if any): none observed

Site integrity (good, fair, poor): good

Site condition (disturbed, undisturbed): undisturbed

Threats to site: Modern gardening and animal husbandry activities.

Land Ownership: Myleen Mathias

Photographs: 2244, 2245

HISTORIC SITE INVENTORY FORM

Site Number: PoC3-33

Site Type: Architectural

Features (descriptions and UTM coordinates, if available):

F1: UTM 57 N0425886, E0756780

This feature is an alignment (Myleen Stone Alignment 2 in notes) of 5 basalt boulders approximately 2.7m long. It stretches roughly from SW to NE. The purpose is unknown, but due to the size of the boulders and the lack of slope in the local area, it is unlikely to represent terracing.

Vegetation and Environment (description): This feature is located in a managed tropical agroforest, with no local slope.

Soil Type: Humic

Arifactual or other cultural material (if any): none observed

Site integrity (good, fair, poor): good

Site condition (disturbed, undisturbed): undisturbed

Threats to site: Modern gardening and animal husbandry activities.

Land Ownership: Myleen Mathias

Photographs: F1 – 2246, 2247, 2248, 2249

HISTORIC SITE INVENTORY FORM

Site Number: PoC3-34

Site Type: Primarily agricultural

Features (descriptions and UTM coordinates, if available):

F1: UTM 57 N9425877, E0756753

This feature is a circular depression approximately 1.2 m in diameter, enclosed by a circle of basalt boulders, approximately 2.3m in diameter. This is likely a former yam enclosure, where the yam was removed from the soil (Myleen Yam Removal 2 in notes).

F2:UTM 57 N0425859, E0756756

This feature is a circular enclosure made of basalt cobbles, likely used for growing yams (Myleen Yam Pit 9 in notes). It is 1m in diameter. The basalt cobbles are single-layered, and it looks possible that it has been disturbed.

F3: UTM 57 N0425888, E0756753

This feature is a circular enclosure made of basalt cobbles, likely used for growing yams. It is approximately 2m in diameter (Myleen Yam Pit 10 in notes).

F4:UTM 57 N0425888, E0756753

This feature is a circular enclosure made of basalt cobbles, likely used for growing yams. It is approximately 1.4m in diameter. It is located within 2m of F3 (Myleen Yam Pit 11 in notes).

F5: UTM 57 N 0425894, E0756740

This is a SE slope with large basalt boulders strewn across the area. The boundaries are unclear, but the area is at least 10m². It is likely that these boulders were deliberately moved to this location, but the function is unclear.

F6: UTM 57 N0425903, E0756747

This feature is an oval-shaped depression, approximately 2.6m x 1.8m, lined with basalt cobbles. It is most likely an area where a yam was removed from the soil, although it is somewhat larger than most of these depressions (Myleen Cobble-lined depression in notes).

Vegetation and Environment (description): This site is located in tropical managed agroforest, on a SE slope of about 10°. It is close to (but not located in) a swampy area with a SE slope.

Soil Type: humic

Artifactual or other cultural material (if any): none observed

Site integrity (good, fair, poor): fair-good

Site condition (disturbed, undisturbed): semi-disturbed (F2 may be disturbed; other features are undisturbed)

Threats to site: Vegetation, erosion

Land Ownership: Myleen Mathias

Photographs: F1 – 2250, 2251; F2 – 2252, 2253; F3 – 2256; F4 – 2254, 2255, 2257; F5 – 2258; F6 - 2259

HISTORIC SITE INVENTORY FORM

Site Number: PoC3-35

Site Type: Agricultural storage

Features (descriptions and UTM coordinates, if available):

F1: UTM 57 N0425879, E0756941

This is a large depression at the north end of this landowner plot. There are no visible cobbles, but it is an appropriate size for a small breadfruit fermentation pit, ranging from 3-4.8m in diameter. There is also some modern garbage in the pit, suggesting a modern secondary usage for trash disposal.

Vegetation and Environment (description): Location is in a tropical managed agroforest with thick vegetation, on a moderate slope.

Soil Type: Humic

Artifactual or other cultural material (if any): none observed

Site integrity (good, fair, poor): fair

Site condition (disturbed, undisturbed): disturbed

Threats to site: vegetation overgrowth

Land Ownership: Petrick Ringlin

Photographs: F1 – 2263, 2264

HISTORIC SITE INVENTORY FORM

Site Number: PoC3-36

Site Type: Historic, other

Features (descriptions and UTM coordinates, if available):

F1: UTM 57 N0425897, E0756910

This feature is a large circular depression approximately 12.3m long. It is currently being used for garbage disposal, which practically inhibited depth measurement, but it is estimated at 5m. It was likely a WWII Japanese military site, but it is also possible that it had an earlier, unknown use. The shape and size do not suggest agricultural production or storage.

F2: UTM 57 N0425885, E0756908

This is an area of collapsed boulders strewn down a N slope. It is likely archaeological, but the purpose is unknown.

Vegetation and Environment (description): This area has a steep N slope and is located in a managed agroforest.

Soil Type: Humus. Soils are quite muddy.

Arifactual or other cultural material (if any): F1 is currently being used for modern garbage disposal

Site integrity (good, fair, poor): fair

Site condition (disturbed, undisturbed): semi-disturbed

Threats to site: erosion, modern use

Land Ownership: Petrick RInglin

Photographs: F1 – 2265, 2266, 2267 (all from N); F2 – 2268, 2269

HISTORIC SITE INVENTORY FORM

Site Number: PoC3-37

Site Type: Agricultural

Features (descriptions and UTM coordinates, if available):

F1: UTM 57 N0425864, E0756850

This feature is an enclosure made of basalt cobbles approximately 1m in diameter. It was likely used for yam cultivation (PR Yam Pit 1 in notes).

F2: UTM 57 N0425909, E0756845

This feature is an enclosure made of basalt cobbles approximately 1m in diameter. It was likely used for yam cultivation (PR Yam Pit 2 in notes). This feature is 3m from F1.

F3: UTM 57 N0425912, E0756836

This feature is an enclosure made of basalt cobbles approximately 1.3m in diameter. It was likely used for yam cultivation (PR Yam Pit 3 in notes).

F4: UTM 57 N0425916, E0756836

This feature is a pit depression approximately 1m in diameter. It was likely an area used for yam cultivation when a yam was removed (PR Yam Removal 1 in notes).

F5: UTM 57 N0425927, E0756834

This feature is a pit depression approximately 1.3m in diameter. It was likely an area used for yam cultivation where a yam was removed (PR Yam Removal 2 in notes).

Vegetation and Environment (description): This site is located in a tropical managed agroforest.

Soil Type: Humus

Artifactual or other cultural material (if any): none observed

Site integrity (good, fair, poor): good

Site condition (disturbed, undisturbed): undisturbed

Threats to site: erosion, vegetation

Land Ownership: Petrick Ringlin

Photographs: F1 – 2272; F2 – 2273; F3 – 2274, 2275; F4 – 2276; F5 – 2277, 2278

HISTORIC SITE INVENTORY FORM

Site Number: PoC3-38

Site Type: Architectural

Features (descriptions and UTM coordinates, if available):

F1: UTM 57 N0425974, E0756831

This site is a large basalt boulder and cobble wall near the road to Nan Madol. It is approximately 5m from the road, and runs approximately parallel. There is a NW slope behind the wall with large boulders strewn across the area. The wall is approximately 45 meters long, and ends about 10m from the eastern boundary of Petrick Ringlin's land (bordering Masao Silbanuz' land).

Vegetation and Environment (description): This structure is located in a managed agroforest, with a steep NW slope. Other surrounding sites are primarily agricultural

Soil Type: Humus

Artifactual or other cultural material (if any): none observed

Site integrity (good, fair, poor): Fair

Site condition (disturbed, undisturbed): disturbed; it is clear that some boulders and cobbles have been removed for secondary usage, although the wall remains largely intact

Threats to site: erosion, vegetation

Land Ownership: Petrick Ringlin

Photographs: F1 – 2279, 2280, 2281, 2282, 2283, 2284, 2285

HISTORIC SITE INVENTORY FORM

Site Number: PoC3-39

Site Type: Agricultural

Features (descriptions and UTM coordinates, if available):

F1: UTM 57 N0425966, E0756828

This feature is a collection of basalt cobbles, roughly circular and approximately 90cm in diameter. It is likely a disturbed yam enclosure (PR Yam Pit 4 in notes).

F2: UTM 57 N0425957, E0756835

This feature is a small collection of basalt cobbles, roughly circular and approximately 70cm in diameter. It is likely a disturbed yam enclosure (PR Yam Pit 5 in notes).

Vegetation and Environment (description): This site is located in a managed agroforest, near a large boulder wall (PoC3-38). There is a steep NW slope to the NW of the site.

Soil Type: Humus

Arifactual or other cultural material (if any): none observed

Site integrity (good, fair, poor): fair

Site condition (disturbed, undisturbed): disturbed

Threats to site: erosion, vegetation

Land Ownership: Petrick Ringlin

Photographs: F1 – 2286, 2287; F2 – 2288, 2289

HISTORIC SITE INVENTORY FORM

Site Number: PoC3-40

Site Type: Architectural

Features (descriptions and UTM coordinates, if available):

F1:UTM 57 N 0425921, E0756856

This is a boulder wall that is not quite as large as PoC3-38. The height is approximately 1m, and it runs approximately N-S for 25m. There is a steep downward slope to the E of the wall. It is possible that it represents some form of erosion control.

Vegetation and Environment (description): This feature is located in a tropical managed agroforest. The area to the east of the wall is a steep downward slope.

Soil Type: Humus

Arifactual or other cultural material (if any): none observed

Site integrity (good, fair, poor): good

Site condition (disturbed, undisturbed): undisturbed

Threats to site: erosion, vegetation

Land Ownership: Petrick Ringlin

Photographs: F1 – 2290, 2291, 2292, 2293

HISTORIC SITE INVENTORY FORM

Site Number: PoC3-41

Site Type: Alignment

Features (descriptions and UTM coordinates, if available):

F1: UTM 57 N0425915, E0756871

This feature is an alignment of smaller boulders on a NW slope 8.4m in length that meets up perpendicular to an alignment of larger boulders embedded into the slope, of similar length. This may be a form of erosion control and/or terracing.

Vegetation and Environment (description): Tropical managed agroforest on a NW slope

Soil Type: Humus

Arifactual or other cultural material (if any): none observed

Site integrity (good, fair, poor): good

Site condition (disturbed, undisturbed): undisturbed

Threats to site: Potentially erosion, although as the site looks designed to prevent erosion, this is not likely a major threat Also, modern gardening and animal husbandry activities.

Land Ownership: Petrick Ringlin

Photographs: F1 – 2294 (S wall), 2295 (S wall), 2297, 2298, 2299 (all corner)

HISTORIC SITE INVENTORY FORM

Site Number: PoC3-42

Site Type: Agricultural

Features (descriptions and UTM coordinates, if available):

F1: UTM 57 N0425939, E0756811

This is a trench-like depression, characterized as a breadfruit fermentation pit. It is 9.8m long, and 4m wide at its widest. It is teardrop-shaped, with a rounded W end, and an E end that tapers off.

Vegetation and Environment (description): This site is located on a fairly flat area in a tropical managed agroforest. It is about 2m from the road leading to Nan Madol, and is clearly visible from the road.

Soil Type: Humus

Artifactal or other cultural material (if any): none observed

Site integrity (good, fair, poor): good

Site condition (disturbed, undisturbed): undisturbed

Threats to site: vegetation overgrowth

Land Ownership: Petrick Ringlin

Photographs: F1 – 2300 (from E end), 2301 (from W end)

HISTORIC SITE INVENTORY FORM

Site Number: PoC3-43

Site Type: Agricultural (Yam cultivation)

Features (descriptions and UTM coordinates, if available):

F1: UTM 57 N0425657, E0756705

This is a circular enclosure of basalt cobbles approximately 1.8m in diameter. There is a large depression in the center of the enclosure. It appears to be a former yam cultivation area in which a yam was removed from the center (BS Yam Pit 1).

F2: UTM 57 N0425660, E0756711

This is an oval enclosure of basalt cobbles, 2.3mx1.9m. Like Feature 1, it has a central depression that likely indicates yam removal. It is located 1m to the north of Feature 1.

F3: UTM 57 N0425657, E0756715

This is a circular enclosure of basalt cobbles approximately 1m in diameter. It was likely used for yam cultivation, although there is no evidence of yam removal in this feature.

Vegetation and Environment (description): This site is located in a fairly flat area in a tropical managed agroforest. It is located about 10m to the NW of the main road in the area, which is a branch road from the main road encircling Temwen Island.

Soil Type: Humus

Artifactal or other cultural material (if any): none observed

Site integrity (good, fair, poor): good

Site condition (disturbed, undisturbed): undisturbed

Threats to site: vegetation growth

Land Ownership: Bernardihna Silbanuz

Photographs: F1 – 2331; F2 – 2332; F3 – 2333 (Photos: Jackson Silbanuz)

HISTORIC SITE INVENTORY FORM

Site Number: PoC3-44

Site Type: Architectural – stone platform

Features (descriptions and UTM coordinates, if available):

F1: UTM 57 N0425666, E0756719

This feature is a relatively flat rectangular platform of basalt cobbles and boulders (no columns). It measures approximately 8mx10.5m. There is a clear outer edge on four sides measuring approximately 1m across, and boulders and cobbles strewn throughout the middle. Stones are clustered more towards the NW end, and there is a seemingly rectangular platform structure on this end. However, it is unlikely that this structure is a lolog, given that it is not built up, and in most places is just a single level of stones placed directly on the ground.

Vegetation and Environment (description): This platform is located in a relatively flat area of managed agroforest. It is about 10m NW of a branch road from the main Temwen Island road. There is a modern dwelling about 10m to the NW of the site.

Soil Type: Humus

Arifactual or other cultural material (if any): none observed

Site integrity (good, fair, poor): good

Site condition (disturbed, undisturbed): undisturbed

Threats to site: vegetation

Land Ownership: Bernardihna Silbanuz

Photographs: F1 – 2335 (overall), 2336 (overall), 2338 (center, more detail), 2339 (center), 2340 (platform detail), 2341 (wall area, detail), 2342 (NE wall, detail)

HISTORIC SITE INVENTORY FORM

Site Number: PoC3-45

Site Type: Agricultural – yam cultivation

Features (descriptions and UTM coordinates, if available):

F1: UTM 57 N0425589, E0756773

This is a circular cluster of basalt stones approximately 1m in diameter. It does not have a clear central yam growing area, but based on the shape and size it was likely used as a yam enclosure (BS Yam Pit 4 in notes).

F2: UTM 57 N0425581, E0756782

This is a circular enclosure of basalt cobbles approximately 1.1m in diameter. It was likely used as a yam enclosure (BS Yam Pit 5 in notes).

Vegetation and Environment (description): This site is located in a tropical managed agroforest. It is N of a modern fence, and to the NW of a modern taro patch.

Soil Type: Humus

Arifactual or other cultural material (if any): none observed

Site integrity (good, fair, poor): good

Site condition (disturbed, undisturbed): semi-disturbed

Threats to site: vegetation

Land Ownership: Bernardihna Silbanuz

Photographs: F1 – 2343; F2 – 2344 (Photographer: Jackson Silbanuz)

HISTORIC SITE INVENTORY FORM

Site Number: PoC3-46

Site Type: Architectural, agricultural

Features (descriptions and UTM coordinates, if available):

F1: UTM 57 N0425560, E0756797

This is a stone platform (BS Stone Platform 2 in notes) constructed of basalt cobbles and boulders laying flat in an trapezoidal fashion. The uneven sides are 6.2m and 4m oriented NW; there is 7.8m between these sides. There is only a single layer of stones, and they are more concentrated at the SW end.

F2: UTM 57 N0425554, E0756794

This is a single file, unstacked line of boulders and cobbles that is 10.3m long, stretching roughly N-S. Those stones are deeply embedded in the ground; it is possible that this represents terracing (BS Stone Alignment 2 in notes).

F3: UTM 57 N0425548, E0756795

This is a cluster of cobbles approximately 70cm in diameter. It is likely a small yam enclosure (BS Yam Pit 6). There is no clear central growing area, so it may be collapsed.

F4: UTM 57 N0425548, E0756796

This is a small circular arrangement of cobbles approximately 50cm in diameter. It is small enough that it is not likely an yam enclosure; the purpose of the structure is unknown.

Vegetation and Environment (description): This site is located in a tropical managed agroforest; Feature 1 is on a NE slope.

Soil Type: Humus

Artifactal or other cultural material (if any): none observed

Site integrity (good, fair, poor): fair

Site condition (disturbed, undisturbed): semi-disturbed

Threats to site: vegetation

Land Ownership: Bernardihna Silbanuz

Photographs: F1 – 2345, 2346, 2347, 2348; F2 – 2351, 2353, 2354; F3 – 2355; F4 -2356, 2357

HISTORIC SITE INVENTORY FORM

Site Number: PoC3-47

Site Type: Historic agricultural

Features (descriptions and UTM coordinates, if available):

F1: UTM 57 N0425524, E0756837

This is a circular enclosure constructed out of a combination of concrete, metal, and basalt cobbles. It is 1.1m in diameter, suggesting that it is a yam growing enclosure (BS Yam Pit 7 in notes). The inclusion of concrete and metal places the date of this structure firmly in the historic era. Given the shape of the metal, a source and time period could likely be determined.

Vegetation and Environment (description): This site is located in a managed agroforest in the northwest corner of Bernardihna Silbanuz' property. There are no other features adjacent to this site.

Soil Type: Humus

Artifactal or other cultural material (if any): none observed

Site integrity (good, fair, poor): good

Site condition (disturbed, undisturbed): undisturbed

Threats to site: vegetation

Land Ownership: Bernardihna Silbanuz

Photographs: F1 -2358, 2359

HISTORIC SITE INVENTORY FORM

Site Number: PoC3-48

Site Type: Agricultural

Features (descriptions and UTM coordinates, if available):

F1: UTM 57 N0425848, E0756690

This is a circular enclosure constructed of basalt cobbles that was likely a yam cultivation enclosure (BS Yam Pit 8 in notes). It is 1.6m in diameter. There are boulders strewn haphazardly in the surrounding area.

F2: UTM 57 N0425853, E0756684

This feature consists of two linked depressions. The entirety of the depression is 7.3m long NW-SW, and 3.5m NE to SW. There are boulders lining the outside of the two depressions, and one separating the two in the middle, with a few cobbles in the SE depression. The NW depression is more circular, while the SE depression has more of an oblong shape. The NW depression is unusually deep, about an 85cm difference between the top edge and the bottom of the depression.

This site was mapped and excavated. Excavation at this site consisted of a 3mx1m trench cutting through the NW depression. We collected samples for microremain analysis at arbitrary 10cm intervals, and drew soil profiles. However, we were unable to complete the excavation to the desired extent, as the water table was at about 60cm and we could not remove the water quickly enough.

Vegetation and Environment (description): This is a densely wooded area, with soil more heavily saturated with water than most. It is on a steep S slope. Further S, the area becomes swamp-like, with less agriculture-related vegetation. To the north, the area is a managed agroforest.

Soil Type: Humus, clay

Artifactual or other cultural material (if any): N/A

Site integrity (good, fair, poor): good

Site condition (disturbed, undisturbed): Disturbed (F2 has been excavated)

Threats to site: erosion

Land Ownership: Bernardihna Silbanuz

Photographs: F1 – 2360, 2361 (Photos: Jackson Silbanuz); F2 – 2362, 2363, 2364, 2402-2413

HISTORIC SITE INVENTORY FORM

Site Number: PoC3-49

Site Type: Agricultural

Features (descriptions and UTM coordinates, if available):

F1: UTM 57 N0425868, E0756703

This feature is a stone alignment located on a SE slope, and stretches SW-NE. It is 15m long. This feature is likely indicative of terracing.

F1: UTM 57 N 0425869, E0756714

This feature is a roughly circular arrangement of basalt cobbles measuring 1.5m in diameter. It was likely used for yam cultivation (BS Yam Pit 9 in notes). This feature is located at the NE end of Feature 1.

Vegetation and Environment (description): This site is located on a NE slope in a managed tropical agroforest.

Soil Type: Humus

Arifactual or other cultural material (if any): none observed

Site integrity (good, fair, poor): good

Site condition (disturbed, undisturbed): undisturbed

Threats to site: vegetation, erosion

Land Ownership: Bernardihna Silbanuz

Photographs: F1 – 2365, 2366; F2 – 2367, 2368

HISTORIC SITE INVENTORY FORM

Site Number: PoC3-50

Site Type: Agricultural – Breadfruit Fermentation

Features (descriptions and UTM coordinates, if available):

F1: UTM 57 N0425937, E0756664

This is a very large depression that was likely used for breadfruit fermentation. The pit is 17m long and 5.4m across in its widest parts. It has steep, boulder-lined walls about a meter high at their widest. The north end is wide and deep; the pit then narrows and flattens out into a drainage ditch at the south end. The overall shape is keyhole-like. While this pit was documented at the end of the field season, doing more work here would be warranted. However, given the height of the water table, a water pump is absolutely necessary.

Vegetation and Environment (description): This site is located in swampy area that is largely otherwise unsurveyable. It is located in a flat area at the bottom of a SE slope; the slope continues SE of the pit (which is on a different landowner plot). The area is very shaded and is part of a managed agroforest.

Soil Type: Clay

Arifactual or other cultural material (if any): none observed

Site integrity (good, fair, poor): good

Site condition (disturbed, undisturbed): undisturbed

Threats to site: Potentially erosion. Modern gardening and animal husbandry activities.

Land Ownership: Bernardihna Silbanuz

Photographs: 2369 (N end); 2397, 2398 (S. end drainage)

HISTORIC SITE INVENTORY FORM

Site Number: PoC3-51

Site Type: Architectural – burial, agricultural

Features (descriptions and UTM coordinates, if available):

F1: UTM 57 N0425783, E0756668

This large structure has 4 exterior walls that are raised approximately 1m each, and a central raised platform containing some columns. Most of the exterior wall and most of the platforms are constructed of basalt boulders. This structure is highly suggestive of a lolong. It is oriented SE, with the central platform located closest to the NW wall. The structure measures 14.2m SW-NE, and 18.2m NW-SE.

F2: UTM 57 N0425777, E0756669

This structure is a roughly oval collection of basalt cobbles with a central clear area, approximately 2.5mx2m. It appears to be a former yam cultivation enclosure that is highly disturbed (BS Yam Pit 10 in notes).

Vegetation and Environment (description): This site is located on a slight SE slope in a tropical managed agroforest. It is about 50m S of a modern dwelling.

Soil Type: Humus

Artifact or other cultural material (if any): none observed

Site integrity (good, fair, poor): good

Site condition (disturbed, undisturbed): undisturbed

Threats to site: vegetation

Land Ownership: Bernardihna Silbanuz

Photographs: F1 – 2381 (SW wall), 2382 (NW corner), 2383 (Tomb chamber NW, pre-clearing), 2384 *S wall, uncleared)

HISTORIC SITE INVENTORY FORM

Site Number: PoC3-52

Site Type: Agricultural

Features (descriptions and UTM coordinates, if available):

F1: UTM 57 N0425753, E0756657

This feature is a roughly circular collection of basalt cobbles approximately 2m in diameter. It was likely used as a yam growing enclosure, although it is disturbed (BS Yam Pit 11 in notes).

F2: UTM 57 N0425770, E0756645

Located to the SE of F1, this is a long (15.6m), narrow (1-2m) depression. The W end is the widest area, and the depression tapers to the E in what appears to be a water drainage system. The depression is surrounded by basalt cobbles and boulders, characteristic of breadfruit fermentation pits (BS Breadfruit Pit 3).

F3: UTM 57 N0425764, E0756646

This feature consists of two parts, Feature 3a and Feature 3b and is located to the W of Feature 2. Both features are circular enclosures constructed of basalt cobbles. They likely represent yam cultivation enclosures. Feature 3a is to the N and has a basalt cobble in the middle of the enclosure; Feature 3b borders 3a to the S and is empty in the middle. The entire feature is approximately 2.5m N-S, and each enclosure is about 1m in diameter.

F4: UTM 57 N0425714, E0756665

This feature is located slightly to the N of Feature 1. It is a 10.7m alignment of basalt boulders and cobbles running NE-SW. It is likely that this feature is indicative of terracing, especially as it is located on a gentle SE slope (BS Stone Alignment 3 in Notes).

F5: This feature is located 2.1m NW of F1. It is an enclosure of basalt cobbles approximately 1.8m in diameter, likely used for yam cultivation purposes (BS Yam Pit 14 in notes).

Vegetation and Environment (description): This site is located on a mild SE slope. The surrounding environment is a managed agroforest, although it is relatively more open than much of the area on survey.

Soil Type: Humus

Artifact or other cultural material (if any): none observed

Site integrity (good, fair, poor): good

Site condition (disturbed, undisturbed): semi-disturbed

Threats to site: vegetation, erosion

Land Ownership: Bernardihna Silbanuz

Photographs: F2 – 2385 (W end), 2386 (E end drainage); F4/5 – 2379, 2380

HISTORIC SITE INVENTORY FORM

Site Number: PoC3-53

Site Type: Architectural, Agricultural

Features (descriptions and UTM coordinates, if available):

F1: UTM 57 N 0425714, E0756672

This is a large rectangular stone enclosure, measuring 13.1m x 10m. The walls are constructed of basalt cobbles and boulders, and range from 0.5m-1m in height. There is no paving on the interior of the enclosure, although there are some basalt cobbles and boulders strewn around the interior in a haphazard fashion.

Subfeature 1a is a circular enclosure of basalt cobbles about 1m in diameter, likely used for yam cultivation (BS Yam Pit 15 in notes). It is located near the NE corner of the stone enclosure.

Vegetation and Environment (description): This feature is located on a relatively flat area of a managed agroforest. It is S of a branch road of the main Temwen Island road.

Soil Type: Humus

Artifactual or other cultural material (if any): none observed

Site integrity (good, fair, poor): fair

Site condition (disturbed, undisturbed): semi-disturbed

Threats to site: vegetation

Land Ownership: Bernardihna Silbanuz

Photographs: F1 – 2375 & 2376 (SE wall from outside); 2377, 2378 (NW wall and Subfeature 1a from inside)

HISTORIC SITE INVENTORY FORM

Site Number: PoC3-54

Site Type: Agricultural

Features (descriptions and UTM coordinates, if available):

F1: UTM 57 N0425723, E0756674

This feature is a circular enclosure of basalt cobbles and boulders 1.8m in diameter. It was likely used for yam cultivation (Yam Pit 16 in notes).

F2: UTM 57 N0425722, E0756678

This feature is located to the N of Feature 1. It consists of two alignments of basalt boulders and cobbles lined up in a perpendicular fashion. The first alignment is 9.2m long and runs roughly NW-SE. The second alignment starts perpendicular to the first alignment roughly in its center, and runs from NE-SW for 5.4m. It probably represents a form of terracing.

Vegetation and Environment (description): This site is located in a tropical managed agroforest on a mild SE slope.

Soil Type: Humus

Artifactual or other cultural material (if any): none observed

Site integrity (good, fair, poor): good

Site condition (disturbed, undisturbed): undisturbed

Threats to site: vegetation

Land Ownership: Bernardihna Silbanuz

Photographs: F2 – 2373, 2374

HISTORIC SITE INVENTORY FORM

Site Number: PoC3-55

Site Type: Agricultural – Yam Cultivation

Features (descriptions and UTM coordinates, if available):

F1: UTM 57 N0425703, E0756702

This feature is a circular enclosure of basalt cobbles and boulders approximately 1m in diameter. It was likely used for yam cultivation (BS Yam Pit 17 in notes).

F2: UTM 57 N0425699, E0756701

This feature is a circular enclosure of basalt cobbles approximately 80cm in diameter. It was likely used for yam cultivation (BS Yam Pit 18 in notes).

F3: UTM 57 N0425963, E0756703

This feature is a circular enclosure of basalt cobbles approximately 1.1m in diameter. It was likely used for yam cultivation (BS Yam Pit 19 in notes).

F4: UTM 57 N0425682, E0756707

This feature is also a likely yam enclosure, measuring 1.3m in diameter (BS Yam Pit 20 in notes). There is a small piece of coral that was used in constructing the enclosure as well.

Vegetation and Environment (description): This site is located in a tropical managed agroforest. It is located to the south of a branch road of the main road of Temwen Island, and is on relatively flat ground. There is a modern yam enclosure that is also located close to these out-of-use enclosures, suggesting that this may be a relatively recent site.

Soil Type: Humus

Artifactual or other cultural material (if any): none observed

Site integrity (good, fair, poor): good

Site condition (disturbed, undisturbed): undisturbed

Threats to site: vegetation

Land Ownership: Bernardihna Silbanuz

Photographs: N/A

HISTORIC SITE INVENTORY FORM

Site Number: PoC3-56

Site Type: Agricultural

Features (descriptions and UTM coordinates, if available):

F1: UTM 57 N0425749, E0756768

This is a circular enclosure of basalt cobbles, boulders, and one column that is located adjacent to the branch road from the Temwen Island main road. It is 2.1m in diameter. Despite its large size, its structure suggests that it is a yam growing enclosure (BS Yam Pit 21 in notes).

F2: UTM 57 N0425734, E0756773

This is a circular enclosure of basalt cobbles 1.3m in diameter. It is likely an old yam enclosure. However, wild taro is currently growing in the center (BS Yam Pit 24 in notes).

F3: UTM 57 N0425732, E0756779

This is a circular enclosure of basalt cobbles 1.5m in diameter. The enclosure is not particularly evenly built, and there is a crab hole in the center that has significantly disturbed the area (BS Yam Pit 25 in notes).

F4: UTM 57 N0425732, E0756790

This is a cluster of basalt cobbles 1.3m in diameter. It is likely an old yam growing enclosure.
Vegetation and Environment (description): This site is located in a tropical agroforest, near the branch road from of the Temwen Island main road.

Soil Type: Humus

Arifactual or other cultural material (if any): none observed

Site integrity (good, fair, poor): fair

Site condition (disturbed, undisturbed): disturbed

Threats to site: vegetation, crabs

Land Ownership: Bernardihna Silbanuz

Photographs: F1 – 2387; F2 – 2399; F3 – 2400; F4 - 2401

HISTORIC SITE INVENTORY FORM

Site Number: PoC3-57

Site Type: Agricultural

Features (descriptions and UTM coordinates, if available):

F1: UTM 57 N0425797, E0756744

This feature is a circular enclosure of basalt cobbles approximately 1.5m in diameter. It was likely used as a yam growing enclosure (BS Yam Pit 22 in notes).

F2: UTM 57 N0425796, E0756756

This is a circular enclosure of basalt boulders and cobbles approximately 1.1m in diameter. This feature was also likely used for yam growing (BS Yam Pit 23 in notes).

Vegetation and Environment (description): The surrounding environment is managed agroforest. It is located on a SE slope.

Soil Type: Humus

Arifactual or other cultural material (if any): none observed

Site integrity (good, fair, poor): good

Site condition (disturbed, undisturbed): undisturbed

Threats to site: erosion, vegetation

Land Ownership: Bernardihna Silbanuz

Photographs: F1 – 2388, 2389; F2 - 2390

HISTORIC SITE INVENTORY FORM

Site Number: PoC3-58

Site Type: Architectural

Features (descriptions and UTM coordinates, if available):

F1: UTM 57 N0425823, E0756734

This feature is a large stone platform of raised basalt cobble and boulder walls (0.5-1m tall) with a partially paved interior of basalt cobbles. It measures 9m x 6m. The SE wall is collapsing, probably due to a large tree near the wall, but the other walls look to be in good condition.

Vegetation and Environment (description): This site is located in a managed tropical agroforest. The platform is covered in local vegetation. There is a slight SE slope.

Soil Type: Humus

Arifactual or other cultural material (if any): none observed

Site integrity (good, fair, poor): fair

Site condition (disturbed, undisturbed): disturbed

Threats to site: vegetation is a large threat to this site

Land Ownership: Bernardihna Silbanuz

Photographs: 2391 (NE side); 2392 (SW side)

HISTORIC SITE INVENTORY FORM

Site Number: PoC3-59

Site Type: Architectural

Features (descriptions and UTM coordinates, if available):

F1: UTM 57 N0425039, E0756749

This is a large structure of basalt boulders and cobbles, measuring 16.9m x 13.5 m. It is walled on all four sides, with walls approximately 1-1.5m high, varying depending on location. There are a few basalt columns strewn around the center. Vegetation is very dense and clearing the structure would be a major project. The function of this structure is unclear, but it is unlikely to be a lolong.

Vegetation and Environment (description): This site is located in a dense agroforest on a slight SE slope.

Soil Type: Humus

Arifactual or other cultural material (if any): none observed

Site integrity (good, fair, poor): good

Site condition (disturbed, undisturbed): semi-disturbed

Threats to site: vegetation overgrowth

Land Ownership: Bernardihna Silbanuz

Photographs: F2 – 2393 (E corner), 2394 (partial N wall), 2395 (partial N wall), 2395 (N wall into the interior)

HISTORIC SITE INVENTORY FORM

Site Number: PoC3-60

Site Type: Architectural

Features (descriptions and UTM coordinates, if available):

UTM 57 N 0426081, E0756590

This is a single feature site that is approximately 20m north of Peidoh. It is a stone alignment constructed of basalt boulders and cobbles, measuring 4.6m from SW to NE, and 3.7m from SW to NW, with a corner in the NW. There are several cobbles in the corner, and one larger boulder nearby, SE of the structure. It appears to be very disturbed.

Approximate Elevation: 2m

Vegetation and Environment (description):

Managed agroforest very close to the shoreline

Soil Type: Humic

Arifactual or other cultural material (if any): none observed

Site integrity (good, fair, poor): poor

Site condition (disturbed, undisturbed): disturbed

Threats to site: Potentially vegetation, though it did not appear to be disturbed by vegetation at the time that it was recorded

Land Ownership: Masao Silbanuz

Photographs: 2104

Appendix E.

Stabilization Planning and Site Conservation Issues at Selected Islets, Nan Madol, Pohnpei Site PoC3-1

William S. Ayres
University of Oregon

I. Conservation Issues at Nan Madol

The Nan Madol archaeological site complex represents one of the most impressive architectural and cultural sites in Pacific. The Pohnpei State Historic Preservation Program (HPO) has been working for some time to develop conservation plans for this set of monumental sites; however, the magnitude of the site itself and the complexity of conservation issues have made this a slow process. This has been made more challenging because the site is in a marine environment and is tidally impacted, it is built of some materials that deteriorate relatively rapidly, access is difficult, and contemporary use-related activities are diverse. In addition to the Pohnpei State and Federated States of Micronesia governments, traditional leaders on Pohnpei, archaeologists, and preservation specialists internationally are all concerned about Nan Madol's conservation for future generations. This review and assessment for selected islets and kinds of archaeological evidence is a follow-up on a proposal initially created by Ayres, Haun, and Mauricio in the 1980s (see Ayres et al. n.d./2009 for an updated version).

Each islet within the Nan Madol complex requires its own individual conservation plan and these will vary considerably because of the diversity of islet types, construction details, type of archaeological features, nature of the marine incursion, and the current state of preservation. The aims of stabilization steps as outlined here are initially to provide for immediate conservation needs of selected

structures within Nan Madol. Evident deterioration should be slowed, an immediate concern for all components of the Nan Madol complex. At the same time, it is essential that a full set of archaeological data is developed for each islet or area, for example, islets studied in the current project, before any extensive conservation program is implemented. An individual islet's significance within the larger Nan Madol complex, and appropriate conservation methods for that structure can be then understood. Improved visitor access and appreciation, but with mitigated impact, is expected from this, as well as increased knowledge about the site's growth and transformations.

II. Methods for Conservation

Basic methods for conservation of residential, ritual, and defensive sites built of stone are well known internationally and these methods can be applied to the distinctive stone remains at Nan Madol. Preservation of architectural islets, platforms, walls, residential foundations and other features is a major arena for attention; this typically requires re-establishing foundations and other construction efforts. At the same time, conservation of the building materials themselves and artifacts within the site complex continues to be a major topic for consideration. The following five stabilization issues represent major ones for Nan Madol as a whole.

Stabilization Issues

1. Vegetation Control

As discussed in the above report and in two specific case studies below, managing vegetation on the islets continues to be a major issue. The current cover is a complex mixture of indigenous species—with plants native to Pohnpei from pre-settlement times and species introduced in prehistoric periods—as well as historically introduced ones. The effects, both positive and negative, of removing existing vegetation must be carefully considered. One factor is the structural impact of root decay after surface plant material dies off. Roots of long-standing plants have moved

stonework and now support it and tie it together. Another issue is the re-growth of plant types representing invasive species that create an impenetrable mass on top of the islets after existing vegetation is cut back or removed. Understanding the existing vegetation in terms of growth patterns, distribution, and successional stages is essential. The mangrove cover on Pohnpei has been examined by botanists (see, e.g., Devoe 1992; Fujimoto et al., 1995; Victor et al. 2006), but more systematic assessment relative to individual archaeological structures would be useful. This kind of plant documentation was developed in earlier survey in Awak and elsewhere on the main island, but not comprehensively for Nan Madol.

2. Columnar Basalt Building Materials

A major source of concern for Nan Madol conservation is the massive quantity of columnar rock used for crib-like wall construction and architectural alignments. This material dates from an early period and then its use continued up until the termination of major construction at the site. While the stone is very dense, typically, and hard, the columns are also somewhat brittle. Because these building stones were selected as elegant elongated columnar forms—found in five to six sided shapes—they are prone to transverse breakage. Quantification of the amount of broken columns found in a sample of islets would be valuable to assess the extent of site deterioration and damage resulting from a variety of factors, including structural collapse and fire, that has impacted the conservation of stone columns.

3. Canal Maintenance and Improvement

Tidal canals around the Nan Madol artificial islets have been filling in with sediment and plant growth since the initial ones were created over 1500 years ago. Many of these within inland Nan Madol are no longer clearly visible because tidal mud and mangrove root systems have totally filled the original watercourse. Others have been maintained by tidal flushing action and purposeful cleaning so that they allow small canoes or motor boats to pass today at high tide. Investigation of canal

sediments at Kelepwel, Reitik, and Wasau by Ayres and colleagues demonstrated considerable cultural material within the adjacent canals (Ayres et al. 1983).

4. Stabilization of Seawall Architecture

Significant conservation work is required in one of the most vulnerable areas of the main site; the seawall constructions forming the SE, N, and SW side of Nan Madol Central. Previous proposals by Ayres and colleagues have identified some of the most critical areas and these continue to be danger points because no stabilization work has been undertaken. The case of the SE corner of Pahwi Islet (PWI) represents a case in point as discussed below.

5. Disturbance of surface artifacts and food remains

A major consideration for long-term conservation of the Nan Madol site is the surface cultural material, including smaller features marked by stone, portable artifacts of shell and stone, as well as a wide range of food remains. These remains represent one of the fundamental archaeological databases and are the primary sources of new information about how Nan Madol was used in the past. The evidence associated with islet surfaces (as well as sub-surface deposits) is fragile and can easily be lost. Intensive survey of individual islet surfaces undertaken over the years provides much information in this regard and establishes some baseline data, but many islets still do not have a detailed set of observations about surface remains.

Implementation Priorities

Specific planning to implement an on-going conservation effort is essential and urgent because features holding irreplaceable archaeological and environmental evidence are being reduced or eroded away on a daily basis. Some of this change is gradual and hard to detect, but much of archaeological significance is recognizable today. Studies aimed at monitoring the conservation status of various parts of the Nan Madol complex, examining specific architectural forms to evaluate methods of conservation, and experimenting with stabilizing procedures should all be priorities.

Field recording of surface artifact distributional patterns repeated at the same location should also be a priority. Unless longitudinal studies of the sort Ayres and colleagues initiated at Dauahdpeidak Islet (PoC3-1-DPK) in 1997--with follow up studies through 2004--are undertaken, most of the currently preserved information about spatial relationships of portable artifacts will be lost.

III. Steps in the Stabilization Process

The best means to improve management of the site would perhaps be evaluation of current conservation needs for each major structural feature, the individual islets, for example, as well as systematic discussion of necessary steps for the overall site. Because the latter is so complex, focusing on selected individual islets representing distinct environmental zones within the larger site complex would be ideal. The assessment should include: vegetation survey; study of islet fill and sediments forming the islets and the surrounding canals; structural study of stone building materials; and continued surface examination for artifacts and other cultural remains. Some islets are extremely rich in information about artifactual remains (including pottery), while others show little preserved material culture.

For present purposes, two islets considered as case studies will further illustrate the points in this report. Processes of environmental change visible on these islets may then be used a guidelines for further assessment.

Case Studies 1 : Sapwenpwe Islet (SPW), Interior, Nan Madol Powe

Sapwenpwe Islet, Nan Madol (PoC3-1-SPW)

The feature definitions here are based on field survey and on Athens' base map (1:200 scale, 1984), as modified here. Islet SPW is 66x22m , and covers 1500 sq m. The feature descriptions are preliminary and should be further checked and more detailed observations made; however, sufficient evidence is available to reconstruct the main aspects of the later use of the islet. Archaeological features, expanded from

Athens' 1984 work, are distinguished here to enable discussion of specific structural parts of the islet complex. Examination of this particular islet is intended to provide a model for description and evaluation of similar islets in the inner section of Nan Madol. This islet falls into the area I refer to as Nan Madol, Stage 1, the initial set of artificial islet constructions on the Temwen shore. Because of erosion and sediment accumulation, it is not entirely clear if the original SPW islet was fully rectangular in the retaining wall configuration, or if the islet corners were left incomplete. Additional subsurface probing or excavation might more clearly establish this. The details for individual features are best understood by consulting the accompanying plan view of Sapwenpwe Islet (Fig. AppE-1).

Feature Definition and Description for SPW, parts A and B (Sapwenpwe Islet)

F1 Archaeological Feature 1 consists of 4 sub-features designated F1a-F1d.

F1a refers to the NE corner of SPW north islet (SPW part A) and is marked by one boulder approximately 80 x 40 cm that represents the E wall alignment and the actual corner of the artificially elevated land area. Three meters to the W, a large cluster of boulders (F1b) shows the exterior of the original retaining wall and the exposed fill. This cluster of rocks might be linked to F1d in forming a low platform at the NE side of the islet. Feature F6 abuts the wall section extending from F1b to F1d. Feature 1c shows an alignment of boulders and cobbles extending 8m to the W of F1a, and this represents the NW portion of the islet's main N retaining wall. Feature 1d is a section of the N wall with large boulders and a N-S extending wall segment of approx. 4 m that ends in a boulder that was used originally as a *sakau* stone. The stone was most likely no longer a functional *sakau* stone, and was employed just as building material at this stage of building or remodeling.

F2 The east side of the SPW north islet is shown by an intermittent string of boulders extending from a single rock marking the NE corner to a continuous string of boulders forming the wall at the SE corner of the islet and extending across the gap between the two original islets to connect with the E wall of the S islet (SPW B).

F3 Feature 3 designates what appears to be the original S wall of the north islet. This is a continuous string of boulders on the east end of the original retaining wall extending approximately 7 m to the W and there being marked by an intermittent rock alignment extending to a curving retaining wall (F4) forming the SW corner of the north islet.

F4 The designation F4 is for the W wall of the north islet extending from the SW corner to the NW one, a distance of approximately 8 m. In no section is the original wall well preserved, but alignments connecting to the W edges of F8 and F9 with the NW corner of the islet provide a clear definition of the W retaining wall. The original

NW corner of the islet is not well preserved by *in situ* boulders, but the W wall, F-4, intersects F1 to show where this must have been.

F5 Feature 5 is a curved alignment and islet edge running in a concave arc from the N side of the south islet to the mid wall of F9, a low house foundation.

F6 A low elevated area of coral rubble and gravel that shows a concentration of basalt cobbles in the S end represents a foundation designated F6. This extends approximately 5 m to the S from the N wall of the islet. The surface, along with the adjacent areas, is elevated approximately 1.0m above the tidal mud.

F7 The platform structure called F7 is a rectangular area approximately 20 cm higher than the surrounding islet surface. It has a *sakau* stone in the platform's SW corner and two rough cobble-small boulder alignments of approximately 2.5 m extending to the W edge. The platform is 5m E-W and 2.5 m N-S. A paved area extends for an additional 2 m to the S. Feature 7a is the platform and attached pavement; F7b is the *sakau* stone. This may have been a small *nahs* opening to the W. This is Athens' original F-2.

F8. This platform of basalt cobbles and boulders is 5 m from N to S and is approximately 4 m at the widest part on the S end. An alignment of boulders extends from the SE corner towards the S side alignment of F7a. The two structures appear to be structurally connected based on this. Feature 8a is the main platform/terrace and 8b is the boulder alignment. This is Athens' original F-3.

F9 A large platform anchors the SW corner of the N islet and is probably associated with the latest activities on the islet surface; this structure is 4.5 to 6 m in an E-W direction and 5m in N-S dimensions. The W retaining wall is of boulders of up to 75 cm x 50 cm. Part of the platform surface is of coral rubble, but the NE corner is primarily basalt cobble fill and paving stones. An alignment, F9b extends to the E from the SE corner of the platform for a distance of approximately 10 m. It is possible that this feature represent an earlier retaining wall on the S side of a buried islet that was subsequently remodeled and expanded. The SW corner of F9 also connects to a rock alignment represented as F4 here. Athens originally designated this as F-4.

F10. The north wall of the south islet (SPW B) extends E-W for 23m. This is a nearly continuous alignment of elongated boulders, including some columns; the alignment is broken in one section of approximately 3 m. Feature F10a is the section at the W end of the alignment intersecting the E wall of both the N and S islets. F10b is the W tending section of some 15m. Athens did not have a specific feature number for this alignment; it may be part of his F-5.

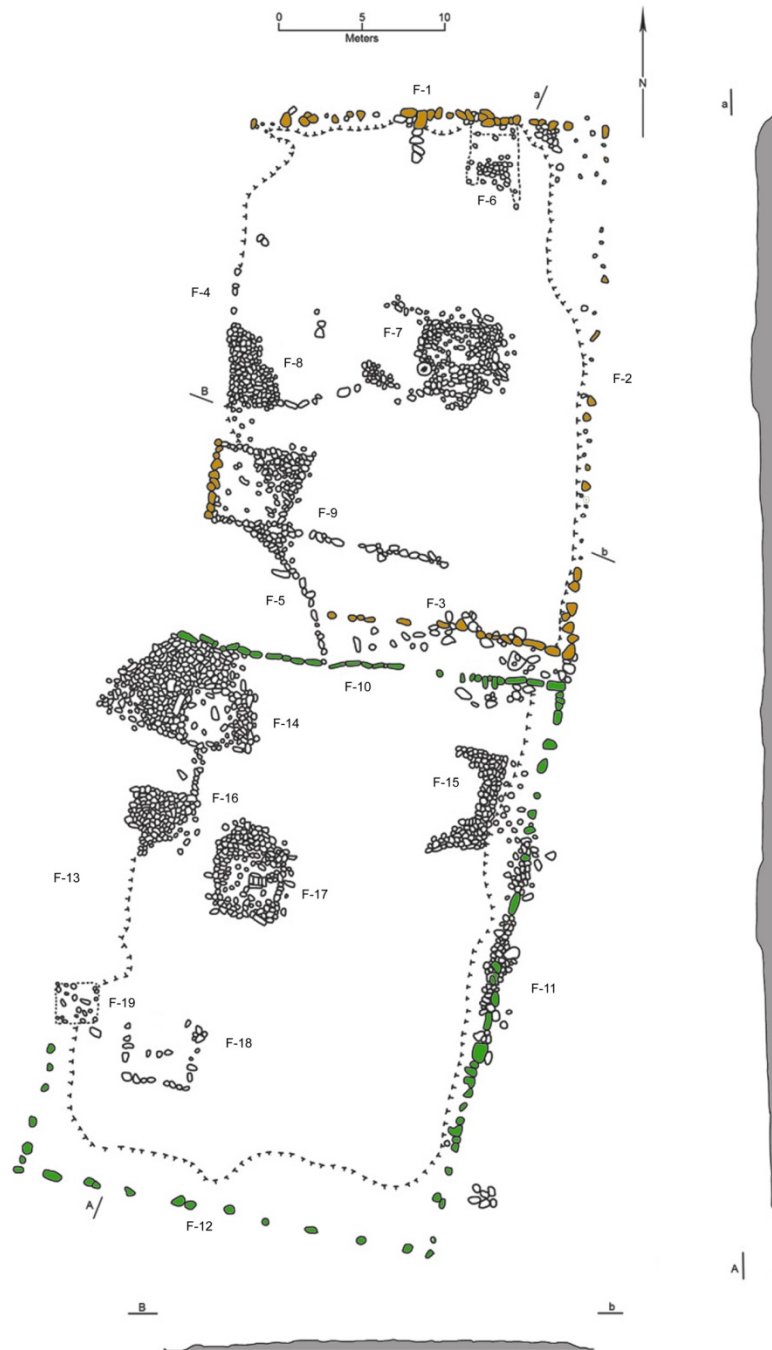


Figure AppE-1. A plan map of Sapwenpwe Islet (SPW) showing the relationships of two original islets (A and B), that were subsequently joined, and 19 feature designations for architectural features. The map is modified from Athens (1984) original to illustrate the feature designations [drafting: W. Ayres].

F11. The E wall of the south islet divides into three segments. F11a is the irregular section of large boulders and smaller cobbles forming the N end; F11b is a central section of mixed boulders and concentrations of smaller boulders and cobbles of approximately 15m length; F11c is the nearly continuous section of wall boulders forming the S end of the E wall. A cluster of small boulders approximately 1.5m E of the S part of the wall is designated here as F11d. Athens (1984) does not provide a designation for this.

F12. The South wall of the islet is a scattered alignment of 12-14 boulders running for approximately 25m. It is tidally inundated on a regular basis. There is no Athens feature designation.

F13. The W exterior wall alignment of the S islet is discontinuous, but clearly identifiable. A 9m long segment of dispersed boulders, F13a, forms the S end of the wall. The remainder of the original wall represented by F13 is not clearly preserved where it extends to the N of this alignment. Post-islet construction has obscured the original wall. Athens provides no separate feature designation for this alignment.

F14. An elevated platform for a house foundation approximately 3 by 4 m, and with an attached pavement of 7 by 5m, located here forms Feature 14. This appears to be a residential platform with an attached paved living area. This structure is Athens' feature F-6.

F15 This elevated, paved area is approximately 3 by 6 m, forming a low raised area with basalt cobbles adjacent to the E erosional edge of the islet fill just 2 m W of the islet's E retaining wall (F11a). (Athens' orig. F-7).

F16 A low, raised paved area comprised of basalt cobbles forms a rectangular platform of approximately 2.5 by 4 m at Site PoC3-1-SPW. This sits at the tidal edge, a low dropoff, on the center W side of the islet. It connects with F14 in the form of an alignment of small boulders/cobbles extending along the W edge of the islet. These two features, F14 and 16, then, were connected. Athens provides feature designation F-8 for this structure.

F17 A square house foundation with a central firepit represents a standard Pohnpei dwelling structure type. This one measures 4 by 4.5 m. Athens' identification for this architecture is F-9.

F18 This rectangular outline of stone alignments forming a square is 4 by 4.5m in dimensions with low elevation. It has some internal cobbles suggestive of a central firepit in a dwelling foundation. The Feature designation from Athens' map is F-11.

F19 A small, low coral platform 2.5 by 2.5m sits at the west side of the islet approximately 2 m W of F18. Athens labelled this as F-10.

Additional observations at Sapwenpwe made during this present project survey complement earlier work by Ayres and his re-definition of the site plan and features (see Fig. AppE-1, above). The plan of the two connected artificial islets shows wall alignments, platforms, and other rock concentrations. Figure V-2 in Section V of this report illustrates one feature, SPW-Fea 15, which is a low platform of volcanic rock, including angular cobbles and boulders, rounded stream cobbles and some stone columnar basalt fragments. Tidally-deposited flotsam (plastic bottles, rubber shoe parts and other historic or recent materials) are scattered across the islet surface at present. As well, the original deposits of shell midden, including shell tools and ornaments, some pottery, and bone, represent food remains and occupational debris associated principally with the stone platforms (Fea 7-9; 14-18). In addition to the tidal inundation, factors visibly affecting conservation of the site's archaeological values include the vegetation, crab burrowing, collapse of coral fill, and physical deterioration of stone and other site contents.

Case Studies 2: Pahnwi Islet (PWI), Lower Seawall, Nan Madol Pah

Pahnwi Islet , Nan Madol (PoC3-1-PWI)

Pahnwi represents one of the largest constructions at Nan Madol and it displays some of the most massive wall constructions in the entire site complex. The islet was mapped at a scale of 1:100 by Ayres and colleagues in the 1980s and subsequent observations have aimed at developing more detailed records for some features and at monitoring the collapse of the primary seawall architecture, especially the SE wall (Fig. AppE-3). The islet is approximately 100 by 60 m in size and covers 8000 sq m.

The focus of this discussion is on the SE corner of the structure, which stands approximately 8 m high—similar in height to the Nan Douwas enclosing wall-- and exhibits some of the most massive megalithic construction patterns evident at Nan Madol. The section of seawall at the SE corner of Pahnwi that is discussed here faces across the reef flat leading to the open ocean, which is located approximately 650 m away to the SE. The seawall beginning at the Pahnwi corner stretches nearly continuously for 1100 m to the NE where it reaches the anchoring corner tomb of Karian. Approximately 1150 meters to the NNE of Pahnwi is Nan Douwas, the hallmark structure of Nan Madol Powe (see Fig. III-6). The outward facing wall at the Pahnwi corner shows more than 14 megalithic boulders ranging in mass from an estimated 8 to 40 metric tons; these are carefully positioned to anchor the Pahnwi seawall and islet stone fill rising to approximately 5 to 6m high behind it. The wall section just to the north of the actual corner construction has collapsed and some boulders are scattered on and embedded in the beach sand adjacent to the wall foundation. The collapsed wall section exposes coral rubble islet fill in the section from approximately 14 m to 22m NE along the wall. At that point, the original wall is relatively intact for the remainder of the 87 m long main seawall of Pahnwi.

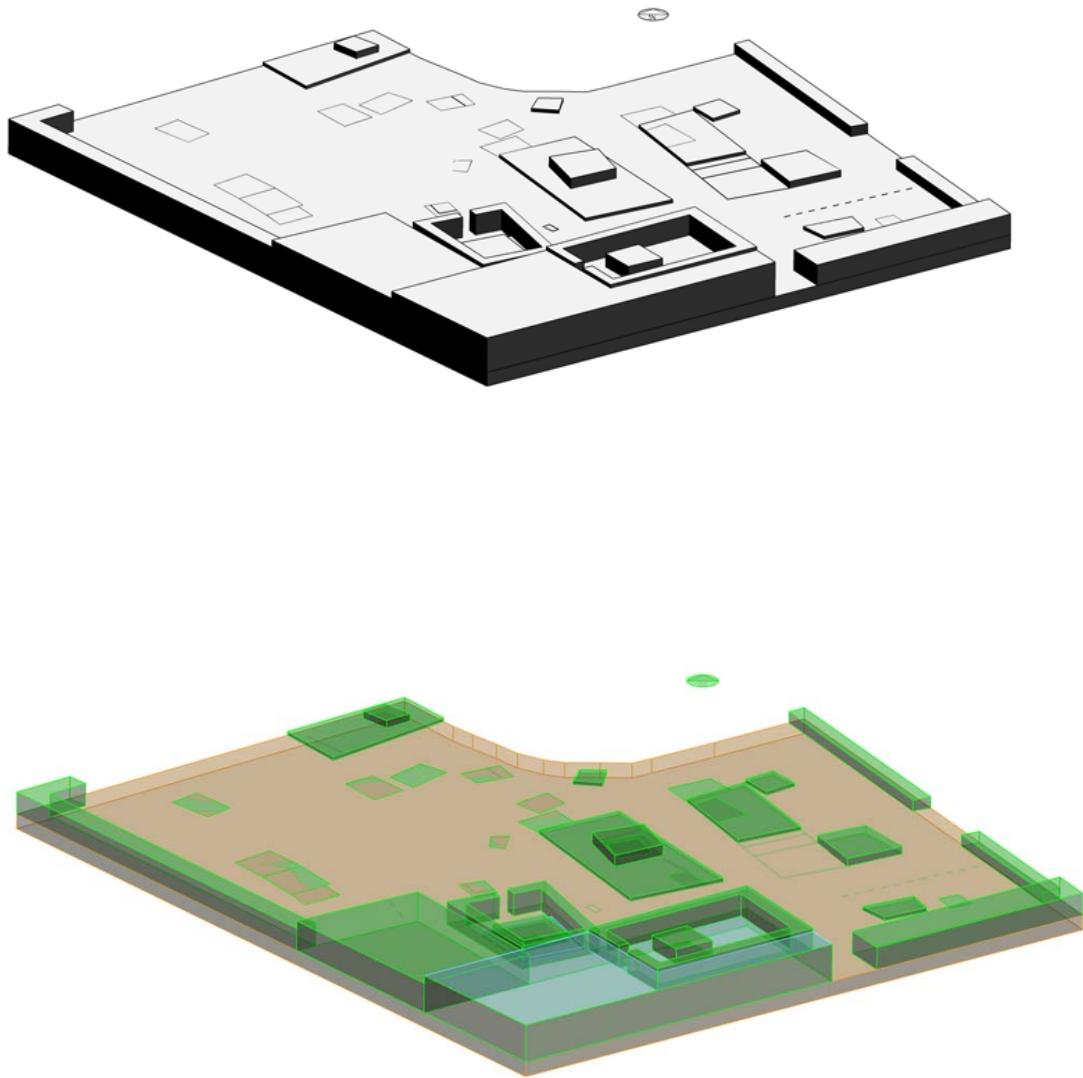


Figure AppE-3. Two views of the main architectural features of Pahn Wi Islet, Nan Madol (PoC3-1-PWI). Top: isometric monochrome with shading; bottom: transparent with shading views generated by Bentley V7 Microstation; based on original scale map of 1:100. The SE corner is shown at the front edge of the artificial islet; the SE retaining wall extends for 60m to the NE. (drafting W. Ayres)

Observations regarding the stability of Pahnwi have been made over the last two decades by members of the Pohnpei HPO and the Oregon field teams, and most parts of the architecture are surviving reasonably well. However, the high part of the wall just to the NE of the section that had collapsed prior to the 1970s, as mentioned above, has been precariously positioned for some time. In the late 1990s, the upper boulders and headers positioned above the massive vertical slab anchoring the wall foundation just N of the original collapse also fell off, thus weakening the overall wall and putting the slab at risk (see Fig. App E3). The view included here shows the effect of the recent wall collapse, that is, a comparison of a wall detail done in 1997-98 and the portion that collapsed more recently, as observed initially in 2004 and in this field season.

Comparative Study

It is useful as well to compare structural parts of the artificial islands for archaeological and conservation purposes, and here we look comparatively at portions of corner architecture for Pahnwi (PWI), Pahn Kadiria (PKI), Peikapw (PKA), Pwilak (PWL), and Pulak (as designated by Hambruch) as shown in Fig. AppE-4 and 5.

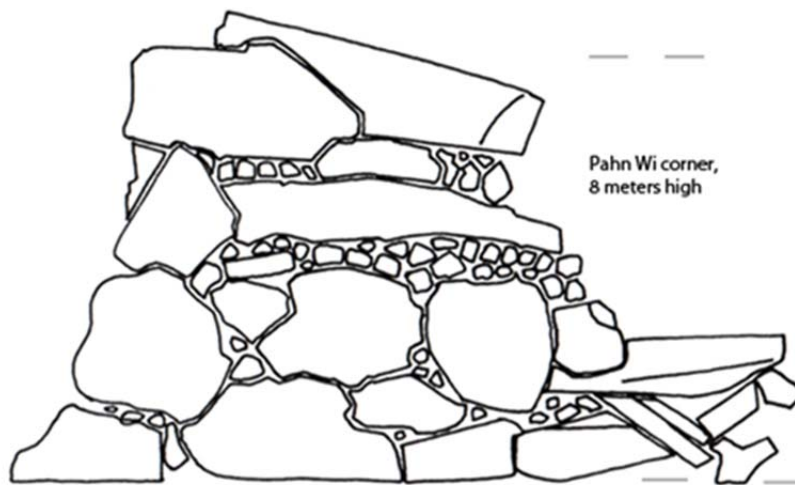
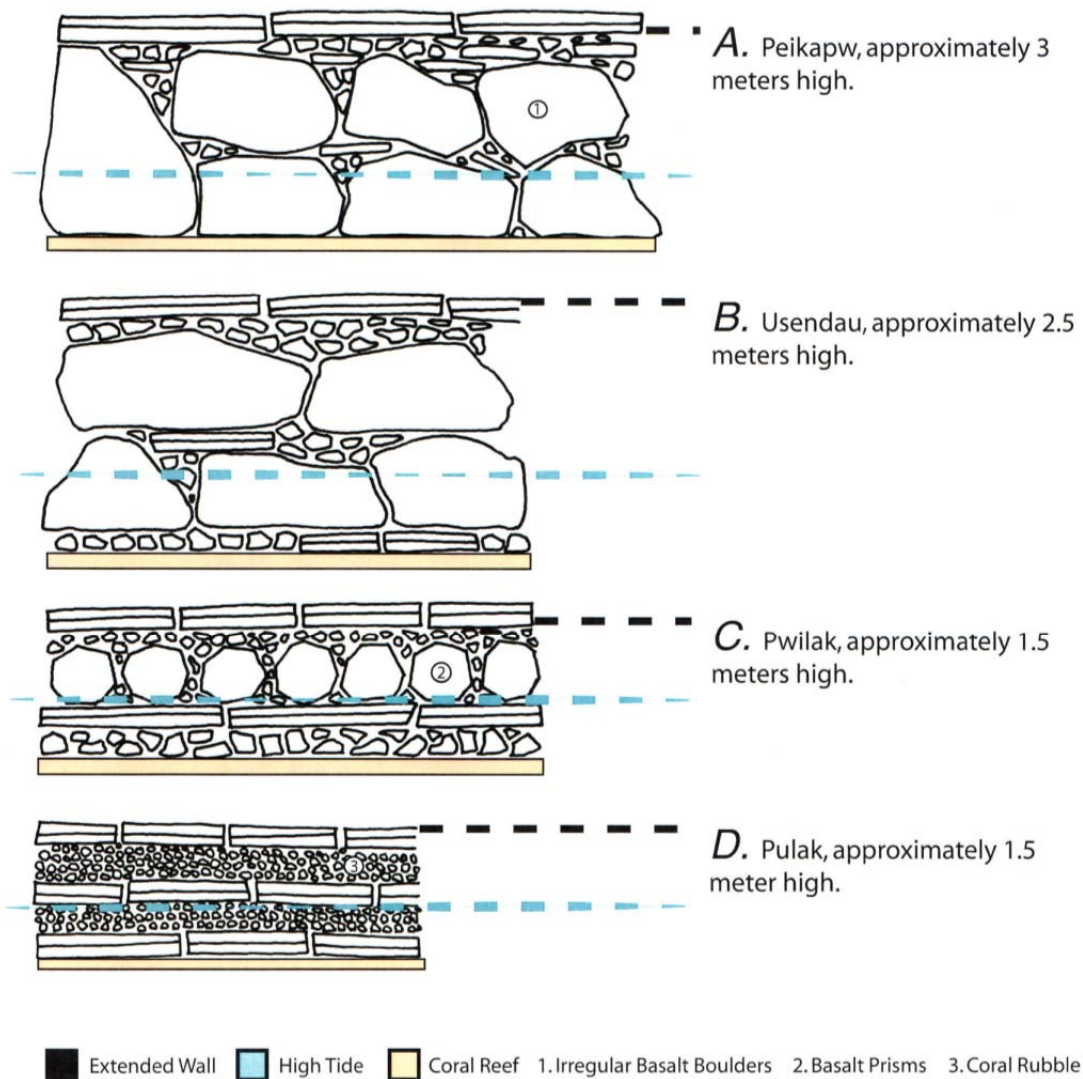


Figure AppE-4. Face view of boulder construction in Pahn Wi Southeast corner (Site PoC3-1-PWI). The area to the right of these boulders continues to the NE as a partially collapsed wall structure (also see Fig. AppE-6).



Nan Madol, Pohnpei

Foundation Structures

Figure App E-5. Comparison of corner architecture for selected Nan Madol islets. a). Peikapw (PKA); b). Usendau (USD); c). Pwilak (PLK); and d). Pwulak (?). (Based, in part, on Hambruch 1936; Drafting by A. Russell).

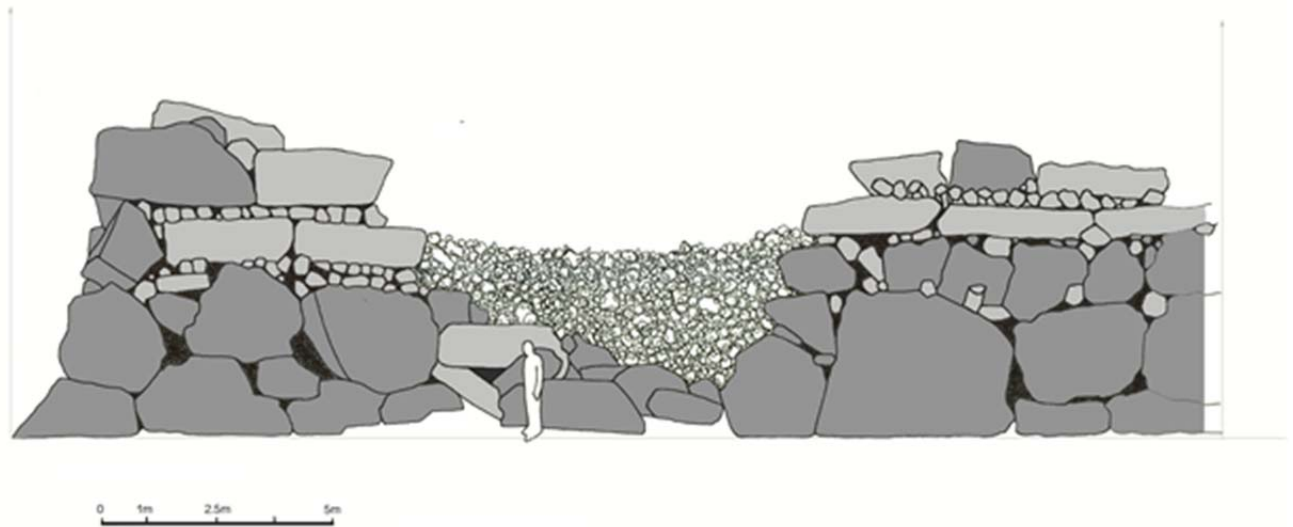


Figure AppE-6. View of the SE corner of Pahnwi Islet (PoC3-1-PWI), Nan Madol. This massive wall is one of the highest at Nan Madol. Gray shading distinguishes the columnar basalt rock. A reconstructed view of the retaining wall face was created by William Ayres and Anthony Russell (Ayres and Russell n.d/2014)..

Comparisons of the sort illustrated here (Fig. AppE-3 to 6) for several islet corner variations will continue to be useful for understanding the construction, dating, use, and collapse of stone structures in Nan Madol. Such comparisons of structural parts of the artificial islands have benefits for the basic archaeological interpretations as well as long-term site conservation.

Supplemental References Appendix E

Victor, Steven, Leinson Neth, Yimnang Golbuu, Eric Wolanski, Robert H. Richmond
2006 Sedimentation in mangroves and coral reefs in a wet tropical island,
Pohnpei, Micronesia. *Estuarine, Coastal and Shelf Science* 66 (3–4): 409–416.

Appendix F

Plant Reference Materials Collected Maureece Levin

Araceae

Colocasia esculenta

Cyrtosperma merkusii

Arecaceae

Areca catechu

Cocos nucifera

Nypa fruticans

Aspleniaceae

Asplenium nidus

Asteraceae

Unknown species 1

Cyperaceae

Unknown species 1

Dioscoreaceae

Dioscorea alata

Dioscorea sp. 1

Dioscorea sp. 2

Tacca leontopetaloides

Euphorbiaceae

Macaranga carolinensis

Lamiaceae

Clerodendrum inerme

Liliaceae

Cordyline fruticosa

Malvaceae

Heritiera littoratus

Hibiscus tiliaceus

Moraceae

Artocarpus altilis, rough-skinned

Artocarpus altilis, smooth-skinned

Musaceae

Musa sp.

Musa troglodytarum

Pandanaceae

Pandanus tectorus

Piperaceae

Piper ponapense

Piper methysticum

Poaceae

Ischaemum polystachyum

Unknown species 1

Unknown species 2

Rhamnaceae

Pomaderris elliptica

Thelypteridaceae

Cyclosorus heterocarpus