

Section 2: The Pacific Island Background

From the perspective of New Zealand, situated in a temperate zone in the south Pacific, it is sometimes forgotten that the indigenous people, the Māori, had not always been Māori. They came to New Zealand from a tropical region much closer to the equator, and although they brought with them a long history of association with the sea, these original immigrants from the tropical Pacific knew and understood a world profoundly different from New Zealand. It is therefore useful to describe the world they came from as a background to their New Zealand experience.

THE EARLIEST FISHERMEN IN THE PACIFIC

It is of some interest to try and identify when marine fishing began in the Pacific region, because it may be related to the development of a maritime technology which ultimately led to the remarkable episodes of exploration and settlement of the vast oceanic world. The presence of fish bones in early archaeological sites does not necessarily mean that people had developed sophisticated canoe transport systems which would enable expansion beyond the large landmass of New Guinea, but it does indicate growing knowledge of the sea and its resources, and canoes would have been needed to capture certain types of fish.

Australia and New Guinea were part of a single landmass until 6,000 years ago, and were populated long before that, by at least 40,000 years ago. The discovery of human occupation on the island of New Britain at the cave site of Misisil dating to 11,000 years ago (Specht *et al.* 1981) was the first important evidence that humans had learned how to cross a significant sea barrier away from a large continental region and successfully colonise land across the sea during the Pleistocene. This discovery was eclipsed from 1985 onwards by a series of excavations in New Ireland and Buka, somewhat further out into the Pacific from New Guinea. These excavations were in a series of caves known as Matenkupkum, Matenbek, Panakiwuk and Balof 2 on New Ireland, and Kilu on Buka (Figure 12).



FIGURE 12

Early cave site known as Panakiwuk in New Ireland with marine fish remains (photo courtesy of Jim Allen).

These sites date well back into the Pleistocene (Wickler & Spriggs 1988: 703; Allen *et al.* 1989: 550–551; Marshall & Allen 1991: 66; White *et al.* 1991: 49; Allen & Gosden 1996: 186); some radio-carbon dates for them are given below.

Matenkupkum,			
New Ireland	35,410 ± 430 BP	ANU-8179	
Kilu, Buka	28,740 ± 80 BP	ANU-5990	
Matenbek,			
New Ireland	20,430 ± 180 BP	Beta-29007	
Panakiwuk,			
New Ireland	15,140 ± 160 BP	Riddl-531	
Balof 2,			
New Ireland	14,240 ± 400 BP	ANU-4848	

These sites are important, not only because they document human colonisation well beyond the nearest continental region, but also because they contain clear evidence of the gathering of marine food, including fish. Much earlier fish remains have been found in some sites in eastern Zaire, in Africa. Three sites at Katanda within about 4 km of Lake Rutanzige produced abundant fish remains (more than 7,000 bones from the K19 site alone), belonging to at least 13 genera, and date to before 90,000 years BP (Brooks *et al.* 1995: 551; Yellen *et al.* 1995: 554). The Katanda finds are remarkable not only for the variety and wealth of fish remains but for the interesting range of bone tools such as spear points, which could have been used for fishing. The fish at these sites are of course fresh-water species, whereas those in the New Ireland and Buka sites are marine species, and this difference is probably quite important. The Pacific sites were occupied by people who somehow had traversed two significant permanent waterways, and therefore had already acquired some mastery of marine transportation. The presence of marine fish remains is a further pointer to a developing association with the sea. This type of association is not necessarily the case at Katanda.

Unfortunately, little has been published yet about the fish bone from the cave sites in New Ireland and Buka. Our own analysis of the Balof 2 assemblage (White *et al.* 1991: 54) produced the following:

Taxon	Family	NISP
Teleostomi	Family?	22
Acanthuridae	Surgeonfishes	6
Elasmobranch	Sharks, skates, rays	16
Carangidae	Jacks and Pompanos	1
Balistidae	Triggerfishes	2
Scaridae	Parrotfishes	3

Allen and Gosden report that the four New Ireland sites all had

“shallow-reef dwellers (Balistidae, Scaridae, etc.) while the elasmobranch fish remains include at least three species of tropical sharks. Fish bones occur in small numbers in the earliest levels of Matenkupkum and are relatively common in the earliest levels of Matenbek... None of the fish species present are open-sea or deep-sea fish which would suggest line-and-hook capture. We therefore assume that the fish were taken either by netting, spearing, poisoning or, more likely, by the use of fish traps on the reef platform” (Allen & Gosden 1989: 552).

Marshall & Allen (1991: 76, 77) report Osteichthyes with NISP=37 and MNI=8 for Panakiwuk.

Obviously, these fishbone assemblages are not large, but they do serve to illustrate that maritime skills were being developed on the shores of the western Pacific near New Guinea well back in the Pleistocene.

The really major movement of people out into the remainder of the Oceanic world did not occur until much later than these first steps along the margins of Papua New Guinea and the Solomon Islands. This took place with the appearance of the Lapita cultural complex about 3,500 years ago (Kirch 2000: Chapter 4). This spread rapidly from the shores of the Bismarck Archipelago at the eastern end of Papua New Guinea all the way to Tonga and Samoa in the central Pacific. About the same time people explored and settled the northern islands of Belau, Yap, and the Mariana Islands. Finally, as much as 2,000 years later, there was a new expansion eastwards to the Cook, Society and Marquesas Islands, which in turn was followed by the colonisation of Hawai'i and the remote margins of the Pacific, including New Zealand, Chatham Islands, and Easter Island, by about 1,000 years ago.

THE PACIFIC ENVIRONMENT

The Pacific Ocean occupies about one-third of the surface of the earth and contains more than 20,000 separate islands (Darby 1945 (1): 5). These can be broadly grouped into two major geological zones, separated by what is known as the andesite line.

In the eastern and central Pacific, east and north of the andesite line, rocks are very restricted in variety – most are basic or alkaline in character, and practically the only rock useful to prehistoric people is basalt. This is the material commonly used for the manufacture of stone tools, particularly adzes. Another important rock, obsidian, occurs in the Tongan group and on Easter Island, and a form of basaltic glass is found in the Hawaiian islands and on Tahiti.

In the western part of the Pacific, in what is known as the andesite zone, there is a much wider variety of rocks, many of which are acidic in form, including granite. The andesite zone is a transitional region between the geologically rich continental areas which surround Oceania, and the geologically impoverished Pacific island world.

When people first crossed the andesite line in their eastward exploration and settlement of the Pacific, they entered a world with a number of important environmental restrictions, of which rock types are a typical example. Another important aspect of these restrictions relates to plant and animal life: the number of species of plants and land animals decreases markedly as one moves eastwards. Characteristic of some parts of the Pacific area is the coral atoll¹, although there are many volcanic or high islands as well. In voyaging to New Zealand, the ancestors of the Māori reached an area of much greater geological diversity than the islands of their tropical homeland.

The popular image of a Pacific island is a small volcanic island with a fringing coral reef (Figure 13, but there are also some very large islands in the Pacific, such as New Guinea, Viti Levu (the largest island in the Fiji group), the main island of New Caledonia, and Bougainville in the North Solomons Province of Papua New Guinea. By way of perspective, it might be noted that New Guinea is three times the size of New Zealand, and nearly four times the size of Great Britain, as some comparative figures in Table 2 show.

¹ Coral atolls have a rocky basement below sea level, inaccessible to early Pacific islanders.



FIGURE 13

Aerial view of Maiao, a typical small Polynesian high island, and associated coral reef (photo Teva Sylvain ©, Pacific Promotion Tahiti S.A., courtesy of Yosi Sinoto).

There is much debate about exactly where the first immigrants to New Zealand came from; my opinion is that there were several landfalls by groups from more than one island group. There is

Island/Island Group	Area km ²
New Guinea (including Irian Jaya)	828,100
Japan	372,300
New Zealand	268,700
Great Britain (including Scotland)	228,300
New Caledonia (La Grande Terre)	16,900
Viti Levu, Fiji	10,900
Stewart Island, New Zealand	1,750
Tahiti, Society Islands	1,040
Chatham Islands	965
Great Barrier Island, New Zealand	285
Hiva Oa, Marquesas	240
Easter Island	130
Ua Huka, Marquesas Islands	117
Huahine, Society Islands	86
Rarotonga, Cook Islands	67
Kapiti Island, New Zealand	22
Tikopia, Solomon Islands	15.6
Mana Island, New Zealand	2.17
Kapingamarangi, Caroline Islands	1.12
Touhou, Kapingamarangi	0.04

TABLE 2

Some comparisons of total land area (source various).
NB: 300 people live on the tiny island of Touhou.

no dispute, however, that these immigrants were all from Eastern Polynesia. The most likely islands of origin are one or more places in the Society Islands, the Marquesas Islands, or the Cook Islands. There are problems in accepting any one of these as the sole source of New Zealand's pre-European population, so perhaps two or even all three were involved. Whatever the case, these three island groups have fairly similar marine environments and the range of fish species familiar to the people living on them is also similar. It is interesting to compare the sizes of some islands from which immigrants may have come. Rarotonga in the Cook Islands is somewhat larger than Kapiti Island in New Zealand, Hiva Oa and Ua Huka in the Marquesas are both smaller than Great Barrier Island, and Tahiti is a little smaller than Stewart Island. New Zealand would have seemed enormous to the immigrant Polynesians.

Islands which have a fringing coral reef support very large populations of fish. Fishermen identify several quite separate zones for capturing different species, at various times of the day and night and according to tidal patterns. The shallow reef flats with coral heads are rich in small species and at high tide, when fresh sea water spills into these areas, marauding carnivores such as needlefish, sauries and half-beaks (families Belontiidae, Scomberesocidae, Synodontidae and Hemiramphidae, Figure 14) will venture across them for easy pickings. At this time people will stealthily paddle a canoe across the still waters to spear such fish. The Māori name *ihe*, applied to the common piper or garfish in New Zealand (family Hemiramphidae), is one example of Polynesian ancestry; this name is used for other types of garfish in the Marquesas, Tahiti, the Austral Islands and the Tuamotus, and can be reconstructed to Proto Polynesian² (Biggs & Clark 1996).

A large number of species of the families Scariidae and Balistidae are found in slightly deeper water, living among coral communities. The Scariidae or parrotfish (Figure 15), which eat coral, have specially adapted jaws for biting off chunks and an elaborate grinding mill in the throat for crushing them up to release nutrients. This is an extremely diverse family of fish, of great importance to both prehistoric and modern Pacific Islanders. However, there are no parrotfish in the colder New Zealand waters, which do not support much coral. The Balis-

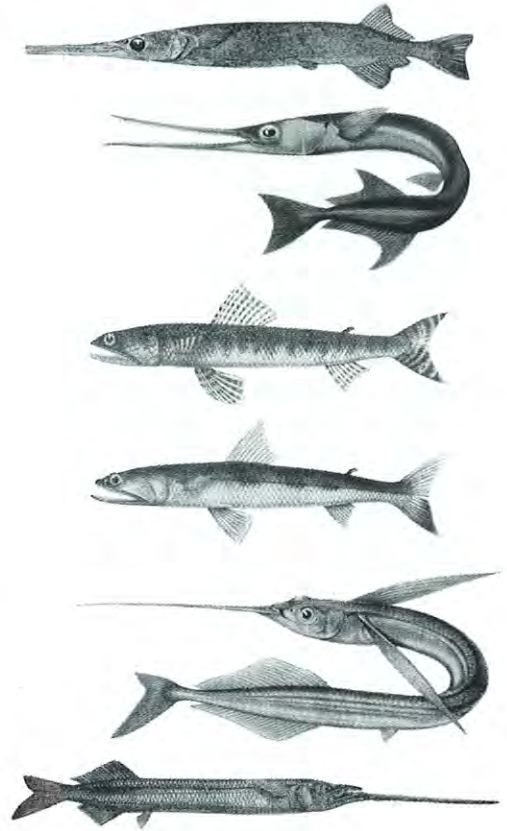


FIGURE 14

Needlefish, sauries and half-beaks (after Munro 1967: plates 7, 10, 11).

tidae or triggerfish are omnivores, eating weeds, sea urchins, sponges, crustaceans and living coral. Once again, there are many species in the Pacific and the most common name is *humu* or *humuhumu*. The name *kōkiri* is given to these fish in the Tuamotu archipelago; in the Māori language the name *kōkiri* is applied to the leatherjacket, the only member of the Balistidae to venture so far south.

For many Pacific Islanders, the sea was an important source of raw materials as well as food. Large shells such as *Tridacna* were used for adzes, pounders and hammers; smaller shells were also used for adzes and chisels. Iridescent shells such as pearl shell, *Trochus* and *Turbo* species were ideal for fishhooks and many shells were suited for personal ornaments. Sea urchin spines and various kinds of coral provided files and other abraders. The New Zealand marine environment provided very few alternatives to these tropical resources.

² A reconstructed language, ancestral to all present-day Polynesian languages.

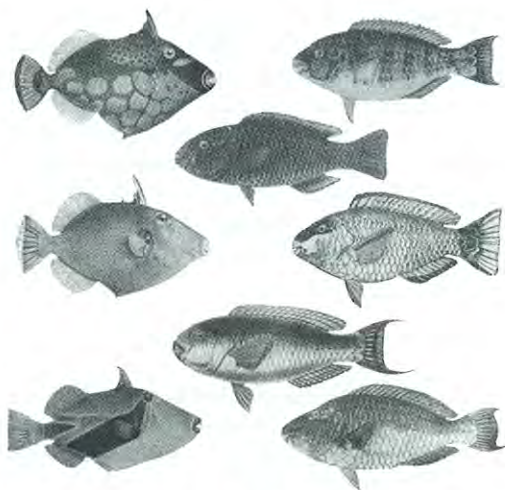


FIGURE 15

Parrotfish and triggerfish (after Munro 1967: plates 61 and 75).

Published accounts of Pacific fishes enumerate over 1,000 species, but the total number is bound to be much larger than this. The comparative collection in the Archaeozoology Laboratory at the Museum of New Zealand has bones of over 300 tropical Pacific species mounted for identification of archaeological bones, compared with only 50 species required for New Zealand.

The nature of the seasonal round in temperate New Zealand would have been in marked contrast to the previous experience of tropical Polynesian immigrants. In the island groups from which the ancestors of the Māori probably came, seasonal differences are relatively slight, the main contrasts being between a wetter and a drier season, and in the direction of the prevailing winds at different times. There is little variation in temperature year-round and very little difference in the number of daylight hours. Night falls swiftly throughout the year. Although there is some seasonal variation in the availability of pelagic fish such as tuna, inshore fish are available all year round, and in most island groups there is no time of the year when seas conditions are unsuitable for fishing or shellfish gathering for any length of time.

There is little regional diversity in the small islands of the eastern Pacific, although in larger islands, in Fiji and Hawai'i, for example, there is a marked difference in rainfall between the wet and the dry side of each island. But these are minor differences compared with the regional variation in landform and climate within New Zealand. This

led to the development of a range of subsistence economies, from predominantly horticultural in the warmer north to fully hunter-gatherer in the south. Whatever the nature of the subsistence base, these economies all followed a strongly seasonal round, with an emphasis on preservation of seasonally available foods for later consumption.

There are marked changes in the abundance of some species of fish in New Zealand. Barracouta, for example, are primarily summer visitors in the South Island. It will be seen later that these fish were of great importance to southern Māori, and their strong seasonal migratory behaviour meant that mass harvesting took place in the summer months and the fish were then preserved by drying in the sun so that stores were available for the lean winter months.

THE EMPHASIS ON FISHING IS PATCHY

Not all Pacific islanders spend a significant amount of time and energy engaged in fishing activities. The Pacific is such a diverse region geographically that it caters for an equally diverse range of human activities, particularly in subsistence economy. All island communities rely on gardening to a greater or lesser extent. Usually, only modest amounts of protein-rich food are consumed, even on atolls, but the amount of protein is adequate for nutritional requirements. On larger islands the types of vegetable foods grown can be quite diverse, but there is always one which is considered above all others to be a staple, and around which a great deal of daily activities revolve. It is interesting that the staple food varies a lot from one place to another, and it is not easy to find reasons for this. In some societies the yam is the most important plant by far, and a great deal of ceremonial attention is given to it as well. In other societies, the taro is supremely important, and in yet others it is the breadfruit, or the sweet potato.

One would expect that on atolls, fish would form a large portion of the food which people eat. This is probably not so, although it is hard to document this because there has been little quantitative research on Pacific Island economies. Fish meat is well known for its lean qualities, and although it is an excellent source of protein, humans require more than protein for healthy existence. Fats and carbohydrate are very important in diet too. Studies of the diet of early Canadian Indians and Arctic Eskimo have shown that during winter when

animals are lean and there is no carbohydrate to be found, people will starve by eating lean meat alone. This is further discussed in Section 8. However, the combination of lean meat with a high intake of fat can offset starvation in cases where carbohydrate foods are rare. Consequently, even on atolls where there is a super-abundance of fish life in the lagoon and it is easy to catch, people cannot live on fish alone and must make gardens for carbohydrate food. These usually take the form of special man-made swamps in the centres of the small land areas along the periphery of atolls. Taro is grown in these swamps, which rely for water on the Ghyben-Herzberg freshwater lens which sits on top of the sea water under the gravels of atolls. Unfortunately, when a tidal wave hits an atoll these swamps may become brackish and can take a long time to recover. The brackish water kills the taro. During these times, people on the atoll starve, despite the rich marine life available.

Even on large islands where the threat of tidal waves is not an important factor, carbohydrate food can be scarce. It is noticeable that wherever pigs are kept they are always bred for as much fat as possible, and the fat is eaten by handfuls at feasts as a highly prestigious food. Fish cannot provide fat to anything like the amounts required for a healthy diet where carbohydrate foods are scarce.

With this dietary perspective in mind it is easy to see that in most circumstances it does not really matter whether there is a super-abundance of fish or not, because above a certain threshold there is no benefit to subsistence. The critical food for Pacific islanders is the tropical root and tree crops which provide carbohydrate. In southern New Zealand, where carbohydrate foods were extremely scarce, the critically important food to obtain was fat. Seals provided a ready source for this.

Drought is another major cause of periodic shortage and famine in some parts of the Pacific. In the early historic period, droughts caused failure of the breadfruit crop in the Marquesas, which led to starvation in some areas and outbreaks of warfare (Dye 1990). Fishing could not compensate for the failure of the breadfruit, which provided the staple carbohydrate food in the Marquesas. In recent years drought has caused extreme hardship in such diverse regions as the highlands of Papua New Guinea and parts of Fiji. When crops fail, pigs as well as people suffer.

It is not surprising that in the larger islands of the Western Pacific, there are groups of people who live inland and have little or no association at

all with the sea. This is the case in some of the larger islands of the Solomons and Fiji, for instance. At the opposite extreme, it was also possible for people living on a very small island to become land-bound. By the late prehistoric period, deforestation on Rapanui (Easter Island) had reached the point where trees for canoe manufacture were no longer available, and marine exploitation was confined to the immediate inshore zone.

COMMON FISHING ACTIVITIES

Prehistoric Pacific islanders used a wide range of fishing techniques and equipment. These include netting, spearing, trapping, angling with baited hooks, trolling with lures or with baited hooks, harpooning, poisoning and general foraging. Fishermen in the Santa Cruz group of the Solomon Islands even used a kite to carry a line and hooks out across the water (Koch 1971: 40).

Direct archaeological evidence of past fishing technology is generally limited to finds of fishhooks and lures; in some areas the remains of stone-walled fish ponds and weirs are still to be seen in the shallow waters of the lagoons. A notable example is the group of weirs at Fauna Nui on Huahine in the Society Islands (Emory 1932). In Hawai'i, fish ponds are believed to have been used to raise mullet (*Mugilidae*) and milkfish (*Chanidae*) in great quantities (Kikuchi 1976), although bones of these fish have been conspicuously absent from archaeological fishbone assemblages in the vicinity of the fish ponds (Leach *et al.* 1988a). This general dearth was noted by Weisler (1993: 132), who reported one otolith of mullet from an archaeological site in an area where fish ponds existed (Weisler 1993: 143–145). In the database at the Archaeozoology Laboratory at the Museum of New Zealand, with a total MNI of 13,704 fish, *Mugilidae* are present in small numbers in only six sites (MNI=31). *Chanidae* are represented by a solitary example from Sinoto's excavation at Fa'ahia on Huahine (Leach *et al.* 1984: 190).

In the case of stratigraphic layers dating close to the historic era, the fishing methods used by the inhabitants can be reconstructed to some extent by drawing on ethnographic accounts from the area concerned and on knowledge of fish habits and behaviour (e.g., Leach *et al.* 1988b). One has to be very careful in the use of ethnographic analogy in such cases though, to avoid assuming what one sets out to discover about the past. Numerous eth-

nographic accounts describe both widespread and more specialised fishing activities. Nets ranged from small scoop nets to huge, communally owned and operated nets used in major fish drives.

A specialised form of netting is the night capture of flying fish using a very large net with a handle, somewhat resembling a large butterfly net. This is held by a man standing in the front of a canoe in front of another man holding a light (now-a-days a lantern, formerly a flaming coconut leaf torch), which attracted the fish (e.g., Buck 1927: 288). This kind of fishing is widespread in Polynesia.

A good description of communal fishing with a very large net on the Polynesian outlier of Nukuoro was provided by Kubary, a nineteenth century German ethnographer. The net, known as the upena tonu (*gubenga donu* in modern orthography), was said to be up to 200 m long and 30 m

deep. It actually consisted of six to ten separate nets, each of which was loaded on a canoe. These were joined at the fishing ground as the net was lowered into the sea. The entire population of the atoll took part in this activity. The canoes formed a long line and the net an arc which gradually drove the fish towards the shore where they were taken with hand nets, spears, or by hand. Because of the size and depth of the net, large sharks and turtles would be taken as well as many kinds of bony fish. The catch was divided in the centre of the village amongst the entire population of the atoll. A more common activity involved a smaller net about 20 to 30 m long and 2 m deep, used by about ten men in several canoes to surround large fish. Such nets were owned by individual fishermen who invited others to accompany them and share the catch (Davidson & Leach 1996: 186).



FIGURE 16

Typical examples of fishing equipment and some personal ornaments made from bone and shell from the Marquesas Islands (photo courtesy of Bishop Museum and Yosi Sinoto).

Fishhooks varied considerably in size, form and material, from tiny one-piece hooks of shell to very large wooden hooks. Not only wood and shell, but bone, turtle shell, coconut shell and even stone were used for hooks in Polynesia. Further west, materials included thorns, spider web, and parts of insects. Trolling lures also varied in size from small examples with shell shanks only a few centimetres long and correspondingly small turtle shell points to massive examples from Tonga which had a whalebone shank lined with an iridescent pearl shell plate on the bottom surface, and a large turtle shell or bone point (Anell 1955).

Spearing was probably not an important fishing method in the Pacific before the advent of underwater goggles and later masks, although spears were certainly used during fish drives, as described above for Nukuoro. There was a variety of traps, ranging from examples very similar to modern crayfish pots to elongated, funnel-like examples.

Most Pacific communities used a variety of fishing methods. The actual combination used by any one community varied according to the local marine environment, raw materials available, cultural preferences, and so on (Figure 16). Some islands have very extensive reef flats; others, such as the Marquesas, lack a fringing reef altogether. Pearl shell, a preferred material for fishhooks and trolling lures, is very unevenly distributed; some lagoons had an apparently inexhaustible supply within easy reach, whereas in other islands, accessible pearl shell was completely lacking. However, such differences provide only part of the explanation for the variation in fishing practice; some communities chose to indulge

in more exciting but dangerous offshore fishing activities, while others did not.

The commonest and most widespread form of fishing involved netting on the inshore reef areas. Analyses of fishbone assemblages from sites of various ages and from all over the Pacific have consistently produced evidence of fish catches in which reef fish predominate. This is typical of Lapita sites (Green 1986) and of many more recent sites. However, examples of much more adventurous fishing behaviour are also encountered.

SPECTACULAR FISHING ACTIVITIES

There is a popular belief that Pacific Island fishing was centred around the exciting pursuit of tuna and other pelagic fish. This required use of canoes capable of going outside the protected reef areas into oceanic waters where these fish are normally found (Figure 17). This commonly held view of the Pacific fisherman probably owes much to the accounts of Tahitian fishing by Nordhoff (1930). Certainly fishermen in many Pacific islands spend a lot of time talking about tuna and other game fish, but analyses of the bones of fish actually caught often lead to the conclusion that “while much dreaming of these fish may have taken place in the past, far more were probably caught in the men’s house than ever in a canoe” (Leach & Davidson 1988: 4). However, there are some well documented archaeological examples of prehistoric fishing for tuna and other game fish.

People in the Marquesas and Society Islands 1,000 years ago or more enjoyed fishing offshore for tuna and the like. In the Marquesas, at least, they continued to do so throughout the prehistoric period, although the proportion of tuna in their overall catch declined. Archaeological evidence of more recent prehistoric fishing in the Society Islands is lacking, but Nordhoff’s account suggests that there was probably continuity in this aspect of fishing behaviour into recent times.

At Hane on Ua Huka in the Marquesas, tuna dominated the archaeological fish catch, comprising 25% of the total MNI. The next most important fish were cod/groupers (16%), which would have been taken with a baited hook, and trevallies (12%), taken, like tuna, on a lure. Although there was some fluctuation in proportion in the four successive layers at the site, tuna were consistently the most important fish (Davidson *et al.* 2000).



FIGURE 17

A small sailing canoe from Vanikolo, Solomon Islands in 1828 (Dumont D’Urville 1833: plate 184).

Several other archaeological sites in the Marquesas have produced similar results (Leach *et al.* 1997c; Rolett 1998: 133, 141).

Tuna were also important at the site of Vaito'otia/Fa'ahia on Huahine in the Society Islands, although here there was more variation within the site. In one area, tuna dominated with 18% of the catch, followed by trevallies (16%), parrot fish (12%) and cod/groupers (9%), but in another, parrot fish dominated with (27%), followed by cod/grouper (11%), trevallies (10%) and tuna (7%) (Leach *et al.* 1984; Davidson *et al.* 1998). It is unusual to find such variation within a single site, and several explanations could be put forward. However, it is worth noting here that even 7% of tuna in a catch is high compared with most other Pacific island fish assemblages studied. This emphasis on tuna fishing should not be taken as necessarily typical of Eastern Polynesia. There is so far no evidence of any comparable activity in the Cook Islands, for example.

The most spectacular evidence to date of game fishing in the Pacific comes from the Mariana Islands, far to the west. These people were adept at catching dolphin fish and marlin or swordfish. Analysis of fish remains from Mochong, on the island of Rota, revealed that fish taken in the open sea accounted for 24% of the total catch. Dolphin fish (family Coryphaenidae) contributed almost 12% and marlin or swordfish (families Istiophoridae and Xiphiidae) 3%. This last figure included at least ten individual fish from different parts of the site, suggesting that this was not the opportunistic eating of a stranded fish, but systematic capture, which must have been extremely dangerous for the fishermen (Leach *et al.* 1988b). Of course the large size of these fish means that their significance to the economy was greater than the simple number count would indicate.

Records of the Marianas in AD 1602 left by Zamora (Driver 1983) describe the capture of large fish and the importance of flying fish as a target of their fishing.

“the first flying fish is eaten raw; the second is baited on a large hook attached to a line that is cast over the stern of the boat. Many dorados [mahimahi; dolphin fish; *Coryphaena hippurus*], agujas paladares³ [possibly blue marlin, or *Makaira nigricans*], and other large fish are caught in this manner” (Driver 1983: 208).

“...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 his 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” (Driver 1983: 209).

The social importance of these large fish is also recorded by Zamora, and he describes various aspects of associated ceremonial behaviour and salting of the meat for preservation. One interesting story, reminiscent of Ernest Hemingway's tale of the 'Old Man and the Sea', is recounted as follows:

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DISCUSSION

Polynesian immigrants to New Zealand were heirs to a very long history of fishing in the Pacific. For as much as 40,000 years, Pacific people had caught marine fish. Their skills in fishing had probably developed together with their knowledge of maritime technology and ability to traverse large tracts of empty ocean – skills which led eventually to their discovery and colonisation of New Zealand.

The vast Pacific Ocean and its numerous islands of many different sizes and types offered a wide variety of fishing environments. People developed a great range of techniques for, and preferences about, fishing. The immediate homeland of the Māori was in one or more of the island groups of Eastern Polynesia. These groups are characterised by small volcanic islands with limited geological resources and terrestrial plants and animals, but with abundant marine resources. The inhabitants of these islands used a variety of fishing techniques and in the Society and Marquesas Islands, at least, fishermen were adventurous, going off-shore in search of tuna, as well as exploiting the safer inshore environments.

³ The Spanish term 'aguja paladar' is old Andalusian for swordfish, but was extended to cover other species in foreign waters (Arturo Morales 2005: pers. comm.).