

## TECHNOLOGY AND EXPLORATORY FISHING SESSION

T U E S D A Y—N O V E M B E R 1 8

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### Exploratory Fishing in Bermuda Waters

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The fishing industry in Bermuda has never advanced beyond primitive types of handlining, simple seining, and the setting of wire fish traps. In the opinion of the writer and several other interested individuals, there exist possibilities for an increase in the catch by tapping the source of supply afforded by the large schools of migratory fishes which pass close to the islands in early summer on their northbound migration, and probably, to a lesser extent, on their return in October or November. Since the capital outlay for the purchase and equipping of a suitable vessel locally for the purpose of investigating this possibility has been prohibitive, advantage was taken of the knowledge that two Danish vessels were about to proceed from Copenhagen to Peru to carry out commercial fishing in those waters for two years.

Arrangements were made between the managing director of the Dansk Perumansk Compagni, Capt. Leo Henriksen, and the Bermuda Government to bring the two vessels to Bermuda to carry out exploratory fishing for a period of one month before they proceeded to Peru.

The purpose of the experimental fishing was to obtain as much information as possible in the short time available on the number of schools of bluefin tuna and false albacore and other pelagic fishes which pass Bermuda and to ascertain what methods would be the most practicable to capture the fish in quantity. Incidental to the pelagic work, some time was to be spent on the operation of shrimp trawls at depths of from 50 to 150 fathoms, on the supposition that schools of the red shrimp, *Hymenopenaeus robustus*, might inhabit the area.

The vessels were fully equipped with various types of off-shore fishing and echo sounding devices. It was hoped that, with luck, sufficient information might be obtained even in that short period to give indication as to the possibility of development of a pelagic fishery. However, the writer and the Director of the Bermuda Biological Station, Dr. Louis W. Hutchins, made it clear to the authorities that, at best, the very short-term research would have to be viewed in the light of a calculated risk.

Commercial species of fish known to inhabit Bermuda waters seasonally, but of which little is known as to abundance or duration of stay, are yellow-fin or Allison tuna, *Thunnus albacares*, wahoo, *Acanthocybium solandri*, false albacore or little tuna, *Euthynnus alletteratus*, and blue-fin tuna, *Thunnus thynnus*. Skip-jack and albacore have been taken, but never in large numbers.

A tentative program for the fishing was laid out under the general direction of Dr. L. W. Hutchins. In the main it consisted of reconnaissance of the off-shore waters to a maximum distance of 50 miles, both visually and electronically, and a search with the sounding machines over the areas of the two

offlying banks, for localities suitable for the setting of bottom trawls. The execution of the plan was left to the discretion of the captains of the two craft in order that the greatest use of gear would result in the weather prevailing at the time. One or more government observers were aboard one boat during all trips. The use of a vacant aircraft hangar was obtained for the storage of spare equipment, and the drying of nets. Actual fishing operations were carried out from the port of St. George's, on the east end of the island, twenty minutes steaming time from the open ocean.

The two fishing vessels, the "Kosack" 61 feet long, and the "Skagerak IV" of 58 feet, arrived in Bermuda on May 4, 1952. The crew of "Kosack", the navigating ship, consisted of the captain and four seamen. She was equipped with an excellent deck-winch which was operated through a take-off from the main propulsion unit, a Burmeister-Wayne diesel engine. An echosounder of European make which was both recording and visual gave good service. Its range was to 400 fathoms. "Skagerak IV," a slightly smaller version of the other ship, had a less efficient engine, and a recorder with a range of only 50 fathoms, but there was no difference in efficiency of action in the crews. "Skagerak's" crew consisted of the captain and three others.

The gear operated in the experimental fishing was of the types which are standard in the North Sea: a purse seine of 200 x 20 fathoms, varicd-mesh gill nets, a modified Larsen trawl, shrimp nets, a Danish seine (a bottom trawl without vanes), and long-lines.

In May numerous schools of blue-fin tuna have been observed passing close by Bermuda, within 20 to 50 miles to the eastward. Black-fin tuna are present in some quantities all year round, but in June they have been observed in large schools, although irregularly. False albacore and wahoo are also year around inhabitants of these waters, and occur in schools of greatly varying size. Yellow-fin tuna have been taken in small numbers in every month, but little is known of the time of greatest abundance. The largest of the species taken locally was caught in February, 1952, and scaled 236 lbs. Blue-fin have been taken on rare occasions in April, October and early November.

Very little choice was possible in the selection of the season for the exploratory work, which had to be done to fit in with the schedule of the vessels en route to Peru. In general, the months of April, May and June, when the work was done, are those in which the migratory fish arrive or pass by Bermuda. During May and June good weather normally prevails, but this project, like so many other similar efforts, was not to be favored with normal weather. It had been anticipated that fishing could take place on at least 21 days of the period. In actual fact only on 17 days was fishing possible at all, and on several of those days it had to be suspended due to high winds and seas.

Probably the most important piece of equipment used was the fleyder-trawl, a modified Larsen trawl or floating trawl. This was operated between two boats and handled with the greatest of ease by the extremely well trained crews. For the most part this was operated "blind", though on occasion it was set after indications of fish or plankton were found on the echo recorder. Sets were made in depths varying from 7 to 150 fathoms. The gear was run at night as well as during the day. No success was experienced in catching commercially important species. A few pilchards, *Harengula callolepis*, were taken in day-light sets at 35 fathoms, and a conglomerate collection of plankton, small

deep-sea fishes (mainly Stomiidae), and several species of unimportant shrimp were captured at night. The shrimp most prevalent in the night sets was a transparent form, related to *Penaeus*, and identified as *Funchalia villosa* (Bouvier). Most of the latter species were taken at a depth of 15 fathoms, sets at 35 fathoms producing almost nothing.

Of the plankton, the most valuable hauls scientifically were those which produced considerable numbers of late-stage larvae of the spiny lobster, *Panulirus argus*. Phyllosoma were found in depths varying from 15 to 35 fathoms from 5 to 45 miles off-shore.

The boats always worked as a team. Following are excerpts from the combined log of "Kosak" and "Skagcrak IV" for 29-30 May, 1952, a typical day except for the weather.

"Arrived Challenger Bank 4:30 a.m. Quiet weather. "Kosak" dropped 80 shark hooks on longline in 28 fathoms in 65.02W 32.06N. "Skagcrak" set out bottom trawl. Destroyed a seine. Tried again. Same result. Two seines destroyed in 3 sets. Fishing with the bottom trawl impossible in this area. While "Kosak" was drifting with his hooks he caught about 30 fish, mostly rockfish, on handline, and salted them for bait.

"11 a.m. The hooks were hauled in. No sharks.

"12 noon. Set out for S. W. Breaker to search the bottom from the Breaker to Long Bar, looking for plankton and fish. Arrived at 1:25 p.m. Plenty of plankton and shrimp fry, according to graph. Tried hand-feeling in a shoal with fine brass wire, but no "pushes" were to be noticed. Finished at 7 p.m.

"Went to deeper water. Set out fleydertrawl at 8:30 p.m. at a depth of 75 fathoms in 1900 fathoms of water. Towed trawl for 4 hours. No fish except small deep-sea fishes and shrimps. Put some in formalin. Left for St. George's at 1:45 a.m., arrived at 6:00 a.m. On Challenger Bank we saw two humpback whales, and "Skagerak" saw a manta ray about 12 feet broad."

The bottom trawl referred to is that type of gear used almost exclusively by the Danish fishermen in the North Sea until the Larsen trawl was developed several years ago. The trawl itself consists of a small seine of about 45 feet in length, with a cork and lead line. To set the trawl, a flag buoy is dropped, to which is attached one end of the drag rope. Several hundred fathoms of one inch diameter rope is then played out, followed by the net and then an equal length of rope. The set is made so that the towing end will be brought back to the float. The rope sinks and the seine sweeps the bottom. As the rope is drawn in the fish are driven toward the center and eventually are swept into the net. This method produces considerable quantities of fish where the bottom is suitable.

Gill nets were set on six occasions. The shortest time of drift was six hours but the average was ten hours. The nets covered a stretch of something over one and one half miles in length, and the meshes of the nets varied in size from 2 inches to 6 inches stretched measurements. All sets were made during the hours of darkness. No success whatever accompanied this method of fishing. Surprisingly, not even flying fish were taken.

No success rewarded the efforts with the shrimp trawl, but that is not surprising because suitable bottom was not located in the short time spent on the

phase of the work. The maximum depth at which any of the nets could be set was 150 fathoms, and as the successful drags for the red shrimp in the Gulf of Mexico have been in depths around 200 fathoms, it is probable that the proper areas, if they exist, were not reached with the gear.

Long-lines were set on six trips. One boat fished for sharks with 200 hooks (4 boxes), 4 fathoms down in 30 fathoms of water. The other boat set out 350 salmon hooks, at depths from 2 to 10 fathoms, in the same area. Lines were left out for 10 hours and then hauled just before daylight. The shark line had 2 tiger sharks of 400 and 300 lbs., and 24 dusky sharks, *Carcharhinus obscurus*. Sixty hooks and leaders were missing. One dusky shark weighed nearly 500 lbs. and contained 10 young, which would have been born within a week. They were 29 inches in length. The other sharks of the same species averaged about 15 lbs. in weight. The salmon hooks were rigged with heavy nylon monofilament leaders and 70 were cut off. There were no fish landed from that set. On other occasions a few small sharks, a barracuda, and a black-fin tuna were taken.

During all daylight operations a close lookout was kept for surface schools of fish, but aside from several schools of scad (*Decapterus*) none were sighted. In consequence, there was no opportunity to use the purse seine. On one occasion this was set to demonstrate its action to a group of local commercial fishermen who had been invited by the government to go along to watch the procedure. When the recorder indicated concentrations of fish or plankton in depths workable by the gear aboard at the time, sets were made. In each instance the mass proved to be small shrimps or other plankton. No commercial species of shrimp or fish were captured by seine or trawl. Greater use of the long-line probably would have produced more tuna, but as that is a simpler and less expensive form of fishing, which could be carried out locally, little time was spent on it.

In making recommendations for the exploratory work to be carried out by these vessels it was consistently pointed out to the local government that the results of such a short-term project would not be conclusive, whether it be favourable or adverse. The opinion of the writer before the work began, and which remains unchanged, was that the only chance of real success would be through the use of the purse seine after visual or electronic contact with schools of tuna, false albacore, or wahoo had been made. No real hope was held out for success with mid-water or bottom trawls or seines due to the fact that nothing in the past led to even a suspicion that species which could be readily taken by those methods were inhabiting the area.

The experiment was of far too short duration to warrant definite conclusions being drawn. However, indications are that there is little or no likelihood of locating commercially valuable bottom species. On the other hand, the fact that no schools of tuna or mackerel-like fishes were sighted is far from proof that they were not present at that period, or that similar efforts during the same season in subsequent years will not be successful.

Long-lines, set at varied levels, seem to offer a fair return for effort expended. It is highly probable that consistent fishing by this method would produce important quantities of yellow-fin tuna. Sharks will remain a menace to this type of operation, but if there are large quantities of sharks available then a new fishery may result.

The fact that 1952 produced a considerably smaller than average fishery catch off Bermuda, and reportedly along the eastern coast of the United States and Nova Scotia, the conclusion is that considerably more exploratory fishing must be carried out before the situation can be evaluated.

The Bermuda Government has recently purchased and partially equipped a 60 foot long motor fishing vessel for future exploration. The craft was obtained from the British Admiralty at a very favourable price. It is intended that a five year research plan will be carried out under the general direction of the Bermuda Biological Station for Research, concurrently with oceanographic work already under way by that institution. The vessel has just been put into commission, and exploratory work on fisheries will probably commence in April, 1953. It is hoped that a satisfactory progress report may be presented at the next session of the Gulf and Caribbean Fisheries Institute.

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