

Exploratory Fishing for Tunas in the Mona Passage

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Abstract

The Institute of Marine Biology of the University of Puerto Rico is conducting a two year study of commercially available tunas off Western Puerto Rico. Ancillary studies of local hydrographic features, bait fishes, and the biology of tunas are carried out routinely in conjunction with the exploratory fishing for tunas in an effort to relate tuna distribution to ecological factors.

The 63 foot T-Boat M. R. V. CARITE has been converted for longline fishing. Periodic fishing and hydrographic stations are made in the Mona Passage and adjoining areas. Longlines have been variously modified but as yet have been unsuccessful in capturing fishes in the Mona Passage. Feather jigs trolled continuously from the CARITE have captured several different species of scombroid fishes.

In addition to hydrographic data collected aboard the CARITE, physical data from the Mona Passage have been received from the National Oceanographic Data Center and are summarized by areas of 100 square miles. Differences in surface temperature and differences in the thickness of the surface layer are summarized by month.

FISHERY RESOURCES IN THE CARIBBEAN have been virtually unharvested due to a lack of capital and sufficient knowledge of the distribution and availability of commercially important fishes. Although there are many kinds of edible fishes around Puerto Rico there is no large fishery for any individual species. Tunas which are cosmopolitan in tropical seas are found throughout the Caribbean, but they have not been fished intensively. Over 200 Japanese longline vessels are currently fishing in the Atlantic Ocean, and several of these have been reported in the region of Puerto Rico and Hispaniola.

Tunas have been observed around the Island of Puerto Rico, but very little is known about them. Erdman (1956) lists seven species of tunas for Puerto Rico: the wahoo (*Acanthocybium solandri*), the little tuna (*Euthynnus alletteratus*), the skipjack tuna (*Euthynnus pelamis*), the bigeye tuna (*Thunnus obesus*), the blackfin tuna (*Thunnus atlanticus*), the yellowfin tuna (*Thunnus albacares*), the bluefin tuna (*Thunnus thynnus*), and the albacore (*Thunnus alalunga*). Nichols (1929) reported the frigate mackerel (*Auxis thazard*) from Puerto Rico.

In order to learn more about tunas, their abundance, and distribution around Puerto Rico, an exploratory pelagic fisheries study is in progress at the University of Puerto Rico's campus at Mayaguez. Operating funds have been provided by research grants 14-171-0007-196-(G) and 14-17-0007-241 (G) from the Bureau of Commercial Fisheries of the United States Fish and Wildlife Service. The 63 feet long T-boat, M.R.V. CARITE, of the University has been converted for long line fishing, trolling, and for bait trawling.

Puerto Rico is a heavily populated island with 644 people per square mile according to a recent census. The total fish consumption is very high, yet most fish are imported. In 1962, 7.8 million pounds of fishes were captured from the sea and fresh waters of Puerto Rico. In that same year the fishery imports amounted to 85 million pounds. Of those, about five million pounds originated

in the United States. Great fisheries expansion is needed before the domestic landings can expect to meet the demand for fish. Although inshore fisheries are somewhat limited in total production, the pelagic resources may prove to be more extensive.

Only the fishermen at the northwestern corner of the island have begun to harvest the offshore tunas, and even this production is low. Crashboat Beach, to the north of Aguadilla, is the base for about 45 fishermen; a few tuna fishermen leave from Aguadilla and Mayaguez. Most of the fishing is done between Point Jiguero and Desecheo Island and the area called the Rabos. This latter name is applied to the outer edge of the very wide continental shelf lying off the northwest corner of Puerto Rico.

Most of the tuna fishermen go to sea in open dories or "yolas," many of which have outboard motors. Some of the Mayaguez fishermen use small speedboats with outboard motors. Wire lines and feather jigs or dead bait are the principal fishing gear. When bait is abundant, it may be carried live in special wells built into the yolas.

BAIT FISHES:

Bait for the exploratory fisheries program is captured in otter trawls and in gill nets set from the CARITE. Most bait, however, has been purchased from local inshore fishermen who catch it in long beach seines and in shallow gill nets of $\frac{3}{4}$ -inch mesh. Puerto Rico is generally unsuited for trawling due to its rocky coastline and coral reefs, but a small area off the west coast between Mayaguez and Rincón has been trawled successfully. Common bait fishes captured in the otter trawl are: lookdown (*Selene vomer*), bumpers (*Chloroscombrus chrysurus*), and burrito (*Brachydeuterus corvinaeformis*).

The following species are frequently captured in gill nets and in beach seines: Atlantic thread herring (*Opisthonema oglinum*), yellow-billed herring (*Harengula humeralis*), half beaks (*Hemiramphus brasiliensis* and *Hyporhamphus unifasciatus*), and the young of two mackerels, the cero (*Scomberomorus regalis*) and the king mackerel (*Scomberomorus cavalla*).

Large concentrations of sardines and herring were noted off La Parguera, Cabo Rojo, Rincón, and Aguadilla, but were not taken in gill nets. These fishes should be available to lampara nets.

LONG LINE FISHING:

A total of 13 long line sets utilizing 2,380 hooks have been made in deep waters off Cabo Rojo, north of Aguadilla and Mona Island, and west of the following localities in deep water: Mayaguez, Añasco, Desecheo Island, and Aguadilla. Between 100 and 300 hooks were fished at each station. Both daytime and nighttime sets were made.

The longlines were variously modified in an effort to capture tunas. The main line of $\frac{1}{4}$ -inch diameter, black polypropylene was unaltered. Prolene branch lines were varied between 2 and 25 feet. Monofilament nylon leaders were twice used with #9 hooks instead of the standard size 38 Japanese longline hook. The buoy lines were varied between 10 and 200 feet.

To date, no tunas have been captured on longlines within the Mona Passage. Two large carcharinid sharks were caught during a night set, but they became so entangled with the line that they had to be cut free in order to recover the lines. Two silky sharks (*Carcharhinus falciformis*), 1000 mm and 1200 mm total length, were taken north of Mona Island. These were released in good

condition after they were marked with dart tags supplied by the Shark Tagging Program of the American Institute of Biological Sciences.

TROLLING:

Trolling from the *CARITE* has been more satisfactory than long line fishing. Several species of scombroid fishes were captured: blackfin, yellowfin, skipjack, and little tunas; frigate, cero, and king mackerels, and wahoo. Of these, the blackfin and skipjack tunas are most available in the region of Desecheo Island. They are captured when feather jigs are trolled at high speeds near flocks of feeding sea birds. The tunas are usually small, weighing between two and eight pounds. The schools appear to contain less than a ton or two of fish.

When a small speedboat with a 28 hp outboard motor was used for trolling in the region of Desecheo Island, between 100 and 200 pounds of blackfin and skipjack tunas were frequently captured in a few hours. The speedboat proved more successful than the larger and slower *CARITE* in keeping pace with the fast moving schools of fish.

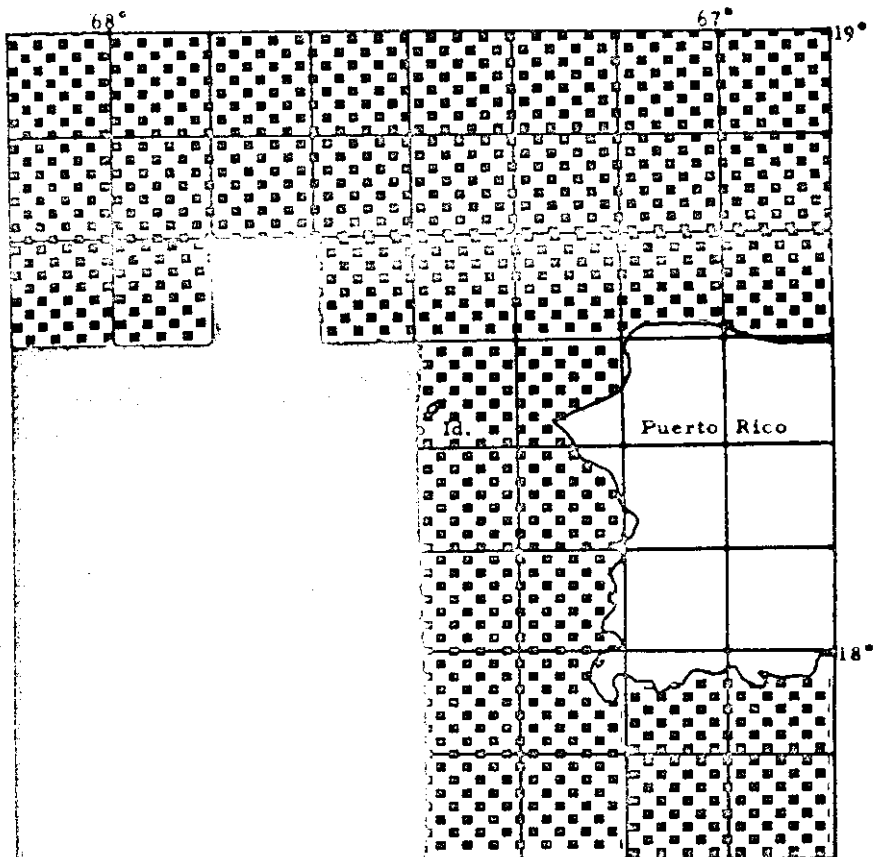


FIG. 1. Surface temperatures in the Mona Passage averaged over several years for the months of January and February. Black, 75.0-77.4F; Checkerboard, 77.5-79.9F; Fine dots, 80.0-82.5F; Coarse dots, over 82.5F.

Schools of the little tuna may be seen throughout the year off Aguadilla, Rincón, and Mayaguez. They are generally found inshore and are frequently seen in the murky waters adjacent to rivers. They are small, weighing between one and four pounds. Although no serious attempt has been made to catch them previously, monofilament nylon gill nets are being prepared to capture them.

COMPARISON WITH OTHER AREAS:

In addition to fishing in the Mona Passage, long lines were set north and northeast of San Juan, northeast of Fajardo, and around the Virgin Islands. Large yellowfin and albacore tunas were captured at the rate of one fish per hundred hooks. In addition, dolphin (*Coryphaena hippurus*), silky sharks, and a large mako shark were taken. Two silky sharks were tagged and released northeast of San Juan. Two additional sets were made southeast of La Parguera with a total of 250 hooks. One jack and one blackfin tuna

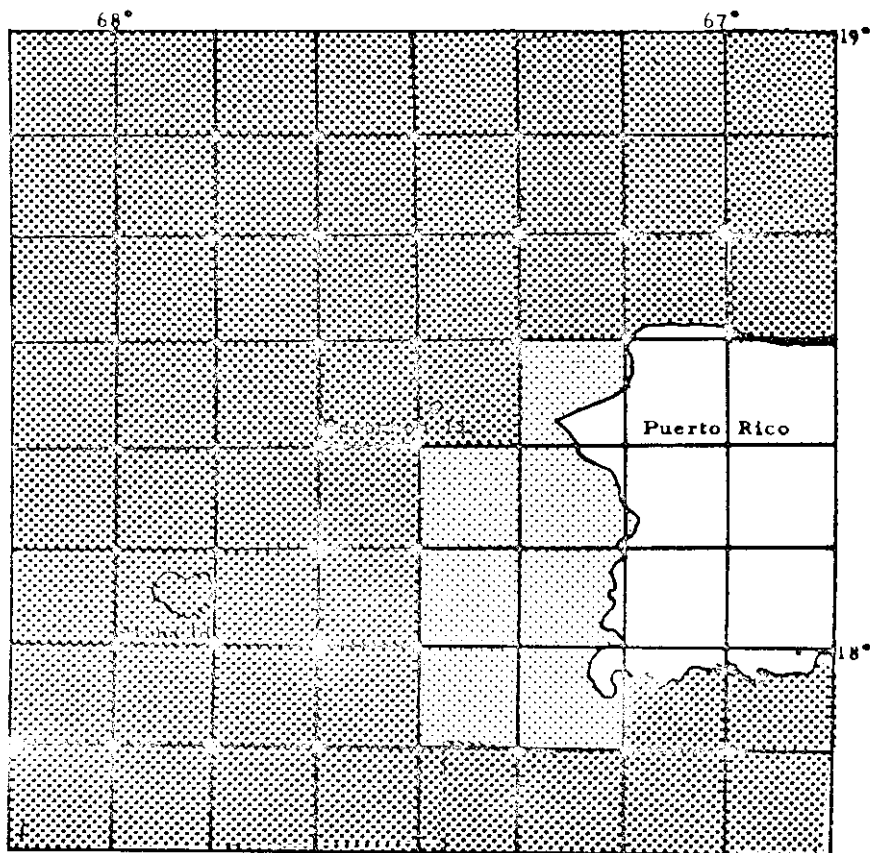


FIG. 2. Surface temperatures in the Mona Passage averaged over several years for the months of August, September and October. Black, 75.0-77.4F; Checker board, 77.5-79.9F; Fine dots, 80.0-82.5F; Coarse dots over 82.5F.

were caught. These sets were made aboard the M.V. SHIMADA of the University of Puerto Rico Nuclear Center. The cooperation of Dr. Frank Lowman and Mr. Donald Erdman in allowing me to accompany the SHIMADA is greatly appreciated.

ENVIRONMENTAL STUDIES:

Physical and chemical data are collected routinely at each station and periodically while the vessel is underway. These include temperatures and salinities from the surface and subsurface layers. In addition to my collections, hydrographic data have been made available through the National Oceanographic Data Center.

Sea surface temperatures and the thickness of the surface temperature layer have been averaged over several years and are plotted by areas of 100 square nautical miles.

The mean monthly temperature for surface offshore waters in the Mona

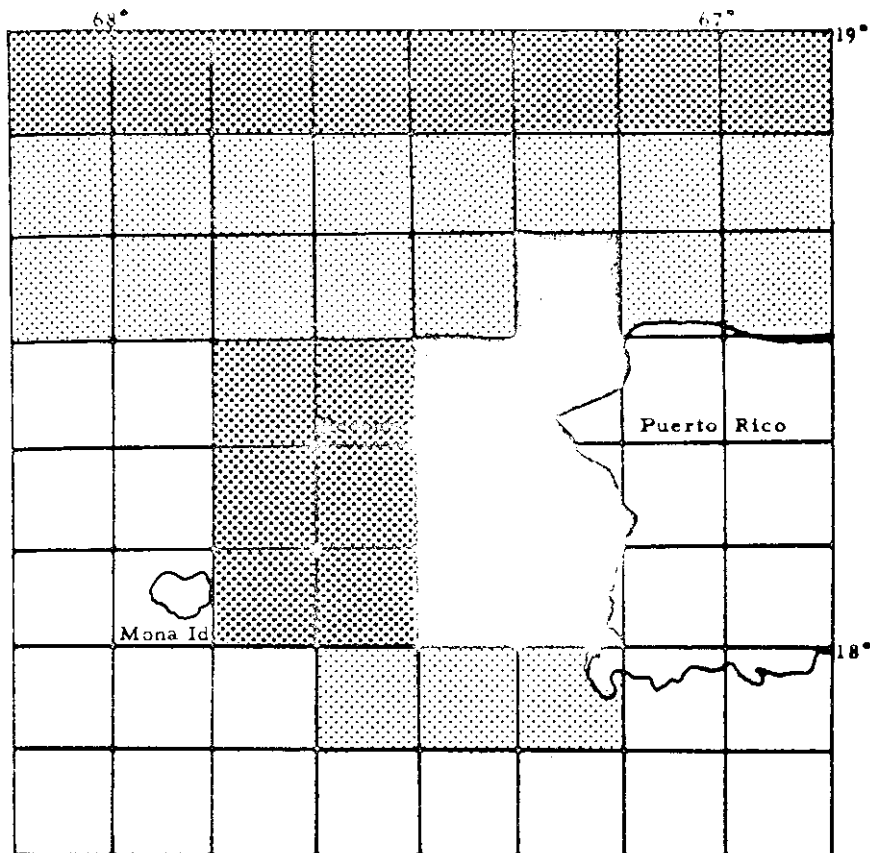


FIG. 3. Thickness of surface temperature layer in feet in the Mona Passage averaged over several years for the months of June and July. Black, over 300; Checkerboard, 200-299; Fine dots, 100-199; Coarse dots, less than 100.

Passage is 80.9F (standard deviation 2.1F). Below average temperatures occur between December and May; above average temperatures occur from June through November (Figs. 1 and 2). Extreme monthly averages range from 77.6F in February to 84.0F in September.

The mean monthly thickness of the surface thermal layer is 189 feet (standard deviation =75 feet). The layer is shallower from June to December with a June minimum of 83 feet (Fig. 3). It is thicker from January to May with a maximum of 317 feet in March (Fig. 4).

When surface temperatures and thickness of surface thermal layers are compared, a correlation coefficient of $r = -.815$ is found.

Surface salinities in the Mona Passage are generally high, in the magnitude of 36.5‰.

Surface currents flow from the south, but they are variable and many eddies are noted. Eddies are particularly pronounced around Desecheo Island and

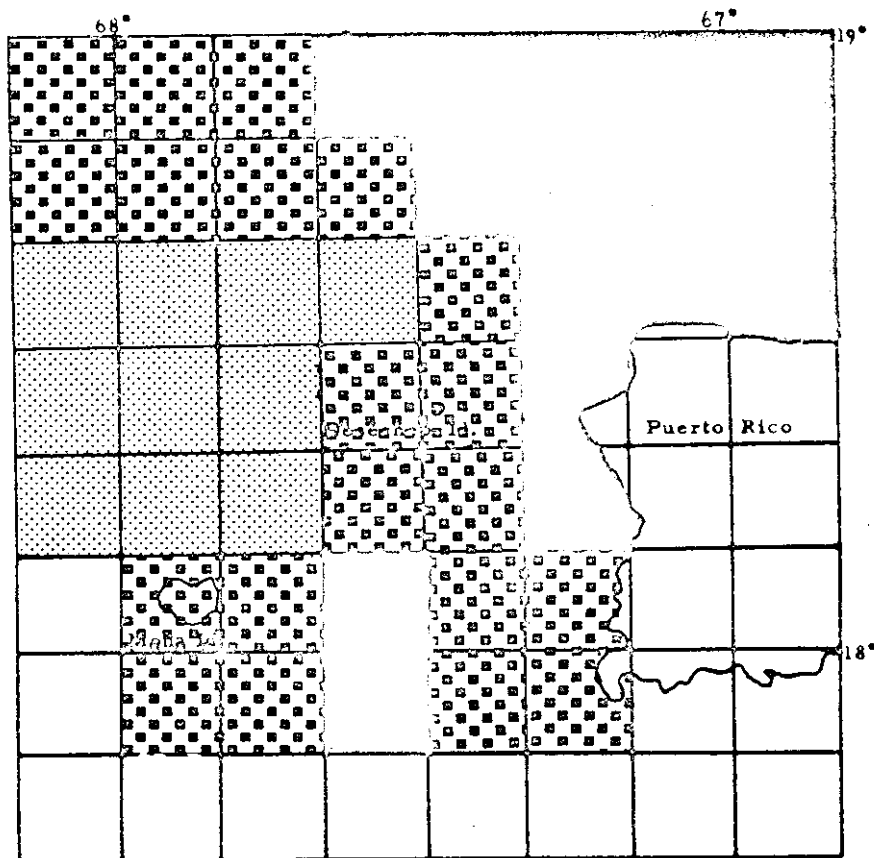


FIG. 4. Thickness of surface temperature layer in feet in the Mona Passage averaged over several years for the months of March and April. Black, over 300; Checkerboard, 200-299; Fine dots, 100-199; Coarse dots, less than 100.

Point Jiguero. The swell is generally confused about the latitude of 18°15'N. It is in this area that the northern swell meets with the swell from the south.

DISCUSSION:

The Mona Passage is not apparently rich in tuna resources. The largest concentrations are blackfin and skipjack tunas which may be taken on trolling gear, but not on long lines. Since these two species are rather small, it is assumed that the hooks and bait used were too large to effect their capture. The larger tunas, such as the bigeye, yellowfin, and albacore, are apparently absent from the Passage or may be occasional migrants through the area. The rather deep discontinuity layer may have an inhibiting effect on tunas, but there is no adequate evidence.

Tunas and other pelagic fishes landed at Aguadilla over a period of one year were recorded by one fish buyer and have been made available for this study through the Puerto Rico Department of Agriculture. Those data were compared with the average monthly surface temperatures and no correlation was noted: yellowfin $r = -.150$, blackfin $r = -.205$, and skipjack $r = -.196$. Although the temperatures are not directly related with the months of the year, the data clearly show that more tunas were landed during the months of May, June, and July than during the rest of the year. No catch per unit of effort data are available, but the Crashboat Beach fishermen claim that the fishing effort is rather consistent throughout the year.

LITERATURE CITED

- ERDMAN, DONALD S.
1956. Recent fish records from Puerto Rico. *Bull. Mar. Sci. Gulf Caribb.* 6 (4): 315-340.
- NICHOLS, JOHN T.
1929. The fishes of Puerto Rico and the Virgin Islands. Branchiostomidae to Sciaenidae. In: *Scientific survey of Puerto Rico and the Virgin Islands*, 10 (2): 159-295. N.Y. Acad. Sci.

The Benefits of Research and Training to Mexican Fisheries

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Abstract

The Mexican fishing industry is an important revenue producer. About 38,500 fishermen and ten thousand boats are utilized by this industry. Ten per cent of the fishing boats are motorized, represented almost entirely by the shrimp fleet which operated 777 boats in the Pacific and 397 in the Gulf of Mexico in 1962.

Only a few resources such as commercial shrimp, some lobsters, and snappers are being fully exploited. Other marine resources, especially fish are not being exploited intensively.