

FISHERIES AND FISHERY DEVELOPMENT POTENTIAL OF THE
GILBERT ISLANDS COLONY INCLUDING FANNING AND
CHRISTMAS ISLANDS

Richard N. Uchida¹

January 1979

¹Southwest Fisheries Center, National Marine Fisheries Service,
NOAA, Honolulu, HI 96812.

GILBERT ISLANDS

Fishing is primarily a subsistence activity in the 16 islands comprising the Gilbert Islands located near the equator between lat. 4°N and 3°S and long. 172° and 177°E. Nearly every family owns an outrigger canoe and most of the islanders are proficient canoe handlers and fishermen. Also popular are outboard motor powered 3.6-m fiber glass boats which in recent years have contributed to an increase in catch.

On the reef flats, the method of fishing either during day or night, varies widely from hand gathering of shellfish, octopus, spiny lobsters, crabs, and small fish, to trapping with large stone traps. Other gear commonly used for reef fishing are pole and line, dip net, and spear. Inside the lagoons, where about 80% of the fishing effort is expended, the primary gear used is the monofilament gill net. Other gear used in the lagoons are spears and handlines. Lagoon catches are dominated by parrotfish, Scaridae, mullet, Mugil vaigiensis, bonefish, Albula vulpes, mountain bass, Kuhlia sandvicensis, milkfish, Chanos chanos, jacks, Carangidae, groupers, Serranidae, and snappers, Lutjanidae. Occasionally, the sardines, Herklotsichthys punctatus, which enter the lagoon are captured with a cast net.

No commercial fishery for tuna exists in the Gilberts. According to resident fishermen, however, skipjack tuna, Katsuwonus pelamis, and yellowfin tuna, Thunnus albacares, are caught throughout the year, principally by trolling in coastal waters from canoes and small

motorized boats. Also used are the traditional pole-and-line method with mother-of-pearl lures and deep handline. In addition to skip-jack and yellowfin tunas, other troll-caught species include billfishes, Istiophoridae, jacks, wahoo, Acanthocybium solandri, rainbow runner, Elegatis bipinnulatus, and barracuda, Sphyraenidae; deep handline catches include sea bass, Serranidae, castor-oil fish, Ruvettus pretiosus, and sharks, Carcharhinidae. Dip net fishing in coastal waters is practiced at night to capture flyingfish.

Fish catches are usually divided first among relatives and friends of the fishermen and the surplus is sold directly to other consumers. The few fishermen who engage in commercial fishing usually sell their catches to the retail markets.

Culture of milkfish has been practiced for many years by either private groups or individuals in several of the islands in the Gilberts; however, these operations are now carried on only on a subsistence level, using traditional methods. Since the introduction of the cichlid fish tilapia, Tilapia mossambica, into the milkfish ponds several years ago, the culture of milkfish has been severely affected by slower growth and production has been drastically curtailed. Consequently the pond owners are now anxious to clear the ponds of tilapia. Government authorities have recognized that substantial improvements can be made in aquaculture among the various islands, particularly with respect to culture of milkfish.

A number of studies conducted in South Pacific islands indicate that the local fisheries supply adequate or abundant protein, but demographic changes have occurred in that the people are now in more crowded and non-traditional groups; therefore, there is now a problem of the distribution of protein. In the Gilberts, for example, there is clearly a mixed situation wherein Tarawa is usually short of fish and Onotoa to the south, where the population density is lower, has more than enough fish.

In general, there is no basis to estimate the potential size of the coastal benthic or nearshore pelagic resources with any degree of accuracy. Until 1970, no statistics were available for either fish landings or fishing effort from the Gilberts. According to FAO statistics, the estimated nominal catches of fish, crustaceans, and mollusks in the Gilberts rose from 200 metric tons (MT) in 1970 to 500 MT in 1971, remained at that level through 1973, then rose to 750 MT in 1974-76. Dominating the marine catch in the Gilberts are skipjack tuna (27%), percoid fishes such as sea basses and sea breams (19%), and clupeids such as sardines and other herringlike fishes (14%). Other important species are milkfish, goatfish, Mullidae, mojarras, Gerres spp., and mullet.

Concerning fishery development, there is considerable interest in developing a skipjack tuna pole-and-line fishery in the Gilberts. Although an inventory of the baitfish resource is not available at this time, past studies indicate that the sardine, H. punctatus, is sufficiently abundant in certain years, particularly in Tarawa lagoon

and Butaritari lagoon for use as live bait in pole-and-line fishing for skipjack tuna. However, obtaining sufficient quantities of live bait for sustained fishing is a major constraint in the development of a skipjack tuna fishery. In an attempt to resolve the problem of insufficient live bait, a UNDP/FAO project has been initiated to look into culturing juvenile milkfish as bait. The lagoon in Tarawa has been modified by the construction of a number of earthen ponds in which milkfish fry captured from wild stocks are placed. How the bait culture experiments are progressing is not known at the present time.

Although surface schooling skipjack and yellowfin tunas have potential for development of a pole-and-line fishery in the Gilberts, it is the large, deep-swimming tunas that have the greater potential. In the pelagic, non-coastal areas, deep-swimming tunas are taken by Japanese, Korean, and Taiwanese longline fishing vessels. Much of the exploratory research leading to the development of the fishery for the deep-swimming tunas in the central equatorial Pacific was conducted by the Pacific Oceanic Fishery Investigations, a predecessor agency of the Honolulu Laboratory, Southwest Fisheries Center, National Marine Fisheries Service.

The three most important species taken by longline are the yellowfin tuna, bigeye tuna, Thunnus obesus, albacore, T. alalunga. In 1975, Japanese, Korean, and Taiwanese longliners caught 12,091 MT of tunas and billfishes in the 200-mile conservation zone of the Gilbert Islands colony; albacore, yellowfin, and bigeye tunas

represented roughly 95% of the catch. The 1976 catches of these species by foreign longliners represented 94% of the 11,348 MT of tunas and billfishes landed. Other species usually taken by longliners are the northern bluefin tuna, Thunnus thynnus, southern bluefin tuna, T. maccoyii, skipjack tuna, swordfish, Xiphias gladius, blue marlin, Makaira nigricans, striped marlin, Tetrapturus audax, black marlin, Makaira indica, sailfish, Istiophorus platypterus, and shortbill spearfish, Tetrapturus angustirostris.

Ciguatera fish poisoning is a relatively serious problem in the Gilberts. A survey conducted in 1964 showed that ciguatoxic fishes occurred around 10 of the 16 islands and that toxic fishes were generally concentrated in open sea reefs and anchorages on the leeward side of the islands. Fish considered to be fatty are greatly appreciated by the Gilbertese; however, a number of these popular fatty fishes are known to be ciguatoxic. The Gilbertese recognize that some species of fatty fish may be toxic; however, they apparently find it impossible to resist eating them and frequent cases of fish poisoning are encountered in the Gilberts. Furthermore, those afflicted only mildly seldom report the attacks to the medical officer. Among the species most frequently implicated in ciguatera attacks were Epinephelus fuscoguttatus, Cephalopholis miniatus, Promicrops lanceolatus, Lutjanus bohar, Sphyraena sp., and Muraenidae. Interviews with Gilbertese have also disclosed that ciguateric symptoms occur after consuming the liver of some sharks, the heads of some mullets and goatfishes, the castor-oil fish, and some sardines.

In addition, the hawksbill turtle has been reported to be toxic. Among invertebrates two species of crab, Zoerymus aeneus and Carpilius convexus, and one species of gastropod, Charonia tritonis, have been reported to be toxic.

FANNING AND CHRISTMAS ISLANDS

Fanning Island, which has been described as a beautiful atoll, is located at lat. 3°55'N, long. 159°23'W, and is part of the Gilbert Islands colony, which also includes Washington Island, Ocean Island, and those islands claimed by the United States, Caroline, Christmas, Flint, Malden, Starbuck, and Vostok in the Line Islands; and Birnie, Gardner, Hull, McKean, Phoenix, and Sydney in the Phoenix group. Fanning Island is composed of three islets, has a circumference of about 51 km (32 mi) and a land area of about 32.5 sq km (12.5 sq mi).

A cable station established in 1902 to serve as a connecting link of the Pacific cable between British Columbia and Suva, Fiji Islands, was abandoned in 1963. In 1966, the University of Hawaii, Honolulu, Hawaii, acquired a lease for the abandoned cable station from the former Gilbert and Ellice Islands Colony. A 760-m (2,500-ft) airstrip has since been added to the island by the University.

The land is owned by Fanning Island Plantation, Ltd., a subsidiary of Burns, Philp and Company, Ltd., Sydney, Australia. About 12.5 sq km (3,100 acres) of the total land area are under cultivation for copra production. It is presently inhabited by 600 Gilbertese copra workers.

Christmas Island, situated 284 km (153 nmi) southeast of Fanning Island at lat. 1°55'N, long. 157°20'W, is the largest coral atoll in the world, covering 640 sq km (247 sq mi) of which 321 sq km (124 sq mi) is land. The island is shaped like a lobster claw whose jaws open to the northwest. Within the claw is a shallow, semicircular 160 sq km (62 sq mi) lagoon dotted with numerous coral heads.

The island was discovered in 1777 and was included in the former colony of the Gilbert and Ellice Islands in 1919. British control of the island was disputed by the United States in 1936-38. Christmas Island is presently administered by the Gilbert Islands colony, but the United States has not relinquished its claim on the island.

There are two old settlements on the island--London and Paris--but the latter is deserted and in ruins. A third settlement, Poland, has been permanently occupied since June 1966.

In addition to the lagoon, Christmas Island has about 500 lakes with salinities varying widely from 35‰ to 330‰. At present, the Christmas Island plantation, which is owned and operated by the government, has 20 sq km (5,000 acres) under cultivation for copra production. The island has an excellent network of paved main roads and hardpan secondary roads. A 1,800-m (6,000-ft) runway is at the northern end of the island.

There are no established fisheries at Fanning or Christmas Islands; however, research cruises conducted during the 1950's by the Pacific Oceanic Fishery Investigations indicated the presence of numerous schools of skipjack and yellowfin tunas in the vicinity of Fanning

and Christmas Islands. In general, the data showed a peak in abundance of tuna schools in June-August and that yellowfin tuna schools were usually closer to the islands whereas skipjack tuna schools predominated in the semioceanic zone between 111 and 334 km (60 and 180 nmi) from land.

Although only a limited number of observations has been made on bait availability and abundance, it is quite apparent that bait is not abundant or in constant supply anywhere in the Line Islands. Among the species present in the Fanning lagoon suitable as bait for pole-and-line fishing are mountain bass and mullet, Mugil sp. At Christmas Island, bait scouting expeditions have revealed the presence of relatively large concentrations of goatfish and mullet (Mugilidae), but no fish of the silverside, anchovy, or herring families. One commercial vessel reportedly caught 200 scoops of juvenile mullet suitable as live bait for pole-and-line fishing. Because of the size of its lagoon, Christmas Island is potentially the most important baitfish source in the entire Line Island chain.

Several exploratory commercial and semi-commercial fishing trips have been made to the Line Islands to determine the potential for tuna pole-and-line fishing. In late 1947, the FV Pioneer caught 6.4 MT of yellowfin tuna mostly around Fanning and Christmas Islands. This trip was followed by another in 1949 when the FV Calistar, carrying 1,800 scoops of anchoveta, Cetengraulis mysticetus, caught at Magdalena Bay in Lower California, caught about 45 MT of yellowfin tuna near Fanning Island. In 1953, a Hawaiian sampan FV Tradewind

caught 5.9 MT of yellowfin tuna with 385 kg of baitfish, mostly small mullet and milkfish while fishing around Fanning Island. At Christmas Island, however, the bait supply was poor although skipjack tuna schools were quite numerous close to the island. In general, the major obstacle to successful pole-and-line fishing in the Line Islands is the absence of a constant and ample supply of live bait.

Purse seine fishing has also been attempted in the Line Islands area during the 1950's, but the conclusion drawn from these trials was that this fishing method was unsuitable because the tuna schools were too wild and they were usually too close to the islands' reef. The deep thermocline in this area also allowed the tuna schools to sound beneath the net.

Trolling offers another alternative for capturing tunas in the Line Islands; however, the catch rates during the surveys in the 1950's were not as high at Fanning and Christmas Islands as at other islands and atolls such as Kingman Reef, Palmyra, and Washington Islands. Skipjack and yellowfin tunas are the principal species caught by trolling in the Line Islands but other species that are likely to be caught include barracuda, Sphyraena barracuda, mahimahi, Coryphaena hippurus, wahoo, rainbow runner, and jacks.

Concerning fishery development for Christmas Island, it is believed that the potentials are good for brine shrimp culture and the development of sport, lobster, and tuna fisheries. Of these four projects, the most likely candidate for rapid development is sport fishing. A lobster fishery could also be developed rapidly because

little is required in terms of infrastructure. The size of the lobster population, however, is presently not known, but it is estimated to be rather large. Brine shrimp culture in the saline lakes of Christmas Island is technically and economically feasible. Commercial tuna fishing has the largest dollar potential to the Gilbertese, but development may be several years away due to the relatively high capital investment required for boats and other support facilities. Also, the potentials for the development of a fishery for the deep-swimming tunas that are presently being exploited by Japanese, Taiwanese, and Korean fishermen were discussed in the section on the Gilbert Islands.

Sport fishing at Christmas Island could include not only offshore trolling for tunas and tunalike fishes but also spin fishing, bottom handlining, and spear fishing for a wide variety of reef and bottom fishes including snappers, groupers, and carangids. There is, however, the ever-present danger that some species may be ciguatoxic. Research conducted by University of Hawaii scientists gave clear evidence that some species of red and gray snapper, a grouper, and a parrotfish are toxic at Fanning and Christmas Islands.

REFERENCES

Clutter, R. I.

1972. Reef and lagoon productivity, South Pacific islands.

A report prepared for the Fisheries Development Agency Project.

FAO RI:DP/RAS/69/102/10, 68 p.

Cooper, M. J.

1964. Ciguatera and other marine poisoning in the Gilbert

Islands. Pac. Sci. 18:411-440.

Food and Agriculture Organization of the United Nations.

1977. Yearbook of fishery statistics. Catch and landings, 1976.

FAO Yearb. Fish. Stat. 42, 323 p.

Halstead, B. W.

1978. Poisonous and venomous marine animals of the world (Rev.

ed.). The Darwin Press, Inc., Princeton, N. J., 1043 p.

Helfrich, P., T. Piyakarnchana, and P. S. Miles.

1968. Ciguatera fish poisoning. I. The ecology of ciguateric

reef fishes in the Line Islands. Occas. Pap., B. P. Bishop

Mus. 23(14):305-369.

Hinds, V. T.

1969. Gilbert and Ellice Islands Colony. In UNDP/FAO South

Pacific Tuna Mission, Annex III, 8 p.

Klawe, W. L.

1978. Estimates of catches of tunas and billfishes by the Japanese, Korean and Taiwanese longliners from within the 200 mile economic zone of the member countries of the South Pacific Commission. South Pac. Comm., Occas. Pap. 10, 41 p.

Shomura, R. S.

1977. Fisheries aspects of central and western Pacific islands area. SWFC Admin. Rep. 17H, Natl. Mar. Fish. Serv., NOAA, Honolulu, Hawaii, 23 p.

Uchida, R. N.

1975. Recent development in fisheries for skipjack tuna, Katsuwonus pelamis, in the central and western Pacific and the Indian Ocean. In Studies on skipjack in the Pacific, p. 1-57. FAO Fish. Tech. Pap. 144.

1976. A summary of environmental and tuna fishing information of the Line Islands. SWFC Admin. Rep. 4H, Natl. Mar. Fish. Serv., NOAA, Honolulu, Hawaii, 67 p.

1978. The fish resources of the western central Pacific islands. FAO Fish. Circ. 712, 53 p.