H-82-20 (rev)

Southwest Fisheries Center Administrative Report H-82-20 (Revised)

U.S. DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
Southwest Fisheries Center
Honolulu Laboratory
P. O. Box 3830
Honolulu, Hawaii 96812

A NOTE ON THE COMMERCIAL FISHERIES IN HAWAII

By

Thomas S. Hida and Robert A. Skillman
Southwest Fisheries Center Honolulu Laboratory
National Marine Fisheries Service, NOAA
Honolulu, Hawaii 96812

LIBRARY
NATIONAL MARINE FISHERIES SERVICE
HONOLULU LABORATORY
P. O. BOX 3830
HONOLULU, HAWAII 96812

10

February 1983

NOT FOR PUBLICATION

ABSTRACT

Commercial fish landings in the State of Hawaii for the 11 most important species are given for 1960, 1970, and 1980. Presented also are brief descriptions of the major fisheries accounting for these landings.

The commercial fish landings for the State of Hawaii have fluctuated between 8,891 metric tons (MT) valued at $3.6 million in 1965 and 4,400 MT valued at $6.3 million in 1975. The annual commercial fish landings for Hawaii for the past 20 years averaged 5,942 MT valued at an average of $5.8 million. The landings are small when compared to those of many other coastal states and contributed but a small portion to the State's income. Although a rich variety of fishes are available, many are not of commercial value. Eleven species comprise over 90% of the State's commercial landings (Table 1). The aku or skipjack tuna, Katsuwonus pelamis, contributed from 40 to 60% of the annual commercial landings.

Table 1.--Landings of some of the important fish species in the Hawaii commercial fishery for 1960, 1970, and 1980 (incomplete data). The 1960 and 1970 figures are from the calendar year reports of the Hawaii Division of Aquatic Resources (HDAR). The 1980 figures are from unpublished data of HDAR. The weights given are for fish actually sold which are usually slightly less than the catch. The totals include the State's landings of all species.

Selected species (Hawaiian name)	1960		1970		1980	
	Catch sold (MT)	Value ($1,000)	Catch sold (MT)	Value ($1,000)	Catch sold (MT)	Value ($1,000)
Skipjack tuna (aku)	3,338	1,001	3,334	1,497	2,486	4,314
Bigeye tuna (ahi)	588	582	216	510	20	83
Yellowfin tuna (ahi)	161	152	320	499	1,241	3,331
Blue marlin (au)	144	90	101	69	203	195
Bigeye scad (akule)	135	207	445	358	232	476
Striped marlin (au)	99	67	156	218	31	72
Mackerel scad (opelu)	87	82	79	98	223	524
Dolphin (mahimahi)	41	50	35	55	111	469
Pink snapper (opakapaka)	40	46	24	40	106	484
Wahoo (ono)	11	6	20	12	121	454
Albacore (ahipalaha)	4	3	9	11	71	127
Total	5,051	2,705	5,127	3,902	5,359	12,255

There were approximately 3,532 licensed commercial fishermen in Hawaii in 1947, and this number declined to a low of 715 in 1966 (Hawaii State. Department of Land and Natural Resources 1979). Since then, the number of fishermen has risen steadily, and today there are about 2,500 licensed commercial fishermen in the State. In 1970, there were about 80 vessels of 5 net tons or larger fishing commercially in Hawaiian waters and less than

700 smaller commercial fishing boats (Hawaii State. Department of Land and Natural Resources 1979). In 1980, there were over 130 fishing vessels larger than 5 net tons and over 1,000 smaller fishing boats.

Much of the fishing is done within 20 nmi of the main islands, and the fishing techniques, vessels, and equipment have changed but little in the past 50 years.

The Skipjack Tuna Fishery

The live-bait, pole-and-line skipjack tuna fishery is the most important fishery in terms of weight landed and value of catch. In 1965, 7,348 MT of skipjack tuna were landed which was worth $2 million. More recently, the catches have fallen below 2,722 MT in 1979 and 1980. The price of tuna, however, has improved over the years as indicated by the value of $4.3 million for the 2,495 MT of skipjack tuna landed in 1980. The skipjack tuna fishery is seasonal with the greatest landings being made from about May through September. There were 32 skipjack tuna fishing vessels operating in 1948, whereas today there are only 13 vessels. The vessels range in length from 15.2 to 27.4 m. A steel 27-m vessel built in 1971 and a 22.8-m fiberglass vessel built in 1979 are the only new additions to the fleet that is otherwise made up of boats 25 years and older. The average vessel crew is 10, and there are about 130 full-time fishermen in this fishery.

A readily available and suitable baitfish is essential to this fishery. The most important baitfish is the nehu, Stolephorus purpureus, an anchovy. About 30,000 to 40,000 buckets (one bucket = 5 kg) are caught annually by the skipjack tuna fishing fleet mostly in Pearl Harbor, Kaneohe Bay, and Keehi Lagoon.

Because the nehu is relatively weak, fishing is primarily confined close to the main islands, and typically, a fishing trip lasts a day. Crushed ice is carried aboard the vessels to refrigerate the catch.

Several efforts over the last 24 years have been made to find suitable supplementary baitfish. In cooperation with Hawaii Division of Aquatic Resources (HDAR), eight batches of the Marquesan sardine, Sardinella marquesensis, which seemed like a good baitfish, were brought to the Honolulu Laboratory and released around Oahu from 1955 to 1959. Although the sardine became established in the islands, its use as baitfish has been very limited. The Honolulu Laboratory carried out a pilot study on the Island of Maui in 1958-59 to produce tilapia, Tilapia mossambica, as supplemental live bait. The results were encouraging and the State built a prototype hatchery. However, skipjack tuna fishermen preferred to use the native nehu rather than the tilapia, and the State's operation was abandoned. In cooperation with HDAR the Honolulu Laboratory also transported threadfin shad, Dorosoma petenense, from California for introduction into Lake Wilson in August 1959. The threadfin shad became established within a year, and shortly thereafter many sea trials were made using them as live bait. Although they were found to be a suitable live bait, there were problems in transporting them from Lake Wilson to the vessels, mortalities were high,

and the skipjack tuna fishermen again preferred nehu to shad. In 1975 the Honolulu Laboratory undertook to transport northern anchovy, Engraulis mordax, from California to Honolulu. Not only were there problems in developing an effective means of transportation, but the fishermen again preferred the endemic bait. Topminnows, especially of the genus Poecilia, have been used at times by Hawaiian skipjack tuna fishermen as live bait. Some studies in production and sea tests for suitability were carried out by personnel of the Hawaii Institute of Marine Biology in the 1970's. Presently studies are underway to raise topminnows, mullet, and milkfish as baitfish by the State of Hawaii, Maui County, and the Pacific Tuna Development Foundation in a joint undertaking.

The Tuna Longline Fishery

The tuna longline fishery once occupied a prominent position in Hawaii's fishery. There were about 33 longline fishing vessels based in Honolulu and 10 based in Hilo during 1949-52 (Otsu 1954). The vessels ranged in length from 12.2 to 19.2 m. The annual landings during 1953-54 reached a high of 1,996 MT. The bigeye tuna, Thunnus obesus, landings were as high as 1,270 MT in 1953 and yellowfin tuna, T. albacares, landings were as high as 862 MT in 1952. Based upon four fishermen aboard each vessel, there must have been over 150 full-time commercial fishermen in the fishery during those years. The number of vessels remained fairly constant up to 1957 before showing signs of decline. Presently, the fleet consists of 18 vessels; a few of them, about 24 m long, are new to the fishery. Recently, the catch of bigeye tuna made in this fishery amounted to only 79 MT and that of yellowfin tuna amounted to only 84 MT. Even with the inclusion of the blue marlin, Makaira indica, and striped marlin, Tetrapturus audax, wahoo, Acanthocybium solandri, mahimahi, Coryphaena hippurus, and albacore, T. alalunga, that are caught in this fishery, the most recent figures extracted from the 1979 commercial fish landings records of the State of Hawaii gave a total landing of 117 MT. Most of the fishing is done within 100 nmi of the main islands, but some of the vessels fish up to about 500 nmi from the islands.

The catches from this fishery are brought back chilled and sold fresh, mostly to the sashimi market. Some tuna of poorer quality are sold to the cannery, and some of the marlins and tunas make their way into the fishcake market. Prices have increased and sashimi quality tunas command very high prices, e.g., $11.00/kg ($5.00/lb) in the round.

The Ika-Shibi Fishery

The Hawaiian ika-shibi fishery had its beginning as a squid fishery early in the 1900's when Japanese immigrants began handlining for squids from small boats (Yuen 1979). World War II curtailed the fishery; then after the War, three to four boats resumed the fishery in which tunas are caught incidental to squid fishing. By 1976, this night handline fishery, concentrating its effort on tunas, had grown to about 30 boats. A wide assortment of boats is used in this fishery. They range from 6.1-m fiberglass skiffs to 18.3-m vessels that fish tuna longlines during the off-season. The boats are usually manned by two men, but some fishermen go out alone. Three heavy handlines are usually fished from a boat: one each at

the bow, midship, and the stern. The fishing grounds are about 15 to 20 nmi from port, and the boats leave port in time to reach the fishing grounds at sundown. They use a sea anchor to slow down their drift, turn on two lights above surface and one light underwater, and start fishing for squids. They fish for tunas after enough squids are caught. However, they may fish for tunas simultaneously while fishing for squids. In areas where squids are scarce, they fish for tunas only with frozen bait.

There are an estimated 250 boats fishing, and assuming that there are 2 fishermen on each boat, there should be about 500 fishermen in this fishery. The fishing is primarily conducted off the Island of Hawaii, especially to the east of Hilo, off South Point, and to the west of Kailua-Kona. Seasons differ with area: July through December on the east side of the island and January through April on the west side. Most of the productive areas are within 20 nmi of shore. The catch is primarly sent to the fresh fish (sashimi) market. A large portion of the catch is thought to be exported, mostly to the mainland and some to Japan although no statistics are available to document the volume. In 1980, the average ex-vessel price per kilogram for yellowfin tuna was $3.22 (or $1.46/lb) and that for bigeye tuna was $3.75 (or $1.70/lb). Marlins, swordfish, Xiphias gladius, albacore, mahimahi, and a few other species are also caught in this fishery. The most recent catches made by this fishery are given in Table 2.

Table 2.--Ika-shibi landings in Hawaii, 1980 (Ikehara 1982[1]).

Species	Weight (MT)	Value ($1,000)
Yellowfin tuna	813	2,619
Albacore	44	71
Bigeye tuna	29	109
Swordfish	20	59
Mahimahi	7	33
Marlins	8	15
Squids	2	4

[1]Ikehara, Walter N. 1982. A survey of the ikashibi tuna fishery in the State of Hawaii. Southwest Fish. Cent. Adm. Rep. H-82-4C, 12 p., Southwest Fish Cent., Natl. Mar. Fish. Serv., NOAA, Honolulu, Hawaii 96812.

The Troll Fishery

The landings of the State's commercial troll fishery totaled 37 MT valued at $18,000 to the fishermen in 1960. This was <1% of the State's commercial fish landings of 5,034 MT valued at $2.7 million to the fishermen. Blue marlin contributed the largest percentage of the commercial troll landings followed by skipjack tuna, yellowfin tuna, wahoo, mahimahi, and striped marlin (Table 3).

In recent years with the increased number of commercial charter (trolling) vessels and the placement of fish aggregating devices by the HDAR, there were significant increases in the commercial troll landings. Also in recent years, several albacore trolling vessels from the west coast, fishing for albacore in waters north of Midway Islands and also for yellowfin tuna and wahoo in the Northwestern Hawaiian Islands (NWHI), have landed their catches in Hawaii.

Roughly 200 vessels and 240 fishermen indicated that they trolled commercially and about 1,000 vessels and 1,000 fishermen indicated that they fished commercially combining trolling with other types of fishing during fiscal year 1981-82 (license forms issued by the Hawaii Division of Conservation and Resources Enforcement).

The commercial troll-caught landings totaled 807 MT valued at $2.1 million to the fishermen in 1981 (incomplete landing data from HDAR). This was 33% of the State's commercial fish landings of 2,465 MT and 37% of the value of the State's commercial fish landings of $5.7 million. Yellowfin tuna contributed the largest percentage to the commercial troll landings followed by the blue marlin, wahoo, mahimahi, albacore, skipjack tuna, and striped marlin (Table 3).

Table 3.--Landings of major species caught in the Hawaiian troll fishery for 1960 and 1981.

	1960		1981	
Species	Weight sold (MT)	Value ($1,000)	Weight sold (MT)	Value ($1,000)
Blue marlin	17	6	178	220
Skipjack tuna	5	3	28	64
Yellowfin tuna	5	3	248	784
Wahoo	2	1	92	413
Mahimahi	2	1	71	385
Albacore	--	--	55	151
Striped marlin	1	1	10	27

The Spiny Lobster Fishery

The commercial spiny lobster fishery in Hawaii was very small up until the mid-1970's when an exploitable resource was found in the NWHI by the Honolulu Laboratory. In 1960, the commercial landings amounted to only 4.5 MT, valued at about $7,000; in 1970 the landings totaled a little over 2.3 MT, valued at about $6,000. In 1977 there was a dramatic increase in the landings due primarily to the expansion of the fishery to the NWHI. In

1981, it was estimated that the landings in the NWHI fishery exceeded 317.5 MT, valued at over $3 million (Ito[1]), and for January-September 1982, the catch was estimated to be 25 MT. The catch consists primarily of Panulirus marginatus and a small percentage of P. penicillatus.

Lobster fishing around the main islands is confined to shallow waters where several methods of capture are used. Panulirus marginatus and P. penicillatus are caught incidentally in fish traps, gill nets, and by divers who catch them by hand. Recent landings have not exceeded 7 MT and have averaged only about 3.5 MT. It is generally believed that the recreational catch of spiny lobsters around the main Hawaiian Islands is greater than the commercial catch.

Five vessels are currently fishing for spiny lobsters in the NWHI. In 1981, there were nine vessels, ranging in length from 18.3 to 55.5 m. Some of the vessels were from the king crab and black cod fisheries of the U.S. west coast and others were from the albacore fleet in Honolulu. Most of the vessels use the California two-chambered, lobster pot (0.5 x 0.8 x 0.9 m). Frozen mackerel is usually used for bait. The vessels usually carry 250 to 300 traps. One boat carried 2,000 pots. There are 6 crewmen on the smaller boats and 18 on the largest.

The two primary areas fished for lobsters in the NWHI are Necker Island and Maro Reef. The best concentrations of lobsters have been found between 27 and 55 m around Necker Island and Maro Reef.

Since there is a limited market for live lobsters in Hawaii, much of the marketing in 1981 was directed at the frozen tail market. It is believed that some of the catches are exported to Japan and the United States mainland.

In the State of Hawaii, the legal size for spiny lobsters is presently 8.25 cm carapace length. All berried females must be released, and open fishing season is from September 1 through May 30. The season is closed from June 1 through August 31 when a high percentage of females are said to be berried. A Fishery Management Plan has been developed by the Western Pacific Regional Fishery Management Council for spiny lobsters in the U.S. Fishery Conservation Zone (FCZ) in the western Pacific which is primarily in the NWHI. The plan has been approved and regulations, including a minimum carapace length of 7.7 cm or tail width of 5.0 cm, when the carapace has been removed, have been proposed for the FCZ around the NWHI. In addition, the Council has recently proposed implementing regulations for the FCZ around the main Hawaiian Islands and one of the options essentially duplicates the State regulations. Implementation of the regulations is being delayed because of consistency of issues relative to the interpretation of the Coastal Zone Management Program.

---

[1]Ito, Bernard M., Physical Science Technician, Southwest Fisheries Center Honolulu Laboratory, National Marine Fisheries Service, NOAA, P. O. Box 3830, Honolulu, HI 96812, pers. commun.

The Bigeye Scad (Akule) Fishery

The bigeye scad (akule), Selar crumenophthalmus, is a relatively important species in the Hawaii fisheries. It is a very popular fish that is consumed fried, dried, and in many other ways. The annual landings of this species approached 136 MT, valued at $207,000, in 1960. In 1970 the landing increased to nearly 454 MT, valued at about $360,000. The catch declined in 1980 to about 227 MT, valued at almost $500,000.

Available data show that in 1979 roughly 47% of the akule were caught with bag nets, 23% with handlines, and 30% with gill nets. In 1965 the situation was a little different; 69% were caught with bag nets, 29% with handlines, and only 2% with gill nets. The dramatic increase in gill net caught fish in recent years probably resulted from the use of monofilament gill nets.

The Mackerel Scad (Opelu) Fishery

The mackerel scad (opelu), Decapterus macarellus, like the akule, is a very popular fish that is consumed in a variety of ways including fried, dried, etc. The landings of this species in the 1960's and 1970's remained below 90.7 MT annually and were valued at less than $100,000. More recently, the landings have increased, approaching 227 MT and were valued at more than $500,000.

In 1979, roughly 51% were caught with handlines and 48% with lift nets. In 1965, about 56% were caught with handlines and 44% with lift nets.

The Pink Snapper (Opakapaka) Fishery

The pink snapper (opakapaka), Pristipomoides filamentosus, is a very popular species with wide ethnic appeal and strong demand in the restaurant trade because of its fine flesh quality.

The landings in 1960 amounted to 40 MT, valued at $46,000. In 1970, the landings declined to 24 MT, valued at $40,000. The landings increased in 1980 to 101 MT, valued at $484,000. This species is caught almost wholly using handlines.

Other Important Species in the Handline Fishery

The jacks or ulua (Carangidae), are the most prominent of the remaining commercial species. Although the landings are composed of more than a single species, we believe that they are mostly Caranx ignobilis. They are consumed raw as sashimi, fried, baked, etc. In 1980, the landings amounted to nearly 27 MT valued at $146,000.

The gray snapper (uku), Aprion virescens, is utilized in much the same manner as the ulua. The 1980 landings amounted to 34 MT, valued at $161,000.

The blue-lined snapper (taape), Lutjanus kasmira, which was introduced from the Marquesas Islands and Moorea into Hawaiian waters by the Hawaii Division of Fish and Game (now HDAR) between 1958 and 1961 quickly established itself in the islands. It is a nearshore species making it vulnerable to capture by fishermen using quite small boats. They are good for panfrying and broiling. The 1980 landings amounted to 28 MT, valued at $32,000.

The grouper (hapuupuu), Epinephelus quernus, the red snapper or onaga, Etelis coruscans, and ehu, E. carbunculus, and the amberjack (kahala), Seriola dumerili, are some of the other important handline species. They are consumed in many different ways. The onaga is one of the most highly esteemed fish and is used widely as a centerpiece on festive occasions. Collectively, these species contributed 72 MT to the landings with a value of $222,000.

Miscellaneous Species

The goatfishes (weke), mostly Mulloidichthys spp., are caught by various gear such as gill nets, traps, and handlines in shallow water. They are rather strong flavored and do not command prime prices. In 1980, roughly 29 MT were caught and were valued at $51,000. They are mostly consumed fried or broiled.

The kawakawa, Euthynnus affinis, a small coastal tuna, is caught by trolling. In 1980, the total catch was a little more than 26 MT and was valued at slightly more than $34,000. It does not command high prices and is commonly used in a diced raw fish dish called "poke." It is also fried or dried, but it is definitely not used for canning because of its dark-colored flesh.

Squirrelfishes (uu), Myripristis spp., are caught handlining, spearing, netting, and trapping. They are usually consumed fried but are known to make a good soup. The landings totaled 19 MT, valued at $75,000, in 1980.

Statistical Information on Commercial
Fishermen and Vessels in Hawaii

Although it is traditional to analyze fisheries by gear types or species, it is difficult to do so in Hawaii because of the nature of the fisheries. Most of the Hawaiian fishermen are multigear and multispecies fishermen. They use several types of gear to target on different species or species groups; sometimes on the same trip, sometimes during different seasons. There are some who fish with one type of gear throughout the year, e.g., the skipjack tuna live-bait, pole-and-line fishermen, tuna longline fishermen, some handline fishermen, and some troll fishermen. Although fishing with one type of gear, they may catch as many as a dozen different species of fish. In addition, availability of certain species, weather conditions, and market conditions all play a part in determining the type of fishing that is carried out.

Therefore, it is very difficult to classify fishermen and fishing vessels by type of fishing. Indeed, it is difficult for the fishermen to do so as can be seen from the records of Hawaii Division of Conservation and Resources Enforcement. When completing the application for a commercial fishing license, the fishermen check off as many as five or six different types of fishing. The tabulation of numbers of fishermen and vessels by each different combination of fishing types, as indicated on the license forms of the Hawaii Division of Conservation and Resources Enforcement, results in an unwieldy classification summary totaling in excess of 100 categories of fishing types.

LITERATURE CITED

Hawaii State. Department of Land and Natural Resources.
1979. Hawaii fisheries development plan. Department of Land and Natural Resources, State of Hawaii, 297 p.

Otsu, T.
1954. Analysis of the Hawaiian longline fishery, 1948-52. Commer. Fish. Rev. 16(9):1-17.

Yuen, H. S. H.
1979. A night handline fishery for tunas in Hawaii. Mar. Fish. Rev. 51(8):7-14.