

Ethnoecology and Tokelauan fishing lore from Atafu Atoll, Tokelau

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Abstract

Marine exploitation has various cultural implications. In this paper we discuss Tokelauan fishing lore, focusing on fishing practices, technologies and materials, and relate these to fish ecology. We examine the Tokelauan classification of the marine ecosystem and the ethnoecology of fish and molluscs, particularly focusing on Tokelauan folk taxonomy and ecological knowledge related to the behaviour of fish and other marine life.

Introduction

Marine exploitation, especially fishing, is the most important subsistence activity in Tokelau, and has multifarious cultural implications (Huntsman and Hooper 1996; Mafutaga-a-Toeaina-o-Atafu-i-Matauala-Porirua 2008; Matagi Tokelau 1991). This has probably been the case ever since people first settled the island. A previous archaeological study (Best 1988) suggested the possibility of up to 1,000 years of human occupation in Tokelau. Zoo-archaeological analyses of Best's excavated fish bones have shown that Tokelauans exploited various fish habitats — from the inshore area to the open ocean (McAlister 2002). Despite the prehistoric and contemporary importance of fishing in Tokelau, folk knowledge of fish behaviour, habitats and fishing technologies have rarely been published in English (e.g. Hooper 1985; Macgregor 1937), apart from some studies that contain information on tuna and outer-reef fishing (Gillett 1985; Hooper 1985, 2008; Hooper and Huntsman 1991).

The Mafutaga-a-Toeaina-o-Atafu-iMatauala-Porirua (2008) has produced an excellent book documenting (in Tokelauan) Atafu's rich traditions of fishing lore. The foresight and wisdom shown in this initiative is laudable, and could serve as an example for many island communities where fishing is quickly changing under the pressures of modern life. However, only those with strong Tokelauan language skills can access the rich information in this book. This excludes both non-Tokelauans and those Tokelauans who have been raised in diaspora and lack strong Tokelauan language skills.

Our purpose in this article is to discuss Tokelau marine resource use (with special reference to

Atafu) from an ethnoecological perspective and for an English-speaking audience. Ethnoecological studies seek to investigate questions about how people conceptualise and exploit their ecosystems (Akimichi 1978; Conklin 1954; Frake 1961). The first goal is to discuss Tokelauan fishing lore, focusing on fishing practices and technologies, as well as materials, and relating these materials to fish ecology. The second goal is to examine the Tokelauan classification scheme of the marine ecosystem and the ethnoecology of fish and molluscs, particularly focusing on folk taxonomy and ecological knowledge related to the behaviour of fish and other marine life.

We collected fish and mollusc names from fishermen³ of different ages on Atafu Atoll. Identification was aided by the use of color drawings and photographs as references. We selected three men who were locally recognised as knowledgeable about fish and fishing. These men were interviewed formally in order to collect the names and information for fish, other land and sea animals, lunar cycles and fishing grounds. For fish we used reference books (Allen 1999; Okamura and Amaoka 1997) and discussed with informants the fish depicted. For shell names, one man and one woman were selected for interviewing. We used reference shells that we collected on Atafu and confirmed the names with reference books (Abbott 1991; Habe and Kosuge 1996). Beside these formal interviews, we also informally interviewed 10 local men in order to obtain information on specific fishing events and landings during our stay on Atafu. Tokelauan names were cross-checked with the Tokelauan Dictionary (Tokelau Dictionary 1986); these and some additional names shown in the dictionary are listed in Appendix 1.

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3. Fishing is a male activity in Tokelau.

Tokelau's atolls

New Zealand-administered Tokelau is a group of three atolls located about 500–600 km north of Samoa at 8–10°S and 171–173°W (Fig. 1). Atafu Atoll is located at the northwest end of the archipelago, with Nukunonu Atoll in the middle, Fakaofu Atoll to the southeast, and Olohega Atoll at the south end of the archipelago. Tokelau's total land area is tiny; the combined dry land area of all three atolls (excluding Olohega) is only 12.2 km² (Huntsman and Hooper 1996). Tokelau's exclusive economic zone is considerably larger, covering 290,000 km² (Passfield 1998). The average mean annual temperature in Tokelau is 28°C, and annual rainfall is 2,900 mm (Toloa et al. 1994). Geo-culturally, Tokelau is located at a crossroads between eastern and western Polynesia (Burrows 1939, 1940), about 400 km east of Tuvalu and 400 km west of the northern Cook Islands.

Like most low and exposed atolls, Tokelau is particularly susceptible to wave surge during tropical storms. Between November and March the weather is often unsettled, and the atolls are exposed to high winds and rough seas. During these months, sea travel is frequently restricted to the sheltered waters inside the reef (Matagi Tokelau 1991). Occasionally, the atolls are struck by cyclones during this season.

Atafu, Nukunonu and Fakaofu are typical atolls with a large central lagoon surrounded by an intermittent chain of sandy islets known as *motus*; Olohega has a landlocked brackish water lake in the centre instead of a central lagoon. The largest of the atolls is Nukunonu, with a land area of about 5.5 km², the second largest is Fakaofu with 3 km², Atafu is the smallest with 2.5 km², and the land area of Olohega is about 1.5 km². Lagoon size is even more variable: Atafu's lagoon is considerably smaller than the other two, covering only 19 km², compared with 109 km²

for Nukunonu, and 59 km² for Fakaofu (Huntsman and Hooper 1996).

In terms of population, Atafu is the most populous with about 600 people, followed by Fakaofu with some 500, and Nukunonu with about 400. Olohega currently has fewer than 20 people. Tokelau has been an incorporated territory of New Zealand since 1948. Over 7,000 Tokelauans now live in New Zealand, and several thousand more live in Australia. Although Olohega is currently part of American Samoa, many Tokelauans consider it historically and culturally part of Tokelau (Matagi Tokelau 1991).

People and language

Tokelauans are Polynesian, with strong affinities to the atoll peoples of Tuvalu to the west, and the northern Cook Islands to the east. Interaction with Samoa to the south has been important for at least the last century, and possibly much longer. However, oral tradition is silent on the earliest origins of the Tokelauan people (Huntsman and Hooper 1996; Huntsman pers. comm.; Tokelau Dictionary 1986). Archaeologically, the Lapita cultural complex is the first indication of people in western Polynesia

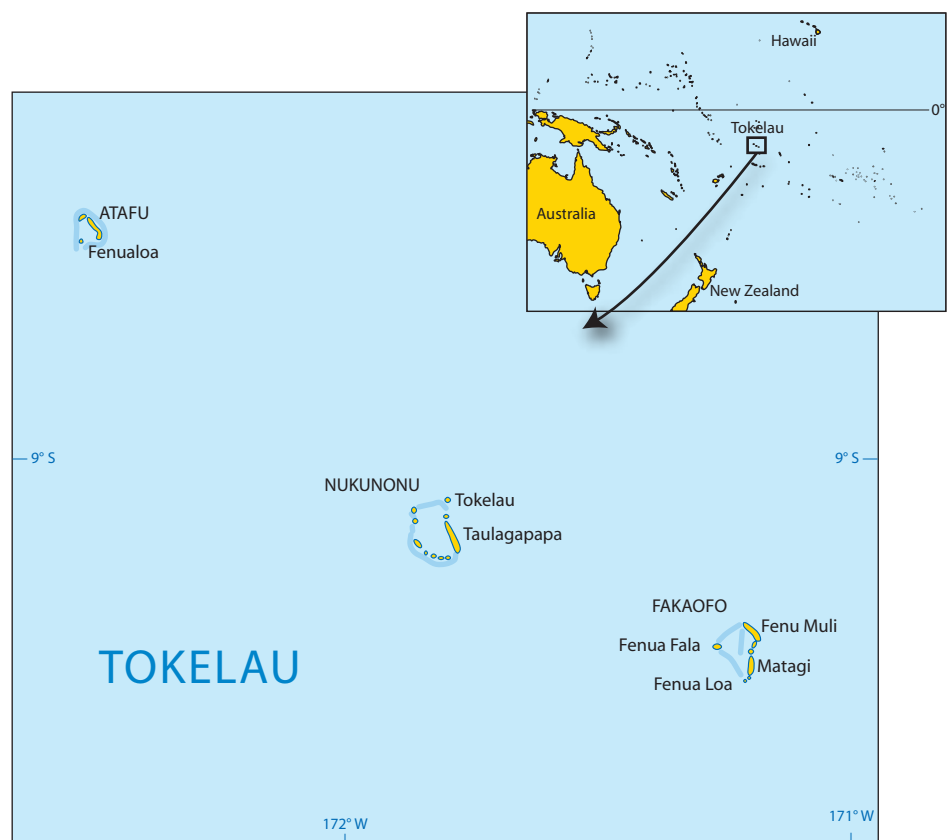


Figure 1. Atafu, Nukuonu and Fakaofu, the three main atolls of Tokelau

around 3000–2800 calibrated years BP⁴ (e.g. research summarised in Kirch 1997). In the “Hawaiki” model (Kirch and Green 2001), an “Ancestral Polynesian Society” with unique cultural and linguistic traits developed in the area of Fiji, Tonga, Samoa, Uvea and Futuna over the following millennium of regular interarchipelagic contact. A dialect chain developed over this area and eventually split into a northern and southern branch. At around 1300–800 cal BP and subsequent to this split, eastern Polynesia and the Polynesian outliers were settled, mostly from islands speaking the northern branch of the dialect chain — Proto Nuclear Polynesian (Green 1966; Green 1988; Marck 2000; Pawley 1966,1967).

Tokelau was probably first settled during this period of expansion. The single prior archaeological excavation in Tokelau (Best 1988) dated unidentified charcoal from basal cultural deposits on Atafu to around 1150–690 cal BP.⁵ On Fakaofu, turtle bone from the lowest cultural deposits dates to 790–530 cal BP (Best 1988). The apparent discrepancy between these two dates could be resolved by arguing that the area of overlap represents the actual initial settlement period for Tokelau. Coconut endocarp excavated in 2008 from a basal cultural layer about 100 m from Best’s 1986 sample location dates to 660–550 cal BP (Addison et al. 2009; Addison and Kalolo 2009; Petchey et al. in review), further reinforcing the idea that the overlap in Best’s basal dates is the actual period of initial colonisation. Many more dating samples from a variety of stratigraphically secure contexts on all three atolls will be required to resolve this question.

The Tokelauan language is typically Polynesian. It contains five vowel sounds (written as a, e, i, o and u), and ten consonants (written as f, g, h, k, l, m, n, p, t and v). The f is pronounced like wh, and the h is a glottal fricative, whereas it sounds the same as an English h before the vowels i and e. On the other hand, before the back vowels a, o and u, is pronounced more like h^v (Tokelau Dictionary 1986). The last century has seen an increase in cultural and linguistic influence on the Tokelauan language by Samoa, and this has affected some of the names of plants (Whistler 1988). Some Tokelauan fish names have also been affected or introduced from adjacent islands, mainly the northern Cook Islands, Tuvalu, Samoa and Tonga (Hooper 1994; Rensch 1994).

In a comparative linguistic analysis of Proto Polynesian and Proto Nuclear Polynesian fish names,

Hooper (1994) checked for shared retentions and innovations, or borrowings between Polynesian islands. Her analysis indicates that out of 112 Proto Polynesian reconstructions for fish names, Tokelauan retains reflexes of 94 (84%), which is an extraordinarily high figure (Hooper 1994). As Hooper mentions, the high figure for Tokelauan could indicate either a more nearly complete inventory of local fish names than other islands, or the more conservative nature of the Tokelauan lexicon (Hooper 1994). In any case, it is clear that Tokelauan fishing terms and fish names are good candidates for inclusion in core vocabulary lists for the region.

Ecological background

Most of the *motus* of Tokelau’s atolls are covered with dense groves of coconut palms except in some areas where littoral forest dominates. The most common terrestrial plant species are *Cordia subcordata*, *Guettarda speciosa*, *Hernandia nymphaeifolia* and *Pisonia grandis*, while *Pandanus tectorius* and *Tournefortia argentea* prevail on the margins of the littoral forest (Whistler 1988). The main food plants are mostly root crops (*pulaka*, *Cyrtosperma chamissonis* and *taamu*, *Alocasia macrorrhizos*) and fruit trees (screwpine, *Pandanus tectorius*; breadfruit, *Artocarpus altilis*; banana, *Musa* spp.; coconut, *Cocos nucifera*; and papaya, *Carica papaya*). *Pulaka* is cultivated in swampy pits excavated in the centre of some of sandy *motus*, whereas fruits trees are planted both around houses in villages and on *motus*.

Every island except Olohega has a large inner lagoon with a variety of fish and mollusc species. The major fish habitats in the lagoons support species of Holocentridae, Chaetodontidae, Pomacentridae, Muridae, Siganidae, and small-sized species of Serranidae, Lethrinidae, Balistidae and Labridae. Some species of *Tridacna* are widely distributed and are targeted by islanders when large enough to harvest and eat, whereas the harvest of small-sized individuals is prohibited. Pearl shell (perhaps *Pinctada margaritifera*) formerly inhabited the lagoons of Tokelau, and once was used to produce lure shanks, although this species was very limited in Atafu (Macgregor 1937). It may have been locally extirpated from Tokelau by the 1950s when it was reported that 10 years had passed since any pearl shell was found on Fakaofu (Van Pel 1958). Other important invertebrate species include about 10 species of crab, such as *tupa* (a land crab, *Cardisoma* sp.), *ugauga* (coconut crab, *Birgus latro*), and

4. Radiocarbon dating uses a known rate of decline of the naturally occurring radioisotope carbon-14 to determine the age of carbon-containing materials, mainly from archaeological sites. Raw results of dating are generally given as “radiocarbon years before present (BP)”. “Present” here is defined as AD 1950. Using standard curves, the raw radiocarbon dates (in BP years) must then be calibrated to give calendar dates. A BP date cannot be used directly as a calendar date because the level of atmospheric carbon-14 levels have fluctuated during the period that can be carbon dated. The notation “cal BP” indicates a date that has been calibrated to calendar years before 1950. Thus, “500 cal BP” means 500 calendar years before 1950.
5. Reported at 2 σ , calibrated using OxCal v3.10 with InterCAL04. (For justification for Northern Hemisphere curve see Addison and Asaua 2006, Petchey and Addison 2008.)

kamakama (rock crab, *Grapsus* sp.) are also common around the shorelines of lagoons, and are usually exploited as food or fishing bait.

The ocean side of the atolls are surrounded by narrow coral reefs that have a greater variety of fish and mollusc species than the lagoons. The major fish inhabiting the outer reefs are various species of Scaridae, Labridae, Balistidae, Acanthuridae, and small species of Carangidae, Serranidae, Lethrinidae and Lutjanidae, which swim mainly around reef edges. Of the molluscs, some species of Turbinidae and Trochidae inhabit mainly reef edges, but recently, only *Turbo* shells are taken for food. According to Passfield (1998), *Trochus* is not native to Tokelau, but was introduced from Fiji in 1986, as part of a development project. Some larger fish inhabit the outer reef waters, particularly between the reef edges and the open ocean. They include species of Carangidae, Scombridae, Lutjanidae, Serranidae, Sphyraenidae and sharks. Flying fish (*Cypselurus* sp.) and sea turtles are also captured mainly in this biotope.

Wild birds inhabit the islands, and Tokelauans still occasionally capture them for food (Huntsman and Hooper 1996; Matagi Tokelau 1991). Seabirds, such as terns and noddies (*lakia*), are caught generally with nets and nooses (Matagi Tokelau 1991). There are no terrestrial mammals native to Tokelau; all were introduced either by the early Polynesian settlers or later European visitors. Archaeological finds (Best 1988; Addison and Kalolo 2009) suggest that the first people to arrive in Tokelau brought with them the dog (*Canis canis*) and the Polynesian rat (*Rattus exulans*). Dogs were no longer present in Tokelau at the time of European contact. Tokelauans have no tradition of dogs, either as a source of food or of companionship, and they are not kept today. *R. exulans* are still found in Tokelau along with recently introduced rat species; rats are now considered a pest. Pig (*Sus scrofa*) was introduced to Tokelau after European contact. It is not known when chickens were introduced.

A brief sketch of Atafu

Atafu Atoll is located at the northwest end of Tokelau, the part of Tokelau farthest away from Samoa (600 km). There is ship transport roughly every two weeks between Samoa and Tokelau, and it usually takes about 48 hours to reach Atafu from Samoa, via Fakaofu and Nukunonu. As noted earlier, Atafu is the smallest atoll in Tokelau, both in lagoon size and land area. The only village is on an islet at the northwest corner of the atoll. The village is at the southern end, known as “Fale”, while the north end is called “Vao”, and the middle portion “Malae”. The current human population is ~600. Atafu’s other 41 islets are uninhabited (Fig. 2).

There are three subsistence activities on Atafu: fishing, root-crop cultivation, and fruit-tree harvesting. Coconut gardens are used for human and pig food. Traditionally, only men were allowed to fish on the outer reefs, whereas fishing and gathering in the lagoon and on the reef were also practiced by women and children. Large repertoires of fishing

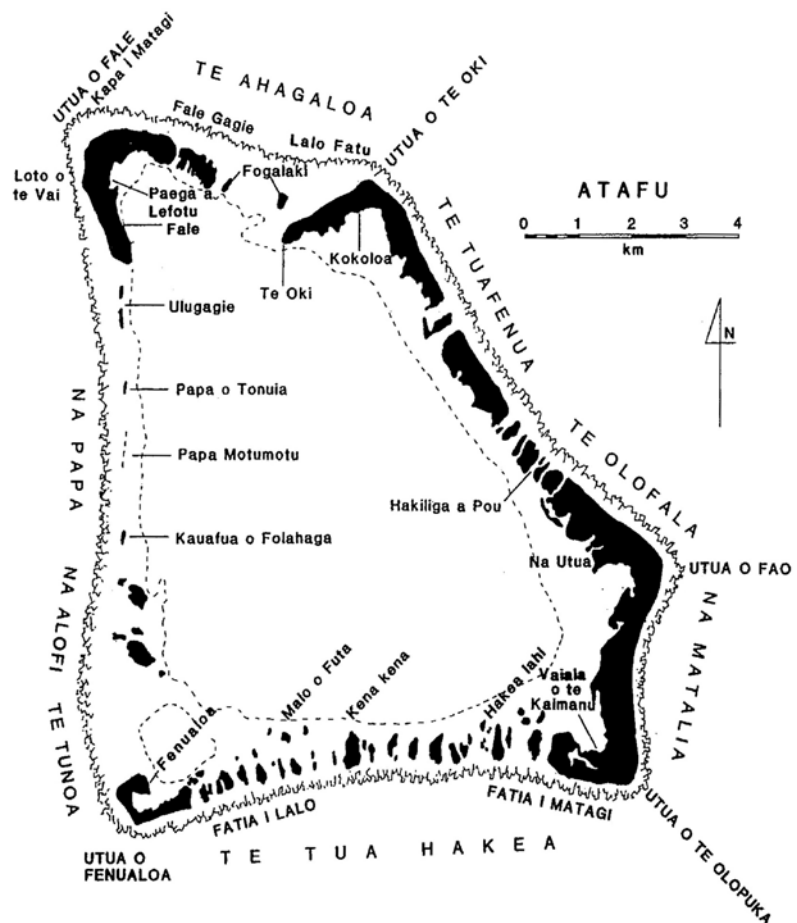


Figure 2. Atafu Atoll

techniques and strategies (~120) were formerly employed throughout the lagoon, inner reef, and outer reef to offshore zones of Atafu (Mafutaga-a-Toeaina-o-Atafu-i-Matauala-Porirua 2008). A variety of coral reef fish, sharks, sea turtles, pelagic fish, and some invertebrates were caught using seines, hand nets, stone weirs, lines, spears, ropes, and lures. Molluscs, crabs and other marine resources were also gathered occasionally. The range of fishing techniques and strategies has considerably narrowed in recent decades (Mafutaga-a-Toeaina-o-Atafu-i-Matauala-Porirua 2008).

The major root crop cultivated on Atafu is giant swamp taro (*pulaka*, *Cyrtosperma chamissonis*), which is cultivated mainly on some of the larger islets on Atafu's west and southwest sides, where the Ghyben-Herzberg freshwater lens is easily accessible from the surface. Villagers must travel to the islets where their gardens are located to maintain and cultivate their land and crops. Beside root crops, fruit trees such as coconut, breadfruit, banana and pandanus are also cultivated, both in the village and on other islets. Among them, coconut has also been planted for copra production. Copra was the major commercialised economic crop on Atafu for some decades, but is no longer exported.

Some pandanus leaf crafts, such as hats and bags made by women, and wood carvings produced by men, are exported. An annual grant provided by the New Zealand government is used for building and running public services, including roads, hospital, power plant, and school. The main shop on Atafu is a cooperative run by the community, and it imports various foods and other products. These public services are administered by a council of male elders known as the Taupulega o Atafu. A council of women, the *fatupaepae*, and a men's society, the *aumaga*, are each responsible for coordinating other important economic, social and cultural activities.

Tokelauan fishing lore and fishing in Atafu

In Tokelau, traditional fishing lore and knowledge was closely related to the *tautai* title system. This title was a status that could be achieved only by men. It can be translated as "master fisherman" — someone who has a considerable amount of expertise in the entire spectrum of fish-catching methods and also the leadership skills and experience necessary for directing and managing fishing expeditions (Gillett 1985; Hooper 1985; Matagi Tokelau 1991). In the course of acquiring skills to become a *tautai*, a young man had one or two older *tautai* to act as teachers. Traditionally, until achieving *tautai* status, a young man was not supposed to take the stern seat in a canoe, the position from which all operations were directed (Hooper 1985). After years or decades of instruction, he would be eligible for a

kau kumate ceremony in which the title of *tautai* was conferred. Details of the *kau kumate* ceremony are described by Hooper (1985) and in other documents (e.g. Matagi Tokelau 1991).

Tokelauans use the term *faiva* to refer to the capture of all edible animals; the most important of these activities is fishing (Gillett 1985; Matagi Tokelau 1991). Traditionally, a great range of fishing techniques was employed in Tokelau, including various methods of angling, netting, trapping and spearing. Gillett (1985) reported that since the 1980s, some traditional fishing methods, such as skipjack trolling with pearl shell lures, were no longer used in Tokelau. On the other hand, some new and modern fishing methods and gear are widely employed.

Three main types of fishing zones are identified on Atafu and other Tokelauan atolls: offshore (*tuakau*), reef (*uluulu*) and lagoon (*namo*). Although each is characterised by a set of distinctive fishing methods, there is considerable overlap in the types of fish that are commonly caught in them. In addition, land and beach zones are also recognised as part of fishing areas on Atafu (Mafutaga-a-Toeaina-o-Atafu-i-Matauala-Porirua 2008), particularly for fish bait, as important bait species such as coconut crab (*ugauga*) are caught ashore.

Outer reef to offshore fishing

According to Atafu informants, offshore fishing is more important than reef or lagoon fishing, because of the relatively small size of their lagoon. In fact, the book written and published by the Atafu-born elders living in New Zealand (Mafutaga-a-Toeaina-o-Atafu-i-Matauala-Porirua 2008) reported 47 methods of offshore fishing on Atafu, compared with 29 methods for lagoon fishing and 45 for reef fishing. The number and variety in methods are largest for the offshore fishing zone. Most of the fishing activities observed during our stay on Atafu in August 2008 were on the outer reef or offshore.

Trolling with a hook or lure for *atu* (skipjack, *Katsuwonus pelamis*) and *kakahi* (yellowfin tuna, *Thunnus albacares*) has probably been the most important single type of fishing practiced traditionally on Atafu, both economically and socially (e.g. Gillett 1985; Macgregor 1973; Matagi Tokelau 1991; Hooper 1985, 2008; Hooper and Huntsman 1991). This pattern continues today. Skipjack fishing is called *alo atu*, or just *alo*. Decades ago this involved paddling through a group of shoaling fish while trolling with a hook and lure. Today, aluminium boats with outboard engines are commonly used for outer reef to offshore fishing, including *alo atu*, although some Atafu fishermen maintain the tradition of using wooden outrigger canoes (with outboard engines). Fishing for skipjack and yellowfin tuna

is traditionally a communal, family or fishing crew based activity, involving a number of boats (see also Hooper 2008 for the Fakaofu case in the 1970s), and the catch is distributed among the people in a process called *inati* (only when the catch is large) or simply by family or person who owns vessel.

Hahave (flying fish or *Cypselurus* sp.) are caught usually at night in waters close to the shore, using scoop nets called *heu* and torches. This fishing is called *lama hahave* (*lama* = torch) on Atafu, and traditionally coconut leaf torches were used (see also Mafutaga-a-Toeaina-o-Atafu-i-Matauala-Porirua 2008). Catches of up to 300 fish per night are not uncommon (Passfield 1998). *Hahave* are available throughout the year, but are most abundant from July to October. At this season they are consumed in greater numbers than tuna (Passfield 1998), although they are a much smaller fish, growing to around 25 cm, and weighing about 300 g (Froese and Pauly accessed 2009). Similar fishing methods with scoop nets are also employed to catch *talagogo* (a seabird species, possibly *Sterna fuscata*) on the outer reefs during the day time.

Noosing *pala* (wahoo, *Acanthocybium solandri*) is also a well-regarded traditional fishing method in Tokelau (Matagi Tokelau 1991) and is called *takiulu*. A small baitfish, such as a flying fish, is towed behind a canoe to lure the *pala* into a prepared noose, which catches the fish by the tail. Groups of *hakula* (marlin, *Xyphias gladius*), *kakahi* (yellowfin tuna, *Thunnus albacares*), and *mago* (sharks) were also occasionally caught using this method. Among these, *hakula* is traditionally regarded as one of the sacred fish (*ika ha*) by the Atafu people and its meat is distributed equally to each household within the *inati* system. Both inshore and deepsea (80–100 fathoms) shark fishing with large hooks and lines is another popular fishing method, particularly for elders who relish shark meat, especially the liver. Deepsea shark fishing called *fakatu* (Mafutaga-a-Toeaina-o-Atafu-i-Matauala-Porirua 2008) is a rather new method developed in the early 20th century (Matagi Tokelau 1991). *Pala* and *ono* (barracuda, *Sphyraena barracuda*) are also caught using this method.

Sea turtle (*fonu*) is one of the important catches in traditional fishing among all the atolls of Tokelau (Matagi Tokelau 1991). Although there are different methods for catching sea turtles, the most popular is to catch a pair of mating turtles, usually as two men swim to approach the turtles seizing each turtle (see also Macgregor 1937). There were also many traditional restrictions (*lafu*) for turtle fishing, such as a man whose wife was pregnant was not allowed to join a fishing party since his presence with the team would make the turtles timid and shy (Matagi Tokelau 1991). Turtle was regarded as one of the sacred marine resources

(*ha*) by Atafu people, and the meat was equally distributed to each household within the *inati* system similar to other sacred species such as skipjack tuna and marlin. The season of turtle fishing is closely related to the turtle's mating period, usually September to November on Atafu. As in most Pacific Island countries, today turtle fishing is officially prohibited throughout Tokelau.

Longline fishing has also been an important fishing method (usually employed in the outer reef to pelagic zone) and includes a variety of techniques. *Makomako* is a longline fishing method in which as many as eight baited hooks in a cluster and separated by spreaders are let down to the bottom of the sea with a heavy sinker (*fatu makomako*) to depths of about 200–300 fathoms (Mafutaga-a-Toeaina-o-Atafu-i-Matauala-Porirua 2008). A similar fishing method was also observed on Pukapuka in the northern Cook Islands, where *tuku moana* is deepsea handline fishing in depths up to about 300 fathoms, and involving the use of a special composite fishing apparatus (*taumakomako*) consisting of four or more hooks fixed by spreaders to a single line (Beaglehole and Beaglehole 1938; Hooper 1994).

Reef fishing

Fishing with nets (*kupega*, *heu*, *kalele*) is the most common reef fishing technique practiced today in Tokelau (see also Passfield 1998), although angling (*hi*) is also actively employed on Atafu (Mafutaga-a-Toeaina-o-Atafu-i-Matauala-Porirua 2008). In the recent past, nets were made locally, using 30 kg breaking strain monofilament. Passfield (1998) reported that mesh size ranged from ½ inch (12.7 mm) to 4 inches (100 mm), with 2 inches (50 mm) being the most common size. Although most of the nets used today on Atafu are commercial products made of nylon, the nature of netting is quite similar to that in the recent or traditional past; nets are usually set on the reef flat to catch fish moving in and out of the lagoon. Fishing with a net attached to a circular wooden frame that can be closed by pulling a line is called *tata*, and is commonly employed in the reef zone.

Smaller and long-handled scoop nets (*heu*) are used by groups of two or three people to catch groupers (e.g. *Epinephelus melanostigma*, *Epinephelus merra*, *Epinephelus hexagonatus*) and squirrelfish (*Myripristis* sp.) on Atafu (see also Mafutaga-a-Toeaina-o-Atafu-i-Matauala-Porirua 2008). Handle scoop nets (*kalele*) were frequently used for fishing in outer reef channels (e.g. Macgregor 1937), and this method is called *tatago* on Atafu. On Atafu today, large netting drives with seines (*talitali*) are also occasionally employed as a community fishing activity involving over 100 people (men and children but no adult women). The main fish captured by such netting are *ulahi* (*Scarus harid*), *umeihu* (*Naso unicornis*), *umelei*

(*Naso lituratus*), *kanae* (*Mugil cephalus*), and *nanue* (*Kyphosus cinerascens*).⁶

Fishing with a hook (*matau/kafilo*) and line (*uka*) is occasionally practiced on Atafu, mainly around reef channels. Among 45 traditional fishing methods mainly employed in reef zones, 13 are recognised as hook-and-line fishing (Mafutaga-a-Toeaina-o-Atafu-i-Matauala-Porirua 2008). Most of these hook-and-line fishing methods are named and identified with targeted fish names, such as *hi gatala* (*gatala* = *Epinephelus quoyanus*), *hi patuki* (*patuki* = *Cirrhitus pinnulatus* or hawkfish in general), *hi api* (*api* = *Acanthurus guttatus*), *hi mutu* (*mutu* = *Abudefduf* sp.), and *hi ulafi* (*ulafi* = *Hipposcarus longiceps* or *Scarus harid*). Lures are also used where the sea bottom is sandy (so that hooks do not get snagged).

Stone weir fish traps (*fota*) were also used as one of the traditional fishing methods on Atafu. However, the use of such stone weirs ended by the late 1970s. On Atafu, basically two types of *fota* were built and employed; the former one is called *tali aheu i na fota* and mainly targets schools of *Caranx* sp. The trap is a *fota* about 18 m long with the mouth facing the land and lagoon side. The other type is called *tali ihe i na fota* and mainly targets schools of garfish with a trap about 18 m long, with the mouth also facing toward land (Mafutaga-a-Toeaina-o-Atafu-i-Matauala-Porirua 2008). Our interviews with elder men confirm that there were at least two of each *fota* on Atafu in the late 1970s. Huntsman and Hooper (1996) report that traps were constructed beside the shallow passes in the reef to catch fish on their spawning runs from the lagoon to the sea. Although most traps were operated communally, some were owned and operated by individual families (Matagi Tokelau 1991).

A fishing method targeting octopus (*feke*) and crayfish (*ula*) was also mainly employed in the reef zone. The three main techniques used to take octopus (collectively called *fagota feke*): are 1) *fagota feke*, using a wooden stick made from a *gagie* tree (*Pamphis acidula*) and fishing string called *kalava* made from the outer skin of a coconut frond petiole (which attracts the octopus so that it can be caught); 2) *taki feke*, using an octopus lure (*pule takifeke*) made from a large cowrie shell (*pule*) and pandanus leaf (*laufala*); and 3) *toko feke*, using a metal stick at low tide. A canoe was used occasionally for moving around the reef to seek octopus. Crayfish are captured using a method called *holi ula*, in which feet and hands are used to catch them during a rising

tide on a moonlit night when they emerge to feed (Mafutaga-a-Toeaina-o-Atafu-i-Matauala-Porirua 2008). Among these, *toko feke* is the main method used today.

Lagoon fishing

On Atafu, lagoon fishing is not considered as productive as fishing in the open sea, and is often only done when the weather prohibits fishermen from going out to sea, especially during the hurricane season between November and April. A number of different species are caught with a hook and line. Among 29 fishing methods mainly employed in the lagoon, 16 are recognised as hook-and-line fishing (Mafutaga-a-Toeaina-o-Atafu-i-Matauala-Porirua 2008). Similar to reef fishing, most of these methods are named and identified with targeted fish names such as *hi kulapo* (*kulapo* = small-sized *Scarus harid* or *Hipposcarus longiceps*), *hi mu* (*mu* = *Monotaxis grandoculis*), *hi umu* (*umu* = *Balistoides viridescens*), *hi mutu* (*mutu* = *Abudefduf* sp.), *hi papo* (*papo* = *Cheilinus fasciatus*), and *hi kafa* (*kafa* = *Liza vaigiensis* or *Liza subviridis*).

Flying fish moving into the lagoon are also targeted by line fishing during the daytime, and this method is termed as *hi havane ite ao* (*ite ao* = during daytime). Line fishing is also employed at night to catch *gatala* (*Epinephelus quoyanus*) and *talatala* (*Myripristis violaceus*). The method used to catch *gatala* is termed *hi gatala i te tete*, and the other, for *talatala*, is termed *hi talatala*. Swimming fishing with goggles and a line is called *fakatakoto*. Octopus meat is used mainly as bait for this kind of fishing (Matagi Tokelau 1991). Sometimes a sack of coral gravel is tipped into the lagoon to attract fish before the line is cast. This is known as *tuki akau* (Matagi Tokelau 1991) or *tuki toka* (Mafutaga-a-Toeaina-o-Atafu-i-Matauala-Porirua 2008).

Smaller hand and scoop nets (*heu*) have also been used by groups of two or three people in lagoon fishing. The main fishing method with *heu* is called *lama ihe*, which targets garfish or half-beaks (*ihe* = Hemiramphidae and Belonidae) inside the lagoon at night. Baskets (*faga*) made from the *gagie* tree are also used in lagoon fishing. Some net fishing, such as *tata* (see description in reef fishing) and *tali tafega*, which targets some fish species moving between the reef and lagoon during low tide, are used as lagoon fishing methods (Mafutaga-a-Toeaina-o-Atafu-i-Matauala-Porirua 2008). Basket traps were also employed mainly in the lagoon on Atafu and

6. We had a chance to observe the large netting drive during our stay on 11 July 2009. The netting was practiced as the community fishing during the aumaga festival with over 100 men involved. Fishing started at around noon for about an hour to catch ~480–600 kg (25 baskets each of which was ~20–25 kg) of inshore fish. All the fish captured were distributed equally to each household within the *inati* system, and our count of each fish species confirms that *ulahi* (305 specimens), *umelei* (240 specimens), and *umeihu* (81 specimens) were the main fish caught, far exceeding other species in number and weight.

other atolls. Macgregor (1937) reported that he did not see basket traps at Atafu during his visit in 1932, although he saw a few of one type at Fakaofu and Nukunonu. Our interviews confirm that there were some at Atafu in the recent past, although none were seen on Atafu during our stay. Such basket traps might not be commonly used in Tokelau, particularly at Atafu, with the smallest lagoon.

Gathering molluscs is also part of lagoon fishing. Giant clams (*fahua*, *Tridacna maxima* and *Tridacna squamosa*) are harvested regularly from shallow parts of the lagoon, and they are levered from below the water with a knife-like instrument called a *nao*. This type of fishing is called *naonao fahua* (Mafutaga-a-Toeaina-o-Atafu-i-Mataualala-Porirua 2008). At present, there is some concern over the decline of clams (e.g. Toloa et al. 1994). The introduction of underwater goggles and the recent development of commercial harvesting for the export market have both contributed to this problem (e.g. Gillett 1985; Passfield 1998). The *taupulega* on Atafu has now imposed strict limits on *Tridacna* harvesting.

Seasonality, lunar cycle and fishing activity

Atafu and the other Tokelauan atolls are occasionally struck by cyclones from November to March, whereas rather mild southeast trade winds blow during May to November. The cyclone season is also the period of variable north and west winds that blow onshore at Tokelau's village islets, thus making access through reef passes problematical. Outer reef to offshore fishing on the inhabited side of islands is periodically difficult or impossible during this season, so fishing activities are more actively pursued from May to November, the season regarded as the best fishing season on Atafu and the other atolls (see also Gillett 1985; Hooper 1985; Matagi Tokelau 1991).

The annual cycle is divided into 12 months, similar to the western solar calendar, and month-to-month transitions are recognised by the location of an associated star (Matagi Tokelau 1991). The monthly change does not correspond directly with fishing seasons, which in Tokelau are basically classified into two seasons, depending on the prevailing wind direction (May to November and November to March). The transitional period around April is generally a period of light winds and calm seas — an ideal time for voyaging.

Fishing activities in Tokelau are more closely related to moon phase or the lunar cycle than to the annual calendar. The single moon phase is generally termed as 30 days, and the middle of the phase, which corresponds to the 14th and 15th nights, is the full moon. On Atafu and other atolls the moon phase is divided into three phases: 1) *po utua* (ocean nights), which

corresponds to the 1st (*fakatahi*) through 10th (*magafulu*) nights when the new moon is seen in the western sky at sundown on the ocean side of the village islet; 2) the *po loto* phase (middle nights), which corresponds to the 11th (*fakatahi*) through 14th (*malama* = light; recognised as the full moon night) nights when the moon is seen overhead at sunset; and 3) *po o namo* phase (nights of the lagoon), which correspond to the 15th (*fakatahi*) through the 30th (*fanolao*) nights when the moon rises after sundown across the lagoon side (see also Macgregor 1937; Matagi Tokelau 1991).

These three phases are shown in Table 1, where it can be seen that the first night of each phase are similarly called *fakatahi* (*faka* = causative prefix; *tahi* = one). This means the terms of the moon are reset when the moon's location at sundown changes from the ocean side to the lagoon side of the village islet. Among these phases, the terms of the moon phases simply correspond to counting as 1 (*tahi*) to 10 (*fulu*) for the *po utua* phase, while some specific terms are used during the *po loto* phase in which the 13th night is termed as *utua* (=border of land and ocean, or reef channel), and the 14th night is termed as *malama*. During the *po o namo* phase, the 20th through 29th nights are reverse-counted from 10 to 1, and the 30th night is termed with the specific name of *fanola* (= fading moon night).

The detailed classification and terms of the lunar cycle on Atafu and other atolls in Tokelau partly indicates that the lunar cycle is important for fishing activities. This also corresponds to tidal cycles, which have a strong relationship with fish feeding and other behaviours, and is sometimes one of the factors regulating fishing activities. For example, a species of Siganidae (possibly *Siganus canaliculatus*) crosses between the outer reef and lagoon every month of the year, particularly during the 27th to 29th nights, whereas some species of Acanthuridae (*Acanthurus* spp.) can be caught in abundance during the 1st to 3rd nights and the 22nd to 25th nights. On the other hand, small Carangidae (*Caranx* spp.) up to 30 cm, and long-nosed emperors (*Lethrinus minatus*) cross between the outer reef and lagoon around the 15th and 16th nights and the 27th and 28th nights from May to November (see also Matagi Tokelau 1991).

Similarly, some offshore fish are known to exhibit seasonality (Table 1). For example, *pala* (*Acanthocybium solandri*) can be caught from the 1st to 22nd nights, while the best times to catch sharks are during the 1st to 10th nights and the 22nd to 30th nights. Although flying fish can be caught all year, the best times are between the 4th to 12th nights and the 17th to 18th nights from August to October. Because fishing for flying fish is practiced at night with a torch or lamp, the nights

Table 1. Moon phases and major targeted fish

Day	Tokelauan name	Phase	Moon location	Acanthurids	Scarids	Siganids	Caranx	Scads	Flyingfish	Lethrinids	Skipjacks	Sharks
1	<i>Fakatahi</i>	Poutua	ocean side			x					x	x
2	<i>Fakalua</i>					x					x	x
3	<i>Fakatolu</i>					x					x	x
4	<i>Fakafa</i>								x			x
5	<i>Fakalima</i>			x	x				x			x
6	<i>Fakaono</i>			x	x	x			x			x
7	<i>Fakafitu</i>			x	x	x		x	x			x
8	<i>Fakavalu</i>			x	x			x	x			x
9	<i>Fakaiva</i>			x	x	x		x	x			x
10	<i>Magafalu</i>			x	x	x		x	x			x
11	<i>Fakatahi</i>	Poloto	island	x	x		x		x	x		
12	<i>Fakalua</i>			x	x		x		x	x		
13	<i>Utua</i>											
14	<i>Malama</i>											
15	<i>Fakatahi</i>	Po Onamo	lagoon side									
16	<i>Fakalua</i>											
17	<i>Fakatolu</i>								x			
18	<i>Fakafa</i>								x			
19	<i>Fakalima</i>											
20	<i>Fakatutupu</i>											
21	<i>Magafalu</i>											
22	<i>Poiva</i>			x	x							x
23	<i>Povalu</i>			x	x						x	x
24	<i>Pofitu</i>			x	x						x	x
25	<i>Poono</i>			x	x						x	x
26	<i>Polima</i>											x
27	<i>Fanouluata</i>					x			x	x		x
28	<i>Fanolotoata</i>					x			x	x		x
29	<i>Mateiluga</i>					x						x
30	<i>Fanoloa</i>											x

After Gillett 1985; Matagi Tokelau 1991; our interviews in 2008

with a bright moon during the 13th to 16th nights are not selected. It is clear that the lunar cycle is strongly related to fishing activities in Tokelau. Such kinds of knowledge about the relationship between each fish species' behaviour and lunar and seasonal cycles have been passed down by Tokelauan males. On Atafu, the men's activity house at *lalopua* is the locus for such learning. One Atafu male aptly referred to it as "Atafu's university of traditional knowledge and practice".

Material culture and fishing

Gear and equipment associated with fishing have changed since prehistoric times, particularly after contact with the Western world. Historical evidence indicates that Tokelauans used lines, hooks, lures, rods, nets of various kinds, as well as traps and stone weirs before European contact (e.g. Hooper 1985; Macgregor 1937). Archaeological research on Fakaofu and Atafu by Best (1988) unearthed four

one-piece pearl shell or bone hook fragments and recovered a complete pearl shell lure shank. Traditionally, the hook portion of the lure was made from the shell of *fonu una* (hawksbill turtle or *Eretmochelys imbricata*), whereas in modern times cow horn, coconut shell, whale teeth, marlin spikes, aluminium and plastic are also occasionally used (Gillett 1985). Historically, lures have had the leader line attached to both the head of the pearl shell shank and to the base of the turtle shell hook. This conforms typologically to the typically western Polynesian types, such as those from Samoa, Pukapuka, Tuvalu, Wallis and Polynesian outliers in Melanesia (Anell 1955; Buck 1930; Gillett 1985; Macgregor 1937).

The records of the United States Exploring Expedition (Wilkes 1845; Hale 1846), which visited Atafu and Fakaofu in 1841, mention the people's extreme eagerness to trade for metal fish hooks and pieces of iron for making hooks. Gillett (1985) reported that pearl shell was also brought to Tokelau from Papua New Guinea by Tokelauan missionaries during the early 1940s. The shells were also imported from other locations, including Pukapuka and Nassau in the northern Cook Islands, and finished lure shanks from Samoa (Gillett 1985). This evidence indicates the eagerness of Tokelauans for exogenous materials for making fishing gear, especially pearl shell. This may suggest a motivation for extensive voyaging in prehistoric times, supporting archaeological evidence for Tokelau long-distance exchange in basalt and ceramics (Addison et al. 2009; Addison and Kalolo 2009; Best 1988; Best et al. 1992).

By the late 1960s, imported fishing equipment had almost entirely replaced items of local manufacture, except canoes. Cotton lines, which had supplanted lines made of coconut sennit or other braided fibres, such as *Hibiscus tiliaceus*, since the early 20th century, now have been completely replaced by monofilament nylon lines (e.g. Hooper 1985). Nets used to be locally made with braided sennit or other fibers, but now also have been replaced by nylon. Spears are not so actively used in Tokelau, whereas spearguns and goggles have been more widely used since their introduction during the 1940s.⁷ The use of pearl shell lures had either stopped or dramatically decreased by the early 1970s (Gillett 1985; Hooper 1985), and subsequently, most hooks have been made from metal. The traditional pole for skipjack fishing was made from the wood of *puka* (*Hernandia nymphaeifolia*), although imported bamboo has been used in recent times (Gillett 1985), as well as fibreglass fishing poles.

A variety of woods were used to make fishing gear up until a few decades ago. For example, to build a traditional canoe, *kanava* (*Cordia subcordata*) was used for the hull and outrigger spars, *gagie* (*Pemphis acidula*) for attaching the spars to the outrigger, and *puka* (*Pisonia grandis* or *Hernandia nymphaeifolia*) for the outrigger (Gillett 1985; Whistler 1988). On occasion, breadfruit wood was also used for the hull (Huntsman pers. comm. 2009). All terrestrial resources are owned and controlled by *kaiga* (extended family unit), which is one of Tokelau's traditional social structures. Canoes were also unequivocally *kaiga* property in the past. Until the 1970s, each extended family had at least one canoe, and could hardly have existed as an independent unit without it (Hooper 1985). However, the number of traditional canoes has been decreasing since the 1970s, after the widespread introduction of aluminium skiffs and outboard engines.⁸ Today on Atafu, traditional canoes are a common site beside houses and around the village, although most are in disrepair and seldom or never used. People mainly use aluminium skiffs, although several traditional canoes are regularly maintained and used. Both skiffs and canoes are propelled by outboard engines and are regarded as the property of individuals or of married couples now, and no longer of *kaiga* (see also Hooper 1985 for the Fakaofu case). This may be an example of the rapid replacement of traditional fishing gear and materials through the introduction of modern ones since the middle to late 20th century, which have simultaneously weakened the tight connections that formerly existed between material culture, the social system, and the island ecosystem.

Marine conservation measures

A number of measures are in place in contemporary Tokelauan society that act to limit the exploitation of certain taxa (McAlister 2002). One of the most important conservation measures is the periodic imposition of a *lafu*, or use restriction, on specific areas of the reef by the *taupulega* (Tolosa et al. 1994). In addition to protecting fisheries that are periodically depressed because of human exploitation and seasonal changes, a *lafu* is sometimes declared to ensure that fish stocks are built up in anticipation of future needs for specific events, such as important festivals (Tolosa et al. 1994). On contemporary Atafu, for example, private fishing is restricted on most of the reef fronting the islet where the village is located. Only communal fishing (*faiva fakamua*) is allowed there at certain times of the year.

7. Gillett (1985) suspects that the introduction of diving goggles to Fakaofu in the 1940s was a major factor contributing to the virtual absence of pearl shell in the lagoon by the 1950s.

8. For example, Hooper reported that about 60 canoes were in serviceable condition at Fakaofu in 1971, whereas their number had decreased to only 8 in 1981 (Hooper 1982).

The distinctive *inati* system of distribution practiced in the atolls is another aspect of Tokelauan fishing that is strongly related to marine conservation. All resident members of the village are assigned to an *inati* group, often on the basis of kin relationships, but sometimes for a variety of other reasons (Passfield 1998). In this system, certain types of fish are considered as *ha* (sacred), meaning that they must be shared among the village when they are caught. As described above, these sacred fish (*ika ha*) were traditionally *fonu* (sea turtle), *hakula* (billfish or marlin), and *atu* (skipjack tuna), and they were divided among the whole population through the *inati* system on Atafu and the rest of Tokelau (see Hooper 1985). Even today, *fonu* and *hakula* are still regarded as *ika ha*, whereas *atu* is usually not, except when there is an especially large catch. In effect, the *inati* system deters the exploitation of these taxa by reducing individual incentives for capturing certain animals. Other species, mainly reef fish, are also distributed through the *inati* system, particularly at the time of communal fishing.

Atafu classification of the marine ecosystem

Marine and coastal environments

Atafu people divide the space around them into several categories. For the marine ecosystem, the inner lagoon at the centre of the atoll is termed *namo*, and land is *laufenua*. The micro-environmental features of the lagoon are distinguished by depth, nature of the bottom, and coral development. The shallow water or tidal zone is termed *matafaga*, the much deeper but visible bottom zone is *aloalo*, and coral formations in the lagoon interior are termed *akau*. All other parts of the lagoon are called *namo*, and no specific terms were collected by our interview survey (Fig. 3). Similarly, the reef to outer reef zones that surround the *laufenua* are also distinguished by their micro-geographical changes and depth. The inner reef zone is termed *uluulu*, and the reef channel

is *utua*. On Atafu, there are six *utua* and each has its own name. The reef edge partially higher than sea level at low tide is termed *fagautua*. Seaward of the *fagautua* is the *pufaiava*; then the *tafato* extends outward to a depth of about 20 m.

Classification of fish and molluscs

Knowledge of fish and fish behaviour on Atafu is extensive and elaborate, including a set of named categories related to lore and fish, which is ingeniously incorporated into the multiple facets of actual activities, such as fishing and gathering. We collected 164 fish names on Atafu, Hooper (1994) collected about 130 monomial fish names during fieldwork in Tokelau, and Rensch (1994) collected 239 fish names from the Tokelauan Dictionary (Tokelau Dictionary 1986) and other publications (Gillet 1985; Van Pel 1956) as well as from research in Tokelau (Appendix 1).

In reference to Tokelauan fish names, Hooper (1994) indicates that four fish names are only found in Tokelau, Tuvalu and Pukapuka plus eastern Polynesian languages, and thus may not warrant a Proto Nuclear Polynesian reconstruction. These are *eve* (*Epinephelus hexagonatus* or *Epinephelus merra*), *komulo* (*Caranx sexfasciatus* or *Caranx ignobilis*), *pakeva* (*Carangoides ferdau* or *Carangoides orthogrammus*), and *tupoupou* (*Aulostomus valenti*). In 2008, however, we could not collect the name *tupoupou* on Atafu for several reasons: 1) the books we used lacked the exact species corresponding to this fish name; 2) the fish family including this species is not important as food or as a resource on contemporary Atafu (although these fish are commonly found in Atafu waters, according to our informants); and 3) the informants we selected did not know or had forgotten about the fish name at the time of our interview. For possibly the same reasons, we were unable to collect some fish names that are shown in the Tokelauan Dictionary and other publications and which

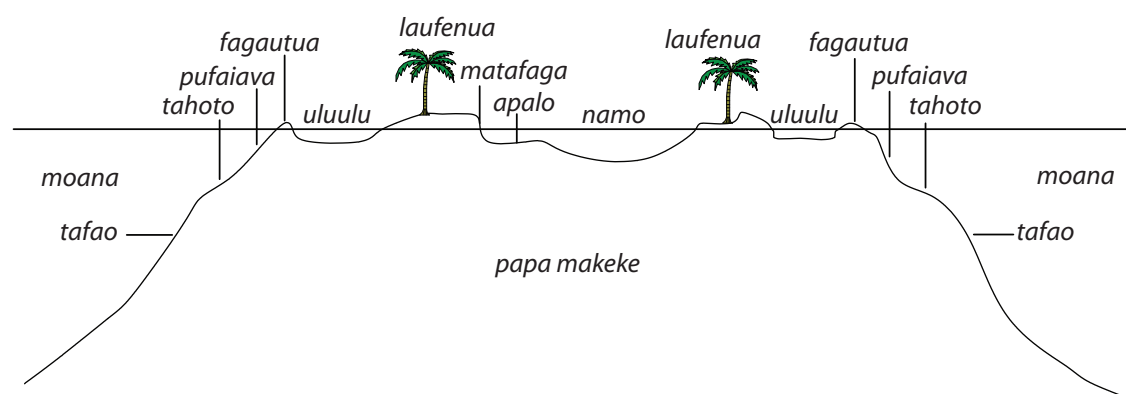


Figure 3. Atafu names and classification of atoll marine environments (drawn after Mafutaga-a-Toeaina-o-Atafu-i-Matauala-Porirua 2008).

are possibly common fish in Tokelau, including Atafu. To highlight these limitations, consider the case of *palu* (a species of oil fish, *Ruvettus pretiosus*). This fish and its name are also well known on contemporary Atafu, but we could not identify and collect a fish name during our interviews because, according to the informants, the exact species was not illustrated within the books we used during interviews.

On Atafu as well as the other Tokelau atolls, taxa for fish are generally organised into a hierarchy consisting of four levels (Fig. 4). A very general taxon, *ika*, is applied to a wide variety of fish species and also to marine mammals such as dolphin (*taka*) and whale (*tafola*), whereas *figota* is applied to all marine shell species in general. In Atafu and Tokelauan categories, *ika* are mainly divided into *ika o te namo* (fish of the lagoon), *ika o te uluulu* (fish of the reef), and *ika o te moana* (fish of the ocean) as the second level, while species included in those categories have their own names (e.g. Hooper 1994).

At the lower levels, each term is applied to particular groups or kinds of fish. Terms at the third level (“primary lexemes” in Hooper 1994:188) correspond to larger sub-groups or kinds of such fish as butterflyfish (*tifitifi*), parrotfish (*ufu*), squirrelfish (*malau*), and moray eels (*puhi*). At the fourth level (“secondary lexemes” in Hooper 1994:188), terms are applied to more specific groups or kinds of fish; for instance, the label *tifitifi taputapu* covers both Philippine butterflyfish (*Chaetodon adiergastos*) and threadfin butterflyfish (*Chaetodon auriga*), whereas *tifitifi kainiumata* applies to saddled butterflyfish (*Chaetodon ephippium*), and *tifitifi piu* for bluespot butterflyfish (*Chaetodon plebeius*), all of which are included into the *tifitifi* category at the higher level.

It should also be noted that terms at the second and third level are not always the same as the Linnaean system of categorisation, as in the case of *tifitifi taputapu*. For other examples, *ufu taia* is applied to two species of parrotfish: six-banded parrotfish (*Scarus frenatus*) and green-finned parrotfish (*Chlorurus sordidus*). *Maeva* is applied to three species of spinefoots: black spinefoot (*Siganus fuscescens*),

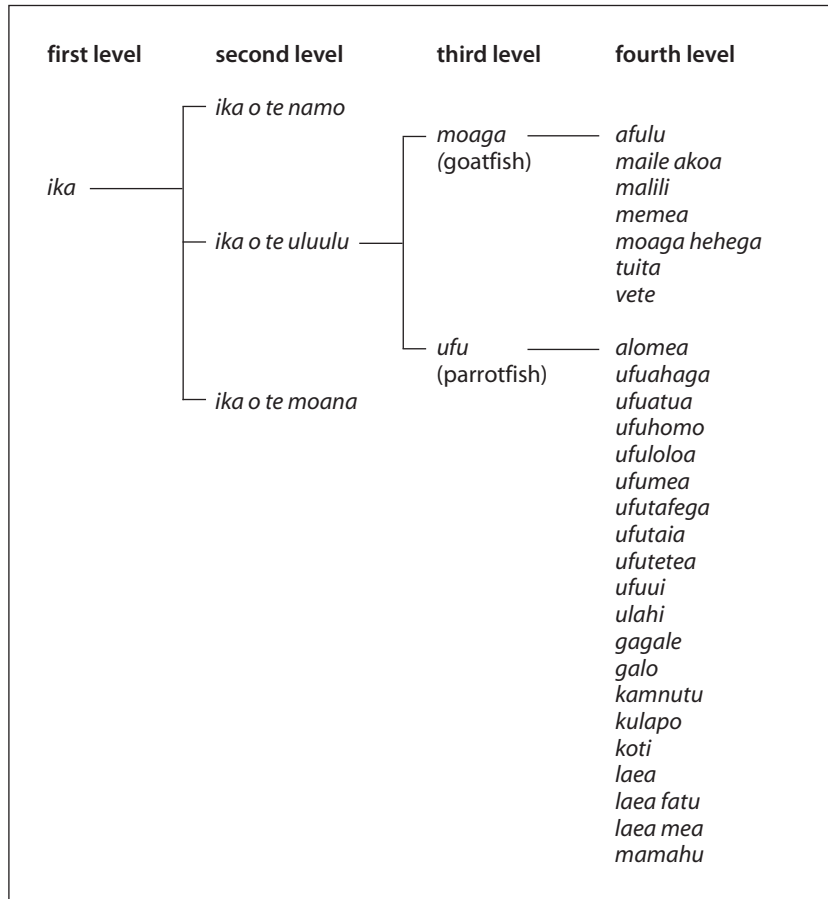


Figure 4. Schematic representation of a sample Tokelauan hierarchical classification of fish using goatfish and parrotfish from our 2008 Atafu interviews

golden-lined spinefoot (*Siganus lineatus*), and smudgespot spinefoot (*Siganus canaliculatus*). *Humu fagota* is applied to two species of triggerfish: white-barred triggerfish (*Rhinecanthus aculeatus*) and yellow-spotted triggerfish (*Rhinecanthus rectangulus*).

On the other hand, some fish species are possibly indicated by some different names. Although it is not obvious on contemporary Atafu, some fish names in the Tokelauan Dictionary (1986) and other documents (Hooper 1994; Rensch 1994) correspond to the same species. For example, saddle parrotfish (*Scarus sordidus*) is termed both as *ufu* and *ufuui*, and tattooed parrotfish (*Scarus jonesi*) is termed both as *kamutu* and *laea*. However, these differences could also be caused by the difference between each atoll in Tokelau, as it is unclear on which atoll these fish names were collected. As clearly shown in Appendix 1, many fish names collected on Atafu correspond to a similar type of fish indicated in the dictionary and other publications, but not exactly to the same species. In coming years, we anticipate collecting fish names on Fakaofu and Nukunonu to compare with our Atafu data.

On Atafu, lagoon to reef fish (a variety of small-sized species) mainly have second-level terms,

whereas most of reef edge to outer reef fish (a variety of large-sized species belonging to the families Carangidae, Scaridae, Lutjanidae, Acanthuridae, Serranidae, Labridae and Scombridae) are mainly termed only at the third level, and no terms correspond to larger sub-groups or to the Linnaean family level. Also, these fish groups have the most varied names in each family. For example, Carangidae has the most individual names, corresponding to 16 species; followed by Scaridae with 12 species individually named; Acanthuridae with 12 species named; Lutjanidae with 12 species named; Scombridae with 9 species named; sharks with 9 species named; and Serranidae and Labridae each with 8 species named. (These data are for Atafu only and exclude names possibly collected on other atolls in Tokelau [see Appendix 1].)

Further, some fish species mainly belonging to families that inhabit the reef edge to outer reef have two or more Atafu names according to their developmental stage or by their size (Table 2). For instance, red bass (*Lutjanus bohar*) has two names, *tatatata* (for the small size) and *fagamea* (for the large size); giant trevally (*Caranx ignobilis*) has four names, *lupoama* (baby size), *komulo* (small size), *uuaaoge* (middle size), and *uluakata* (large size). Bluefin trevalley (*Caranx melampygus*), another species of Carangidae, also has four names, *lupohehu* (baby size), *aheru* (small size), *amahua* (middle size), and *uluakata* (large size); thicklip trevally (*Carangoides orthogrammus*) has two names, *alaala* (small size) and *pakeva* (large size).⁹ As these names show, *lupo* or *lupolupo* is a term for juvenile *Caranx* species, and *ulua* is for the mature or largest-growing species of the same

genus (see also Hooper 1994; Tokelau Dictionary 1986). Flyingfish (*Cypselurus* sp.) also has three or four different names depending on its size: *hipa* (baby size); *malolo* (small size); *hahave* (middle size); and *tuali* (large size). In the Scombridae family, skipjack tuna (*Katsuwonis pelamis*), yellowfin tuna (*Thunnus albacares*), and dogtooth tuna (*Gymnosarda unicolor*) each have two different names according to their growth stages. Other instances are shown in Table 2.

Apart from the hierarchical classification mentioned above, some fish have names related to their character, shape, colour, behaviour and habitat. For instance, the black damselfish (*Neoglyphidodon melas*) is termed *leoleo akau*, which means “guard of coral” in Tokelauan, because this fish is usually found around coral and attacks people when they come too close. The duskyfin bigeye (*Heteropriacanthus cruentatus*) is termed *mata pula*, which means “open eye widely” as the fish has big eyes. In terms of shape and colour, the Indo-Pacific sailfish (*Istiophorus platypterus*) is termed *tua niu* which means “coconut leaf” because the fish has a large dorsal fin that looks like a coconut leaf. The giant moray (*Gymnothorax javanicus*) and yellow-edged moray (*Gymnothorax flavimarginatus*) are termed *puhi kukula* (*kukula* = red), and the painted moray (*Siderea picta*) is termed *puhi tea* (*tea* = white) because of their skin colour. The mottled moray is termed *puhi gatala* as its colour pattern is similar to that of a grouper species termed *gatala* (*Epinephelus quoyanus*). Hammerhead sharks (*Sphyrna* spp.) are termed *mata i ta liga*, which means “eyes on ears” as the eyes of this fish are on both sides of its wide head.

Table 2. Fish names for different developmental stages

Family	Scientific name	Baby size	Small size	Middle size	Large size
Carangidae	<i>Caranx melampygus</i>	<i>lupohehu</i>	<i>aheru</i>	<i>amahua</i>	<i>uluakata</i>
	<i>Caranx ignobilis</i>	<i>lupohama</i>	<i>komulo</i>	<i>uuaaoge</i>	<i>uluakata</i>
	<i>Carangoides orthogrammus</i>		<i>alaala</i>		<i>pakeva</i>
Scombridae	<i>Gymnosarda unicolor</i>		<i>tava tava</i>		<i>valu</i>
	<i>Thunnus albacares</i>		<i>kakahi</i>	<i>kakahi</i>	<i>takuo</i>
	<i>Katsuwonis pelamis</i>		<i>atu</i>	<i>atu</i>	<i>nakano</i>
Scaridae	<i>Scarus harid</i>	<i>alomea</i>	<i>kulapo</i>		<i>ulahi</i>
	<i>Hipposcarus longiceps</i>		<i>kulapo</i>		<i>ulahi</i>
Exocoetidae	<i>Cypselurus</i> sp.	<i>hipa</i>	<i>malolo</i>	<i>hahave</i>	<i>tuali</i>
Lutjanidae	<i>Lutjanus bohar</i>		<i>tatatata</i>		<i>fagamea</i>
Labridae	<i>Cheilinus undulatus</i>		<i>lalafi</i>	<i>lafilafi</i>	<i>malatea</i>
Kyphosidae	<i>Kyphosus bigibbus</i>		<i>gafu gafu</i>		<i>nanue</i>
Mullidae	<i>Parupeneus cyclostomus</i>		<i>moaga hehega</i>		<i>moaga aheru</i>
Sphyrnidae	<i>Sphyrna barracuda</i>		<i>ono</i>	<i>ono</i>	<i>pananua</i>

9. Hooper (1994) indicates that growth terms for *Caranx* species exist in many Polynesian languages and the same five words can occur at different levels in these systems.

Table 3. List of Atafu mollusc names

Tokelau name	Family	Scientific name	English name
<i>aliao</i>	Trochidae	any trochus	
<i>alili</i>	Turbinidae	any turban shell	
<i>unga</i>	Gastropoda		Other gastropoda shells
<i>fao</i>	Cypraeidae	<i>Cypraea</i> spp.	Cowrie shell
<i>fao</i>	Cassidae	<i>Cassis</i> spp.	Helmet shell
<i>fao</i>	Strombidae	<i>Lambis</i> spp.	Conch shell
<i>fatifati afa</i>	Conidae	<i>Conus pulicarius</i>	Flea-bitten cone shell
<i>fahua</i>	Tridacnidae	<i>Tridacna gigas</i>	Giant clam shell
<i>fahua taka</i>	Tridacnidae	<i>Tridacna gigas</i> (extra large)	Giant clam shell
<i>favae</i>	Conidae	<i>Conus mobile</i>	Necklace cone shell
<i>fuiono</i>	Collumbidae	?	
<i>kahikahi</i>	Cardiidae	<i>Fragum fragum</i>	White strawberry cockle
<i>mimiha</i>	Ellobidae	<i>Melampus</i> spp.	
<i>makulu</i>	Lottorinidae	<i>Littoraria coccinea</i>	Blight coccinea
<i>mapu</i>	Conidae	<i>Conus</i> spp.	Small cone shell
<i>paelo</i>	Conidae	<i>Conus lividus</i>	Livid cone
<i>paua</i>	?	?	Poisonous shell
<i>pipi</i>	Bivalva		All bivalva shells
<i>pule</i>	Cypraeidae	<i>Cypraea</i> spp.	Cowrie shell
<i>tiolu</i>	Conidae	<i>Vermetus</i> sp.	
<i>valu</i>	Conidae	<i>Conus connectens</i>	Comma cone shell
<i>tuitui</i>		<i>Echinometra</i> sp.	Sea urchin
<i>vana</i>		<i>Diadema</i> sp.	Black sea urchin

belong to the families Haemulidae, Ploctosidae and Ariidae although some of these species are named on other islands in western Polynesia (Rensch 1994). By our interviews, most of the answers for the absence of these fish names are explained by the scarcity of these fish or their absence in and around Atafu. Although an intensive biological survey is required to empirically document their absence or scarcity, their absence in names may indicate the small populations of these fish in Atafu waters.

Similarly, the same tendency is confirmed among the molluscan names of Atafu. Only 16 names were collected for molluscs (Table 3), compared with our collection of over 160 fish names (corresponding to about 200 species). Further, only two groups — *Tridacna* sp.

(*fahua*) and *Turbo* sp. shells (*alili*) — are exploited as food. Other named molluscs are rather small in size, and are only used as material for ornaments. These small-sized gastropods are mainly spiral shells such as *Conus* spp. of which six are named. *Cypraea* sp., and *Strombus* sp., while small bivalves are all termed *pipi* in the third level with no names corresponding to family or species level except for *Tridacna* spp.

The idea that the very limited number of mollusc names on Atafu might be caused by the island's historic and cultural background with limited use of molluscan resources is confirmed by our interviews and observations. It may also be directly caused by ecological factors in the lagoon and coasts of Atafu Atoll, such as a limited number and species variety of molluscs, especially large-growing species used for food. Although further ecological and biological surveys are required to confirm this possibility, our short collecting surveys along the coasts both in the lagoon and on the reef confirmed that, except

On the other hand, yellow-dotted Maori wrasse (*Cheilinus chlorurus*) is termed *taina o te puhi*, which means "cousin of *puhi* (moray eel)" because the fish's mouth looks similar to that of a moray eel. The ladder wrasse (*Thalassoma trilobatum*) or red-and-green wrasse (*Thalassoma purpurum*) are termed *hugale paea* or just *hugale*, which means a kind of "beauty" as their skin pattern is very colourful. In terms of behaviour and habitat, black marlin (*Makaira indica*) is termed *tiu vaka* (fast canoe) because this fish swims as fast as a canoe, and rosy snapper (*Pristipomoides filamentosus*) is termed *palu vaka alo*, which means "paddle of a canoe" as this fish also swims very fast, like a canoe being paddled. Pale soldierfish (*Myripristis melanostictus*) is termed *malau tafu* because this fish inhabits areas of stone (*fatu*) or coral, and barred garfish (*Hemiramphus far*) is termed *ihe fota* because this fish (*ihe* = garfish) is usually caught by stone weir (*fota*).

On Atafu, some fish families or groups have no name at either the third or fourth level. These fish

for some *Tridacna* sp. and *Turbo* sp., most individuals encountered were small-sized *Conus* sp. and *Cypraea* sp., or small bivalves. Previous archaeological test excavations by Best (1988) on Atafu and Fakaofu and our 2008 excavations on Atafu (Addison et al. 2009; Addison and Kalolo 2009) also confirmed the very limited number of molluscan food shell remains, except *Tridacna* sp.

Discussion

The cognition or mental images of present Tokelauans about marine environments and resources provides some hints for reconstructing prehistoric fishing and maritime exploitation. For instance, the classification and diversity of fish and mollusc names on Atafu clearly shows the overwhelming importance of fish resources, as opposed to molluscs. An analysis of fish name classification enables us to consider people's preferences regarding fish and other marine resources. Also, the variety and character of fishing methods and fish name classification on Atafu reveal that there are more variations in names and fishing methods for larger pelagic fish species, such as those in the families Carangidae and Scombridae, and show a high dependence on outer reef and offshore resources. Such tendencies possibly indicate that outer reef and offshore resources were significant both economically and culturally in the past on Atafu.

McAlister's (2002) analysis of fish remains excavated from Fale Islet on Fakaofu Atoll (Best 1988) offers a contrasting situation. The major fish taxa in the assemblage were mainly reef and lagoon species in the families Scaridae, Serranidae and Holocentridae, while outer reef to offshore fish such as Scombridae and Sphyraenidae were very limited in number — both in the number of identified specimens and in the minimum number of individuals. Carangidae, which ranked the 6th in the number of identified specimens are complicated to interpret because they can be caught in most fishing zones and inhabit different zones at different life stages. McAlister's study is currently the only analysis of archaeological fish remains from Tokelau. Therefore, it is impossible to say whether the much higher dependence on reef and lagoon fish resources prehistorically on Fakaofu is replicated at other locations in Tokelau for the prehistoric period. Or, is the difference between modern Atafu and prehistoric Fakaofu not due to temporal changes, but rather represent fundamentally different long-term marine resource exploitation strategies employed by the two populations, as hinted at in Huntsman and Hooper's historical ethnography (Huntsman and Hooper 1996)?

Some ethnographic and historic documents recorded since the late 19th century report outer-reef

fishing was also actively practiced and people's dependence both on lagoon-to-reef and outer-reef-to-offshore fish resources (Hale 1846; Macgregor 1937; Matagi Tokelau 1991; Wilkes 1845). Once considering these records, there might be another possibility that changes in resource exploitation from inshore and lagoon resources to offshore resources might have occurred at some periods in the past. Analysis of material excavated from each atoll will be required to begin addressing such topics with archaeological faunal assemblages.

In terms of exploitation of outer-reef-to-offshore fish, more variety and numbers are confirmed in names for Carangidae, Scombridae, Lutjanidae and sharks (see Appendix 1 for details), while there are few names for rays (cartilaginous fish related to sharks) in Tokelau including Atafu. The scarcity of names for rays on Atafu (and possibly other atolls in Tokelau) tentatively indicates less importance for rays as food items. Our interview surveys in Atafu also confirmed that people seldom catch and eat rays, hence rays are not regarded as an important food resource on Atafu today.

With regard to lagoon-to-reef exploitation, more variety of names are confirmed both in the third and the fourth levels ("primary and secondary lexemes" in Hooper 1994:188) for Scaridae, Labridae, Mullidae, Acanthuridae, Holocentridae and Balistidae (see Appendix 1 for detail), hence the importance of these fishes may be higher than other fishes, or alternatively, overall numbers of these fish resources may be higher on Atafu. The variety names for Labridae, Holocentridae and Balistidae as well as Carangidae, Scombridae, Lutjanidae and sharks which are caught mainly by line and trolling on other Pacific islands (Butler 1994; Kirch and Dye 1979; Masse 1986, 1989; Ono 2007, 2009; Ono and Intoh in press; Rolett 1998; Walter 1989), and the highest number and variety in line-fishing methods also indicate that line fishing and trolling have been more important and extensively used on Atafu. On the other hand, as discussed above, there are some fish families or groups which have no name either at the second or third levels, similar to the case for rays. These facts possibly indicate that these fishes are neglected as food resources by the people or simply that these fish resources are very scarce on Atafu.

More intensive biological survey is required to examine these alternative possibilities. Also, more intensive interview survey and analysis is needed to focus on cultural factors behind fish names, such as the meaning or image of each fish by the people and the relationship with food or catch restrictions (e.g. Akimichi 1981; Nagatsu 1995). Hooper's (1985) and Gillett's (1985) studies focused on pelagic fishing on Fakaofu during the 1970s to 1980s. These data need to be supplemented with intensive observational

survey on the full range of fishing activities at different time intervals (e.g. week, month, year) and on each atoll in Tokelau. In sum, we need various kinds of ethno-ecological data, not only for Atafu, but also for the other atolls in Tokelau to achieve a satisfactory understanding of traditional and modern marine exploitation, people's cognition of marine environments, and the Tokelau marine ecosystem itself. We are also firmly convinced that ethno-ecology is an efficient method to approach both the past and present relationship between people and marine ecosystem.

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APPENDIX 1

Fish names in Atafu and Tokelau. Sources: Tokelau Dictionary 1986; Hooper 1994; Rensch 1994 (names in bold were only recorded in the Tokelauan Dictionary).

Tokelau	Scientific names	English names
	Carangidae	Trevallies
<i>aheu</i>	<i>Caranx melampygus</i> (small)	Bluefin trevally (small)
<i>alaala</i>	<i>Carangoides orthogrammus</i> (small)	Thicklip trevally
<i>alaala</i>	<i>Caranx bucculentus</i>	Blue-spotted trevally
<i>alalala</i>	<i>Carangoides gilberti</i>	Striped jacks
<i>amafua</i>	<i>Caranx melampygus</i> (middle)	Bluefin trevally (middle)
<i>atualo</i>	<i>Megalaspis cordyla</i>	Finny scad
<i>atule</i>	<i>Selar crumenophthalmus</i>	Silver scad
<i>atule</i>	<i>Selar boops</i>	Oxeye scad
<i>atule</i>	<i>Selar crumenthalmops</i>	Pure-eyed scad
<i>hoke</i>	<i>Trachinotus baillonii</i>	Blackspotted dart
<i>hoke</i>	<i>Trachinotus botla</i>	Common dart
<i>kamai</i>	<i>Elegatis bipinnulata</i>	Rainbow runner
<i>kanai</i>	<i>Seriola lalandi</i>	Yellowtail kingfish
<i>katalolo</i>	<i>Carangoides talamparoides</i>	White-tongued trevally
<i>katalolo</i>	<i>Carangoides bajad</i>	Blue trevally
<i>katalolo</i>	<i>Trachinotus blochii</i>	
<i>komulo</i>	<i>Caranx sexfasciatus</i>	Bigeye trevally (small)
<i>komulo</i>	<i>Caranx ignobilis</i> (small)	Giant trevally (small)
<i>lai</i>	<i>Scomberoides commersonianus</i>	Talang queenfish
<i>lai</i>	<i>Scomberoides tala</i>	Barred queenfish
<i>lai</i>	<i>Scomberoides lysan</i>	Double spotted queenfish
<i>lupo (lupolupo)</i>	<i>Caranx sp. (very small >5 cm)</i>	
<i>lupohama</i>	<i>Caranx ignobilis</i> (very small)	Giant trevally (very small)
<i>lupohehu</i>	<i>Caranx melampygus</i> (very small)	Bluefin trevally (very small)
<i>pakeva</i>	<i>Carangoides ferdau</i>	Black-spotted jack
<i>pakeva</i>	<i>Carangoides orthogrammus</i> (large)	Thicklip trevally
<i>tafauli</i>	<i>Caranx lugubris</i> (middle)	Black trevally (middle)
<i>uauaoge</i>	<i>Caranx ignobilis</i> (middle)	Giant trevally (middle)
<i>uli</i>	<i>Decapterus pinnulatus</i>	Mackerel scad
<i>uli</i>	<i>Decapterus macarellus</i>	Mackerel scad
<i>atuaalo</i>	<i>Decapterus russelli</i>	
<i>uluu</i>	<i>Caranx sp. (largest size >0.9 m)</i>	
<i>uluakata</i>	<i>Caranx ignobilis</i> (large)	Giant trevalley (large)
<i>uluakata</i>	<i>Caranx melampygus</i> (large)	Bluefin trevally (large)
<i>uluatafauli</i>	<i>Caranx lugubris</i> (large)	Black trevally (large)
<i>mago</i>	<i>Elasmobranchi</i>	Sharks
<i>ikapo</i>	<i>Carcharhinus menissorah</i>	Grey shark
<i>ikapo</i>	<i>Carcharhinus amboinensis</i>	Pigeye shark
<i>ikupi</i>	<i>Alopias pelagicus</i>	Small-toothed thresher shark
<i>fakaulu</i>	<i>Carcharhinus brevipinna</i>	Long-nosed grey shark
<i>faime</i>	<i>Rhincodon typus</i>	Wale shark
<i>kanaelauvaka</i>	<i>Galeocerdo cuvier</i>	Tiger shark
<i>kapakan hakana</i>	<i>Carcharhinus albimarginatus</i>	Silvertip shark
<i>kapahan hakana</i>	<i>Triaenodon obesus</i>	Whitetip shark
<i>kili</i>	<i>Carcharhinus melanopterus</i>	Black-tipped shark
<i>kili</i>	<i>Carcharhinus longimanus</i>	Oceanic whitetip shark
<i>lalaila</i>	<i>Carcharhinus albimarginatus</i>	Silvertip shark
<i>malu</i>	<i>Triaenodon obesus</i>	Whitetip shark
<i>mata i talingga</i>	<i>Sphyrna spp.</i>	Hammerhead sharks
<i>mokoha</i>	<i>Isurus glaucus</i>	Mako shark
<i>palumago</i>	?	Huge oily shark
<i>tagutu</i>	<i>Galeocerdo cuvier</i>	Tiger shark
<i>toke kimoa</i>	<i>Alopias vulpinus</i>	Thresher shark
	Scombridae	Tunas, mackerels, bonitos
<i>atuaalo</i>	<i>Grammatocygnus bilineatus</i>	Double-lined mackerel
<i>atutaaa</i>	<i>Thunnus alalunga</i>	Albacore
<i>atu</i>	<i>Katsuwonis pelamis</i> (middle)	Skipjack tuna (middle)
<i>nakano</i>	<i>Katsuwonis pelamis</i> (large)	Skipjack tuna (large)
<i>kakahi</i>	<i>Thunnus obesus</i>	Bigeye tuna
<i>kakahi/lalavalu</i>	<i>Thunnus albacares</i>	Yellowfin tuna (small/middle)
<i>kavalau</i>	<i>Euthynnus affinis</i>	Mackerel tuna
<i>pala</i>	<i>Acanthocybium solandri</i>	Wahoo
takuo	<i>Thunnus albacares</i> (very large)	Yellowfin tuna (very large)
<i>takuo</i>	<i>Thunnus maccoyii</i>	Southern bluefin tuna
<i>tava tava</i>	<i>Gymnosarda unicolor</i> (small)	Dogtooth tuna (small)
tuikaufoe	<i>Katsuwonis pelamis</i> (small)	Skipjack tuna (small)
<i>valu</i>	<i>Gymnosarda unicolor</i> (large)	Dogtooth tuna (large)
	Lutjanidae	Snappers
<i>utu</i>	<i>Aprion virescens</i>	Green jobfish
<i>fagamea</i>	<i>Lutjanus bohar</i> (large)	
haputu	<i>Lutjanus rivalatus</i>	
<i>havane</i>	<i>Lutjanus kasmira</i>	Blue-striped seaperch
<i>havane</i>	<i>Lutjanus quinquelineatus</i>	Five-ried seaperch
<i>havane</i>	<i>Lutjanus russellii</i>	Striped seaperch
<i>palu ave</i>	<i>Etelis radiosus</i>	Pale snapper
palu hega		
palu kata		
palu loa		
palu makomako		
palu malau		Big eye snapper
palu utu	<i>Pristipomoides argyrogrammicus</i>	
<i>palu vaka alo</i>	<i>Pristipomoides filamentosus</i>	Rosy snapper
<i>palu vaka alo</i>	<i>Symphorus nematophorus</i>	Chinaman fish
<i>palu vaka alo</i>	<i>Lutjanus argentimaculatus</i>	Mangrove jack
<i>taea</i>	<i>Lutjanus gibbus</i>	Paddletail
<i>taiva</i>	<i>Lutjanus russellii</i>	Moses perch
<i>tagau</i>	<i>Lutjanus fulvus</i>	Yellow-margined seapearch
<i>tatatata</i>	<i>Lutjanus bohar</i> (small)	Red bass
	Serranidae	Groupers
<i>fapuku/hapuku</i>	<i>Epinephelus microdon</i>	Marbled sea bass
<i>loi</i>	<i>Cephalopholis boenack</i>	Peacock rockcod
<i>mataele</i>	<i>Cephalopholis urodeta</i>	Flag-tailed rockcod
<i>kaupatuo</i>	<i>Cephalopholis sonnerati</i>	Tomato rockcod
katakata	<i>Epinephelus melanostigma</i>	
<i>gatala</i>	<i>Epinephelus quoyanus</i>	Long-finned rockcod
<i>gatala utuvai</i>	<i>Epinephelus tauvina</i>	Reef cod
<i>eve</i>	<i>Epinephelus merra</i>	Honeycomb cod
<i>eve</i>	<i>Ephinephelus hexagonatus</i>	Hexagon rockcod
<i>tonu</i>	<i>Epinephelus macrospilos</i>	Large-spotted rockcod
malau	Holocentridae	Squirrelfishes
<i>anaoho</i>	<i>Neoniphon opercularis</i>	Black-finned squirrelfish
anaoho	<i>Flammeo opercularis</i>	Banded soldierfish
<i>foto</i>	<i>Sargocentron violaceum</i>	Violet squirrelfish
<i>malau fatu</i>	<i>Myripristis melanostictus</i>	Pale soldierfish
malau fagamea	<i>Myripristis adusta</i>	Blackfin soldierfish
<i>malau kelekele</i>	<i>Myripristis adusta</i>	Blackfin soldierfish
<i>malau vale</i>	<i>Myripristis hexagonatus</i>	Doubletooth soldierfish
<i>malau mama</i>	<i>Myripristis kuntee</i>	Crowned squirrelfish
malau naunefe	<i>Myripristis kuntee</i>	Black-tip soldierfish
malau loa	<i>Adioryx andamanensis</i>	Red squirrelfish
<i>malau loa</i>	<i>Sargocentron tiere</i>	Bluestripe squirrelfish
<i>malau ta</i>	<i>Sargocentron spiniferum</i>	Spiny squirrelfish
malau tea	<i>Myripristis pralinus</i>	Scarlet soldierfish
<i>putala loa</i>	<i>Sargocentron rubrum</i>	Red squirrelfish
putala loa	<i>Flammeo sammara</i>	Blotched soldierfish
<i>talatala</i>	<i>Myripristis violaceus</i>	Violet squirrelfish

humu	Balistidae	Triggerfishes			
umu	<i>Balistoides viridescens</i>	Blue finned triggerfish			
humu ikutea	<i>Melichthys vidula</i>	Pinktail triggerfish			
humu ikutea	<i>Sufflamen chrysopterus</i>	Black triggerfish			
humu uli	<i>Melichthys niger</i>	Ebony triggerfish			
humu fagota	<i>Rhinecanthus rectangulus</i>	Yellow-spotted triggerfish			
humu fagota	<i>Rhinecanthus aculeatus</i>	White-barred triggerfish			
humu lega	<i>Balistapus undulatus</i>	Red lined triggerfish			
humu tagitagi	<i>Anameses scopas</i>	Black filefish			
humu tuakau	<i>Melichthys niger</i>	Black triggerfish			
tifitifi	Chaetodontidae	Butterflyfishes			
tapukulu	<i>Chaetodon lunula</i>	Raccoon butteerflyfish			
tifitifi kainiumata	<i>Chaetodon ephippium</i>	Saddled butterflyfish			
tifitifi tapu tapu	<i>Chaetodon adiergastos</i>	Philippine butterflyfish			
tifitifi tapu tapu	<i>Chaetodon auriga</i>	Threadfin butterflyfish			
tifitifi piu	<i>Chaetodon plebeius</i>	Bluespot butterflyfish			
	Pomacentridae	Damselfishes			
ika tele lautau	<i>Hemiglyphidodon plagiometopon</i>	Lagoon damsel			
leoleo akau	<i>Neoglyphidodon melas</i>	Black damsel			
mutu	<i>Abudefduf sordidus</i>	Blackspot sergeant major			
mutu lei	<i>Abudefduf</i> spp.	Sergeant major			
o	Lepidozygus tapeinosoma				
	Sphyraenidae	Barracudas			
ono	<i>Sphyraena barracuda</i> (middle)	Barracuda			
haohao	<i>Sphyraena qenie</i>	Military sea-pike			
pananua	<i>Sphyraena barracuda</i> (large)	Barracuda			
tapatu	<i>Sphyraena forsteri</i>	Sea-pike barracuda (small)			
tapatu	<i>Sphyraena jello</i>	Giant seapike			
fai	Dasyatidae	Stingray			
fai kili	<i>Dasyatis luhlui</i>	Bluespotted stingray			
fafalua	<i>Aetobatis nari nari</i>	Eagle ray			
fafalua	<i>Himantura undulata</i>	Leopard whipray			
lautiapua	<i>Manta birostris</i>	Manta ray			
	Xiphiidae	Swordfish			
hakula	<i>Xyphias gladius</i>	Swordfish			
	Istiophoridae	Marlins			
tuaniu	<i>Istiophorus gladius</i>				
tuaniu	<i>Istiophorus platypterus</i>	Indo-Pacific sailfish			
tiuvaka	<i>Makaira indica</i>	Black marlin			
hahave	Exocoetidae	Flyingfishes			
hipa	<i>Cypselurus</i> sp. (very small)	Flyingfish (very small)			
malolo	<i>Cypselurus</i> sp. (small)	Flyingfish (small)			
hahave	<i>Cypselurus</i> sp. (middle)	Flyingfish (middle)			
tuali	<i>Cypselurus</i> sp. (large)	Flyingfish (large)			
	Coryphaenidae	Dolphinfishes			
mahimahi	<i>Coryphaena hippurus</i>	Common dolphinfish			
	Echeneidae				
teletele vaka niu	<i>Echeneis naucrates</i>	Slender suckerfish			
	Apogonidae	Cardinalfishes			
fakupa	<i>Lepidaplois axillaris</i>	Black-spot pigfish			
fakupa	<i>Apogon septemstriatus</i>	Seven-banded cardinalfish			
	Priacanthidae	Bigeyes			
mata pula	<i>Heteropriacanthus cruentatus</i>	Duskyfin bigeye			
	Bothidae	Flounders			
ali	<i>Bothus mancus</i>	Left-eye flounder			
ali	<i>Bothus pantherinus</i>	Panther flounder			
manoko	Blennidae	Gobbies & mud skippers			
talau	<i>Mimoblennius atrocinctus</i>	Mimic blenny			
	Zanclidae	Moorish idol			
laulaufau	<i>Zanclus cornutus</i>	Moorish idol			
kumikumia	<i>Zanclus</i> spp.	Yellow moorish idol			
			Fistulariidae		Flutemouth
taotao			<i>Fistularia petimba</i>		Cornet fish
tupoupou			<i>Aulostomus valentini</i>		Trumpet fish
ufu			Scaridae		Parrotfishes
alomea			<i>Scarus harid</i> (young)		Yellow parrotfish
ufu			<i>Scarus sordidus</i>		Saddled parrotfish
ufuahaga			<i>Scarus microrhinos</i> (female)		Steephead parrotfish
ufuatua			<i>Bolbometopon bicolor</i>		Two-coloured parrotfish
ufuhomo			<i>Bolbometopon bicolor</i>		Two-coloured parrotfish
ufuloloa			<i>Scarus forsteri</i> (male)		Big belly parrotfish
ufuloloa			<i>Scarus rubroviolaceus</i>		Ember parrotfish
ufumea			<i>Scarus rubroviolaceus</i>		Meadow parrotfish
ufutafega			<i>Scarus forsteri</i> (female)		Big belly parrotfish
ufutai			<i>Scarus frenatus</i>		Six-banded parrotfish
ufutai			<i>Chlorurus sordidus</i>		Green-finned parrotfish
ufutetea			<i>Scarus schlegeli</i> (female)		Schlegel's parrotfish
ufuui			<i>Scarus sordidus</i>		Saddled parrotfish
ufuui			<i>Scarus dimidiatus</i>		Saddled parrotfish
ufuui			<i>Scarus chameleon</i>		Chameleon parrotfish
ulahi			<i>Scarus harid</i>		Yellow parrotfish
ulahi			<i>Hipposcarus longiceps</i>		Long-nosed parrotfish
gagale			<i>Calotomus spinidens</i>		
galo			<i>Scarus globiceps</i>		Brown parrotfish
kamnutu			<i>Scarus jonesi</i>		Tattooed parrotfish
kulapo			<i>Scarus harid</i> (small)		Yellow parrotfish
kulapo			<i>Hipposcarus longiceps</i> (small)		Long-nosed parrotfish
koti			<i>Scarus venosus cuvier</i>		Cut parrotfish
koti			<i>Scarus schlegeli</i> (male)		Schlegel's parrotfish
laea			<i>Scarus jonesi</i>		Tattooed parrotfish
laea			<i>Scarus microrhinos</i> (male)		Steephead parrotfish
laea fatu			<i>Scarus lunula</i>		Paumotu parrotfish
laea mea			<i>Scarus</i> sp.		King parrotfish
mamahu			<i>Cetoscarus bicolor</i>		Red-speckled parrotfish
			Labridae		Wrasses
uho ote puhi			<i>Novaculichthys taeniourus</i>		Carpet wrasse
uloulo			<i>Hologymnosus doliatus</i>		Pastel ringwrasse
uloulo			<i>Thalassoma fuscum</i>		Fire wrasse
gatuloa			<i>Epibulus insidiator</i>		
lalafi			<i>Cheilinus undulatus</i> (small)		Double-headed Maori wrasse
lafilafi			<i>Cheilinus undulatus</i> (middle)		Double-headed Maori wrasse
lautotonu			<i>Cheilinus unifasciatus</i>		Whiteband Maori wrasse
lolo			<i>Oxycheilinus bimaculatus</i>		Violet-lined Maori wrasse
malatea			<i>Cheilinus undulatus</i> (large)		Double-headed Maori wrasse
molali			<i>Cheilinus trilobatus</i>		Tripletail Maori wrasse
motoa			<i>Thalassoma</i> spp.		Green moon wrasse etc
motoa			<i>Thalassoma hardwichei</i>		Six-barred wrasse
papo			<i>Cheilinus fasciatus</i>		Scarlet-breasted Maori wrasse
taina ote puhi			<i>Cheilinus chlorurus</i>		Yellow-dotted Maori wrasse
hoa ote puhi			<i>Hemipteronotus taeniourus</i>		Bar-cheeked wrasse
hugale paea			<i>Thalassoma trilobatum</i>		Ladder wrasse
hugale paea			<i>Halichoeres hortulanus</i>		Rainbow wrasse
hugale			<i>Thalassoma purpureum</i>		Red and green wrasse
hugale			<i>Thalassoma hardwichei</i>		Six-barred wrasse
ume			Acanthuridae		Surgeonfishes, unicornfishes
alogo			<i>Ctenochaetus striatus</i>		Lined bristletooth
alogo			<i>Acanthurus mata</i>		Yellowmask surgeonfish
apalani			<i>Acanthurus xanthopterus</i>		Yellowfin surgeonfish
apalani			<i>Acanthurus auranticavus</i>		Orange-socket surgeonfish
api			<i>Acanthurus guttatus</i>		White-spotted surgeonfish
ikumelo			<i>Acanthurus nigricans</i>		Whitecheeked surgeonfish
ume			<i>Naso unicornis</i>		Brown unicornfish
umeihu			<i>Naso brevirostris</i>		Longnosed unicornfish
umelei			<i>Naso lituratus</i>		Stripe-face unicornfish
maomao			<i>Acanthurus nigricauda</i>		Blackstreak surgeonfish
maninini			<i>Acanthurus triostegus</i>		Convict surgeonfish

<i>pone</i>	<i>Acanthurus achilles</i>	Red-spotted surgeonfish	<i>hue ate</i>	<i>Arothron reticularis</i>	Reticulated pufferfish
<i>ponelolo</i>	<i>Ctenochaetus striatus</i>	Lined bristletooth	<i>huehega</i>	<i>Arothron nigropunctatus</i>	Yellow pufferfish
<i>ponehamoa</i>	<i>Acanthurus lineatus</i>	Blue-lined surgeonfish		Kyphosidae	Sea chubs
<i>tatifi</i>	<i>Naso brachycentron</i>	Humpback unicornfish	<i>nanue</i>	<i>Kyphosus cinerascens</i>	Rudderfish
<i>tatifi</i>	<i>Naso brevirostris</i>	Longnosed unicornfish	<i>gagafu/gafugafu</i>	<i>Pomacentrus pavo</i> etc.	Damselfish & sergeant-majors
<i>tatifi</i>	<i>Naso herrei</i>	Long-horn unicornfish	<i>gafugafu</i>	<i>Kyphosus bigibbus</i> (small)	Southern drummer
<i>tatifi</i>	<i>Naso rigoletto</i>	Hunchback unicornfish	<i>nanue</i>	<i>Kyphosus bigibbus</i> (large)	
<i>tatifi atu</i>	<i>Naso annulatus</i>	Ringtailed unicornfish		Cirrhitidae	Hawkfishes
<i>tatifi atu</i>	<i>Naso vlamingi</i>	Zebra unicornfish	<i>patuki</i>	<i>Cirrhitus pinnulatus</i>	Marble hawkfish
<i>moaga</i>	Mullidae	Goatfishes	<i>patuki laufala</i>	<i>Paracirrhites forsteri</i>	Freckled hawkfish
<i>afulu</i>	<i>Parupeneus bifasciatus</i>	Doublebar goatfish	<i>patuki laufala</i>	<i>Paracirrhites hemistictus</i>	Ornate hawkfish
<i>maile akoa</i>	<i>Upeneus vittatus</i>	Striped goatfish	<i>ihe</i>	Hemiramphidae	Garfishes
<i>maile akoa</i>	<i>Upeneus sulphureus</i>	Sunrise goatfish	<i>ihe fota</i>	<i>Hemiramphus far</i>	Barred garfish
<i>maile akoa</i>	<i>Upeneus tragula</i>	Bartailed goatfish	<i>ihe lafa</i>	<i>Hyporhamphus actus</i> (large)	Half-beak
<i>malili</i>	<i>Mulloidichthys vanicolensis</i>	Non-spotted goatfish	<i>ihemulo</i>	<i>Hyporhamphus actus</i>	Half-beak
<i>memea</i>	<i>Mulloidichthys auriflamma</i>	Gold-lined goatfish		Belonidae	Longtoms
<i>moaga</i>	<i>Parupeneus trifasciatus</i>	Three saddled goatfish	<i>aku</i>	<i>Tylosurus gavioloides</i>	Stout longtom
<i>moaga</i>	<i>Parupeneus bifasciatus</i>	Doublebar goatfish	<i>ihe loa</i>	<i>Platybelone argalus</i>	
<i>moaga hehega</i>	<i>Parupeneus cyclostomus</i> (small)	Gold-saddled goatfish	<i>ihe loa</i>	<i>Platybelone platyura</i>	Flat-tailed longtom
<i>moaga aheu</i>	<i>Parupeneus cyclostomus</i> (large)	Gold-saddled goatfish	<i>galio</i>	<i>Ablennes hians</i>	Barred longtom
<i>tuaita</i>	<i>Parupeneus berberinus</i>	Dot and dusk goatfish	<i>galio</i>	<i>Strongylura leiura</i>	Slender longtom
<i>tuaita</i>	<i>Parupeneus macronema</i>	Stripe-spot goatfish	<i>galio</i>	<i>Tylosurus crocodilus</i>	
<i>tuaita</i>	<i>Parupeneus indicus</i>	Indian goatfish	<i>maeva</i>	Siganidae	Spinefoots
<i>vete</i>	<i>Mulloidichthys samoensis</i>	Goatfish	<i>maeva</i>	<i>Siganus fuscescens</i>	Black spinefoot
<i>vete</i>	<i>Parupeneus chrysopleuron</i>	Yellow striped goatfish	<i>maeva</i>	<i>Siganus lineatus</i>	Golden-lined spinefoot
	Lethrinidae	Emperors	<i>maeva</i>	<i>Siganus canaliculatus</i>	Smudgespot spinefoot
<i>mu</i>	<i>Monotaxis grandoculis</i>	Humpnose big-eye bream	<i>maeva</i>	Teuthis rostratus	Spotted rabbitfish
<i>gutula</i>	<i>Lethrinus olivaceus</i>	Long-nosed emperor		Scorpaenidae	Scorpionfishes
<i>nutuala</i>	<i>Lethrinus miniatus</i>	Sweetlip emperor	<i>hakuhalulele</i>	<i>Pterois volitans</i>	Red firefish
<i>filoa</i>	<i>Lethrinus olivaceus</i>	Long-nosed emperor	<i>nofu</i>	<i>Synanceia horrida</i>	Estuarine stonefish
<i>filoa</i>	<i>Lethrinus atkinsoni</i>	Yellow-tailed emperor	<i>nofu</i>	<i>Synanceia verrucosa</i>	Reef stonefish
<i>filoa</i>	<i>Lethrinus sp.</i>	Blue-lined emperor		Diodontidae	Porcupinefish
<i>liki</i>	<i>Lethrinus microdon</i>	Small-thoother emperor	<i>tautu</i>	<i>Diodon hystrix</i>	Porcupinefish
<i>puhi</i>	Muraenidae	Moray eels		Caesionidae	Fusiliers
<i>fau ote kolo</i>	<i>Echidna nebulosa</i>	Starry eel	<i>ulihega</i>	<i>Caesio / Pterocaesio spp.</i>	Fusiliers
<i>puhi gatala</i>	<i>Gymnothorax meleagris</i>	Spotted moray eel	<i>ulihega</i>	<i>Caesio lunaris</i>	Blue fusilier
<i>puhi gatala</i>	<i>Gymnothorax undulatus</i>	Mottled moray		Pempheridae	Sweepers
<i>puhi kaitamoko</i>	<i>Echidna nebulosa</i>	Clouded reef eel	<i>manifi</i>	<i>Pempheris schwenkii</i>	Striped bullseye
<i>puhi kukula</i>	<i>Gymnothorax javanicus</i>	Giant moray		Ophichthidae	Snake eels
<i>puhi kukula</i>	<i>Gymnothorax flavimarginatus</i>	Yellow-edged moray	<i>palaoa</i>	<i>Myrichthys colubrinus</i>	Harelequin snake eel
<i>puhi matamata</i>	<i>Gymnothorax undulatus</i>	Mottled moray		Chanidae	Milkfish
<i>puhi takuali</i>		Most dangerous moray eel	<i>ava</i>	<i>Chanos chanos</i>	Milkfish
<i>puhi tea</i>	<i>Siderea picta</i>	Painted moray		Albulidae	Bonefishes
	Monacanthidae	Leatherjackets	<i>kiokio</i>	<i>Albula neoguinaica</i>	Bonefish
<i>humu kaleva</i>	<i>Paramonacanthus filicauda</i>	Threadfin leatherjacket		Gerreidae	Silver biddies
<i>humu kaleva</i>	<i>Aluterus scriptus</i>	Figured leatherjacket	<i>matu</i>	<i>Gerres sp.</i>	Silver sand-eater
	<i>Pseudomonacanthus peroni</i>	Pot-bellied leatherjacket		Kuhliidae	Aholeholes
	Mugilidae	Mullets	<i>hafole</i>	<i>Kuhlia taehimura</i>	Banded flag-tail
<i>aua</i>	<i>Neomyxus chaptalii</i>	Silvery mullet		<i>Kuhlia marginata</i>	
<i>aua</i>	<i>Myxus elongatus</i>	Sand mullet		Gempylidae	Snake mackerels
<i>kafa</i>	<i>Liza vaigiensis</i>	Diamond-scale mullet	<i>palu</i>	<i>Ruvettus pretiosus</i>	Oilfish
<i>kafa</i>	<i>Liza subviridis</i>	Greenback mullet		Zeidae	Dories
<i>kanae</i>	<i>Mugil cephalus</i>	Sea mullet	<i>humu kaleva</i>	<i>Zeus faber</i>	John Dory
<i>kanae</i>	<i>Valamugil buchanani</i>	Blue-tail mullet	<i>humu kaleva</i>	<i>Alutera scripta</i>	Figured leatherjacket
	Ostraciidae	Boxfishes		Others	
<i>moa moa</i>	<i>Ostracion cubicus</i>	Yellow boxfish	<i>talitaliuli</i>	<i>Naukrates ductor</i>	Pilotfish
<i>moa moa</i>	<i>Rhynchostracion nasus</i>	Small-nosed boxfish		<i>Labroides dimidiatus</i>	Paradisefish
<i>tete</i>	<i>Tylerius spinosissimus</i>	Fine-spined pufferfish			
<i>tete</i>	<i>Arothron nigropunctatus</i>	Black-spotted toadfish			
<i>tete</i>	<i>Arothron meleagris</i>	White-spotted pufferfish			
	Tetraodontidae	Puffers			
<i>hue</i>	<i>Anchisomus multistriatus</i>	Many-striped pufferfish			
<i>hue</i>	<i>Anchisomus hispidus</i>	Stars and stripe toadfish			
<i>hue ate</i>	<i>Arothron alboreticulatus</i>	Spotted and lined pufferfish			