AN ANALYSIS OF ARCHAEOLOGICAL AND HISTORICAL DATA ON FISHERIES FOR PELAGIC SPECIES IN GUAM AND THE NORTHERN MARIANA ISLANDS

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CHAPTER 1. OVERVIEW OF THE PREHISTORY OF THE MARIANA ISLANDS

By Rosalind L. Hunter-Anderson

INTRODUCTION

Micronesian Archaeological Research Services (MARS) has been contracted by the Pelagic Fisheries Research Program (PFRP) of the Joint Institute for Marine and Atmospheric Research at the University of Hawaii School of Ocean and Earth Science and Technology to perform an analysis of archaeological and historical data on pelagic fisheries in the Mariana Archipelago. The study includes the Territory of Guam and the Commonwealth of the Northern Mariana Islands (CNMI), comprised of all the islands north of Guam in the Marianas chain. These U.S. flag entities form a northeast-southwest trending archipelago lying between about 13 and 21 degrees north latitude, and between about 144 and 146 degrees east longitude in the tropical western Pacific Ocean (see Karolle 1997). Figure 1 shows the Mariana Archipelago within the western Pacific region.

As archaeologists, we take an anthropological approach to the history of pelagic fisheries. Based in cultural ecology, this approach recognizes cultural adaptive systems as an appropriate interpretive framework for cultural differences and similarities. As open systems comprised of matter, energy and information, cultural adaptive systems are concrete [as opposed to conceptual and abstract systems] *sensu* Miller (1965:202-203). Open concrete systems have "at least partially permeable boundaries, permitting sizeable magnitudes of at least certain sorts of matter-energy or information transmissions to cross them." The main components of a cultural adaptive system include its technological organization, which intercepts and transforms matter and energy from the environment and buffers the system from anticipated perturbations, its sociological organization, which regulates production and consumption of materials, and its ideological organization, which guides and mediates human actions vis a vis information generated by the system.

From these abstractions comes a "down to earth" view of culture that focuses upon physical environmental conditions and human responses to them. In archaeology the clues to the latter lie in the detailed study of material remains such as artifacts and human-constructed features such as house floors, burial pits, etc. and in a search for regularities in the spatial patterning of these remains. In the present study we have sought both archaeological and paleontological information that can inform on past adaptational challenges that have "shaped" cultural systems in the Marianas and, specifically, the various natural and cultural conditions under which pelagic fishing has been undertaken.

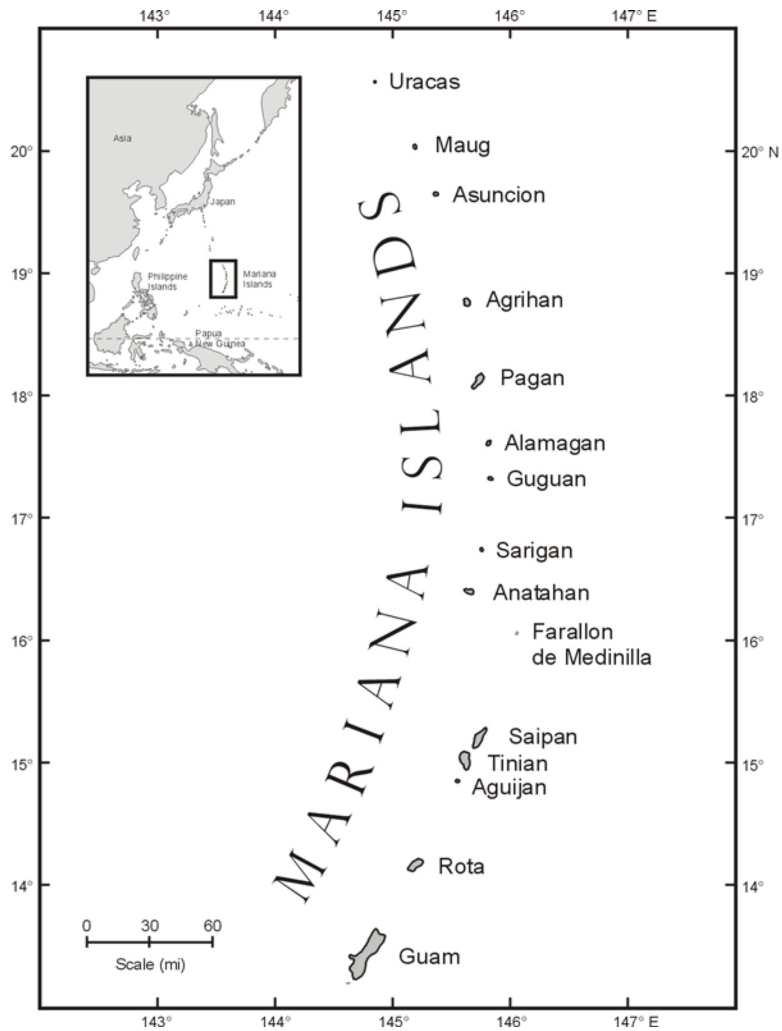

Figure 1. Mariana Archipelago. Courtesy of Barry Smith, University of Guam Marine Lab.

Cultural ecology does not ignore human agency; clearly human beings make decisions, affect the physical environment, and so on. It simply places individual and group decisions and actions within a cultural evolutionary context, where the effectiveness of human agency ultimately is "decided" by selective forces over which individuals ultimately have no control. This is the same viewpoint that acknowledges the truth that human intentions cannot affect the force of gravity, while granting that there are human inventions that can overcome the effects of gravity under certain conditions. Similarly, human inventions may be directed at solving an adaptive problem like food shortage but whether such efforts succeed is determined by forces in the external world, not by what people think or do. Nonetheless, common adaptive problems tend to be solved by similar cultural solutions in similar environments, and it is this knowledge that assists archaeologists in anticipating patterning in the archaeological record on a global and local basis.

AN OVERVIEW OF THE MARIANAS PREHISTORIC RECORD AND ITS CULTURAL ECOLOGY

Compared with other of Earth's major biomes, the tropical Pacific Ocean was first occupied relatively late in human history, within the last four millennia. The earliest records of human presence come from Micronesia, and specifically, the Marianas. Radiocarbon dating has shown that the Marianas Archipelago had been reached via sailing canoes by c. 3500 BP (before present). This arrival was about 500 years before people entered other remote western Pacific islands. If the first Marianas arrivals came from the nearest large landmass to the west, the Philippines, this implies an open sea crossing of c. 2600 km. It is also possible that people came to the Marianas by “island hopping” via Palau and Yap but the archaeological records of those island groups do not support such a scenario.

In the southern hemisphere, ancient sailors had crossed the 950 km-long "water gap" between the Bismarcks/Solomon Islands groups and the Reef/Santa Cruz Islands groups by 3000 BP. Archaeological sites with later radiocarbon dates document subsequent expansions east into the Pacific basin on both sides of the equator over the ensuing millennia. By c. 1000 BP nearly all the island groups, whether high volcanic islands or low coral atolls and raised coral islands, had been occupied and some were about to be abandoned as the climate shifted from the Little Climatic Optimum to the Little Ice Age.

In contrast with late human advent in the remote Pacific, the large, island-like landmasses of New Guinea and Australia had been inhabited by c. 40000 BP, and new dates from Australia suggest even earlier occupation there. The larger islands in the Bismarcks and Solomons have a known human record of c. 35,000 years, and older sites may yet be found. Human presence in the islands connected to the Asian mainland during the late Pleistocene is evidenced by human fossils dated to 20000-30000 BP in Taiwan off China's southeast coast. Similar situations no doubt prevailed elsewhere in the Indo-Pacific region when radically lower sea levels enabled overland travel across areas now separated by wide, shallow seas.

As formerly connected land areas were separated by the rising seas at the end of the Pleistocene, 15000-10000 BP, people who had been occupying low-lying coastal areas were displaced. The new land/sea configurations necessitated radical adjustments, mainly through inland migration and related changes in settlement and subsistence practices. Flooding of shallow continental shelves probably occurred slowly enough for displaced migrants to merge with populations in the Southeast Asian valleys and plateaus.

Agricultural practices signaling the Neolithic in the middle reaches of China's river valleys began by at least c. 8000 BP but the Paleolithic continued in island Southeast Asia until c. 5000-3000 BP (Meacham 1984-85), when some groups began to grow millet and rice. Paleoclimatic evidence from various parts of the Pacific rim suggests modern climatic regimes became established after c. 5000 BP, and the rise of grain agriculture in the larger Southeast Asian islands such as Taiwan and Luzon may be related to this if only indirectly through demographic processes.

Throughout the western Pacific, hydro-isostatic sea level adjustments brought maximum high stands in the mid-Holocene, c. 5000-6000 BP. In the as-yet uninhabited Marianas, mid-Holocene seas peaked at c. 1.5-2.0 m above present sea level (apsl). In Taiwan and elsewhere in island Southeast Asia, an open network of marine-oriented peoples, many of whom interacted with adjacent land-based groups, had come into being. This zone has been called "Austronesia" (Solheim 1984-85) to signify the probable origins of Pacific island languages that are now classified within the large Austronesian language family (Fig. 2).

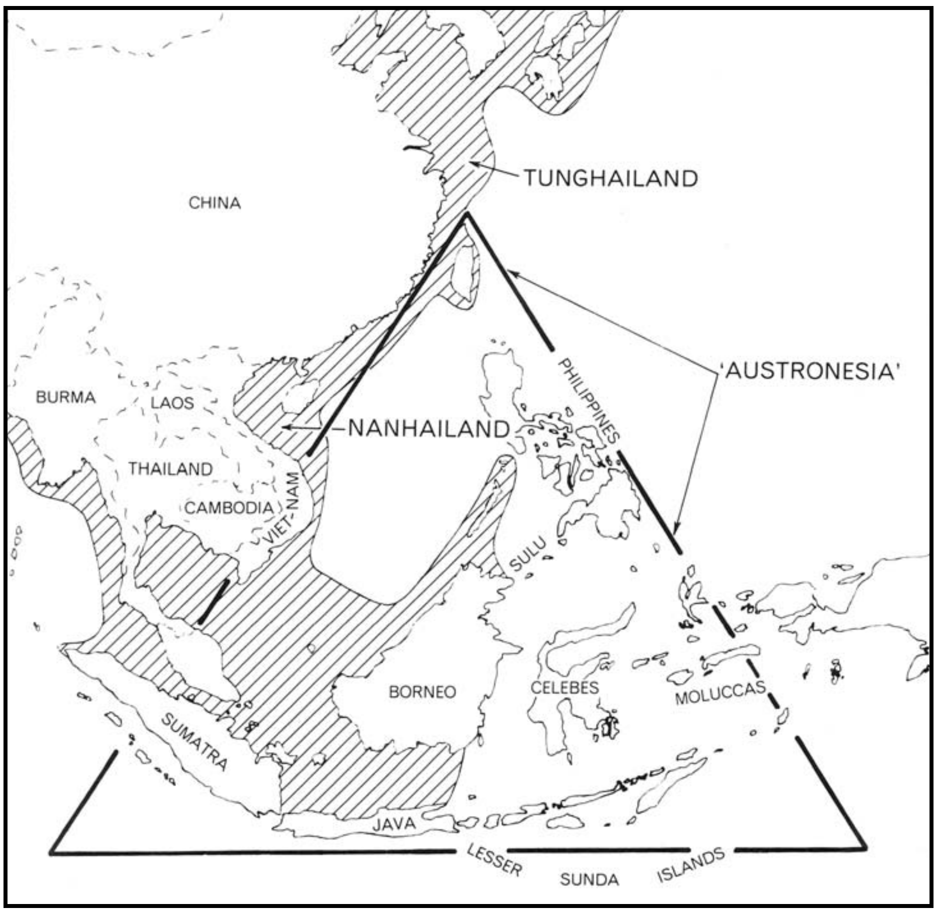

Figure 2. Portion of Southeast Asia showing "Austronesia." From Meacham (1984-85).

The mobility of these putatively Austronesian-speaking "sea nomads," who must have used sailing and paddling canoes, linked distant coastal and inland populations through trade and exchange of manufactured valuables and other necessities. During this time, it is likely that long-distance voyaging technologies and seasonal regularities in ocean currents and winds were codified by groups frequenting particular portions of the network. Regular weather patterns, especially predictable seasonal wind shifts, enabled exploratory voyages, and remote islands such as the Marianas may have been discovered but remained unsettled for several millennia.

The apparent neglect of the western Pacific islands until c. 3500 BP is best explained through principles of biogeography and cultural ecology. The latter includes considerations of past environmental changes and opportunities, such as climatic and sea level oscillations, with related shoreline alterations and changes in the distribution of surface and groundwater. These factors can strongly affect decision-making regarding settlement and subsistence strategies. From a biogeographical standpoint, an island's or island chain's remoteness makes it less likely that immigrant species will reach it, and small land area makes it less likely that new arrivals will become established.

Even if remote islands were known to exist by human groups capable of sailing to them, small islands remain among the least favorable of habitats for people. Small islands are characterized by relatively low floral and faunal diversity, and many lack surface water and fresh groundwater. Those in trade wind belts and near seismically active zones are subject to seasonal and extended droughts due to the El Nino cycle, typhoons and earthquakes; the Marianas are an example. The usual question of how soon were the small remote Pacific islands occupied might be turned around to ask, why did they become inhabited at all, and how were continuous populations maintained…or were they?

Throughout the tropical western Pacific, mid-Holocene sea levels covered all but the tops of the highest undersea volcanic ridges. Steep coastlines, unprotected by fringing reefs and lacking sandy beaches, were exposed to relentless wave action, making these high-energy habitats undesirable. Lower-elevation island-peaks were submerged entirely, and present-day atolls, on which thousands of people dwell today, had not yet formed. Continuing hydro-isostatic adjustments in the western Pacific resulted in sea level decline from the mid-Holocene high stands beginning c. 4000 BP. As the sea receded, small volcanic peak-islands became larger islands once again, while fringing reefs, reef platforms, mangrove-lined lagoons, and estuaries formed along their margins.

In the southern Marianas, former high-energy coastlines changed as small coves and beaches formed on leeward shores. It is likely that habitat diversity along the island perimeters increased compared with earlier millennia but this situation was not to endure forever. The sea continued to recede over the next several centuries, albeit more slowly. The conditions that would support temporary stays by maritime-oriented groups from source areas in the west were in place by c. 3500 BP, as the archaeological record of these groups attests.

Archaeological manifestations of human advent in the Marianas have been found at a small number of beachside sites occupied between c. 3,500 and 3,000 years ago. Archaeologists assign these occupations to the Pre-Latte Phase of Marianas prehistory (see Spoehr 1957; Hunter-Anderson and Butler 1995; Moore and Hunter-Anderson 1999). A contemporary development was taking place in the southern hemisphere, in the Bismarck Archipelago: beachside occupations from this time period have been discovered and assigned to the Lapita cultural tradition or complex (for a popular summary, see Kirch 1997). About 500 years later, similar sites to those in the Bismarcks were created in the small islands east of the Bismarcks (Anderson et al. 2001). According to current models, Lapita culture bearers subsequently moved on to colonize Vanuatu and New Caledonia; see Allen and Gosden (1991), Summerhayes (2000), and Specht and Gosden (1997).

That the Marianas Pre-Latte and the Bismarck Archipelago Lapita sites were essentially contemporary and contain similar artifact assemblages has not seemed important to Pacific researchers more concerned with defining local chronological sequences. We propose that the coincidences in timing, location, and assemblage contents from Pre-Latte and Bismarck Lapita sites signal a major regional adaptational process—human populations adjusting to new environmental conditions—and therefore to a new cultural evolutionary context. Below is a review of similarities and differences in the Lapita and Pre-Latte assemblages that illustrate aspects of this adjustment process.

Lapita, Pre-Latte, and the Trader/Broker Niche

Like the Marianas Pre-Latte sites, the Bismarck Lapita sites whose occupation dates fall between 3500-3000 BP are found on what were then narrow sand-covered reef flats, often associated with mangroves and other wetland communities rich in birds and other species that are not common today. Most of the Bismarck Lapita sites are located on the small offshore islands within the archipelago, and in many cases they represent the first human activities on these islands, at least the first "archaeologically visible" ones. Similarities in Bismarck Lapita and Marianas Pre-Latte assemblages include red-slipped, calcareous-tempered, mainly thin-walled ceramic remnants of bowls and jars (a small proportion of the total pot sherds at each site are decorated with finely incised and stamped geometric designs, some filled with powdered lime), marine shell ornaments (beads, bracelets, circlets, pendants) in various states of completion, shell and stone implements used to make the shell items (sea urchin files, small basalt hammers), shell fish hooks, worked pieces of shell, and chert flakes. Other similarities are evident in the faunal remains: abundant marine food shells, turtle and fish bones (of both reef and pelagic fish), and the bones of fruit bat and of sea and land birds.

Contrasts between Marianas Pre-Latte and Bismarck Lapita archaeological assemblages include artifactual and faunal differences, with Lapita assemblages having more artifact types and more diverse faunal remains than the Pre-Latte, although assemblage sizes are small in both areas. A prominent artifactual contrast between the two areas' assemblages is the prevalence of obsidian flakes at the Lapita sites and their absence at Pre-Latte sites. Sourcing studies show that the obsidian was obtained from quarries within the Bismarck Archipelago, suggesting a local exchange network. Ground stone axes, mostly fragmentary but nonetheless suggesting agriculture, have been found at Bismarck Lapita sites as well, while this artifact type is absent in Pre-Latte sites. Also in contrast with Lapita sites, Pre-Latte flaked stone and ground stone tools are rare while in the Bismarcks they are more common. Although obsidian sources are not known in the Marianas, suitable volcanic rock for ground stone tools is present throughout the archipelago but is not well represented in Pre-Latte assemblages. This may mean that exchange networks were not in place at this time but also that Pre-Latte people were narrowly exploiting the islands' resources.

Bismarck Lapita faunal assemblages contain the bones of dog, pig, and chicken, the murids *Rattus exulans* and *R. praetor*, as well as phalanger and small reptiles. Pre-Latte faunal assemblages lack all these species except small reptiles (which could be naturally present at sites in both areas).

Finally it can be noted that post-holes, hearths and earth-oven features are present at both Bismarck Lapita and Pre-Latte sites, and that material remains of more substantial dwellings and permanent site furniture, such as large mortars or other stone features are lacking in both areas.

In the Bismarcks, but not the Marianas, there is evidence for the very early use of coastal caves and rock shelters as well as open-air coastal sites. This contrast suggests again that the Pre-Latte people were more selective in their use of Marianas resources. For more detailed information on Bismarck Lapita sites, see Anson (1983); Allen and Gosden (1991); Clark et al. (2001); for early Pre-Latte sites see Spoehr (1957); Pellet and Spoehr (1961); Moore et al. (1992); Amesbury et al. (1996); Butler (1995); Haun et al. (1999).

The adaptive significance of the differences and similarities between Marianas Pre-Latte assemblages and Bismarcks Lapita assemblages can be better appreciated when considered within the particular "regional geographic system" (hereinafter RGS; see Terrell 1977 and Rappaport 1969) in which the site occupants participated, and how that participation was structured. Under this analytical frame, the somewhat more diverse archaeological assemblages found in the Bismarck Lapita sites would be a consequence of the cultural adaptive niche occupied by the creators of those assemblages. Defining the parameters of that niche is beyond the scope of the present report but it can be noted that the Bismarcks RGS differs in a number of basic ways from the Philippines/Marianas RGS. For example, the greater total length of available coastline and large total area of shallow reef flats in the Philippines/Marianas RGS may have favored economic specialization by some marginal groups, in contrast to economic opportunities available in the Bismarcks RGS.

According to Terrell (1977:65), a regional geographic system includes both physical-geographic and cultural components connected through "a complex of intercommunicating variables within which a change in any one variable or relationship is likely to affect [sic] changes, of a greater or lesser degree, in all the others." Cultural aspects of an RGS would include customary practices and social interactions while physical aspects would include biological, geological, climatological, etc., conditions. As Terrell (1977:65) emphasized, "such a complex of variables and relationships is unlikely to respond only to single causes, although changes in some dimensions may be more influential on the system as a whole than others." In the arguments presented below, sea level was an especially influential variable.

The post-mid-Holocene similarities between the Philippines/Marianas and Bismarcks RGS's include the presence of human inhabitants of the large islands, some of whom were practicing agriculture by this time. The practice of agriculture is a signal that local population density thresholds had been reached, which precluded reliance only upon foraging for at least some groups. In this adaptive context, simple socio-economic arrangements probably had already developed among coastal hunter-gatherer-fishers and those subsisting to some degree upon agriculture.

Small Islands, Sources and Sinks

Romantic stereotypes of idyllic south sea isles surrounded by turquoise waters notwithstanding, in human ecological terms, small islands—whether near larger ones or located more remotely—are demographic "sinks" as opposed to demographic "sources" (Pulliam 1988, 1996). According to Pulliam (1988), source habitats produce excess population of a given species while sinks absorb it. "Pseudo-sinks" are also possible; such habitats appear to be sinks but if the source no longer provides immigrants, the sink population does not disappear as happens with true sink populations but survives at a much lower density (Pulliam 1996).

Large islands can be thought of as "source habitats" and small islands as "sink habitats." These correspond, respectively, to habitats that generate excess people and those that receive them but cannot sustain them as a population indefinitely—i.e., less desirable habitats within the expanded (cultural) niche.

Theoretical ecologists have captured the concept of participation-structure by the term niche, an n-dimensional environmental space within which a population is capable of maintaining or increasing its size. Hutchinson (1958, cited in Pulliam1996:63-65) differentiated the niche concept into "fundamental" and "realized." The fundamental niche is the set of environmental conditions within which the population can exist. The realized niche is the set of environmental conditions occupied in the presence of other species, making the realized niche smaller than the fundamental niche because competition from other species excludes the population from occupying some portions of its fundamental niche.

Pulliam (1996) introduced the idea of the "expanded" niche to acknowledge that a species may occupy habitats that are only marginally suitable. An expanded niche is the entire range of environmental conditions utilized by the species and may include habitats from which the species would disappear in the absence of continued immigration. The expanded niche concept allows for situations of open populations that can migrate among habitats, some of these habitats comprising conditions that are not part of the fundamental niche. Roughly equating culturally organized human groups with species, this concept captures the character of cultural adaptive systems in which Pre-Latte and Bismarck Lapita groups participated. Their habitats were less than fully suitable for continuous occupation: shallow seas, reefs, small islands, and island-margins on larger islands. However, given maritime technology, the shallow seas provide corridors of travel that enable a way of life to be created through mobility and negotiation with landed groups. (While there is no evidence that the Pre-Latte occupants of the Marianas practiced agriculture, the Bismarcks Lapita archaeological record indicates a niche difference: some groups either practiced agriculture and raised pigs or received such produce in regular exchanges.)

The anthropological arrangements whereby population transfers from source to sink take place are complicated and dynamic and the details need not concern us here. Suffice to say the very large islands adjacent to the Philippines and Bismarck RGS's (Borneo and New Guinea, respectively) were potential "source habitats" that affected human population size in their nearby RGS's, perhaps less directly than did the large islands within each archipelago affect the small islands there. This is because human cultural interactions occur most frequently with near-neighbors, making transfers of population among closely neighboring large and small islands within an RGS more likely.

Typically, nearby areas provide marriage partners and a degree of subsistence security through cooperative arrangements for resource sharing. Such arrangements can take different forms, from dyadic exchanges between two groups, say between a group living on a large island and a group living on a nearby small island (or a similar dyadic exchange relationship within a large island), to more complex connections that include internal ranking and other relationships among occupants of several islands of differing size and biological diversity.

The term "socio-economic heterarchy" (Crumley 1979, 1995; Ehrenreich et al. 1995) might be used to describe the various cultural arrangements in our two RGS's at the time period under consideration. According to Crumley (1979:165-166), "[t]he assumptions of the regional heterarchy model posit an open cultural system extending over varied terrain whose boundaries fluctuate through time and space, depending on the nature and frequency of communication/connectivity with other cultural systems." In heterarchical socio-economic systems, as opposed to hierarchical ones, natural resources tend to be both dense and spatially dispersed, and not necessarily evenly distributed in space or time. For example, in the RGS's considered here, large trees suitable for making canoes are only present and available on certain islands at certain times due to differences in growth cycles and fluctuations in local demand. Because they are not highly concentrated and yet fairly abundant throughout a region, such resources are not easily monopolized for trade by hierarchical polities that normally develop to control access to highly concentrated resources in high demand (see discussions in White [1995]).

This is not to say that dense and dispersed resources are never contested; on the contrary, under sustained high human densities or elevated demand, they are contested, and localized means of regulating competition for such resources usually arise. In non-industrialized cultural systems this often takes the form of ethnic differentiation and partitioning of access among local groups, regardless of their biological and/or linguistic similarities. Ethnically organized groups protect the interests of constituent families, lineages and clans, which are the social entities that own or are the recognized stewards of specific lands or resources. Ethnic boundaries, although certainly permeable biologically and socially, tend to discourage unauthorized access to claimed resources.

Given this understanding, ethnic diversity in our two RGS's is expected to have developed by c. 4000 BP, as source areas contributed excess population to marginal habitats, and to have been accompanied by 1) tension at boundary areas between different ethnic groups, necessitating cultural conventions for interaction among them, 2) familial and voluntary (friendship) relationships created across ethnic boundaries and marked by exchanges of tokens both material and non-material, and 3) prominent use of symbols of ethnic identification, ranging from styles of dress, personal ornamentation, architecture, handicraft, and other less tangible ways that distinguished among local groups.

Demand for commonly understood high value symbols and commodities in the social milieu of the Philippines and Bismarcks RGS's probably increased over time as regional population increased with sea level decline from its mid-Holocene high stand. The physical geography of these archipelagoes became more complicated and heterogeneous; reef flats and saline lagoons emerged and smaller islands enlarged and joined with others. Human population rose on the larger islands in response to more favorable conditions for agriculture and food storage, relieving the demographic constraint of the leanest period. As long as sink habitats existed (i.e., smaller islands and sand bars in shallow seas), and were increasing in number and area as sea level declined, excess population from source habitats could be absorbed and sink populations would have appeared stable.

The basic problem for maritime populations occupying expanded niche habitats was lack of direct access to sufficient land and its resources, the lack of access becoming more acute with more co-contenders. A solution would have been to increase the number and kinds of interactions with landed groups in source areas, for example, maritime groups offering not only marine products in exchange for land products but also transport and trading/brokering services.

The niche-space that the post-mid-Holocene maritime people in our two RGS's came to occupy thus could be termed "trader-broker space" and its occupants trader-brokers (T-B's), whose usual habitats afforded direct access only to the products of marine ecosystems. Among the islands of each archipelago, the seas were the medium of movement and paddling and sailing canoes the technical means. Sea nomadism was an economic niche that easily differentiated T-B's from landed groups and conferred a kind of social neutrality. As long as they presented no direct competition, T-B's could negotiate access to the products of land ecosystems in return for providing sea products and for services such as brokering arrangements to obtain items and commodities for landed groups whose members were unable to travel across ethnic boundaries.

The advantage of this kind of neutrality within the competitive, “heterarchical” (i.e., complex but not hierarchical) social context is that it would allow for negotiated passage for trade purposes through what would be hostile territory for others. Thus, T-B's could participate in a wide network of relationships with relatives, neighbors, and distant associates and clients, as they performed the services needed by landed groups.

Those who transport objects involved in complex exchanges are not always, or even usually, the manufacturers of those objects but in the RGS's considered here, some of the T-B's may have been. For example, smaller items not requiring much space to make but requiring skilled hand labor could have been made by some T-B groups. Raw materials from which these items were made, such as marine shells and turtle shells, could be collected from reef flats and sandy shores and converted into pendants, beads, armlets, ear and lip ornaments, the tokens of individual and group social relations needed throughout the RGS. Larger items, representing greater investments in time, materials and skill, would more likely come from land-based producers but brokered by T-B's for others.

In addition to obtaining their own canoes through purchase, exchange, or in-kind services, T-B's might be contracted to obtain large and expensive items such as canoes on behalf of others willing to pay upon receipt of the item. Such economic arrangements might be organized along kin, ethnic, and friendship lines, or all of these, and involve the use of valuables or currency for payment. Lesser transactions might involve small items obtained during the course of trips undertaken for a variety of reasons—trading and procurement as well as visits with distant relatives, clients, and friends. This is the way exotic items (rare marine shells, aromatic resins, colorful feathers, turmeric, and other preparations) could enter and circulate within an RGS.

The main point here is that the T-B niche afforded people who lacked the ability to produce all their own food and to satisfy other needs a way to obtain what they lacked through trade and exchange, assuming there existed willing partners and clients. That maritime peoples had access to fish and other marine resources, including turtles, is certain but it is doubtful that pelagic species were a dietary mainstay given the inshore-oriented activities of mobile traders/brokers.

The Marianas and Visiting Trader-Brokers

As sea level declined after 4000 BP, creating more land and more geographical diversity in the RGS's of the Indo-Pacific region, human population began to rise and heterarchical socio-economic systems to evolve. As argued above, within these systems the T-B niche developed from a previous basis in sea nomadism. Thus we can propose that by 3500 BP, groups who occupied the Bismarck Lapita sites and the Pre-Latte sites in the Marianas were the "cultural descendants" (not necessarily direct biological descendants) of maritime people who had been the first to adapt to the conditions of rising seas of Austronesia during the mid-Holocene.

For groups attempting to maintain a position within the T-B niche amidst the increasingly competitive milieu of rising human densities, reliable access to raw materials and finished items for use in trade was decreasing and ethnic differentiation sharpening. In the Philippines/Marianas RGS, some T-B's experiencing the exclusionary tactics of other groups of T-B's may have perceived travel to the uninhabited Marianas as an opportunity, despite the risks of open ocean voyaging. Beaches, lagoons, and reef flats had emerged and were unexploited. Small parties may have been able to survive for short periods by fishing, shelling, catching turtles, and collecting sago, breadfruit, and coconuts—plants that were already present—and other crops could be planted and left until the next visit (see Rainbird 2004 for a similar idea).

Initially, permanent, long-term settlement in the Marianas was probably not successful, although it may have been attempted. The problem was that the geographic characteristics of these small remote islands made them human population sinks—like the small islands and reef areas in the Philippines and Bismarcks—habitats with insufficient carrying capacity for sustained human occupation without population and other subsidies from source areas. Alluvial soils suitable for coastal agriculture had not yet accumulated to a significant depth, groundwater was saline, and reefs were only just forming and so could not buffer exposed shorelines against high waves during typhoons. Living as "strand-loopers" (i.e., without agriculture) may have been possible for short periods; Bayliss-Smith (1975) has calculated that a fisher-gatherer community of 30 persons requires some 17.2 km of reef when it is about 200 m wide as a minimum for subsistence. In the Marianas c. 3500-3000 BP reef platforms and fringing reefs were nowhere near that large nor were they continuous.

On the other hand, living as temporary occupants of the Marianas, Pre-Latte groups of T-B’s could have used most of the exploitable reef area by ranging among the large southern islands of Guam, Rota, Tinian, and Saipan rather than concentrating only upon one of these islands. Reef and pelagic fish, turtles, and shellfish could have been taken with techniques reflecting low and intermittent demand; if so, fishing gear would not have been specialized and a variety of marine species should be represented in archaeological assemblages. Over time, Pre-Latte visitors may have "seeded" the island with plants such as wild yams, and certain varieties of coconuts, and seeded breadfruit trees, that could survive unattended and would be usable when they returned.

What is the archaeological evidence for the proposal that the early Pre-Latte sites were created by visitors from the Philippines rather than as determined settlers? What would the signs be? One approach is to note the archaeological signature of temporary visits—of people who can be regarded as occupying a sink habitat, namely, what is lacking in the early Marianas archaeological record: dense accumulations of residential debris; tools used in agriculture and to regularly process agricultural products (i.e., fleshy, fibrous and woody materials); substantial architectural features; and graves. As we have seen, the early Pre-Latte assemblages are in fact sparse and lack these items.

Ethnic differentiation arises under complex social and demographic conditions, and is often expressed in material culture, such as in pottery decoration. The decorated Pre-Latte pottery found at the early sites indicates that its makers/users were participants in a socially complex cultural system, but likely one that arose elsewhere. Had Pre-Latte groups been permanent residents rather than temporary occupants, they would have had no reason to produce highly decorated pottery for local use, assuming that among other aspects, the decorations conveyed social information such as ethnic affiliation. Being the islands' only inhabitants living at very low densities, they would have had a simple social system lacking internal ethnic differentiation, thus obviating the need for symbols of ethnic affiliation.

In order to infer cultural connections between two areas, archaeologists have looked for close similarities between items found in the two areas. If the two areas' artifact assemblages are closely contemporary, the inference is that they were made by the same people, or people sharing the same cultural tradition. If one area's assemblage is older, it is thought to have been the "parent" and the younger assemblage with similar contents is the "descendant." The marine shell ornaments and pottery at Pre-Latte sites and those from contemporary coastal sites in the Philippines show striking similarities.

Spoehr (1957) was the first to suggest that the few pieces of decorated Pre-Latte pottery (which he called "Lime-filled Impressed Tradeware") from a site at Chalan Piao, Saipan were imported, probably from the Philippines. The layer with this pottery was radiocarbon dated to c. 3500 BP. The decorated sherds from Chalan Piao were found among many other undecorated sherds, which Spoehr called "Marianas Red" and thought had been locally made. Regarding the significance of Marianas Red, he wrote, "The presence of red pottery wares in the Philippines may link with Marianas Red. I believe that through these red wares a relation will be established" (Spoehr 1957:174). We are proposing that the relation was relatively direct, with Pre-Latte site occupants representing a larger group of T-B's based in the Philippines. Precisely where such groups lived within the Philippines is open to speculation; a likely place would be where the pottery designs most closely resemble the Pre-Latte designs.

Later excavations at early Pre-Latte sites by Craib (1993) and by Butler (1995) indicated that Spoehr's Lime-Filled Impressed Tradeware was quite common, and researchers have assumed from this and geological analysis of the calcareous temper in the pottery that it was produced locally. Local manufacture cannot definitely be confirmed by reference to the calcareous sand temper in these ceramics because such beach sands are not diagnostic of their island of origin (Dickinson et al. 2001). Thus some, if not all, of the early Pre-Latte pottery may have been imported into the Marianas after all. The study by Dickinson and colleagues found that volcanic and mixed sand tempers from Guam and Saipan (but not the other main islands in the southern portion of the chain, Rota and Tinian) dominate the later (non-Pre-Latte) pottery. This pattern was recognized in a multivariate compositional cluster analysis of Mariana clays and prehistoric pottery pastes (Graves et al. 1990), which included several Pre-Latte sherds. Graves and colleagues found more variations in clay sources among the Pre-Latte sherds than among the later prehistoric sherds, permitting an inference of higher rates of inter- and intra-island pottery exchange in the early period. Still, most of the Pre-Latte sherds did not match known clay sources, and the possibility remains that some of the Pre-Latte pottery may indeed derive from islands other than the Marianas.

That the geographic area within which calcareous-tempered redware was used was extensive during the mid-late Holocene has been noted by Solheim (1984-85; 2002), Shutler (1999) and others (Bellwood 1987; Bulmer 1999; Terrell and Welsch 1997). This large zone includes eastern Indonesia (Sulawesi, Timor, and possibly Flores) as well as Papua New Guinea, the Philippines, the Batanes Islands, and Taiwan. Of these ceramics, the Philippine redwares bear the closest resemblance to the Marianas Pre-Latte ceramics. In a recent review, Shutler (1999), like Spoehr, ties the Pre-Latte Phase in Saipan to redware sites in the Philippines. The dates of the Philippines sites with redware range from c. 6000 to 2000 BP, and these sites occur in northern, central, and southern Luzon as well as in Palawan, generally in coastal settings. Non-ceramic artifacts and other cultural materials found at these sites are not well described but appear to contain similar items to those found at Pre-Latte sites. For example, at the Musang Cave in northern Luzon, a layer dated to c. 4100-4950 BP yielded redware ceramics, marine food shells, bone, flake tools, and beads (Thiel 1980).

Expectations Regarding Pelagic Fishing during the Early Pre-Latte Phase

What can be learned from these archaeological comparisons in respect to pelagic fishing in the Marianas? By not confining our attention to the fish remains alone, but considering the wider regional context in which these islands were first utilized, we can propose certain expectations under the RGS/T-B niche model. For instance, Pre-Latte groups' fish predation rates would have been quite low and not likely to have significantly affected inshore or pelagic fish populations. Fishing gear would be unspecialized, i.e., not designed to maximize catch size or rates, under conditions of low consumer demand and no pressure for time efficiency. Large-bodied fish were probably not systematically targeted, although not avoided, and meat preservation techniques would have been only minimally developed. Land animals such as fruit bat along with seabirds might have been taken expediently, but predation pressure is likely to have been very light for these species. This would result in archaeological faunal assemblages in which several vertebrate species and variable body sizes are represented with no evidence of systematic hunting and processing.

In contrast, the Lapita archaeological assemblages in the Bismarcks RGS can be expected to reflect patterned relationships with landed groups who owned the resources of the considerably more diverse and productive large islands in the archipelago. Animals of larger body size than were present in the Marianas were supported in this richer biogeographical setting, and T-B's would have gained access to these through negotiation and alliances, just as they did to other land resources. Pelagic fishing among most T-B's was probably rare, since the majority of canoe travel was likely conducted in inshore areas and shallower seas.

End of the Pre-Latte, End of the T-B Niche

The Pre-Latte Phase covers a period of about 2,500 years. Various authors have proposed subdivisions of the Pre-Latte (Craib 1990; Hunter-Anderson and Butler 1995; Moore 1983, 2002; Moore and Hunter-Anderson 1999). The details of these divisions need not concern us here; suffice it to say that noticeable changes are marked in a long archaeological sequence that appears to have "transitioned into" the Latte Phase by c.

1000 years ago. To assume that the Marianas archaeological record reflects a single cultural system that grew continuously over time due to intrinsic population increase (the usual model encountered in the Pacific literature) may be incorrect. We may abandon that assumption and propose instead that the Marianas, as a sink habitat, temporarily supported or absorbed immigrants but could not sustain any group for long. With regard to the "transition" to the Latte Phase, the question is whether the character of the immigration had changed; by 2500 BP were immigrants coming to stay, or still only visiting?

To answer this and related queries we need to know if the adaptive milieu in the source habitat(s) in Southeast Asia was changing. If so, and immigration to the Marianas continued as implied by the archaeological record, the circumstances under which the immigration process took place were also changing. Technological changes, specifically, the introduction of iron working in the Philippines, may have greatly influenced the context of immigration to the Marianas. In the Philippines, the Iron Age spans the time period from c. 2500-1500 BP, precisely when we observe changes in the Marianas archaeological record that have been termed "transitional."

Iron working and regional trade in iron implements comprised a new element in the Philippines/Marianas RGS. This new technology likely caused new social and political arrangements to form and older ones to be abandoned. For example, the T-B niche may have narrowed through cessation of demand for the services of mobile traders and brokers. If that niche was no longer viable for the same number of people (or indeed for any), T-B's would have had few options to pursue a living within the RGS anymore, and all would have involved loss of autonomy. One of these was emigration to unoccupied locales such as the Marianas, where environmental changes were taking place that made the islands more attractive for settlement than previously.

Between c. 2500-1500 BP, the archaeological record reflects a shift in the context and character of human occupation in the Marianas. A re-orientation of immigrant groups toward permanent settlement is indicated by artifact and settlement pattern changes. For example, there was a decline and eventual absence of decorated redware pottery, a decline in marine shell ornaments, larger and more complex artifact assemblages with more ground stone tools, frequent use of *Tridacna* clam shells for adzes, site locations that imply the utilization of more kinds of geographic settings and the use of pit interments at residential sites and in inland and coastal rock shelters.

These archaeological changes in part reflect natural geographic enhancement (from the human settlement point of view) of the southern islands, where sea level decline resulted in ever-widening shorelines that had developed over exposed reef flats. Amesbury's (2007, 1999) work on mollusk frequencies in Marianas coastal archaeological deposits has yielded new information about changes in relative sea level that imply changes in inshore environments and help explain changes in mollusk types and abundances over time.

Also, there were now deeper alluvial soils in lowland catchments brought by downcutting streams. Sea recession by 2500 BP had nearly eliminated mangroves at the Laguas River mouth in southwestern Guam, according to dated sediment cores (Ward 1995). Other environmental changes could reflect the culturally engineered conversion of the large southern islands from a natural sink habitat into a "pseudo-sink" that could support more people than was previously possible. This process need not have been abrupt but rather gradual, as immigrants and earlier settlers slowly "domesticated" the landscape by planting imported cultigens, adapting them to local conditions, and through the skillful management of the forests favoring certain useful species.

An indication that competition for optimal locales in the southern Marianas had reached a threshold c. 2500 BP is the practice of human burials at coastal residential sites beginning at this time. Under this understanding, burial-associated mortuary ritual was a non-violent competitive tactic to demonstrate group claims to the few potentially contested locales. In the local social idiom, such locales may have been regarded as clan origin-sites where first landings took place, similar to customary beliefs regarding the Anakena beach locale of Easter Island.

A late marker of the transition to the Latte Phase is a more complex and geographically extensive settlement system. For example, in addition to coastal beach and rock shelter sites, interior settings were more frequently used after c. 1500 BP, a trend that continued throughout the Latte Phase. The kinds of sites occupied after c. 1500 BP include open ridge tops, caves and rock shelters, valley sides and river terraces. This more extensive landscape coverage may reflect the final stages in the human-effected conversion of the Marianas from sink to pseudo-sink, when an archipelago-wide system of rainfall-dependent swidden agriculture, foraging, and fishing was developing, and social organization was altered to fit this reality.

The Latte Phase

Throughout the c. 500 year-long Latte Phase (c. 1000-500 BP), certain trends and directional changes in architecture and settlement patterns, as well as gradual and episodic changes in material culture, have been recognized. For example, Latte Phase site locations are more varied than the early Pre-Latte and transitional sites, although the trend toward more spatially extensive use of the islands is apparent by c. 2000 BP. Latte Phase sites are found along the islands' coasts in open sandy areas, some with deep deposits, as well as in rock shelters. Many sites occur also in the island interiors, in ridge top and valley settings, including rock shelters and caves. Interior sites usually have shallow cultural deposits, although some are extensive in area. The latter pattern may relate to a relatively mobile settlement system at times, in which some sites were repeatedly visited but for short periods.

Judging from similarities in prehistoric artifacts and other archaeological characteristics, and the fact of a common language spoken throughout the archipelago at European contact in the 16th century, it is likely that prehistoric Chamorro groups within the archipelago interacted frequently, with individuals traveling between islands on sailing canoes. As in other Micronesian cultures, these interactions probably followed clan and lineage relationships and were manifested in marriage, adoption, visitation, and material exchanges of food and other resources.

The most prominent features of the Latte Phase are latte stones (Photo 1). When found intact, latte stone sets are sited on level ground in configurations of two parallel rows of columns inserted into a shallow pit with small stones supporting the wide base. The two rows enclose a rectangular space. The columns are referred to as *haligi* in Tagalog and Chamorro, after the Spanish word for post, *harigue*. Hemispherical capstones (*tasa* in Tagalog and Chamorro, after the Spanish word for cup) were placed atop the columns, flat side up, presumably to support the cross beams of a rectangular wood structure. Site furniture in the form of large stone mortars embedded into the ground is typical of latte stone sites. Called *lusong* (in Tagalog and Chamorro) stone mortars were placed at one end of the feature and are thought to have been used to husk rice prehistorically, as they are known to have been used historically.

Photo 1. Latte set at Mochong, Rota. Photo by J. Amesbury.

Latte sets are usually found in poor condition due to modern disturbances (farming and construction). Many sets are incomplete and the elements displaced from their original alignment but often the original configuration can be inferred. While some sites contain several latte sets, most have only one or two sets.

Hunter-Anderson (1989) (see also Moore and Hunter-Anderson 1994) has argued that latte stones, as part of the megalithic tradition of Southeast Asia, served symbolic purposes, as well as practical purposes. As practical structural devices, latte stones (in a set of opposing pillar and capstone pairs) were house posts that elevated the floor above the ground and provided additional sheltered space beneath the house. This two-tiered-space use pattern is common in ethnographically known Ifugao architecture where wooden pile houses are used for dwellings and for rice storage while the ground level is used for daily activities (Perez et al. 1989). The physical similarities between Marianas Latte Phase latte stone structures and the wood post structures of the Ifugao suggest cultural connections in the prehistoric past but the symbolic content of latte stones was probably unique to the Marianas.

The symbolic value of latte stone architecture, aside from its practical functions, may have been as a conventional means of expressing group strength and ability to defend claims to land. Megalithic traditions in Oceania stress the importance of height and size to convey group solidarity and continuity. Such notions can be understood anthropologically as competitive tactics. Placing latte sets in potentially contested areas may have served to convey the intention of the builders to use those areas in future, just as they had in the past. The ability of mute stone structures to "stand in" for people who were absent would be important under a semi-mobile settlement system in which group sizes were small and residential locations changed relatively frequently. Detailed archaeological studies in particular regions of Guam have been conducted in the last two to three decades; these indicate that latte sets occur precisely in potentially contested areas: on ridges near interior wetlands, along river valleys and terraces, and along coastal strands.

Figures 3-5 show the distributions of latte stones observed in Guam, Saipan and Tinian in the 1920s by an amateur archaeologist, Hans Hornbostel (see Thompson 1932 for a summary of his work). The Guam map shows the most detail, as Hornbostel was able to spend more time on the American-administered territory than in German-held Saipan and Tinian.

The clustered distributions of latte on these maps depict areas where remains of nearly ten centuries of latte stone construction were still visible. It is evident that latte stones were erected most often in coastal settings and in river valleys, i.e., areas with wetlands. The practice of erecting the megaliths was abandoned after the Spanish conquest in the 1700s, although the abandonment process may have been somewhat gradual; some latte stone sites have yielded evidence that they were utilized during the early portion of the period, possibly as refuge sites.

Other types of sites occupied during the Latte Phase have been found in Guam's interior. These include small open-air sites with surface scatters of artifacts, a variety of pits and fire-related features such as earth-ovens and hearths. Rock shelters, some with burials, have been documented as well. Moore and Hunter-Anderson (1994) have proposed such sites reflect a diverse subsistence system during the Latte Phase that included a terrestrial component of upland rice cultivation along the edges of small, interior wetlands and streams, swidden gardens planted to bananas, taro, and yams, and managed strand and limestone forests, in addition to a marine component of some complexity given the variety of marine habitats, both nearshore and pelagic in the Marianas.

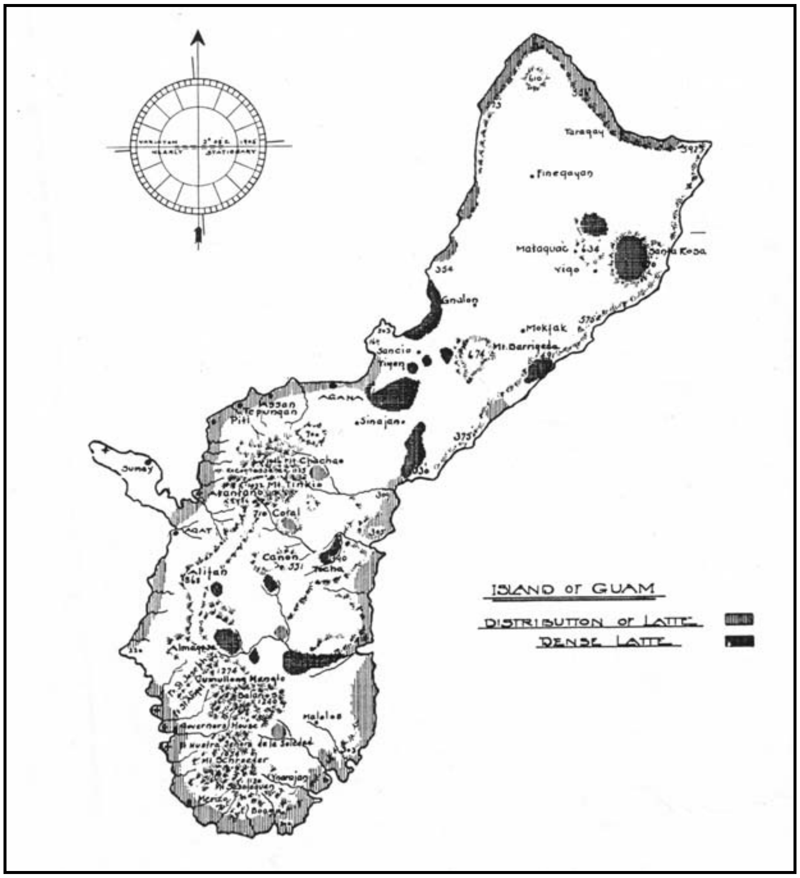

Figure 3. Hornbostel's map of latte stone sites on Guam. From Reed (1952).

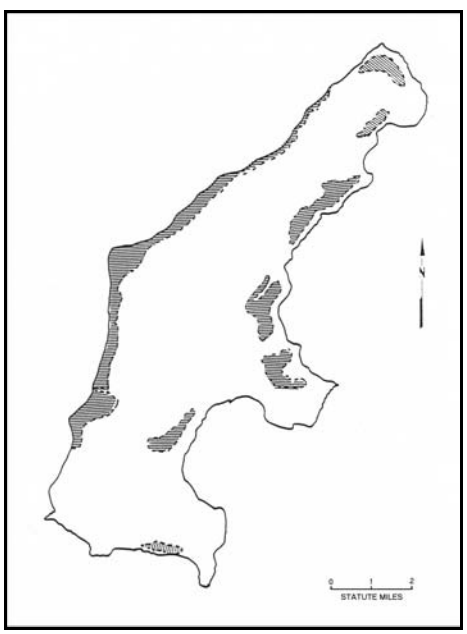

Figure 4. Hornbostel's map of Saipan showing latte stone distributions. From Hornbostel (1924-1925).

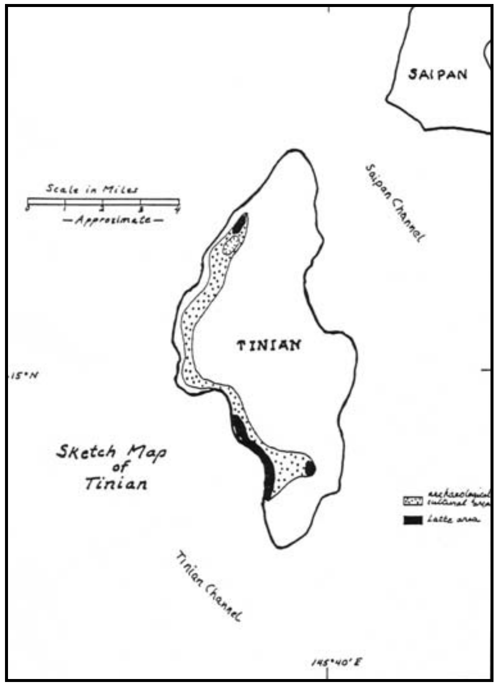

Figure 5. Hornbostel's map of Tinian showing distribution of latte stones. From Hornbostel (1924-1925).

The proportions of these dietary components and patterns of consumption among various local groups are unknown; probably they varied over time and space with local weather and demographic conditions. For example, intrinsic growth may have contributed to the total human population during favorable climatic periods such as the Little Climatic Optimum (c. 1050-650 BP). Population subsidies from the Philippines may have played a role as well.

As Figure 6 shows, the northern Philippines now suffers the highest frequencies of typhoons in the western Pacific; moving to Guam from this area was a move from typhoon zone 5 to typhoon zone 3.

During the late Latte Phase, the climate had oscillated from the Little Climatic Optimum to the Little Ice Age (c. 650-100 BP) and storage of rice and other foods, such as breadfruit, fish and shellfish by salting, smoking, and pickling probably increased. These measures would have been put into place to buffer against weather-related food shortages. Some evidence for this is the trend in ceramics for larger vessels to be made after c. 1450 CE, a practice that continued into the Historic Period. Studies of archaeological fish bone assemblages in northwest Rota and in northern Guam suggest a late prehistoric preference for Scaridae over other fish species, which could signal a shift in fishing tactics in response to caloric stress.

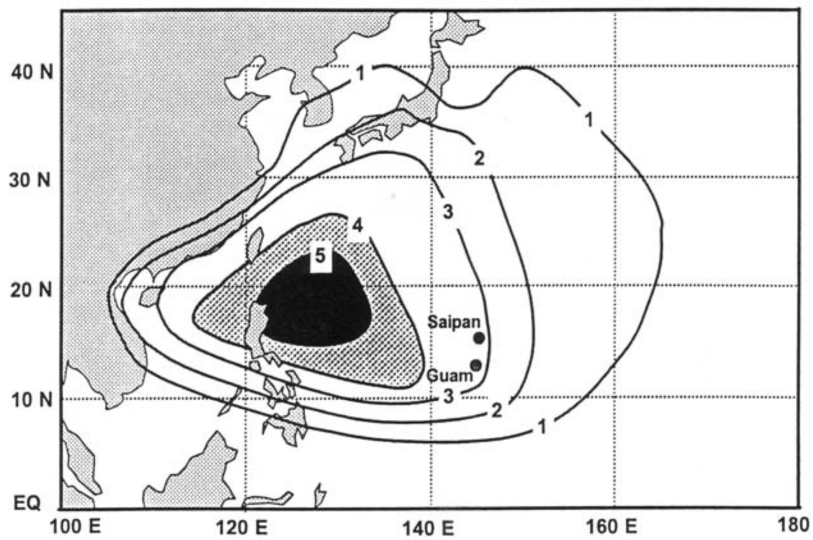

Figure 6. Mean number of tropical storms and typhoons passing 5-degree latitude by 5-degree longitude squares; note Marianas are in intermediate zone 3. From Lander (2004).

Expectations Regarding Pelagic Fishing during the Latte Phase

Marine habitat complexity from variations in topography, soils, aspect or orientation vis a vis the sun, and many other geographic and biological factors challenged the Latte Phase occupants to be both knowledgeable and flexible in fishing behavior and technology. However, this complexity probably did not select for technical specialization in the pursuit of marine species taken for protein and calories. A preference for large-bodied fish may have emerged as competitive social conditions involved frequent displays of competence and ability. One of the ways individuals can achieve recognition for themselves and their affiliates is to obtain difficult-to-procure but highly desirable items, large pelagic fish being ideal candidates. The deep waters with submerged seamounts and shoals probably presented excellent opportunities for this kind of activity. An early historic account of a Guam fisherman bringing in a large blue marlin after defending his catch from a shark, and then publicly distributing the fish in socially meaningful ways, with enthusiastic approbation from his neighbors, appears exemplary of this; see Driver (1989:16).

Fishing skill, like other motor behaviors, is not evenly distributed in a population, although basic levels of competence were probably achieved by most men and women during the Latte Phase. We can therefore anticipate that marine vertebrate assemblages from most archaeological sites will not vary greatly from one another in species composition, all else equal. For example, the type of site where the assemblage was generated could condition its marine vertebrate assemblage; a fishing camp site's assemblage could differ in species composition from a midden at a residential site. The latter could be larger and reflect a longer accumulation period as well as a greater variety of processing and consumption events, while the former could be smaller and reflect a more limited accumulation period and fewer kinds of processing and consumption events.

When assemblages from similar site types are combined, a more accurate judgment regarding temporal trends in species composition may be made.

In the present project, through identification of fish bones from two roughly similar prehistoric sites, both situated on Guam's east coast and both with long occupational time spans (although it is not known whether these sites were occupied continuously or used in precisely the same manner over time), we attempted to determine if there had been any significant changes in pelagic fishing practices from the Pre-Latte to the Latte Phase. As will be discussed in detail later, no such evidence was found, and our expectations of non-specialization and general similarities in species composition generally reflecting available species in the marine habitats near the sites, regardless of time period, were borne out.

CHAPTER 2. PREHISTORIC PERIOD

By Judith R. Amesbury

INTRODUCTION

The following review of the archaeological literature with regard to fish remains and fishing gear includes only sites with pelagic fishes from the families Coryphaenidae (mahimahi), Istiophoridae (marlins and sailfishes), Xiphiidae (swordfishes), and Scombridae (wahoo and tunas). Sites with turtle remains are also reviewed in this chapter. Sites with pelagic fish remains and turtle remains dating to the Prehistoric Period are found on all of the four major Mariana Islands—Guam, Saipan, Tinian, and Rota.

People have lived in the Mariana Islands for at least 3,500 years or about 3,000 years before European contact. Spoehr (1957) divided the long Prehistoric Period into Pre-Latte Phase and Latte Phase. Subsequent authors have proposed various subdivisions of the Pre-Latte Phase. The terms used in this chapter are based on Moore and Hunter-Anderson's (1999) subdivisions (Table 1, Fig. 7).

Table 1. Spoehr's (1957) broad phases of Marianas prehistory as subdivided by Moore and Hunter-Anderson (1999).

Phase	Subdivisions	Years Before Present	Approximate Calendar Dates
Pre-Latte Phase	Early Pre-Latte	3500 to 2500 years BP	1550 to 550 BC
	Intermediate Pre-Latte	2500 to 1600 years BP	550 BC to AD 350
	Transitional	1600 to 1000 years BP	AD 350 to 950
Latte Phase		1000 years BP to AD 1521	AD 950 to 1521

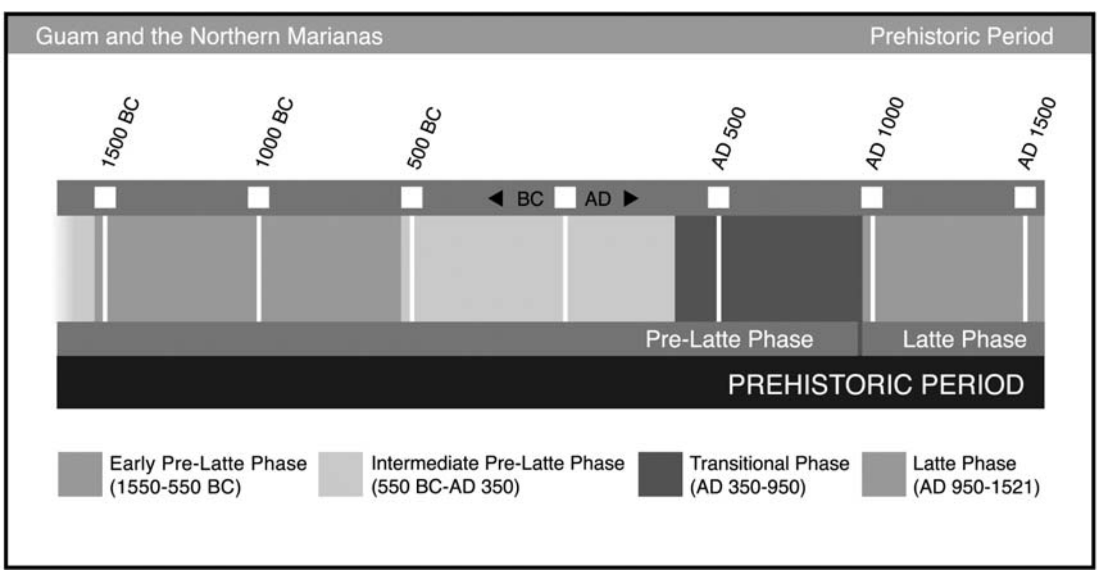

Figure 7. Timeline of the Prehistoric Period in Guam and the Northern Mariana Islands. Figure by Robert Amesbury.

Different faunal analysts use different methods. Some report only number or weight of remains (e.g., bones, teeth, scales). Others report the number of identified specimens (NISP), which refers to the number of bones identified, or minimum number of individuals (MNI), which refers to the number of fishes identified. For an explanation of these methods, see Grayson (1984).

This chapter reports the scientific names used by the faunal analysts. Some analysts are "lumpers" and some are "splitters." For example, Foss Leach and Janet Davidson divide the scombrids (tunas and wahoo) into two groups, Thunnidae/Katsuwonidae and Acanthocybiidae. According to Nelson (2006), this is not a distinction at the family level; it is a distinction at the level of tribe within the subfamily Scombrinae. Rather than rename these groups to the tribe level or obscure the distinction by calling them all Scombridae, we are using the names reported by Leach and Davidson.

FISH REMAINS AND FISHING GEAR FROM GUAM

Ritidian

S. Amesbury (1989) analyzed fish remains from the archaeological excavations by Kurashina et al. (1989) at the Naval Facility, Ritidian Point, the northernmost point of Guam (Fig. 8). Fish bones from Test Areas 1 through 7 totaled 1,017. There were 34 bones from other proveniences. Most of the bones (n = 1005) came from Test Areas 4, 6, and 7. There were also 313 fish scales from Test Areas 3 and 6.

Six families of fishes were tentatively identified from the 30 mouthparts. They are Acanthuridae (surgeonfishes), Labridae (wrasses), Lethrinidae (emperors), Lutjanidae (snappers), Scaridae (parrotfishes), and Serranidae (groupers). Half of the identifiable mouthparts (13 of 26) were from parrotfishes. Four mouthparts were indeterminate. A seventh family, Balistidae (triggerfishes), was identified from two spines.

Sixty-one vertebrae had centrum diameters of 12 mm or less. One vertebra and 51 fragments had centrum diameters of 19 mm or more. No vertebrae measured 13-18 mm in diameter. All of the large vertebrae derived from Test Area 4. While it is possible that these large vertebrae came from reef fishes such as large parrotfishes or humphead wrasses (*Cheilinus undulatus*), it is likely they are from pelagic species (S. Amesbury 1989:215).

Charcoal from Test Area 4, Layer 7, the layer with the greatest number of fish bones, yielded a radiocarbon date (C13 adjusted) of 660 +/- 70 BP or AD 1290 +/- 70 (Kurashina et al. 1989:180). Charcoal from Test Area 7, Layer 2, yielded a C13 adjusted date of 750 +/- 50 BP or AD 1200 +/- 50. Both areas appear to date to the Latte Phase.

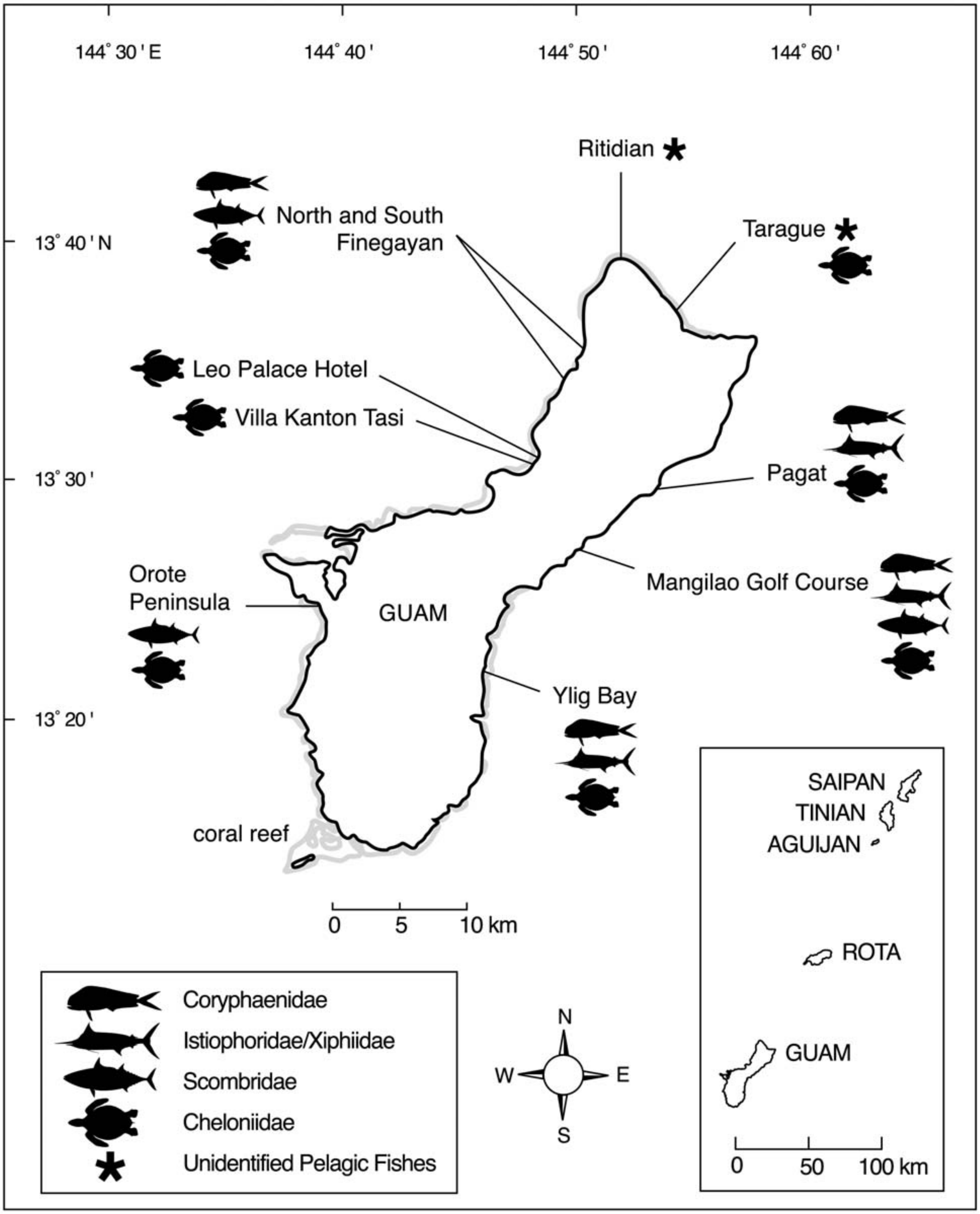

Figure 8. Guam, showing archaeological sites with pelagic fish and turtle remains.
Figure by Robert Amesbury.

Tarague

Tarague Beach is located on the northeast coast of Guam adjacent to the reef flat and a natural channel through the reef (Fig. 8). From the archaeological excavations conducted there by Kurashina et al. (1987), S. Amesbury (1987) analyzed 7,002 fish bones from 27 excavation units and eight depositional layers. More than 40% of the bones were vertebrae or vertebral fragments. Mouthparts numbered 337 or 4.8% of the total. Caudal blades of surgeonfishes of the genus *Naso* numbered 11 or 0.2% of the total.

Mouthparts from parrotfish (family Scaridae) were the most numerous (n = 217 or 64.4%) of all mouthparts. The percentage of parrotfish mouthparts among the total mouthparts increased through time, from a low of 54.2% in Layer VIII to a high of 75.7% in Layer I. Other families of fishes identified by mouthparts and the number of mouthparts include the Serranidae (groupers) 32, Labridae (wrasses) 18, Lethrinidae (emperors including *Monotaxis grandoculis*) 4, Diodontidae (porcupinefishes) 2, and Hemiramphide (halfbeaks) 2. Undoubtedly additional families were represented by the bone fragments, but only the genus *Naso* (family Acanthuridae) was identified by a part other than a mouthpart.

Most of the vertebrae were relatively small (modal centrum diameter = 4 mm). These vertebrae probably derived from reef fishes. A few large vertebrae with centrum diameters up to 25 mm were recovered. Although these could not be identified, their size indicates they are from pelagic fishes.

Moore (1983:65) reported three radiocarbon dates from the South Profile at Tarague. Charcoal from Layer I yielded a date of 1150 +/- 80 BP or AD 800. Fish bone from Layer V yielded a date of 2100 +/- 270 BP or 150 BC, and fish bone from Layer VII was dated to 3060 +/- 350 BP or 1110 BC. These dates encompass both the Pre-Latte and Latte Phases.

Moore (1983:183-185) also reported six shell fishhooks and gorges from Layers I, III, and VII. An earlier excavation at Tarague Beach (Ray 1981) had recovered numerous fishhooks and gorges of *Isognomon* and *Turbo*; 89 such items are illustrated. In addition a human bone point of a composite hook (Fig. 9), a bone fishing spear point, and five stone sinkers were collected. The composite hook and the fishing spear could have been used to take pelagic fishes.

Subsequent archaeological research at Tarague (Liston 1996) recovered 253.64 grams of fish bones from 11 units at five sites. Alan C. Ziegler of Honolulu identified the following families: Acanthuridae (surgeonfishes), Balistidae (triggerfishes), Carangidae (jacks), Cirrhitidae (hawkfishes), Congridae (conger eels), Exocoetidae (flyingfishes), Holocentridae (squirrelfishes), Kyphosidae (rudderfishes), Labridae (wrasses), Lethrinidae (emperors), Lutjanidae (snappers), Mullidae (goatfishes), Muraenidae (moray eels), Scaridae (parrotfishes), Serranidae (groupers), as well as marine eel and shark (not identified to family). Weights of fish bones by unit and level are provided by Liston (1996:441-455).

Nine radiocarbon dates were obtained from three of the Tarague sites that yielded fish bone (Liston 1996:213). The calibrated (2 sigma) dates range from 1023-427 BC to AD 1651-1995, encompassing all but the very earliest centuries of the human occupation of Guam.

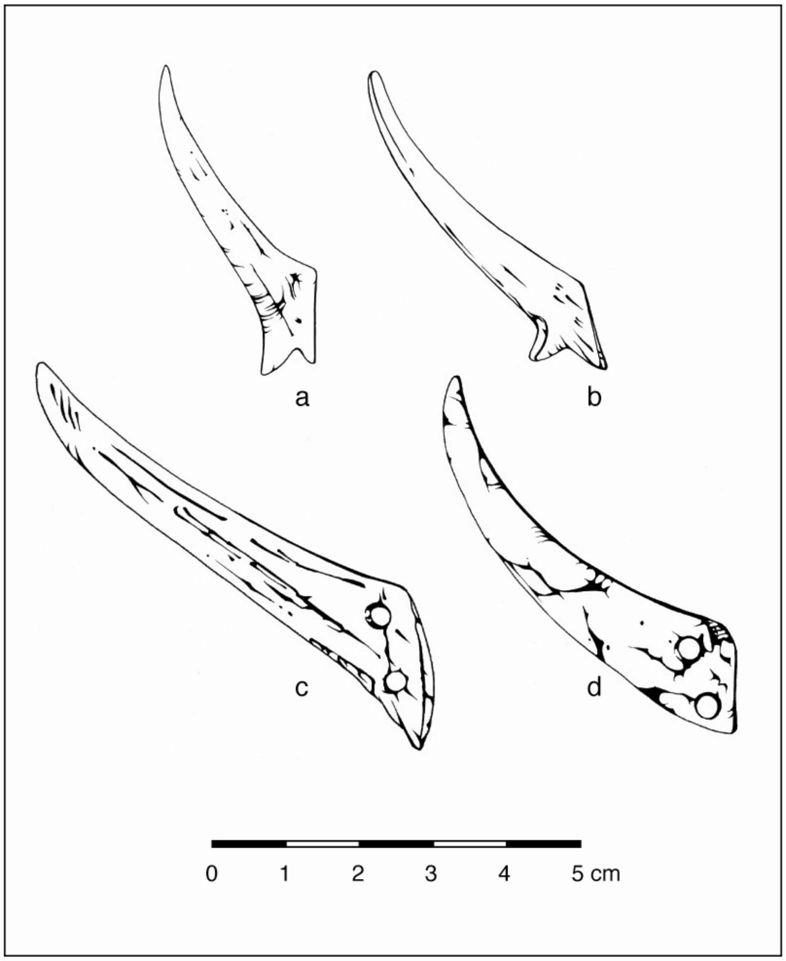

Figure 9. Points of composite fishhooks from archaeological sites in Guam. a = human bone point from Tarague (Ray 1981); b and c = bone points from Pagat (Craib 1986); d = shell point from Pugua Point (Olmo et al. 2000). Figure by Robert Amesbury.

Pagat

The fish bone from the Pagat excavations, conducted by the Guam Territorial Archaeology Laboratory, was identified by the Department of Anthropology of the University of Otago, New Zealand, and reported by Craib (1986). Horizon I yielded 2858.6 grams of fish bone with a density of 187.20 grams per cubic meter. The lower Horizon II yielded 1789.7 grams of fish bone with a density of 378.37 grams per cubic meter. Five radiocarbon dates were obtained from Horizon I. They range from AD 1080-1310 to AD 1520-1640 (Latte Phase and early Historic Period). The single date from Horizon II is a late Pre-Latte date (AD 770-970). It appears, then, that the Pre-Latte deposits had a higher density of fish remains, although the Latte deposits yielded a greater quantity. The areal extent of the Pre-Latte deposits was much smaller than that of the Latte deposits.

Thirteen families were identified and grouped by habitat (inshore, benthic, or pelagic). Minimum number of individuals (MNI) and percent MNI were calculated (Table 2). Inshore fishes account for 86% of the MNI; benthic fishes make up 9%; and pelagic fishes 5%. All except the pelagic fishes could have been taken from the immediate environs of Pagat. The inshore and benthic fishes could have been taken by angling or spearing, and the pelagic fishes by trolling.

Table 2. Families of fishes, minimum number of individuals (MNI) and percent MNI from Pagat, Guam (Craib 1986).

Habitat	**Family**	**Common Name**	**MNI**	**Percent MNI**
Inshore	Balistidae	Triggerfishes	64	35
	Scaridae	Parrotfishes	42	23
	Lethrinidae	Emperors	22	12
	Labridae	Wrasses	16	9
	Acanthuridae	Surgeonfishes	12	6
	Carangidae	Jacks	1	0.5
	Diodontidae	Porcupinefishes	1	0.5
Benthic	Serranidae	Groupers	11	6
	Lutjanidae	Snappers	3	2
	Holocentridae	Squirrelfishes	2	1
	Pempheridae	Sweepers	1	0.5
Pelagic	Coryphaenidae	Mahimahi	8	4
	Istiophoridae	Marlins, sailfishes	2	1
Total			**185**	**100.0**

Fishing gear collected from the excavations includes 31 shell gorges (apparently *Isognomon*), 8 shell hooks (both *Isognomon* and *Turbo*), 14 bone points from composite trolling lures (Fig. 9), a possible shank for a composite hook made of *Tridacna*, and 14 worked pieces of limestone and shell that were classified as weights. In addition, there are 13 pieces of barbed bone spears, which Craib (1986: 234-235) described as weapons, but said they may have been used for spearing fish.

Mangilao Golf Course

The present PFRP project funded the analysis of the fish bone from Mangilao Golf Course on the east coast of Guam (Fig. 8). A collection of approximately 8,000 fish bones was sent to Foss Leach and Janet Davidson in New Zealand. Their complete report (Leach and Davidson 2006a) is included as Appendix A.

From Mangilao Golf Course Site 25, 394 bones were identified. At least 20 families or other groups are present. MNI equals 267 (Table 3). Pelagic fishes account for 22.9% of total MNI.

Table 3. Families of fishes, minimum number of individuals (MNI) and percent MNI from Mangilao Golf Course Site 25, Guam (Leach and Davidson 2006a).

Family or Other Group	Common Name	MNI	Percent MNI
Scaridae	Parrotfishes	97	36.33 +/- 6.0
Coryphaenidae	Mahimahi	41	15.36 +/- 4.5
Coridae/Labridae	Wrasses	21	7.87 +/- 3.4
Lethrinidae	Emperors	20	7.49 +/- 3.3
Istiophoridae/Xiphiidae	Marlins, sailfishes/Swordfishes	14	5.24 +/- 2.9
Epinephelidae	Groupers	11	4.12 +/- 2.6
Elasmobranchii	Sharks and rays	10	3.75 +/- 2.5
Diodontidae	Porcupinefishes	9	3.37 +/- 2.4
Balistidae	Triggerfishes	8	3.00 +/- 2.2
Acanthuridae	Surgeonfishes	7	2.62 +/- 2.1
Nemipteridae	Monocle breams	6	2.25 +/- 2.0
Lutjanidae	Snappers	5	1.87 +/- 1.8
Acanthocybiidae	Wahoo	4	1.50 +/- 1.6
Teleostomi	Includes bony fishes	4	1.50 +/- 1.6
Carangidae	Jacks	2	0.75 +/- 1.2
Coridae	Wrasses	2	0.75 +/- 1.2
Scombridae	Tunas	2	0.75 +/- 1.2
Echeneidae	Remoras	2	0.75 +/- 1.2
Holocentridae	Squirrelfishes	1	0.37 +/- 0.9
Kyphosidae	Sea chubs or rudderfishes	1	0.37 +/- 0.9
Total		**267**	**100.00**

In order to determine if there were changes through time, Leach and Davidson (2006a) grouped the assemblages into four groups: Early Prehistoric, Middle Prehistoric, Late Prehistoric, and Historic Periods (Table 4). Those groups were based on the stratigraphy and the 41 radiocarbon dates from Mangilao Golf Course Site 25 (Dilli et al. 1998).

Table 4. Leach and Davidson's four groups correlated with Mangilao Golf Course strata and corresponding cultural phase or period.

Leach and Davidson's Four Groups	Mangilao Golf Course Strata	Corresponding Cultural Phase or Period
Early Prehistoric Period	IIIg	Early Pre-Latte Phase
Middle Prehistoric Period	IIIb-IIIf	Intermediate and Transitional Pre-Latte Phases
Late Prehistoric Period	IIIa	Latte Phase
Historic Period	I and II	Historic Period

The MNI and percent MNI for the four time periods are presented in Table 5. Based on percent MNI, it appears that there are changes through time. For example, percent MNI of Istiophoridae/Xiphiidae rises from 2.5% in the Intermediate and Transitional Pre-Latte Phase to 9.1% in the Latte Phase to 14.3% in the Historic Period.

However, Leach and Davidson (2006a:15) point out that this cannot be confirmed due to the margins of error. They conclude that no changes through time or from one part of the site to another can be confirmed.

Table 5. Families of fishes, minimum number of individuals (MNI), and percent MNI from Mangilao Golf Course Site 25 by time periods (Leach and Davidson 2006a).

Family or Other Group	**Early Pre-Latte Phase**		**Intermediate Pre-Latte and Transitional Pre-Latte Phases**		**Latte Phase**		**Historic Period**	
	MNI	**Percent**	**MNI**	**Percent**	**MNI**	**Percent**	**MNI**	**Percent**
Scaridae	6	60.0±39.1	33	27.3±8.3	43	43.4±10.4	2	28.6±46.5
Coryphaenidae			21	17.4±7.2	18	18.2± 8.2		
Lethrinidae			14	11.6±6.1	4	4.0± 4.4	1	14.3±37.6
Coridae/Labridae			11	9.1±5.5	5	5.1± 4.9		
Istiophoridae/ Xiphiidae			3	2.5±3.2	9	9.1± 6.2	1	14.3±37.6
Epinephelidae	1	10.0±25.9	8	6.6±4.8	2	2.0± 3.3		
Elasmobranchii	1	10.0±25.9	6	5.0±4.3	2	2.0± 3.3	1	14.3±37.6
Balistidae	1	10.0±25.9	4	3.3±3.6	2	2.0± 3.3		
Diodontidae					6	6.1± 5.3	1	14.3±37.6
Acanthuridae			2	1.7±2.7	2	2.0± 3.3	1	14.3±37.6
Lutjanidae			3	2.5±3.2	2	2.0± 3.3		
Acanthocybiidae			3	2.5±3.2	1	1.0± 2.5		
Nemipteridae			3	2.5±3.2	1	1.0± 2.5		
Teleostomi			4	3.3±3.6				
Coridae	1	10.0±25.9	1	0.8±2.0				
Scombridae			2	1.7±2.7				
Echeneidae			2	1.7±2.7				
Carangidae					1	1.0± 2.5		
Holocentridae			1	0.8±2.0				
Kyphosidae					1	1.0± 2.5		
Total	**10**	**100.0**	**121**	**100.0**	**99**	**100.0**	**7**	**100.0**

Numerous artifacts identified as fishing gear were recovered from the Mangilao Golf Course excavations. They include 119 one-piece fishhooks and gorges, 117 worked shell tabs, 17 composite hook components, nine bone harpoon points, and five stone net sinkers. The composite fishhook components include 14 bone points, two shell points, and one possible shank preform. Eight of the nine harpoon points were manufactured from human bone and one from non-human bone. Of the human bone harpoons, one was made from a humerus, three from tibias, and four from unidentified elements. Holstrum et al. (1998) said the harpoons were most likely used for fishing, but could have functioned as weapons also.

Ylig Bay

The present PFRP project funded the analysis of fish bone from the excavation at Ylig Bay, Guam, conducted by International Archaeological Research Institute (IARII). The project is ongoing; the report has not been completed.

Approximately 2,000 fish bones were sent to Leach and Davidson in New Zealand; 170 bones were identified. Fifteen families or other groups are present. MNI and percent MNI are shown in Table 6. Pelagic fishes account for 43.1% of total MNI.

Table 6. Families of fishes, minimum number of individuals (MNI) and percent MNI from Ylig Bay, Guam (Leach and Davidson 2006b).

Family or Other Group	**Common Name**	**MNI**	**Percent MNI**
Coryphaenidae	Mahimahi	37	38.9 +/- 10.4
Scaridae	Parrotfishes	18	18.9 +/- 8.5
Acanthuridae	Surgeonfishes	8	8.4 +/- 6.2
Epinephelidae	Groupers	6	6.3 +/- 5.5
Lethrinidae	Emperors	5	5.3 +/- 5.1
Istiophoridae/Xiphiidae	Marlins, sailfishes/Swordfishes	4	4.2 +/- 4.6
Lutjanidae	Snappers	4	4.2 +/- 4.6
Carangidae	Jacks	3	3.2 +/- 4.1
Coridae/Labridae	Wrasses	2	2.1 +/- 3.4
Elamobranchii	Sharks and rays	2	2.1 +/- 3.4
Teleostomi	Includes bony fishes	2	2.1 +/- 3.4
Sphyraenidae	Barracudas	1	1.1 +/- 2.6
Balistidae	Triggerfishes	1	1.1 +/- 2.6
Diodontidae	Porcupinefishes	1	1.1 +/- 2.6
Holocentridae	Squirrelfishes	1	1.1 +/- 2.6
Total		**95**	**100.0**

The present PFRP project also paid for three of the six radiocarbon dates obtained by IARII from the Ylig Bay excavation. The analysis of fish bone took place before the radiocarbon dates were obtained. The archaeologists from IARII tentatively designated the deposits “Pre-Latte,” “Latte,” or “Mixed” on the basis of the cultural contents. Those are the designations used by Leach and Davidson (2006b). The radiocarbon dates (Table 7) enable us to designate the Pre-Latte deposits more precisely as “Transitional Pre-Latte Phase” and to designate the Latte deposits more correctly as “Latte Phase/Historic Period.” There were no significant differences from one time period to another (Table 8).

Table 7. Radiocarbon dates from Ylig Bay, Guam with corresponding cultural phase or period.

Beta Number	**Conventional Radiocarbon Age (BP = Before Present)**	**2 Sigma Calibrated Results**	**Corresponding Cultural Phase or Period**
Beta-219666	1620±40 BP	AD 370-540	Transitional Pre-Latte Phase
Beta-219667	1490±40 BP	AD 460-480, AD 520-650	Transitional Pre-Latte Phase
Beta-219665	1230±40 BP	AD 690-890	Transitional Pre-Latte Phase
Beta-216631	650±60 BP	AD 1270-1420	Latte Phase
Beta-216633	380±40 BP	AD 1440-1640	Latte Phase/Historic Period
Beta-216632	320±40 BP	AD 1460-1660	Latte Phase/Historic Period

Table 8. Families of fishes, minimum number of individuals (MNI), and percent MNI from Ylig Bay by time periods (Leach and Davidson 2006b).

Family or Other Group	**Transitional Pre-Latte Phase Deposits**		**Latte Phase/ Historic Period Deposits**		**Mixed Deposits**	
	MNI	**Percent**	**MNI**	**Percent**	**MNI**	**Percent**
Coryphaenidae	5	35.7±30.9	14	35.0±16.4	18	43.9±16.8
Scaridae	3	21.4±26.9	9	22.5±14.5	6	14.6±12.3
Acanthuridae			5	12.5±11.8	3	7.3± 9.4
Epinephelidae	2	14.3±23.5	4	10.0±10.8		
Lethrinidae			2	5.0± 8.2	3	7.3± 9.4
Istiophoridae/ Xiphiidae			1	2.5± 6.2	3	7.3± 9.4
Lutjanidae	1	7.1±18.2	2	5.0± 8.2	1	2.4± 6.1
Carangidae			1	2.5± 6.2	2	4.9± 8.0
Coridae/Labridae					2	4.9± 8.0
Elamobranchii	1	7.1±18.2			1	2.4± 6.1
Teleostomi	1	7.1±18.2			1	2.4± 6.1
Sphyraenidae			1	2.5± 6.2		
Balistidae	1	7.1±18.2				
Diodontidae					1	2.4± 6.1
Holocentridae			1	2.5± 6.2		
Total	**14**	**100.0**	**40**	**100.0**	**41**	**100.0**

The Ylig Bay site has an unusually high percentage MNI of mahimahi. It is possible that the large vertebrae were preferentially collected at the start of the excavation. The project was originally designed to recover human burials, and midden was not collected systematically in the upper (more recent) layers. However, as the project progressed, midden from the lower (older) layers was collected with ¼" screen. However Leach and Davidson (2006b) found consistently high percentages of mahimahi in the three sub-collections. The percentage MNI in the Transitional Pre-Latte deposits is almost identical to the percentage MNI in the Latte Phase/Historic Period deposits. So preferential collection does not explain the abundance of mahimahi.

A second reason why the percentage MNI of mahimahi may be inflated is that vertebrae were used to determine MNI. It is preferable to use unique bones with which one bone represents one fish. However, Leach and Davidson (2006b:13) use the same methodology with all assemblages and all sites. So even if the number of mahimahi is inflated, the analysis is consistent from site to site. Evidently the people at Ylig Bay were very successful pelagic fishermen.

The analysis of fishing gear from Ylig Bay has not been completed, but a human bone hook from a compound fishhook was found (Photo 2). This item is nearly identical to points found at two other east-coast Guam sites, Pagat (Craib 1986) and Tarague (Ray 1981) (Fig. 9).

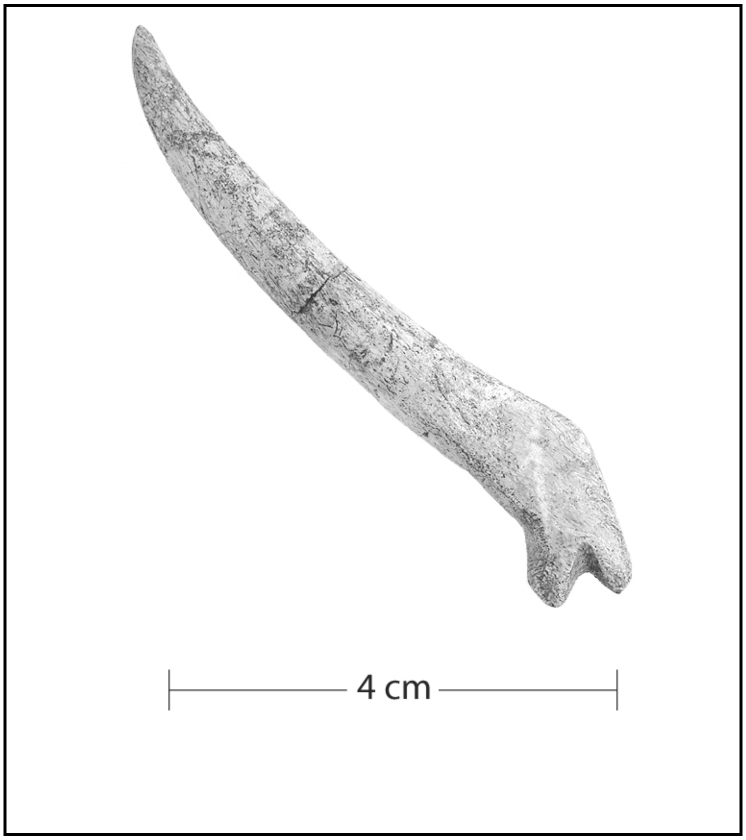

Photo 2. Human bone point of composite fishhook from Ylig Bay, Guam. Photo by Rick Schaefer.

Orote Peninsula

From three sites at Orote Peninsula, Carucci (1993) collected 604 fish bones and 548 fish scales. Most of the remains (92% of the bones and all but one of the scales) came from the Dadi Beach Rockshelter, Site 2-1302. Dadi Beach is the west coast of the southernmost part of Orote Peninsula (Fig. 8). Ziegler identified the vertebrate remains. Families of fishes and NISP are shown in Table 9. No fishhooks were found in the Dadi Beach Rockshelter, but a single piece of worked *Isognomon* was collected. Ten radiocarbon dates were obtained from the rockshelter. The most probable calibrated age ranges span AD 540-870 to 1450-1670, from the Transitional Pre-Latte Phase through the Latte Phase and into the early Historic Period.

Table 9. Families of fishes and number of identified specimens (NISP) from Orote Peninsula, Guam (Carucci 1993).

Family or Other Group	**Common Name**	**NISP**
Scaridae	Parrotfishes	15
Acanthuridae	Surgeonfishes	13
Balistidae	Triggerfishes	11
Labridae	Wrasses	9
Belonidae	Needlefishes	7
Diodontidae	Porcupinefishes	3
Holocentridae	Squirrelfishes	3
Chondrichthyes	Sharks and rays	1
Exocoetidae	Flyingfishes	1
Mullidae	Goatfishes	1
Scombridae	Tunas	1
Total		**65**

North and South Finegayan, Communications Annex

North and South Finegayan are on the northwest coast of Guam, directly north and south of the former FAA Housing (Fig. 8). From sites at Pugua Point and Haputo Embayment in North Finegayan and Hilaan Embayment in South Finegayan, Olmo et al. (2000) recovered 677 fish bones. Ziegler identified the vertebrate remains. Families of fishes and NISP are shown in Table 10.

Citing Davidson and Leach (1988:350), Olmo et al. (2000) suggested that the families present indicate four types of fishing: 1) nets (acanthurids, balistids, mullids, and scarids), 2) demersal baited hooks (labrids, lethrinids, lutjanids, and serranids), 3) pelagic lures (carangids, coryphaenids, and scombrids), and 4) general foraging (diodontids, fistulariids, and holocentrids).

From North Finegayan, 24 shell fishhooks, fishhook fragments, and fishhook blanks were recovered, as well as 6 shell gorges. Most of the fishing gear, including the *Isognomon* point of a composite hook (Fig. 9), came from Pugua Point.

Seven radiocarbon dates were obtained, most from coconut shell. The 2-sigma calibrated results range from AD 960-1030 to AD 1640-1950, covering most of the Latte Phase and the Historic Period. The radiocarbon sample from the same provenience as the *Isognomon* point of a composite hook yielded a date of AD 1020-1190, early in the Latte Phase.

Table 10. Families of fishes and number of identified specimens (NISP) from North and South Finegayan, Guam (Olmo et al. 2000).

Family	Common Name	NISP
Scaridae	Parrotfishes	110
Acanthuridae	Surgeonfishes	10
Balistidae	Triggerfishes	7
Holocentridae	Squirrelfishes	6
Serranidae	Groupers	4
Diodontidae	Porcupinefishes	3
Labridae	Wrasses	3
Lethrinidae	Emperors	3
Labridae or Lethrinidae	Wrasses or Emperors	2
Carangidae	Jacks	2
Scombridae	Tunas	2
Coryphaenidae	Mahimahi	1
Fistulariidae	Cornetfishes	1
Lutjanidae	Snappers	1
Mullidae	Goatfishes	1
Total		**156**

FISH REMAINS AND FISHING GEAR FROM THE CNMI

The three largest islands of the CNMI, from north to south, Saipan, Tinian, and Rota, are discussed.

Achugao, Saipan

The Achugao Archaeological Project, undertaken by the Center for Archaeological Investigations at Southern Illinois University, investigated four parcels north and south of Puntan Achugao on the northwest coast of Saipan (B. Butler 1995) (Fig. 10). Fish remains were identified by Virginia Butler of Portland State University. Fish remains numbered 446 with 75 of the specimens identifiable to family and element (V. Butler 1995) (Table 11). A comparison with fish remains from two projects on Rota, the Rota Airport Road Project and Mochong, using data from Davidson and Leach (1988), found that the three project areas are similar with regard to the inshore fishes, but differ markedly with regard to the pelagic fishes. The families Coryphaenidae (mahimahi) and Istiophoridae/Xiphiidae (marlins and sailfishes/swordfishes) are present in the Rota collections, but lacking from Achugao. This difference was attributed to major environmental differences between the two islands (V. Butler 1995).

Fishing gear recovered by the Achugao Archaeological Project includes one complete fishhook, possibly of *Turbo* shell, from an Early Pre-Latte context, two fishhook fragments of *Turbo* or *Haliotis* from Transitional contexts, and two fishhook fragments of *Isognomon* (B. Butler 1995). In addition, there are 16 pieces of worked shell, mostly *Isognomon*, including at least two fishhook blanks and six pieces that may be fragments of lures.

According to B. Butler (1995:35), the Achugao area was occupied by at least 1500 BC. The 2-sigma calibrated dates from the area range from 1920-1630 BC to AD 1280-1395, almost the entire Prehistoric Period.

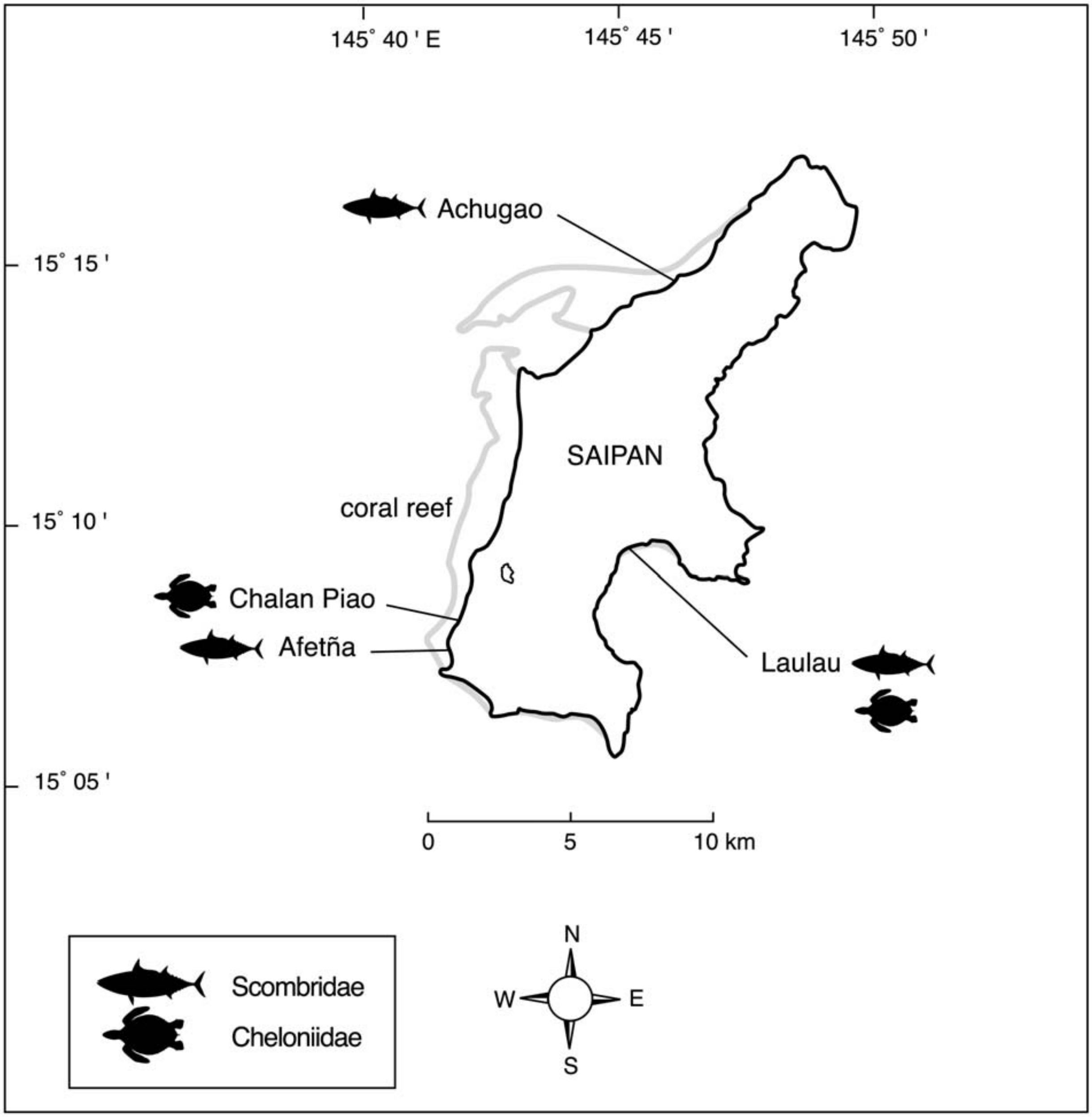

Figure 10. Saipan, showing archaeological sites with pelagic fish and turtle remains. Figure by Robert Amesbury.

Table 11. Families of fishes and number of identified specimens (NISP) from Achugao, Saipan (V. Butler 1995).

Family or Other Group	Common Name	NISP
Scaridae	Parrotfishes	25
Acanthuridae	Surgeonfishes	15
Lethrinidae	Emperors	14
Labridae	Wrasses	6
Serranidae	Groupers	5
Balistidae	Triggerfishes	3
Holocentridae	Squirrelfishes	2
Carangidae	Jacks	1
Diodontidae	Porcupinefishes	1
Elasmobranchii	Sharks and rays	1
Lutjanidae	Snappers	1
Scombridae	Tunas	1
Total		**75**

Afetña, Saipan

Excavations at Afetña, Saipan (McGovern-Wilson 1989), southwest of Chalan Piao (Fig. 10), revealed three occupations of the area. Three dates were obtained from *Tridacna* shells, and a marine reservoir correction was applied. The dates calibrated according to Stuiver and Pearson (1986) range from AD 420-650 to AD 650-810. Amesbury et al. (1996) recalibrated the dates according to Stuiver and Reimer (1993). The revised dates are a few hundred years later; the 2-sigma dates range from AD 676-1161 to AD 901-1307 (Amesbury et al. 1996:56).

The faunal material from Afetña was analyzed by Leach et al. (1989a) (Table 12). Pelagic fishes account for 2.6% of total MNI. McGovern-Wilson (1989) reported two shell gorges and one fragment of a bone composite hook. In addition, there were seven human bone spear points associated with a human burial (Fig. 11) and two bone spear points not associated with the burial. The spear points may have been harpoons, or they may have been used in fighting, or both.

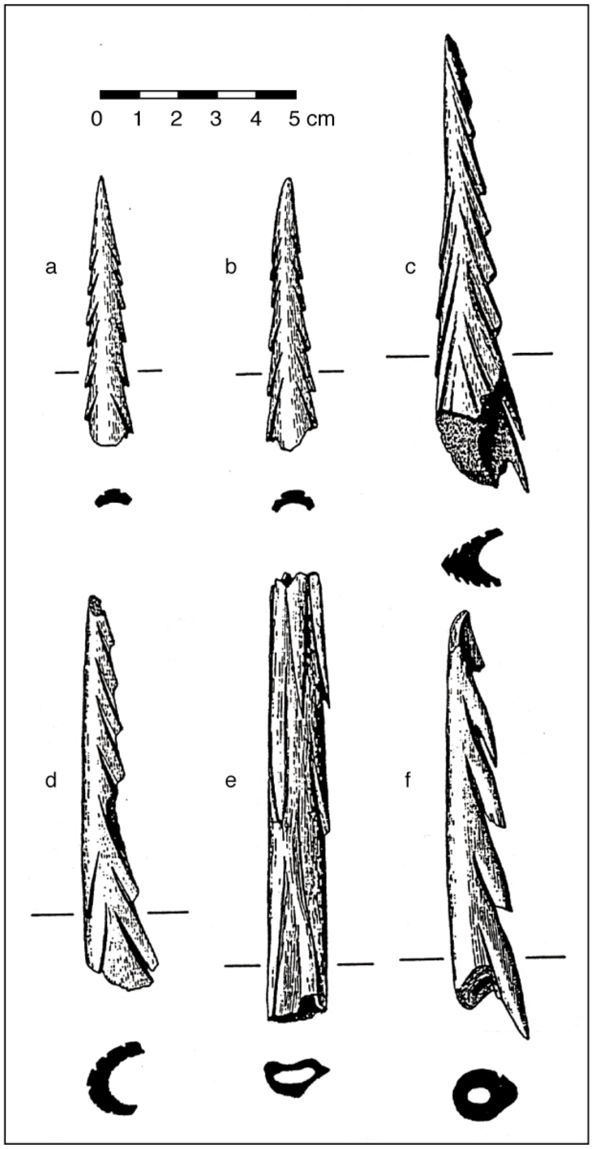

Figure 11. Human bone spear points found in association with Burial 6, Afetña, Saipan. From McGovern-Wilson (1989).

Table 12. Families of fishes, minimum number of individuals (MNI) and percent MNI from Afetña, Saipan (Leach et al. 1989a).

Family	**Common Name**	**MNI**	**Percent MNI**
Scaridae	Parrotfishes	31	79.5
Labridae/Coridae	Wrasses	3	7.7
Carangidae	Jacks	2	5.1
Holocentridae	Squirrelfishes	1	2.6
Lethrinidae	Emperors	1	2.6
Thunnidae/Katsuwonidae	Tunas including yellowfin and skipjack	1	2.6
Total		**39**	**100.0**

Laulau, Saipan

Fish bone from the 1977 Laulau excavation (Marck 1978) was identified by Thomas Dye, then at the Bishop Museum. Sixteen bones were identified to family. Families present are Scaridae (parrotfishes), Acanthuridae (surgeonfishes), Serranidae (groupers), Scombridae (tunas), and Lethrinidae (emperors). Dye tentatively identified the scombrid tooth as dogtooth tuna (*Gymnosarda unicolor*), which according to Amesbury and Myers (1982) is a solitary species and primarily a reef dweller. So it is possible that no pelagic fishes were recovered from this site. Two Early Pre-Latte dates were obtained: 960 BC and 940 BC. Eight fishhooks and one blank were found throughout the sequence.

Military Leaseback Area, Central Tinian

Twenty-eight of 47 test units excavated during the Tinian Leaseback Area project yielded 1289 fish bones weighing 196.0 grams (Gosser et al. 2002). Eight families were identified. Number of identified specimens (NISP), MNI, percent MNI, and weight are shown on Table 13. The mahimahi remains (family Coryphaenidae) account for 2.2% of the total MNI of identified fishes. They were recovered from a latte site (TN-1/2/4-0592) at Unai Masalok on the east coast of Tinian (Fig. 12).

Table 13. Families, minimum number of individuals (MNI), percent MNI, number of identified specimens (NISP), and weight of fish remains from the Tinian Leaseback Area (Gosser et al. 2002).

Family or Other Group	Common Name	MNI	Percent MNI	NISP	Weight (grams)
Scaridae	Parrotfishes	29	63.0	42	29.8
Labridae	Wrasses	4	8.7	4	2.5
Serranidae	Groupers	4	8.7	4	2.7
Lethrinidae	Emperors	3	6.5	3	4.8
Diodontidae	Porcupinefishes	2	4.3	2	4.6
Balistidae	Triggerfishes	2	4.3	2	0.5
Carangidae	Jacks	1	2.2	2	1.2
Coryphaenidae	Mahimahi	1	2.2	2	5.7
Total		**46**	**100.0**	**61**	**51.8**

Gosser et al. (2002) calculated fish bone densities and correlated the radiocarbon dates with layers of the excavation. The density of fish remains for ten layers dated to the Pre-Latte Phase is 49.4 grams per cubic meter. The density of fish remains from eight layers dated to the Latte Phase is 58.5 grams per cubic meter. Gosser et al. (2002:119) concluded that there were no major changes in density or diversity of fish remains. However, it should be noted that the total volume excavated is not large. Less than one cubic meter was excavated of the ten layers dated to the Pre-Latte Phase, and just over one-half cubic meter was excavated of the eight layers dated to the Latte Phase.

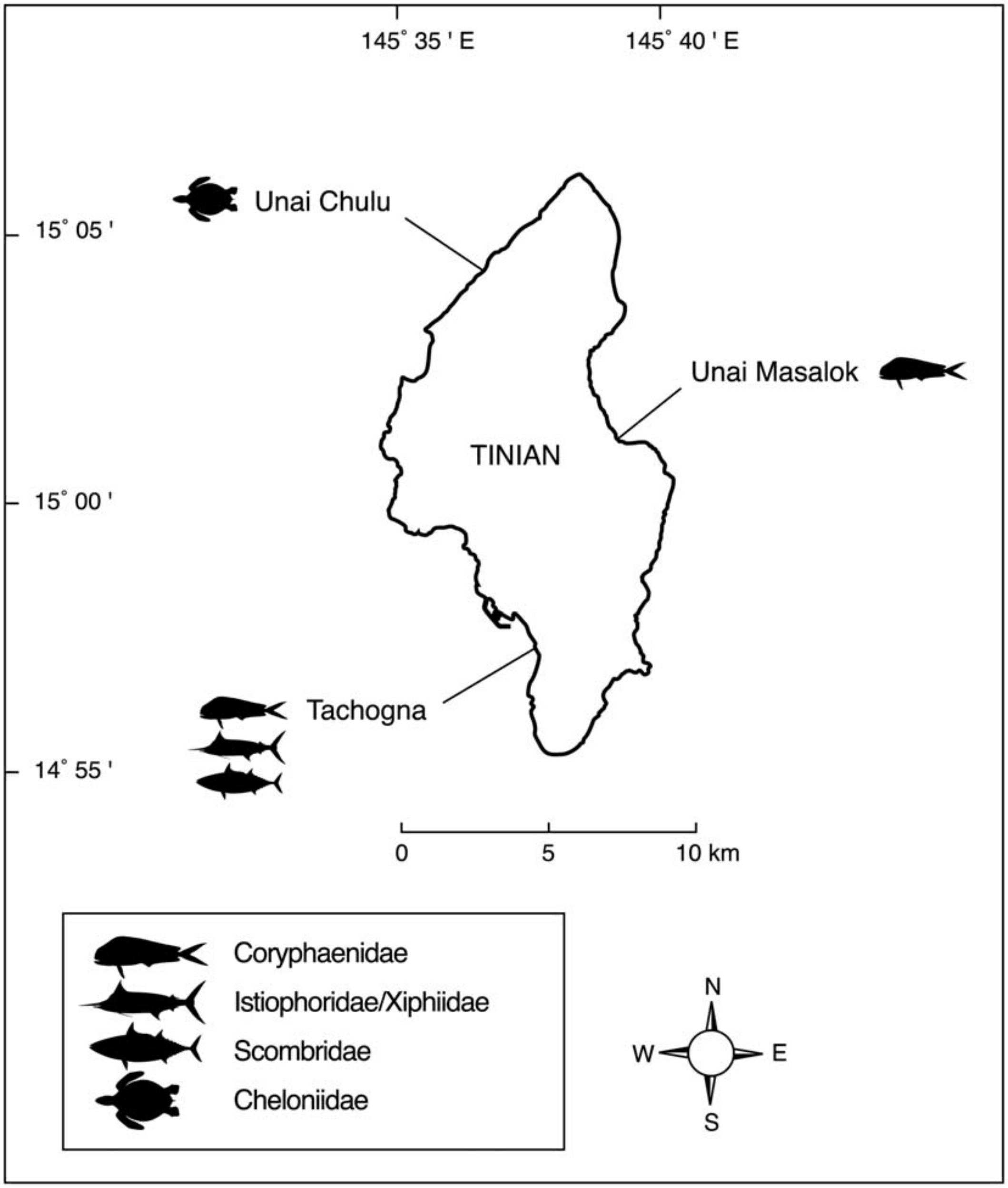

Figure 12. Tinian, showing archaeological sites with pelagic fish and turtle remains. Figure by Robert Amesbury.

Tachogna, Tinian

Tachogna is an area on the southwest coast of Tinian, south of San Jose Village (Fig. 12). On the USGS map the name is spelled "Tachungnya," but Leach and Davidson (2006a, b) spell this site "Tachogna."

The fish remains from the site were recovered by John Craib and Graeme Ward of Australia and studied by Andrew Piper at Otago University in New Zealand. The MNI data presented here (Table 14) were extracted from the faunal database at the

Archaeozooology Laboratory, Museum of New Zealand Te Papa Tongarewa by Foss Leach (pers. comm. 2006). Pelagic fishes account for 3.3% of the total MNI.

Table 14. Families of fishes, minimum number of individuals (MNI) and percent MNI from Tachogna, Tinian (Leach pers. comm. 2006)

Family or Other Group	Common Name	MNI	Percent MNI
Scaridae	Parrotfishes	132	43.42
Lethrinidae	Emperors	34	11.18
Holocentridae	Squirrelfishes	24	7.89
Epinephelidae	Groupers	24	7.89
Coridae/Labridae	Wrasses	24	7.89
Lutjanidae	Snappers	23	7.57
Nemipteridae	Monocle breams	13	4.28
Elasmobranchii	Sharks and rays	5	1.64
Istiophoridae/Xiphiidae	Marlins, sailfishes/Swordfishes	4	1.32
Balistidae	Triggerfishes	4	1.32
Scombridae	Tunas	3	0.99
Carangidae	Jacks	3	0.99
Coryphaenidae	Mahimahi	2	0.66
Belonidae	Needlefishes	2	0.66
Acanthuridae	Surgeonfishes	2	0.66
Teleostomi	Includes bony fishes	1	0.33
Mullidae	Goatfishes	1	0.33
Kyphosidae	Sea chubs or rudderfishes	1	0.33
Aulostomidae	Trumpetfishes	1	0.33
Acanthocybiidae	Wahoo	1	0.33
Total		**304**	**100.00**

Mochong, Rota

Fish bone from Mochong, Rota (Craib 1990) (Fig. 13) was analyzed by Leach et al. (1990). MNI was calculated for identifiable fishes. The total minimum number of identifiable fishes is 313. At least 27 families or other groups were identified, and percentage by MNI was calculated for each family (Table 15). Pelagic fishes account for 16.9% of MNI.

Method of fishing was estimated and percentage by MNI was calculated for each method (Table 16).

The most numerous class of fishing gear at Mochong is the fishhooks (Craib 1990). Finished hooks and preforms number 18, while fishhook blanks and tabs number 13. All were made from *Isognomon* or *Turbo*. Fifteen gorges (eight finished and seven unfinished) were recovered, all from Horizon 1. Three pieces of worked bone were identified as barbs of two-piece hooks. Four spear points with grooves at right angles to the shaft were recovered from Horizon 1. The spear points are classified as weapons, but they may have been used to procure fish.

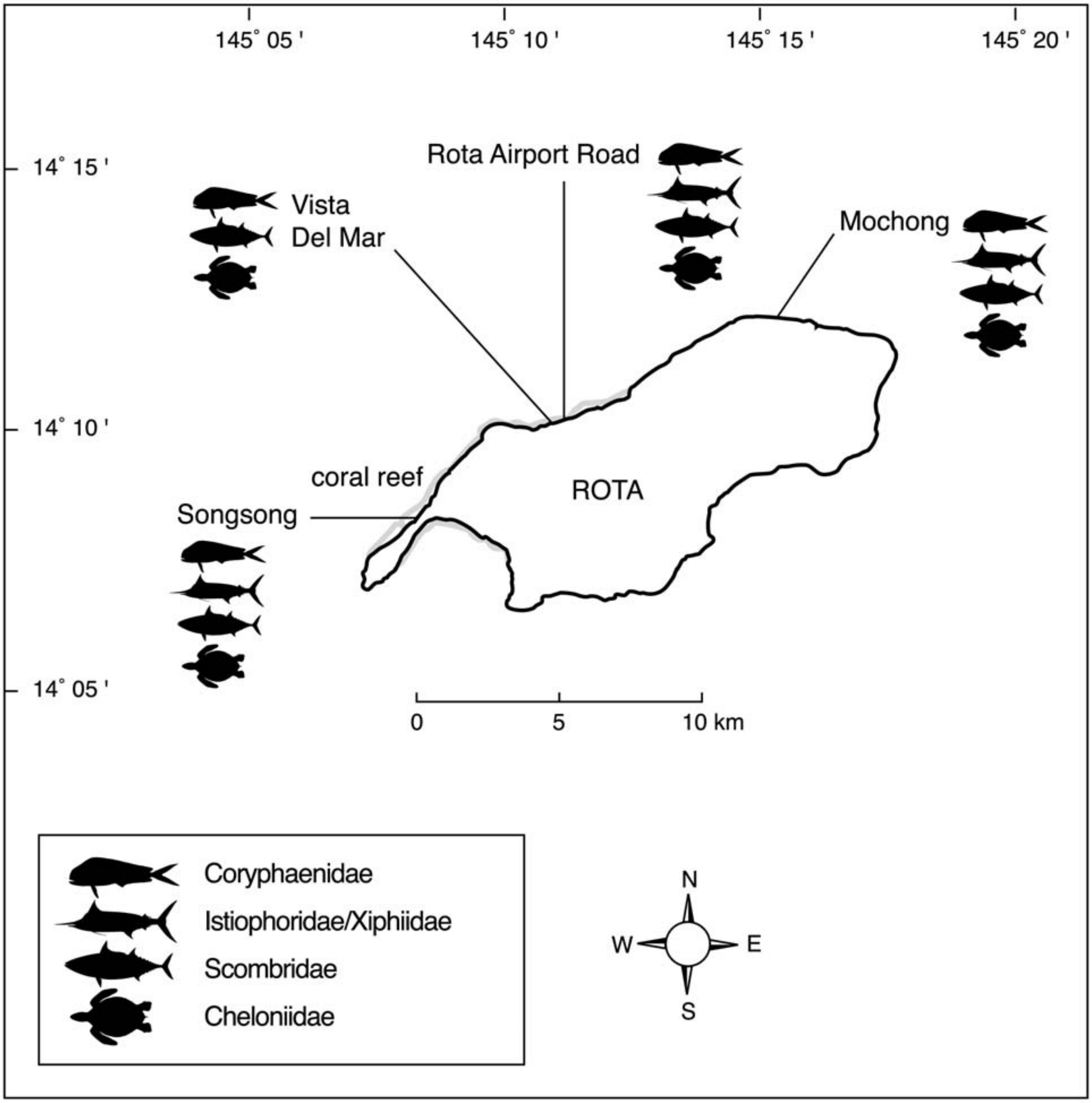

Figure 13. Rota, showing archaeological sites with pelagic fish and turtle remains. Figure by Robert Amesbury.

Table 15. Families of fishes, minimum number of individuals (MNI), and percent MNI from Mochong, Rota (Leach et al. 1990).

Family or Other Group	**Common Name**	**MNI**	**Percent MNI**
Scaridae	Parrotfishes	68	21.7
Coryphaenidae	Mahimahi	37	11.8
Lethrinidae	Emperors	35	11.2
Epinephelidae	Groupers	30	9.6
Balistidae	Triggerfishes	25	8.0
Lutjanidae	Snappers	18	5.8
Holocentridae	Squirrelfishes	15	4.8
Coridae/Labridae	Wrasses	12	3.8
Nemipteridae	Monocle breams	11	3.5
Acanthuridae	Surgeonfishes	9	2.9
Muraenidae	Moray eels	8	2.6
Carangidae	Jacks	8	2.6
Istiophoridae/Xiphiidae	Marlins, sailfishes/Swordfishes	8	2.6
Acanthocybiidae	Wahoo	4	1.3
Coridae	Wrasses	3	1.0
Scorpaenidae	Scorpionfishes	3	1.0
Elasmobranchii	Sharks and rays	3	1.0
Teleostomi	Includes bony fishes	3	1.0
Bothidae	Left-eyed flounders	2	0.6
Istiophoridae	Marlins, sailfishes	2	0.6
Tetraodontidae	Puffers	2	0.6
Thunnidae/Katsuwonidae	Tunas including yellowfin and skipjack	2	0.6
Aphareidae	Snappers	1	0.3
Kyphosidae	Sea chubs or rudderfishes	1	0.3
Platacidae	Batfishes	1	0.3
Diodontidae	Porcupinefishes	1	0.3
Aluteridae	Filefishes	1	0.3
Total		**313**	**100.0**

Table 16. Likely catch methods of fishes from Mochong, Rota by families with MNI and percent MNI (Leach et al. 1990).

Likely Catch Method	**Family or Other Group**	**Common Name**	**MNI**	**Percent MNI**
Netting			105	33.5
	Bothidae	Left-eyed flounders		
	Scaridae	Parrotfishes		
	Acanthuridae	Surgeonfishes		
	Balistidae	Triggerfishes		
	Aluteridae	Filefishes		
Demersal Baited Hook			109	34.8
	Epinephelidae	Groupers		
	Lutjanidae	Snappers		
	Nemipteridae	Monocle breams		
	Lethrinidae	Emperors		
	Coridae	Wrasses		
	Coridae/Labridae	Wrasses		
Pelagic Lures			51	16.3
	Acanthocybiidae	Wahoo		
	Coryphaenidae	Mahimahi		
	Carangidae	Jacks		
	Thunnidae/Katsuwonidae	Tunas including yellowfin and skipjack		
Harpoons or Bait Trolling			10	3.2
	Istiophoridae	Marlins, sailfishes		
	Istiophoridae/Xiphiidae	Marlins, sailfishes/ Swordfishes		
General Foraging			23	7.3
	Holocentridae	Squirrelfishes		
	Aphareidae	Snappers		
	Kyphosidae	Sea chubs or rudderfishes		
	Scorpaenidae	Scorpionfishes		
	Diodontidae	Porcupinefishes		
	Tetraodontidae	Puffers		
Basket Traps			8	2.6
	Muraenidae	Moray eels		
Opportunistic Catch			3	1.0
	Elasmobranchii	Sharks and rays		
No Strong Opinion			4	1.3
	Platacidae	Batfishes		
	Teleostomi	Includes bony fishes		
Total			**313**	**100.0**

North Coast of Rota including the Uyulan Region

In 1984 Butler investigated a portion of the north coast of Rota affected by the construction of a new road alignment between the airport and Songsong (Butler 1988). Four prehistoric villages, from west to east, Salug-Songton, Unginao-Uyulan, Teteto-Guata, and Tatgua, were identified in the vicinity of the road. The fish bones from the

Rota Airport Road Project were analyzed by Davidson and Leach (1988) at the University of Otago, Dunedin, New Zealand. Neither total weight nor total number of bones is reported, but MNI was calculated for identifiable fishes. At least 16 families or other groups were identified (Table 17). Pelagic fishes account for 33.6% of MNI. Families were grouped by likely catch methods (Table 18).

Table 17. Families of fishes, minimum number of individuals (MNI), and percent MNI from the Rota Airport Road Project (Davidson and Leach 1988).

Family or Other Group	Common Name	MNI	Percent MNI
Scaridae	Parrotfishes	54	29.3
Coryphaenidae	Mahimahi	30	16.3
Istiophoridae/Xiphiidae	Marlins, sailfishes/Swordfishes	17	9.2
Epenephelidae	Groupers	16	8.7
Thunnidae/Katsuwonidae	Tunas including yellowfin and skipjack	12	6.5
Lethrinidae	Emperors	9	4.9
Holocentridae	Squirrelfishes	8	4.3
Carangidae	Jacks	8	4.3
Lutjanidae	Snappers	8	4.3
Nemipteridae	Monocle breams	8	4.3
Coridae/Labridae	Wrasses	7	3.8
Acanthocybiidae	Wahoo	3	1.6
Acanthuridae	Surgeonfishes	1	0.5
Balistidae	Triggerfishes	1	0.5
Ostraciidae	Boxfishes and cowfishes	1	0.5
Teleostomi	Includes bony fishes	1	0.5
Total		**184**	**100.0**

Davidson and Leach (1988) drew two conclusions from the analysis of the Rota Airport Road Project fish remains. One is that the highly specialized fishing activities observed at Mochong also prevailed for the area investigated by the Rota Airport Road Project. The second is that there was a change either in fishing behavior or in patterns of midden deposition in the area investigated by the Rota Airport Road Project. The big game fishing for marlin and mahimahi, which took place early and through most of the sequence, did not show up in the most recent deposits representing the late Prehistoric Period.

Although fishing was an extremely important subsistence activity for the people of the north coast of Rota, items of fishing gear are not especially numerous from the Rota Airport Road Project (McNamara and Butler 1988). The scarcity may be due to the fragility of the fishhooks and gorges. Fragments of finished fishhooks number 11, and there are two finished gorges. Five pieces of *Isognomon* were classified as unfinished fishhooks, and there are nine other worked pieces of *Isognomon*. Bone artifacts include three spear points, five awls (?), and a possible portion of a fishing lure. Three grooved stone items were classified as line or net sinkers (Weaver 1988). In addition, a single large *Turbo* operculum was grooved like a stone sinker (McNamara and Butler 1988).

Table 18. Likely catch methods of fishes from the Rota Airport Road Project by families with MNI and percent MNI (Davidson and Leach 1988).

Likely Catch Method	Family or Other Group	Common Name	MNI	Percent MNI
Netting			57	31.0
	Scaridae	Parrotfishes		
	Acanthuridae	Surgeonfishes		
	Balistidae	Triggerfishes		
	Ostraciidae	Boxfishes and cowfishes		
Demersal Baited Hook			48	26.1
	Epinephelidae	Groupers		
	Lutjanidae	Snappers		
	Nemipteridae	Monocle breams		
	Lethrinidae	Emperors		
	Coridae/Labridae	Wrasses		
Pelagic Lures			53	28.8
	Acanthocybiidae	Wahoo		
	Thunnidae/Katsuwonidae	Tunas including yellowfin and skipjack		
	Coryphaenidae	Mahimahi		
	Carangidae	Jacks		
Pelagic Harpoons			17	9.2
	Istiophoridae/Xiphiidae	Marlins, sailfishes/ Swordfishes		
General Foraging			8	4.3
	Holocentridae	Squirrelfishes		
No Strong Opinion			1	0.5
	Teleostomi	Includes bony fishes		
Total			**184**	**100.0**

Archaeological data recovery at the Vista Del Mar Resort in the Uyulan region along the north coast of Rota yielded 792 fish bones weighing 659.5 grams (Craib 1998). Nine fish families were identified and MNI was calculated for identifiable fishes (Table 19). Pelagic fishes account for 19.2% of the total MNI. Only two items of fishing gear were recovered, a hook and a gorge.

In order to have a larger sample for analysis, Craib (1998) combined the Vista Del Mar and Rota Airport Road assemblages. In the combined sample are 16 families (MNI = 201) from both Transitional and Latte Phase deposits. Craib found that the Transitional deposits yielded the widest range of fish families—all 16 families, with no single family predominating. The two most common families were Scaridae and Coryphaenidae. In the Latte Phase deposits, only five families were present, and the Scaridae dominate the sample, accounting for 86% of the MNI. With the exception of Istiophoridae/Xiphiidae, all the Latte Phase families are inshore fishes. Craib concluded that the fish bone analysis indicates a trend from a generalized pattern of fishing to a more selective approach where fewer kinds of fish were taken.

Table 19. Families of fishes, minimum number of individuals (MNI), percent MNI, number of identified specimens (NISP) and weight from Vista Del Mar Resort, Rota (Craib 1998).

Family or Other Group	Common Name	MNI	Percent MNI	NISP	Weight (grams)
Scombridae	Tunas	3	11.5	3	69.8
Scaridae	Parrotfishes	9	34.6	18	24.5
Mullidae	Goatfishes	2	7.7	7	5.6
Carangidae	Jacks	2	7.7	3	4.1
Labridae	Wrasses	3	11.5	5	2.2
Istiophoridae	Marlins, sailfishes	2	7.7	3	1.4
Lethrinidae	Emperors	1	3.8	1	1.2
Balistidae	Triggerfishes	1	3.8	1	0.7
Acanthuridae	Surgeonfishes	3	11.5	5	0.5
Total		**26**	**100.0**	**46**	**110.0**

Songsong, Rota

Leach et al. (1989b) analyzed the faunal material for *The Archaeology of Songsong Village, Rota* (McManamon 1989). Pelagic fishes account for 10.6% of the MNI, if the specimen identified to the Order Lamniformes is from a pelagic shark such as a thresher shark or mako shark (Table 20).

Table 20. Families of fishes, minimum number of individuals (MNI), and percent MNI from Songsong, Rota (Leach et al. 1989b).

Family or Other Group	Common Name	MNI	Percent MNI
Scaridae	Parrotfishes	37	43.0
Balistidae	Triggerfishes	7	8.1
Carangidae	Jacks	5	5.8
Coryphaenidae	Mahimahi	4	4.7
Nemipteridae	Monocle breams	4	4.7
Lethrinidae	Emperors	4	4.7
Diodontidae	Porcupinefishes	4	4.7
Epinephelidae	Groupers	3	3.5
Lutjanidae	Snappers	3	3.5
Istiophoridae/Xiphiidae	Marlins, sailfishes/Swordfishes	3	3.5
Belonidae	Needlefishes	2	2.3
Telostomi	Includes bony fishes	2	2.3
Holocentridae	Squirrelfishes	1	1.2
Acanthocybiidae	Wahoo	1	1.2
Mullidae	Goatfishes	1	1.2
Acanthuridae	Surgeonfishes	1	1.2
Scorpaenidae	Scorpionfishes	1	1.2
Elasmobranchii	Sharks and rays	1	1.2
Lamniformes	Mackerel sharks	1	1.2
Coridae/Labridae	Wrasses	1	1.2
Total		**86**	**100.0**

Leach et al. (1989b) also determined the likely catch methods and MNI for each method (Table 21).

Table 21. Likely catch methods of fishes from Songsong, Rota by families with MNI and percent MNI (Leach et al. 1989b).

Likely Catch Method	**Family or Other Group**	**Common Name**	**MNI**	**Percent MNI**
Netting			45	52.3
	Scaridae	Parrotfishes		
	Acanturhidae	Surgeonfishes		
	Balistidae	Triggerfishes		
Demersal Baited Hook			16	18.6
	Epinephelidae	Groupers		
	Lutjanidae	Snappers		
	Lethrinidae	Emperors		
	Nemipteridae	Monocle breams		
	Mullidae	Goatfishes		
	Coridae/Labridae	Wrasses		
Pelagic Lures			12	14.0
	Carangidae	Jacks		
	Belonidae	Needlefishes		
	Coryphaenidae	Mahimahi		
	Acanthocybiidae	Wahoo		
Harpoons			3	3.5
	Istiophoridae/Xiphiidae	Marlins, sailfishes/ Swordfishes		
General Foraging			6	7.3
	Holocentridae	Squirrelfishes		
	Diodontidae	Porcupinefishes		
	Scorpaenidae	Scorpionfishes		
Opportunistic			2	2.3
	Elasmobranchii	Sharks and rays		
	Lamniformes	Mackerel sharks		
No strong opinion			2	2.3
	Teleostomi	Includes bony fishes		
Total			**86**	**100.0**

In order to determine if there were changes through time, the fish remains were grouped according to the depths at which they were found in the ground: 0-50 cm, 51-100 cm, and 101-150 cm. The three most common catch methods are consistent through time (Table 22). Leach et al. (1989b) concluded, "there is nothing to indicate that fishing behaviour significantly changed focus over the history of this site. This could indicate one of three things, either it is a short duration settlement, or there was behavioural conservation over a longer period, or the assemblage sizes are simply too small to make an accurate judgement."

There was no lack of time depth in the Songsong deposits. McManamon (1989) concluded that the pottery analysis and the radiocarbon dates indicate continuous occupation for 2000 years prior to European contact. This would be from the

Intermediate Pre-Latte Phase on. So it appears that there was little change in fishing behavior through time.

Table 22. Catch methods and percentage of total catch for different levels of the excavation at Songsong, Rota (Leach et al. 1989b).

Catch Method	**0-50 cm**	**51-100 cm**	**101-150 cm**
Netting	52.0	53.0	50.0
Baited Hook	12.0	17.0	35.7
Pelagic Lure	16.0	12.8	14.3
Total	**80.0**	**82.8**	**100.0**

Fishing artifacts include shell fishhooks (n = 7) and gorges (n = 3), but none especially for pelagic fishing.

TURTLES FROM GUAM

Turtle remains are reported from seven sites in Guam (Table 23). In addition, they are present in the Ylig midden collections, but not yet reported. All but two of the sites with turtle remains also yielded pelagic fish remains. The two sites with turtle, but without pelagic fishes, are at Tumon Bay—Villa Kanton Tasi (Amesbury 2002) and the Leo Palace Hotel (Davis et al. 1992).

Moore (1983) reported five turtle bones from Layer III at Tarague. Sea turtle was recovered from only one of Liston's (1996) Tarague sites—Site 7-1614. From Pagat, there are 210 grams of turtle bone (Craib 1986). Mangilao Golf Course Site 25 yielded turtle remains weighing 60.87 grams (n = 21).

From the Dadi Beach Rockshelter on Orote Peninsula, Carucci (1993) collected two turtle bones. A single bone from the Leo Palace Hotel site, Naton Beach, was identified as sea turtle (Davis et al. 1992). From four of the five burial areas excavated at Villa Kanton Tasi, there are 67.5 grams of turtle bone (Amesbury 2002). Olmo et al. (2000) recovered three turtle bones from Pugua Point 13, North Finegayan.

Table 23. Number and/or weight of turtle remains from Guam sites.

Site or Area	**Reference**	**Number**	**Weight (grams)**
Tarague	Moore 1983	5	
Tarague	Liston 1996		2.07
Pagat	Craib 1986		210.0
Mangilao Golf Course	Dilli et al. 1998	21	60.87
Ylig Bay	In preparation	Present	
Orote Peninsula	Carucci 1993	2	
Villa Kanton Tasi	Amesbury 2002		67.5
Leo Palace Hotel, Naton Beach	Davis et al. 1992	1	
North Finegayan	Olmo et al. 2000	3	

Pagat is the Guam site with the greatest quantity of turtle remains. Most of the turtle bone from Pagat came from the Pre-Latte Phase deposits. From Horizon I dating to the Latte Phase and Early Historic Period, there are 15.9 grams or 1.04 grams per cubic meter (Table 24). From Horizon II dating to the Pre-Latte Phase, there are 194.1 grams or 41.04 grams per cubic meter.

Table 24. Weight and density of turtle bones by horizon from Pagat, Guam (Craib 1986).

Horizon	**Time Period**	**Weight of Turtle Bones (grams)**	**Density of Turtle Bones (grams per cubic meter)**
I	Latte Phase and Early Historic Period	15.9	1.04
II	Pre-Latte Phase	194.1	41.04

TURTLES FROM THE CNMI

Seven sites in the CNMI have yielded turtle remains (Table 25). Only two of these sites did not have pelagic fish remains. They are Chalan Piao, Saipan (Moore et al. 1992) and Unai Chulu, Tinian (Haun et al. 1999).

Table 25. Number and/or weight of turtle remains from CNMI sites.

Site or Area	**Reference**	**Number**	**Weight (grams)**
Chalan Piao, Saipan	Moore et al. 1992	Present	
Laulau, Saipan	Marck 1978	Present	
Unai Chulu, Tinian	Haun et al. 1999	225	
Mochong, Rota	Craib 1990	114	
Airport Road, Rota	Becker and Butler 1988	9	
Vista Del Mar, Rota	Craib 1998	17	43.5
Songsong, Rota	Henry et al. 1999b	2	2.16

The two CNMI sites with the greatest number of turtle remains both show a decrease in number of bones from the lower layers to the upper layers. At Unai Chulu, Tinian (Haun et al. 1999), all of the turtle bones were recovered from Pre-Latte deposits, but the vast majority of bones (89.33%) derived from Stratum VII, which dates to the Early Pre-Latte Phase (Table 26).

At Mochong, Rota (Craib 1990), 78% of the turtle bones came from Horizon 3, which dates to the Early Pre-Latte to Intermediate Pre-Latte Phases (Table 27).

Table 26. Number of turtle bones by strata from Unai Chulu, Tinian (Haun et al. 1999).

Stratum	Time Period	Turtle Bones
II	Early Transitional Pre-Latte Phase	3
IIIb	Early Transitional Pre-Latte Phase	1
IIIc	Early Transitional Pre-Latte Phase	2
IV	Late Intermediate Pre-Latte Phase	2
VI	Late Early Pre-Latte Phase to Intermediate Pre-Latte Phase	13
VII	Early Pre-Latte Phase	201
VIII		3
Total		**225**

Table 27. Number of turtle bones by horizon from Mochong, Rota (Craib 1990).

Horizon	Time Period	Turtle Bones
1	Latte Phase	10
2	Transitional Pre-Latte Phase	15
3	Early Pre-Latte Phase to Intermediate Pre-Latte Phase	89
Total		**114**

SUMMARY AND DISCUSSION

Minimum Number of Individuals (MNI) and Number of Identified Specimens (NISP) for pelagic fishes from Marianas sites with analyzed remains reviewed in this chapter are shown in Table 28.

The total MNI (based on combined MNI and the allowable NISP) for all of the four largest islands of the Marianas together, for Guam only, and for Rota only are shown on Table 29. The numbers on Table 29 indicate different ratios of the pelagic fishes in the catch of Guam and Rota. For every 100 mahimahi caught around Guam, there were 23 marlins, sailfishes or swordfishes and 9 wahoo or tunas. For every 100 mahimahi caught around Rota, there were 45 marlins, sailfishes or swordfishes and 35 wahoo or tunas. However, these ratios changed greatly with the addition of the two Guam sites (Mangilao Golf Course and Ylig Bay) analyzed for this project. It is likely the ratios will change again when more sites are analyzed.

Percentages of MNI for the ten sites Marianas sites with pelagic fish remains and MNI analysis are shown in Table 30.

Prior to the analyses of fish bones from Mangilao Golf Course and Ylig Bay, it appeared that most of the pelagic fishing in the Marianas during the Prehistoric Period occurred around Rota. This made sense, because Rota is smaller than Guam, Saipan, or Tinian, and has less reef area. It also lacks the large protected west-coast bays and lagoons of Guam and Saipan where reef fishing occurs.

The analyses from these two sites on Guam have changed the picture of pelagic fishing in the Marianas during the Prehistoric Period. It is now clear that there were simply more fish bone analyses for sites on Rota. Pelagic fishing was important on Guam as well as on Rota.

Table 28. Summary of pelagic fish MNI and/or NISP from archaeological sites in the Mariana Islands.

Site or Area	**Coryphaenidae**		**Istiophoridae/ Xiphiidae**		**Scombridae**		**Thunnidae/ Katsuwonidae**		**Acanthocybiidae**	
	MNI	NISP	MNI	NISP	MNI	NISP	MNI	NISP	MNI	NISP
Pagat, Guam	8		2							
Mangilao, Guam	41		14		2				4	
Ylig Bay, Guam	37		4							
Orote, Guam						1				
Finegayan, Guam		1				2				
Achugao, Saipan						1				
Afetña, Saipan							1			
Laulau, Saipan						1				
Central Tinian	1	2								
Tachogna, Tinian	2		4		3				1	
Mochong, Rota	37		10				2		4	
Airport Road, Rota	30		17				12		3	
Vista Del Mar, Rota			2		3					
Songsong, Rota	4		3						1	
Total	**160**	**3**	**56**		**8**	**5**	**15**		**13**	

Table 29. Total MNI of families of pelagic fishes for the Marianas, Guam only and Rota only.

Island/s	**Coryphaenidae**	**Istiophoridae/Xiphiidae**	**Scombridae**
Four largest of the Mariana Islands	161	56	40
Guam only	87	20	8
Rota only	71	32	25

Table 30. Percent of pelagic fishes in the total MNI of identified fishes from ten sites in the Mariana Islands with pelagic fish remains and MNI analysis.

Site or Area	**Coryphaenidae Percent MNI**	**Istiophoridae/ Xiphiidae Percent MNI**	**Scombridae Percent MNI**	**Lamniformes Percent MNI**	**All Pelagics Percent MNI**
Pagat, Guam	4.0	1.0			5.0
Mangilao, Guam	15.4	5.2	2.3		22.9
Ylig Bay, Guam	38.9	4.2			43.1
Afetña, Saipan			2.6		2.6
Central Tinian	2.2				2.2
Tachogna, Tinian	0.7	1.3	1.3		3.3
Mochong, Rota	11.8	3.2	1.9		16.9
Airport Road, Rota	16.3	9.2	8.1		33.6
Vista Del Mar, Rota		7.7	11.5		19.2
Songsong, Rota	4.7	3.5	1.2	1.2	10.6
Average of 10 Sites	**9.4**	**3.5**	**2.9**	**0.1**	**15.9**

Mahimahi was identified at eight of the ten Marianas sites with pelagic remains and MNI analysis shown in Table 30. Marlin was also identified at eight of the ten sites. This is very unusual for Pacific islands. The database of fish remains from archaeological sites at Museum of New Zealand Te Papa Tongarewa contains information on more than 75 tropical Pacific island sites and more than 125 sites in New Zealand, but none of the sites outside the Marianas have mahimahi remains and only one site outside the Marianas has marlin remains (Leach and Davidson 2006b). Marlin accounted for less than 1% of MNI at Motupore, Port Moresby, Papua New Guinea.

However there is another part of the Pacific with evidence of pre-contact fishing for mahimahi and marlin. This is the area on either side of the Luzon Strait, which includes southern Taiwan and the northern Philippines. Coryphaenidae and Istiophoridae are among the most common taxa from archaeological sites at O-luan-pi (or Eluanbi) on the southernmost tip of Taiwan, which date to approximately the same time period as the Early Pre-Latte Phase in the Marianas or somewhat earlier (Li 2002, 1997). Across the Luzon Strait from Taiwan in the Batanes Islands of the Philippines, mahimahi bones have been recovered from a site on the island of Sabtang (Campos pers. comm. 2008). Also the Yami of Botel Tobago, an island off the southeast coast of Taiwan, traditionally fished for mahimahi (Hsu 1982; Kano and Segawa 1956).

Leach and Davidson (2006a) noted that pre-contact people in both southern Taiwan and the Marianas possessed highly specialized fishing skills not seen in other parts of Oceania. The people of the northern Philippines should be added to that group of exceptional pelagic fishermen. Pelagic fishing skills may be one of the pieces of the puzzle that will help to answer the question of where the people of the Marianas came from.

CHAPTER 3. SPANISH PERIOD

By Judith R. Amesbury

EARLY EXPLORERS

Many of the early European explorers to reach the Marianas remarked on the islanders' foods, fishing practices, and fishing gear. The years shown in the headings below are the years in which the individual was in the Marianas. In the case of secondary accounts, the years pertain to the time that the voyage or expedition was in the Marianas. The important arrivals of the 1500s were Magellan's voyage of discovery in 1521, the Loaysa expedition just five years later in 1526, and the voyage of Legazpi, who claimed the Marianas for Spain, in 1565.

Antonio Pigafetta—1521

Magellan's historian on the first expedition to circumnavigate the globe, Antonio Pigafetta, recorded the European discovery of the Mariana Islands in March 1521 (Lévesque 1992a:189-202). The stop at Guam was brief and hostile. The log of the pilot Alvo (Lévesque 1992a:221-229) shows that the Spanish arrived on March 6 and departed on March 9. The islanders came aboard Magellan's ships and took things from them. Magellan was angered by the removal of a skiff, which had been tied to the poop of his own ship. He went ashore with 40 armed men, burned 40 or 50 houses and many canoes, killed seven islanders, and recovered his skiff.

As the Europeans departed, the islanders followed them for a league in 100 or more canoes. They came close to Magellan's ships, showing the Europeans fish as if they were offering the fish to them, but instead they shot stones at them [according to Lévesque, they were using slings to throw stones, Ed. note 1, p. 200]. Pigafetta marveled at the speed and skill with which the islanders maneuvered their canoes.

In his brief description of Guam, Pigafetta provided the following information about the islanders' food and fishing practices:

> Their food is from certain fruits called coconuts, and potatoes [either yams or taro, according to Lévesque, Ed. note 6, p. 200]. There are birds, bananas as long as one palm, sugar-cane and flying fish…
>
> The pastime of the men and women of the said place, and their sport, is to go with their canoes to catch some of these flying fish with some fish-hooks made of fish bones (Lévesque 1992a:200-202).

The significance of Pigafetta's observation to this report is that flying fish are the main food of mahimahi (*Coryphaena hippurus*). This was demonstrated in a pelagic fish feeding study conducted on Guam from 1981 to 1983 (Myers 1984:77, 79). Flying fishes made up 74.5 percent by weight of the stomach contents of the mahimahi samples. This means that it would be possible for a fisherman who was catching flying fish with a hook and line to also catch mahimahi. We know from the archaeological record that the pre-contact Chamorros did catch mahimahi (see Chapter 2).

Martín de Uriarte —1526

The Loaysa expedition, under the command of Fray García Jofre de Loaysa, left Spain in 1525 and arrived in the Marianas in 1526. One of the pilots of the expedition was Martín de Uriarte. Portions of his log are included in the report to the King by Hernando de la Torre (Lévesque 1992a:424-452). Uriarte observed, "They kill plenty of fish with fishhooks made of either wood or bone and with line which they make out of tree bark" (Lévesque 1992a:438).

Andrés de Urdaneta—1526

Andrés de Urdaneta sailed on board one of the Loaysa expedition vessels, which was captained by Juan Sebastian Elcano, who completed the voyage of Magellan after Magellan's death in the Philippines. Urdaneta later became an Augustinian friar and returned to the Marianas in 1565 with the Legazpi expedition.

In Urdaneta's first eyewitness account (Lévesque 1992a:453-460), written at Valladolid in 1537, he described the Marianas. "In these islands, there is no livestock whatever, no chickens, nor any other animals nor food supplies, except rice, which they have in abundance, as well as fish, coconut, coconut oil, and salt" (Lévesque 1992a:456).

In the second eyewitness account by Urdaneta (Lévesque 1992a:461-469), he remarked on the islanders' use of tortoise shell. "As for tortoise shells, they praise them very much for making combs and hooks to fish with…As for fish, they kill many with hooks" (Lévesque 1992a:465-466).

Urdaneta also described the canoes of Guam (Lévesque 1992a:466):

> The canoes they use for fishing are small and they have a counterweight on one side, made of a big piece of wood shaped like a tunny fish. This counterweight is always kept to windward. It is fastened to two sticks that come out of the hull of the canoe. The canoe is made with two prows, which without any interruption can become poop as well as prow. It runs as swiftly one way as the other. The sails are lateen, made of closely-woven mats. They run fast under sail. In order to tack, they do not turn the canoe around but only the sail; they tack with the poop, which is the same as the prow and thus the counterweight remains continuously to leeward [sic].

Secondary Account by Martín Fernández de Navarrete—1526

In describing the canoes of Guam, Martín Fernández de Navarrete paraphrased Herrera and Oviedo (Lévesque 1992a:481-482). Oviedo had interviewed Urdaneta and Martín de Islares in 1539. So Navarrete's information was second or third hand. Concerning trade with the Mariana Islanders, he said,

> Before the *nao* [Manila galleon] anchored at the island, many canoes went aboard with water, that they carried in gourds, salt, fish, potatoes, rice, coconuts, bananas and other local fruits. They did not wish anything other than iron, nails or things with metal tips in exchange for them. All such things they called *herrero*. They appreciate tortoise shell very much in order to make combs and hooks for fishing (Lévesque 1992a:481).

Navarrete described the canoes as follows:

> Most of their canoes were of one piece, although some were composed of many. Usually they were 4 to 5 fathoms in length, were narrow, being two cubits or a little less in width and their depth came up to a man's knee, although there were bigger ones and smaller ones. They fasten the boards of the canoes that are made up of many pieces by drilling the edges and tying one to the other with cord made from tree barks. On the inside, they would have some pieces of wood drilled, upon which they pushed through sticks that they also fastened, in order to strengthen them [according to Lévesque, this means that the canoes had thwarts, Ed. note 3, p. 481]. On the outside, they would caulk them, sealing all the seams with pitch made of lime and oil, so that they did not leak. Every one of them had on one side a counterweight of wood shaped like a tunny fish, almost as long as half the length of the canoe, strongly fastened to two sticks that projected from it [i.e. the canoe] and kept it [i.e. the float] separated from the side something like one fathom.
>
> Their poops could not be differentiated from their prows, and they carried lateen sails made of mats, very well woven. In order to change direction, they did not tack, but only changed the sail because they made the poop the prow whenever they wanted (Lévesque 1992a:481-482).

Father Fray Martín Rada—1565

Miguel Lopez de Legazpi was the Spaniard who formally claimed the Mariana Islands as a possession of Spain on January 26, 1565. Like Magellan's visit in 1521, Legazpi's visit was brief and ended in hostility. The longest narrative of Legazpi's voyage is attributed to Father Fray Martín Rada (Lévesque 1992b:148-170). According to Rada, the fleet sighted land on January 22, and the ships anchored at Guam on January 23. On board was Fray Andrés de Urdaneta who had visited Guam briefly with the Loaysa expedition in 1526. The day the ships anchored, Urdaneta delighted the Chamorros by speaking a few words he remembered in their language. However two days later as the vessels attempted to refill their water supply at the mouth of a cove, the islanders showered the Spaniards with spears and slingstones. The hostilities culminated in the murder of a ship's boy who had fallen asleep on land and the retaliation on the part of the Spaniards by killing some islanders and burning houses and canoes. The ships sailed from Guam on February 3, less than two weeks after their arrival.

When Legazpi's ships anchored, more than 400 proas came out to meet them. The following day, they came in larger numbers. Rada described the proas as follows (Lévesque 1992b:158):

Their canoes are so well finished and very well made, fastened with cords. On their surface, they applied a white or orange-colored pitch instead of tar. They are very light and they sail aboard them with their palm-mat lateen sails, cutting against the wind and tacking so swiftly that it is [a] marvelous thing to watch. According to the sailors aboard the fleet, they have never seen any kind of *fustas* [small ships rigged with lateen sails] so light as these. They have neither poop nor prow [as such] so that as they go sailing they just change the point of the lateen sail and, as fast as they went forward, they come back with the poop [acting now] as a prow. It certainly is something to see how fast they sail and how easily they change direction.

Concerning the food and fishing practices of Guam, Rada wrote the following (Lévesque 1992b:164):

No-one was found who ate or had any kind of meat, any wild or domestic cattle, any birds whatever except a few turtle doves that they kept in cages; as for the Indians we kept captive on board, they did not wish to eat any meat at all and at the beginning they did not want to eat any of our things. They have fish in quantity which they take with fish-hooks, and fish-nets, some of which are rather large implements. Some people noticed a few times, when the Indians were bartering at the ships, if some fish of any kind swam by the ship, they dove in after it and took it out with their [bare] hands, which is something wonderful to see. They are excellent swimmers.

In describing the boat sheds, Rada gave the following details about the ocean-going sailing canoes (Lévesque 1992b:164):

They have other large houses used as boat sheds, not to live in but used as community halls. They place their large proas and their canoes in the shade there. Each village has one of these sheds. There was one of them where we took our water [Umatac], very nice with four naves, made in the shape of a cross, that could hold 200 men, 50 in each wing. They were very spacious, wide and high, and worth seeing. Inside the above, mass was said on the days we were there; there could be seen also some large proas, which they say are meant for crossing the high sea between the islands and which carry a heavy load. All of them come with a counterweight on the windward side, in proportion to the size of the proa, with which they sail safely because they cannot capsize.

Major Estéban Rodriguez—1565

Major Estéban Rodriguez was the pilot of the flagship of Legazpi's voyage. Rodriguez also described the canoes of Guam (Lévesque 1992b:91):

The proas they brought along are the lightest sailboats in the world. Neither galley nor brig can be compared with them. They are very narrow and long. The prow and the poop are interchangeable. They have as a counterweight on one side, in order not to capsize, a thick but light pole, stuck out at the end of some [cross-]bars, that touches the water. This counterweight is kept to windward, and the side in question is always the windward side, with the other side to leeward. That is why they make one end the prow when they go one way and the other end when they tack back. The sails are lateen sails, cut in the shape of a triangle, on the side of the yardarm as well as on the side of the boom, which serves to trim the sail. [Hence,] they carry the sail on two yards, one above and the other below. With the lower yard, they make the sail bigger, or smaller; if there is much wind, they roll up the sail upon the lower yard as much as they want. The sails are made of finely woven palm and looked like coarse linen. Each proa carried 9 to 10 Indians. One of them was kept busy bailing out water, because such boats are not water-tight. They do not caulk them nor nail them together; [rather,] they have the boards fastened to the others with reed lashings. They then apply a pitch made of red earth [mixed] with lime and coconut oil. When new, they caulk them with this pitch, and they do not leak; the water that comes in is not much. These people are graceful and fast, expert with these boats.

Rodriguez added the following:
Their food consists of *tamales* made of rice, some toasted and others fresh; the toasted ones keep much longer. They also eat big yams and small potatoes, bananas, fish and coconuts. They make oil from the coconuts for lighting and cooking purposes. There is much ginger here, and other fruits whose names I do not know.

These islanders have many canoes, big and small. One day I saw more than 500 of them alongside the ships; they all came to barter, bringing food of the type mentioned above. They called for nothing else but nails in exchange (Lévesque 1992b:94).

Secondary Account by Father Juan de Medina—1565

A secondary account of Legazpi's voyage by Father Juan de Medina (Lévesque 1992b:258-265) also reported on the islanders' skills at sailing, swimming, and fishing. Medina wrote, "Both men and women are fine sailors and swimmers, for they are accustomed to jump from their little boats after fish, and to catch and eat them raw" (Lévesque 1992b:262).

Secondary Account by Father Fray Gaspar de San Augustin—1565

Another secondary account pertaining to the voyage of Legazpi is by Father Fray Gaspar de San Augustin (Lévesque 1992b:267-281). Father San Augustin wrote, "The natives are not used to eating meat; they were unable to have those held captive aboard the ships eat meat either, except fish. They caught the fish with hooks made of bone, or something that produced the most admiration, by diving underwater to get it, as they are such awesome swimmers that only those who have seen them can believe it" (Lévesque 1992b:280).

THE FIRST SPANISH RESIDENTS OF THE MARIANAS

Before the end of the 16th century and at the beginning of the 17th century, individuals motivated by religious zeal jumped ship in the Marianas in order to convert the islanders to Roman Catholicism. Other Spaniards resided in Guam as a result of shipwreck. Their longer tenure in the islands allowed them to learn more of the customs of the islanders.

Fray Antonio de los Angeles—1596-1597

Fray Antonio de los Angeles, who is considered the first missionary to the Mariana Islands, jumped ship at Guam in 1596. Two men from his ship jumped into the water to bring him back, but they were unable to overtake him, and all three Spaniards remained in the Marianas until 1597.

De los Angeles wrote, "When our ships pass by, they come to barter palm mats that are very well made, coconuts and fish, for iron, of which they are very fond, not caring for gold nor silver" (Lévesque 1993:71).

"Their occupation is fishing and bartering the fish with the islands where they do not have any, bringing back as a reward what they need and is lacking in their island" (Lévesque 1993:72). [According to Lévesque, the word "islands" is used to mean "villages", Ed. note 1 on p. 71. However, the Chamorros were traveling between islands of the Marianas as well.]

Concerning the customs associated with dying, de los Angeles said, "When a sick person is about to die, they take him upon a board to the house of a friend and they give him a little raw fish to eat, and those present eat some of it also" (Lévesque 1993:72). After a person died and was buried,

> They placed on top of the burial site a paddle or a [model] canoe, a bow and arrow, or all the fishing nets, fishhooks and knives, all of it made into bundles…They praise him for his skill at fishing and the great strength with which he used to throw spears and shoot the sling, that he would go to the Spanish ships passing by there and bring back iron, that he built canoes, gave feasts to which he invited the town people, and that he owned many tortoise shells, which they placed on the grave and which they value a great deal (Lévesque 1993:73).

De los Angeles said that fishing nets and fishhooks were also offered to their idols at feasts (Lévesque 1993:73).

Fray Juan Pobre de Zamora—1602

Fray Juan Pobre de Zamora, a lay brother of the Franciscan order of Discalced Friars, was aboard a ship in a fleet that departed Acapulco on February 4, 1602 (Driver 1983). The fleet carried the new governor of the Philippines, Don Pedro Bravo de Acuña. Governor de Acuña had learned in Acapulco of the shipwreck of the *Santa*

Margarita at Rota one year earlier in February 1601, so he ordered the fleet to put in at Rota where they recovered 21 survivors. An additional four survivors were recovered from Guam.

Moved by a desire to see the people of Rota converted to Roman Catholicism, Fray Juan Pobre and a religious brother Fray Pedro de Talavera jumped ship at Rota. Fray Juan Pobre remained there seven months until October 1602 when he left on a ship bound for the Philippines.

While on Rota, Fray Juan Pobre was visited by a Spaniard named Sancho, one of the three Spanish survivors of the *Santa Margarita* that had remained in the Marianas. Sancho lived on Guam as the servant to a Chamorro master named Suñama. Islanders from Pago, Guam, brought Sancho to Tazga, Rota, where he visited for several days with Fray Juan Pobre and Fray Pedro de Talavera. At the end of their visit, Fray Juan Pobre accompanied Sancho back to the village of Guaco, Rota, where he was to meet the villagers from Pago, Guam, who had brought him to Rota (Driver 1988). As the two slept at Guaco that night, Sancho was speared in the back, and nine or ten days later, in the month of August, he died at the home of Fray Juan Pobre's master in Tazga.

In Chapter 70 of his account, Fray Juan Pobre related what Sancho had told him about the customs of the Mariana Islands (Lévesque 1993:175-188). Sancho said the islanders "use all the known nets and inventions to catch fish, and many more" (Lévesque 1993:175). Concerning flyingfishes (family Exocoetidae), Sancho reported the following:

> The common fish they catch in the islands is the flying-fish which is a very good fish (in the islands). They use many different kinds of hooks, of very hard wood, of shells, and they make them with surprising workmanship although most of them now make them with nails from the ones the ships give them and those they found in the sad ship, the *Santa Margarita*, which must have supplied the whole island. When they fish for these flying-fish, those from one town all come together in a bunch and they go out in their canoes, each one with from ten to twelve gourds; to each gourd is tied with a very slim cord a small two-pointed shell hook. One hook is baited with coconut meat and the other with shrimp or some minnow from the sea. All the fishermen throw these gourds into the sea together, everyone taking care of his own. It is by watching the gourds and seeing them wiggle that they know they have a flying-fish. There are so many fishermen because all those living on the coast of all the islands are fishermen. There are flying-fish for all of them as there are sardines in Spain. The average fish measures about one palm in length, and others about two. The first flying-fish they catch, they then eat it raw. The second one is placed as a bait on a large hook and the cord is thrown over the poop and in this manner they usually catch many dorados, swordfish, and other big fishes. They are much enemies of the sharks and they do not eat them. The Indian chiefs do not eat any fish with leathery skins nor soft-water river fishes either. I want to conclude, as far as their fishery is concerned, with two things I have seen by which the reader will be

convinced that they are the most skillful fishermen and sailors who have been discovered (Lévesque 1993:176).

The two stories that Sancho then related were one demonstrating the swimming and diving skills of the islanders and one about how his master landed a billfish, possibly a blue marlin (*Makaira nigricans*) according to S. Amesbury (Driver 1983). Details of the story differ in the two translations by Driver (1983) and Lévesque (1993). Below is the translation by Driver (1983:209):

> My master, whom they called Sunama, went fishing far out to sea. After having eaten the first flying fish (*bolador*), and after having baited his hook with the second, as I described earlier, a very large blue marlin (*aguja paladar*) took the hook. His line was very thin and, as he did not want to break it, he hesitated to pull it in. Yet he was very anxious to land the fish; therefore, he very cautiously began playing and tiring it. This took a long time. Meanwhile, a large shark appeared and attacked the blue marlin in the midsection of its back. In order not to let go of his line, the *indio* allowed his boat to capsize. Then he tied the end of the line to the capsized *funei*, followed the line through the water to the shark, and diverted him from his catch. Then he brought the blue marlin back to his boat, righted the craft, and sailed home, flying a woven mat as a banner from the masthead. Once ashore, he began to tell us what had happened and, like a person who believes he has accomplished a great feat, very proudly strutted pompously along the beach.

Sancho concluded his discussion of fishing by giving the Chamorro equivalents for his Spanish names of the fish. "They call the *bolador* 'gaga' [flying fish], the *dorado* 'botague' [mahimahi], and the *aguja paladar* 'batto' [blue marlin]" (Driver 1983:209).

In regards to the Chamorro system of justice, Sancho commented on the value of turtle shell.

> When one kills another, if they are from the same town he absents himself from that town to go to another island so that the relatives will not kill him. He remains absent until from the killer's house or from that of his father or mother they take one or two palms of tortoise [shells] which is the thing that is most valued among them and with some big fish and rice they pay the father or mother or wife of the deceased for the death. Once this has been done, they send word to the exile and he can come freely and walk about fearlessly through his town and that is their form of justice (Lévesque 1993:212).

In fact this practice of paying for a death with valuables, including tortoise shells, was carried out after Sancho's own death (Lévesque 1993:195). The native who killed Sancho, a man named Sínaro from Guaco, Rota, made a trip to Guam to take a piece of tortoise shell, a few fish, and other little things to Sancho's master, Suñama, to atone for Sancho's death. However, once the payment was made, Sínaro did not quickly return to Rota, because he feared the natives of Tazga, Rota, where Fray Juan Pobre's master lived.

THE FIRST SPANISH COLONISTS

In 1668 the first permanent mission in the Marianas was established. The superior of the mission was Father Diego Luis de Sanvitores, a Jesuit priest who arrived on Guam on June 15, 1668 (Carano and Sanchez 1964). Along with Father Sanvitores were four other Jesuit priests, a lay brother and lay assistants. In addition to the missionaries, there was a garrison force consisting of a captain, Don Juan de Santa Cruz, and 32 soldiers. Some of the soldiers and most of the lay assistants to the missionaries were natives of the Philippines.

After an initial period of apparent success in converting the islanders to Roman Catholicism, the mission met with hostility. Open rebellion on the part of the Chamorros against the Spaniards broke out in 1670, and Father Sanvitores was killed in 1672. The Spanish-Chamorro Wars continued until 1695 when the final battle took place on Aguiguan or Aguijan (Fig. 1).

Brother (later Father) Lorenzo Bustillo—1668-1671 and 1676-1712(?)

An account by Father Bustillo, made in 1691 (Lévesque 1995a:497-504), described the landing of Father Sanvitores, then-Brother Bustillo, and the other missionaries in the Marianas in 1668. Their entrance into the Marianas was facilitated by General Antonio Nieto, who became Captain of the galleon *San Diego* after the death at sea of Admiral Bartolomé Muñoz just three days prior to their arrival in the Marianas.

Bustillo described a banquet with mutual giving of presents that took place between the islanders and the Spanish at the house of Chief Quipuha in Hagåtña. After eating, Nieto rewarded the Chamorro chiefs with the things they appreciated, "such as hats, clothes, tortoise shells, beads, iron hoops, knives, axes, etc." So in 1668 the islanders still valued tortoise shells, but they were receiving them from the Spanish.

Padre Diego Luis de Sanvitores—1668-1672

Father Sanvitores, in a letter to the Queen of Spain, requested that tortoise shells be sent to him (Lévesque 1995a:528-545). The enclosure to the letter is dated June 1669 and entitled, "List of the things which we will accept for the love of God." The list includes "Tortoise shells, as many as possible. These are used here as money for the payment of freight, etc." (Lévesque 1995a:535).

In a later letter, dated July 5, 1671, to Father Solano, Father Sanvitores requested that a man named Bungi be paid either with half of a large [iron] hoop or a whole small hoop. In a P.S. to the letter, Father Sanvitores wrote, "Bungi is asking for a tortoise shell. If he promises to go to Tinian, he can be given one, instead of the hoop and, since he is our friend, and that eventually we may have to give one to all the chiefs of Agadña, keeping some for those who deserve them" (Lévesque 1995b:150).

Two Accounts Pertaining to the Year 1670

Two accounts pertaining to events on Tinian in the year 1670 relate how a turtle shell was used in a Roman Catholic religious context. The second biography of Father Luís de Medina, another of the priests who arrived in 1668, edited by Father Francisco de Florencia (Lévesque 1995b:20-51) tells how Father Medina and Father Sanvitores arranged peace between two enemy villages on Tinian. On January 22, there was a procession.

> Father Luís de Medina was leading it with the Standard of the most holy Virgin, and of our Fathers St. Ignatius and St. Francis Xavier. Behind him were the catechism children, then the youths, and finally the older ones, and the old men from 7 villages. They all carried some thing in their hands, be it a fruit, or rice. There was a big [turtle] shell which, according to their custom is a sure sign of what they call *Tarioyot*, which means "gratitude". Thus they were walking along, repeating the Act of Contrition, sung out by the fervent Fr. Luís, towards the village of Sungharon, the opposite side" (Lévesque 1995b:41)
>
> As for the [turtle] shell, which is, as we have said, their best sign of gratitude, it was placed as a permanent reminder of past discords at the feet of Our Lady of Guadalupe of Mexico, the patroness and protectress of the Island of Tinian (Lévesque 1995b:42).

The same event was described by Francisco García in his biography of Father Sanvitores.

> Padre Medina led those of Marpo, with the Standard of the Holy Virgin, San Ignacio and San Francisco. After him followed the children who were receiving instruction in the Doctrine, and after them the youths and the older Principals of the village, each with a small gift of fruit or rice. Last of all they carried a great shell, the chief sign of friendship, which only a few days before had come to their hands on one of the rare turtles which are found in these waters. It was believed that the turtle was like a dove of peace, for it was caught at the time that peace was being adjusted, but when they lacked the *concha* [sea shell] that was customarily used at such a time (García 1985:111-112).

Secondary Account by Father Francisco García—1668-1681

Father Francisco García's (1985) *The Life and Martyrdom of the Venerable Father Diego Luis de Sanvitores* includes a history of Guam from 1668 to 1681. García, a Jesuit priest, never served on Guam, but wrote his history in Spain based on correspondence with the Jesuit missionaries in the Marianas and other documents available to him. The work was originally published in 1683 just two years before García died. García recorded the early years of the Spanish-Chamorro wars, and although he mentioned fish or fishing only incidentally, the events he recorded indicate the decline of pelagic fishing.

On May 17, 1672 (García 1985:164-165), a group of soldiers led by Captain Juan de Santiago left Hagåtña to search for the murderers of Sanvitores and to punish other villagers who had assisted them. In Tumon, they did not find Matapang, the principal murderer of Sanvitores, but they burned his house, as well as a dozen more, and destroyed several boats. García noted that this was a form of punishment the natives used against each other.

When Juan Antonio de Salas became the governor of Guam in June 1678, he sacked and burned rebellious villages including Tarague, Tupalao, Fuuna, Orote, and Sumay. In the village of Agofan (located between Piti and Sumay), the governor burned the homes of those who fled but spared the homes of those who remained in the village. García (1985:269) noted that, "…this kind treatment was not sufficient to reassure the *Indios*," and a few days later, some villagers from Agofan departed Guam for the island of Rota. The governor was chagrined by this development and with a native canoe overtook one of the fleeing canoes and made prisoners of its occupants. García (1985:270) added, "This affair made such an impression on the people that for a long while no boats passed along that side of the Island for fear of being seized by the Governor."

In the fall of that year, the same governor burned the villages of Picpuc and Talofofo "with all the goods contained therein, including more than twenty *bancas*" [canoes] (García 1985:272). The following year he burned the village of Janum, and García (1985:285) related, "Fifty boats that were taken as spoils of war were given to the friendly *Indios*" (villagers from Nisihan who had blocked the port of Janum to prevent the escape of the Janum residents by sea).

In 1680, during the first of his three terms as governor, José de Quiroga went to Rota to round up fugitives who had fled from Guam. In Rota he burned some villages where the "malefactors" had been received, and he ordered more than 150 fugitives returned to Guam. He then began the relocation of the islanders into larger settlements more accessible to his administration and to the priests. García (1985:298-299) reported that a furious typhoon on November 11, 1680, destroyed every native house and wooden structure on the island, as well as nearly half the boats, but he added, "The storm served a useful purpose in destroying the houses of the *Indios*, thus facilitating the matter of gathering them into the larger villages."

Some consideration was given to the fishing industry in the relocation process however (García 1985:296-297). When Inapsan was selected as the site for a settlement in the eastern part of Guam, it was found that the river there did not have a good sand bar from which to launch boats, so a channel was made with some difficulty by breaking through the coral reef. Referring to Pago, García (1985:297) said, "Here they established a large settlement, no less agreeable that the other (Inapsan), for it is served by a large river which cuts the village in two, and which has a mouth suitable for launching boats."

OTHER FOREIGN VISITORS

During the Spanish Period, the Mariana Islands were host not only to the Spanish, but also to many other foreign visitors who described the islands. William Dampier, a seaman aboard an English privateer commanded by Captain Swan, visited Guam in 1686 and published a narrative of his round-the world voyage, which includes a lengthy description of the Chamorro "*proes*" (proas) (Dampier1937). Captain Woodes Rogers, who commanded the British privateer *Duke* and spent ten days on Guam in 1710, described the "flying proa" in his diary (Rogers 1928). The English Commodore George Anson, who spent nearly two months on Tinian in 1742, also described the proa (Barratt 1988). The French expedition led by Captain Crozet spent nearly two months on Guam in 1772. The Freycinet expedition, a French scientific endeavor, spent several months in the Marianas in 1819.

William Dampier—1686

William Dampier was a seaman aboard an English privateer commanded by Captain Swan, which sighted Guam on May 20, 1686. In his narrative of their round-the-world voyage, Dampier (1937:196) said it was well for the captain that they sighted land when they did, because the ship was almost out of provisions and, as they learned later, the crew had planned to kill and eat the captain and any others responsible for the voyage.

Before they had anchored at Guam on the night of May 21, they were met by a priest and three islanders who mistook them for Spaniards. The priest was detained aboard ship as a hostage, and the following morning the islanders were sent to the governor of Guam with letters from the priest and from Captain Swan requesting provisions. A cordial exchange of gifts and letters followed until Captain Swan released the priest on May 30 and sailed from Guam on June 2, 1686. Although a Spanish galleon arrived in sight of Guam while Swan was anchored there, there was no hostile action between the English and Spanish ships.

Dampier (1937:206-207) provided a lengthy description of the Chamorro "proes" (proas) and gave the following reason for his description. "I have been the more particular in describing these Boats, because I do believe, they sail the best of any Boats in the World."

Concerning the islanders' sailing ability, he said, "The Native Indians are no less dextrous in managing than in building these Boats. By report they will go from hence to another of the Ladrone Islands about 30 leagues off, and there do their Business, and return again in less than 12 Hours. I was told that one of these Boats was sent Express to Manila, which is above 400 Leagues, and performed the Voyage in four Days time" (Dampier 1937:207).

Captain Woodes Rogers—1710

Captain Woodes Rogers commanded the British privateer *Duke*, which accompanied by the *Duchess*, left England on August 1, 1708. Their voyage around the world concluded on October 14, 1711, and Woodes Rogers published his journal in 1712.

The ships anchored at Guam on March 11, 1710, and departed ten days later on March 21, 1710. Captain Woodes Rogers used the same ploy that Captain Swan had used in 1686. Pretending to be Spanish, he invited two Spaniards aboard ship and detained one of them as a hostage while a letter was sent to the governor demanding provisions. The governor accommodated them with an abundance of food, and their visit was entirely friendly.

The governor also presented them with a "flying proa," which Woodes Rogers described in his diary (Rogers 1928:268-269). He took the boat back to London, thinking "it might be worth fitting up to put in the Canal in St. James's Park for a Curiosity, since we have none like it in this Part of the World."

George Anson—1742

George Anson left England on September 18, 1740 with seven vessels intent on assaulting the Spanish sea towns of South America and the South Seas and seizing the Manila galleon off Acapulco (Barratt 1988). The voyage proved to be extremely costly in ships and lives, but Anson did indeed seize the treasure galleon *Nuestra Señora de Covadonga* off the Philippines in June 1743 before returning to England one year later. He had lost all the ships except the *Centurion* and more than 1300 men.

When the *Centurion* anchored at Tinian August 27, 1742, Anson found no permanent population, because the Chamorros had been moved to Guam. Instead he encountered a party of about two dozen men, islanders under the command of a Spanish sergeant, who had come from Guam to kill and cure beef for the garrison in Guam and for the galleon, which would stop on her way from Acapulco to Manila. After an eventful two-month stay, the *Centurion* departed Tinian on October 21, 1742.

Anson and some of his lieutenants captured a proa on their arrival at Tinian, later dismantled it, and then burned it before they left the island (Barratt 1988:11, 69, 14). Their descriptions and drawings of the proa are among the last in history. Below are Anson's description and a drawing of the proa (Fig. 14) from Haddon and Hornell (1975:413-415).

> These Indians [inhabitants of the Marianas] are a bold, well-limbed people; and it should seem from some of their practices, that they are in no way defective in understanding; for their flying proas in particular, which have been for ages the only vessels used by them, are so singular and extraordinary an invention that it would do honor to any nation, however dexterous and acute. For if we consider the aptitude of this proa to the particular navigation of these

islands, which, lying all of them nearly under the same meridian and within the limits of the trade-wind, require the vessels made use of in passing from one to the other to be particularly fitted for sailing with the wind upon the beam; or, if we examine the uncommon simplicity and ingenuity of its fabric and contrivance, or the extraordinary velocity with which it moves, we shall, in each of these articles, find it worthy of our admiration and meriting a place amongst the mechanical productions of the most civilized nations, where art and sciences have most eminently flourished. As former navigators, though they have mentioned these vessels, have yet treated of them imperfectly,…I shall here insert a very exact description:

The name of "flying proa" given to these vessels is owing to the swiftness with which they sail. . . . From some rude estimations made by our people of the velocity with which they crossed the horizon at a distance, while we lay at Tinian, I cannot help believing that with a brisk trade-wind they will run near 20 miles an hour, which, though greatly short of what the Spaniards report of them, is yet a prodigious degree of swiftness. . . .

The construction of this proa is a direct contradiction to the practice of all the rest of mankind. For as the rest of the world make the head of their vessels different from the stern, but the two sides alike; the proa, on the contrary, has her head and stern exactly alike, but her two sides very different; the side intended to be always the lee side is flat, and the windward side is made rounding in the manner of other vessels: And, to prevent her oversetting, which from her small breadth and the straight run of her leeward side would, without this precaution, infallibly happen, there is a frame laid out from her to windward, to the end of which is fastened a log, fashioned into the shape of a small boat and made hollow. [Haddon and Hornell questioned the statement that the float is hollow.]

The weight of the frame is intended to balance the proa, and the small boat is by its buoyancy (as it is always in the water) to prevent her oversetting to windward; and the frame is usually called an outrigger. The body of the proa (at least of that we took) is made of two pieces joined endways and sewed together with bark, for there is no iron used about her. She is about 2 inches thick at the bottom, which at the gunwale is reduced to less than 1 inch. The dimensions of each part will be better known from the uprights and views contained in the annexed plate, which were drawn from an exact mensuration [Fig. 14]… When [the proa] alters her tack, they bear away a little to bring her stern up to the wind, then by easing the halyard and raising the yard and carrying the heel of it along the lee side of the proa, they fix it in the opposite socket [Fig. 14 c, 7-8], whilst the boom at the same time, by letting fly [one] sheet [Fig. 14 a, 3-4] and haling the [other], shifts into a contrary situation to what it had before, and that which was the stern of the proa now becomes the head, and she is trimmed on the other tack. When it is necessary to reef or furl the sail, this is done by rolling it round the boom. The proa generally carries six or seven Indians, two of whom are placed in the head and stern, who steer the vessel alternately with a paddle according to the tack she goes on, he in the stern being the steersman; the other Indians are employed either in baling out the water which she accidently ships, or in setting and trimming the sail. From the description of these vessels it is sufficiently obvious how dexterously they are fitted for ranging this collection of islands called the Ladrones. For as these islands bear nearly north and south of each other and are all within the limits of the trade wind, the proas, by sailing most excellently on a wind, and with either end foremost, can run from one of these islands to the other and back again, only by shifting the sail, without ever putting about; and, by the flatness of their lee side and their small breadth, they are capable of lying much nearer the wind than any other vessel hitherto known, and thereby have an advantage which no vessels that go large can ever pretend to: the advantage I mean is that of running with a velocity nearly as great, and perhaps sometimes greater than that with which the wind blows.

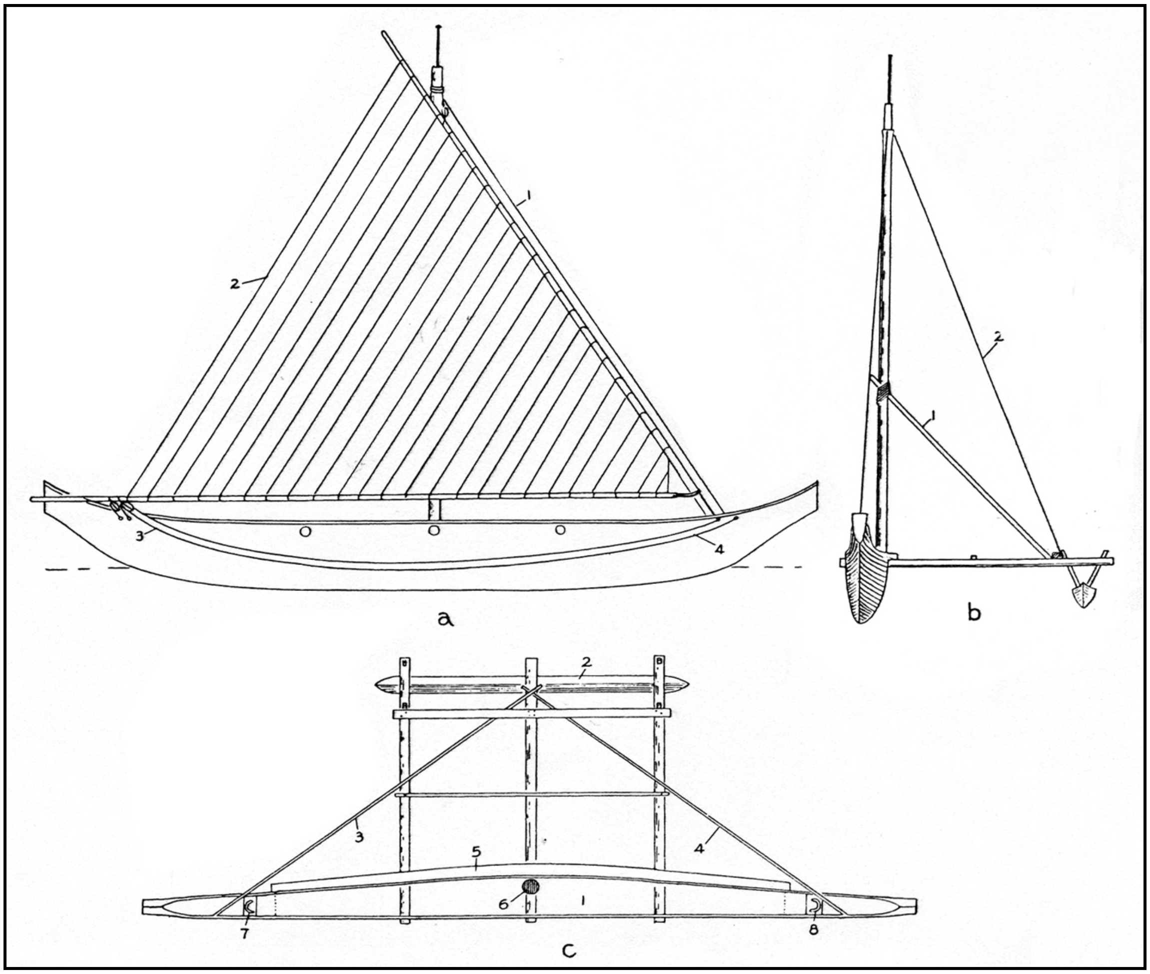

Figure 14. "Flying proa" of the Mariana Islands. a, view from leeward with sail set: 1, one of two stays supporting mast, the other hidden behind sail; 2, matting sail; 3, 4, running stays. b, head view, outrigger to windward: 1, mast shore; 2, shroud. c, plan: 1, proa; 2, "boat" at end of outrigger frame; 3, 4, braces from the ends to steady frame; 5, thin plank placed to windward to prevent shipping of water, to serve as seat for native who bales, and sometimes as rest for goods transported; 6, part of middle outrigger boom on which mast is fixed; 7, 8, horseshoe sockets, in one of which yard is lodged according to tack (after Anson 1748). Figure and caption from Haddon and Hornell (1975:414).

Captain Crozet—1772

Captain Crozet became the leader of a French expedition sent to explore the South Seas when the original leader, Marion du Fresne, was eaten by cannibals in New Zealand (Crozet 1891:54). The Crozet expedition anchored at Guam on September 27, 1772, and did not depart until November 19, 1772. They were so well received by Governor Tobias that Crozet considered Guam a "terrestrial paradise" (Crozet 1891:82). He wrote that his sailors fished for freshwater fish on Guam, while the natives preferred the saltwater fish.

> The rivers of Guam, which after all are only brooks, or torrents, abound in fish. During their convalescence, our sailors amused themselves by fishing, and caught eels, mullets, gobys and a sort of carp. All these fish are excellent, but the Indians do not eat them, preferring salt-water fish, which are generally very inferior in quality to the fresh-water ones. It is true that the abundance of meat, vegetables, and fruit is so great in Guam, and the Spanish Commandant provided us with them so generously, that during the whole stay we hardly thought of getting any sea-fish (Crozet 1891:91).

Crozet went on to describe a problem with some marine fishes. Probably he was referring to ciguatera poisoning.

> There is, besides, some inconvenience in a preference for salt-water fish. Among those which are caught on the coast of Guam, as in all the Marianne Islands, there are some which are very unwholesome, for they nourish themselves on the little polyps, which form the coral. It appears that these sea-insects, like the sea-galleys and sea-nettles, have some caustic property which is imparted to the fishes, and the fishes have a coralline taste which betrays their poisonous properties. The Indians know which are unwholesome, but it is better not to eat any sea-fish at all. This, however, does not hold good with the sea-turtles which are caught on the coasts of Guam. They are very good and as big as those of the island of Ascension, but the Spaniards and Indians do not eat them. I collected sufficient to form a good supply during our journey to the Philippines (Crozet 1891:91).

Crozet (1891:94-96) included a detailed description of the Chamorro proas, which he prefaced with this evaluation:

> In acquiring new knowledge by their contact with civilization, the islanders have at the same time preserved perfectly the art of making canoes received from their forefathers. In this respect they had nothing new to learn. It is quite certain that the invention of the form of their craft would do honour to any boatbuilder amongst the most advanced maritime people. This form has not been copied from any model, for it differs from all those which have been given to sea-going vessels by any of the known peoples in different parts of the world.

Haddon and Hornell (1975:417) noted that Crozet was the last voyager to describe the Chamorros' "flying proa," but they questioned his description because it "coincides so closely with that of Dampier that it is impossible to resist the conclusion that Crozet had Dampier's account before him as he wrote and that he based his own almost entirely upon it." As proof of their conclusion, they cited the fact that Crozet repeated Dampier's error in saying that the outrigger was on the lee side of the boat, rather than the windward side, as correctly reported by other writers.

A footnote in Crozet (1891:96), added by the translator H. Ling Roth, says that Dumont D'Urville wrote that at the time of his first visit to the Mariana Islands in May 1828, the islanders were no longer able to make these canoes and instead used similar ones from the Carolines. This statement was confirmed to Roth in August 1888 by Vice-Admiral E. Paris, who had been a midshipman with D'Urville.

Louis de Freycinet—1819

The Freycinet expedition, which arrived at Guam March 17, 1819, was a French scientific expedition that included the zoologists Quoy and Gaimard, the botanist Charles Gaudichaud-Beaupré and the artist and writer Jacques Arago (Carano and Sanchez 1964). The expedition spent several months in the Marianas, visiting Tinian and Rota as well as Guam.

Freycinet (1824) provided a lengthy and detailed account of the tools and techniques of fishing in the Marianas. He described the methods of fishing for *mañåhak* (spelled *magnahak* by Freycinet, juvenile rabbitfishes, *Siganus* spp.), *hachuman* (spelled *atchoman* by Freycinet, *Decapterus* sp. or *opelu* in Hawai'i), parrotfishes (family Scaridae), flyingfishes (family Exocoetidae), *anaho* (probably mahimahi), and other marine resources including turtles. The tools are described below, followed by the techniques of fishing for certain fishes.

Hooks and Lines, Spears

Hooks (*hagoit*) were made of shell, including mother-of-pearl, bone, and coconut shell. By the time of Freycinet's arrival, the preference was for iron hooks. Lines were made of plant fibers, including banana fiber. A special arrangement of lines and hooks used to fish for flyingfishes was known as *kinatchit gomahga*. A main line was held afloat by gourds (*tagoadji*), and lateral lines were attached to it at intervals of six to nine feet [based on "*une brasse*" equaling one fathom or six feet].

On some occasions, a fisherman used a thick stick or bludgeon, or a barbed wooden spear. The wooden spear had been replaced by one with a single or multiple iron points by the time of Freycinet.

The *Poio* or Fishing Stone

The *poio* or fishing stone (Photo 3) was a type of chumming device used to fish for *hachuman* (*Decapterus* sp., *opelu* in Hawai'i). The stone was hemispherical and flat on top. A coconut shell cap about the same size as the stone was attached to the flat top with cords to hold the two pieces together. A plant fiber braid served as a handle, with a long cord that would allow the stone to be lowered to a depth of 8 fathoms or 48 feet. Chewed coconut meat was placed inside the coconut shell cap, and the device was used to attract fish toward the surface where they could be taken in a net. The *poio* is shown in Plates 63 and 79 of Freycinet (1824). The use of the *poio* is described below under *Hachuman*.

Photo 3. *Poio* or fishing stone made of argillaceous limestone found by MARS near Marine Drive in Anigua, Guam, and refitted with lines and coconut shell. Photo by Frank Wells.

Nets

Freycinet described several kinds of nets and gave their Chamorro names. The most important was the *lagoa pola*, used to catch small fish from the beach. The net consisted of three rectangular mats joined together. The side mats were six feet high by three feet long, while the one in the middle was 12 feet high by 20-30 feet long. At each end of the net, a stick was tied to hold the net upright. Wooden floats were attached to the top of the net and stone weights to the bottom. The net was maneuvered in the same way as the French *seine* or *seinette*. Nets of this kind differed in the tightness of the weave, which depended on the size of fish to be caught.

For *hachuman* fishing, a net called *lagoa atchoman* was used. It was similar to the French nets known as *chaudière* or *caudrette*. The net, which measured nine feet in diameter and four and a half feet in length, was in the shape of a large bag with a circular opening. The mouth was held open by a circle of *lodogao* wood [*Clerodendrum inerme* according to Moore and McMakin 1979]. Four cords attached around the circumference of the opening came together in the center where the fisherman set the line. The *lagoa atchoman* is shown at the far left of Freycinet's Plate 63.

A net similar to the *lagoa atchoman*, but much smaller and with a long handle was known as *lagoa popo* or *lagoa omo-soho*. This net had the same form and function as the French *truble*, and it was used especially in Tinian where the large quantity of stones and corals scattered on the coast made the use of the *lagoa pola* impractical. The net had an oval opening measuring one and one-half by two feet and was one foot deep with a five or six foot long handle.

The Chamorros also used a conical net known as *lagoa djoti*, similar to the French *l'épervier*. This worked well for certain large and small fish.

Traps and Weirs

The stone fish traps (*ghigao*) once built along the coastlines no longer existed by Freycinet's time. They had been replaced by multi-chambered weirs, illustrated by Freycinet (1824:438). The most developed of these constructions was found between the island of Apapa [probably Cabras Island] and Guam near the mouth of the Masso River. The *lagoa popo* was used to scoop fish from the reservoirs, or if the fish were large they were speared with the iron-tipped spear.

Mañåhak (*Siganus* spp., Juvenile Rabbitfishes)

Freycinet (1824:439-440) reported that *mañåhak* were caught regularly during the months of April, May, and June, and rarely in September and October, but only at the time of the moon's last quarter. *Mañåhak* that appeared during the fall months were called *magnahak ababa* or crazy *mañåhak*, because they appeared only about once every 25 years.

Freycinet reported that these fishes are always prodigious in number. Two species occur in the Marianas. The smaller fish are *Siganus spinus* (Linnaeus) and the larger are *Siganus argenteus* (Quoy and Gaimard) (Amesbury and Myers 1982). The smaller fish appear first and then the bigger ones, sometimes on the same day or on subsequent days. Once the larger species appears, it means the run is coming to a close.

Plate 63 in Freycinet (1824) shows the *mañåhak* fishing. People are dragging a *lagoa pola* on the shore. On a mat to one side are the fish that have already been caught. The women are putting the fish into bags to transport them to the place where they will be salted.

Hachuman (*Decapterus* sp., *Opelu* in Hawai'i)

Freycinet (1824:440-441) described the *hachuman* fishing as follows. This fish was caught beyond the reefs, one-half league to five leagues from land. Closer to land, one would catch none or almost none. The fishing began in August and continued until October when the fish were full grown.

The fisherman filled a *poio* with the chewed pulp of a young coconut and lowered the device on a line to a depth of six to eight fathoms [36-48 feet]. The fisherman shook the line from time to time to disperse the coconut meat into the water. The *hachuman* came in great numbers to eat the coconut. When the *poio* was empty, the fisherman took it out, refilled it, and continued the operation until evening.

The following morning, the fisherman returned to the same spot, but this time he lowered the *poio* one or two feet less deep than the previous day. He did this each day for a month and a half or two months except when bad weather prevented him. By this time the *hachuman* were coming almost to the surface. Ordinarily this fish was caught at a depth of one fathom [six feet].

The process did not need to take so long if the fisherman was satisfied with a less abundant harvest. If he did not begin the operation until September when the fish were full grown, 15 days of feeding would have been sufficient. In that case, instead of gradually shortening the cord by one or two feet, he shortened it more each day.

With the *poio* at a depth of one fathom and always in motion, the fisherman or his helpers put the large *caudrette* (*lagoa atchoman*) into the water and slid it carefully under the *poio*. The net was lifted gradually until the circle that surrounded the opening came to the top of the water. The men then took the net out of the water and threw the fish into their boat. Then they began the same maneuvers again. They could obtain a second and third catch on the same day. The fish were taken to the women who dried them in the sun with salt.

The 1943 unedited translation done for the Yale University Human Relations Area Files mistakenly translates the French to say that the fisherman could obtain two or three fish on the same day. However, the French word "*capture*" is better translated "catch" here. The fisherman was able to obtain a second or third catch, meaning a second or third netful.

In the section on fishing law, Freycinet said that an *hachuman* fisherman would sometimes throw his *poio* into the water while crossing several fishing grounds. The fish would follow his canoe, and when he arrived at his own ground, he would have a better catch. However, if the fisherman were caught doing this, he would receive the death penalty.

Freycinet (1824:440) said that *hachuman* fishing took place one-half league to five leagues from land. The length of a league has varied with time and place from about 2.4 to 4.6 statute miles. Two sources dating to the late 1500s stated that an English sea league contained 2500 fathoms and a Spanish sea league contained 2857 fathoms, and that a fathom is six feet (Marden 1986:576-577). One of the sources added that a Portuguese sea league was the same as the Spanish. This means that the English sea league was 2.47 nautical miles, while the Iberian sea league was 2.82 nautical miles. Currently, a French league equals four kilometers (Chevalley and Chevalley 1966) or 2.16 nautical miles. Based even on the most conservative equivalent, one-half league was more than a nautical mile and five leagues were more than ten nautical miles.

Knudson (1987) estimated five leagues at 15 statute miles and felt that distance was excessive because of the difficulty of placing a small boat in the same spot that far from shore each day. However, it would be possible to place the boat in the same spot each day even at that distance from shore if the spot were over an offshore bank, and that was probably the case according to the late Richard K. Sakamoto, a Guam fisherman. In 1989 Sakamoto reported that *Decapterus* sp. were found at offshore banks such as 11-Mile Bank, Galvez Bank, and Santa Rosa Reef, as well as parts of the Guam reef system, such as Double Reef (Amesbury and Hunter-Anderson 1989:27).

Låggua **or Parrotfishes (Family Scaridae)**

Freycinet (1824:441-442) described two types of fishing for parrotfishes. One took place at night and the other by day. The nighttime fishing occurred at the time of the new moon in the months of August thru December. After sunset, when the tide was low and the sea was calm, a canoe went out with a man in front holding a torch. The light of the torch permitted the fishermen to see the parrotfishes sleeping near the outer edge of the reef. In times past, the fishermen carried a barbed wooden spear, but by Freycinet's time, they used the multi-prong iron spear to take the fishes.

The daytime fishing for parrotfishes involved the use of a live fish as a decoy. The live parrotfish had a line attached through its lower jaw. The fisherman carried the fish in his canoe to an appropriate place where there were natural basins formed by corals inside the reefs. The fish was put into the water and allowed to swim as far as the cord extended. The other parrotfish saw the captive fish and hurried to attack it. The fisherman then removed the decoy fish from the water and made a sliding knot near the spot where the fish was wounded. When he put the decoy fish back into the water, the other fish attacked the bleeding spot, and the fisherman pulled the noose around the attacking fish. Freycinet reported that a skilled fisherman would not catch more than six or eight parrotfish per day in this way. The live decoy could be kept in water near the shore and used for a week.

Flyingfishes (Family Exocoetidae)

Freycinet's description of fishing for flyingfishes (Freycinet 1824:443) is much the same as that provided by Sancho to Fray Juan Pobre (above). Both Freycinet and Fray Juan Pobre noted that in the past the fishhooks were made of shell, but by early Spanish times were made of iron.

Anaho (*Dorade*?, *Coryphaena hippurus*)

Freycinet (1824:443) also mentioned fishing for what he called in French *l'anaho* (*dorade*?). The addition of the word *dorade* indicates that he was talking about mahimahi (*Coryphaena hippurus*). The Spanish word used by Fray Juan Pobre (above) is *dorado*. The content of Freycinet's description also indicates he was talking about mahimahi, because he said the fish was caught using a recently killed flying fish. However, Freycinet said that this fish was taken formerly. He used the past tense.

Turtles

Freycinet (1824:443) reported that the islanders had no method for catching turtles other than tipping them over onto their backs.

Shipbuilding

Freycinet included a description of the Chamorro sailing canoes written by Gemelli Careri, who saw them in 1696, just after Spanish conquest, when the canoes were still being built. Freycinet concluded that the craft of the Mariana Islanders of old were similar to those of the Carolinians still used in Freycinet's time. He said, "The craft used nowadays to make crossings from one island to another are of Carolinian construction, and they are even manned by natives of those islands, rather than by natives of the Marianas" (Freycinet 2003:178).

SPANISH GOVERNORS

The Spanish governors of the second half of the 18th century confirmed the end of inter-island travel by the flying proas of the Chamorros. Two governors of the 19th century wrote about the seasonal fisheries for *mañåhak*, *ti'ao*, and *atulai*. They also wrote about fishing for *hachuman*, but it is doubtful that they ever saw that.

Henrique Olavide—1749-1756 and 1768-1771

When Governor Olavide took office in 1749, he noted a lack of sea-going vessels and decided to change the situation. During his first term, he had three 30-foot vessels built at Hagåtña. He also had eleven *bancas* (sea-going canoes) built for inter-island travel—six in Guam, four in Rota, and one in Tinian (Driver 2005:37).

José de Soroa—1759-1768

During Soroa's term as governor, he sent *bancas* to Tinian for meat (Driver 2005:38). One of the canoes was lost at sea.

Phelipe de Ceraín—1776-1786

In 1777 Governor Ceraín issued a proclamation ordering the district administrators to see to it that each village had a large *panga* (flat-bottomed boat) for the use of the natives "to attain a better livelihood, by being able to buy and sell whatever they want, whenever, and wherever it is best for them to do so" (Driver 2005:46). The proclamation did not indicate that these boats were for fishing. Instead they were for transportation of products. Ceraín noted that the villages of Agat, Umatac, Merizo, Inarajan, and Pago were unable to transport their products, because they had no boats.

José Arlegui y Leóz—1786-1794

During Governor Arlegui's administration, several disasters highlighted the importance of the Carolinians and their ocean-going canoes (Driver 2005:54-57). Inter-island travel was dependent on the Carolinians. The *bancas* traveled to Rota for purposes of the government and church, and they traveled to Tinian to obtain meat and produce.

Felipe María de la Corte y Ruano Calderón—1855-1866

Felipe María de la Corte y Ruano Calderón was the governor of Guam from May 1855 to January 1866. Carano and Sanchez (1964:141) said that de la Corte was one of three 19th century Spanish governors who "stand out from the rest as having worked hard and well for the benefit of Guam." His administration consisted of a series of agricultural and economic experiments, and in his lengthy report, he concluded that the principal problem in Guam was poverty.

Concerning pelagic fishing, de la Corte (1970:143) made this statement: "In the contiguent seas there are considerable large fish, but as the natives never go fish them beyond the reef few fish are caught."

He described the fishing for three seasonal fishes: 1) *mañåhak*, which de la Corte spelled *atañaja* (juvenile rabbitfishes, *Siganus* spp.); 2) *ti'ao* (juvenile goatfishes, family Mullidae); and 3) *atulai*, which de la Corte spelled *atislai* (big-eye scad, *Selar crumenophthalmus*).

De la Corte (1970:144) said the *mañåhak* "come in through the reefs at low tide in some moons of May to July and sometimes come in compact layers of five and six feet thick and many braces wide and long. The town comes out in mass to catch all they can in small nets and sometimes this lasts two or three days each moon. This fish is tasty and besides eating it fresh, they pickle it and keep it the whole year round."

It is uncertain whether the word "brace" used here is the same as the French word "*brasse*", which equals six feet (see Freycinet above). In another place, de la Corte (1970:144) said that the diameter of the net used with the *poio* for *hachuman* fishing is a brace. Freycinet (1824:437) said the *lagoa atchoman* is nine feet in diameter. Using the more conservative figure of six feet, the *mañåhak* arrived in schools that were many times six feet in width and length.

The *ti'ao*, he said, "also comes in shoals, but not as big as those of the *atañaja*. They turn up around April to August."

Concerning the *atulai*, de la Corte (1970:144) said, "Some shoals of fish like mackerel or large sardines also appear which are called *atislai* and they catch them in the same way, but they do not come in such great abundance nor every year. They are caught during the moons of June to August and are eaten like the others, fresh and pickled."

De la Corte's description of *hachuman* fishing (de la Corte 1970:144-145) is quite similar to Freycinet's, except that he said the fish are fattened for one to three months. He also quantified the catch, "With this operation they sometimes catch more than a ton of fish a day, and repeat the fishing for a month, around August." However, he added, "As this requires a certain amount of patience, perseverance and experience, only certain old men practice this, and I do not think anybody does so nowadays. This practice seems to have originated from the old natives." This raises the question of whether de la Corte ever saw catches of a ton per day, or whether he had just been told that was the size of the catch in the past.

De la Corte (1970:145) also said, "Sharks abound and another fish called *rompecandados* [padlock breaker] which is more voracious than the shark," but he did not mention that either was fished. He added, "There are no carey turtles [sea turtles] or pearl shells or any other articles of value."

Concerning navigation, de la Corte (1970:146) remarked, "In spite of the fact that on their discovery these natives created a reputation as good navegators [sic], and notwithstanding the fact that they individually have a good disposition as sailors, they do not at present exercise it whatsoever, on the island since there is no boat capable of making a trip even to the nearest route." He reported there were three or four boats or "whale hunters' canoes" used for transporting good from the harbor to Hagåtña or for carrying unmilled rice from Inarajan or Merizo at harvest time. He said the islanders used small canoes or "*galquides*" [*galaides*] for fishing, but added, "they are so small, they cannot be used for anything other than going between the reefs, and thus nobody fishes beyond them." He said that in 1863 there were only 24 of these small canoes and concluded, "Consequently, we can say there is no navegation [sic] of any kind on the island."

Francisco Olive y García—1884-1887

Governor Francisco Olive y García's notes (1984) pertain to the years 1884-1887. The section of his report concerning fishing is almost item for item the same as de la Corte's. He described the same seasonal runs for *mañåhak*, *ti'ao*, and *atulai*, as well as the fishing for *hachuman*. The similarity to de la Corte's descriptions leads one to conclude that Olive copied them from de la Corte.

Olive added that the *hachuman* fishing was still done on the island of Rota, saying "we believe this is practiced only by an occasional person, especially on the island of Rota" (Olive y García 1984:34).

Concerning turtles, Olive (1984:34) said, "There are turtles—but no tortoise shell."

SUMMARY

European contact with the Mariana Islands occurred with Magellan's arrival in 1521, and Legazpi claimed the islands for Spain in 1565. However, it was not until more than 100 years later that the Spanish colonized Guam in 1668. During the period between European contact and colonization, the early explorers and first Spanish residents marveled at the sailing, swimming, and fishing ability of the Chamorros.

Pigafetta in 1521 and Pobre in 1602 wrote about fishing for flying fish. Pobre related Sancho's story of how his Chamorro master used a flying fish as bait to hook a marlin, then fought off a shark in order to land the marlin. Sancho said the fishermen caught many mahimahi, billfishes, and other large fishes. There is no reason to doubt that, because bones of mahimahi, marlin, and other pelagic fishes have been identified in the pre-contact archaeological assemblages (see Chapter 2). Sancho concluded that the islanders of the Marianas were the most skillful fishermen and sailors ever discovered.

Pelagic fishing during the Prehistoric Period and the first couple hundred years of the Spanish Period depended on the flying proa, the large ocean-going sailing canoe. An idea of the number of proas comes from the narrative of Legazpi's voyage attributed to Father Martín Rada. Rada reported that more than 400 proas surrounded Legazpi's ships anchored at Umatac, Guam in 1565. Rada also described a boathouse in the village of Umatac that would hold 200 men.

However, soon after colonization in 1668, hostilities broke out, and the Spanish-Chamorro Wars continued for 25 years from 1670 to 1695. García's history of the years 1668-1681 tells how the Spanish governors systematically burned Chamorro villages and canoes and captured fugitives who escaped to other islands. Eventually the islanders were relocated into villages on Guam to make them more accessible to the Spanish government and priests.

Several foreign visitors, including Dampier in 1686 and Anson in 1742, described the flying proas, and Anson said they "are so singular and extraordinary an invention that it would do honor to any nation." Crozet in 1772 was the last visitor to describe the proa, but his description coincides so closely with Dampier's that it appears to have been copied. By the time of Freycinet's visit in 1819 and D'Urville's visit in 1828, the Chamorros no longer built and sailed the flying proas, although Carolinians sailed similar canoes. Anson may have been the last European visitor to see the flying proa in use. The Spanish governors confirmed the lack of sea-going vessels by the mid-1700s. Apparently the Chamorros no longer fished for pelagic fishes after that time.

Freycinet, who spent months on Guam in 1819, mentioned that formerly the islanders fished for mahimahi. He appears to have been the first to describe fishing for *mañåhak* and *hachuman.* De la Corte, who governed Guam from 1855 to 1866, did not think anyone fished for *hachuman* in his day, but Olive, writing about the years 1884-1887, said that people on Rota still fished for *hachuman*. Olive was correct, because Fritz and Hornbostel both reported that the *poio* was in use on Rota in the 20th century (see Chapter 4). In fact, one of the fishermen interviewed on Rota, Estanislao Taisacan, still uses the *poio* (see Chapter 5).

The Spanish Period writers documented a change in the use of turtle. Early writers from the 16th century and beginning of the 17th century including Andrés de Urdaneta, Fray Antonio de los Angeles, and Fray Juan Pobre de Zamora, told how the islanders valued tortoise shell. Later in the 17th century, Brother Bustillo and Father Sanvitores recorded that the islanders received tortoise shell from the Spanish. An incident in Tinian in 1670 incorporated tortoise shell in a Roman Catholic ceremony. The writers of the late 18th century and 19th century, including Crozet, Freycinet, de la Corte, and Olive, indicated that turtles and tortoise shell had diminished in importance.

CHAPTER 4. TWENTIETH CENTURY

By Judith R. Amesbury

DIVERGING HISTORIES

Just prior to the beginning of the 20th century, Spain lost control of the Mariana Islands. Guam was ceded to the U.S. in 1898 as a result of the Spanish-American War, and in 1899 Germany purchased the Mariana Islands north of Guam (Fig. 15). The histories of Guam and the Northern Mariana Islands continued to diverge as Japan occupied the Northern Marianas for 30 years, while Guam was occupied by the Japanese for less than three years during World War II. Both Guam and the Northern Marianas have been part of the U.S. since 1944, but their governments were never reunited. At present Guam is an unincorporated territory of the U.S., while the Northern Mariana Islands are a commonwealth. This chapter covers the 20th century in Guam first, then the 20th century in the Northern Marianas.

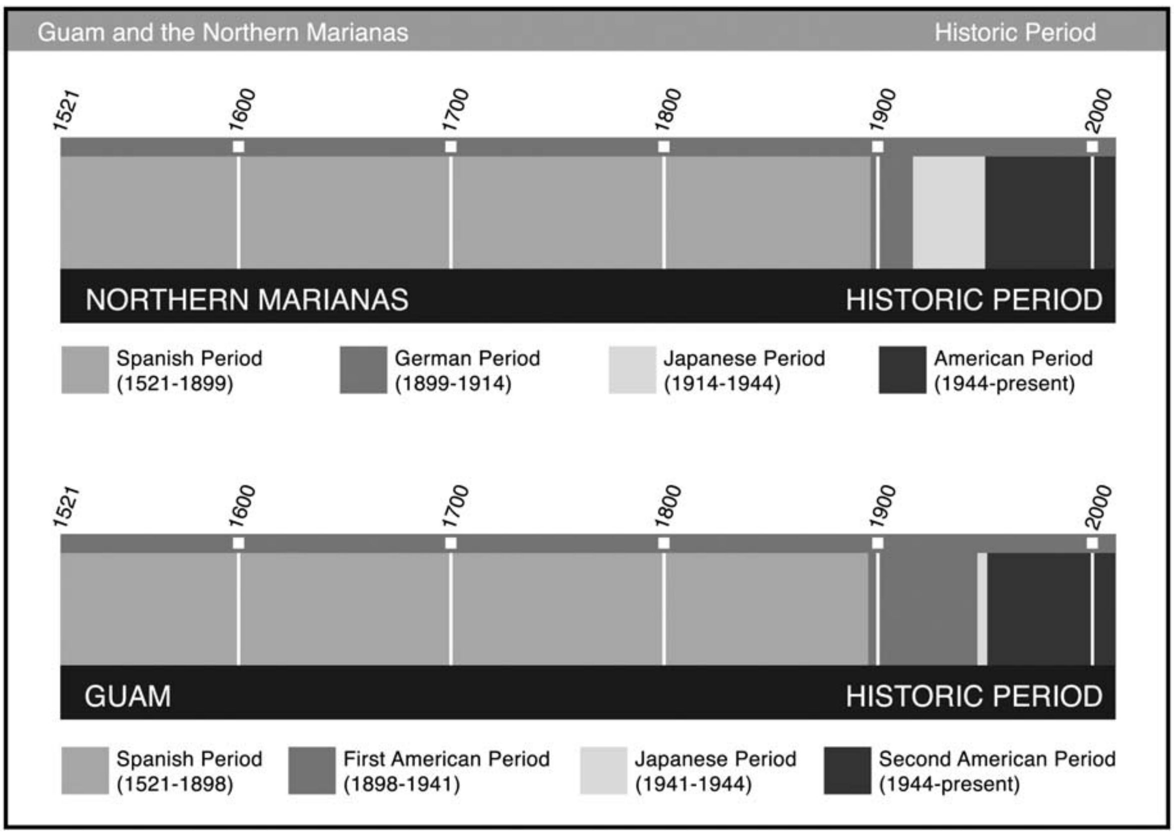

Figure 15. Timelines of the Historic Period in Guam and the Northern Mariana Islands. Figure by Robert Amesbury.

FIRST AMERICAN PERIOD IN GUAM (1898-1941)

In December 1898, President William McKinley issued an executive order placing Guam under the control of the Department of the Navy, and in 1899 the U.S. Naval Government of Guam was established under Captain Richard P. Leary, the first American governor of Guam. The First American Period in Guam lasted until December 1941 when the Japanese invaded Guam.

William Edwin Safford—1899-1900

William Edwin Safford was a U.S. Navy lieutenant who spent a year on Guam from August 1899 to August 1900 as an aide to Governor Richard P. Leary. In 1902 he resigned his commission in the Navy to become the assistant curator of the U.S.D.A. Office of Tropical Agriculture (Carano and Sanchez 1964:189), and in 1905 he published *The Useful Plants of the Island of Guam*. In both that work and his diary, excerpts of which were published in the Guam Recorder from 1933 to 1936, Safford described fishing on Guam.

The fishing method that Safford described in most detail was the use of the fruit of *Barringtonia asiatica* (*puting* in Chamorro) to stupefy reef fish (Safford 1905:81-82). This method had been forbidden by the Spanish government, because it kills many young fishes, but it was revived under the American administration. Concerning other methods of fishing, Safford wrote the following:

> The natives do not now devote themselves to fishing so extensively as formerly, yet many of them have cast nets with which they catch small fish swimming in schools near the beach, and a few have traps and seines. To-day the large pool in which the poison [*Barringtonia*] was sunk was surrounded by seines. Among the fish we caught there were very few pelagic species. We got no bonitos nor flying-fishes. The custom of trawling [trolling] for these is nearly obsolete. In the olden times one of the favorite sports of the natives was to go out under sail in their wonderful 'flying praos' [proas] trawling [trolling] for bonitos. Wives accompanied their husbands and vied with them in managing the sails and in swimming and diving (Safford 1910:238) [brackets added by Amesbury].

Safford (1905:83-89) provided a list of what he called the principal fishes of Guam. He listed them by their Chamorro names but included the scientific names and descriptions of the fishes. All the fishes listed can be found on the reef or in nearshore waters, although flying fish (*gahga*) also occur around offshore banks and at least one species of jack (*tarakito*) occurs in deep waters. Since Safford was a scientifically trained and observant individual who spent an entire year on Guam, his failure to list any offshore or deepwater fish species (with the possible exception of *tarakito*) is an indication that these species were not being harvested on Guam at the time.

Safford (1905:90) wrote, "The natives eat many kinds of marine animals, but they do not depend upon the reef to the extent that the Samoans and Caroline Islanders do, having become essentially an agricultural people, and few of them find it to their advantage to neglect their fields for fishing."

Reports of the U.S. Naval Government of Guam—1901-1941

From 1901 through 1941, the U.S. Naval Government of Guam issued annual reports. During the early years of the First American Period, almost no mention was made of fishing in the reports. In 1904 (p. 2) Governor George L. Dyer wrote, "The people are purely agricultural," and in another place (p. 17), "The people are, almost without exception, small farmers, raising only corn and sweet potatoes." In 1905 (p. 16), he said, "This is purely an agricultural community."

The 1915 report (p. 18) showed that 505 pounds of preserved fish worth $45.10 had been exported to Manila in 1914. The 1918 report (p. 18) listed ten cases of fish poisoning [ciguatera] under admissions to the hospital. The 1932 report (p. 54) listed one case of the use of dynamite in fishing under criminal cases, and under criminal cases in the 1933 report (p. 61), there were two cases of fishing in a restricted zone. During these years, the Chamorro people were fishing, but apparently not for much more than their own needs and not beyond the reef.

In 1934 (p. 10) Governor George A. Alexander wrote that a fishing school was begun in October 1933 "to establish fishing beyond the reef." He said, "Twelve men from each village undergo a course of training for a period of 3 months. To prevent accident all fishing instruction is given within view of a fishing lookout at Orote Point. To give greater safety to such fishing parties are carried homing pigeons trained to bring back messages as may be necessary." Governor Alexander hoped that within a year or two there would be a sufficient number of trained men with power boats and proper fishing equipment to supply all the people of Guam with an abundance of fish.

In 1935 (p. 10), Governor Alexander reported on advances in the fishing industry. A Fish Warden had been appointed who was successful in curtailing the forays of thieves on fish weirs and traps. The Fishing School had been continued with 12 men from each seaside village undergoing three months of training in offshore fishing methods. Fishing inside the reef had improved over the year, but offshore fishing had not progressed due to a lack of suitable boats. Steps had been taken to procure boats from the Navy, which would be reconditioned and distributed to the seaside villages. Governor Alexander added, "It is believed that when this plan is inaugurated off-shore fishing will be developed to an extent that will justify any governmental expenditures involved. At the present time this immense potential source of food supply lies practically untouched." The 1935 report (p. 74) showed that $24,344.63 worth of fish had been imported. This exceeded the value of meat imported by nearly $9,000.

The 1936 (p. 26) and 1937 (p. 34) reports of Governor McCandlish contained the very same information on the deep-sea fishing classes. The Fish Warden instructed 12 men at a time from seashore villages. To safeguard the boats, a lookout was maintained at Orote Point. Each boat carried trained homing pigeons to carry messages in case of danger. After 1937 there was no more mention of the fishing school.

In the remaining pre-war reports from 1938 to 1941, the fisheries section is entitled only "Fishweirs" and is usually only one sentence about the number of licensed fishweirs. The 1941 report listed fishing under labor performed by prisoners (p. 64) and also under recreation of enlisted men (p. 137).

WORLD WAR II/JAPANESE PERIOD IN GUAM (1941-1944)

On December 8, 1941, the Japanese bombed Guam just a few hours after the bombing of Pearl Harbor. On December 10, the Japanese invaded Guam and the Governor of Guam, Captain George J. McMillan, USN, surrendered the island.

During the Japanese occupation, most Chamorros were engaged in subsistence farming, but they were also fishing within the reef (Rogers 1995; Sanchez 1979, 1984). Commerce was curtailed. The demand for meat exceeded the supply, and Japanese personnel had priority in buying. Carano and Sanchez (1964) reported that a Japanese tuna-fishing company came to Guam about the middle of the occupation, and the same priority system prevailed. The Japanese were allowed to buy before the local people.

According to Higuchi (Appendix C of this report), two Japanese pole-and-line bonito vessels from Saipan were sent to Guam. In 1942 and 1943, the vessels fished southwest of Merizo, the southernmost village of Guam, and between Guam and Rota to the north in order to support the Japanese military. Catches were disappointing due to "an unfavorable period of migratory fish, and few schools of baitfish in the Guam and Saipan areas" as well as "the influence of seasonal winds and rough waters" (Sanbo Hanbu 1944 quoted in Higuchi—Appendix C). The vessels were later used to patrol around Guam in case of attack by the U.S.

Particularly during the last six months of the Japanese occupation, food was scarce, and the Chamorros were required to produce food for thousands of Japanese troops sent to defend the island. Some local men were assigned to fish under Japanese supervision (Amesbury et al 1986). As pressure increased to provision the Japanese troops, the use of explosives to harvest fish on the reef increased. It is very unlikely that there was any pelagic fishing done by the Chamorro people during the Japanese occupation.

SECOND AMERICAN PERIOD IN GUAM (1944-PRESENT)

After the war, the U.S. Navy resumed governing Guam until 1949 when President Truman transferred the administration of Guam from the Secretary of the Navy to the Secretary of the Interior. From 1949 through 1970, Guam had civilian governors appointed by the U.S. president. Since 1971, Guam has had popularly elected governors. Governor Carlos Garcia Camacho was both the last presidentially appointed governor and the first elected governor.

Reports of the U.S. Naval Government of Guam—1946-1950

After the war, the U.S. Naval Government of Guam issued monthly reports during 1946 and 1947 and quarterly reports for 1948 through 1950. These reports provide information on the number of men deriving their living principally from fishing (Table 31). Although the reports do not give information on the race of the fishermen, for the most part the naval governor's reports are talking about the Chamorro people. When they talk about a person who is not Chamorro, they frequently name the nationality or race of the individual. Guamanian was the term used to refer to Chamorros at this time.

Table 31. Number of men on Guam deriving their living principally from fishing, 1946-1950. "Guamanian" is the word used to refer to Chamorros during this time period. From the monthly and quarterly reports of the U.S. Naval Government of Guam.

Time Period	Number of Men Deriving Their Living Principally from Fishing	Total Number of Adult Guamanian Males (age 16 & up)	Percentage of Guamanians in the Total Resident Population
July 1946	72		
August 1946	71		
September 1946	71		
October 1946	71		
November 1946	71		
December 1946	71	5,844	97.48
January 1947	75	5,862	97.38
February 1947	75	5,871	97.38
March 1947	75	5,870	97.31
April 1947	97	5,880	97.30
May 1947	97	5,903	97.29
Third Quarter 1948	Up about 150 to 289	5,907	95.03
Fourth Quarter 1948	302	6,014	95.07
Second Quarter 1950	253 reduced to 211	6,469	95.35

During the years 1946-1950, Guamanians made up approximately 95 to 97 percent of the resident population. Due to the large number of military personnel and American and Filipino workers involved in the rebuilding of Guam, the non-resident population exceeded the resident population for all the periods in which the number of fishermen is known, but the non-residents would not have been engaged in fishing as an occupation. The naval security clearance required to enter the island prevented anyone from moving to Guam who was not employed, for example, by the U.S. military or civil service or by construction companies contracted by the military and the dependents thereof.

If we assume that the men deriving their living principally from fishing are Chamorros or at least that the percentage of Chamorros among the fishermen is the same as the percentage of Chamorros in the total resident population, between one and five percent of adult Chamorro men were earning their living principally from fishing.

The post-war naval governors' reports also provide information on the amount of fish caught (Table 32). The reports distinguish between fish caught by traps and by other methods, but they provide no information on what the other methods were or what species of fish were harvested.

Table 32. Pounds of fish caught on Guam by year, month, and method, 1946-1950. Non-fish marine food products are excluded. From the monthly and quarterly reports of the U.S. Naval Government of Guam.

Month	Method	1946	1947	1948	1949	1950
January	Traps		4,690	16,835	42,447	3,400
	Other		23,875	2,800	31,982	4,190
	Total		**28,565**	**19,635**	**74,429**	**7,590**
February	Traps		5,880	11,538	31,441	5,880
	Other		17,398	800	33,243	6,810
	Total		**23,278**	**12,338**	**64,684**	**12,690**
March	Traps		10,519	16,820	28,010	5,700
	Other		13,005	240	37,761	6,660
	Total		**23,524**	**17,060**	**65,771**	**12,360**
April	Traps		8,107	10,324	2,115	6,150
	Other		46,020	46,290	9,542	6,950
	Total		**54,127**	**56,614**	**11,657**	**13,100**
May	Traps		8,705	8,885	11,688	5,500
	Other		6,795	6,372	15,865	23,950
	Total		**15,500**	**15,257**	**27,553**	**29,450**
June	Traps		18,063	15,352	8,665	5,600
	Other		13,370	11,611	6,840	7,060
	Total		**31,433**	**26,963**	**15,505**	**12,660**
July	Traps		18,025	36,100	10,020	
	Other		15,005	28,895	10,115	
	Total		**33,030**	**64,995**	**20,135**	
August	Traps		19,627	92,417	3,875	
	Other		19,823	35,340	11,695	
	Total		**39,450**	**127,757**	**15,570**	
September	Traps		14,940	34,802	18,560	
	Other		3,445	395,979	8,280	
	Total		**18,385**	**430,781**	**26,840**	
October	Traps		5,635	39,723	12,275	
	Other		10,870	43,663	9,440	
	Total		**16,505**	**83,386**	**21,715**	
November	Traps		16,221	37,442	7,180	
	Other		9,458	42,243	8,680	
	Total	**37,386**	**25,679**	**79,685**	**15,860**	
December	Traps	5,277		25,984	2,830	
	Other	35,610		30,009	8,220	
	Total	**40,887**		**55,993**	**11,050**	

The 1947 reports (June, p. 24; September, p. 23; October, p. 21; November, p. 29) refer to two commercial fishermen equipped to do deep-sea fishing. However, these reports invariably state that the fishermen were handicapped by a lack of qualified labor, mechanical trouble, or rough seas.

Reports of the Presidentially Appointed Governors of Guam—1951-1970

The governors' reports for the years 1951 through 1954 give the number of men engaged in fishing (Table 33). This varied from 262 to 315. The total pounds of seafood harvested in the years 1951 through 1955 varied from 375,000 to 691,000.

Table 33. Number of men engaged in fishing and pounds of fish, turtle, and shellfish caught from 1951 through 1955. From the annual reports of the presidentially appointed governors of Guam.

Year	**Men Engaged in Fishing**	**Fish Caught by Traps**	**Fish Caught by Other Methods**	**Turtle**	**Shellfish**	**Total**
1951	262	376,800	258,380	15,985	39,975	691,140
1952	315					559,620
1953	312					375,279
1954	312					405,164
1955						376,000

The reports for 1956 through 1970 give various breakdowns of the catch, including shallow-water fish caught by weirs and shallow-water fish caught by other methods; the seasonal fishes, *mañåhak* (juvenile rabbitfishes, *Siganus* spp.), *ti'ao* (juvenile goatfishes, family Mullidae), mackerel (*atulai* or big-eye scad, *Selar crumenophthalmus*), and *i'e'* (juveniles of *Caranx melampygus* and other similar jacks); tuna and trolling catch; turtle, shellfish, and crustaceans (Table 34). The year 1956 is the first year in which tuna or trolling catch is listed separately, probably indicating that pelagic species were not an important part of the catch until sometime in the 1950s. According to the 1968 report, the estimated minimum number of man-days fishing is 10,000. This is the only report with information on effort. No statistics on fishing are given for the years 1962, 1965, 1966, 1969, and 1970.

Table 34. Pounds of fish, turtle, shellfish, and crustaceans caught from 1956 through 1968. From the annual reports of the presidentially appointed governors of Guam.

Year	**Shallow-water Fish Caught by Weirs**	**Shallow-water Fish Caught by Other Methods**	***Mañåhak* and *Ti'ao***			**Tuna**	**Turtle**	**Shellfish**	**Total**
1956	128,865	252,800	47,500			26,570	10,988	9,250	462,688*
Year	**Weirs**		***Mañåhak***	**Mackerel**					**Total**
1957			34,000	41,400					
1958	84,816			39,750					376,556**
Year	**Weirs**	**Other Methods**	***Mañåhak***	**Mackerel**	***Ti'ao***	**Trolling**	**Turtle**	**Crustacean**	**Total**
1959	55,090	229,000	4,125	4,000	2,575	16,300	5,790	6,636	323,516
1960	75,896	218,900	21,900	12,450	4,750	13,700	7,101	4,948	359,645
Year	**Weirs**		***Mañåhak***	**Mackerel**	***I'e'***	**Trolling**	**Turtle**	**Crustacean**	**Total**
1961	92,085		17,778	156,960	6,400	15,000	5,479	1,710	295,412
Year	**Weirs**	**Surround Net**				**Trolling**			**Total**
1963	102,200	15,000				86,000			200,000*
1964									573,000
Year	**Reef Fish**		**Rabbit Fish**	**Mackerel**		**Trolling**			**Total**
1967	51,000		22,000	61,000		114,000			248,000
1968									343,500

Mañåhak = juvenile rabbitfishes, *Siganus spinus* and *S. argenteus*
Ti'ao = juvenile goatfishes, family Mullidae
Mackerel = *atulai* or big-eye scad, *Selar crumenophthalmus*
I'e' = the young of *Caranx melampygus* and other similar jacks

* The total given in the report is less than the sum of the parts.
** The total given is more than the sum of the parts.

Reports of the Guam Division of Aquatic and Wildlife Resources—1956-present, Western Pacific Fishery Information Network—1981-present, and the Pelagics Plan Team of the Western Pacific Regional Fishery Management Council—1987 to present

The Division of Aquatic and Wildlife Resources (DAWR, formerly the Division of Fish and Wildlife) of the Guam Department of Agriculture has produced annual reports since 1956. According to Gerry Davis, former Chief of the Division, there were cursory efforts to collect data on fisheries beginning in the 1960s. However, the surveys done the way they are now began in 1979 for boat-based fisheries and 1982 for coastal fisheries.

The annual reports contain information on both offshore and inshore fishing. Offshore fishing is broken down into five methods (trolling, bottomfishing, spearfishing, *atulai* night-light jigging, and other methods). Data are collected by interviewing returning fishing parties at the three major boat ramps on island: Hagåtña Boat Basin, Agat Marina, and Merizo boat ramp. In 2007 Acfayan Bay ramp in Inarajan was added to the monitoring program. Data are collected on weekdays and weekends and mornings and evenings. Complete interviews include information on catch, participation, and effort. Expansion algorithms are used to extrapolate the total catch, participation, effort, and catch per unit effort. Composition of the catch for each method is reported by species and weight.

Table 35 shows estimated annual effort and catch for trolling around Guam from 1963 through 1981. This table is derived from the data in DAWR reports.

Table 35. Estimated annual effort and catch for trolling around Guam from 1963 through 1981. From DAWR annual reports.

Fiscal Year	**Time Period Covered**	**Estimated Effort**		**Estimated Trolling Catch (1000 pounds)**
		Person Hours	**Boat Hours**	
1963	7/1/62-6/30/63			86.0
1964	7/1/63-6/30/64			
1965	7/1/64-6/30/65			
1966	7/1/65-6/30/66			
1967	7/1/66-6/30/67			114.0
1968	7/1/67-6/30/68			
1969	7/1/68-6/30/69	14,270		91.3
1970	7/1/69-6/30/70	27,093	9,031	38.4
1971	7/1/70-6/30/71	11,490	3,830	24.9
1972	7/1/71-6/30/72		2,614	8.6
1973	7/1/72-6/30/73		3,547	66.3
1974	7/1/73-6/30/74		3,754	20.6
1975	7/1/74-6/30/75		4,519	34.3
1976	7/1/75-12/31/76 *		8,037	20.5
1977	1/1/77-6/30/77 **	26,291	9,882	118.8
1978	7/1/77-6/30/78	48,645		187.1
1979	7/1/78-9/30/79	65,185.4		148.0
1980	10/1/79-9/30/80	21,090	8,170	102.6
1981	10/1/80-9/30/81	42,355	13,123.8	149.4

* annual estimates derived from 18 months of data
** estimated six month effort and catch

Table 36 shows the composition of the trolling catch of the five most common species caught by trolling around Guam: skipjack tuna (*Katsuwonus pelamis*), mahimahi (*Coryphaena hippurus*), marlin (*Makaira nigricans*), yellowfin tuna (*Thunnus albacares*) and wahoo (*Acanthocybium solandri*). These data are derived from DAWR reports.

Table 36. Percentages of the estimated total trolling catch of the five most common species caught by trolling around Guam from 1966 through 1981. From DAWR annual reports.

Fiscal Year	Time Period Covered	Skipjack	Mahimahi	Marlin	Yellowfin	Wahoo
1966	7/1/65-6/30/66	24.7	63.5	0.0	0.0	0.0
1967	7/1/66-6/30/67	30.1	9.4	34.2	3.4	0.0
1968	7/1/67-6/30/68	60.0	0.0	0.0	0.0	0.0
1969	7/1/68-6/30/69	34.4	20.2	0.0	26.2	11.9
1970	7/1/69-6/30/70	52.6	15.3	9.3	0.4	10.2
1971	7/1/70-6/30/71	6.2	3.8	58.3	12.8	7.2
1972	7/1/71-6/30/72	26.2	11.9	17.2	13.5	23.5
1973	7/1/72-6/30/73	32.7	7.8	5.0	23.2	27.6
1974	7/1/73-6/30/74	64.3	3.7	0.0	12.5	12.0
1975	7/1/74-6/30/75	7.3	12.0	35.9	8.1	29.9
1976	7/1/75-12/31/76					
1977	1/1/77-6/30/77					
1978	7/1/77-6/30/78	35.3	16.9	1.7	16.8	16.6
1979	7/1/78-9/30/79	27.9	22.6	12.5	24.3	8.6
1980	10/1/79-9/30/80	33.0	40.6	8.1	9.5	5.5
1981	10/1/80-9/30/81	45.0	7.0	8.0	27.0	11.0
14 Year Average		**34.3**	**16.8**	**13.6**	**12.7**	**11.7**

In 1981 the National Marine Fisheries Service's (NMFS) Southwest Fisheries Science Center (SWFSC) started the Western Pacific Fishery Information Network (WPacFIN) to work cooperatively with the Pacific islands fisheries agencies to collect and disseminate fisheries statistics. These statistics are available through the WPacFIN web site and the administrative reports produced by the Honolulu Laboratory, SWFSC.

Beginning in 1987, the Pelagics Plan Team and staff of the Western Pacific Regional Fishery Management Council have produced reports to the Council on the pelagic fisheries of the Western Pacific region based on the statistics produced by the island agencies and WPacFIN. Pelagics Plan Team reports use the Guam data from 1982 on.

Table 37 shows the estimated total landings of the five most abundant pelagic species from 1982 through 2006. These include non-charter and charter landings. These data are from the 2006 Annual Report of the Pelagics Plan Team.

Table 37. Estimated total landings of pelagic fishes by 1000 pounds in Guam, 1982-2006. From Pelagics Plan Team and Council Staff (2007).

Year	Mahimahi	Skipjack	Wahoo	Yellowfin	Blue Marlin
1982	112.2	126.7	55.9	112.7	21.8
1983	156.3	97.8	86.5	66.0	30.4
1984	26.1	218.6	53.8	68.0	49.7
1985	72.7	107.8	130.3	93.0	54.3
1986	102.9	77.7	69.6	55.6	57.1
1987	80.3	62.3	87.0	41.8	50.0
1988	338.4	213.5	99.1	85.8	61.6
1989	96.0	128.1	127.2	40.4	86.2
1990	140.3	149.3	85.3	72.3	94.8
1991	416.1	118.8	56.0	44.1	87.8
1992	87.6	123.8	82.2	133.4	84.4
1993	235.0	109.6	62.6	50.4	58.0
1994	138.0	188.8	50.5	71.2	76.6
1995	327.4	178.6	77.4	93.4	76.7
1996	327.6	238.4	146.9	107.0	64.5
1997	265.2	219.2	65.0	90.2	90.8
1998	265.4	202.5	158.5	137.7	43.9
1999	162.2	123.7	76.5	128.0	80.8
2000	85.6	267.5	70.5	76.6	86.6
2001	183.0	331.5	119.6	57.9	33.2
2002	172.3	175.5	71.7	44.8	53.5
2003	84.1	183.2	63.9	70.2	67.0
2004	194.8	167.6	119.9	104.5	38.8
2005	107.2	99.4	43.9	24.9	9.2
2006	162.5	146.7	105.9	28.0	29.2
25 Year Average	**173.6**	**162.3**	**86.6**	**75.9**	**59.5**
Percent of Five Species	**31.1**	**29.1**	**15.5**	**13.6**	**10.7**

The Pelagics Plan Team reports include information on effort, including estimated number of trolling boats, estimated number of trolling trips, estimated number of trolling hours, estimated trip length, and catch per unit effort (CPUE) in terms of pounds per hour. Table 38 shows the catch rates from 1982 through 2006.

The Pelagics Plan Team reports also include economic data including average price per pound of pelagic species, annual consumer price indexes (CPI) and CPI adjustment factors, inflation-adjusted commercial revenues, annual estimated inflation-adjusted average prices, and annual estimated inflation-adjusted revenue per trolling trip.

Pelagic fishing is seasonal with mahimahi and wahoo caught during the winter months, while skipjack, yellowfin, and marlin are most abundant during the summer months. Table 39 shows the average of 26 years of monthly estimated commercial landings. These data are from the WPacFIN web site.

Table 38. Trolling catch rates (pounds/hour) for Guam, 1982-2006. From Pelagics Plan Team and Council Staff (2007).

Year	Mahimahi	Skipjack	Wahoo	Yellowfin	Blue Marlin
1982	3.8	4.3	1.9	3.8	0.7
1983	4.9	3.1	2.8	2.2	1.0
1984	0.9	7.5	1.9	2.3	1.7
1985	2.0	2.9	3.5	2.5	1.5
1986	2.7	2.0	1.8	1.4	1.5
1987	2.3	1.8	2.5	1.2	1.4
1988	5.7	3.6	1.7	1.5	1.0
1989	1.9	2.5	2.5	0.8	1.7
1990	2.9	3.1	1.8	1.5	2.0
1991	9.4	2.7	1.3	1.0	2.0
1992	2.0	2.8	1.9	3.0	1.9
1993	5.4	2.5	1.4	1.2	1.3
1994	3.0	4.1	1.1	1.5	1.7
1995	5.7	3.1	1.3	1.6	1.3
1996	5.0	3.7	2.3	1.7	1.0
1997	4.6	3.8	1.1	1.6	1.6
1998	4.2	3.2	2.5	2.2	0.7
1999	2.8	2.1	1.3	2.2	1.4
2000	1.6	5.0	1.3	1.4	1.6
2001	3.2	5.8	2.1	1.0	0.6
2002	4.2	4.3	1.7	1.1	1.3
2003	2.6	5.7	2.0	2.2	2.1
2004	5.6	4.8	3.5	3.0	1.1
2005	4.1	3.8	1.7	0.9	0.4
2006	5.6	5.0	3.6	0.9	1.0
25 Year Average	**3.8**	**3.7**	**2.0**	**1.7**	**1.3**
Standard Deviation	**1.9**	**1.4**	**0.7**	**0.8**	**0.5**

Table 39. Average monthly estimated commercial landings of pelagic fishes by 1000 pounds in Guam, 1980-2005. From WPacFIN web site.

Month	Mahimahi	Skipjack	Wahoo	Yellowfin	Marlin
January	12.87	2.80	3.88	2.88	0.64
February	18.33	2.59	4.80	2.21	0.66
March	20.93	3.49	6.78	2.62	0.77
April	13.86	5.32	5.06	3.48	2.27
May	4.91	7.94	1.87	4.43	4.19
June	0.85	6.59	0.99	4.98	6.38
July	0.26	6.30	1.23	5.08	8.15
August	0.21	4.74	2.02	3.71	5.67
September	0.33	4.27	2.72	3.37	4.53
October	2.03	3.25	3.54	3.03	4.22
November	3.35	2.75	9.52	2.38	1.46
December	5.79	1.87	5.84	2.15	0.93

The DAWR data prior to 1982 are less reliable than the data from 1982 on. Nevertheless it appears that there was a change in the relative abundance of skipjack tuna and mahimahi caught around Guam prior to 1982 and from 1982 on. In 11 of the 14 years for which there are data from 1963 through 1981 (Table 36), more skipjack was caught than mahimahi. Mahimahi was more abundant than skipjack in only three of the 14 years. In 1982, Amesbury and Myers (1982:119) reported "The Skipjack Tuna is harvested in greater quantities than any other fish on Guam (except in years of exceptionally large Mahimahi runs)."

However in 14 of the next 25 years from 1982 through 2006 (Table 37), more mahimahi was caught than skipjack. This may be related to the increased use of FADs for fishing for mahimahi and also to the lower price and shorter shelf life of skipjack compared with mahimahi. See the interview with Guam fisherman, Peter Plummer, in Chapter 5.

Secretariat of the Pacific Community Oceanic Fisheries Programme—1981-present

The Oceanic Fisheries Programme (OFP) of the Secretariat of the Pacific Community (SPC) collects, compiles, and disseminates catch and effort data on the pole-and-line, purse seine, and longline fisheries in the Western and Central Pacific. Public domain data on these fisheries can be downloaded from the SPC web site. This report will not cover purse seining and longlining, as the data from those most recent methods of fishing have been available to fisheries scientists for some time. However, we will cover pole-and-line fishing in order to follow through with the pre-war pole-and-line fishery data from the Northern Marianas (below). The SPC data are grouped by five-degree squares of latitude and longitude. Table 40 shows the annual pole-and-line catches made by foreign vessels, mostly Japanese, in the vicinity of Guam from 10°-15° N and 140°-150° E.

Table 40. Annual catches of skipjack and yellowfin tuna made by foreign vessels doing pole-and-line fishing in the vicinity of Guam (10°-15° N, 140°-150° E). Public domain data from SPC web site.

Year	Skipjack (mt)	Skipjack (1000 lbs)	Yellowfin (mt)	Yellowfin (1000 lbs)
1972	585.6	1,291.0	4.1	9.0
1973	756.8	1,668.5	8.9	19.6
1974	198.1	436.7	0.9	2.0
1975	1,706.3	3,761.7	1.1	2.4
1976	193.4	426.4	2.9	6.4
1977	3,858.3	8,506.1	3.4	7.5
1978	1,753.1	3,864.9	14.3	31.5
1979	5,214.1	11,495.1	6.6	14.6
1980	1,273.8	2,808.2	3.5	7.7
1981	588.7	1,297.9	3.3	7.3
1982	910.8	2,008.0	4.4	9.7
1983	2,011.9	4,435.5	18.3	40.3
1984	199.0	438.7	15.2	33.5
1985	279.8	616.9	12.6	27.8
1986	3,739.9	8,245.1	38.8	85.5
1987	9,126.3	20,120.0	23.9	52.7
1988	840.4	1,852.8	17.8	39.2
1989	205.1	452.2	5.4	11.9
1990	3,307.1	7,290.9	14.8	32.6
1991	1,138.6	2,510.2	11.0	24.3
1992	282.0	621.7	0.0	0.0
1993	3,225.0	7,109.9	18.2	40.1
1994	2,295.1	5,059.8	15.2	33.5
1995	2,919.1	6,435.5	57.9	127.6
1996	318.5	702.2	3.7	8.2
1997	178.0	392.4	3.6	7.9
1998	867.8	1,913.2	13.6	30.0
1999	7.0	15.4	0.0	0.0
2000	562.0	1,239.0	2.8	6.2
2001	553.1	1,219.4	1.0	2.2
2002	2,793.8	6,159.3	4.3	9.5
2003	874.0	1,926.8	2.0	4.4
2004	433.8	956.4	1.2	2.6
2005	3,553.2	7,833.5	5.5	12.1
34 Year Average	**1,669.1**	**3,679.7**	**10.0**	**22.0**

GERMAN PERIOD IN THE NORTHERN MARIANA ISLANDS (1989-1914)

The Northern Mariana Islands were purchased by Germany in 1899 and remained in German hands until 1914 when the Japanese took the islands.

Georg Fritz—1899-1907

Georg Fritz spent eight years on Saipan as the District Officer of the German Mariana Islands from 1899 to 1907. In addition to acting as a capable administrator, Fritz wrote a history and ethnography of the Chamorro people entitled *Die Chamorro*, which was published in 1904 in the German journal *Ethnologisches Notizblatt*. The English translation by Elfriede Craddock (Fritz 2001) affords us a look at the customs of the turn-of-the-century Chamorros and, to a lesser extent, the Carolinians of the Northern Marianas.

Concerning fishing, Fritz (2001:68) wrote,

> Naturally, fishing provides the main source of food for the island inhabitants. However, fishing takes place only inside the reef. Only the Carolinians sometimes go on the high seas to visit Aguiguan 25 sea miles away from Saipan, and dive for trepang (*balate*) which they sell to the Japanese. They also catch turtle (*haggan*) and utilize weir traps inside the reef, a fishing technique not practiced by the Chamorros.

Although Fritz said that the Carolinians went to Aguiguan (or Aguijan on Fig. 1), he doesn't say they engaged in pelagic fishing. By Fritz's time, the Chamorros no longer built or sailed the flying proas. Fritz (2001:73-74) wrote,

> With the demise of the brave [Chamorro] nation, these ocean craft disappeared. Only the Carolinians who migrated to the Marianas in the 19th century, whose canoes and sails had the same form and construction as the canoes from the Marianas, resumed the traffic among Guam, Rota, Tinian and Saipan. [These voyages were stopped as a result of Spanish] government policy because of a few accidents. The last *sagman* is supposed to have arrived in Guam from Saipan in 1892.

According to Freycinet (2003:178), *sagman* is the Chamorro word for the largest proas. Fritz did not state clearly whether the last *sagman* to sail from Guam to Saipan in 1892 was sailed by Chamorros or Carolinians, but it appears that he meant it was sailed by Carolinians. He said the Chamorros' ocean-going craft disappeared with the demise of their nation, which took place as a result of Spanish conquest in 1695, and that the Carolinians resumed the inter-island traffic in the 1800s. Fritz (2001:74) said, "The Chamorros now use - solely for fishing within the reef - outrigger canoes made of *dugdug* [seeded breadfruit, *Artocarpus mariannensis*] or *lemai* [seedless breadfruit, *Artocarpus altilis*]. They are from three to six meters in length and are called *galaide*." (English names and species names of breadfruit added by Amesbury).

Fritz described the use of nets and other methods of reef fishing, including the use of fish poison from the fruit of a tree, also described by Safford (1905) in Guam at about the same time period (above).

Fritz wrote that two ancient types of fishing, both of which had been described by Freycinet (1824), had been preserved on Rota. These were the use of the hemispherical stone and half coconut shell in fishing for *hachuman* (*Decapterus* sp. or *opelu* in Hawai'i), and the use of a lure fish in fishing for parrotfish.

Fritz (2001:71) used the term *atcho poc*o for the stone and *guiguas* for the half coconut shell. He added two details not previously mentioned by Freycinet (1824). The coconut shell was fastened to the stone with gum from the sap of the breadfruit tree. After attracting the fish with ground coconut meat (*mahan*), the fisherman might catch the fish with hook and line, as well as with the net described by Freycinet.

JAPANESE PERIOD IN THE NORTHERN MARIANAS (1914-1944/45)

Japan controlled the Northern Marianas beginning in 1914. Saipan and Tinian were taken by the U.S. in 1944, but Rota continued to be occupied by the Japanese until the end of World War II in 1945.

Beginning in the 1920s and ending in 1944, the Japanese operated a pole-and-line fishery for skipjack and yellowfin tuna out of Saipan. This was the first large scale commercial fishery in the Marianas. With PFRP funding for the present project, MARS sent Wakako Higuchi, a Japanese-speaking Research Associate of the Micronesian Area Research Center, University of Guam, to Japan to research documents there. Her detailed report on the Japanese fisheries in Micronesia is included as Appendix C of this report and has now been published in *Immigration Studies* the journal of the Center for Migration Studies, University of the Ryukyus, Nishihara, Okinawa (Higuchi 2007).

In addition to Higuchi's report, there are reports in English to the League of Nations from the South Seas Bureau.

Reports to the League of Nations—1920s and 1930s

During most years of the 1920s and some years of the 1930s, the South Seas Bureau produced an *Annual Report to the League of Nations on the Administration of the South Sea Islands under Japanese Mandate*. The islands under Japanese mandate included the Northern Marianas, the Carolines, and the Marshalls. All of the reports contain information about fishing; however, only the reports made during the 1920s have the information divided by island. The reports made during the 1930s give statistics on fishing for all the Japanese mandated islands combined.

Table 41 presents information from the reports to the League of Nations on the quantity and value of fish caught off Saipan during the 1920s. By 1926, tuna (bonito and tunny) accounted for more than 90 percent of the total quantity and value of fish caught.

Table 41. Quantity and value of marine products from the Saipan District during the 1920s. Quantity is given in kilograms for every year except 1923 when it is given in *Kwan*. Value is given in *Yen*. From the *Annual Reports to the League of Nations on the Administration of the South Sea Islands under Japanese Mandate*.

Fishes		**1923**	**1924**	**1925**	**1926**	**1927**	**1928**	**1929**
Bonito (1)	Quantity Value	750 2,250	9,097 6,065	14,805 6,348	44,843 17,937			
Tunny (2)	Quantity Value	334 888	1,537 1,025	1,402 749	2,314 1,235			
Horse Mackerel (3)	Quantity Value	495 990	570 304	2,610 1,392	1,481 665			
Mackerel (4)	Quantity Value	5 14	45 30	787 210	690 369			
Gray Mullet (5)	Quantity Value	76 152	16 15	127 46	150 80			
Shark (6)	Quantity Value	26 26	1,522 324	1,023 273	2,348 313			
Other	Quantity Value	3,560 5,357						
Mackerel-like	Quantity Value		352 234	386 228				
Sawara (7)	Quantity Value				94 51			
Total Fishes	Quantity Value	5,246 9,677	13,139 7,997	21,140 9,246	51,920 20,650	34,377 13,167	25,417 21,029	46,417 16,833
Other Marine Products		**1923**	**1924**	**1925**	**1926**	**1927**	**1928**	**1929**
Sea slugs	Quantity Value	2,500 750	171,281 4,586	26,451 964		8,310 279	33,000 2,426	75,870 1,821
Green turtles	Quantity Value	15 375		(#) 125 1,595	(#) 78 780			
Other	Quantity Value		---- 2,612	21,918 6,935	24,008 6,387	---- 5,971	---- 1,036	---- 975
Manufactured Products		**1923**	**1924**	**1925**	**1926**	**1927**	**1928**	**1929**
Dried sea slugs	Quantity Value	320 760	35,460 16,420	2,967 2,798		1,965 1,598	11,610 9,288	8,820 4,704
Dried bonito	Quantity Value		855 2,508	484 1,292	3,293 8,780	1,976 5,270	885 2,360	
Dried tunny	Quantity Value				19 50			
Shark fins	Quantity Value		364 364	75 150	188 375			
Other	Quantity Value					---- 190		
Total Value		**11,562**	**34,487**	**22,980**	**37,022**	**26,475**	**36,139**	**24,333**

1. Bonito = skipjack tuna (*Katsuwonus pelamis*); 2. Tunny = probably yellowfin tuna (*Thunnus albacares*); 3. Horse Mackerel = scad mackerel or *muroaji* (*Decapterus muroadsi*), round mackerel or *maruaji* (*Decapterus maruadsi*), and jack mackerel or *maaji* (*Trachurus japonicus*) (Anon. 1977); 4. Mackerel = Japanese mackerel or *masaba* (*Scomber japonicus*) and spotted mackerel or *gomasaba* (*Scomber tapeinocephalus*) (Anon. 1977); 5. Mullet = family Mugilidae; 6. Shark = more than one family; 7. Sawara = *Scomberomorus niphonius* (Masuda et al. 1984).

From Appendix C: Pre-war Japanese Fisheries in Micronesia by Wakako Higuchi

Table 42 shows the Japanese pole-and-line catch of bonito (skipjack tuna) and tuna (probably yellowfin tuna) from Saipan District for the years 1922 through 1941. Higuchi refers to the years 1922-1931 as the “Experimental Period,” and the years 1931-1941 as the “Rise of Fishing Industries." The bonito catch peaked in 1937 at over eight million pounds. Tuna peaked in 1936 at over 330,000 pounds.

Table 42. Bonito (skipjack tuna) and tuna (probably yellowfin tuna) from Saipan District, 1922 through 1941. Based on Tables 5 and 6 of Appendix C by Higuchi.

Year	**Bonito (mt)**	**Bonito (1000 pounds)**	**Tuna (mt)**	**Tuna (1000 pounds)**
1922	2.4	5.2	1.3	2.9
1923	2.8	6.2	1.3	2.8
1924	9.1	20.1	1.5	3.4
1925	14.8	32.6	1.4	3.1
1926	44.8	98.9	2.3	5.1
1927	28.1	62.0	2.9	6.4
1928	26.5	58.4	1.3	2.8
1929	24.7	54.4	0.6	1.2
1930	258.0	568.8	4.5	10.0
1931	564.3	1,244.0	16.7	36.9
1932	1,309.7	2,887.4	48.2	106.4
1933	1,762.3	3,885.2	9.6	21.1
1934	2,516.0	5,546.8	27.3	60.2
1935	1,786.0	3,937.4	42.9	94.6
1936	1,696.0	3,739.1	151.0	332.9
1937	3,697.3	8,151.1	88.9	195.9
1938	2,592.0	5,714.4	33.9	74.8
1939	1,297.4	2,860.2	not available	not available
1940	3,379.0	7,449.5	84.5	186.3
1941	1,297.4	2,860.2	33.7	74.2
Average	**1,115.4**	**2,459.1**	**29.1**	**64.3**

For the most part, the statistics from the *Annual Reports to the League of Nations on the Administration of the South Sea Islands under Japanese Mandate* (Table 41 above) correspond with the statistics Higuchi obtained from Japan (Table 42 above and Appendix C). There are occasional discrepancies. For example, the 1929 League of Nations report shows 885 kg of dried bonito in 1928 (Table 41 above), while Higuchi’s tables (Appendix C, Tables 4 and 5) show 2,235 kg of dried bonito in 1928.

Certain differences in the numbers within Higuchi’s report appear to be due to the difficulty of distinguishing between the numerals 3 and 8. For example, Higuchi’s Table 3 (Appendix C) shows 14,305 kg of bonito from Saipan in 1925, but her Table 5 (Appendix C) shows 14,805 kg for that year.

The Japanese pole-and-line fishery employed Japanese and Okinawan people. According to Bowers (2001:189), “No natives were employed in the industry, neither on the boats nor in processing plants, and native fishing continued in its traditional function of providing day-by-day food supply.” The local people were involved in reef fishing for subsistence. However Alfonso C. Reyes, who was born on Saipan in 1924 and interviewed there in 2005, was quite clear in stating that some local people were employed by the Japanese in the tuna fishery (see Chapter 5).

Hans G. Hornbostel—1931

In an article published in the *Guam Recorder* in 1931, Hans G. Hornbostel confirmed that the fishing stone, the *poio*, originally described by Freycinet (1824:436), was still in use on Rota. Hornbostel’s description of *hachuman* fishing varied little from Freycinet’s. Hornobstel’s article verifies Fritz’s (2001) statement that this ancient type of fishing was preserved on Rota.

AMERICAN PERIOD IN THE NORTHERN MARIANAS (1944-PRESENT)

From 1944 to 1947, the U.S. Naval Military Government administered the Northern Marianas. From 1947 to 1976, the Northern Marianas was part of the Trust Territory of the Pacific Islands. In 1975 the voters of the Northern Marianas chose to join the U.S. as a commonwealth (U.S. Government 1975:6), and in March 1976 the U.S. Congress and the President approved the Marianas Commonwealth Covenant (U.S. Government 1976:7, 20). The government of the Northern Mariana Islands was separated administratively from the Trust Territory government effective April 1, 1976 (U.S. Government 1977:1, 14), and the new Northern Marianas Commonwealth government was installed January 9, 1978 as Dr. Carlos S. Camacho took office as the first governor of the CNMI (U.S. Government 1978:5).

Neal M. Bowers and Rohma Bowers—1947-1948
Alexander Spoehr—1949-1950

Shortly after the war, three American scholars resided in Saipan for nearly a year each and wrote about the problems encountered at the end of the war. Neal Bowers and his wife Rohma were geographers affiliated with the University of Michigan, whose work of investigating the problems of re-establishing the economy of the Northern Mariana Islands after the war was part of the Coordinated Investigation of Micronesian Anthropology (CIMA), a research program administered by the Pacific Science Board of the National Research Council. The Bowers arrived in Saipan in July 1947 and remained for ten months. Bowers’ research resulted in his Ph.D. dissertation. *Problems of Resettlement on Saipan, Tinian and Rota, Mariana Islands* was first published in 1950 and republished by the CNMI Division of Historic Preservation in 2001.

Alexander Spoehr, an anthropologist with the Chicago Natural History Museum, was on Saipan from November 1949 to October 1950 doing both archaeology and ethnology. His study of the indigenous Chamorro and Carolinian cultures, *Saipan, the*

Ethnology of a War-Devastated Island, was first published in 1954 as Volume 41 of Fieldiana: Anthropology. It was republished by the CNMI Division of Historic Preservation in 2000. Both Bowers and Spoehr wrote about fishing immediately after the war.

Toward the end of the war, the Japanese fishing boats were unable to leave Saipan lagoon due to American submarines. At that time they fished inside the lagoon using dynamite (Bowers 2001:30). The end of the war in Saipan was also the end of the Japanese fishing industry. "American attack on the islands completely wrecked the Japanese fishing industry. All shore installations were destroyed and the boats either sunk in the harbor or beached and destroyed by fire" (Bowers 2001:189).

Soon after the end of hostilities, the sunken hulls were raised from the lagoon and reconstructed by Japanese and Okinawan carpenters, prior to the removal of Japanese nationals early in 1946 (Bowers 2001:189, 65). American diesel engines replaced the Japanese engines, which made the boats faster and more easily repaired with American parts. Four boats were restored for use in Saipan and Tinian.

A fishing base was established at Garapan, Saipan, and another on Tinian in the embayment north of the harbor (later the site of the Trust Territory Leprosarium shown on the 1983 USGS map). In addition to offshore fishing, a seine crew operated in Saipan lagoon. The fish caught were distributed to the interned civilians. The base on Tinian was abandoned when the island was left uninhabited by the repatriation of the Japanese nationals (Bowers 2001:189).

After the repatriation of the Japanese, a cooperative of indigenous fishermen was formed on Saipan to engage in commercial fishing. The Saipan Fishing Company was the larger of two indigenous commercial fishing operations in the Trust Territory. The other was in Truk (Bowers 2001:242). A small group of Carolinian men who were employed as policemen started the Saipan Fishing Company and provided the capital. Shareholders increased to 173 people. Only a half dozen were Chamorro; most were Carolinian (Spoehr 2000:129).

Post-war production of the commercial fishing industry was greatly reduced from the pre-war Japanese production. More than 4,000 tons of bonito were harvested in 1937, compared with fewer than 100 tons in 1948 (Table 43). Spoehr (2000:129) reported that by 1950 the Saipan Fishing Company was on the verge of bankruptcy. Only twelve tons of fish had been caught in the first nine months of 1950, and more than two tons had been lost to spoilage.

Table 43. Pre-war and post-war production of the commercial fishing industry, Saipan District. From Bowers (2001:191).

Marine Products	**1937 (tons)**	**1948 (tons)**
Fish		
Bonito	4,075.64	
Tuna	97.99	
Mackerel	15.98	
Mullet	.22	
Shark	6.39	
Other fish	168.98	
Total Fish	4,365.20	89.45
Other Marine Products		
Trepang	24.34	0.00
Trochus		0.00
Turtle		0.03
Lobster		0.44
Total Other Marine Products	24.34	0.47
Grand Total	**4,389.54**	**89.92**

Spoehr (2000:129-130) cited four factors in the demise of the Saipan Fishing Company. The fishermen were more familiar with reef and lagoon fishing than deep-sea fishing for bonito and tuna. Maintenance of the fishing boats was a problem. Management of the commercial venture was lacking. There were difficulties in transporting the fish to market in Guam and in marketing the fish there.

Two men, Rafael Rangamar and Lino Olopai, whose fathers were part of the Saipan Fishing Company, were interviewed on Saipan in 2005 (see Chapter 5).

Reports of the CNMI Division of Fish and Wildlife—1978-present, Western Pacific Fishery Information Network—1981-present, and the Pelagics Plan Team of the Western Pacific Regional Fishery Management Council—1987 to present

The CNMI Division of Fish and Wildlife (DFW) distributes and collects invoice books from participating fish purchasers on Saipan. In this way approximately 90 percent of the commercial landings are recorded. The data collection system has been in operation on Saipan since the mid-1970s, but only the data from 1983 on are considered accurate. Tinian and Rota are in the process of establishing similar data collection systems. Table 44 shows commercial landings of pelagic fishes on Saipan from 1983 through 2006.

Table 44. Total commercial landings of pelagic fishes by 1000 Pounds in Saipan, 1983-2006. From Pelagics Plan Team and Council Staff (2007).

Year	Skipjack	Yellowfin	Mahimahi	Wahoo	Blue Marlin
1983	183.4	21.3	13.9	8.8	3.8
1984	290.8	19.6	7.6	14.1	1.5
1985	177.3	12.5	13.0	18.3	1.9
1986	254.4	16.9	17.8	9.1	2.7
1987	161.5	10.5	9.5	13.4	2.5
1988	266.5	15.4	30.8	11.7	1.3
1989	257.7	10.1	7.3	1.6	5.7
1990	148.0	10.5	10.4	3.5	2.0
1991	115.8	13.0	33.8	1.5	1.6
1992	82.3	25.7	26.3	17.2	6.6
1993	97.3	14.9	37.5	2.8	3.7
1994	92.2	13.4	15.1	3.9	2.6
1995	131.4	20.9	23.3	5.7	6.6
1996	165.0	38.0	35.7	10.8	8.6
1997	133.4	21.4	31.3	7.6	7.1
1998	167.1	14.6	25.4	6.3	4.2
1999	106.3	24.4	12.9	8.1	3.5
2000	140.4	17.7	7.3	4.1	3.6
2001	133.8	14.5	14.2	4.6	1.9
2002	180.0	30.0	18.0	8.2	1.3
2003	171.6	26.0	7.4	8.0	1.1
2004	148.3	27.5	35.8	6.9	2.0
2005	260.6	52.0	26.9	3.3	1.6
2006	265.8	42.0	17.2	3.1	1.4
24 Year Average	**172.1**	**21.4**	**19.9**	**7.6**	**3.3**
Percent of Five Species	**76.7**	**9.5**	**8.9**	**3.4**	**1.5**

The Pelagics Plan Team reports contain information on effort, including number of fishermen landing pelagic species, number of trips catching any pelagic fish, and the trolling catch rate in terms of pounds per trip. For skipjack tuna, there are catch rates based on the commercial invoices and based on creel survey. Table 45 shows catch rates from 1983 through 2006.

The Pelagics Plan Team reports also contain economic data including the value of commercial landings and average price per pound by species, annual consumer price indexes (CPI) and CPI adjustment factors, annual inflation-adjusted average price per pound, annual inflation-adjusted commercial revenues, and annual inflation-adjusted revenues per trip.

Table 45. Trolling catch rates (pounds/trip) for Saipan, 1983-2006, based on commercial invoices, except where specified as creel survey data. From Pelagics Plan Team and Council Staff (2007).

Year	Skipjack	Skipjack Creel Survey	Yellowfin	Mahimahi	Wahoo	Blue Marlin
1983	104		12	7.92	4.98	2.15
1984	144		10	3.76	6.95	0.76
1985	114		8	8.36	11.77	1.20
1986	150		10	10.50	5.35	1.57
1987	130		8	7.66	10.81	1.98
1988	164	49	9	18.98	7.21	0.81
1989	166	112	7	4.71	1.01	3.67
1990	133	104	9	9.40	3.12	1.83
1991	93	51	10	27.03	1.22	1.26
1992	46	60	14	14.80	9.68	3.72
1993	57	106	9	21.89	1.62	2.15
1994	61	110	9	9.89	2.54	1.73
1995	61	62	10	10.84	2.66	3.08
1996	59	68	14	12.68	3.84	3.06
1997	52		8	12.25	2.97	2.77
1998	60		5	9.13	2.27	1.51
1999	48		11	5.86	3.67	1.61
2000	54	95	7	2.80	1.56	1.38
2001	49	123	5	5.23	1.67	0.71
2002	78	104	13	7.87	3.58	0.55
2003	80	134	12	3.43	3.71	0.53
2004	45	106	8	10.94	2.12	0.61
2005	72	101	14	7.43	0.93	0.44
2006	102	113	16	6.58	1.19	0.54
Average	**88**	**94**	**10**	**10.00**	**4.02**	**1.65**
Standard Deviation	**40**	**27**	**3**	**5.85**	**3.12**	**1.01**

Table 46 shows the average of 25 years of monthly estimated commercial landings. These data are from the WPacFIN web site. Skipjack is abundant year round, but is most abundant in April through August. Mahimahi is highly seasonal and caught during the first four months of the year, especially February and March. Yellowfin is most abundant June through October. Wahoo is most abundant in March and April. Billfish are most abundant May through October.

Table 46. Average monthly estimated commercial landings of pelagic fishes by 1000 pounds in Saipan, 1981-2005. From WPacFIN web site.

Month	Skipjack	Mahimahi	Yellowfin	Wahoo	Billfish
January	9.24	3.22	1.56	0.59	0.09
February	8.84	4.99	1.24	0.69	0.06
March	13.54	4.98	1.41	1.27	0.06
April	16.29	2.79	1.41	1.31	0.11
May	16.65	1.02	1.50	0.50	0.33
June	16.11	0.21	1.72	0.23	0.50
July	15.00	0.08	1.76	0.21	0.47
August	14.93	0.12	1.76	0.25	0.49
September	13.59	0.05	1.87	0.46	0.38
October	12.71	0.22	1.82	1.02	0.44
November	11.31	0.38	1.53	0.73	0.22
December	10.01	1.14	1.61	0.50	0.15

Secretariat of the Pacific Community Oceanic Fisheries Programme—1981-present

Public domain data on the pole-and-line fishery for skipjack and yellowfin tuna in the vicinity of the Northern Mariana Islands was downloaded from the SPC web site. Table 47 shows the annual pole-and-line catches made by foreign vessels, mostly Japanese, in the vicinity of the CNMI from 15°-25° N and 140°-150° E.

SUMMARY

At the start of the 20th century, there was virtually no pelagic fishing in the Marianas. There had been little or none since the mid-1700s. During the 1800s, it was only the Carolinians that had ocean-going canoes. Just after the start of the 20th century, Fritz mentioned that Carolinians from Saipan sometimes sailed to Aguijan to dive for *balate* or trepang (sea cucumbers). They also caught turtles, but if they caught pelagic fishes, Fritz didn't mention it.

Japan took control of the Northern Marianas in 1914, and beginning in the 1920s they developed the first commercial fishery in the Marianas. This was a pole-and-line fishery for skipjack and yellowfin tuna employing mostly Okinawans and Japanese. The skipjack catch peaked at over eight million pounds in 1937.

At the same time in Guam (1933-1937), the U.S. Navy conducted a fishing school for Chamorro men. For safety's sake, instruction took place within view of a fishing lookout at Orote Point, and each boat carried trained homing pigeons to carry messages in case of emergency. Off shore fishing did not develop in Guam at that time due to a lack of boats.

World War II and the U.S. capture of Saipan in 1944 put an end to the Japanese pole-and-line fishery in Saipan. From 1946 to 1950, a cooperative of Carolinian men known as the Saipan Fishing Company tried to revive the fishery. Their total fish catch in 1948 was less than 100 tons.

Table 47. Annual catches of skipjack and yellowfin tuna made by foreign vessels doing pole-and-line fishing in the vicinity of the Northern Mariana Islands (15°-25° N, 140°-150° E). Public domain data from the SPC web site.

Year	Skipjack (mt)	Skipjack (1000 lbs)	Yellowfin (mt)	Yellowfin (1000 lbs)
1972	6,652.1	14,665.4	76.5	168.7
1973	7,415.3	16,347.9	345.5	761.7
1974	4,872.5	10,742.0	329.8	727.1
1975	6,022.4	13,277.1	273.3	602.5
1976	3,106.0	6,847.6	310.0	683.4
1977	3,135.2	6,911.9	454.0	1,000.9
1978	4,399.1	9,698.4	423.8	934.3
1979	6,236.6	13,749.3	509.3	1,122.8
1980	5,245.8	11,565.0	217.6	479.7
1981	6,980.6	15,389.6	373.3	823.0
1982	7,550.5	16,646.0	193.4	426.4
1983	6,931.6	15,281.6	327.7	722.5
1984	17,568.6	38,732.1	536.6	1,183.0
1985	4,978.5	10,975.7	345.2	761.0
1986	3,813.3	8,406.9	313.7	691.6
1987	5,706.6	12,580.9	82.5	181.9
1988	4,834.4	10,658.0	285.8	630.1
1989	6,216.1	13,704.2	184.0	405.7
1990	6,451.4	14,222.9	119.8	264.1
1991	3,569.0	7,868.3	202.2	445.8
1992	3,645.7	8,073.4	87.6	193.1
1993	5,276.6	11,632.9	123.7	272.7
1994	3,281.1	7,233.6	125.1	275.8
1995	4,322.1	9,528.6	190.4	419.8
1996	2,103.8	4,638.1	60.3	132.9
1997	802.7	1,769.7	66.7	147.0
1998	2,108.8	4,649.1	62.8	138.5
1999	236.5	521.4	59.3	130.7
2000	560.7	1,236.1	32.7	72.1
2001	932.2	2,055.1	19.5	43.0
2002	1,773.4	3,909.7	35.4	78.0
2003	4,666.7	10,288.3	58.4	128.7
2004	931.5	2,053.6	39.2	86.4
2005	900.3	1,984.8	72.6	160.1
34 Year Average	**4,506.7**	**9,936.6**	**204.1**	**449.9**

As the post-war economy improved in the 1950s and 1960s, the local people in the Marianas began to buy boats and troll for pelagic species. The year 1956 was the first year for which the catch of tuna was recorded in Guam. From 1959 on, the records show a trolling catch in Guam.

Now hundreds of thousands of pounds of pelagic fishes are landed annually. The composition of the Saipan trolling catch is very different from that of the Guam trolling catch. Figure 16 compares the 25-year average total landings in Guam (from Table 37) with the 24-year average commercial landings in Saipan (from Table 44). The Saipan catch is more than 75 percent skipjack, while the Guam catch is more evenly divided between the five most abundant species. It is possible that the preference for skipjack in Saipan is a result of Saipan's history with the pre-war Japanese pole-and-line fishery.

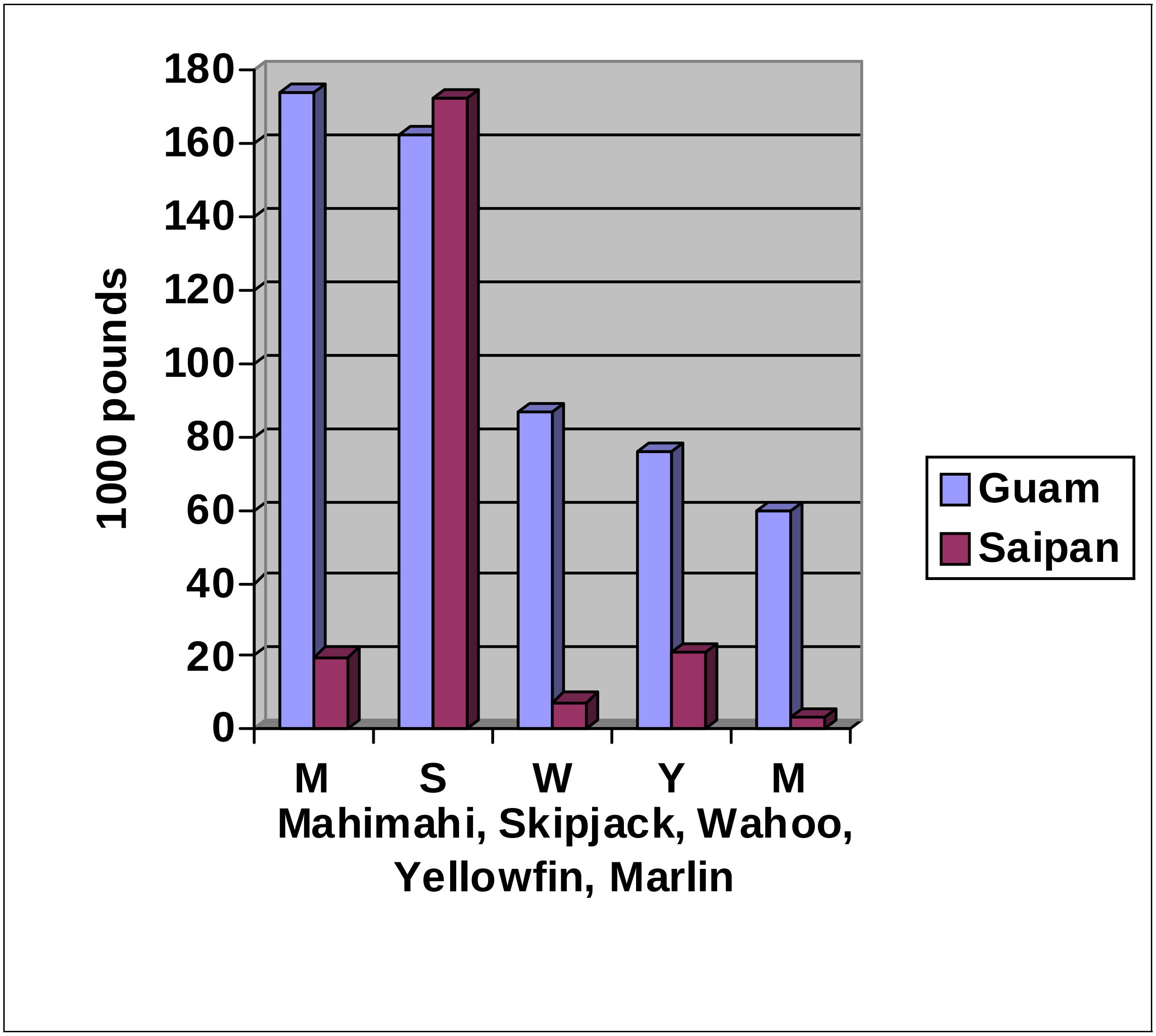

Figure 16. Composition of the trolling catch in Guam and Saipan, based on the average annual catches shown on Tables 37 and 44.

On Guam, the average annual total trolling catches of mahimahi and skipjack exceed 160,000 pounds each. The average annual trolling catches of wahoo, yellowfin, and marlin range from 87,000 to 59,000 pounds each.

On Saipan, the average annual commercial trolling catch of skipjack exceeds 170,000, but yellowfin, mahimahi, wahoo, and marlin average less than 22,000 each.

Japanese pole-and-line vessels still fish in the vicinity of Guam and the Northern Marianas. Skipjack catches from 1972 through 2005 average more than 3.5 million pounds per year in the vicinity of Guam and nearly 10 million pounds per year in the larger area around the CNMI. Yellowfin catches from 1972 through 2005 average 22,000 pounds per year in the vicinity of Guam and nearly 450,000 pounds per year in the larger area around the CNMI.

CHAPTER 5. INTERVIEWS

By Judith R. Amesbury

INTRODUCTION

Fishers from each of the four major islands of the Marianas were interviewed. After the interviews were written, they were mailed to the fishers for their comments or corrections. When the fisher used a Chamorro name for a fish, the author matched that name with the scientific names in Amesbury and Myers (1982), Amesbury et al. (1989), and Kerr (1990). The interviews are presented by island (Guam, Saipan, Tinian, and Rota) and by alphabetical order within each island.

GUAM

Manuel P. "Manny" Duenas II

On April 7, 2008, Judith Amesbury and John Calvo, Guam Coordinator for the Western Pacific Regional Fishery Management Council, interviewed Manuel P. Duenas II at the Guam Fishermen's Cooperative Association in Hagåtña, Guam (Photo 4). Duenas is President of the Co-op.

Photo 4. Manny Duenas at the Guam Fishermen's Cooperative Association in Hagåtña, Guam, April 2008. Photo by John Calvo.

Duenas was born in Sinajaña, Guam in 1958, and he is Chamorro. His father, Manuel Duenas, was born in Guam in 1926. Manny's father was in the military for seven years and served in the Korean War. Other than those years in the military, he lived on Guam and was mostly a farmer in Inarajan. Manny's grandparents had a farm in Inarajan where they raised cows, pigs, and horses. Manny's father died in 2003.

Manny's mother was born in 1932 and is living in Sinajaña, Guam. She lived in Colorado for a year during high school, but she has lived on Guam the rest of her life. Her parents ran a grocery store in Inarajan before and during the war. Later they established a garment store when the family moved to Hagåtña.

When Manny was growing up, people in Guam did mostly reef fishing, especially for the seasonal runs of *atulai* (big-eye scad, *Selar crumenophthalmus*, commonly called mackerel on Guam), *mañahak* (juvenile rabbitfishes, *Siganus spinus* and *Siganus argenteus*), *i'e* (juvenile jacks, such as *Caranx melampygus*), and *ti'ao* (juvenile goatfishes, family Mullidae). Manny said *ti'ao* was never as abundant as the others.

Manny and his friends were spear fishermen and shoreline fishermen. They fished for *atulai*. Manny would cast the line out and then rewind it on the neck of a Coke bottle; there were no rod-and-reels readily available back then.

Manny's uncle, his father's brother Roy Duenas, was a fisherman who was born and raised in Inarajan. He moved to Hagåtña a few years after he married and then to Agana Heights where he lives now. In the late 1970s, Roy purchased a second-hand boat with cash and fixed it up. He fished for pelagic species and bottom fish on the offshore banks. At first he would go out for only a few hours at a time, but then the hours became a full day and finally a couple of days. Fishermen from Guam were not used to being out at sea, but Roy was an officer in the Merchant Marines. The Co-op was incorporated in 1977, and Roy Duenas was a member. For a few years, he was President of the Co-op.

In the late 1980s, Manny joined Roy in fishing for pelagics and bottom fish. International reels replaced the Penn Senators, and the handline basket was replaced by electric reels. The use of landmarks was replaced with the use of GPS and depth sounders. However, the new technology could not replace experience and instinct in the art of catching fish. Manny said many factors affect the fisherman's catch: "lure size, wire or mono, overcast or sunny, moon phase, tidal changes, and ocean depth."

Amesbury asked how Manny became President of the Co-op. Manny said one night the fishermen were gathered complaining about the price of fuel, availability of gas, amount of fish sold, and the price of fish. Manny had 20 years of experience with a non-profit civic organization, so the fishermen asked him to read the Co-op by-laws and figure out how to change things. Many Co-op fishermen were unaware that there was supposed to be an annual meeting every January. The Co-op members forced the issue of having the meeting. The meeting was held and resulted in Manny being elected to the Board along with six other new members. Manny has been with the Co-op since 1995.

At that time some people, most of them with business experience, said the Co-op wouldn't last six months. They thought it was not salvageable.

Manny said that when he took over, the Co-op was more than $250,000 in debt. The Co-op owed the fuel company about $100,000; they owed the fishermen another $100,000, and other vendors the difference. There was no money in the Co-op account. Day-to-day operations were paid for on a cash-on-delivery basis. The Co-op was re-organized and a management regime put in place. Priorities were set with re-establishing credit, increasing sales, and more importantly increasing members' confidence. Manny said the reason the Co-op works now is because he works 12 to 18 hours per day and operates a true co-op benefiting its members. After fourteen years, he still works seven days a week. In 1995 there were only three employees. Now the Co-op has a manager hired by the Board and 20 full-time employees. In 1995 sales were approximately $650,000. Today they are $2.1 million.

Accountability is another reason the Co-op has been successful. At night the cashiers do their sales reports and cash counts. Those are verified by another cashier. The next morning the administrative assistant verifies the reports and makes the deposits. All of that is verified by the manager, the bookkeeper, the treasurer, and Manny. The financial reports are presented to the Board monthly and to the members of the Co-op at the annual meeting.

In 1997, the Co-op began requiring members to sign a marketing agreement. The agreement spells out what the Co-op does and what the members do. Members sell their catch to the Co-op. For fish brought in from the 1st to the 15th of the month, they are paid on the 10th of the following month. For fish brought in the second half of the month, they are paid on the 25th of the following month. Members know when they will receive their checks. Other benefits for Co-op members are that they can charge their fuel at a lower price than at the gas station, and they can charge ice at a lower price as well. When the fishermen are paid for their fish, the Co-op deducts the amounts charged for fuel and ice.

A major factor in the Co-op increasing its market base is that the Co-op has applied fish handling requirements to its members. The fish harvested must exhibit proper handling by the fisherman. First, the fish received must meet the maximum temperature requirement. Second, each fish is tagged to identify which fisherman caught the fish. During the processing the fish is filleted, and the color and texture must meet Co-op standards. If any fish fails any portion of this in-take process, the fish is either returned or destroyed. Co-op consumers receive on-premises education about the high quality standard. In one instance a consumer argued that the mahimahi in the display case was not fresh because the flesh was not white. Co-op employees showed her the mahimahi from the freezer and compared the two shades of color, and the consumer was astonished.

Manny said there has been a lot of fishing pressure by large scale commercial fishing around here. This is the most productive and most impacted area in the Western Pacific. Purse seiners have had the greatest impact. Purse seining started here in the

1970s and continued until 1990. A man named Zuanich operated U.S. purse seiners out of San Diego. His was the largest and most modern fleet in the U.S. with about 10 vessels. The three main ships were named for his daughters. His company held a record for the largest catch in a single set of the net. The catch was approximately 130 metric tons (mt). For comparison Manny said a small boat from Guam catches 35 mt in a year. Manny believes that the U.S. purse seiners fished within Guam's Exclusive Economic Zone (EEZ), the waters from 3 to 200 miles out. Foreign purse seiners have visited but supposedly never fished in the EEZ.

Purse seining in the Western and Central Pacific is limited by the number of vessels, but not by the capacity of the vessel. The capacity of a purse seiner used to be 800 to 1200 mt, but now they are double that. Some have a capacity of 3000 mt. Zuanich used helicopters to find the fish. Now purse seiners use fish aggregating devices (FADs). They catch everything. Around the Western Pacific, they catch both yellowfin and skipjack along with a large quantity of by-catch (mahimahi, wahoo, and rainbow runner), because the schools are mixed. In 2006, the purse seiners in the Western and Central Pacific caught 2.1 million mt. That is more than 50 percent of the world's tuna market.

Guam has never had a longline fishery within its EEZ, but we've had many foreign longliners fishing outside the 200-mile limit. According to a Coast Guard report, last year five longliners were discovered on the boundary. Two were fishing and three were in transit. One longliner was fined $130,000 for fishing in the EEZ of the CNMI. The foreign longliners transship their fish through Guam. The peak year for that was 1995 when 500 vessels used Guam for their port-of-call. They offloaded 15 to 30 mt per night of rejects (an average of 15% of their total catch).

The United Fisheries Corporation (UFC) used to buy the rejects and freeze them with three 40-foot blast freezers and export the fish to other fish processing plants in China, Taiwan, and the U.S. The U.S. companies complained about the quality of the fish, so the U.S. Food and Drug Administration enforced Hazard Analysis and Critical Control Point (HACCP) requirements, which affected the reject industry. UFC complied with the requirements, but other companies didn't, and enforcement wasn't consistent. UFC is still here, but in 2002 the fisheries leveled off. Since the decline in the number of foreign longliners, the UFC just places the reject fish in cold storage due to the low volume.

The Shark Finning Prohibition was enforced in 2005. Manny said the Taiwanese were bringing in both the carcass and fins; the Japanese were landing only the fins, which could go undetected more easily. The Coast Guard cracked down and said the fins can weigh no more than 5 percent of the weight of the carcass. But the Taiwanese use the shark belly for bait and cut too deep when removing the fins, so the fin weight was 8 or 9 percent of the carcass weight. Manny said the 5 percent limit doesn't work. The Taiwanese left the island about 2005-2006, which resulted in one of the largest companies that dealt with them shutting down.

There are still 75 longliners, mostly Japanese and a few Taiwanese, fishing in the vicinity of Micronesia and sometimes just outside the Guam EEZ. There is a Japanese pole-and-line fishery for skipjack and yellowfin, but Manny said those boats usually fish farther north.

Manny said the effort of purse seiners should be reduced by 50 percent. He said that 200 purse seiners in the Western and Central Pacific harvest 70-75 percent of the tuna-like fish caught. The other 25-30 percent is caught by all other boats, about 40,000 or more boats in the Western and Central Pacific. Manny said we can't really blame the longliners. He welcomes the ban on purse seining in Guam's EEZ, which was recently voted on by the Western Pacific Regional Fishery Management Council, because it will also protect the seamounts from possible damage.

With regard to mahimahi, Manny thinks the biggest problem is coastal pollution. In the 1980s you could catch mahimahi right outside the Hagåtña Boat Basin channel, but that changed when the sewer pipe broke. Now that it's repaired, they're coming back. Also there are only a couple of FADs out around Guam now where there were 15 total a few years ago.

The FADs attract mahimahi, blue marlin, and wahoo. Blue marlin are caught on FADs, but more striped marlin are caught on seamounts according to fishery statistics. According to the Pacific-wide stock assessment, the striped marlin is in trouble. Last year was a really bad year for blue marlin. Usually more than 50,000 pounds are caught around Guam, but last year less than 20,000 pounds were caught.

Manny is pessimistic about the future of fisheries on Guam. He thinks they'll be gone in ten years. There's a new mindset that says fishing is destroying the environment. The lack of government support is a problem. The Co-op used to have contracts with the Department of Education and the Department of Corrections, but those food services have been privatized. Although the private companies were mandated to buy locally, that is not enforced.

Manny said the charter boat business has been declining. It used to be a $6 million a year industry, but now it is about a $1 million industry. There used to be 12 companies, but now there are six. He said that compounding the poor fishing situation is the fact that Guam is not getting the high-end tourists from Japan. The tourists who are coming now spend less and are more frugal. Also the cost of operation and maintenance of the boats has gone up, especially the price of fuel. Manny said the offshore banks, like 45 Degree Bank and Rota Banks, are not as productive as they once were. Seasonal fish are not there. Manny said, "Even the unavoidable skipjack tuna is difficult to catch."

Peter Plummer

On April 1, 2008, Amesbury and Calvo interviewed Peter Plummer at Chamorro Village in Hagåtña, Guam (Photo 5). Plummer is a Caucasian American who has lived and fished in Guam for more than 30 years. His wife is Chamorro.

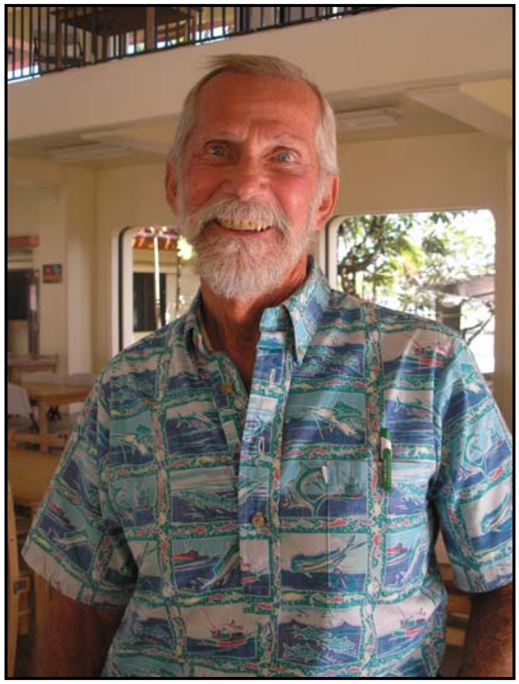

Photo 5. Peter Plummer at Chamorro Village, April 2008. Photo by John Calvo.

Plummer's father, who was British and Spanish, grew up in Trinidad where Plummer's grandfather had a sugarcane plantation. Plummer's father moved to the U.S. in 1932 when he was in his 30s. Plummer's mother, who was Latvian, moved to the U.S. as a teenager about 1927 or 1928. Peter Plummer was born in Summit, New Jersey in 1941.

Plummer said his father filled his head with island stories, and Plummer lived and fished in the Virgin Islands and American Samoa before coming to Guam. He was recruited in San Francisco to teach in Guam in 1976. He taught Health and Physical Education at John F. Kennedy High School until 1981.

Plummer grew up doing recreational fishing on the east coast of the U.S. in New Jersey. He caught blue fish and flounder. It was in the Navy that he learned to fish for pelagic species. As a Boatswain's Mate stationed in Key West, Florida from 1959-1961, he was put in charge of sport fishing for the naval officers. They caught sailfish and mahimahi. Plummer did commercial fishing in Alaska during the summers of 1963-1974. He worked on small purse seine and gill net boats that caught pink salmon in the summer and silver salmon in the fall.

Within one month of arriving on Guam, Plummer bought a small Boston Whaler. Over the years here, he has owned six boats. The boats he owns now are *Mamulan I*, a 31-foot Shamrock, and *Mamulan II*, a 35-foot Viking. He operates a charter business. Ninety-five percent of the time is spent trolling for pelagic species. In the winter they catch bonita, mahimahi, and wahoo. In the summer, they catch marlin, yellowfin, and bonita. They also do some bottomfishing on request in the summer.

[Note added by Amesbury: In Guam and the Northern Marianas, skipjack tuna, *Katsuwonus pelamis*, is referred to as "bonito" and "bonita" both. The sources quoted in Chapter 4 spelled the word "bonito," but the fishers interviewed in Chapter 5 used the word "bonita." That is why the word is spelled differently in Chapter 4 and Chapter 5.]

Plummer's customers are 90 percent Japanese tourists, who he says are very respectful and never complain. Plummer is under a contract with Japan Travel Bureau. The other 10 percent are military and local people. Military customers may increase after the military build-up over the next six years.

Plummer sells his fish to the Guam Fishermen's Cooperative Association. He doesn't sell fish off the boat. Co-op members sign a marketing agreement to sell to the Co-op. Sometimes Plummer takes a fish home for his family. He and his wife are semi-vegetarians since he had bypass surgery three years ago. They eat *sashimi*, or *kelaguen*, or his wife bakes the fish.

When asked how fishing has changed in Guam, Plummer said one species in particular, yellowfin tuna, has almost disappeared. In the 1970s there were schools of 60-100 pound yellowfin off the points around Guam, like Ritidian. In those days, you didn't have to go to Rota Banks or Galvez Banks. Until the mid-1980s, he was still catching good-sized yellowfin, but he hasn't caught a 100-pound yellowfin for ten years now, and he fishes every day. Both the number and size of yellowfin have decreased. He said that if records do not show that, then it's because the records have not been kept well. The yellowfin he catches now are 30 pounds. Plummer said even the longliners are catching bonita.

When asked why yellowfin have decreased, Plummer said, "Overfishing." He said throughout the years he's been fishing in Guam, there have been at least 165 mostly foreign longliners transshipping through Guam. During the early or mid-1980s, there were also purse seiners. Zuanich, the owner of the purse seiners left, because there were no more yellowfin. Plummer said, "They have to make a profit. When they start catching more cat food than yellowfin tuna, it's time to leave." By "cat food" he said he meant bonita.

Mahimahi run in cycles according to Plummer. About every three years, there is a good year, followed by two so-so years. In a good year, his charter boat catches 20 mahimahi in three hours. This year they caught only one to three mahimahi in three hours. Fish aggregating devices (FADs) increase mahimahi by 200 percent, but there are only a couple FADs out around Guam now. Mahimahi are attracted to floating logs also. During the full moon, mahimahi come in close and feed on reef fish. They can be caught in 60 to 100 feet of water. As the day goes on, the mahimahi move out to deeper water. Plummer said, "They are eating machines. That's why they're so easy to catch."

Amesbury remarked that since about the beginning of the 1980s, more mahimahi have been caught around Guam than bonita, but earlier more bonita were caught. Plummer said the fishermen could still catch more bonita, but they don't do that due to the price. The Co-op pays a higher price for the first 100 pounds of bonita, but after 100 pounds, the price drops to 50 cents a pound. Plummer said he could catch 300 to 400 pounds a day at Rota Banks, but the fuel is too expensive to spend catching 50-cents-a-pound fish. Also bonita has a shelf life of only three days, whereas mahimahi can be frozen and it's good for six months to a year. The Co-op doesn't drop the price of mahimahi part way through the day. There is a set price for mahimahi for that day. Plummer sells mahimahi to the Co-op for $1.50 to $2.25 a pound, but that is the same price that he was getting 20 years ago. The local fishermen are competing with fish coming in from the Philippines at $1.00 per pound.

Marlin sizes and numbers have been pretty consistent. Plummer said that you can't sell marlin on the east coast of the U.S. You have to release it. He said if you want to implement catch-and-release in the Pacific, you'd have to take the selling price off their heads. In June 2001, his boat caught a 700-pound marlin, which is the largest ever caught on a charter in Guam.

Over 30-some years, Plummer has hooked and released about five turtles. The largest was right outside the Hagåtña Boat Basin. Others were at Galvez Banks. Plummer said there used to be a lot of turtles in Apra Harbor when he windsurfed there in the 1970s.

All of Plummer's children and grandchildren fish. His son, who is the captain of *Mamulan I*, will eventually take over the charter fishing business from him. They may add a third boat if his oldest grandson wants to fish.

Masao Tembata

On April 1, 2008, Amesbury and Calvo interviewed Masao Tembata at his office on Marine Corps Drive in Anigua, Guam (Photo 6). Tembata was born in Japan in 1951, and he is Japanese. He came to Guam, because his father had a business here. Tembata's father was on the inaugural flight of PanAm from Tokyo to Guam in 1967. Governor Guerrero spoke to the group and encouraged the businessmen to invest in Guam. Tembata was 16 when he first came to Guam and 18 when he came to stay. Tembata showed the interviewers a photo of himself when he was five years old with his mother in a chartered Chris-Craft boat in Tokyo Bay. He said that was the start of his love affair with boats.

Tembata attended the University of Guam and graduated with a degree in Business Management in 1975. He had been a skin diver in Japan, and he won trophies for spearfishing in the 1971 and 1972 Charter Day activities of the University of Guam.

In 1972 Kuni Sakamoto joined Masao's father's company, Tenbata Guam, Inc. Sakamoto was manager of the auto repair shop for four years from 1972 to 1976.

Sakamoto had come to Guam in 1966 under contract with the Division of Fish and Wildlife in order to provide training in small boat fishing methods, particularly bottomfish handlining and *atulai* (big-eye scad, *Selar crumenophthalmus*) jigging, and to survey the waters around Guam for fishery resources. Tembata showed the interviewers a 1970 paper co-authored by Sakamoto entitled "Exploratory Fishing Survey of the Inshore Fisheries Resources of Guam" (Ikehara et al. 1970). Sakamoto and Tembata ate together every night, and Sakamoto taught Tembata everything about fishing. Tembata referred to Sakamoto as his "fishing master." (For an interview with Sakamoto, see Amesbury and Hunter-Anderson 2003).

Photo 6. Masao Tembata at his office in Guam, April 2008. Photo by John Calvo.

In 1972 Tembata bought a 12-foot boat, and he and Sakamoto did deep bottom fishing in Agat, not in open water. In 1974 Tembata bought a 16-foot boat with two engines. That is when he started doing pelagic fishing. He had done bottomfishing and shoreline fishing in Japan, but he had never done trolling in Japan. Now he fished twice a week at Rota Banks, catching yellowfin, mahimahi, and marlin. He also fished for the deep bottomfish, silvermouth or *lehi* (*Aphareus rutilans*) and *onaga* (*Etelis coruscans*). In 1975 Tembata bought an 18-foot boat. He caught a 146-pound yellowfin and a 413-pound marlin. He said there were plenty of fish at Rota Banks.

In 1983 Tembata became a charter boat captain and started his business, Ten Boat Charter, with a 22-foot boat purchased from MarBoats in Guam. He bought the boat with a bank loan, and then used the money he made with the charter business to pay off the loan. Then he bought the next boat and kept moving up. To make a long story short, Tembata said he bought 23 boats from 1972 to 2007. The largest was a 46-foot boat he no longer owns. Now he owns three American boats, *Ten*, *Ten II*, and *Ten III*. The first two are 36 feet and the third is 38 feet.

During the 1980s, Tembata went to Hawaii every year to learn about the charter boat business and to buy lures from Joe Yee (Joe Yee Custom Lures). He said the Japanese love to fish in Kona. The fish are bigger in Hawaii. They are different populations there.

Since 1987, Tembata has been going to Ft. Lauderdale, Florida to the boat shows. He bought his boats there. Also he wanted to learn about tag-and-release and how to be more professional.

In 1995, Tembata needed a walk-around boat for casting (for mahimahi, bonita, and yellowfin) and jigging (for dogtooth tuna), so he had one made. It is the 38-foot boat. It has a well for live bait, so he can do bottom fishing with live bait.

Tembata's charter boats here do 60 percent trolling, 30 percent bottomfishing, and 10 percent jigging. Tembata said they catch everything. The customers are mostly Japanese tourists, but there are also Chinese from Hong Kong. Three groups of Chinese come every year and do bottomfishing for three days. Ten Boat Charter has few military customers, because their price is higher than other charter boats.

When asked what has changed over the years he has fished in Guam, Tembata said the big change is the decrease in yellowfin due to overfishing. Back in the 1970s during the summers he could catch 100-pound yellowfin. Small yellowfin were so easy to catch, it was embarrassing. They were like trash. By handlining for an afternoon at Rota Banks, he could fill a cooler box with bonita, and there were ten boats at Rota Banks all the time.

At that time, Tembata didn't appreciate marlin. He considered it a waste of time, because it was a cheap fish, and he wanted tuna. He would hook big marlin (500-700 pound) a couple times a year off Ritidian or at Rota Banks. He couldn't handle that big a fish, couldn't land it. Now he doesn't even hook those. The ones he hooks now are below 400 pounds. Tembata said even 10 years ago, one of his boats would land 20-30 marlin and lose 50-80 marlin in a year. Now one boat lands two to ten marlin and loses five marlin a year.

Tembata said 80 percent of the marlin they catch are tagged and released. He's been doing that for 18 years, first with a California tag, and now with the Billfish Foundation in Fort Lauderdale, Florida. If one of his tagged marlin is recaptured and reported, he receives a letter and a T-shirt from the Billfish Foundation.

This year was a bad year for mahimahi. Guam didn't have a winter season, and the fish didn't come this year. Tembata said that's due to global warming. Normally the typhoons in the Pacific form southeast of Guam around Chuuk and move northwest over Guam, but this past year they formed around Guam and moved west from here. Japan has more hot days than before. It's two or three degrees warmer in Japan and here. The ice is melting at the poles.

Tembata said he's not worried about longlining or harpooning, but purse seining is a problem. Amesbury mentioned that the Western Pacific Regional Fishery Management Council recently voted to exclude purse seining from Guam's EEZ (out to 200 miles), but Tembata said the problem is at the lower latitudes, closer to the equator, where the spawning populations of tuna are. He said the fish are getting scarce.

SAIPAN

Mike Fleming

On February 27, 2005, Amesbury and Hunter-Anderson interviewed Mike Fleming (Photo 7) at his home in Saipan. Fleming is both a fisherman and an archaeologist. He obtained a Master's degree in Anthropology from the University of Otago, Dunedin, New Zealand. His thesis about archaeological fishbone is entitled *The Scaridae Family in Pacific Prehistory* (Fleming 1986).

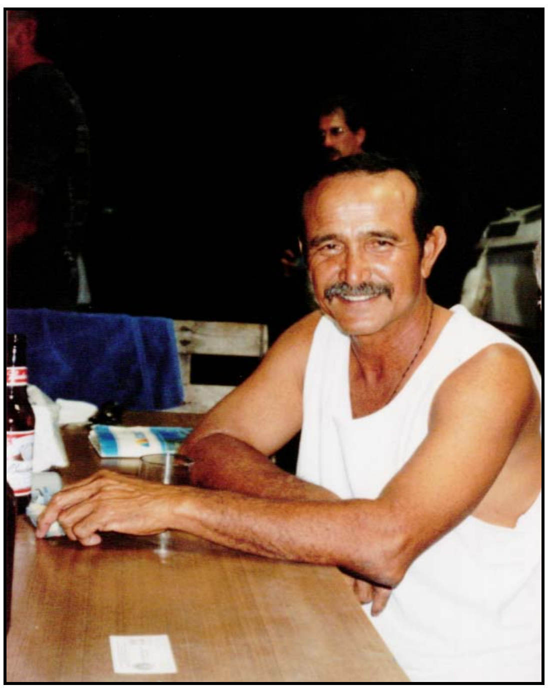

Photo 7. Mike Fleming at his home in Saipan, February 2005. Photo by J. Amesbury.

Mike Fleming has lived in Saipan for 25 years, but he is originally from Tinian. His parents still live in Tinian, and we interviewed his father Alfred Fleming there. Mike is Chamorro, though his great grandfather, Henry Gordon Fleming, was European. Mike's wife is Carolinian, and he says his children are "Chamolinian."

Mike was born August 20, 1953. His father is Alfred Flores Fleming, born January 1, 1922, and his mother is Rosalia Concepcion Aldan, born November 9, 1924. Both of Mike's parents were born in Yap, but they came to Tinian after the war in 1948. Mike's father is now the oldest man in Tinian. Mike is one of six children of Alfred and Rosalia. However, Rosalia was married earlier to a man who died, and they had two daughters, so Mike has two older stepsisters.

Mike's mother says that Mike has a special relationship with fish. She tells of how they picnicked at Unai Dangkolo when he was about five or six years old, and Mike speared a fish with a *tangan-tangan* (*Leucaena leucocephala*) stick. Mike's mother and Carmen Sanchez's mother are sisters. Carmen Sanchez is another person we interviewed on Tinian.

Mike's father was a trolling fisherman who caught mahimahi, marlin, tuna and wahoo, but he also worked for Public Works in Tinian. Because the job occupied a lot of Mike's father's time, it was Mike's uncle, Justo Sanchez, the father of Carmen Sanchez, who taught him how to fish. His uncle taught him all methods of fishing—everything from using the throw net and spearfishing to fishing in the deepest ocean. Justo taught Mike about the phases of the moon and the tides.

Mike said he has 40 years of experience fishing. For the last 12 years, he has kept records of where he fishes, what he catches, the number of pounds caught, the phase of the moon and the tide. He uses GPS to identify his location, and he knows 300 places to fish. He can fish in a different place every day of the year. He prefers bottom fishing at depths of 200 to 1000 feet. Mike is especially known for his ability to catch *onaga* (*Etelis coruscans*). He once caught 67 *onaga* in one day. He also catches *opakapaka* (*Pristipomoides flavipinnis*) for weddings. He said he sometimes targets a certain species for weddings or other occasions. In 2003 Mike won the grand prize in the fishing derby with a 280-pound marlin.

Mike's boat is a 20-foot Wellcraft, named *Bunita*. He likes it, because it is a dry boat; he doesn't get wet. Mike went out fishing by himself for 15 years, but he doesn't go by himself any longer. He has a house in Saipan and a house in Tinian. When he fishes going south to Tinian, he gives his fish to his father. When he fishes on the way back to Saipan, he gives his fish to his wife's relatives. He also sells fish to the fish market, and he has a freezer for personal use.

The evening that we talked to Mike, he served us yellowfin *sashimi*, plus *opakapaka* (*Pristipomoides flavipinnis*), *gindai* (*Pristipomoides zonatus*), *kalikali* (*Pristipomoides auricilla*), and *ehu* (*Etelis carbunculus*) grilled outdoors. (The last four fishes are all snappers—family Lutjanidae.)

Rafael I. Rangamar and Lino M. Olopai

On February 25, 2005, Amesbury and Hunter-Anderson interviewed Rafael Rangamar and Lino Olopai (Photo 8) at the Seaman's Restaurant in Saipan.

Photo 8. Lino Olopai (left) and Rafael Rangamar at the Seaman's Restaurant, Saipan, February 2005. Photo by J. Amesbury.

Rangamar is a Saipanese Carolinian. He was born in Garapan, Saipan in 1936. Rangamar's parents and grandparents were also born in Saipan. It was his great-grandparents who immigrated to Saipan. His mother's side of the family was from Satawal, and his father's side was from Pulusuk.

In 1937 Rangamar's family moved to the northern island of Asuncion. When asked if the Japanese required them to move, Rangamar said no, they chose to go to Asuncion to work in the copra industry. They worked there for the NKK (Nan'yō Kōhatsu Kaisha or South Seas Development Company). Rangamar is the oldest of 11 children, six boys and five girls. Three of the children, two boys and one girl, were born in Asuncion.

According to Rangamar, there were about seven families on Asuncion at the time his family was there. Most of those people returned to Saipan before the war. There were also some Japanese civilians on Asuncion. When the Americans bombed Maug, the Japanese there escaped to Asuncion. In 1945, the U.S. military moved everyone off Asuncion, and Rangamar's family returned to Saipan.

Lino Olopai is also Saipanese Carolinian. He was born in Saipan in 1940, the second of five children, one girl and four boys. Olopai's parents were also born in Saipan. His family was originally from Satawal, but his grandfather was from Pulusuk. Olopai is described in the book *A Song for Satawal* by Kenneth Brower (1983). He has been involved in the renewed interest in traditional Carolinian navigation. Olopai sailed from Saipan to Satawal with five Satawalese in 1974 and lived in Satawal for most of the next three years. The canoe route between Satawal and Saipan had been reopened in 1970 after a 70-year hiatus (Brower 1983).

Rangamar and Olopai talked about the Saipan Fishing Company, which was formed right after the war in 1945 and of which both their fathers were a part. Olopai's father was one of the Carolinian policemen who provided the capital for the fishing company (see Spoehr 2000:129). Rangamar's father was captain of one of the boats.

The three boats were known by their numbers, 1, 6, and 7, with the numbers pronounced in Japanese. Boat 1 was captained by Bwabwa Rabauliman, Boat 6 by Pedro Apolisan, and Boat 7 by Ernesto W. Rangamar, the father of Rafael Rangamar. Ernesto Rangamar became the captain of Boat 7, when Juan Olopai, the uncle of Lino Olopai, retired from that position. Ernesto Rangamar had such good vision that he could spot a school of fish miles away. People said the ocean spirits liked him. He could bring in two loads of fish per day when the other boats brought in one load per day.

Both Rangamar and Olopai went out on the boats when they were children. Olopai said that his parents sent him out with different boats, and since he was thought to bring luck to the fishermen, they fought over him.

The two men described a day of fishing with the Saipan Fishing Company, which caught mostly skipjack. Very early in the morning, they set out for Tinian or Aguijan (Goat Island) to catch bait. The bait was a small silver-colored fish, known in Japanese as *iriko*. The boats would drop men off in the water while it was still dark, and the men would move toward the cliff concentrating the small fish as they moved. They used a fine, long net tied against the wall of the cliff with weights to hold it down. The men on board the boats would pull the net in and scoop the baitfish into the boats. On the boats were saltwater containers to hold the live bait.

When a school of fish was spotted, the captain brought the boat up toward the school and slowed the boat down. The fishermen threw a couple handfuls of bait into the water. When the school of fish moved in, the boat was stopped. The boats had diesel engines. The boat pumped saltwater and sprayed it out to camouflage the boat and fishermen. (Another Saipan fisherman, Mike Fleming, said there are no boats like that in Saipan now, but he said the Hawaiian fisherman Henry Pelekai has a boat that sprays water like that.)

The fishermen used bamboo poles, which they worked on in their spare time. The line they used was from Japan. The hooks had metal heads and no barbs. There was no need to unhook the fish. A fisherman would pull in his pole and flick it or snap it to release the fish. They fished with unbaited hooks. One man would move about the boat throwing bait into the water as the others fished and called out for bait as necessary. There were 15 men per boat, and they could fill the boat in 30 minutes. Olopai and Rangamar estimated the catch at 60 tons per boat. (Amesbury notes that figure is high compared with data in Bowers [2001:191].) They caught bonita, yellowfin tuna, and wahoo. The men mentioned rainbow runner, but said it was not so abundant.

In the heat of the day, from about 10:00 am to 2:00 pm, the fish would stop biting. Then the fishermen would do bottom fishing or trolling. About 2:30 or 3:00 pm, the fishermen would resume pole-and-line fishing until the sun went down. The fishermen sold their fish in Saipan, Tinian, Rota, and Guam. It was a long day by the time they had delivered their fish and returned home. The boats came in by the lighthouse. There was a walk-in refrigerator at Garapan, and several of them near Kristo Rai.

Olopai said that sometimes the fishermen played jokes on him. They would fling their fish way back in the boat, then look around surprised and ask what happened to it. Olopai said his uncle would sometimes break into a Carolinian dance to rejoice over the catch or some accomplishment of Olopai's. Both men said they were lucky to grow up in those times, because the families were very close back then.

When the Saipan Fishing Company ended about 1950 or soon after, the men fished for their own families. Rangamar and Olopai said that the Carolinians also grew taro, sweet potatoes, and bananas, but fishing was the major source of food. They said taro was grown in the swampy area near Chalan Kanoa, and sweet potatoes were grown inland of San Antonio. The Carolinians prefer taro to rice. A man named Villagomez, the father of Justice Villagomez, grew rice in the As Lito/Finasisu area.

Rangamar and Olopai said the Carolinians like to eat turtle. When a female turtle came in to lay her eggs on the beach, they would catch it by turning the turtle over on her back. They said it was possible to catch a turtle in the water by chasing it with a motorboat, and then jumping into the water and catching it when it came up for air. They caught the turtles for subsistence or for fiestas, but not for commercial purposes. They said it was possible to catch six turtles in a day. They knew the turtles' resting grounds on high reefs and what kind of algae the turtles ate.

Olopai said he owned two turtles as pets. Rangamar's father caught one and drilled the shell and put a swivel and rope on it, so the turtle could swim. Olopai said he lost the first turtle when a big wave came in. He ran to the beach, but the turtle had gotten loose. This was near Chalan Kanoa. He later had a second turtle for a pet.

Rangamar and Olopai told how they had an aunt who was close to animals. She had a pet pig that would follow her to the beach when she bathed. The aunt used coconut on her hair and skin after bathing in the ocean, and the pig stood guard over the coconut to prevent the dogs from taking it.

The men told how they dried fish. They cut the fish in half and salted it and dried it in the sun for a day or two. Then they put the fish in a bucket and covered it with leaves, and put weight on it. When they took it out, they put it on a screen and smoked it. The smoked fish lasted longer than dried fish. They said the fire was always going in a Carolinian outdoor kitchen. Fish that was not dried was eaten raw, as *sashimi*, barbecued, or cooked in a soup. When a large amount of food was prepared for a big gathering, the *um* or underground oven was used. The *um* was used for turtle or pig. Sometimes two *um* were used for a big gathering with a separate *um* for breadfruit.

After this interview, Olopai's (2005) book, *The Rope of Tradition*, was published in Saipan. The book discusses some of the same things he talked about in this interview.

Alfonso C. Reyes

On February 26, 2005, Amesbury and Hunter-Anderson interviewed Alfonso Reyes on the beach by the Dai Ichi Hotel in Garapan, Saipan. He was working with his daughter and son-in-law in a business called Ben and Ki Watersports.

Reyes was born September 18, 1924. His father was Jose Reyes Coloma, and his mother was Maria Palacios Cabrera. Jose Reyes Coloma was from Santiago, Chile. He came to Saipan during the German Period (1899-1914) when he was 19 years old. He was on a ship that caught fish and sold them in Japan. Alfonso Reyes's mother was Chamorro. Reyes joked that he got his nose from his father, who had a large nose. He was one of two children—a boy and a girl. Reyes's father owned three houses in Saipan, one of which was rented by the Japanese governor during the Japanese Period (1914-1944). Reyes's father died about 1976.

Reyes said he was never involved in pelagic fishing, because he gets seasick. However, he remembered the pre-war tuna fishery in Saipan. He said there were five tuna companies. Their dock was where the Hafa Adai Hotel is now in Garapan. He said the fish was dried and taken to Japan, though some was sold locally. Reyes was very clear in stating that some local people worked for the Japanese in the tuna fishery.

During the war, Reyes worked as a lookout for the Japanese on Mount Takpochao. He said he sometimes saw planes, but he didn't want to record them. He also worked on the airport, repairing the runway for the Japanese, and at Mañagaha Island, loading ammunition and supplies.

Reyes was injured during the U.S. bombing of Saipan in 1944. He showed the interviewers scars on his legs. He said there was no medicine available at that time. He used only his own saliva to treat his wounds. He hid in the jungle for 18 days during the U.S. bombing.

In 1945 Reyes became an ambulance driver for the Americans. After that he went to school for one year to become a mechanic. The training conducted by the Americans took place where American Memorial Park is now. After the training Reyes worked as a mechanic at Kobler Field in San Antonio. Because Reyes had work as a mechanic, he didn't spend time fishing or farming.

In 1953 Reyes married. A photograph of his wife and brother-in-law is found on the cover of the second edition (2001) of Bowers' 1950 book, *Problems of Resettlement* *on Saipan, Tinian and Rota, Mariana Islands*. The photo was taken soon after the war, about 1948. Reyes's wife and their ten children are all alive. One son is a priest in Menlo Park, California.

Reyes's descendants did not inherit his seasickness. His daughter Ki told us that her son, Lawrence Concepcion, has a Boston Whaler named *Relax*. In 2002, Lawrence caught a 954-pound marlin, but he came in 30 minutes too late to win the fishing derby!

Juan San Nicolas

On March 2, 2005, Amesbury and Hunter-Anderson interviewed Juan San Nicolas on Saipan. He is the President of the Saipan Fishermen's Association. The Association has a web site (http://saipanfishermen.org). He is also the Resident Executive of the Indigenous Affairs Office.

San Nicolas was born May 16, 1947. Both his parents were Chamorro. His father Herbert San Nicolas died eight years ago at the age of 72. His mother Ignacia Manibusan San Nicolas died three years ago at age 75.

San Nicolas said he has been fishing for more than 25 years, since about 1972. He learned from a friend. The friend was out of work, and they wanted to make some income, so San Nicolas bought the boat, and the friend taught him how to fish. They shared equally in what they made after expenses.

The boat was a 21-foot Bayliner with a 135-horsepower outboard motor. He bought it at Joeten in Saipan. The men caught skipjack tuna by trolling and *onaga* (*Etelis coruscans*) and *opakapaka* (*Pristipomoides flavipinnis*) by bottom fishing. They had no GPS to help them locate their fishing spots. They used landmarks, or if they were caught in a rainstorm, they used a compass.

San Nicolas had two big refrigerators, and people would come to buy fish from him. They sold tuna for 35 cents a pound and bottom fish for less. At that time, Palau was sending fish to Saipan cheap. He said tuna is now $3.00 a pound.

San Nicolas became the first president of the Saipan Fishing Co-op in about 1976. He said the problem with the Co-op was that the fishermen caught more than they could sell. They had agreed not to sell outside the Co-op, but the Co-op couldn't market all the fish. San Nicolas said that at that time there were only two hotels (Royal Taga and Hafa Adai Hotel), and there were few outsiders in Saipan. Saipan was still part of the Trust Territory. The population was small and their buying power was weak.

The next president of the Co-op did not succeed in getting the cooperation of the fishermen. The fishermen kept on fishing, but bypassed the Co-op. So the Co-op ended two or three years later.

San Nicolas said that when he fished on Sundays, he made it a point to give the catch to his family members. His friends did the same thing. But he said fishermen can't afford to give their catch away now, because of the price of gas. Eight hours of fishing costs $100 in fuel. That's why you don't see fish at fiestas as much anymore. He said many fishermen are "weekend warriors." They work for the government during the week and fish on the weekends only.

San Nicolas did not know about the Japanese tuna fishery in Saipan, because that was before he was born. But he said the Japanese had a way of catching flying fish at night with lights and gill nets. The fish will approach the light and get caught in the net. Flying fish can be used as bait for mahimahi and marlin.

San Nicolas said that he never took turtle. He is "strictly a fish fisherman." But he described a Carolinian technique for taking turtle. The Carolinians took turtle near the Grotto (on the northeast end of Saipan) at 4 am, when the turtles were eating sea grass. Two men were in the water and one in the boat. One man in the water used a scuba tank and a long pole with a marlin hook. He hooked the neck of a turtle. The hook was attached to a rope, which was attached to a float on the surface. The boatman pulled in the rope, and the men in the water assisted.

TINIAN

Ana Pangelinan Cruz

On February 28, 2005, Amesbury and Hunter-Anderson interviewed Ana Pangelinan Cruz (Photo 9) at the Aging Center in Tinian. Cruz spoke partly in Chamorro, and Carmen Sanchez translated into English for the interviewers. Cruz was born on the northern island of Pagan on June 13, 1936. Her parents were born in Saipan, but they moved to Pagan in 1933 to work for the Japanese in the copra industry. Cruz said that at that time there were only Chamorros and Carolinians on Pagan. They left Pagan before the Japanese soldiers arrived there. They returned to Saipan in 1937.

Cruz said that on Pagan her parents fished, using the *talaya* (throw net) and gill nets. They also did spearfishing and trolling, using a canoe. The canoe was made of plywood and tin. The fishes Cruz named that were caught in Pagan include *guili* (*Kyphosus cinerascens*), *kichu* (*Acanthurus triostegus*), *hamoktan* (*Acanthurus guttatus*), *mañåhak* (juvenile rabbitfishes, *Siganus* spp.), and *laiguan* (mullets, family Mugilidae). Her parents would catch a lot of fish and share with their neighbors or trade for other things. They also dried the fish with salt they made from seawater. When someone built a house in Pagan, all the neighbors would help. The women would share in the cooking.

Cruz said that her parents caught turtles in Pagan, and the turtles were bigger in those days. They would catch a female when she came up on to the beach to lay her eggs, and there were a lot of eggs inside the turtle.

Photo 9. Ana Pangelinan Cruz at the Aging Center, Tinian, February 2005. Photo by J. Amesbury.

Cruz's late husband did trolling and bottomfishing around Tinian. He started fishing in 1959, because there were no jobs available. He bought his boat, a fiberglass Sea Hawk, in Saipan. Cruz still owns the boat. She said her husband caught *mafuti* (*Lethrinus rubrioperculatus*), *lililok* (*Lethrinus olivaceus*) *matait* (*Epinephelus faciatus*), *pulonnon* (triggerfishes, family Balistidae), *sawara* (*Scomberomorus niphonius*), wahoo (*Acanthocybium solandri*), and mahimahi (*Coryphaena hippurus*).

Leonardo Flores Diaz

On February 28, 2005, Amesbury and Hunter-Anderson interviewed Leonardo Flores Diaz at the Aging Center in Tinian. Diaz spoke mostly in Chamorro, and Carmen Sanchez translated into English for the interviewers. Diaz is a Chamorro born in Yap on November 26, 1931. He came to Tinian on April 14, 1948. He was a part-time fisherman, but he didn't go out by boat because he gets seasick. He fished with a line from Suicide Cliff in southeast Tinian. He caught bottom fishes, *matanhagan* (*Monotaxis grandoculis*), *mafuti* (*Lethrinus rubrioperculatus*), *lililok* (*Lethrinus olivaceus*) and *sagamilon* (squirrelfishes, family Holocentridae). (The first three fishes named are emperors, family Lethrinidae.) Diaz said he also fished with a throw net.

Alfred F. Fleming

On February 28, 2005, Amesbury and Hunter-Anderson interviewed Alfred Fleming (Photo 10) at his home in Tinian. Alfred is the father of Mike Fleming, whom we interviewed in Saipan, and the uncle of Carmen Sanchez, whom we interviewed in Tinian. Alfred told us the history of their family.

Photo 10. Alfred Fleming at his home in Tinian, February 2005. Photo by J. Amesbury.

The original Fleming in Micronesia was Alfred's grandfather, Henry Gordon Fleming. Henry was from Scotland, and he was in the British navy. He was part of the crew of a navy schooner. Henry Gordon Fleming married a high-caste Marshallese woman from the DeBrum family. Alfred showed us a photo of Legamzo DeBrum Fleming with her sisters taken in 1895. He also showed us a photo of his grandfather and grandmother, Henry and Legamzo, with four children. One of the boys in the photo is Alfred's father.

Alfred's father was Henry Gordon Fleming, Jr., who worked as an accountant for O'Keefe in Yap. O'Keefe was an Irish-American sailing captain and successful businessman in Yap (see Klingman and Green 1950). Henry Jr. married a Chamorro woman, Consolacion Aguon Flores, in Yap. (Mike Fleming told us that Consolacion had 13 sisters and 4 brothers, but she was the last to die, and she died in Tinian.) Henry Jr. and Consolacion had 9 children, one of whom was Alfred, born January 1, 1922.

Alfred's wife is Rosalia Concepcion Aldan, who was also born in Yap on November 9, 1924. Alfred and Rosalia came with the Chamorros from Yap to Tinian in

1948 and married in Tinian on January 27, 1949, when Alfred was 27. Rosalia had been married earlier to a man who died, and she had two daughters. Alfred and Rosalia had six more children, including Mike Fleming.

Alfred also showed us a photo of himself with his godmother, Mrs. Scott, the daughter of O'Keefe. He didn't know her first name because he called her *Nina* (godmother). Alfred said the year was 1936, and he was 16. (However, if Alfred was born in 1922, he was 14 in 1936, or if he was 16, it must have been 1938.) Alfred accompanied Mrs. Scott to the island of Mapia, an island north of New Guinea, which was controlled by O'Keefe. Some of Mrs. Scott's siblings were in Mapia.

Alfred and Mrs. Scott traveled on Japanese ships. On the way there, they were detained on an island between the Philippines and Borneo and stayed a month and a half. This was the time when war was breaking out between Japan and China. Alfred stayed three months in Mapia. Then he continued on to New Guinea, Palau, and back to Yap. Alfred showed us a map of the Pacific with his travels drawn on it.

Mapia is made up of three islands. There were people on one island and animals on the other two. There were so many chickens, one had to be careful not to step on the eggs. Alfred said there were many turtles in Mapia. At night people would go out with a torch of coconut leaves, not to attract the turtles, but to be able to see them, and they would spear the turtles. By day, people could capture a turtle by jumping on it and holding it.

Before the war, Alfred worked on a Japanese ship. Every two years they went to Yokuska, Japan, for dry dock and stayed three months. It was not a fishing ship; it was an NKK (Nan'yō Kōhatsu Kaisha or South Seas Development Company) ship. Once a month, the ship went back and forth between Yap and Palau. Palau was the capital of the Japanese district.

Alfred said Yap was very poor, not like Palau. In Yap, the fishing was not year round. It lasted only a few months of the year. But in Palau there was year round fishing, and there were hundreds of fishing boats. The Japanese fishing company dried the fish. They also had a refrigerated ship to take tuna to Japan. The tuna was packed in ice. Hundreds of tons of fish were taken to Japan. There were thousands of vessels in the harbor in Palau before the war.

Alfred stayed in Yap during the war. It was hard to earn a living then. He said it didn't matter how much education you had, the Japanese would not promote you. During the war, he worked under the military, not on a boat, but supplying food for the military. He was First Level and received no pay. He had to look for his own food. The Japanese headquarters were in Colonia, where Alfred stayed. He said the Japanese had a warehouse with a bamboo floor. Inside the warehouse were sacks of rice, and people could steal rice by poking a hole in a sack with a piece of bamboo. During the American bombing of Yap at the end of March 1944, Alfred and two friends went into the mountains and stayed in the jungle. Colonia was wiped out.

When Alfred moved to Tinian, he worked first for the naval administration, then for the Trust Territory Public Works. Public Works was in charge of the water, electricity, roads, and airport. He retired from Public Works in 1980. He sometimes fished at night, either on the pier or from a boat outside the reef. He had a small 14-foot boat he got from an American. He bought an outboard motor and trolled between Tinian and Saipan. He also did bottom fishing and caught *onaga* (*Etelis coruscans*) at depths of 800 to 1000 feet. He used shrimp and small tuna, not mackerel, as bait for bottom fishing. He didn't catch turtles. Alfred emphasized that the fishing is not as good in the Marianas as in Palau. He said he also hunted fruit bats for food.

Lino Lizama

On March 1, 2005, Amesbury and Hunter-Anderson interviewed Lino Lizama at his home in Tinian. Lizama is a Chamorro born in Saipan in 1947. His parents were also born in Saipan, but went to Yap. Most of Lizama's brothers and sisters were born in Yap. We asked Lizama how he happened to be born in Saipan in 1947, if the Chamorros returned from Yap in 1948, but he was unsure how to explain that.

After the war, the U.S. military approached the Chamorros in Yap, and said there was an uninhabited island in the Marianas. The military brought Lizama's father and a few other men to look at Tinian. When the men returned to Yap and talked to the other Chamorros, they decided to move to Tinian. (For more on this subject, see Farrell 1992:71.) In April 1948, a U.S. Navy LST carried the people and their cattle to Tinian. They landed near the old sugar refinery.

When the Chamorros came to Tinian, there was no employment. The men were self-employed as farmers and fishermen. Lizama's father obtained a Grumman aluminum canoe from a U.S. military man. Lizama still has the canoe (Photo 11). It is so lightweight that only two people can carry it, but it will hold four people. At either end of the canoe are air pockets, but the plugs are now missing. The manufacturer's plate on the canoe reads as follows:

Grumman Air
Eng. Corp. (In between these two abbreviated words is a symbol of a globe.)
Bethpage, New York
2424A-5-17

(The web site of Marathon Boat Group www.marathonboat.com/history2.htm says the first aluminum canoe was produced at a Grumman aircraft plant in Bethpage, Long Island in 1945. It was 13 feet in length, but the line was expanded to include 15-foot, 17-foot, 18-foot, 19-foot and 20-foot canoes. We contacted Marathon Boat Group, and they said the serial number indicates this canoe was the 2,424th canoe built for sale by Grumman, and it is the 17-foot model. They said it was built in 1946 or 1947.)

Photo 11. Lino Lizama in his yard in Tinian with a Grumman aluminum canoe built in 1946 or 1947. Photo by J. Amesbury.

Lizama said his father fished using the throw net and long net for reef fishing and using the canoe for bottom fishing, but not in deep water. The canoe was also used to harvest *atulai* (big-eye scad, *Selar crumenophthalmus*) from fish traps made of wire. The chamber of the trap in which the fish were caught, Lizama called *apusento* (Chamorro for bedroom, room). Sometimes moray eels got into the fish traps and ate the fish. Lizama's father took the *atulai* to Saipan in coolers on Pangelinan's boat. Carmen Dela Cruz Farrell's father fished with Lizama's father. They had a small organization for *atulai* fishing.

Lizama's sister, Rita, who was present for part of the interview, said she used to steal the canoe and go out to fish near the dock with her girlfriends. She said now that area is polluted with cans and bottles, tires, and other trash.

In the mid-1960s, Lizama's father found a large quantity of brass left by the U.S. military from machine gun shells. This was in a location called Dumpcoke, where the military dumped Coke bottles and other things. Lizama's father tied a weapons carrier to a big tree and used the winch on the weapons carrier to raise the drum cans of brass. He sold the brass and used the money to buy a boat and engine. He had five sons who fished with him.

Dumpcoke is on the northwest coast of Tinian in the vicinity of Lamonibot. Lizama said Lamonibot is the Carolinian word for the place that the Americans called Earle Point. He said they sometimes found unopened bottles of Coke there. If they still fizzed, they drank them.

The boat Lizama's father purchased was an 18-foot wooden boat locally built in Saipan by Lizama's father's brother-in-law, Pobio Cabrera. (Pobio Cabrera's wife was a cousin of Lizama's father.) Cabrera worked for Public Works as a carpenter, but he also built and sold many boats. The engine was a 40-horsepower Evinrude. The name of the boat was *Bithen de Carmen*.

Lizama said his father and brothers caught all kinds of tuna and mahimahi. There were only three or four boats on Tinian by the mid-1960s. Lizama said the boat once crashed on Goat Island. He couldn't remember what happened to it in the end. He said his family didn't own other boats after that.

Carmen Sanchez

On February 28, 2005, Amesbury and Hunter-Anderson interviewed Carmen Sanchez (Photo 12) on Tinian. Sanchez is the Historic Preservation Coordinator for Tinian and Aquijan. She is the cousin of Mike Fleming, and it was her father who taught Mike how to fish. Carmen's mother and Mike's mother are sisters. Carmen's father was Justo Lewis Sanchez, who was born in Yap on February 2, 1920, and is now deceased.

Photo 12. Carmen Sanchez on Tinian, February 2005. Photo by J. Amesbury.

Carmen told us about the Chamorros coming to Tinian from Yap in 1948. They first lived at what she called Fisher Village, the site of the immediately post-war Okinawan fishing base and the later Trust Territory Leprosarium. Later they lived in the old village, the abandoned Japanese town of Churo. Then they were awarded agricultural homesteads. They built houses from materials salvaged from the U.S. military. The military had left buildings, vehicles, and tools on island after the war. In 1959-60 Microl Corporation came to Tinian and took scrap metal from the island. The people of Tinian didn't move to San Jose, the main village by the harbor, until the 1960s.

Carmen's father was a mechanic. In 1948-49, he worked for the Navy as a plumber at Marbo. He then went to Guam to learn English. In the 1960s, Justo started to work at the Tinian power plant. That was when the island first had electricity. Justo earned $20 for every ten days of work. Before work he fished with a throw net and caught mullet (family Mugilidae) at Unai Dangkolo and other places. He had 12 children to feed.

Carmen said the fish were more abundant and less afraid in those days. She said you don't see that anymore. She said there are outsiders on island now (Chinese people who work for the casino or farm land for the Chamorros, and Filipino construction workers) who catch anything they can eat. She said they even break the corals to take out fish or invertebrates, such as sea cucumbers. There is not enough enforcement of the law. The outsiders do not practice conservation on land either. They lease land inexpensively, for $1000 per year, and when the land is no longer good, they lease another piece of land. Carmen said there is only one Chamorro person selling produce on island. Most of the Chamorros can't compete with the outsiders.

In the early 1970s, Justo bought a Bayliner. He sold land in order to buy the boat. He went out on the boat on weekends and nights. He caught yellowfin and skipjack tuna, mahimahi, barracuda, and *onaga* (*Etelis coruscans*). Carmen said Mike Fleming uses shrimp to chum for *onaga*. Carmen said her father caught dolphin and ate it. We went back and forth about whether she meant dolphinfish (mahimahi) or dolphin (subfamily Delphininae), but she said he caught and ate both—mahimahi and dolphin.

Carmen said that red snapper is poisonous in Tinian, but not in Yap and Palau. She attributed that to the military dumping on Tinian. (It may be due to ciguatoxins. According to Amesbury and Myers [1982], *Lutjanus bohar* is the most frequently ciquatoxic fish in the Indo-Pacific region. It is banned from sale in many places.)

Justo once caught a turtle so large that they couldn't lay it down flat in the pickup truck bed. Carmen said the turtle is a special animal. She said the old people say the turtle has three hearts—a heart for fish, a heart for humans, and a heart for itself. She said actually it has three parts to its heart.

In a certain season, Justo caught *ti'ao* (juvenile goatfishes, family Mullidae) with a throw net, and Carmen had to preserve them. She used six large containers, pots left behind by the U.S. Navy, to salt and store the fish. After one week, she would drain it, then boil it. After another week, she would boil it again. She did this three times. Then the fish would last for a long time. This was necessary, since there was no electricity. Carmen said it was the more well-to-do families that purchased the first refrigerators.

Justo traded fish for beef, pork, and taro. Carmen said they seldom ate rice, but they ate taro, breadfruit, and banana. They used coconut oil for cooking.

ROTA

Antonio "Tony" Mesngon Sr.

On February 18, 2006, Amesbury and Hunter-Anderson interviewed Antonio "Tony" Mesngon Sr. (Photo 13) at his home on Rota. Mesngon is a Chamorro, born and raised on Rota. His father and mother were from Rota, but one grandmother, his mother's mother, was from Guam. His great grandfather was from the Philippines.

Photo 13. Antonio Mesngon Sr. at his home on Rota, February 2006. Photo by J. Amesbury.

Mesngon was born in 1945. His father died before he was born, but he did not die as a result of the war. Mesngon lived with his stepbrothers, the Calvos. Roberto Calvo, an *hachuman* fisherman that Stan Taisacan mentioned, was a stepbrother of Mesngon.

Mesngon went to high school in Guam. He returned to Rota in 1965 to help his mother with a bakery business. He also worked for the Trust Territory, starting at 50 cents an hour. In 1966-67 he worked for the Municipal Office and in 1967 for

Continental. In 1968 Mesngon began his career as a policeman. He retired from that work after 25 years in 1993.

All of the years that Mesngon worked, he also fished. Roberto Calvo taught his nephew Onecimo Atalig, another relative Pedro Atalig, and Mesngon how to fish. Back in the 1960s only a few people (about four) owned boats on Rota. Pedro Atalig and Onecimo Atalig built a 12-foot plywood boat with a 10-horsepower engine. Later they had a 20-horsepower engine.

They made their own lures for trolling out of chicken feathers, cloth, and a shiny white plant called *leerio* (*Crinum asiaticum*). (See Amesbury et al. 1989:54, 62-65.) They trolled for mahimahi, skipjack, yellowfin, and wahoo. They didn't catch marlin. Mesngon said that rainbow runner was rare. You were very lucky if you caught one. You had to have the right lure.

They bought hooks and monofilament line from Dejima's on Guam. Dejima's used to be on Marine Drive.

Mesngon said they found fish by watching the birds. A certain white bird indicates the presence of rainbow runner. A black bird, maybe it's a frigate bird, indicates mahimahi mixed with yellowfin. Another black bird indicates skipjack.

Mesngon said they did not go too far offshore, only a couple miles. Twelve gallons of gas was enough for one day. The gas was 75 cents a gallon. They could catch enough fish in a couple hours. They sold the fish to stores for 50 cents a pound. Sometimes customers were waiting on the beach for them.

Now Tony and his son have a 22-foot boat with a 130-horsepower engine. That takes a lot of gas. Tony fishes for fun now, but his son is making money, concentrating mostly on *onaga* (*Etelis coruscans*). Tony helped his son get the needed equipment. The son also works for Department of Youth Services.

When Mesngon was a child, his uncle found turtles laying eggs on the beach right near his house, but he warned Mesngon not to go near or touch the eggs. Mesngon said he never tried turtle meat, but he tried the eggs. He said when you boil the eggs, the shell stays soft.

When asked how fishing has changed, Mesngon said it was easier back in the 1960s. He said it was very easy to catch *mafuti* (*Lethrinus rubrioperculatus*) back then. He attributed the difference to the crown-of-thorns starfish (*Acanthaster planci*). A crown-of-thorns outbreak in the late 1960s or early 1970s damaged the corals.

Estanislao "Stan" Taisacan

In August 2002, Amesbury met Estanislao "Stan" Taisacan of Rota, who said that his father was the last fisherman in Rota to use the *poio* to fish for *hachuman* (*Decapterus* sp., *opelu* in Hawai'i). Amesbury interviewed Stan in two long distance phone calls in April 2003.

Stan was born in 1954, and he has lived in Rota all his life, except that he attended George Washington High School in Guam. He returned to Rota in 1973 and worked for the government for 24 years, including 12 years for the Division of Fish and Wildlife in Rota. He retired from the government in 1997.

Stan's father was named Clemente Saralu Taisacan. He was born in Saipan but moved to Rota in the late 1920s. Clemente's father was Chamorro and his mother was Carolinian. Saralu is the Carolinian maiden name of Clemente's mother. Clemente was born February 11, 1922, and died December 16, 1980.

Clemente's fishing partner was Tobias Songao Maratita, Stan's mother's stepbrother. Tobias Maratita built a canoe that he and Clemente used for fishing. The canoe was carved from a seeded breadfruit tree (*Artocarpus mariannensis*). The canoe was lost during Typhoon Karen in 1962. After that, they used a rowboat built of marine plywood.

Clemente made his own nets with nylon string. He made the *talaya* (throw net) and the *lagua' hachuman* (*hachuman* net). The *lagua' hachuman* had a six to eight foot radius and a rim of bamboo. The net was eight to ten feet deep from the rim to the bottom. Stan still has the stone *poio* used by Clemente.

Clemente did all kinds of fishing. The *hachuman* fishing was done each year from about March through June. The fishermen would chew up young coconut of a certain stage of ripeness to use as bait. Using the *poio* and shortening the line a little each day, they fed the fish in a certain spot every day for about a week. After a week, as soon as the canoe reached the spot, the fish would be splashing around near the surface where they could be easily netted. The fishermen could fill the canoe, which Stan estimated was about 16 feet long, 2 feet wide and 2 feet deep. After netting the fish, the fishermen would have to paddle back with their feet over the sides of the canoe, because the canoe was so full of fish.

They fished for *hachuman* in the bay south and east of Songsong. From the East Harbor, they would paddle out only five to ten minutes or maybe 20 minutes. If they fished from the West Harbor, they would paddle out 30 minutes. Stan said the fishermen had to be consistent about the time of day they fished, for example, 6-7 am or 3-4 pm. They marked their spot in the water by tying an old coconut to a white stone from the beach. The coconut floated beneath the surface of the water.

The fishermen used a glass-bottomed box to look into the water. Stan said they looked for a certain kind of unicorn fish found at that distance offshore. If they saw the unicorn fish, they knew that the *hachuman* were near. The fishermen began by lowering the *poio* to a depth of about 90 feet, but by the end of one week, they were lowering it to a depth of 40 feet.

Stan helped his father with the *hachuman* fishing, which they did until the late 1960s (about 1967 or 1968). He said they sometimes slept on the beach to watch who was going out and to guard their fish (the fish they were feeding). Stan said it would be considered a crime for another fisherman to steal their fish from the water where they had been feeding them.

The catch was shared with family members and salted and dried or pickled to preserve it. Prior to the 1960s, only a few places on Rota had iceboxes. Electricity was available on Rota by the late 1960s, but it was shut off at 8 pm. It was not until the 1970s that everyone on Rota had 24-hour-a-day electricity.

On February 18, 2006, Amesbury and Hunter-Anderson visited Stan in Rota. On the beach, he showed us two paddling canoes (*galaide* in Chamorro), which he and his son had carved from *Hernandia* logs (Photo 14). Stan said a Japanese group had been to Rota to film him teaching his children how to make the canoe. One canoe is named *Marifega*, after the daughter of a Chamorro chief. The other is *Taihagan*, after a rock that protrudes from the ocean and is used to indicate how high the tide is. Stan's Uncle Tobias Maratita named the rock Taihagan, which means "no turtle" or "not a turtle" in Chamorro. The larger of these two canoes is about 14 feet long. It is not as long or deep as Stan's father's canoe.

Photo 14. Estanislao Taisacan with two canoes he and his son carved from *Hernandia* logs in Rota. Photo by J. Amesbury.

At his home, Stan showed us the *poio* he uses for *hachuman* fishing (Photo 15). One is the original *poio* used by his father and two are replicas Stan made using modern tools including a grinder and sander. He said that rather than chewing the coconut meat, they sometimes use a food processor, and they use rice, as well as coconut.

Photo 15. Estanislao Taisacan with two *poio* (fishing stones), one old and the other a replica. Photo by J. Amesbury.

Stan showed us the *lagua' hachuman* (*hachuman* net) (Photo 16). The monofilament net has a PVC rim. He also showed us the "look box" made from a bucket with Plexiglas across the wide, open end of the bucket and an opening cut in the bottom of the bucket. The fisherman holds the Plexiglas end of the bucket under the water and puts his face up to the open end of the bucket in order to see below the surface of the water.

Stan talked about the late Roberto Calvo, an *hachuman* fisherman from Rota who had an aluminum canoe made from an airplane wing float. An opening was cut in the float and wood was put around the opening in order to convert it into a canoe.

When asked about turtle, Stan said they used to catch turtle, but he didn't eat it. His father had weirs made from chicken wire and rebar, and they sometimes caught turtles in the weirs by accident. Stan's father was half Carolinian, and Stan said the Carolinians celebrated with turtle once a year. He said the turtle was put on the table, and the children were lined up and made to take a sip of the turtle blood through a papaya straw stuck in the turtle. The turtle was still alive and flapping, and Stan did not want to drink the blood, but his uncle stood there with a stick to make the children take a sip. The turtle blood was thought to cure asthma.

Photo 16. Stan Taisacan's son holding the *lagua' hachuman* (*hachuman* net). Photo by J. Amesbury.

Stan said he ate turtle eggs. His grandmother (the foster mother of Stan's mother), a Chamorro woman named Eliza Maratita Dim, was a *suruhana* (traditional healer) and a midwife. He said she was very strict and taught him that if you find a nest of turtle eggs, you don't tell anyone. Stan would show her the eggs, and they would take a couple eggs, then use a branch to erase their steps so that other people would not find the nest. They would boil and eat the eggs, but they would never take more than a couple eggs and they would never show anyone else the nest. This grandmother is the one who named Estanislao after a Polish priest in Rota.

Stan bought his first boat in 1984. It was an 18-foot boat with a 150-horsepower engine. He bought it to take divers around the island. He emphasized that it was so easy to catch fish back then. He did trolling, shallow bottom fishing for *mafuti* (*Lethrinus rubrioperculatus*), and deep bottom fishing for *opakapaka* (*Pristipomoides flavipinnis*), *gindai* (*Pristipomoides zonatus*), *kalikali* (*Pristipomoides auricilla*), and *onaga* (*Etelis coruscans*).

In those days, the fishermen didn't use GPS. He said now they use GPS to find their spot and then they "hammer it."   They fish that spot to the maximum. Stan said there are some "weekend warriors," fishermen who come up from Guam on Fridays and fish all day on Saturdays and Sundays.

When asked about changes in fish abundance, Stan said there has been a very rapid depletion of fish, both inside and outside the reef, since the mid-1980s. He attributed this to the H-2 workers on island, immigrants from the Philippines and Bangladesh, who take even tiny fish and tiny crabs. He said there are more Asians on island now for the airport expansion. Stan said the marine resources are not being managed correctly, and the island needs better enforcement of the laws.

Stan suggested that having open and closed areas would be one way to preserve the resources. He said it is the people that need to be managed. He said the local people have trained the immigrants to obtain various resources, and now the immigrants are doing it themselves. For example, the Bangladeshis are hunting coconut crabs and selling them to the Chamorros. Stan said the Chamorros should not have taught the immigrants to do that.

Francisco "Frank" Toves

Amesbury and Hunter-Anderson interviewed Frank Toves (Photo 17) at his home on Rota on February 18, 2006. Toves is a Chamorro born on Rota June 8, 1946. Both his parents were Chamorro.

Photo 17. Frank Toves at his home on Rota, February 2006. Photo by J. Amesbury.

Toves learned to fish from his father and other older people. His father worked for the government, but he also fished to get food. His father was an agriculturalist in charge of the Department of Agriculture and also the quarantine inspector. He had 11 children, two sons and nine daughters.

Toves's father raised chickens and pigs and cattle. He had 100 cattle and 200 chickens. Toves said there are not many cattle on Rota now. An invasive plant species known as *masigsig* (*Chromolaena odorata*) has spread in the pastures, and the cattle won't eat that plant.

Toves's father had a 14-foot Yamaha boat with a 25-horsepower Evinrude engine. He did bottomfishing, trolling, and spearfishing.

After Toves married, he fished on his own. His father gave him a boat. Toves worked for a while as a policeman with Tony Mesngon and sometimes went out fishing with him. He fished all around the island. Toves also worked as head of the quarantine section, and he was the Director of Department of Land and Natural Resources from 1975 to 1977.

Toves fished with a handline. He bought hooks and line mostly from Guam. They were less expensive in Guam than Saipan. He said that back in the 1970s and 1980s, you didn't have to go far to catch wahoo, mahimahi, skipjack, and yellowfin.

He fished for his family, but sometimes sold fish when he caught a lot. He also dried fish. He had a kerosene-operated refrigerator. Electricity on Rota was not 24-hours a day until the 1970s. Before that, it went off at midnight.

Toves said he didn't take turtle, because his family didn't like it.

Toves said there are not as many fish now as there used to be in the 1970s and 1980s. He said you very seldom catch mahimahi now. His uncle recently went out for two hours and caught only one wahoo. Toves said it may be that something has happened to the food supply of the fish, or that the weather has changed. He said he doesn't want to point to a cause, but there are more fishermen now.

SUMMARY

The authors interviewed 16 people—three on Guam, five on Saipan, five on Tinian, and three on Rota. The oldest individual was born in 1922 and the youngest in 1958. Most of the people interviewed are Chamorro or part Chamorro, but one is a Caucasian American, one is Japanese, and two are Saipanese Carolinians.

Almost all of the fishers interviewed said the fish are not as plentiful as they were in the past, but they offered various reasons for the change, including overfishing by purse seiners and longliners, global warming, coastal pollution, damage to corals by crown-of-thorns starfish, improper use of the marine resources by immigrants in the CNMI, and lack of law enforcement. Two of the Guam fishermen stressed that the biggest change has been in the number and size of yellowfin caught.

Stan Taisacan of Rota is unique among the fishers interviewed in that he is still using tools and methods first described in the early 1800s. Stan and his children are perpetuating the use of the *poio* and *lagua hachuman* in fishing for *hachuman* (*Decapterus* sp. or *opelu*). They have also built their own canoes.

Alfonso Reyes remembered the pre-war Japanese fishery on Saipan. He contributed information not found in the history books when he stated that there were local people working in the Japanese fishery.

Rafael Rangamar and Lino Olopai of Saipan remembered the Saipan Fishing Company that attempted to revive the pole-and-line fishery after the war, because their fathers were part of that Carolinian fishing cooperative and they went out on the boats as children.

Some of the people interviewed on Tinian had been born in Yap. They told how the Chamorros who came to Tinian from Yap in 1948 occupied an island left vacant by the repatriation of Japanese subjects, including Okinawans and Koreans, which was completed by the end of 1946.

After the war, people in the Marianas began to buy boats. Lino Lizama on Tinian still owns a Grumman aluminum canoe built in 1946 or 1947. His family later owned a wooden boat built on Saipan. According to Lizama, there were only three or four boats on Tinian by the mid-1960s, and Tony Mesngon said there were only about four boats on Rota in the 1960s. It was not until the 1970s that there was electricity 24 hours a day on Rota.

In the last few decades, the Chamorros have reclaimed their heritage as outstanding pelagic fishermen. Men like Mike Fleming in Saipan, and Tony Mesngon and his son in Rota earn their living or supplement it with their fishing. Long-term residents of Guam, Peter Plummer and Masao Tembata operate successful charter boat businesses primarily for the Japanese tourists.

Manny Duenas on Guam told how he runs what is probably the only successful fishing cooperative in Micronesia. He attributes the success to long hours, financial accountability, proper fish handling, and education of the consumers. He operates a true co-op that benefits its members.

Each of the interviews contributes to our understanding of fishing during the 20th century in the Mariana Islands.

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