

A REPORT ON THE CUBAN TUNA FISHERY

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SUMMARY

The Cuban tuna fishery has been developing since 1940 as an off-season activity for canneries, vessels, and fishermen. The canneries pack not only other sea food but vegetable products as well.

The fishing is carried on very close to shore with live bait. The tuna fishing grounds frequented mostly, as well as the bait grounds, are within the territorial limits of Cuba.

The estimated annual catch of 1,000 to 1,500 tons of tuna is canned and marketed in Cuba as "Bonito en Aceite." This supply satisfies about 85 percent of the present domestic demand.

The tuna taken are small (average weight between 3 and 4 pounds on the South Coast) and are approximately 75 percent blackfin tuna and 25 percent skipjack. On the North Coast somewhat larger fish are taken, with skipjack making up a larger proportion of the catch.

INTRODUCTION

Large schools of several species of tuna during some seasons of the year were observed in preliminary surveys conducted in the Gulf of Mexico during 1951 and 1952 by the exploratory fishing vessel Oregon. This vessel is operated by the

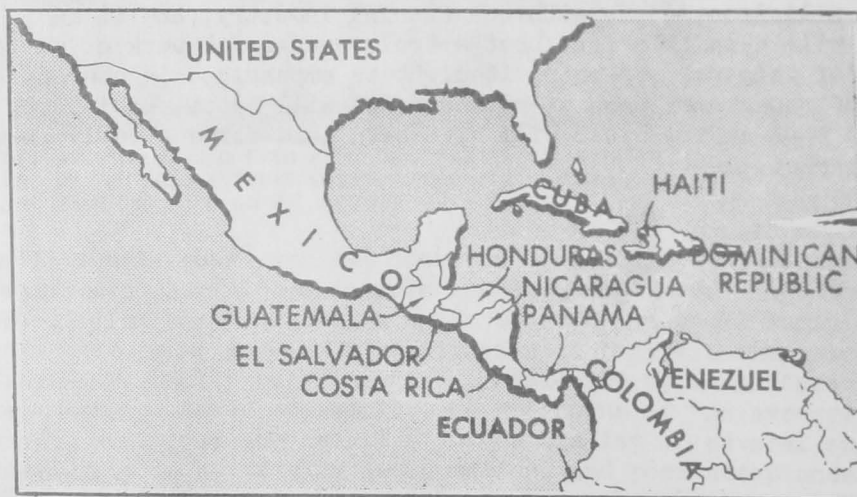


FIGURE 1 - MAP OF CUBA AND SURROUNDING COUNTRIES.

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U. S. Fish and Wildlife Service's Branch of Commercial Fisheries. It was apparent that many of the problems in the development of tuna fishing in the Gulf would be similar to those encountered and, to some extent, solved by the small but successful Cuban tuna fishery of the adjacent Caribbean. As a result I was sent to Cuba in late August 1952 to get first hand information on fishing practices in this interesting fishery.

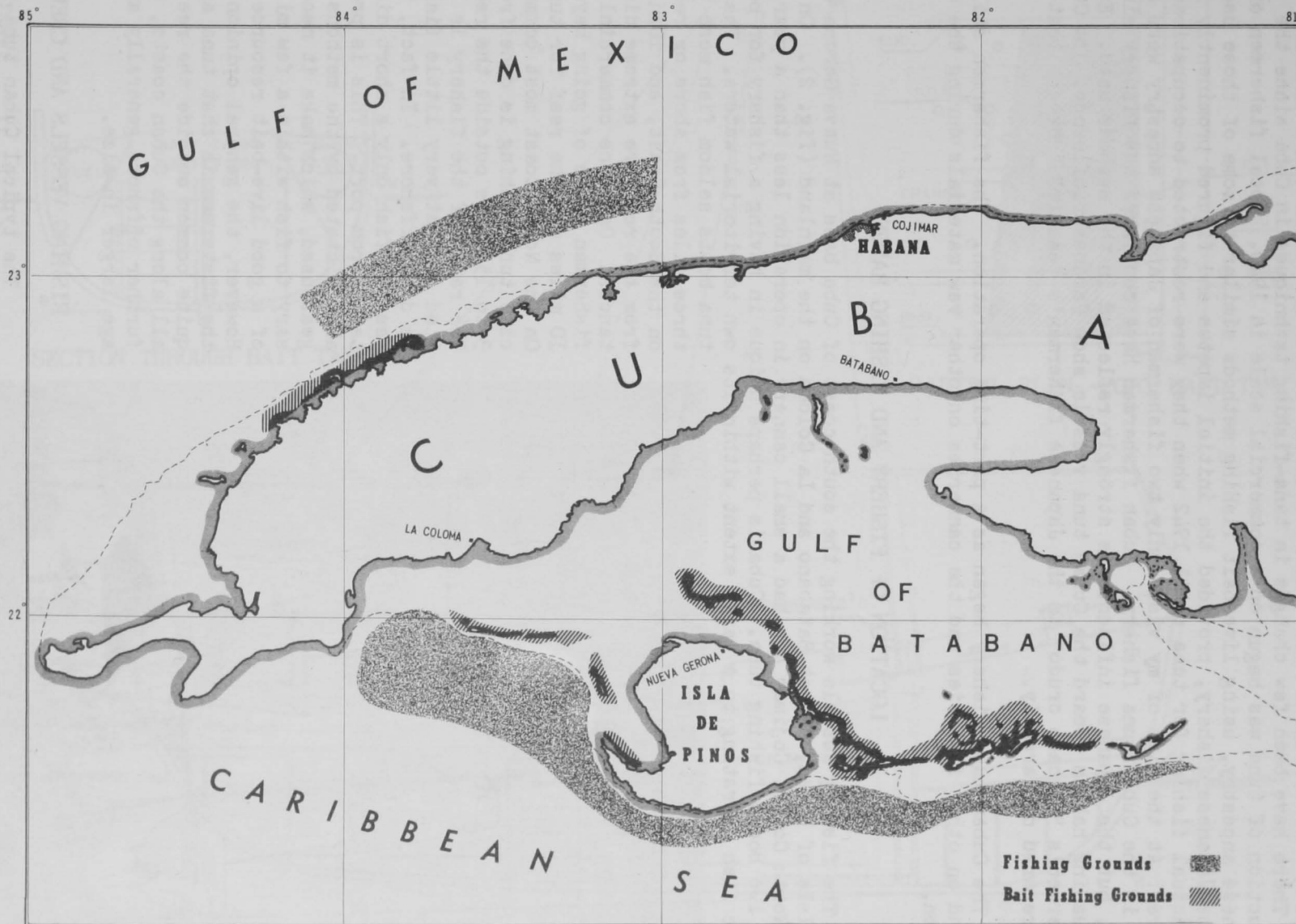


FIGURE 2 - WESTERN CUBA, SHOWING TUNA AND BAIT FISHING GROUNDS.

HISTORY

There have been few changes in tuna-fishing techniques in Cuba since the production of tuna was begun on a commercial scale in 1940. Local fishermen of Japanese ancestry, using live-bait fishing methods similar to some of those used in the Japanese fishery, provided the initial impetus and figured prominently in the actual fishing for tuna until 1942 when they were restricted to occupations ashore. At the time of my visit only two fishermen of Japanese ancestry were active in the Cuban tuna fishery. Cuban fishermen have continued the fishery since 1942, but the Japanese influence is strongly reflected in the methods used. Even the eating habits aboard the Cuban tuna vessels show Japanese influence. The Cuban fishermen's "pescado crudo" is the Japanese fishermen's "sashimi," except that it is prepared differently.

The Cuban tuna fishery began as a part-time operation. The fishermen still depend on other fisheries and the canneries on other raw materials during the off-season.

LOCATION OF FISHERY AND FISHING RANGE

The fishing vessels working the south coast of Cuba base at Nueva Gerona on the Isle of Pines, and at Batabano and La Coloma on the mainland (fig. 2). On the North Coast, Cojimar has had a small cannery in operation less than a year, with two boats fishing tuna. Cuba is perhaps unique in having a fishery for pelagic fish operating to a large extent within its own territorial waters. The

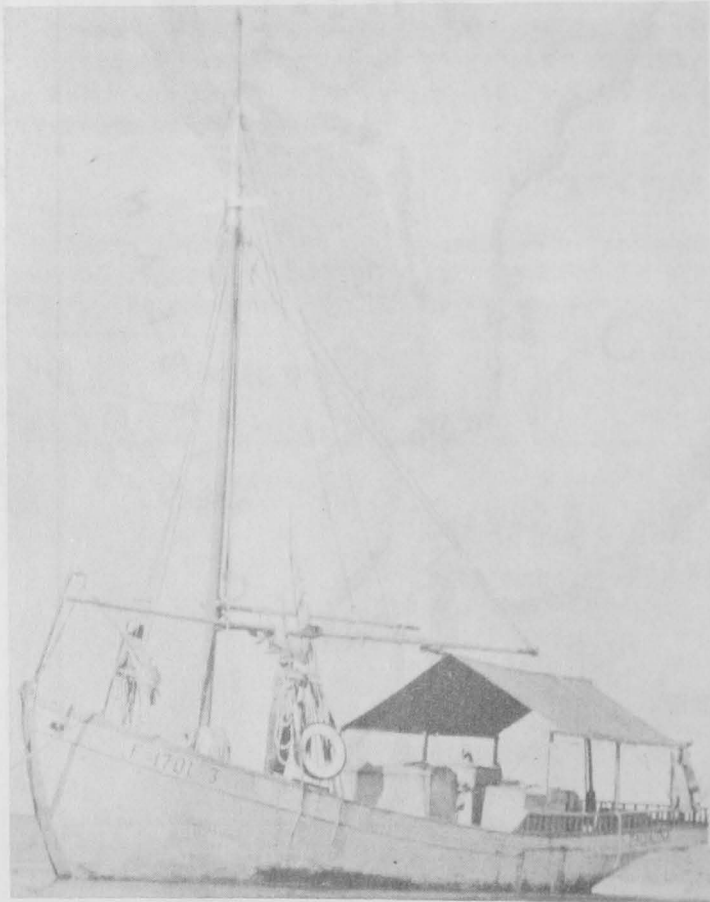


FIGURE 3 - THE CUBAN TUNA-FISHING BOAT MAGDALENA.

tuna boats seldom fish more than three miles from shore or reef on the South Coast, and 10 miles from the reef are extreme distances. Only one commercial fisherman spoke of going beyond 10 miles off the reef for tuna. On the North Coast most commercial tuna fishing is done from 3 to 15 miles outside the reef. The range of the fishery is limited so that very little fishing is done offshore. In fact, the vessels fish only a short distance from port. This is probably dictated by the methods and gear used, which make it necessary to fish within a few miles of a good live-bait resource. However, the general opinion of the fishermen is that tuna are quite common outside the reefs all along the Cuban coasts, and further offshore generally average larger in size.

FISHING VESSELS AND CREWS

The typical Cuban tuna-fishing vessel (fig. 3) is a modified sloop with a gaff-rigged main-sail, usually with a flying jib.

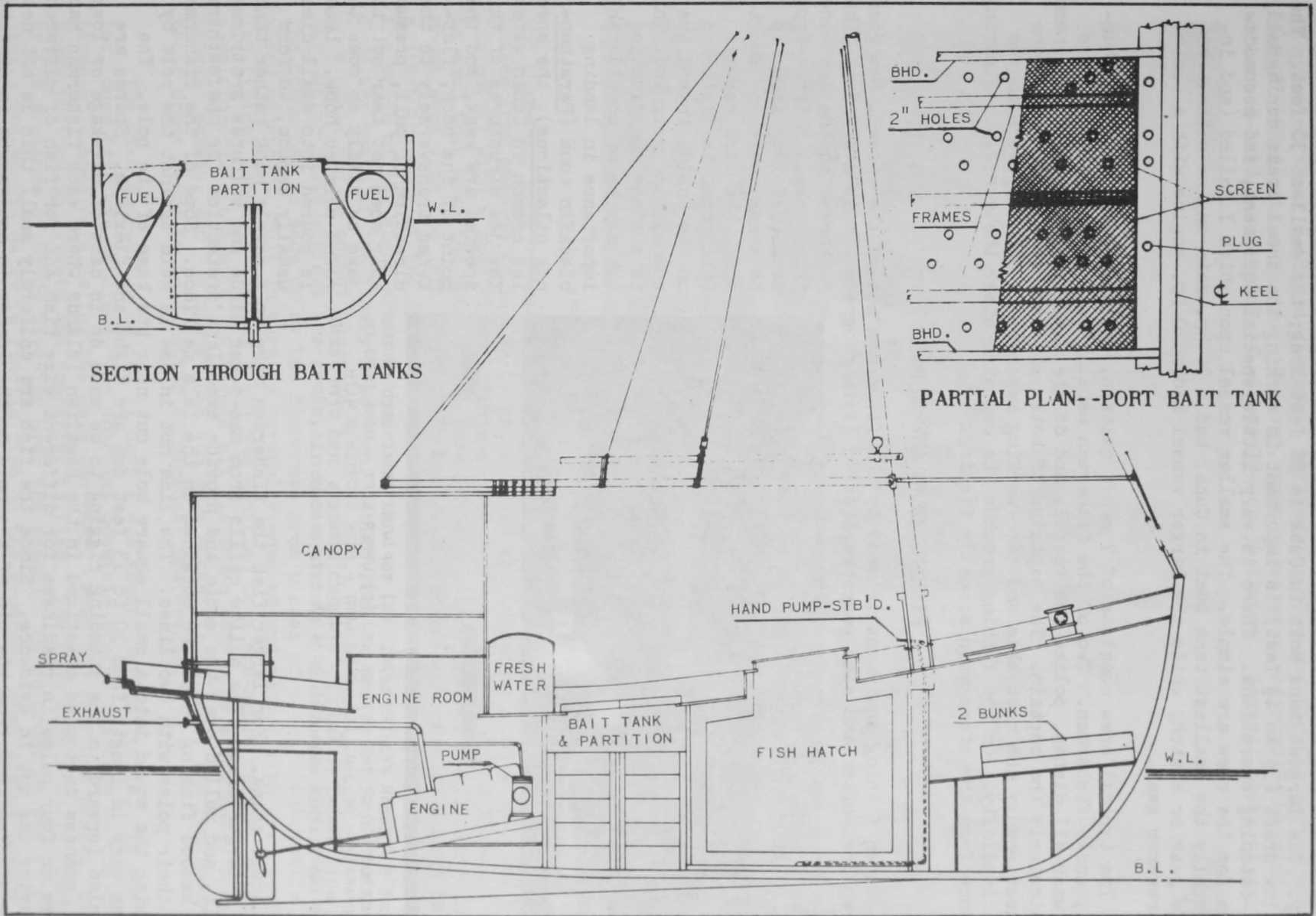


FIGURE 4 - INBOARD PROFILE OF CUBAN TUNA-FISHING BOAT SHOWING TYPICAL ARRANGEMENT.

The sails are not used regularly, but are still carried aboard in case of emergency. The largest tuna boat in Cuba is 58 feet long; the smallest 30 feet. The shallow draft ($3\frac{1}{2}$ to $4\frac{1}{2}$ feet) is important in working the shoal areas during daily bait-catching operations. There is very little special equipment, and accommodations for the crew are simple. The smaller vessel upon which I sailed (and incidentally the smallest tuna boat in Cuba) had a 30 hp. main engine without reverse gear or clutch, while the larger vessel had a 70 hp. engine with a clutch and reverse gear.

The typical crew consists of 7 men: captain, engineer-cook, majuero (chummer), and 4 fishermen. Two of the fishermen usually have an apprentice status and wash all dishes, police the vessel, and do the bidding of the older fishermen, particularly the captain. The captains of both vessels that I accompanied were unquestionably the most able and hard-working men aboard, and they were obeyed most implicitly. On the fishing grounds the captains steer the vessels. Steering is done from the stern when actually fishing.

FISHING GEAR AND METHODS

Cuban fishing equipment is made by the fishermen aboard the vessel. New gear is required often and some gear preparation is in progress almost every day. The

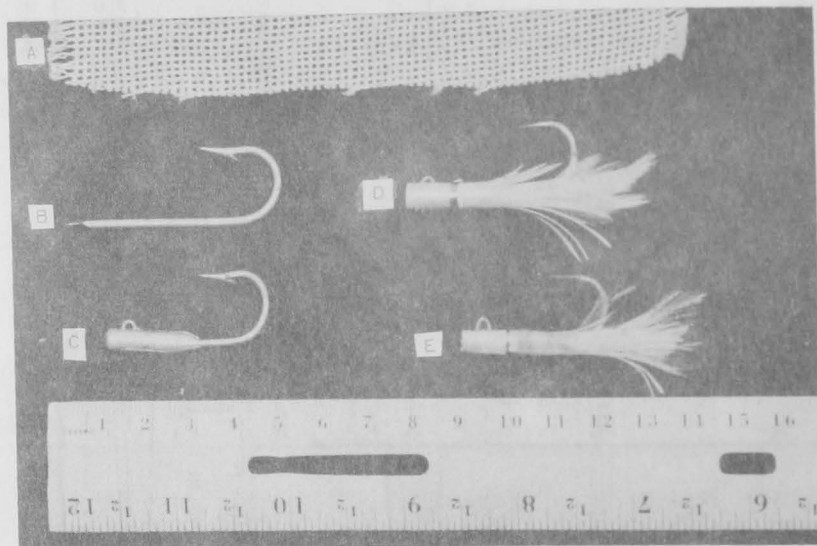


FIGURE 5 - CUBAN FISHING GEAR. (A) TOP - MATERIAL USED IN THE CONSTRUCTION OF THE BAIT SEINE. (B) UPPER LEFT - HOOK USED IN PREPARATION OF JIG. (C) LOWER LEFT - HOOK SHORTENED WITH WEIGHTED SHANK. (D AND E) - FINISHED BARBLESS JIGS WITH FEATHERS AND FEATHER GUARDS MADE OF FRIGATE BIRD QUILLS.

feathered squids are made from a small halibut-type hook ($\frac{5}{8}$ inch from tip to shank) which is shortened, the barb removed (the point is flattened on the inside toward the shank), and weighted. This is a minor modification but may be of considerable importance in landing blackfin tuna (*Parathunnus atlanticus*), the species common in Cuban waters. The jaw structures of this species are weak, and the point of the hook, flattened transversely to the direction of pull, presumably does not tear out the jaws as easily as does the round pointed hook. Lead is poured into small dies, usually bamboo, to form

the squid shank. For larger fish the fishermen make up a double hook rather than use a larger size. The hollow quills from man-o-war birds and vultures are trimmed, split, and pulled over the squid and provide excellent protection for the feathers. The bamboo fishing poles are obtained on the Isla de Pinos. Some of the fishermen rig their poles with two lines. The line not in use is held against the pole by hooking the squid into a small square hole cut near the base of the pole. The poles vary in length from 10 to 13 feet and are light and flexible. Spares are carried forward in the standing rigging to be made up in case of breakage or loss. The Japanese custom as practiced in the Hawaiian Islands where each fisherman has three or four poles in readiness for different size fish and for fish of different behavior was not in evidence. Since the fish are uniformly small this is not necessary. The line from the tip of the pole to the leader is equivalent in diameter

to 30- or 36- thread hard-laid seine twine. The preferred material is four strands of nylon of about 6-thread diameter, twisted together and tightly served with a hard-finished cotton thread. However, many poles were observed to be made up with hard-laid seine twine of either 30- or 36-thread. Several types of swivels

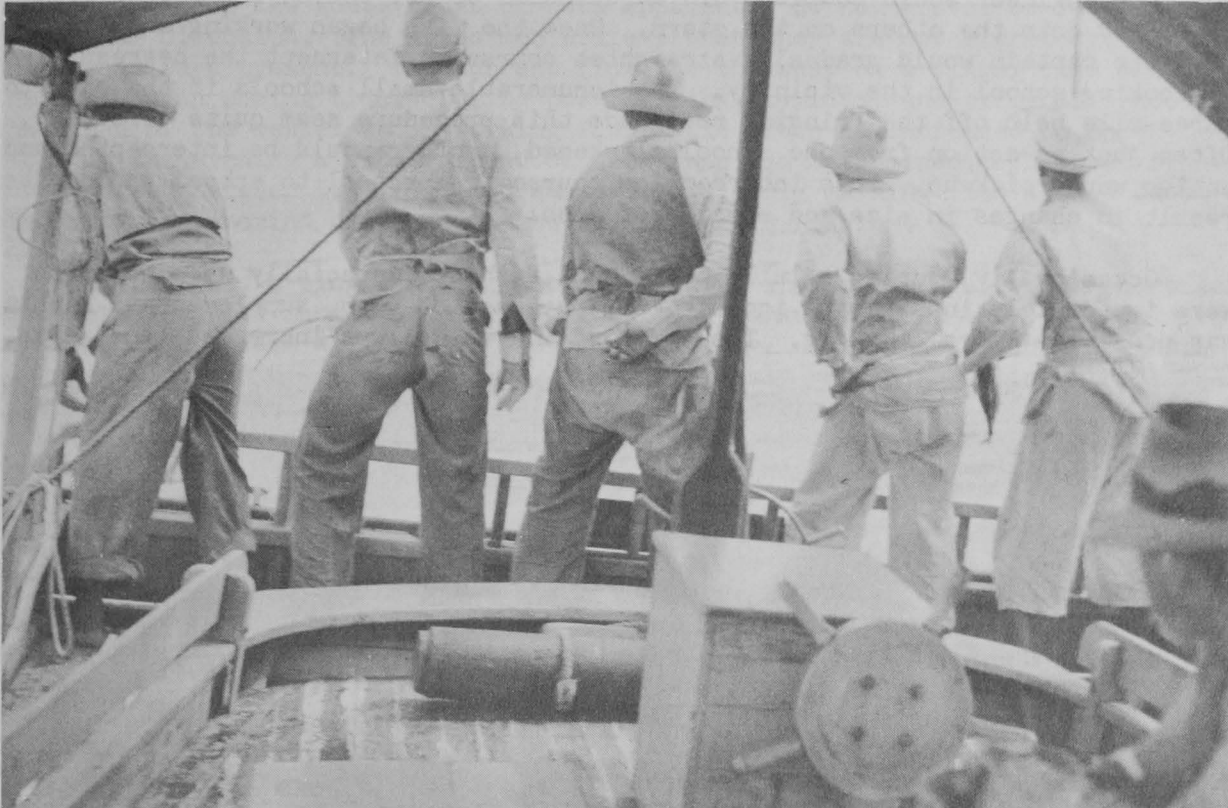


FIGURE 6 - FISHING OFF THE STERN OF THE MAGDALENA.

and snap-ons, some homemade, are used on the end of the line. The leader wire (30 inches from snap-on to squid) is No. 6 (.016 inch diameter with a 58-pound breaking point) with a special dull finish. The over-all length of the line and leader is such that when the butt of the pole is in position the hook will swing in just about even with the left armpit. As the fish swings inboard it is caught solidly against the body of the fisherman with the left arm. The pole is then cradled in the crook of the right arm and the right hand is brought over to remove the hook from the mouth of the firmly held fish. While fishing the base of the pole rests in a small bag or socket suspended with a piece of line around the waist. This bag, which rests against the groin, is the equivalent of the American harness. The Cuban bag is made up by the fishermen from pieces of a small automobile tire wired together. This in turn is carefully covered and padded with sewn burlap. The typical Japanese fishing dress was modified to a one-armed canvas jacket with a reinforced left armpit. Although all fishermen wear wide straw hats, one-armed canvas jackets, and "jolongos" (as the pole socket is called), the remainder of their dress seems to be a matter of personal preference.

The fishing routine on the 11 days I was aboard varied little. In the morning, once bait was obtained, the shortest possible course was made to the one- to three-mile area paralleling the keys and reef. When the reef was passed, all hands began putting on jackets and preparing to fish. The fish were usually found first by the presence of birds hovering over the school. On no occasion was there more than a ten-minute delay in finding fish on the grounds. When coming toward fish the procedure was to slow the speed of the vessel to approximately two knots, and

circle wide to port or starboard throwing handfuls of bait off the starboard side, amidships. If fish broke water in the wake, which was always watched very closely at this time, the spray system would be started on the stern and pole fishing would begin. The captain would steer from the extension wheel as shown in figure 6. The engineer would complete his adjustments below, batten the engine-room hatch and join the others on the stern. Once the fish began working and biting well the captain would gradually straighten course to intercept the nearest likely-looking school in the vicinity. The innumerable small schools in the one- to three-mile belt off the fringing reef made this procedure seem quite effective. Often just as action from one school slackened, another would be intercepted and action would pick up. This interception course from school to school would often result in changes in size and species of fish.

Occasionally, during a lull in the bait fishing, especially when no birds were immediately in sight to indicate the presence of fish, supplementary fishing was done with a trolling jig. The speed of the vessel was increased, and a jig



FIGURE 7 - TUNA STRIKING NEAR THE STERN.

strike would usually be followed by circling and chumming. The effectiveness of this method of finding fish was rather poor, as often the strike would be a barracuda or dolphin. The small tuna, especially the blackfin, usually tore off the jig even at the comparatively slow speeds of 5 to 7 knots, and in all cases the fish taken had the throat torn and the neck broken. (These conditions parallel the experience of the U. S. Fish and Wildlife Service's Oregon with the blackfin tuna in the Gulf of Mexico.)

Considerable time was spent by the Cuban fishermen in "string" chumming on little or no signs of fish. This seemed a very extravagant use of bait, but was explained on the basis of the inevitable bait mortality. The expenditure of bait is not only conditioned by the fish encountered and the way they bite but how crowded the bait is in the tanks, the appearance of the bait, the time of day, and the quantity left. The tuna often came in ahead of the stern of the vessel and intercepted the bait as it worked toward the stern. The fishermen work from the stern

only, and make no effort to work the quarter of the vessel. The spray nozzles send all water directly astern. This spray resembles a shower of feed and helps to obscure the fishermen and vessel.

The tuna on the south coast of Cuba apparently do not travel or feed in any particular direction. The fishermen believe that they are not migratory, and that some are always present. The current flows to the west on a rising tide and to the east on an ebbing tide. During pole fishing in midday and early afternoon, the speed of the vessel while working fish would often be increased to three knots. Later in the evening a slower speed of two knots was maintained. The best fishing occurred between 5:30 p.m. and sundown. No early morning fishing was done as during that period bait was caught for the day's fishing.

In trolling, a single No. 7 barbed hook with shaped eye was used. Short sections of discarded manila rope were combed out, worked through the eye, and seized to the shank to form a primitive but effective jig. A single strand of pliable 20-gauge wire was used for trolling line (it greatly resembles baling wire). These lines when taken in were made up quickly by making figure-eight loops from palm to elbow. The fishermen explained that the wire was used to get greater depth for the lure.

The birds seen over the fish in the south of Cuba were not identified. Mention should be made of the common occurrence of one or two large sharks in schools of tuna. The sharks, which the fishermen ignore, do not attempt to take tuna as they are caught, and the fishermen often work their squids right on the shark's back. However, occasionally a large barracuda appears. When this happens, two or three of the men immediately stop tuna fishing and catch and remove the barracuda from the school of tuna.

BAIT

The live bait used by the Cuban tuna fisherman is primarily the majua (Jenkinsia lamprotaenia), a very small fish about 1 to 1½ inches long. This species schools well, follows the boat, and lives an average of one day in the Japanese-type bait wells. A second species called cabezona by the Cubans and hardhead by Americans (Atherinomorus stipes) is taken indiscriminately with the majua and is

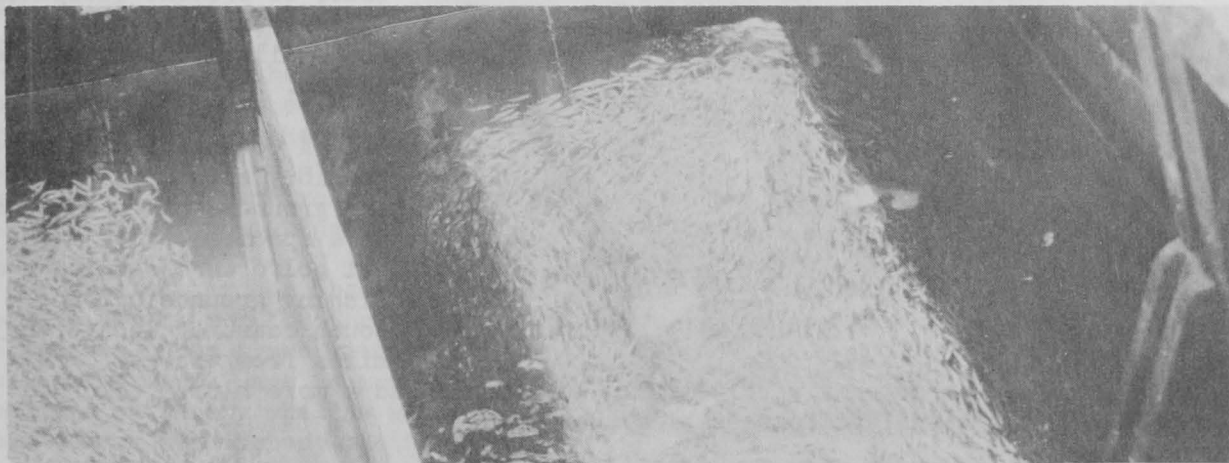


FIGURE 8 - MAJUA IN THE BAIT WELL.

usually considered by the fishermen as identical. It is quite different in appearance, however, and is the more hardy of the two species. These two bait species are the stand-by of the Cuban tuna fishery. There is an anchovy (called the *catucuche* by the Cubans) which, according to the fishermen, would rival or surpass either of the bait fish mentioned if they would live in the tank. Except on rare occasions, when small numbers are taken and there is no crowding, the *catucuche* will not live to reach the fishing grounds. When taken in a bait net in large numbers, they are released by the fishermen and no attempt is made to use them. Another bait fish, *sardina de ley*, is used occasionally, but they are much larger, occasionally growing to six inches. They are not sought out for bait, but are taken along with the *majua*. The fishermen spent considerable time telling me of the importance of the lunar cycle in predicting the presence, size, and hardiness of the *majua*.

After the day's fishing was concluded, there always remained a scoop or two of bait in the tank. The tank would then be emptied of all dead bait, and the inboard plugs (shown in fig. 4) removed. The eviscerated catch of tuna would be dumped in this tank for washing and then iced-down in the fish hatch. The holes were left open overnight.

The following morning all the bait left over from the previous day would be found alive and active, which suggests that probably the high bait mortality is



FIGURE 9 - THE FLOATING BAIT RECEIVER BEING TAKEN TO SHALLOW WATER.

due to poor water circulation and overcrowding. Although the open holes at the bottom of the tank were not plugged until a quantity of new bait was added, the old and new bait did not escape. The fishermen contend that *majua* and *cabezone* will quickly escape from a hole in the sides of a vat or well, but will not go through a hole in the top or bottom. This is undoubtedly the reason the floating bait receiver was lined with webbing on the sides to prevent escapement of very small *majua*, and not similarly lined on the bottom.

A potential bait source possibly exists on the fishing grounds. Huge schools of a species called *majua del golfo* were seen on the fishing grounds off the south coast of Cuba 2 or 3 miles from the reef. Ex-

cept for the fact that they were a little larger and had a more bluish color on the back, the *majua del golfo* resembled the *majua*.

The prime source of the *majua* used for bait is the waters surrounding the innumerable keys in the Gulf of Batabano and, in particular, the keys most accessible

to the reef and to the passage to and from Nueva Gerona and the fishing grounds. The bait is most abundant in water from 3 to 5 feet in depth over eel-grass bottom but is also found over sandy bottom, shoals, and protected and exposed reefs.

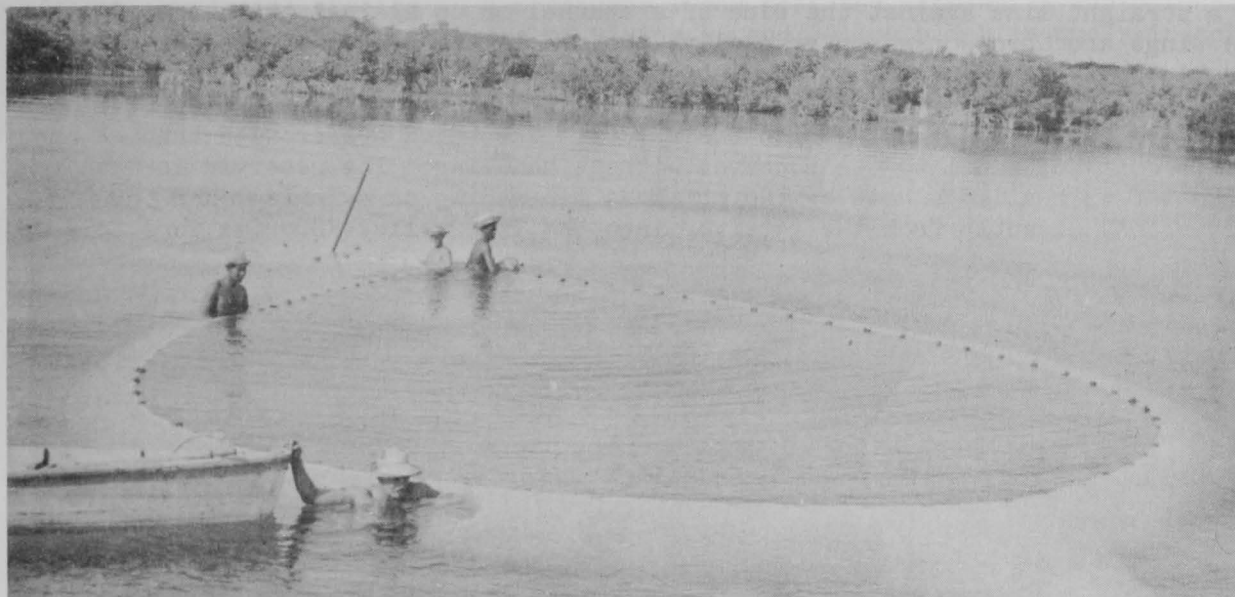


FIGURE 10 - NET FULL OF BAIT READY FOR TRANSFER TO THE RECEIVER.

The fishermen claim that majua exist in all Cuban waters but are particularly abundant in protected shoal areas. Although there is a sufficient supply available most of the time, there was some expression of concern over the occasional bait scarcity. Few of the fishermen that I met on the South Coast had much experience in other Cuban fishing areas, but many believed the Gulf of Guanacabibe north of Cape San Antonio and the northeast coast of Cuba back of the fringing reef have an abundant supply of majua. The fishermen emphasized the marked fluctuations of availability of bait. It was either very abundant in many areas or scarce in all areas.

The gear used to catch bait consists of a 12- to 15-foot flat-bottom skiff, a 20- to 35-fathom bait net, and a floating bait receiver. The bait net is 4 feet deep on the wings, 7 feet deep in the center where the bag tapers to a square, and is sewn to iron or brass rods to make a square opening the same size as the sliding door in the receiver. The usual procedure in taking bait is for the large vessel to approach a key as close as the shallow water will permit and for the skiff to proceed from there with two men. The majua are sometimes found in extremely shallow water, as little as six inches deep. The fishermen do not seem to be worried about the majua escaping

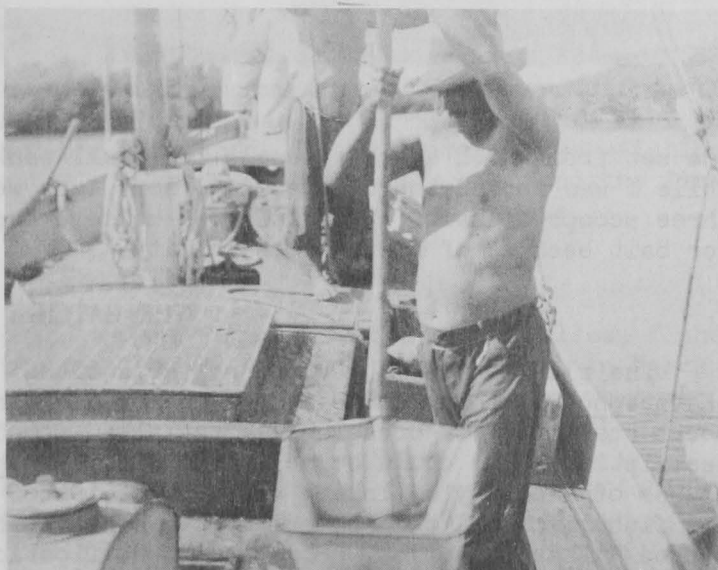


FIGURE 11 - TRANSFERRING MAJUA FROM THE RECEIVER TO THE BAIT WELL WITH A DIP NET.

after they are located, although it may occasionally take many hours in the skiff to find a suitable school. Most sets with the bait net are made from the skiff with one man rowing and another paying the net off the stern. The majua, when frightened or crowded, head into deeper water, so often the bait net is paid out in a straight line against the side of a channel or up against the shore of a key. The wings are then worked in gradually, the man in the center of the net working the bag into deeper water and forming an area for the majua to school in. Meanwhile the wings are moved around behind the fish to form a full circle. Then both wings are worked together down to the pocket. The majua are crowded through the sack of the net and into the receiver without handling. The receiver is then taken out to the large boat by two or three men wading or swimming, and the majua are scooped directly from the receiver into the live wells. Stories were told of



FIGURE 12 - BLACKFIN TUNA WITH LARGE PECTORAL FINS AND SKIPJACK WITH SMALL PECTORALS. A DOLPHIN IS IN THE FOREGROUND.

one set from which 4 or 5 vessels took full tanks of bait, with many majua released. While I was aboard the two vessels, some sets were made on as little as two or three scoops of bait. The fishermen believe certain areas in Cuba are overfished for bait because of their accessibility.

THE CATCH

The blackfin tuna (Parathunnus atlanticus) and the skipjack or oceanic bonito (Katsuwonus pelamis) comprise the commercial tuna catch of Cuba. Fishermen on the south coast talk of occasionally taking 50-pound tuna, usually on a jig. From the description these could be yellowfin tuna (Neothunnus argenteivittatus). In the course of each day's fishing another species of tuna was taken in small numbers. The fishermen call this comeviveres. The flesh is dark and the fish are not accepted at the canneries. Positive identification was not made. On the South Coast the annual average size of both the commercial species as received at the canneries is about three pounds, with blackfin tuna accounting for 75 percent of the catch. On the North Coast the average size is 6 to 8 pounds, but skipjack account

for 75 percent of the catch. Several schools of mixed fish were abandoned by both the Atun and Magdalena because the fish fell below the one-pound minimum size accepted by the cannery. The canneries were reluctant to accept a load in which one-pound fish exceeded ten percent of the total catch. The smallest tuna of both commercial species in the catches I saw measured between $7\frac{1}{2}$ and 9 inches in total length. Fishermen spoke of taking 4- and 5-inch blackfin and skipjack

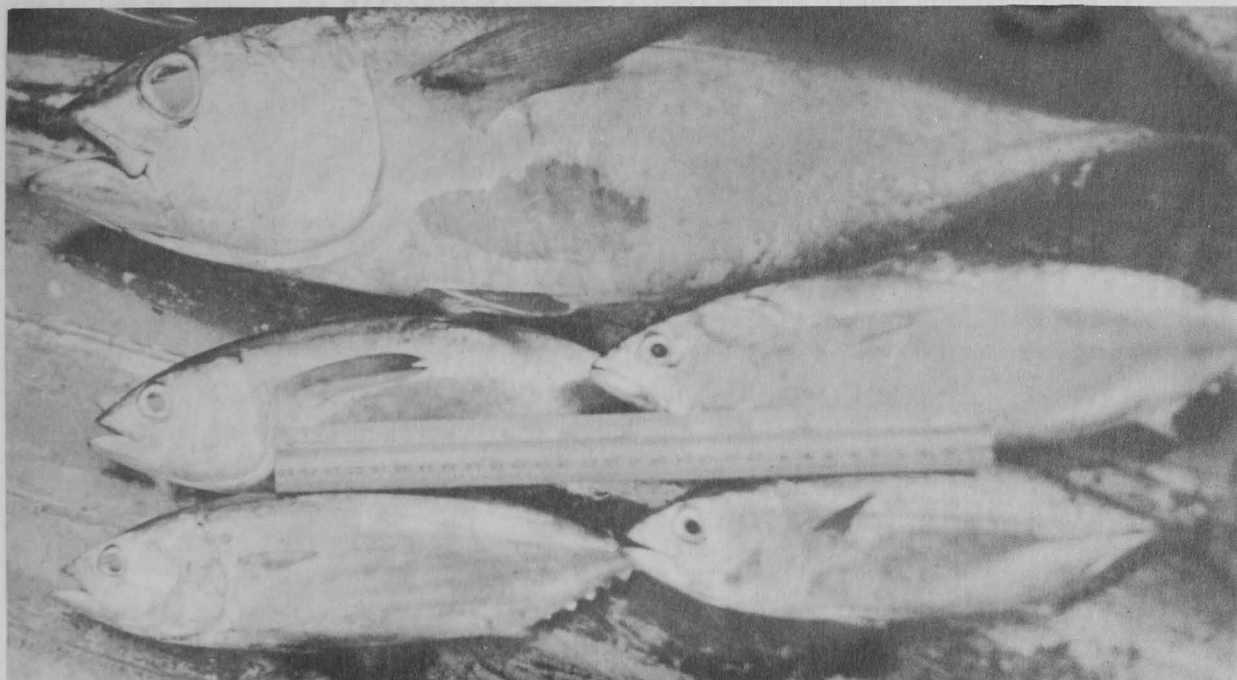


FIGURE 13 - BLACKFIN TUNA, UPPER AND UPPER LEFT, AND THREE WHITE SKIPJACK.

tuna in August 1951, and also mentioned finding many smaller than this in the stomach contents of the catch. A specimen $1\frac{1}{2}$ inches long taken from the stomach of a 4-pound blackfin was identified as a young blackfin by Giles Mead of Stanford University.

During the six days I spent aboard the Magdalena, 1,180 fish were taken weighing approximately 3,200 pounds eviscerated. Twelve hours were actually spent on the fishing grounds. The rest of the time was spent in traveling to and from the fishing grounds and looking for bait. The catch was better than average for the season. Five days were spent aboard the Atun and 1,100 fish were taken weighing approximately 3,400 pounds eviscerated. Twenty-one hours were spent on the fishing grounds. The usual trip from the Isle of Pines takes from 4 to 7 days.

SEASONS

In 1951 most of the bonito boats, as the Cuban tuna boats are called, fished tuna the entire year for the first time. Before this the season began in March or April and ended in September or October. The interim period, November through February, was spent by the same vessels and crews fishing for spiny lobster.

I was unable to determine whether this sudden change to year-round fishing was brought about by an unusual cycle of abundance, pressure from boat owners, unusually good weather (bad weather could understandably drive the fishermen from the open-water tuna grounds to the more protected spiny lobster grounds in the Gulf of Batabano), or a combination of these circumstances. The tuna are very abundant early in the season, bite well, but are very small. The men aboard the Magdalena

reported an 8,000-pound day in April 1952, consisting of two-pound eviscerated fish. Toward the end of the season (September-October) the fish are larger, less abundant, and do not bite so well.

I was able to spend one day at sea off the North Coast aboard a sport-fishing vessel. Excellent trolling was found 10 to 12 miles north of Havana. Skip-jack (10 to 15 pounds each) were taken along with blackfin (5 pounds each), both



FIGURE 14 - PART OF AN AFTERNOON'S CATCH READY FOR ICING.

from the same schools. Many schools were seen in every direction, and the use of binoculars showed more bird signs beyond the range of normal vision. These fish were generally fast moving, feeding, and working toward the west. This was said to be their normal direction of movement in the area.

PROCESSING AND MARKETING

The processing of tuna, as well as most of the fishing, was on a part-time basis in 1952. Five companies operated 7 canneries, working on tuna for some portion of the year; two at Batabano, two at LaCaloma, and one each at Nueva Gerona, Pinar del Rio, and Cojimar. Estimates of the Cuban pack for 1952 are upward of 100,000 cases (24 cans, about $9\frac{1}{2}$ ounces each) labeled "Bonito en Aceite" to compete with a similarly-named product imported from Spain. The local product retailed at 42 to 45 cents a can in 1952, while the similar Spanish product retailed up to 75 cents a can. It is estimated that local production would satisfy about 85 percent of the Cuban market demand in 1952.

The tuna were produced by 23 boats, 21 of them fishing on the South Coast. The Magdalena produced 60 tons of eviscerated tuna in 1951. The Atun produced

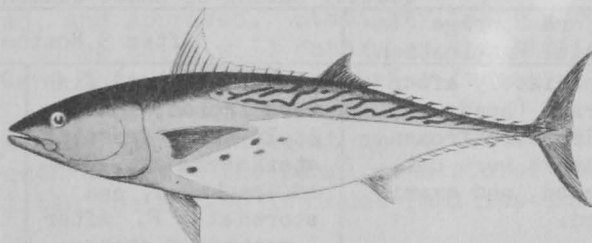
35 tons in the period from April to the end of August 1952. Estimated total tuna landings for 1952 are approximately 1,300 tons of eviscerated fish. The tuna-fishing boats are owned by the canneries or the cannery operators and the fishermen are paid on a share basis. The tuna price in 1952 was \$200 a ton with no species differential. Under the share system, the cost of fuel, lubricating oil, ice, and water is deducted from the gross. Of the remaining amount the boat owner gets 25 percent and the fishermen share 75 percent equally. The fishermen pay for the provisions. Usually the captain receives 10 percent of the boat owner's share in addition to his regular share as a fisherman.

ACKNOWLEDGMENTS

Extremely helpful in making arrangements for collecting the information contained in this report were Mr. Guy Bush, Agricultural Attache of the United States Embassy at Havana, Dr. Gerardo Canet, Banco de Agricola e Industriales de Cuba, and Mr. Casimiro Tellaeché. I am also indebted to many other persons connected with the Cuban fishing industry for assistance, particularly to Captain Enrique Marrero of the fishing vessel Magdalena and Captain Filipe Canoa of the Atun, and the crews of these vessels.



"LITTLE TUNA" OF THE ATLANTIC AND GULF COASTS



LITTLE TUNA
Euthynnus alletteratus

Recent developments offer some encouragement for the commercial canning of "little tuna," Euthynnus alletteratus, along the Atlantic and the Gulf Coasts. For many years this fish has been caught in varying amounts in these areas. From Cape Cod to the Florida Coast, and also along the Gulf, the little tuna has been reported in abundance at certain seasons of the year. It has also been reported to be in fair abundance in various parts of the Caribbean Sea.

—Fishery Leaflet 353