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The Historical Development of Territorial Rights and Fishery Regulations in Okinawan Inshore Waters

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The sub-tropical, small-scale, nearshore fisheries of Okinawa historically have been characterized by the use of a wide range of technologies employed to exploit a large number of benthic and pelagic marine resources, in a highly diversified biological and physical environment. In broad terms, the principal ecological characteristics to which small-scale fisheries have been adapted are the existence or not of coral reefs and mangroves, as well as to the seasonal windward-leeward dichotomy.

Paralleling that ecological and technological diversity is the complex Japanese-Okinawan system for administering inshore fisheries by cooperative formal systems of sea tenure, which operate together with the fishermen's informal, community-oriented systems of territorial behavior on the sea.

Using original licensing documents, this paper describes and analyses the bases for the development of formal systems of sea tenure in Okinawa from the early 1870s until the present time, and examines the changing technologies licensed, the geographic ranges of their application, and the changes in resources thus exploited. Access rights granted to outsiders are discussed using the example of the specialized fishermen from Itoman, Okinawa Island, who historically ranged widely throughout the Ryukyus, where they exercised traditional rights to exploit marine resources in the territories of other fishing communities.

In general, changes in species exploited and specialization within local fisheries has reflected market demand. This, in turn, has been mirrored in changing fisheries regulations and the territorial behavior of fishermen. The changes are also, in part, a response to the need for resource conservation and to the dictates of changing technologies, as well as to the demand for reserved sea space by the gradually increasing populations of small-scale fishermen.

INTRODUCTION

Among the world's small-scale fishermen those of Japan are almost certainly exceptional in the degree to which they enjoy *bona fide* legally guaranteed ownership of their inshore waters, the tenurial status of which is unambiguously set forth in the Civil Code [HARA 1977; HIRASAWA 1980; RUDDLE and AKIMICHI n.d.]. In Japan,

no conceptual distinction exists between land holdings, or land tenure, and sea holdings, or sea tenure. Fisheries rights enjoy a legal status equal to that of land ownership. According to the *Fisheries Law* (1949), fisheries rights in the sea area under the jurisdiction of a Fisheries Cooperative Association (FCA) are the *bona fide* personal property of the individual members of that Association, to whom they are distributed by the Association. Each FCA establishes regulations for the control and operation of various types of fishery in an equitable, efficient and sustained manner, as local conditions dictate. This situation had its origins in both village customary law and in the formal legislation of the Japanese feudal era [HABARA 1957; cf. other papers this vol.], although democratic processes and equitable treatment had to await the sweeping institutional reforms that followed WW II.

In this paper we attempt to analyze some of those legal complexities by examining the evolution of territorial rights and fishery regulations in Okinawa Prefecture, Japan, where inshore fisheries are based on the exploitation of an Indo-Pacific biota in a basically coralline environment. Unlike most similar tropical or sub-tropical areas, the student of Okinawan fisheries has access to a rich general data base that for some places dates back several centuries. Despite its several flaws, and particularly its irritating gaps, such a wealth of historical data is of inestimable value to research on coral reef fisheries.

Our analysis is based almost exclusively on available Fisheries Rights Registration Documents for each FCA in Okinawa Prefecture for three periods: the "Exclusive Fisheries Registration Documents" for 1907-1940 ("First Period"), which was characterized by the implementation of the 1901 *Fisheries Law* (the so-called Meiji Fisheries Law) when FCAs were being formed, pre-Meiji customary regulations replaced or complemented, local regulations codified, territories registered and inter-FCA entry rights contracts legalized; the "Joint Fisheries Rights Registration Documents" for 1964 ("Second Period") when territorial consolidation and aggregation was almost finalized, following the 1949 *Fisheries Law*; and the "Joint Fisheries Rights Registration Documents" for 1974 ("Third Period") when the situation prevailing until the present-day finally emerged. These documents were supplemented by unpublished manuscripts, documents such as village diaries and data on local execution rules, where available. Documents for the period of the U.S. Administration (1945-1972) are not available for analysis since they are mixed in files with still classified materials (pers. comm. U.S. National Archives and Records Service).

Overall, the data available present some problems, principal among which are that (1) the registration documents and related information for a few FCAs during the First Period appear to have been lost, and (2) that the interactive processes inherent in the decision-making of fisheries officers, FCA committees and individual fishermen are not documented, which occasionally makes it difficult to interpret the real intent of some of the ambiguous language and highly generalized terms employed in these documents. We have omitted discussion of conflict resolution, the empirical division of territory by, *inter alia*, age, skill and technology, as well as the territorial

behavior of individual fishermen, since these topics are dealt with elsewhere [RUDDLE and AKIMICHI n.d.; AKIMICHI this vol.]. It should also be noted that we focus here only on fisheries rights and not licenses, and mainly just with those pertaining to sea areas inside the coral reef.

The Biophysical Context of Okinawan Fisheries

Because of their location just north of the Tropic of Cancer, and under the strong influence of the Kuroshio, the islands that comprise Okinawa Prefecture are characterized by a humid, sub-tropical climate (Fig. 1). Air temperatures are moderate year-round, although winters are dominated by cold, continental air which, moistened by its passage over the East China Sea, brings relatively chilly, humid weather and persistent cloudiness. Although the northwesterly winds of winter frequently cause rough seas and interrupt fishing activities for several days, water temperatures, which have an annual average range of 20.0–29.0°C, hardly ever fall low enough to impede the underwater activities that characterize inshore fishing in Okinawa. Summers are hot and rainy, and the typhoons of late-summer and autumn, an average of six per year of which affect Okinawa, result in the suspension of all fishing activities for several days at a time.

The dominant feature of the marine environment of Okinawa Prefecture is the Kuroshio. This branch of the North Pacific Equatorial Current curves northwards in the Philippine Sea, enters the East China Sea via the broad channel between Taiwan and Japan's westernmost island, Yonaguni, in the Yaeyama archipelago, and continues northeastwards along the East China Sea coast of Okinawa Prefecture. The Kuroshio supports an extremely rich, varied and economically valuable marine biota, characterized by Indo-Pacific species, that sustains the important fisheries of Japan. In addition, and of great importance to inshore fisheries, this stream of warm water, the average minimum winter temperature of which is 18°C, permits corals to extend far north of their normal range [SHIRAI 1977]. As a consequence, the primary factor determining the type and location of small-scale, inshore fisheries operated in Okinawa Prefecture is the extent of the coral reef and its micro-topographical features.

In this paper we have defined the following three broad fishery activity zones in Okinawan waters: (1) An inshore zone which extends from the high tide mark to the seaward margin of the reef and includes the outer reef crest as well as lagoons. It is sub-divided into shallow areas with average depths of less than 4 m and deeper areas with water depths of 4–12 m; (2) An offshore zone of relatively shallow waters of 20–50 m depth which includes the seaward margin of the reef and the seaward slope; and (3) An open sea zone that lies beyond the reef and is exploited for surface, middle-water fauna and demersal species. For taking the latter, rocky upheaved reefs (*sone*) are particularly important locations for fishing using long- and deep line techniques. In this paper we examine the fisheries of the first two of the zones.

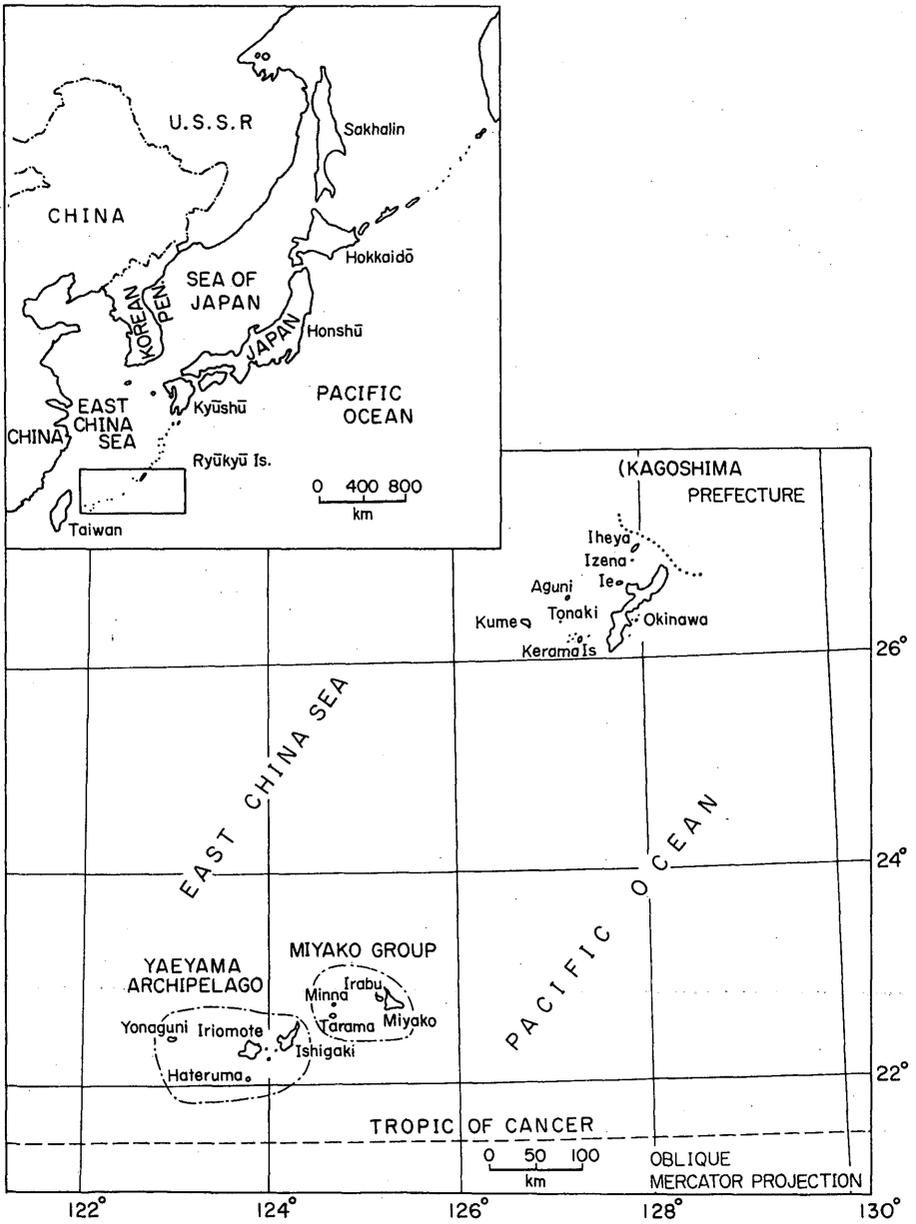


Figure 1. Location of Okinawa Prefecture

The Socio-Economic Context of Okinawan Fisheries

Okinawa Prefecture comprises 73 islands, of which 43 (1971) are inhabited, some by very small populations. The bulk of the population is concentrated in the increasingly highly urbanized southern part of Okinawa Island, the major landmass of the Prefecture. Much of Okinawa is mountainous or hilly, and historically most of the rural population has been concentrated in the South and Central sectors of Okinawa Island (Shimajiri and Nakagami, respectively), which have always been more amenable to agriculture, historically the economic mainstay. Other areas have always been physically remote and sparsely peopled, their inhabitants leading a relatively harsh and economically impoverished life, surviving on a staple diet of sweet potatoes (since the sixteenth century) complemented occasionally by pork or goat meat and to a lesser extent by marine products.

Historically, too, the dependent islands of Okinawa Island in the East China Sea (the Keramas, Kume, Aguni, Tonaki, Ie, Izena and Iheya), as well as those off the Pacific coast (Kudaka, Tsuken, Hamahiga, Henza-Takahhanari and Ikei) had self-sufficient, mixed economies based on farming and small-scale fishing. The malaria-ridden and natural hazard-prone southern islands—the Miyako group and the Yaeyama archipelago, some 300 km and 450 km, respectively, from the main group—have never supported large populations and have generally been regarded as remote frontier outposts of the Prefecture.

In former times Okinawa, one of the poorest and most neglected of the Japanese prefectures, suffered from the “do nothing” policy of the Central Government from the Prefecture’s establishment, in 1879, until the start of post-WW II rehabilitation, under the U.S. Administration. This was not surprising, since the Ryukyus were then a poverty-stricken and over-crowded (relative to the natural resource base) chain that offered little inducement for Japanese investment at a time when the new Meiji and later governments had more important priorities in the national modernization drive. As a consequence, Okinawa experienced large-scale emigration to the main islands of Japan and overseas, as well as an internal redistribution of its population, as people from the remoter and poorer parts of Okinawa Island together with the outlying islands gravitated either toward the richer areas of Okinawa Island or toward the core areas of the two southern island groups.¹⁾ This has had a significant impact on small-scale, fisheries and contributed to the aggregation of local fisheries institutions and their sea territories.

1) Rural depopulation rates for some Okinawan islands have been quite dramatic. In the dependent islands off Okinawa Island they have been, for example: Iheya 26%, Izena 25%, Kume 21%, Aguni 50%, Tonaki 20%, and the Keramas (Zamami and Tokashiki) 30% (all for 1965–1970); in the Miyako Group for the same period Hirara 13%, Tarama 13%, Irabu 10% and Minna 88%. Overall during those five years, the population of the Yaeyama archipelago declined by only 16%, but the various outer islands had much higher rates: Iriomote 35% (1960–75), Hatoma 82% (1960–75), Uechi (part of Aragusuku) 50% (1965–70), Kuro 58% (1960–70), Hateruma 30% (1965–70) and Yonaguni 38% (1960–75).

With the exception of a few specialized fishing communities, particularly Itoman, on Okinawa Island, as well as other villages dominated by migrants from Itoman, such as Arakawa, on Ishigaki Island, in the Yaeyama archipelago, Ryukyuan society was primarily agricultural and the number of fishermen relatively few. Moreover, the number of persons engaged in fishing has almost everywhere declined over the last 70 years (Table 1).

Historically, apart from a few highly specialized communities, fisheries in Okinawa, even in coastal villages, have been largely the province of part-time or seasonal farmer-fishermen who employed small-scale technologies to exploit inshore marine resources. Although the number of specialized fishing communities has increased with modernization, part-timers and seasonal fishermen still constitute the majority of Okinawan fishermen, apart from in the Naha area (Table 2).

Since 1945, with the gradual introduction of modern gear and diesel-powered boats from Japan proper, the hitherto relatively simple technologies employed by Okinawan fishermen have been progressively replaced, and the fishing sector has become highly commercialized. In terms of its contribution to the prefecture's economy, long-range fishing, using various line techniques, and particularly for skipjack and snappers, has gradually eclipsed that of inshore fishing, although the latter is still of great importance. In inshore fishing various line techniques employed from small boats are now predominant (Table 3).

Table 1. Number of Fishermen in Okinawa Prefecture

| | 1912 ¹⁾ | | 1940 ¹⁾ | | 1981 ¹⁾ | |
|-------------------------|--------------------|---------|--------------------|---------|--------------------|---------|
| | N | % | N | % | N | % |
| Naha ²⁾ | 1088 | (7.8) | 393 | (5.9) | 195 | (4.6) |
| Shimajiri ³⁾ | 6017 | (43.3) | 1780 | (26.8) | 116 | (27.2) |
| Nakagami ⁴⁾ | 2560 | (18.4) | 830 | (12.5) | 863 | (20.2) |
| Kunigami ⁵⁾ | 2038 | (14.7) | 1090 | (16.4) | 831 | (19.4) |
| Miyako ⁶⁾ | 1210 | (8.7) | 2052 | (30.8) | 683 | (16.0) |
| Yaeyama ⁷⁾ | 1000 | (7.2) | 510 | (7.7) | 540 | (12.6) |
| Total | 13,913 | (100.1) | 6,655 | (100.1) | 3,228 | (100.0) |

Table Notes:

- 1) These three periods have been selected for comparison since 1912 corresponds to the main time when the "Meiji Fisheries Law" was being implemented and when limited industrialization and mechanization of coastal fisheries began; 1940 corresponds to a period of slight economic depression but never theless when the fisheries sector developed vigorously as Japan moved onto a war footing; and 1981 represents the present transitional situation in which inshore fisheries are declining and offshore activities growing.
- 2) The Naha urban-industrial zone.
- 3) Southern Okinawa Island.
- 4) Central Okinawa Island.
- 5) Northern Okinawa Island.
- 6) The Miyako group.
- 7) The Yaeyama archipelago.

Sources: 1912 data [RYÜKYÜ SEIFU 1967]; 1940 data [RYÜKYÜ SEIFU 1967]; 1981 data [OKINAWA-KEN 1981].

Table 2. Ratio of Full-Time/Part-Time Fishermen in Okinawa Prefecture, by District

| | 1912 | 1940 | 1981 |
|-----------|------|-------|------|
| Naha | 3.95 | 23.15 | 2.00 |
| Shimajiri | 2.43 | 1.34 | 0.52 |
| Nakagami | 0.03 | 0.68 | 0.67 |
| Kunigami | 1.00 | 1.08 | 0.36 |
| Miyako | 1.78 | 0.93 | 0.14 |
| Yaeyama | 3.24 | 1.96 | 0.86 |

Table Note: $\frac{\text{No. of full-time fishermen}}{\text{No. of part-time fishermen}}$

(For other notes see Table 1)

Sources: 1912 data [RYŪKYŪ SEIFU 1967],
1940 data [RYŪKYŪ SEIFU 1967],
1981 data [OKINAWA-KEN 1981].

Table 3. Distribution of Fishing Boats by Size Class and Fishing Technique in the Yaeyama Archipelago (1981)

| Fishing Technique | Tonnage Group | | | | | Total per technique | |
|--------------------------|---------------|-------|-------|--------|---------|---------------------|------|
| | 0-0.9 | 1-2.9 | 3-4.9 | 5-19.9 | 20-49.9 | N | % |
| Shellfish Harvesting | 4 | 2 | — | — | — | 6 | 0.8 |
| Line Fishing | 143 | 246 | 23 | 5 | 5 | 422 | 58.8 |
| Gill Netting | 36 | 8 | — | — | — | 44 | 6.2 |
| Lift Netting | 9 | 5 | — | — | — | 14 | 2.0 |
| Seine Netting | 2 | 4 | — | — | — | 6 | 0.8 |
| Tuna and Bonito Fishing | — | — | — | 12 | 1 | 13 | 1.8 |
| Miscellaneous | 113 | 96 | — | — | — | 209 | 29.5 |
| Total Number | 307 | 361 | 23 | 17 | 6 | 709 | 99.9 |
| Percent | 43.3 | 50.9 | 3.2 | 2.5 | 0.1 | 100.0 | — |
| Average Tonnage per Boat | 0.72 | 1.75 | 3.57 | 16.90 | 47.46 | — | — |

THE ADMINISTRATION OF JAPANESE FISHERIES BY CENTRAL AND LOCAL GOVERNMENTS

The *Fisheries Law* of 1949, designed within the framework of the post-WW II democratization of Japanese institutions, made detailed modifications to the 1901 *Fisheries Law* ("The Meiji Fisheries Law"), based on three important principles:

- (i) That fishery rights and licenses were to be granted only to fishermen or fishing enterprises actually engaged in fishing, and leasing arrangements were prohibited;
- (ii) that the local administration of fishing rights was to be invested only in FCAs or similar organizations; and
- (iii) that Fishery Co-ordination Committees, to be established for each sea area, were charged with preparing comprehensive plans for the full and rational use of coastal fishing grounds, and based on these plans fishing rights and licenses

were to be granted to FCAs, other bodies and individuals.

Previously, in 1948, via the *Fisheries Co-operative Association Law*, membership in FCAs was restricted to fishermen resident in the jurisdictional area of the Association and who were engaged in fishing 90–120 days *per annum*, the precise period being determined by each FCA. This FCA Law established, *inter alia*, the right of voluntary participation, (although nobody is permitted to fish without valid membership), democratic control by membership (1 member, 1 vote), and an election and recall system for officers [ZENGYOREN 1979].

The fisheries of present-day Japan are managed according to a comprehensive, dual system of rights and licenses, both administered by the Ministry of Agriculture, Forestry and Fisheries (*Nōrinsuisanshō*), under the *Fisheries Law (Gyogyō-hō)* of 1949 (Table 4). In practise, the Ministry delegates administrative responsibility for coastal waters to each prefecture (*vide infra*). Fishery rights, which are defined as the right to conduct a particular fishery within a confined public sea, lake, or river area, refer in the marine environment to coastal waters, and cover those types of fishery which either employ fixed gear or that exploit relatively immobile benthos. In contrast, licences govern those types of fishery that move gear over often considerable distances in search of highly mobile schools of fishes. They are issued for coastal, offshore and distant water fisheries.

Fisheries Rights

Three principal categories of rights are recognized under Japanese law: Joint

Table 4. The Structure of Japanese Fisheries Rights and Licenses

| | CATEGORIES | GRANTED TO |
|----------|---|--|
| RIGHTS | (1) JOINT FISHERY RIGHTS (<i>Kyōdō gyogyōken</i>) ¹⁾ a. Gathering of seaweed, shellfish and other benthic animals b. Specific small-scale net fisheries c. Beach seines, unmotorized trawling, and for artificial fish shelters | To FCAs exclusively |
| | (2) DEMARCATED FISHERY RIGHTS (<i>Kukaku gyogyōken</i>) a. Special Demarcated Fishery Rights b. Demarcated Fishery Rights | To FCAs exclusively To FCAs, private organizations, individuals |
| | (3) LARGE-SCALE SET NET FISHERY RIGHTS (<i>Teichi gyogyōken</i>) | Ditto |
| LICENSES | (1) LARGE-SCALE OPERATIONS IN DISTANT WATERS | Mostly to private organizations and individuals |
| | (2) MEDIUM-SCALE OPERATIONS IN DEEP WATERS | Ditto |
| | (3) SMALL-SCALE INSHORE OPERATIONS | Individuals or FCAs |

Table Note:

- 1) In addition two geographically limited sub-divisions exist, one referring to particular fish stocks in the Seto Inland Sea and in the Pacific Ocean off Mie Prefecture, and the other to inland fisheries.

Rights (*kyōdō gyogyōken*), Demarcated Rights (*kukaku gyogyōken*), and Set Net Rights (*teichi gyogyōken*). Joint Fishery Rights are granted exclusively to an FCA or to a federation of FCAs, which, in turn, distributes them among its membership. Three main sub-divisions exist within this category: (a) That to gather seaweed, shellfish, and other benthic animals; (b) that for various types of small-scale net fisheries, in places where the water depth is less than 15 m (in Okinawa Prefecture), including, principally, the gill net, lift net and small-scale fixed nets (not included in the set net category), among others; and (c) that permitting the use of beach seines, trawling nets from unmotorized boats and the use of artificial shelters for fish.

Demarcated Fishery Rights are granted, usually for five years, for the culture of seaweed, shellfish (particularly oyster and pearl fisheries) and where spats are seeded on the seabed, shrimp, Seabream (*Pagrus major*) and Yellowtail (*Seriola quinqueradiata*), which can be cultivated in such small units as individual cages, rafts or nets. Two classes exist, "Special Demarcated Fishery Rights," granted only to FCAs, and "Demarcated Fishery Rights," which can be given to private enterprises and individuals as well as to FCAs.

The former are granted where many individual members of an FCA wish to engage in aquaculture within a relatively large, but, by definition of the enterprise, sheltered geographical area, and thus a relatively pollution-prone location as a consequence of a weak natural flushing action, and in which fishery activities with diverse requirements must be coordinated and supervised in a compatible and equitable manner. Demarcated Rights are given for such enterprises as prawn farms and other types of pond culture that occupy a particular, fixed site and which require little supervision by the fishery authorities or coordination with other, potentially incompatible activities.

Rights for Large-Scale Set Net Fisheries, which are used mainly in the herring, migratory trout and salmon fisheries, and in Hokkaidō, are granted to private individuals and private organizations, as well as to FCAs, since the high capital investment and large operating budget required by this technology serve to limit the number of nets, and thus the area and sites of operation of large-scale set net fisheries can be restricted easily. In Okinawa the use of these nets is restricted to waters more than 15 m deep at high tide. Small- and medium-size set nets, on the other hand, can be operated by large numbers of small-scale fishermen within a given area. Thus their management is assigned to the FCA, by placing them within the category of Joint Fishery Rights.

Fishing Licenses

Large-, Medium- and Small-Scale (Coastal) categories of fishing license are distinguished in Japan, based on the scale of the fishery and the location of operations. Licenses for large-scale operations in distant waters and medium-scale fisheries in deep waters, such as for tuna and bonito, and those requiring the use of "factory" or "mother" ships, are issued by the Ministry, mostly to private individuals or companies. Virtually none are issued to FCAs, although they are eligible to partici-

pate in these fisheries. For large-scale fisheries the Central Government makes all decisions pertinent to the issuance of licenses (*e.g.*, the number of licenses to be issued, vessel size and fishing season and grounds for each type of fishery, as well as determining the number of eligible licencees), and for the medium-scale category the Ministry issues the license after the local governments have determined the number of eligible licencees within their respective prefectures. Small-scale fishery licences, for operations conducted in coastal waters, are issued by the government of each prefecture to both individuals, if the number of applicants does not exceed the optimum for the fishery, or to the FCA where the number of applicants is large. In the latter case the prefectural government decides only the number of licences to be allotted per FCA, and each Association distributes them among its membership.

The Distribution of Rights and Licenses

When fishery rights are awarded exclusively to FCAs no problems of distribution occur between the Association and the Government, and distribution among its membership is an internal question to be resolved by each FCA. Allocation problems could arise in rights to Large-Scale Set Net Fisheries and in Demarcated Fisheries, where private individuals and organizations in addition to the FCAs are eligible to apply for rights at the same time, were it not for particular conditions of eligibility and an order of priority set forth in the *Fisheries Law*. Although details vary somewhat according to the specific fishery involved, those eligible to apply for fisheries rights must possess prior fishing experience, must not have been found guilty of flagrant violations of the *Fisheries Law* or other fisheries or pertinent labor regulations, and neither are they permitted to already hold other fishery rights. Eligible applicants are then ranked as follows: (1) FCAs; (2) organizations composed of a large number of fishermen from a particular district; (3) Production Unions consisting of seven or more fishermen and which are entitled to receive financial assistance; and (4) private individuals and private organizations. *Ceteris paribus*, by law, FCAs will always receive top priority for the award of any particular fisheries rights, whereas private individuals and organizations will be ranked lowest.

THE EVOLUTION OF SEA TENURE AND INSHORE FISHERIES RIGHTS IN OKINAWA

In 1609 the entire Ryūkyū chain, hitherto a separate kingdom, became in effect part of the Satsuma-*han* (fief), which had its base in Kagoshima, in southwestern Kyūshū. The feudal rule of the Satsuma ended shortly after the Meiji Restoration (1868), with the establishment of the Ryūkyū fief, in 1872. Seven years later that was superseded by the creation of Okinawa Prefecture.

According to ancient customary law, the generally acknowledged sea territory of each coastal village was a simple seaward extension of its terrestrial territory (*magiri*). In 1719 this became codified, at least as far as Okinawa Island and other main islands were concerned, when the Satsuma government instructed each coastal village to

proclaim and define its own sea territory (*umi-hō-giri*, lit. "to divide the sea"), regardless of whether or not fishing was an important economic activity. From that time each coastal village legally retained the exclusive right to exploit the resources of its adjacent sea territory, as the common property of all the residents [NAKAYOSHI 1915].

Concurrent with the instruction to villagers to "divide the sea" was the appointment by the Satsuma government of village officers (*umiatai* or *umiganae*) responsible for village marine affairs via the enforcement of government regulations. The principal intent of *umi-hō-giri* was not to regulate inshore fisheries *per se*, but rather the local level control of marine affairs, as is clearly revealed by the three main duties of the *umiatai*, which were: (1) to inspect the shoreline and to notify the village guard of "any objects drifted ashore;" (2) to protect and guide government vessels transitting a village's sea territory; and (3) to supervise the villagers' fishery activities and to ensure that tribute goods were offered to the fief government and to the village lord, as specified [NAKAYOSHI 1915].

Based on time-honored customary laws, the 1719 law upheld a village's right to manage its adjacent inshore waters. This law also upheld the customary practise whereby outsiders could not exploit a village's sea territory unless an agreed fee was first paid to the *umiatai* of the village whose territory was to be worked. The boats and gear of fishermen from another village caught working illegally were confiscated and were returned after a fine had been paid. Similarly, inhabitants of other villages apprehended for poaching octopus or shellfish were fined and then returned to their own village. Further, only owners of houses in a village enjoyed free access rights to the village sea territory, whereas an annual fee was levied on tenants living in the village who wanted to exploit octopus and shellfish [RYŪKYŪ SEIFU 1967].

On the infertile and impoverished agricultural land characteristic of much of Okinawa Prefecture a particularly important customary right in fisheries acknowledged during the feudal era was the access right of farmers. At least in some localities this right preceded the implementation of the Meiji Fisheries Law, in 1902, since the registration documents of the Ōgimi and Haneji FCAs, clearly state that farmers are permitted to harvest *hondawara* (*Sargassum* spp.) seaweed and to collect sea urchin (*Tripneustes gratilla*) for use as fertilizer.

The foregoing refers to Okinawa Island, and its offshore dependent islands. During the feudal era the situation in the remote, poor and neglected Yaeyama archipelago appears to have been quite different. Under the Ryukyuan monarchy Yaeyama villagers were not permitted to exploit marine fisheries, but, despite their poverty, were obliged to produce tribute commodities for the Court. Men had to engage in forestry and agriculture, and women in the weaving of high-grade textiles (*Yaeyama jōfu*). In those days, wild pig and freshwater fauna were the main sources of animal protein for the Yaeyama islanders. Nevertheless, in the shallower waters within the reef each village of Ishigaki and Kohama Islands owned communally a stone weir or fish trap (Ryū. *ingaki*, lit. "sea wall") that was operated and maintained by the cooperative labor of all village households, who shared equally in its catch.

Other *ingaki* were the private property of female shamans (*noro*), who obtained their "official salary" from the sale of the fish trapped [NISHIMURA 1975].²⁾

Direct Transfer of Fisheries Rights by the Feudal Government

Resource areas and migratory species outside customary village sea territories, both before and after the 1719 law, were under the control of the fief government that in some cases transferred them to either individuals or to groups of fishermen. Two examples will serve to clarify some historical aspects of this process.

In 1673 the Ryūkyū Government awarded the temporary use right to three reef areas off the coast of Naha—Inano, Jishaka and Kan-no-hishi—which are all rich in such schooling fish as fusiliers (*Caesio* spp.), sardine (*Sardinella clupeioides*) and damselfish (*Pomacentrus* spp.), to Itoman fishermen for an annual rent of 100 *kan* (375 kg) of copper money. Five years later the government transferred the temporary title to these reefs to Tomari and Wakasa villages, near Naha, in return for a rental of 240 *kan* (900 kg). Then in 1691 the rights to the reefs were returned to Itoman. In 1729 the villagers of Tomari and Naha lodged a strong petition with the government and succeeded in having the use rights to the reefs withdrawn from Itoman and returned to the fishermen of Tomari and Naha [TAMASHIRO 1915a,b,c].

Doubtless the government had wearied of this continual bickering and back-and-forth transfer of rights to the reefs, since in 1729 it appointed six *umiatai* (two persons each from Tomari, Wakasa and Iri villages) to control fishing in the reef area. Eventually the reefs were granted as an hereditary right of these six supervisors, on payment of a tax to the government.

At a later stage access to particular fisheries in the reef area was transferred as a permanent right to villagers. The right to net migratory sardine and *hichi* (damselfish) that seasonally enter the reef areas in large shoals was transferred to Gima Village, near Naha, in return for 250 *kan* (937.5 kg) and the rights for fish trapping and *izari* (collecting) were sold to Itoman village for 120 *kan* (450 kg.)

Use rights to Chiibishi, another reef area with three small uninhabited islands, located some 13 km west of Naha and halfway to the Kerama Islands, were rented, in 1676, by the government to a resident of Naha, for 100 *kan* (375 kg). This person, in turn, transferred the rights to Tokashiki Village, in the Kerama Islands, for the same rental fee. The village, in its turn, rented-out some of the use rights, for the employment of specified techniques and sometimes particular species, to three other villages, Kakinohana, Ōmine and Itoman. Net- and line-fishermen from Kakinohana were permitted to employ those techniques in Chiibishi on the payment of a 70 *kan* (262.5 kg) rent; Ōmine fishermen were given the right to use drive-in nets for fusiliers, for 100 *kan* (375 kg); and in return for a rent of 100 *kan* Itoman fisher-

2) Another source recounts that under the Satsuma fishing was regarded as a low caste activity, so that even small children were punished for going into the sea. Most people were afraid to go near the water and marine resources were barely exploited, for subsistence purposes, and using rudimentary techniques [YAEYAMA REKISHI 1954]. Perhaps this refers just to Yaeyama, but the source is ambiguous on this point.

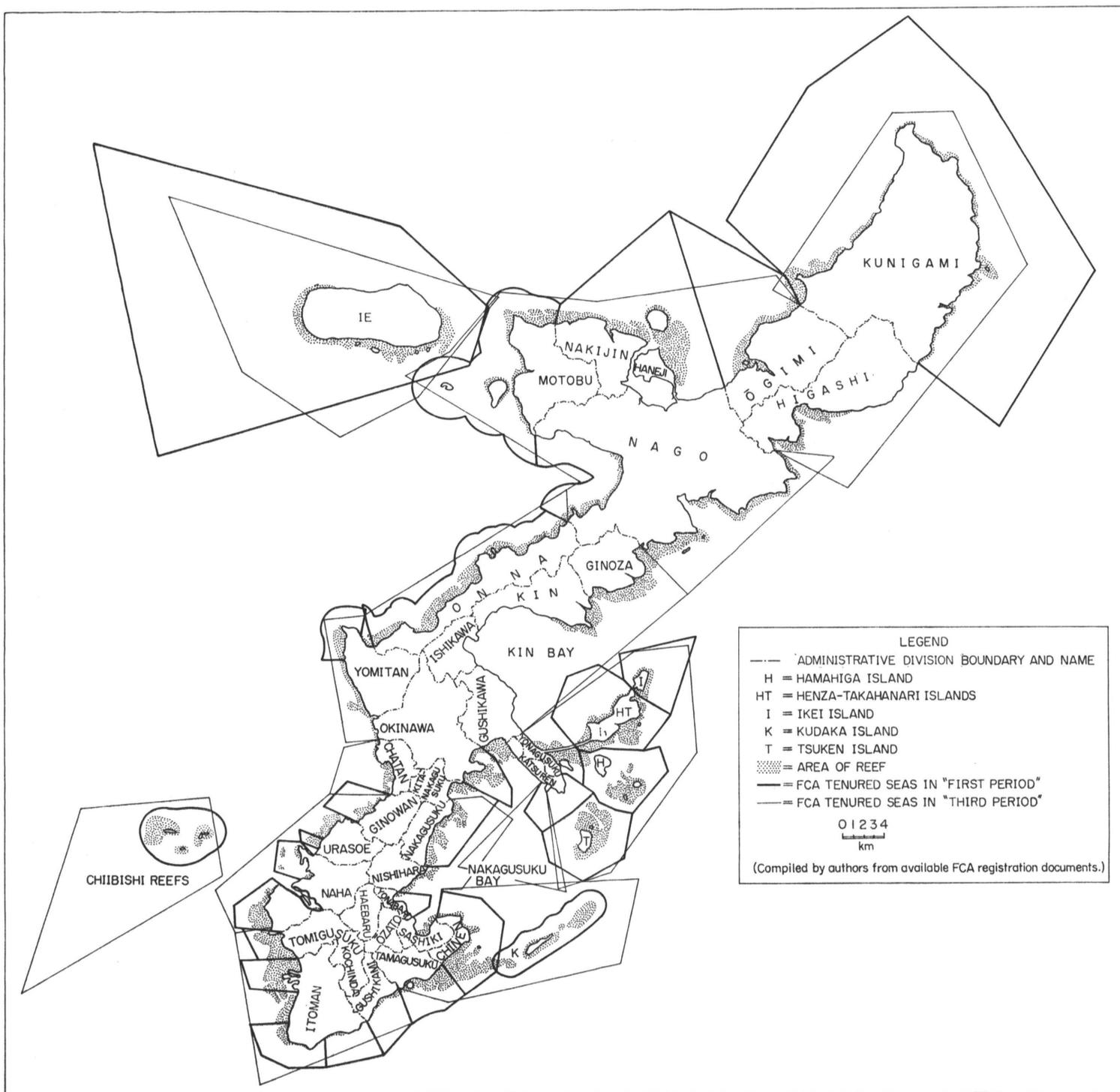


Figure 2. Boundaries of FCA-tenured Areas around Okinawa Island during the First and Third Periods

men obtained the rights to exploit Chiibishi using *ami-tsukai kago* (probably fish trap), as well as those to collect sea cucumber (*Holothuria* spp. and *Stichopus* spp.).

Thus in Okinawa during feudal times the ownership rights and control of inshore fisheries devolved exclusively upon the inhabitants of adjacent villages. But the villagers were, in return, obliged to pay tribute from their territory to both the fief government and their village lord. These rights could be extended to members of other villages on the payment of entry fees. Similarly, rights to offshore reefs and uninhabited islands belonged to the government which transferred them either permanently or temporarily to either individuals or to villages, in return for a cash payment. Then, as now, the transfer of rights was effected and enforced through monetary payment and contractual obligations.

With the Meiji Restoration, in 1868, the feudal system was gradually abolished throughout Japan, and modernization began. But in the fisheries sector the regulations established during the feudal era continued and despite attempted reforms persisted well into the twentieth century through their incorporation in legislation passed by the new central government. With the dissolution of the feudal fiefs the ownership of all fisheries reverted to the central government, which permitted operations on the payment of a use tax by individual fishermen. This revolutionary system failed and the central government restored the traditional system of the feudal era, and returned *de facto* ownership of fishing grounds to each prefecture [YABUUCHI 1958].

In response to the general confusion that characterized the two decades following the Meiji Restoration, in 1887 the *Nōshōmushō* (Ministry of Primary Industries) directed, via the "Standard Rules for Fishery Association," the establishment of fisheries cooperatives to co-ordinate the use of coastal fishing grounds. That was the only intervention in the fisheries sector by the new central government during the nineteenth century, and until the nationwide *Fisheries Law* ("The Meiji Fisheries Law") was enacted, in 1901, Japanese fisheries were controlled entirely by the local governments.

The 1901 law was based on traditional practises developed during the long feudal era, when fishermen worked as members of a fishing village guild, membership in which was limited rigidly to fishermen born in a particular village. All members had to adhere strictly to the regulations established by the guild, which established fishing zones, seasons, gear and methods. The traditional practises were incorporated into the 1901 law, which took the old fishing guilds as its local administrative nucleus, designated them as Fisheries Cooperative Associations (FCAs), and charged them with carrying-out fisheries management, via the granting of fisheries rights and the issuance of licenses, as they had conducted it traditionally. By the 1901 law the FCAs were granted the legal status to own and manage all coastal fishery rights and licenses within the village sea territory. The administration of fishing rights in coastal waters was, and still is, the principal function of the FCAs.

THE DEFINITION AND CODIFICATION OF VILLAGE SEA TERRITORIES

First Period (1907–1940)

In 1902, with the implementation of the “Meiji Fisheries Law,” passed in 1901, village sea territories established during the feudal era were mapped, codified and registered at the Okinawa Prefectural Fisheries Office (Fig. 2).

Typically, these boundaries coincided with those established through prior customary usage, extending a fixed distance offshore between the seaward projection of a village’s terrestrial boundaries at the high tide mark (Fig. 3). This presented no problems in most of the dependent islands. For example, at that time the islands of Iheya and Izena were treated as one unit and their joint seaward tenorial boundary was fixed at 3.7 km from the shoreline, around the entire coast (Fig. 4). This typical pattern occurred in most of the remoter islands (*e.g.*, Tarama 1.8 km offshore, Minna 2.5 km, Aguni 1.8 km, Tonaki 2.3 km, and Yonaguni 0.9 km [Fig. 5]). This same system was also used to establish the boundary of nearby Kudaka Island, where it was fixed at 0.9 km offshore.

A similar pattern, but somewhat complicated by adjacent sea territories, occurred in various parts of Okinawa Island. On the East China Sea coast, for example, the

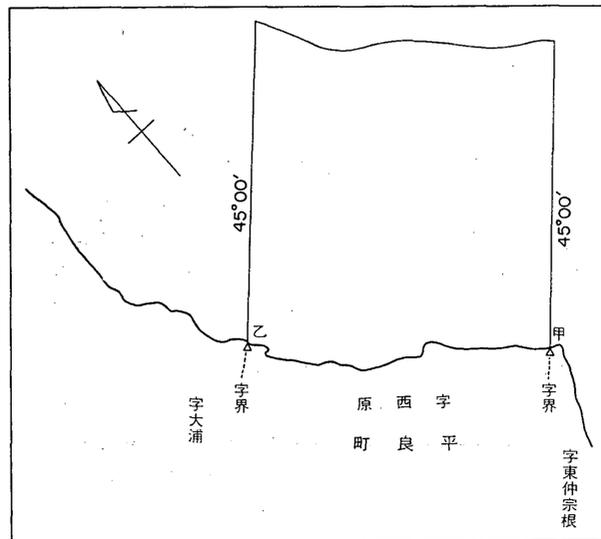


Figure 3. Map Accompanying the Registration Document for Exclusive Fisheries of Nishihara FCA (License No. 5072, first registered 27 March, 1928), Miyako Group

Figure Notes:

Location of Fishing Grounds: Seashore waters of Nishihara Section (*aza*), Hirara Chō, Miyako Province, Okinawa Prefecture.

Location of Basepoints: basepoint 甲—the boundary between Agari-Nakasone and Nishihara Sections of Hirara Chō; basepoint 乙—the boundary between Nishihara and Ōura Sections of Hirara Chō.

Areas of Fishing Grounds: the area surrounded by the seaward limit 3000 m from the coastline at the highest tide, the projection line at 45° from the basepoint 甲, and the projection line at 45° from the basepoint 乙.

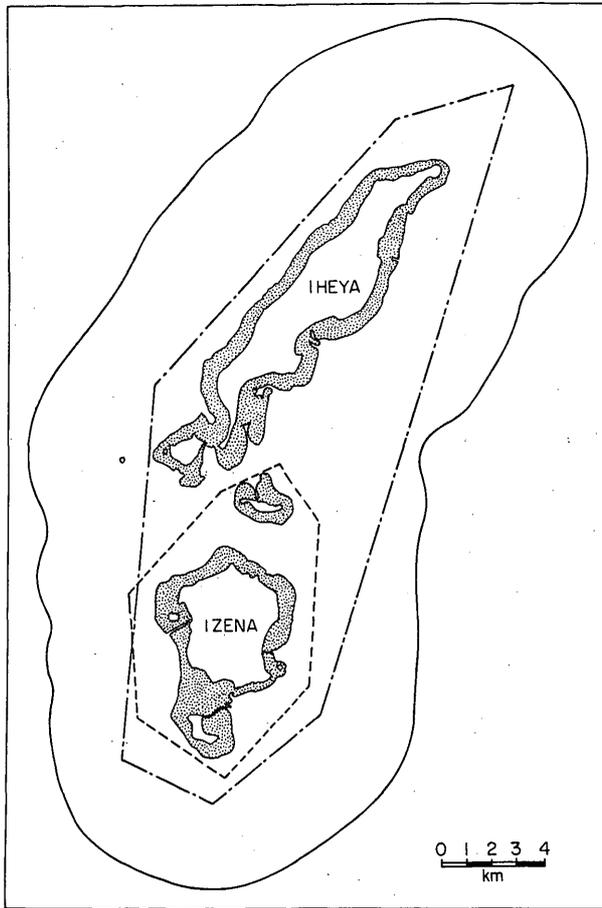


Figure 4. Historical Change in the Exclusive Fishing Territory of the Iheya-Izena Group of Northern Okinawa

Figure Notes:

-  Reef area
-  Boundary in "First Period"
-  Boundary in "Second Period"
-  Boundary in "Third Period"

(Boundary documents for Iheya [a separate FCA in the "Second Period"] are missing.)

seaward boundaries of the territories of Motobu, Nago, Onna (Fig. 6) and part of Yomitan-Uken FCAs were fixed at 2.1, 2.4, 1.9, 1.8 km offshore, respectively, each territory beginning and ending at a point on the sea surface fixed by the seaward projection, for a specified distance and at a defined angle, of the village's terrestrial boundaries. In all cases the seaward boundary was positioned to include the entire reef area together with the seaward slope, thereby reserving the exclusive right to inshore fisheries for small-scale fishermen from that particular FCA, unless separate

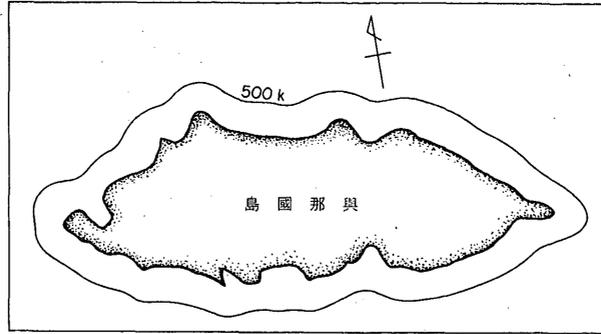


Figure 5. Map Accompanying the Registration Document for Exclusive Fisheries of Yonaguni Village Yaeyama Archipelago (License No. 4789, first registered on 4 November, 1918)

Figure Notes:

Location of Fishing Ground: Seashore waters of Yonaguni Village, Yaeyama Province, Okinawa Prefecture.

Areas of Fishing Ground: Seaward limit of no more than 500 ken (9.09 km) from the highest tide mark, at the full moon, on Yonaguni Island.

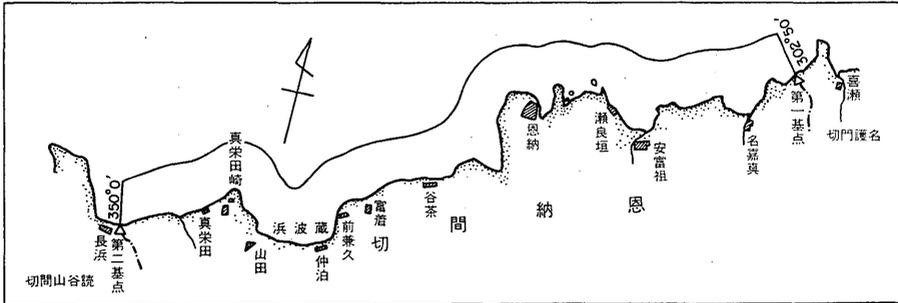


Figure 6. Map Accompanying the Registration Document for Exclusive Fisheries of Onna Magiri, Okinawa Island (License No. 870, first registered on 22 May, 1907)

Figure Notes:

Basepoints: the first basepoint—the boundary between Onna Magiri and Nago Magiri; the second basepoint—the boundary between Onna Magiri and Yomitan Magiri.

Location of Fishing Grounds: Sea areas surrounded by the projection line at $302^{\circ}50' - 350^{\circ}0'$ from the first basepoint, the projection line at 350° from the second basepoint, and the seaward limit of 1 nm from the Onna Magiri coastline at the highest tide at full moon.

agreements permitted access to members of other FCAs. Also included were tracts of adjacent deeper water in which separately licensed long- and deep-line fishermen from the same FCA alone could operate.

The sea territory boundaries of other FCAs on Okinawa Island were defined somewhat differently during the First Period, a precursor of what was to happen later, by the use of a base point or points. These base points were either the terrestrial village boundaries at the high tide mark, or some prominent onshore landmark visible from the sea, such as a cape or a distinctive mountain peak. In establishing such boundaries a series of imaginary points were fixed on the sea surface—their position being defined as a given distance along a specific angle from the base—which

were then linked-up to create a seaward boundary. Typical examples were the boundaries of Kunigami, in northernmost Okinawa, those of Ōgimi and Haneji FCAs, on the northwest coast, or those of Naha, Shimoda, Itoman and Minatogawa FCAs in the southwest of Okinawa Island (Fig. 2).

During the First Period, then, most sea territories were somewhat loosely defined, and, in almost all instances, embraced areas far larger than could be exploited by fishing craft which were little more than paddle-powered canoes, and in an era when ice for catch preservation was not available.

Second Period (1964–1974)

By the Second Period all sea territories in Okinawa were defined by the second method described above (Fig. 7), and all had contracted sharply compared with the First Period. In most instances, except where the shelf was narrow and deep water

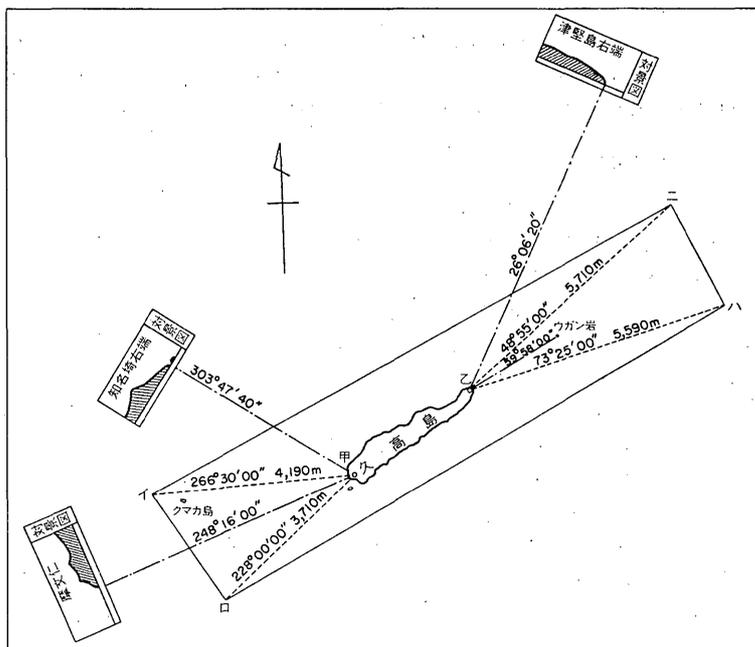


Figure 7. Map Accompanying the Registration Document for the First-Type Communal Fishery of Kudaka FCA (License No. Kyōdō-16, registered in 1956, date not described.)

Figure Notes:

Location of Fishing Grounds: Adjacent waters of Kudaka Island, Chinen Village, Okinawa Prefecture.

Location of the Points: basepoint 甲—so-called Takachiji of Kudaka District of Chinen Village; basepoint 乙—so-called Kabēru point of Kudaka District of Chinen Village; point 一—the point projected 4190 m from basepoint 甲 at 266°30'; point 二—the point projected 3710 m far from basepoint 甲 at 228°; point 一ハ—the point projected 5590 m from basepoint 乙 at 73°25'; 二—the point projected 5710 m from basepoint 乙, at 48°55'.

Areas of the Fishing Ground: Waters surrounded by the four lines 一ロ, ロハ, ハニ, ニ一.

relatively close to the shore, only relatively shallow areas, up to 50 m deep, were included in an FCA's tenured waters.

A certain amount of integration of territories, and in other instances fragmentation, had also occurred by this Period. On Kume Island, for example, the formerly separate FCAs of Nakazato and Gushikawa villages had become integrated to constitute the Kume Island FCA; as had several smaller island Associations in the Yaeyama archipelago. On the other hand, the formerly integrated Iheya and Izena FCA was by this time divided into two separate Associations, one for each island.

Some integration had also occurred on Okinawa Island by the Second Period, particularly in the southwest, where several smaller village FCAs were incorporated into the Itoman FCA, as well as in the administratively bewildering waters of Nakagusuku Bay and the associated offshore islands. By 1964, in the latter area, Kudaka Island FCA had absorbed that of Chinen village, and Katsuren FCA and Yonagusuku FCA, now sharing rights to the same sea space, had jointly absorbed the former FCAs of the small islands of Tsuken, Hamahiga, Henza-Takahanari and Ikei, together with the waters to which they formerly held independent tenure.

Third Period (1974–present)

The integration process that began after the First Period continued into the Third Period. Some formerly separate FCAs were merged into a single unit, such as Iheya and Izena, which re-emerged as Izena FCA. In other cases FCAs retained their own individual administrative identity but henceforth had to share their tenured waters with other separate FCAs. Thus Okinawashi (Okinawa City) FCA and Haebaru FCA had now to share the same sea space, as had Katsuren FCA and Yonagusuku FCA; Yonabaru FCA and Sashiki-Nakagusuku FCA (the latter was formerly composed of two separate FCAs, Sashiki and Nakagusuku); Ishikawa FCA and Kin FCA. More complex were cases where several or more associations shared the same sea space, such as has taken place among Nago FCA, Motobu FCA, Nakijin FCA and Haneji FCA; or among Nahachiku (Naha Region) FCA, Nahashi (Naha City) FCA and Urasoe FCA. But the most complicated such sharing arrangement occurs in one section of Nakagusuku Bay where seven FCAs share use rights.³⁾

As would be expected this sharing of sea space has occurred only in the most productive and heavily claimed territories. On the other hand where historically there has been little inter-FCA rivalry for resources, individual FCAs have retained sole rights to a particular tract of inshore water, such as in the case of Kunigami FCA.

This sharing of sea space has been one of the administrative mechanisms employed by Okinawa Prefecture to resolve the many tenurial and customary law conflicts over the most productive and conveniently located fishing grounds that arose

3) These are Yonabaru, Yonagusuku, Haebaru, Okinawashi, Sashiki-Nakagusuku, Chinen and Minatogawa FCAs.

between and among FCAs. The Prefectural Fisheries Office designated the territory to be shared and then left it to the FCAs concerned to formulate, implement and monitor the detailed executory regulations concerning access, gear and representational authority to higher administrative levels. It should therefore be recalled that in inshore fisheries the direct control and organization of fisheries by the prefectural and national governments extends only to the basic rules, licenses, rights and fundamental conservation regulations issued to the FCAs. Beyond that it is up to the local FCAs or group of FCAs to organize their own allocation and use of the sea space to which they have tenure. However, if inter-FCA conflicts cannot be resolved locally, then the prefecture intercedes to mediate.

One example, that of the Haneji, Nago, Motobu and Nakijin FCAs' area of shared sea space, will suffice to show how this system operates. The execution contract between these Associations for the use of their jointly tenured inshore waters shows clearly that the primary control of the formerly separate exclusive sea territories of the individual FCA is still retained by that FCA. The document also reveals that in reality the joint sea space has been created more for the administrative convenience of the prefecture and that no real merger in terms of completely unimpeded use of the shared sea space by members of all four FCAs has taken place. In effect, all that this document has achieved is the codification in the modern context of an old-established practise; the customary right of one village to exploit the sea territory of another for either specified target species or employing only a specific technology.

Thus the Haneji FCA has reserved the right to employ drive-in nets in its area solely for its own members. But Haneji FCA and Nakijin FCA have a reciprocal agreement that, apart from the use of drive-in nets, permits their members to freely work each other's territory. Nakijin FCA and Motobu FCA have a reciprocal agreement that permits gill netters to operate in specified sectors of each other's sea territory. Members of any one of the four FCAs licensed for lift netting for live bait can operate freely throughout the entire joint sea territory. Finally, and again for administrative convenience, one FCA, in this case Nago, has been designated as the representative of these four FCAs at the prefectural level.

Again, these joint use rights of several FCAs to a particular tract of shallow sea follow long-established precedents. In 1924, for example, mutually acceptable rules were agreed on by the Executive Committees of the Nakijin, Haneji and Ōgimi FCAs for the sharing of the marine resources of Nakao Reef and Kouri-sonē (an upheaved reef). Although these rules are not set forth in the 1927 registration document of the Ōgimi FCA, that document clearly states that Ōgimi fishermen must obey them in their fishing activities.

CUSTOMARY USE AND ENTRY RIGHTS

Entry Rights during the First Period (1907-1940)

With the implementation of the "Meiji Fisheries Law" Fisheries Cooperative Associations had to legally claim and register their own territory. At the same time,

any FCA (or individual) who wished to obtain rights within the tenured sea of another FCA had to officially register them, after reaching an agreement on the terms and conditions of the entry contract.

The specialized fishing community of Itoman, which was established as an FCA in 1903, was particularly active in seeking and making such entry rights with other FCAs, and by 1907 had settled contractual arrangements with respect to the sea territories of Tomigusuku, the Chiibishi reef area (jointly with another FCA), Nakazato, Motobu, Iheya and Zamami [ITOMAN SHI-SHI HENSHŪ INKAI 1982]. Later, as other villages established their FCAs, Itoman FCA gradually made contracts there, also.

The FCA registration documents for the First Period are illuminating with regard to the way in which customary use rights of other villages within the newly registered sea territories of the FCAs were acknowledged and permitted to continue. These documents also reveal the geographical scope of the activities of Itoman fishermen, and the manner in which their customary usage of other villagers' sea space was acknowledged and codified.

In the 1927 registration document of the Ōgimi FCA, for example, it was stated that local fishermen should not prevent the entry of those from Itoman who engaged in *chōsen sazae* (*Marmarostoma argyrostoma*)-collection and *kaininsō* (*Digenea simplex*)-harvesting, "...because Itoman fishermen observe the conservation rules agreed upon by the Ōgimi FCA."⁴ Similarly, the 1908 registration document of Onna Magiri permitted the use of that territory by Itoman fishermen to conduct *agiyā* fish-driving between October 1 and June 30. This privilege to Itoman fishermen was renewed in 1929. In a like manner, by the 1908 document, five fishermen of the Nago FCA were permitted to work in the Onna Magiri territory, a right renewed in 1941, for use the *agiyā* technique, during the same period as permitted to the Itoman fishermen.

The 1927 registration document of the Uken FCA also permitted Itoman fishermen to collect *chōsen sazae*, "...provided they obey the conservation rules" (unstated). But in this instance their number was fixed at a maximum of 40 persons.

In other cases, Itoman fishermen were permitted entry to conduct only closely specified techniques and for specific target species. The 1921 registration document of the Chinen FCA, for example, permitted them to collect sea cucumber, *chōsen sazae*, *yakōgai* (*Lunatia marmorata*), *hirosegai* (*Tectus pyramis*), *takasegai* (*T. niloticus*) and *shakogai* (Tridacnidae), as well as to harvest *kaininsō*, provided Itoman fishermen obeyed Chinen's conservation rules. In addition, they were also permitted to conduct two types of drive-in netting, gill netting, sardine netting and spearing in Chinen's territory. Fishermen from Ou village FCA were also permitted to conduct gill netting for reef fish in Chinen's waters.⁵

4) Unfortunately, those local conservation rules are not made explicit in the document and so far we have been unable to locate any other document related to them.

5) It should be noted that at a later date the sea territory of Chinen was incorporated with that of the Kudaka FCA, and still later the reverse incorporation occurred, largely as a consequence of the depopulation of Kudaka Island. This, together with the per-

Similarly, in 1910, the Katsuren FCA acknowledged the right of fishermen from Henza-Takahanari FCA and Itoman FCA to exploit its waters. These rights were extended in 1919 for the former and in 1926 for the latter.

A like situation prevailed in the dependent islands in the East China Sea. For example, the 1907 registration document of the Iheya FCA permitted the entry of Itoman fishermen—although, again, approved techniques, target species, numbers of fishermen or nets were not specified, perhaps indicating that their entry was unimpeded.

Rights to the Tokashiki area of the Kerama Islands were widely claimed by outsiders. In 1932 members of the Ōmine FCA, near Naha, were permitted to exploit Tokashiki waters, as were two fishermen from Itoman during the period 1932–1939. Then, in 1939, the Itoman FCA registered a claim to some fishing rights in the Tokashiki area. This claim was accepted and henceforth Itoman fishermen were permitted to conduct gill netting for reef fish as well as to collect *takasegai*, *hirosegai* and *koyasugai* (not identified) in the Tokashiki FCA's waters.

The sea territories of the dependent islands off the Pacific coast of the main island (Okinawa Island) presented a particularly complex picture. For example, fishermen from four neighboring FCAs were permitted to operate in the sea territory of Kudaka Island, as indicated by the 1927 registration document. On payment of an entry fee, 16 fishermen from Ou village FCA were permitted to collect *chōsen sazae*, *takasegai*, *hirosegai*, *koyasugai* and *shakogai* in Kudaka waters; five boats from Minatogawa FCA were allowed, on payment of an entry fee, to conduct squid jigging in Kudaka's area; based on customary rights, and provided that an entry fee was paid, fishermen of Tsuken Island FCA were permitted to conduct fish driving for juvenile rabbitfish (*Siganus* spp.), using a maximum of 10 nets (but here the document is ambiguous, since the frequency of net usage is not specified); and men from Chinen FCA were allowed to spear reef fish in Kudaka's waters.

These complications based on customary rights are also clear from the documents of the other Pacific coast island FCAs. In 1919 men from both the Henza-Takahanari and Itoman FCAs were allowed to work the waters of both Hamahiga and Tsuken FCAs. Again, no exact specification of the details of these agreements are available.

And in 1919, also, Itoman fishermen engaged in squid jigging and fish driving, in particular, registered a claim to work in Henza-Takahanari's territory [ITOMAN SHI-SHI HENSHŪ INKAI 1982]. However, information about the outcome of this claim is not available.

Itoman fishermen also extended their claims into the waters of the remoter, southern island groups, Miyako and Yaeyama. Doubtless in Yaeyama this was especially motivated by the family connections among Itoman fishermen who had settled permanently in Yaeyama and those from Itoman [YAEYAMA REKISHI 1954;

mission granted to the Itoman and Ou FCAs to use Chinen's sea space, appears to indicate that inshore fisheries were, historically, of relatively minor importance to the inhabitants of Chinen.

year the Yonaguni FCA permitted fishermen from Itoman to collect shellfish and to harvest seaweeds within its territory.

These inter-FCA entry contracts made during the years following the implementation of the Meiji Fisheries Law basically followed preceding customary practises. That is, where exclusive fishery rights were claimed by an FCA or an individual, fishermen from other FCAs or other individuals had to pay a rent for such temporary access and use rights. Although it was not unreasonable to fix a rather high rental with the objective of reducing competition for one's own FCA members as well as to reduce the potential pressure on resources, in Okinawa during the First Period inflated rentals for entry permits issued to outsiders was one of the factors that retarded the development of small-scale fisheries in the prefecture, the impact of which is still felt at present.

THE REGULATION OF FISHING TECHNOLOGIES

Net Fishing (Figs. 8-10, Table 5)

DRIVE-IN NETS

In the coral reef environment of Okinawa, the drive-in net is a highly effective technique because of its adaptability to micro-topographic features. In Japan, this technique is used only by Okinawan fishermen. At present all Okinawan FCAs are licensed to conduct an undifferentiated category of fish driving. This situation is similar to that prevailing during the First Period when all but two FCAs were licensed to operate fish drives, but when licenses closely specified which type of drive could be operated.⁷⁾ This specification was made in terms of the particular target species and therefore the sea locality and mesh size and overall dimensions of the nets that could be employed. In the Second Period fish drives were licensed only

| TECHNIQUE | OKINAWA ISLAND | | | | | | | | | | | | | | | | | MIYAKO DEP. IS. | | | | YAHEYAMA | | | TOTAL | | | |
|--------------------|----------------|---------|----------|--------|----------|------------|----------|-------|--------|--------|----|--------|------|---------|------------|--------|--------|-----------------|----|--------|-----------|----------|--------|----------|-------|--|----|----|
| | MINATOGAWA | SASHIKI | YONABARU | MISATO | KATSUREN | YONAGUSUKU | ISHIKAWA | OGIMI | HANEJI | NAKJIN | IE | MOTOBU | NAGO | YOMITAN | NAHA CHIKU | ITOMAN | ZAMAMI | TONAKI | OU | KUDAKA | NISHIHARA | IRIOMOTE | HATOMA | ISHIGAKI | | | | |
| DRIVE-IN NET | | | | | | | | | | | | | | | | | | | | | | | | | | | 11 | |
| LIFT NET | | | | | | | | | | | | | | | | | | | | | | | | | | | | 12 |
| GILL NET | | | | | | | | | | | | | | | | | | | | | | | | | | | | 23 |
| FIXED GILL NET | | | | | | | | | | | | | | | | | | | | | | | | | | | | 2 |
| FIXED NET | | | | | | | | | | | | | | | | | | | | | | | | | | | | 22 |
| BEACH SEINE | | | | | | | | | | | | | | | | | | | | | | | | | | | | 15 |
| LOBSTERING | | | | | | | | | | | | | | | | | | | | | | | | | | | | 24 |
| ARTIFICIAL SHELTER | | | | | | | | | | | | | | | | | | | | | | | | | | | | 16 |
| TOTAL | 5 | 4 | 4 | 6 | 7 | 7 | 7 | 7 | 7 | 7 | 4 | 7 | 6 | 7 | 3 | 5 | 5 | 3 | 3 | 4 | 1 | 6 | 5 | 5 | | | | |

Figure 9. Fisheries Techniques during the Second Period (1964)

7) Except Shimoda, on Okinawa, and Yonaguni, in the Yaeyama archipelago.

Table 5. Habitats, Techniques and Species in Modern Okinawan Inshore Fisheries

| | | | | |
|----------------------|---------------------------------|---|---|--|
| (1) Inshore Zone | Lagoon (1-4 m depth) | C, D, L, S, T | Surgeonfish, Unicornfish, Wrasse, Parrotfish, Rabbitfish, Leatherjackets (D, S, T); Fusiliers (L); Bream, Rock-cod (S) | |
| | Lagoon (5-7 m depth) | C, D, L, S, T | ditto, Bream (D, S, T); Fusiliers (L) | |
| | Lagoon (11-18 m depth) | C, D, L, S, SJ, Tu | ditto (D, S, T); Fusiliers (L), Squid; Turtles | |
| | Small Coral Knolls | L, S, T | Fusiliers (L); Surgeonfish, Unicornfish, Parrotfish, Rock-cod, Octopus (S, T); Lobster (S) | |
| | Large Coral Knolls | L, S, T | ditto | |
| | Sandy Shallows nr Shore | A, B, C, F, G, S, T | Sardine (B); Trevally, Silver biddies, Half-beaks, Parrotfish Squid, Cuttlefish (F); Silver biddies, Garfish, Half-beaks, Sea bream (G) | |
| | Grassy Shallows nr Shore | A, B, C, F, G, H, S, T, Tu | Sea urchin (C); Rabbitfish (F, G, S, T); Sardine (B); Turtles (Tu) | |
| | River Mouth | G | Mullet, Silver biddies | |
| | Mangrove Flats | C | Mangrove crab | |
| | Inner Reef Margin | C, D, G, S | Surgeonfish, Unicornfish, Wrasse, Parrotfish, Rabbitfish Trevally, Rock-cod (G, S); Cardinalfish (L) | |
| | Shallow Reef Channels (1-4 m) | D, S, T | Fusiliers, Snappers (D); Rock-cod, Bream, Octopus (T), ditto (S) | |
| | Deeper Reef Channels (14-27 m) | D, G, S, T | Sea bream (D); ditto Bream (G); Bream, Rock-cod, Octopus (T); ditto (S) | |
| | Surge Channels | D | Surgeonfish, Unicornfish | |
| | Reef Flat | C | Shellfish | |
| | (2) Offshore Zone | Surf Zone (2-7 m depth) | G, S | Surgeonfish, Unicornfish, Trevally, Wrasse, Parrotfish, Drummers (G); Surgeonfish, Unicornfish, Wrasse, Parrotfish, Rock-cod (S) |
| | | Seaward Slope | C, HL, S, Tu | Shellfish (C); Squirrelfish, Snappers, Trevally, Barracuda, Bream, Rock-cod (HL); ditto (S); Turtles (Tu) |
| | | Open Sea just off Surf Zone (4-14 m deep) | S | Cuttlefish |
| Ditto (11-12 m deep) | | D, L | Surgeonfish, Unicornfish, Parrotfish (D); Damselfish (L) | |
| Ditto (surface) | | SJ | Squid | |
| (3) Deep Sea | Surface | Tr | Bonito, Dolphinfish, Wahoo | |
| | Bottom (Upheaved Reef) | DL, HL | Snappers | |
| | Bottom (along various contours) | DL, LL | Snappers | |

Legend: A—Aquaculture; B—Beach Seine; C—Collecting; D—Drive-in net; DL—Deep line; F—Fixed net; G—Gill net; H—Harvesting (Seaweeds); HL—Hand line; L—Lift net; LL—Long line; S—Spearing; SJ—Squid jigging; T—Trapping; Tr—Trolling; Tu—Turtling

| TECHNIQUE | OKINAWA ISLAND | | | | | | | | | | | | | | | | | MIYAKO | | YAEYAMA | | TOTAL | | | | | |
|--------------------|----------------|----|----------------------------|------|------|--------------|---------------------|--------------------|-----------------------------|----|--------|---------|--------|-------------|-------------------|------------------|--------|--------|------|---------|--------|-------|---------|------------------------|----------|--------------------------|----|
| | KUNIGAMI | IE | NAGO-HANEJI-NAKIJIN-MOTOBU | NAGO | ONNA | ISHIKAWA-KIN | KATSUREN-YONAGUSUKU | OKINAWASHI-HAEBARU | YONABARU-SASHIKI-NAKAGUSUKU | OU | CHINEN | YOMITAN | CHATAN | NAHA-URASOE | ITOMAN-MINATOGAWA | ZAMAMI-TOKASHIKI | TONAKI | IZENA | KUME | MIYAKO | TARAMA | | YAEYAMA | HATERUMA (Yaeyama FCA) | YONAGUNI | NAKANOUGAN (Yaeyama FCA) | |
| DRIVE-IN NET | ■ | ■ | | | | | | | | | | | | | | | | | | | | | | | | | 24 |
| LIFT NET | ■ | | | | | | | | | | | | | | | | | | | | | | | | | | 12 |
| GILL NET | | | ■ | | | | | | | | | | | | | | | | | | | | | | | | 24 |
| FIXED NET | | | | | | | | | | | | | | | | | | | | | | | | | | | 24 |
| SMALL FIXED NET | | | | | | | | | | | | | | | | | | | | | | | | | | | 15 |
| BEACH SEINE | | | | | | | | | | | | | | | | | | | | | | | | | | | 1 |
| TRAPPING | | | | | | | | | | | | | | | | | | | | | | | | | | | 24 |
| LOBSTERING | | | | | | | | | | | | | | | | | | | | | | | | | | | 20 |
| ARTIFICIAL SHELTER | | | | | | | | | | | | | | | | | | | | | | | | | | | 7 |
| TOTAL | 5 | 5 | 7 | 6 | 7 | 6 | 7 | 7 | 6 | 7 | 7 | 6 | 7 | 6 | 7 | 6 | 5 | 6 | 7 | 4 | 7 | 6 | 2 | 5 | | | |

Figure 10. Fisheries Techniques during the Third Period (1974–1983)

for parts of Okinawa Island (Nakagusuku Bay, Nago Bay, Kin Bay, and Ōgimi, Haneji, Motobu and Ie FCAs), as well as for Iriomote and Ishigaki Islands in the Yaeyama archipelago.

During the First Period, 20 percent (25) of the licenses were issued for the *agiyā* technique (Fig. 11), 26 percent (33) for *chinakakiyā*, 24 percent (31) for juvenile rabbitfish (*Siganus* spp., *ainame*) driving, 16 percent (20) specifically for damselfish driving, 5 percent (7) just for mackerel scad (*Decapterus pinnulatus*), and 7 percent

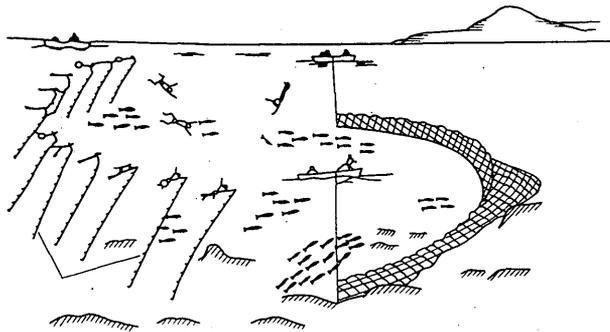


Figure 11. Drive-in Net (*agiyā*)

Source: [OKINAWA DAIHYAKKA-JITEN KANKŌ JIMUKYOKU 1983]

(9) for the combined drive-in netting of sardine, needlefish (*Tylosurus indicus*) and squid. Damselfish and mackerel scad fingerlings (the young of which move offshore shortly after birth) are netted for use as live bait in the bonito fishery. Eighty percent of the FCAs were licensed to operate *chinakakiyā*, 61 percent for *agiyā*, and 75 percent were licensed for *ainame*-driving.

In all types of fish drive, the techniques employed vary little. The principal differences are the scale of the operation and the targets sought. *Agiyā* is the largest-scale fish drive and requires some 40 participants operating 8–10 boats. It is employed in waters about 10 m deep, outside the reef and some 9 km offshore, to capture mainly adult fusiliers. The technique was developed in the 1880s, after water goggles were invented in 1884, and replaced the bottom gill net that was formerly used for fusiliers. In this technique a bag net is first set in a suitable fishing spot and then wing nets are attached. The bulk of the participants then dive to use a variety of simple scaring devices to drive the fish between the wing nets, which are then progressively folded into a circle, and then finally deep into the bag net, which is then detached, enclosed and hauled in. The principal disadvantage of this technique is that it requires a large number of participants, although on the other hand it absorbs surplus labor.

In most FCAs during the First Period the *agiyā* technique was operated year-round, with no closed periods imposed. Local variations occurred, however, probably based on the seasonal availability of adult fusiliers, and where not operated all-year *agiyā* was permitted from autumn through early-summer (*i.e.*, mostly October 1–June 30).

A smaller variant is the *chinakakiyā*, a technique also employed beyond the reef, and in which 4–6 divers from two boats use a long rope to drive the fish into the composite bag-wing net. Apart from this, the techniques used are almost the same as for the *agiyā*. Its advantage is that few fishermen are needed to employ it. During the First Period no closed seasons were imposed on the use of this technique, and it could be employed year-round, except in some FCAs of the Miyako group where it was closed in January.

The *ainame*-drive is used to capture rabbitfish (*Siganus* spp.) fingerlings (*ainame*) in open water beyond the reef. It employs techniques similar to the *chinakakiyā*. But unlike *chinakakiyā*, the use of the drive-in net for *ainame* was permitted only during the summer season (generally June 1 or July 1 through September 30) in the territories of most FCAs. Naha FCA was exceptional in that its use was permitted year-round, and in Miyako FCAs as well as in Tarama and Minna FCAs the *ainame* drive-in season was longer, from March 1 through October 31 (or in one case, November 30). It is widely recognized that rabbitfish fingerlings migrate inshore during the periods of highest tide, from July through September, and that these migrations are quite definite and reliable, although local variations in their seasonal occurrence are reported. This accounts for the restricted season during which the *ainame* drive-in net may be employed.

Drive-in netting of damselfish was generally permitted throughout the year,

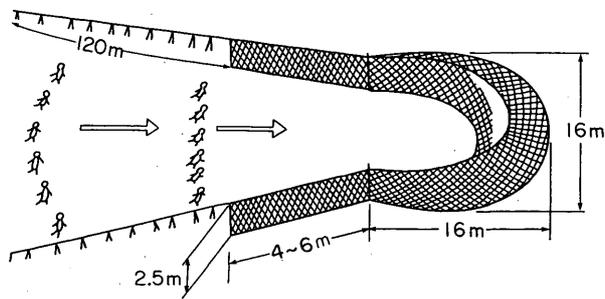


Figure 12. Drive-in Net (*pantatakā*)

Source: [OKINAWA DAIHYAKKA-JITEN KANKŌ JIMUKYOKU 1983]

and in the odd case where seasonal limitations were enforced, it was restricted to summer. This technique was limited mostly to northwestern Okinawa Island.

Inside the reef a small-scale fish drive, called *pantatakā*, which uses a similar composite net, is employed to catch squid, parrotfish (*Scaridae*), sardines, and needlefish (Fig. 12). This is operated in lagoon waters up to 5 m deep, and requires the participation of 15–20 divers who beat the water with their hands to scare the fish into the net.⁸⁾ No closed season was imposed on this use of *pantatakā* during the First Period.

LIFT NETTING

Another netting technique peculiar to Okinawa, and which employs a combination of diving and driving to frighten the fish over the net, is lift netting, which is now used in Okinawan waters exclusively to provide live bait for the bonito fishery. Formerly, lift-netting was also specified in the registration documents for catching round herring (*Spratelloides* spp.), *kibinago* or *sururu*.

During the First Period lift netting was licensed to only 8 FCAs, 6 of which were in Yaeyama, 1 in Miyako, and 1 (Nakijin) on Okinawa Island. This closely reflects the distribution of the bonito fishery in those days. All the FCAs in Yaeyama remained licensed for this fishery during the Second Period, but the number on Okinawa expanded nine-fold over the first period.⁹⁾ This, of course, reflected the growth into the bonito industry during the intervening years. In the Third Period all the Yaeyama FCAs remained licensed for lift netting, as did those for Miyako and eight of the previously licensed Okinawa Island FCAs. Kume and Tonaki Island FCAs were newly licensed and the geographical distribution of the Okinawa Island licensed FCAs changed somewhat.

In Yaeyama waters, for example, where the lift net is used only in the bonito bait fishery, the live bait fishery operates from early April until mid-September, *i.e.*, coincident with the bonito fishing season. It employs two variants of the lift

8) Hence the onomatopoeic name, which denotes the sound of slapping the water with hands.

9) These were the Minatogawa, Misato, Katsuren, Yonagusuku, Ishikawa, Haneji, Ōgimi, Motobu, Nago and Yomitan FCAs.

(blanket) net (*shiki-ami* [Jpn.]), the *ushiē* system and the *hirukuji* system. The former is employed from April-late-July, the target species being *ūmi* and *shiraumi* (*Apogon* spp.). *Hirukuji* is employed from early-June until mid-September to take *sanerā* (juvenile *Caesio* spp.).

GILL NETTING

Gill nets, which can be operated by one or two men from a small boat, have long been widely used in the coralline environments of Okinawa. During the First Period 85 percent of the FCAs were registered for gill netting, a figure which increased to 92 percent and included all FCAs except Miyako by 1964 (Second Period), and to 96 percent in the Third Period, with only the Yonaguni FCA, which is distinguished by its exceptionally small fringing reef area, not registering for gill net operations.

In the last two periods "gill netting" as an undifferentiated rubric appears in the registration documents, whereas in the First Period gill netting for reef fish, for needlefish, for fusiliers and sardine, for flying fish (Exocoetidae), for drummers (Sciaenidae) and emperors, for *konoshiro* (Clupeidae), and for squid and spiny lobster (*Panulirus* spp.) are all distinguished separately, thereby allocating different net mesh sizes to different localities within the inshore waters. In the First Period gill netting for reef fish was registered by every FCA in the Yaeyama and Miyako groups, and for all the dependent islands off the Okinawa mainland except Tonaki, Kudaka and Henza-Takahanari. On Okinawa Island most registrations were for FCAs in the south and southeast, apart from that for Kunigami, in the northernmost part of the island.¹⁰⁾

Thus in the First Period the types of gill net and sea areas exploited by this technique were most widely diversified in the territory of the Minatogawa FCA, followed by those of the Ōsato and Kunigami FCAs. The majority of the FCAs were little differentiated in terms of gill netting, and targeted their efforts on a wide range of reef fish.

During the First Period, most FCAs permitted the use of gill nets to take miscellaneous reef fish throughout the year. Exceptional were three FCAs in the Miyako group (Nishihara, Hisamatsu and Tarama) which limited their use to the period February 1 through July 31. More detailed open season regulations were applied to gill nets aimed at specific types of fish: those for flying fish were limited to winter (November 1–April 30) by Kunigami and Minatogawa FCAs, whereas Ie FCA limited them to the summer season (April 1–August 31); those for spiny lobster and squid were sometimes permitted all year, as by Minatogawa and Ie FCAs, yet elsewhere they could be employed only from late-summer through early-spring

10) Registrations for gill netting of needlefish were made by Kunigami, Ōsato and Mitnogawa FCAs; those for taking flying fish in waters outside the reef were made by Kunigami, Ie and Minatogawa FCAs; Nago, Itoman, and Chinen FCAs together with a private operator in the Naha area on Okinawa Island, plus the Ikemae FCA in the Miyako group registered those for gill netting fusiliers and sardines; Chinen FCA was registered to take drummers and emperors, Haneji FCA Clupeidae, and Shimoda, Minatogawa, Kin and Ikei FCAs squid and spiny lobster, using gill nets.

(August 1–April 30), as in the territories of Itoman and Shimoda FCAs. The permitted seasons for using gill nets to catch half-beaks (Hemirhamphidae) and needlefish also exhibit a mixed pattern, being allowed all-year-round by some FCAs, limited to the winter season by others, and permitted only in the summer by yet others. Closing of gill netting activities reflects the present restriction throughout the prefecture, where the use of trammel gill nets is now prohibited from May to October, when fish caught in the net would rapidly spoil owing to the high temperatures of the shallow waters during the summer.

Most gill net operators continue to exploit areas inside the reef, especially relatively shallow areas near the shore as well as along the inner margin of the reef. In both these habitats they take a variety of reef fish. In the former these include, principally, silver biddies (*Gerres* spp.), garfish, half-beaks, sea bream (Sparidae), and rabbitfish. The main target of gill nets set along the inner reef margin are surgeonfish and unicornfish (Acanthuridae), wrasses (Labridae), parrotfish, rabbitfish, trevally (Carangidae), and rock-cod (*Epinephelus* spp.). The latter group also constitutes the principal target of gill nets set in the deeper reef channels. Gill nets set near river mouths aim to catch silver-biddies and mullet (*Mugil* spp.). Less commonly these nets are set outside the reef, at depths of 2–7 m in the surf zone, where their principal target species are surgeonfish, unicornfish, trevally, parrotfish and drummers.

Special registrations were also made in Okinawan waters for fixed gill nets and drive-in gill nets. During the First and Second Periods these were made for the former to take the migratory sardine. In the First Period they were made by 9 FCAs, or 21 percent of the total.¹¹⁾ It is noteworthy that all registrations for the fixed gill netting of this sardine were issued for the East China Sea side of the prefecture, indicating that the fish migrated along the route of the Kuroshio. By the Second Period, registration for fixed gill netting of sardine were made only by Nakijin and Nago FCAs, on Okinawa Island, and by the Third Period this special registration was no longer applied as a separate category. Only three registrations for fixed gill netting for trevally were made; one in the First Period to Itoman FCA and two in the Second Period to Nakijin and Nago. Again, by the Third Period this special category of gill net was no longer specified through separate registration. During the First Period two registrations for drive-in gill nets were made, one by Haneji FCA for mullet, and the other by Itoman FCA for cuttlefish (*Sepia* spp.) and squid. None were specified in the later periods.

FIXED NETS

Fixed netting is another traditional technique widely employed by Okinawan inshore fishermen. Two types of small-scale fixed net are used; one, known locally as *ambushi* (Fig. 13), is fixed overnight and retrieved the next day [see AKIMICHI this vol.], and the other, *kogatateichi-ami*, is semi-permanently fixed in place for up

11) These were Ōgimi, Nakijin and Yomitani-Uken on Okinawa Island; Ikei and Kume in the East China Sea; and Miyako, Ikemae, Tarama and Minna FCAs in the Miyako group. None was registered for the Yaeyama archipelago.

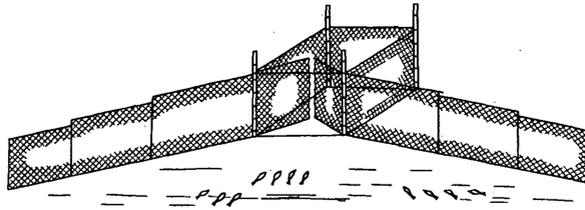


Figure 13. Fixed Net (*ambushi*)

Source: [OKINAWA DAIHYAKKA-JITEN KANKŌ JIMUKYOKU 1983]

to six months, although inspected and emptied daily. Both are mainly employed inside the reef in sandy and grassy shallows near the shore to take trevally, silver-biddies, half-beaks, parrotfish, squid, rabbitfish and cuttlefish as they ascend to the shallows for feeding at high tide.

During the First Period, 59 percent of the FCAs were registered to operate *ambushi* to take reef fish. All FCAs in Yaeyama were so registered, whereas none were in the Miyako group. On Okinawa Island all FCAs except Kunigami, Ie, Onna, Itoman and Ōsato registered for fixed netting, as did all those on the dependent islands off the Pacific coast, except Kudaka. Among the East China Sea islands, however, only the Nakazato FCA, on Kume Island, was registered to operate fixed nets. No seasonal limitations were applied to the use of fixed nets in either this or during the following periods.

Fixed nets gradually became more widely used in Okinawa Prefecture such that by the Second Period all FCAs on the main island were registered for *ambushi*—and Haneji and Motobu could operate the *kogatateichi-ami* as well—as were Zamami, Tonaki, Ou and Kudaka in the dependent islands, with Tonaki also registered for *kogatateichi-ami*. In the southern island groups only Hatoma FCA in the Yaeyama archipelago was not registered for any kind of fixed netting, as was the entire Miyako group.

That trend of the increasingly wider use of fixed nets strengthened during the Third Period when all Okinawan FCAs except Yonaguni, in Yaeyama, which lacks suitable habitats for its use, were registered to operate *ambushi*, including, for the first time, the Miyako FCA. During this Period, also, the *kogatateichi-ami* became widely registered, permission to operate it being granted to 73 percent (11) of the main island FCAs, as well as to Zamami-Tokashiki (Kerama Islands), Miyako, and the Yaeyama and Hateruma FCAs.

BEACH SEINES

Beach seine operations, used principally to capture large shoals of migratory species that enter shallow, sandy bays, as well as for general reef fish, have had a rather chequered history in Okinawa Prefecture, since they require a large number of participants for their successful operation and because their operating efficiency is greatly impaired by the presence of corals. During the First Period only two FCAs, both on Okinawa Island, Awase and Nakagusuku, were registered to operate beach

seines. Both were permitted to operate year-round, without seasonal restrictions. During the Second Period, however, this technique was registered for 81 percent (13) of the FCAs on the main island (all FCAs except Kunigami, Ie and Nahachiku) plus Zamami and Kudaka FCAs on the offshore islands. By the Third Period, however, only one such registration was made, by Okinawashi-Haeburu FCA, on the main island. It is important to note that beach seine licenses have been issued only to FCAs on Okinawa Island and Zamami (in the Keramas) and Kudaka, since other dependent islands lack either a suitable labor force, or, especially in the Yaeyama archipelago and the Miyako group, have inshore waters characterized by highly coralline habitats which strictly limit the number of unimpeded sandy beaches suitable for beach seining. In part, too, it may well have been that the failure of the beach seine to become more popular must be attributed to the preference to employ other technologies that require smaller fishing units and which afford greater individual independence in fishing operations. Also, the capital required for a beach seine operation was high, and perhaps an unduly risky investment in an environment where the threat of damage to the net by corals was an ever-present hazard.

CAST NETTING

Although relatively widespread during the First Period, cast netting has always been a relatively minor, year-round fishing technique in Okinawa, and one employed principally by part-time fishermen operating in shallow inshore areas within the reef to catch mainly mullet. Cast netting was registered for 55 percent (11) of the FCAs on Okinawa Island, plus Nakazato (Kume Island) and Aguni—the latter a relatively poor and remote island inhabited mainly by agriculturalists—during the First Period. One was made during the First Period also by an individual in the Naha area for operating a cast net from a boat in a shallow estuarine area to take mullet [TAMASHIRO 1915a]. This estuary has now been totally reclaimed. No cast netting registrations appear in the data for the Second Period, and nowadays professional fishermen are prohibited from using this technique, which is limited to recreational fishing only.

Trapping

The use of baited, basket-like fish traps inside the reef is another technique traditionally employed without seasonal limitation by Okinawan small-scale fishermen. In former times, small, circular basket traps were made of thin bamboo and thread and had a diameter of 60 cm and a depth of 15 cm. They were baited with seaweed and used in shallow waters, just offshore, to take reef fish. These traps have now virtually disappeared and have been replaced by larger and sturdier devices constructed of heavy gauge wire. These flat-domed wire traps are 1.6 m in diameter and have a depth of 0.5 m, with an entrance at the top. They are baited with the crushed heads and viscera of bonito and placed by divers at depths of 2–9 m over the lagoon floor, and especially in grassy or sandy shallows, and in the shallower reef channels, where they are concealed by a pile of coral rocks or rubble. Surgeonfish,

unicornfish, wrasses, parrotfish and rabbitfish constitute the principal catches in the former location, whereas rock-cod and sea bream are the main species caught in the reef channels.

During the First Period, 35 percent (15) of Okinawan FCAs were registered for fish trapping. All the Yaeyama FCAs except Hatoma and Yonaguni were so registered, but none were in the Miyako group. Trapping registrations were limited to five southern FCAs on Okinawa Island (Yomitan-Uken, Ginowan, Shimoda, Itoman, Minatogawa and Kin), plus one individual in the Naha area. This tendency was also visible in islands off the mainland, where trapping was registered for Ikei, Henza-Takahanari, Hamahiga and Tsuken FCAs. No registrations for trapping appear in the documents for the Second Period, whereas all FCAs except Yonaguni were registered for it in the Third Period.

Spear Fishing

Spear fishing within the reef, along the inner reef margin and the seaward slope and in the surf zone, by individuals is another old-established and characteristic technique employed all-year-round in Okinawan inshore waters. Fishing spots are reached by small boat, after which the fisherman makes the round of his favorite fishing spots spearing octopus, cuttlefish, reef fish and spiny lobster, as well as hooking turtles and collecting shellfish, should they be spotted during the course of the main activity. Okinawan fishing spears consist of a long bamboo shaft with one of several types of steel point attached.

During the First Period registrations for spear fishing activities were distinguished according to the principal target. Five categories were recognized: spiny lobster, cuttlefish, octopus, prawn and reef fish. In this Period 8 FCAs (19 percent of the total) were registered for lobster-spearing.¹²⁾ Similarly, only a few FCAs were specifically registered for prawn-spearing.¹³⁾

Registration for spearing octopus, cuttlefish and reef fish was distributed far more widely during the First Period than were those other two. Fifty-five percent of the FCAs were registered for cuttlefish-spearing; 29 (69 percent) for octopus; and 17 (40 percent) for the spearing of assorted fish. In this Period only FCAs on Okinawa Island and its dependent islands were registered for fish spearing, reef fish apparently being an incidental target for spear-fishermen in the Yaeyama and Miyako groups. On the other hand, most Yaeyama and Miyako FCAs were registered for octopus- and cuttlefish-spearing during the First Period.

For the Second and Third Periods only spear fishing for spiny lobster is specified

12) These were Kunigami, Ie, Nago, Yomitan-Uken and Awase on Okinawa Island, and Nakazato on Kume Island, Zamami in the Kerama Islands and Kudaka among the dependent islands of Okinawa.

13) These were Chinen and Katsuren, on the main island; Henza-Takahanari, Hamahiga, Tsuken and Aguni, among its dependent islands; and the two FCAs of Miyako Island, Nishihara and Hisamatsu.

in the registration documents, although spearing for other species obviously continued, since it is still widely practised in Okinawan inshore waters. In the Second Period lobster-spearing was registered for all Okinawan FCAs except Ikemae, in the Miyako group. In the Third Period it was registered for 80 percent (20) of the FCAs.¹⁴⁾ Apart from the spiny lobster, no restrictions of season or size have been applied to the target species of spear-fishermen. Prior to the Second World War no limitations were placed on the taking of lobsters caught by any method. But during the U.S. Administration a minimum size regulation of 18 cm TBL was applied, and lobstering was closed during the period April 1–June 30, which corresponds to the animal's spawning season. No legal seasonal or size limitations are placed on cuttlefish, but the behavior of this animal empirically limits the spearing season to winter.

Spear-fisheries have not been without problems. Formerly, illegal fishing using arsenic as a piscicide was problematical, and was a practise associated with spearing. More recently the legal practise of night-time spearing by flashlight, which takes resting fish, has become common. However, this is now widely recognized as a threat to fish populations.

Turtling

The Green sea turtle (*Chelonia mydas*) and the Hawksbill turtle (*Eretmochelys imbricata*) are nowadays hunted in Okinawan waters. Formerly a third, unidentified species, was also taken. They are taken in three principal locations, off the seaward slope and inside the reef at their feeding and resting sites. The meat is eaten and artifacts made from the shell, and stuffed turtles are prepared for the local tourist trade.¹⁵⁾

During the First Period turtling was separately registered. All the FCAs of the Miyako group and all those of the Yaeyama archipelago except Hatoma engaged in this activity. Registration was also made at that time by the Pacific coast dependent islands of Okinawa Island—Kudaka, Henza-Takahanari, Hamahiga and Tsuken—as well as by Itoman, Katsuren and Ginowan FCAs on the main island. Turtling was not specifically registered in the other two periods, and now occurs mostly as an activity incidental to spear fishing.

Conservation of turtles is now a matter of worldwide concern, but even during the First Period seasonal restrictions were placed on turtling in Okinawan waters. They applied especially to the Hawksbill turtle, which it was prohibited to take during the period May 1–July 31, their spawning season. At present a size restriction based on plastron length is strictly enforced (Table 6).

14) Those not registered are Ishikawa and Kin, of the main island, Tarama, in the Miyako group, and Hateruma, Yonaguni and Nakano-Ukan in the Yaeyama archipelago.

15) Most of the turtle and turtle-shell artifacts entering the contemporary Okinawan tourist trade are imported from the Philippines.

Table 6. Size Limitations on the Exploitation of Marine Fauna in Okinawa Prefecture during the First and Third Periods

| Scientific Name | English Common Name | Japanese Common Name | Criterion | SIZE LIMIT | |
|-------------------------------------|--------------------------|----------------------|---|--------------|----------------------------|
| | | | | Third Period | First Period ¹⁾ |
| <i>Pinctada margaritifera</i> | Black-lipped pearl shell | <i>kurochōgai</i> | Min. total shell width | 10.7 | 10.0 |
| <i>Pteria (Magnavicula) penguin</i> | Large-winged pearl shell | <i>mabegai</i> | Ditto | NONE | 10.0 |
| <i>Lunaticca marmorata</i> | Green turban | <i>yakōgai</i> | Min. dia. of outer margin of shell aperture | 6.1 | 6.0 |
| <i>Tectus maximus</i> | Button shell | <i>takasegai</i> | Min. dia. of shell aperture | 6.1 | 6.0 |
| <i>T. pyramis</i> | Button shell | <i>hirosegai</i> | Ditto | 6.1 | 6.0 |
| <i>Marmarostoma argyrostoma</i> | Turbo shell | <i>chōsen sazae</i> | Min. height of outer margin of shell aperture | 3.0 | 3.0 |
| <i>Eretmochelys imbricata</i> | Hawksbill turtle | <i>tainai</i> | Min. length of plastron | 15.0 | 25.0 |
| <i>Panulirus</i> spp. | Spiny lobster | <i>iseebi</i> | Min. length | NONE | 18.0 |
| <i>Laticauda semifasciata</i> | Sea snake | <i>erabu-unagi</i> | Min. length | NONE | 60.0 |
| <i>Caesio</i> spp. | Fusiliers | <i>takasago</i> | Min. length | NONE | 9.2 ²⁾ |

Sources: NORINSUISANSHŌ [1938] for the First Period; OKINAWA-KEN [1981] for the Third Period.

Table Notes: 1) Converted and rounded from traditional measures.

2) Except when used for live bait.

jigging is a relatively recent development in Okinawa. During the First Period only four FCAs had specifically registered for this activity.¹⁶⁾ No registration was made for squid jigging as a separate activity in the later Periods.

Collection of Benthos

Historically, because of prohibitions on fishing, *per se*, and owing to the demand for tribute goods, collection of benthos was the most important sector among the Okinawan fisheries. Collecting has always been important in the Miyako group largely because of its extensive reef area and because of the wide range of species available there. Shellfish collecting was also important because it could be easily and inexpensively undertaken by part-time farmer-fishermen as well as by children and older people.

| BENTHOS | OKINAWA ISLAND | | | | | | | | | | | | | | DEP. I.S. | MIYAKO | YAEYAMA | TOTAL | | | | | | | | | | |
|--------------|----------------|----|----------------------------|------|------|--------------|---------------------|--------------------|-----------------------------|----|--------|---------|--------|-------------|-------------------|------------------|---------|-------|-------|------|--------|--------|---------|------------------------|----------|--------------------------|---|----|
| | KUNIGAMI | IE | NAGO-HANEJI-NAKIJIN-MOTOBU | NAGO | ONNA | ISHIKAWA-KIN | KATSUREN-YONAGUSUKU | OKINAWASHI-HAEBARU | YONABARU-SASHIKI-NAKAGUSUKU | OU | CHINEN | YOMITAN | CHATAN | NAHA-URASOE | ITOMAN-MINATOGAWA | ZAMAMI-TOKASHIKI | TONAKI | | IZENA | KUME | MIYAKO | TARAMA | YAEYAMA | HATERUMA (Yaeyama FCA) | YONAGUNI | NAKANOUGAN (Yaeyama FCA) | | |
| SEA CUCUMBER | | | | | | | | | | | | | | | | | | | | | | | | | | | 6 | |
| SEA URCHIN | | | | | | | | | | | | | | | | | | | | | | | | | | | | 22 |
| SHELLFISH: | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Fudegai | | | | | | | | | | | | | | | | | | | | | | | | | | | | 2 |
| Hamaguri | | | | | | | | | | | | | | | | | | | | | | | | | | | | 3 |
| Hirosegai | | | | | | | | | | | | | | | | | | | | | | | | | | | | 22 |
| Kuchibirugai | | | | | | | | | | | | | | | | | | | | | | | | | | | | 1 |
| Kurochōgai | | | | | | | | | | | | | | | | | | | | | | | | | | | | 1 |
| Mabegai | | | | | | | | | | | | | | | | | | | | | | | | | | | | 1 |
| Magakigai | | | | | | | | | | | | | | | | | | | | | | | | | | | | 4 |
| Sazae | | | | | | | | | | | | | | | | | | | | | | | | | | | | 23 |
| Shakogai | | | | | | | | | | | | | | | | | | | | | | | | | | | | 21 |
| Takasegai | | | | | | | | | | | | | | | | | | | | | | | | | | | | 23 |
| Yakōgai | | | | | | | | | | | | | | | | | | | | | | | | | | | | 12 |
| SEaweeds: | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Hitoegusa | | | | | | | | | | | | | | | | | | | | | | | | | | | | 19 |
| Kaininsō | | | | | | | | | | | | | | | | | | | | | | | | | | | | 8 |
| Kirinsai | | | | | | | | | | | | | | | | | | | | | | | | | | | | 3 |
| Mozuku | | | | | | | | | | | | | | | | | | | | | | | | | | | | 22 |
| Sennarizuta | | | | | | | | | | | | | | | | | | | | | | | | | | | | 1 |
| TOTAL | 7 | 8 | 10 | 9 | 7 | 8 | 7 | 9 | 7 | 7 | 8 | 3 | 6 | 7 | 7 | 7 | 10 | 7 | 10 | 15 | 8 | 14 | 7 | 0 | 6 | | | |

Figure 15. Benthos Open for Collection during the Third Period (1974-1980)

16) Two on Okinawa Island, Kunigami and Nago, and two on the dependent islands, Nakazato (Kume Island) and Zamami (Kerama Islands).

The main items collected, some of which remain of economic importance today, have included sponge, sea cucumber, sea urchin, sea snake (*Laticauda semifasciata*), a wide range of shellfish, and numerous species of seaweed (Figs. 14 and 15). Although the collection of benthos remains important in Okinawa Prefecture, the range of items collected has diminished, partly as a consequence of changing economic demand and partially because of over-collection combined with the impact of shore-based pollution and land reclamation. Many fishermen still take part in this activity but increasingly collecting is becoming either a specialized activity or a side-activity of specialists in other techniques, especially spear-fishermen.

Collection of benthos is undertaken in various habitats. Seaweeds, sea urchin and sea cucumber are obtained from shallow, nearshore areas, although habitats are diverse, according to species [NŌSHŌMUSHŌ 1889], whereas most shellfish are excavated from the inner reef margin, the seaward slope and the reef flat, as well as from coralline habitats dispersed throughout the lagoon. Sea snakes are captured by hand when they congregate for spawning in rocky areas.

SEA CUCUMBER (*Holothuria* spp. and *Stichopus* spp.)

Historically, the collection of sea cucumber was of the utmost importance since it was an essential tribute commodity sent to China. During the First Period 61 percent (27) of the FCAs were permitted to collect sea cucumber.¹⁷⁾ The importance of sea cucumber collection remained undiminished during the Second Period, although the China tribute-trade had long since ceased, when all Okinawan FCAs except Ikemae, in the Miyako group, were registered for its collection. By the Third Period, however, sea cucumber collection had seriously declined, and only 24 percent (6) FCAs were permitted to collect it.¹⁸⁾

Seasonal regulations have not been applied to the collection of sea cucumber during the periods studied. However, the locations in which collection is undertaken differ according to species, as does the market price [NŌSHŌMUSHŌ SUISANKYOKU 1889]. Sea cucumber is generally collected in the summer season. The only regulation applied to this item was a minimum weight limit of 130 g per specimen, imposed during the U.S. Administration.

SEA URCHIN (*Tripneustes gratilla*)

Sea urchin collection has been registered in all three periods and its importance has increased gradually during that time. In the First Period 12 FCAs, or 27 percent

17) These included 12 on Okinawa Island (Ōgimi, Nakijin, Nago, Haneji, Ginowan, Itoman, Chinen, Ōsato, Katsuren, Awase and Nakagusuku); Iheya, Tonaki, Nakazato (Kume Island) and Tokashiki (Kerama Islands) of the East China Sea dependent islands; Kudaka, Henza-Takahanari, Hamahiga and Tsuken, or all the Pacific coast dependent island FCAs; all the FCAs of the Miyako group, and Ishigaki and Hateruma FCAs in the Yaeyama archipelago.

18) These were the Okinawashi, Haeburu, Yonabaru, Sashiki, Nakagusuku and Chinen FCAs on Okinawa Island, and the Tonaki, Miyako and Yaeyama FCAs.

of the total, were registered for sea urchin collection.¹⁹⁾ During the Second Period all FCAs except Ikemae, in the Miyako group, were registered to collect it and in the Third Period all except Hateruma, Yonaguni and Nakano-Ukan, in the Yaeyama archipelago, were permitted to engage in sea urchin collection. Harvesting of sea urchin has not been subject to size of seasonal limitations during the periods studied, although empirically its harvest season is governed by the seasonal increase of its ovarian contents.

SPONGE

During the First Period sponge collection was registered as a separate but minor activity, engaged in by only four FCAs (Hisamatsu, Tarama and Minna in the Miyako group and Ishigaki in the Yaeyama archipelago), all in the southern islands of the Prefecture. Those from the Miyako group were recognized as the best quality [NŌSHŌMUSHŌ 1889]. Thereafter, sponge collection does not appear as a separate item in the registration documents and is no longer undertaken in Okinawa. No regulations have ever been applied to sponge collection, apart from the prohibition on collecting live specimens, imposed during the period of U.S. Administration.

SEA SNAKE (*Laticauda semifasciata*)

Only during the First Period was the sea snake specifically registered as a separate item for collection. With the exception of Nakazato FCA, on Kume Island, Kudaka FCA and Hateruma FCA, in the Yaeyamas, which collected sea snakes, this item was limited to the Miyako group, where all the FCAs were permitted to engage in this activity. No seasonal limitation has ever been applied to the collection of sea snakes; but it is prohibited to capture specimens of less than 60 cm in overall length. Formerly smoked sea snake, used as a medicine, was an important export item. Nowadays it is used locally for the same purposes.

SHELLFISH

Shellfish comprise a major element in the collection of benthos during all three Periods, although the number of species specified in the registration documents has decreased since the First Period. The widest range of shellfish has historically been collected in the Miyako group and in the Yaeyama archipelago.

In none of the three periods have seasonal regulations been applied to the collection of shellfish. However, because of the spawning migration of, *chōsen sazae* and *yakōgai*, which during the hot summer months retreat to deeper waters from their normal habitats on the seaward slope and the outer reef flat, their collection in the Yaeyama archipelago was effectively limited to the period January–March, prior to the recent introduction of air compressors that permit divers to collect

19) These were 6 FCAs on Okinawa Island (Ōgimi, Nakijin, Yomitan-Uken, Shimoda, Awase and Nakagusuku), one (Tonaki) in the dependent islands, four in the Miyako group (Nishihara, Hisamatsu, Tarama and Minna) and one (Hateruma) in Yaeyama.

benthos at far greater depths than in former times [NŌSHŌMUSHŌ 1889].

But, in contrast, minimum size restrictions on collectable items have been enforced on shellfish since the earliest Meiji regulations were promulgated. In this manner, the economically important black-lipped pearl shell (*Pinctada margaritifera*), *yakōgai*, *takasegai*, *hirosegai* and *chōsen sazae* have been conserved. It is noteworthy that those minimum size restrictions have practically remained unchanged over the past century (Table 6).

Among the 20 species of shellfish specifically registered during the three Periods, five have remained as main target items until the present: *takasegai*, *hirosegai*, *chōsen sazae*, *yakōgai* and *shakogai*.

Takasegai (*Tectus niloticus*) and *Hirosegai* (*T. pyramis*)

During the First Period *takasegai* was collected by 84 percent of the FCAs of Okinawa Island,²⁰⁾ by those on all the dependent islands except Aguni, and by every FCA in the Miyako group and the Yaeyama archipelago. During the Second Period its collection was registered by all FCAs except Ikemae (Miyako group); and in the Third Period it was registered by all except Yonabaru-Sashiki-Nakagusuku FCA on Okinawa Island, and the Yonaguni FCA in Yaeyama. The collection of *hirosegai* has almost the same history as does *takasegai*, since, apart from a few minor differences, the collection of both shells is permitted to the same FCAs.²¹⁾

Chōsen sazae or *chōgai* (*Marmarostoma argyrostoma*)

Chōsen sazae collection has remained important and has been specifically registered in all three periods.²²⁾

20) All except Onna, Ōsato and Nakagusuku.

21) On Okinawa Island, during the First Period, Katsuren FCA was not registered for *hirosegai*, as were the three FCAs not licensed for *takasegai*. On the dependent islands four FCAs registered for *takasegai* were not registered to collect *hirosegai* (Iheya, Henza-Takahanari, Hamahiga and Tsuken), in addition to Aguni, which was registered for neither. *Hirosegai*-collecting was permitted to all the FCAs of Miyako and Yaeyama. By the Second Period, *hirosegai*-collection had become registered by all FCAs except Ikemae (Miyako group), but by the Third Period registration for its collection had not been made by Yonabaru-Sashiki-Nakagusuku FCAs and Chatan FCA, on Okinawa Island, or by Yonaguni, in Yaeyama.

22) In the First Period 62 percent (13) of the FCAs on Okinawa Island were permitted to collect *chōsen sazae* (those not permitted to do so were Ōgimi, Onna, Itoman, Ōsato, Katsuren, Awase and Nakagusuku). Six of the dependent island FCAs, Aguni, Nakazato (Kume Island), Tokashiki (Kerama Islands), Ikei, Tsuken and Kudaka were registered for its collection, whereas all of the Yaeyama FCAs and all except Tarama and Minna of the Miyako group FCAs were permitted to collect *chōsen sazae*. During the Second Period all FCAs except Ikemae (Miyako group) could collect this item, and in the Third Period its collection was open to all except Yonabaru-Sashiki-Nakagusuku FCAs, on the main island, and Yonaguni, in Yaeyama.

Yakōgai (*Lunatia marmorata*)

On Okinawa Island during the First Period, *yakōgai* collection was permitted in the territories of only five FCAs (26 percent).²³⁾ Collection of this shellfish was more important in the dependent islands and in the two southern island groups.²⁴⁾ Permission to collect this shellfish is not indicated separately in the documents for the Second Period, whereas in the Third Period it recurs.²⁵⁾

Shakogai (Tridacnidae)

Similarly, collection of this shellfish had a wide distribution during the First Period.²⁶⁾ Again, this is not listed as a separate item in the documents of the Second Period, but by the Third Period virtually all FCAs were permitted to engage in *shakogai* collection.²⁷⁾

Koyasugai or *takaragai* (Cypraeidae)

Apart from the two southern island groups, in former times, as is indicated by the documents for the First Period, *koyasugai* was widely collected in Okinawa, and particularly by the FCAs of the dependent islands.²⁸⁾

Miscellaneous shellfish

Ten additional species of shellfish that were specifically registered for collection during the First and Third periods are included in this category. The FCAs of the Miyako group accounted for the collection of the majority of these, and generally one, or at most two, or these miscellaneous species was collected by a few other FCAs. None of this category was specifically registered during the Second Period.

23) There were Kunigami, Ie, Yomitan-Nagahama, Itoman and Kin.

24) In the former the FCAs of Ikei, Iheya, Nakazato (Kume Island), Zamami (Kerama Islands), Henza-Takahanari, Hamahiga and Tsuken were permitted to collect *yakōgai*, as were all those of the Miyako and Yaeyama groups, except Hatoma, in the latter.

25) Ie, Nago, Haneji, Nakijin, Motobu, Nago, Chinen and Naha-Urasoe FCAs being permitted to collect *yakōgai* off the main island, as were Tonaki and Kume FCAs among the dependent islands, and all of those in the Miyako and Yaeyama groups, except Yonaguni, of the latter.

26) On Okinawa Island 47 percent (9) FCAs were permitted to collect *shakogai* (Kunigami, Ōgimi, Haneji, Yomitan-Nagahama, Yomitan-Uken, Ginowan, Kin, Chinen and Nakagusuku), as were 45 percent (5) in the dependent islands (Zamami, Henza-Takahanari, Hamahiga, Kudaka and Tsuken). All FCAs in the Miyako group could collect it as could four of the seven in Yaeyama archipelago, Ishigaki, Aragusuku, Hatoma and Hateruma.

27) The only exceptions being Katsuren, Yonagusuku and Yomitan, on Okinawa Island, and Yonaguni as well as in the Nakano-Ukan area of Yaeyama FCA.

28) There, 72 percent (8) engaged in its collection, the only exceptions being Ikei, Tonaki and Aguni FCAs. On the main island its collection was registered by Kunigami, Haneji, Ōgimi and Ginowan Yomitan-Nagahama, Yomitan-Uken and Kin FCAs, or 81 percent of the total. In the Miyako group Ikemae and Hisamatsu FCAs were permitted to collect *koyasugai*, as was Ishigaki among the Yaeyama FCAs.

During the First Period permission was granted for the collection of the following miscellaneous shellfish: *terajyāgai* (unidentified);²⁹⁾ *kurochōgai* or *kuroshinjuugai* or *shinjuugai* (*Pinctada margaritifera*, black-lipped pearl shell);³⁰⁾ *horagai* (*Charonia tritonis*, trumpet shell);³¹⁾ *mabegai* (*Pteria penguin*, large-winged pearl shell);³²⁾ and *kanmurigai* (unidentified).³³⁾

In the Third Period permission was given for collecting *makakigai* (unidentified);³⁴⁾ for *fudegai* (*Mitra* spp.);³⁵⁾ for *hamaguri* (*Meretrix* spp.);³⁶⁾ for *kuchibirugai* (unidentified) and *mabegai*;³⁷⁾ and for *kurochōgai*.³⁸⁾

SEAWEED HARVESTING.

During the First Period some seaweeds could be harvested only in specific seasons whereas for others harvesting could be done year-round. *Kaininsō* (*Digenea simplex*) and *kirinsai* (*Eucheuma muricatum*) fall into the latter category whereas all others were registered as seasonal. Harvestable in the summer season were *hondawara* (*Sargassum* spp.) (May 1–October 31) and *futomozuku* (*Tinocladia crassa*) (March 1–July 31). Seaweeds that were open for harvesting in the winter season were *hanafunori* (*Gloiopeltis complanata*) (October 1–May 1), *igisu* (*Ceramium kondoi*) (January 1–June 30), *aonori* (*Enteromorpha* spp.) (November 1–May 31) and *hitoegusa* or *aosa* (*Monostroma nitidum*) (generally November–May 31, but occasionally February 1–May 31 or March 1–April 30). Later the U.S. Administration prohibited the uprooting of *kirinsai* during harvesting and closed the harvest of *kaininsō* and *kirinsai* during the period December 1 through July 31. Present-day harvesting seasons are short and strictly regulated by a seaweed harvesting sub-committee in most FCAs.

The harvesting of various kinds of seaweed has also long been a major fisheries activity in Okinawan waters. Among the 15 species that have been open to harvesting during the three periods, three have been, or still are, of principal importance: *kaininsō*, *hitoegusa* and *mozuku* (*Nemacystus decipiens*). During the First Period 89 percent (all but three) of the Okinawan FCAs were permitted to harvest *kaininsō*.³⁹⁾

29) By Kunigami and Yomitan-Nagahama FCAs, on Okinawa Island, by Nakazato (Kume Island) and Zamami (Kerama Islands) in the dependent islands, and by all the FCAs of the Miyako group.

30) By Itoman, Kin, Haneji and Ginowan FCAs, on Okinawa, Hamahiga, in the Pacific coast dependent islands, by all Miyako FCAs except Ikemae and Irabu, and by all Yaeyama FCAs apart from Taketomi and Yonaguni.

31) By only Yomitan Nagahama FCA on the main island and all Miyako group FCAs.

32) By all Miyako FCAs, except Ikemae, and by Yonaguni FCA, in the Yaeyamas.

33) Collected only by Ikemae FCA, Miyako.

34) To the Nago, Haneji, Nakijin, Motobu, and Chatan FCAs of Okinawa Island and to Kume Island FCA.

35) To the Yaeyama FCA.

36) To the Miyako and Yaeyama FCAs.

37) To the Miyako FCA.

38) To the Yaeyama FCA.

39) Those not harvesting it were Onna and Ōsato FCAs, on Okinawa Island, Kudaka and Aguni among the dependent island FCAs, and Hateruma FCA in the Yaeyamas.

In the Second Period all FCAs except Ikemae, in the Miyako group, were permitted to collect it. However, by the Third Period *kaininsō* collection had seriously declined and only 48 percent (12) of all the FCAs were permitted to harvest it.⁴⁰⁾

Hitoegusa was not specified as harvestable until the Third Period, when 80 percent (20) of all Okinawan FCAs were permitted to take it.⁴¹⁾ Similarly, harvesting of *mozuku* was specified separately only in the Third Period. *Mozuku*, too, is harvested by 88 percent (22) of all the Prefecture's FCAs.⁴²⁾

Several miscellaneous seaweeds of local importance, particularly on the East China Sea coast of Okinawa Island, and to a lesser extent in Yaeyama waters, appear in the documents for the First and Third periods. In the First Period the most widely harvested of these was *kirinsai*, also known as *Ryūkyū tsunomata*, which was harvested by 11 (26 percent) of the FCAs in the First Period.⁴³⁾ During the Third Period, harvesting of *kirinsai* was limited to only three FCAs, Miyako, Yaeyama and Hateruma, the latter two in the Yaeyama archipelago. Other miscellaneous seaweeds harvested during the First Period were: *amanori* (*Porphyra* spp.);⁴⁴⁾ *hondawara* (*Sargassum* spp.);⁴⁵⁾ *hanafunori* (*Gloiopeltis complanata*);⁴⁶⁾ *igisu* (*Ceramium kondoi*);⁴⁷⁾ *futomozuku* (*Tinocladia crassa*);⁴⁸⁾ *aonori* (*Enteromorpha* spp.);⁴⁹⁾ and *aosa* (*Monostroma nitidum*).⁵⁰⁾ In the Third Period the only other miscellaneous weed not separately specified in earlier periods that was open for harvesting was *sennarizuta* (*Caulerpa racemosa*), harvested only by Miyako FCA.

THE CONTEMPORARY ROLE OF OKINAWA PREFECTURE IN FISHERIES ADMINISTRATION

In Okinawa, as in all other Japanese Prefectures, detailed regulations to control

- 40) These were Nago, Haneji, Nakijin, Motobu, Ishikawa, Kin, Katsuren, Yonagusuku, Okinawashi and Haeburu FCAs, on Okinawa Island, Tonaki and Kume among the dependent island FCAs, and Miyako and Yaeyama FCAs in the two southern island groups.
- 41) Those not so engaged are Chinen, Chatan and Naha-Urasoe FCAs, on Okinawa Island, and Yonaguni in the Yaeyamas.
- 42) Those not doing so are Yomitan FCA, on Okinawa Island, and Yonaguni in the Yaeyama archipelago.
- 43) These were Ōgimi, Nakijin, Ie, Nago, Haneji, Ginowan and Shimoda-FCAs, on Okinawa Island, Nakazato (Kume Island) and Tokashiki (Kerama Islands), in the East China Sea dependent islands, and Kohama and Hateruma FCAs, in the Yaeyama archipelago.
- 44) Harvested only by Kumigami FCA, on Okinawa.
- 45) By Ōgimi, Nakijin, Haneji, Yomitan-Uken, Ginowan and Chinen FCAs, all on Okinawa.
- 46) Harvested only on Okinawa Island by Ōgimi, Nakijin, Ie and Nago FCAs.
- 47) By Ōgimi, Nakijin, Nago and Shimoda FCAs, on Okinawa, and by Tonaki FCA in the Kerama Islands.
- 48) By Ōgimi, Ie, Nago, Ginowan and Shimoda FCAs.
- 49) Harvested only by Ie FCA.
- 50) Harvested only by Ie FCA on Okinawa Island, but also by Ishigaki, Aragusuku, Kohama and Hateruma FCAs in the Yaeyama archipelago.

fishery operations and to ensure the conservation and rational exploitation of living aquatic resources are established, as appropriate to local conditions, by the local office of the Fisheries Agency. Essentially, such regulations define closed seasons and other limitations for the various fisheries, control the kinds of gear and methods that may be employed by professional fishermen as well as those specifically for sport or recreational fishing, establish the minimum exploitable sizes of particular marine animals, specify closed areas for the purpose of resource conservation, and set various "associated" rules. In Okinawa the following regulations established by the prefecture govern fisheries [OKINAWA-KEN 1981].

Complete Prohibitions

Neither turtle eggs of any species nor corals of the Orders Scleractinia, Gorgonacea, and Stolonifera may be collected in Okinawa Prefecture, nor may they be owned, processed, or sold if they originate from prefectural waters.

Size Limitations

In the interests of resource conservation, the exploitation, together with the keeping and sale of their products, of specific marine animals is prohibited if established minimum size requirements are not met (Table 6). Harvesting of seedstock for aquaculture is excepted, provided it is specifically licensed by the Governor.

Closed Areas

According to the need to conserve marine resources, restrictions may be placed on exploitative activities in particular locations. Such restrictions may be applied to the use of a particular gear or technique, to the exploitation of a specific fishery, or can be a total ban on any exploitative activity whatsoever.

Closed Seasons

Except for the gathering of seedstock for aquaculture, closed seasons are imposed on the exploitation of turtles, *Eucheuma* seaweed, and spiny lobsters. In the interest of conservation, it is illegal to capture the Green sea turtle, the Hawksbill, and others, and to harvest red seaweed during the two month period, June 1 through July 31, each year. And lobster fisheries are closed for three months, from April 1 until June 30. These closed periods correspond with the spawning seasons of animals and the propagation period of seaweed.

Limitations on Fishing Gear

This category of regulations pertains mainly to forbidding the use of certain types of nets, controlling the use of electrical gear, restricting boat numbers in particular types of fishery, and limiting the fishing methods that may be used by amateur fishermen. The prefecture imposes two types of restriction on net use. First, nets with a mesh size of less than 28 mm may not be used in the fish drive, except to catch specified small target fish, including juvenile *Siganus* spp., *Pomacentrus* spp., and *Abudefduf* spp., among others. Second, in summer, from June 1 until September

30, the use of the trammel gill net is prohibited, since fish would spoil rapidly in the high temperatures of the shallow waters, and also because this period is the spawning season of several species of rock cod.

The use of electricity in fishing operations is also restricted. In Okinawa it is illegal to operate underwater gear with the use of electricity, and in medium- and small-scale seine net fisheries, lift netting, and pole-and-line fishing, 5 kw is the maximum permitted capacity of electrical lamps fitted per boat.

Boat numbers are also restricted in certain types of fishery. For lift netting, a maximum of two boats can be employed, and in medium-scale seine fishing, no more than three can be used. Recreational fisheries are restricted to pole-and-line, hand-line (without using a dynamo-powered light or chumming), a small landing net or scoop net, a casting net thrown from the shore, spearing or gaffing, and wading for collection in shallow waters. Licensed, professional fishermen and crew members of fishing boats are prohibited from employing these techniques.

Further, prefectural control is exercised through the issuance of licenses for specific categories of fisheries in waters not included within the Demarcated Area Rights of an FCA. Licenses, issued per boat and not per fisherman, and valid for three years, must be obtained from the governor to engage in: small-scale seine netting (using boats of less than 5 tons); coral collecting (using boats of less than 5 tons) tuna, bonito, swordfish and shark fisheries (with boats 5-20 tons and employing either floating long-line or angling gear); long-line fishing for demersal species (from boats larger than 5 tons); collecting fish for sale to aquaria (if from the 125 species described in the fisheries rule book); and, using boats greater than 5 tons, divers assisted by compressed air, small-scale fixed netting, stand netting, lift netting, stationary gill netting and fish driving. All other aspects of fisheries regulations as well as the enforcement of those established at the prefectural level are left to the individual FCAs (*vide infra*).

THE CONTEMPORARY ROLE OF FISHERIES COOPERATIVE ASSOCIATIONS

The contemporary function of the FCA in Okinawa is illustrated with reference to that of Yaeyama. The fisheries of Yaeyama were slow to develop as were the formal institutions for their organization, and the early FCAs in the archipelago were formed exclusively by persons engaged in the deep water bonito fishery. Initially no other categories of fishing were included.

The first FCAs in Yaeyama were established in 1913, as individual village institutions in Kabira, Sakieda and Shiraho, on Ishigaki Island, and in two villages on Hateruma Island. Hatoma Island followed suit in 1916, as did Yonaguni, in 1918, by each setting-up a cooperative for their respective bonito fisheries. But the Yonaguni association went further and in the same year acquired the rights to all fisheries in its adjacent waters. Then, in 1928, the Hateruma and Hatoma associations obtained the exclusive rights to island waters, and expanded their scope to include all types of

fishery; and off Hatoma the cultivation of *kirinsai* and *kaininsō* seaweeds was begun. Finally, in 1946, the Federation of Yaeyama Fisheries (*Yaeyama Suisangyōkai*) was established [KISHABA 1975].

Based on the fishing grounds plans drawn-up by the Sea Area Fisheries Adjustment Commission for Okinawa Prefecture, the prefectural government issues licenses to the Yaeyama Fisheries Cooperative Association, which specify the location of the fishing grounds assigned to the FCA, the permitted types of fishery and their seasons of operation, and limitations on the license.

Seasonality Regulations for Fishery Operations

The period during which each type of fishery may be operated is specified in the license issued by the prefecture. These specifications are locally reinforced by their incorporation into the "Executive Rules for Licensed Fisheries," drawn-up by the Yaeyama FCA.

The period during which fisheries operation is permitted is restricted according to species. At present, in Yaeyama, only the four kinds of seaweed harvested and lobsters have a legally imposed closed season, and the use of a stationary gill net is not permitted during the hottest months (June 1–September 30). The remainder may be operated year-round. However, the director of the FCA is empowered to restrict the harvesting season of any species, at any time, in the interests of resource conservation and for the control of the fishery.

Limitations on Entry

Only fully paid-up members of the Yaeyama FCA, in possession of the appropriate licenses and who work for 90 or more days *per annum*, are permitted to fish in the sea territory of the Association. Fisheries rights and licenses can be neither transferred nor loaned, regardless of whether the other person is a member of the FCA or not, but they can be inherited by a kinsman or a successor of deceased fisherman, provided that the person who inherits them is a member of the FCA.

The exploitation of all types of benthos, with the exception of black-lipped pearl shell (*Pinctada margaritifera*), which can also be exploited by corporations, is limited to individual fishermen, who can, with one exception, freely harvest throughout the sea area belonging to the FCA. That exception is the *Eucheuma* sp. (red seaweed) fishery of Hatoma Island and western Iriomote Island, which, for reasons of historical precedent, can be operated only by the fishermen of Funaura and Funauki villages, since, before the present FCA was formed by the merger of the two pre-existing cooperatives, the people of these two villages owned the exclusive rights to the exploitation of the red seaweed in those two areas.

Entry into net fisheries is, however, more strictly controlled than for benthos, and is open only to members of the FCA who own a fishing boat and who have acquired prior experience in operating the gear for which they are making an application for a license. Entry is also controlled by restricting the number of nets that may be used per fishing unit (Table 7).

Table 7. Regulation of Net Fisheries by the Yaeyama FCA

| TYPE OF FISHERY | | MAX. NO. OF NETS PER AREA LICENSED ¹⁾ | | | MAX. NO. OF NETS PER FISHING UNIT ²⁾ | SEASONAL RESTRICTIONS |
|--------------------------|-----------------------------|--|-----|-----|---|-----------------------|
| English | Japanese | Main | N-U | Hat | | |
| Fish Drive ³⁾ | <i>Tsunakake-ami</i> | 20 | 2 | 3 | 1 per group | none |
| Gill net | <i>Koteishiki-sashi-ami</i> | 80 | 13 | 15 | 20 panels per boat | Closed, June 1-Sep 30 |
| Stake Net | <i>Tateboshi-ami</i> | 20 | 1 | 2 | 2 sets per group | None |
| Small-Scale Fixed Net | <i>Kogatateichi-ami</i> | 20 | 0 | 2 | 4 fishing spots per group | None |
| Lift Net | <i>Shiki-ami</i> | 30 | 0 | 5 | 5 sets per group | None |
| Fish Trap | <i>Kago-ami</i> | 60 | 10 | 7 | 10 traps per boat | None |

Source: Yaeyama Fisheries Cooperative Association. 共第23号第2種共同漁業権行使規則 (Executive Regulations for the Second Category of Licensed Fisheries)

Table Notes: (1) "Main" refers to the principal island group; "N-U" denotes Nakano-Ukan Island; and "Hat" refers to Hateruma Island.

(2) Refers to all licensed areas.

(3) Inside the reef only.

As in the case of fisheries that exploit benthic resources, the president of the FCA can restrict any of the aspects of net fisheries regulations, but in the case of netting he does so on the advice of the "Integrated Management Committee for Fisheries" (*Gyogyōtōgōkanri Inikai*), which consists of three representatives of each type of net fishery. The consultative committee also decides on the membership of the net fishing category, as well as the period and area of exploitation by netting, together with the associated conditions for each type of fishery within the netting category. The decisions of that committee are reported to the Executive Committee of the FCA (*Rijikai*), which, in turn, submits them to the Annual General Meeting (*Sōkai*) of all FCA members. Usually, the *Sōkai* accepts with little or no opposition plans made by the *Kanri Inikai*, since the fishermen readily accept the need for resource conservation to ensure sustained yields.

CONCLUSION

At first sight it would appear that the Japanese small-scale fisherman is at the receiving end of an enormous load of minutely detailed rules and regulations handed down through a strict hierarchical structure from the Ministry of Agriculture, Forestry and Fisheries, via the Prefectural Fisheries Office, and then to the FCA, which finally issues them to the individual fisherman and ensures their enforcement. But the weight and rigidity of Japanese bureaucracy has generally been misinterpreted by Western commentators. Although often outwardly irritating, its impact at the level of implementation is more apparent than real. A detailed examination of the "Exclusive Fisheries Rights Documents" clarifies this contention. As we noted at the outset, whereas the ambiguity and generality of language in which these docu-

ments are couched is problematical for the analyst, these very characteristics lend to the documents, which limit themselves virtually to a simple statement of basic principles and fundamental rules of behavior, a wide latitude for interpretation. They permit enormous flexibility, on a characteristically Japanese case-by-case basis, as suited to the specific requirements of each FCA. Detailed application of these basic ministerial or prefectural guidelines is left entirely in the hands of the FCA—in which every fisherman is assured a voice—and in many instances at the level of a “sub-FCA”, such as the Sea urchin Collecting Association, or the Live Bait Netting Association of the Yaeyama FCA. Thus within a framework of basic policy guidelines for fisheries decided at the two higher levels, the planning, management and monitoring of Japanese inshore fisheries rests essentially in the hands of the day-to-day operators. The FCA is at the core of the regulatory process and can adapt its implementation or execution rules and regulations to the local needs and conditions of specific fisheries, based on the empirical information provided either directly by the fishermen or indirectly by their fishing behavior and performance.

But inherent within this extremely localized implementation process resides the potential problem of the over-exploitation of migratory species. Although in some relatively localized areas this may be overcome by regulations implemented by a Federation of FCAs, there still remains the potential problem of FCAs over-fishing a migratory stock, say at the southern end of the Kuroshio, depleting the potential catch of FCAs located far away, at the northern end of the current. Similarly, there is a potential problem of over-fishing of juveniles to provide live bait. This could conceivably reduce the catch of those whose target is the adult fish. If this can be established as an intra-FCA problem between different groups of fishermen, then a solution can be fairly easily reached and implemented at the local level. Difficulties arise when impacts are perceived at a location far removed from the source of the problem. In such a case solution requires intervention at the prefectural or inter-prefectural levels, which is far more difficult either to agree on or to implement [KANEDA 1980].

Of a similar ilk are the problems posed by the impact of the use of resources external to and often far removed both physically and conceptually from inshore fisheries. In Okinawa Prefecture, and especially on Okinawa Island, the biggest such problems faced by inshore fishermen stem from environmental pollution and alteration. Principally these include tar-ball pollution, the deposition in sheltered water of sticky, red sediments from pineapple and sugarcane fields, local large-scale land reclamation for infrastructural development onshore, and the widespread use of tetrapods for shoreline protection. FCAs have no control over such problems, but they do have legal redress, through compensation for the permanent loss of fishing grounds or for reduction of catch, although this compensation process is not without its own problems [BEFU 1980].

But the biggest problem with the highly localized Japanese FCA system is that it does not form part of a comprehensive nationwide master plan for coastal zone management. And such a plan is sorely needed.

In Japan, the FCA is the vitally important intermediate organization that links the central and prefectural governments with the individual fishermen. Although comprising the fundamental unit of governmental fisheries administration, and being the key organization in the implementation of official fisheries projects, an FCA belongs entirely to the local community of fishermen. The FCA lies at the hub of modern fishing communities in which it constitutes the focus of social and economic activities. But, as throughout modern history, its principal function remains the planning, management, and continuing sustained development of the sea territory to which the individual community has tenure.

"Incipient FCAs" existed during the feudal era, were more fully formed by the 1901 *Fisheries Law*, and attained their present form with the 1949 *Fisheries Law* and associated legislation. Yet the modern Okinawan FCA is really only an elaborate variant of a traditional fishing village organization that has persisted since feudal times.

Those beneficial aspects of the old village-level fisheries institutions were not abandoned during modernization over the past 70 years, instead, they were transferred to Fishery Associations and later to the Fisheries Co-operative Associations. Thus the well-developed FCA system owes much to the pre-existing system.

What emerges in summarizing the Okinawan situation over the past 70 years since the implementation of the "Meiji Fisheries Law" is that, apart from modernization, little fundamental change has occurred within the local fisheries institutions and the fisheries themselves. Present-day regulations pertaining to entry and fishing grounds remain essentially the same as at the outset of the period under examination, as do those regarding size limitations and seasonal regulations of the species taken. In reality, too, the tenured territories of the local FCAs have varied little, apart from a trend toward aggregation under consolidated FCAs. Overall, the major trend discernible has been one of institutional simplification together with a reduction of the former proliferation of institutions and administrative procedures.

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