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PRELIMINARY REPORT ON 1950 NORTH PACIFIC ALBACORE TUNA EXPLORATIONS OF THE JOHN N. COBB

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INTRODUCTION

In a continuation of work begun in 1949, the U. S. Fish and Wildlife Service exploratory fishing vessel, John N. Cobb, spent more than $3\frac{1}{2}$ months, from June 12 to September 28, 1950, exploring for albacore tuna and testing various gear in the offshore waters of Oregon, Washington, British Columbia, and Alaska. Objectives of the fishing explorations were to obtain information on the inshore migration pattern of the tuna as they approach the commercial fishing areas; to determine if albacore reach Alaskan waters in commercial quantities (in 1949, the Oregon found a few scattered tuna up to 300 miles off Dixon Entrance; Powell and Hildebrand 1950); and to test various types of gear (including surface-trolled jigs, gill nets, and long line) as to their effectiveness in catching albacore. Oceanographic and biological observations were recorded; such as, water temperatures, salinity samples, lengths and weights, and feeding habits of tuna taken during the fishing operations. Radio communication was maintained with the commercial fleet, and information on fish movements and water temperatures was broadcast daily.

METHODS AND RESULTS OF EXPLORATORY FISHING

Since the inception of the fishery in offshore waters of Oregon and Washington in 1937, albacore have, in an average year, been first taken in the latter part of June or early July at various places off the Oregon coast; but little is known of the origin and migration pattern of the fish. In planning the early scouting operations of the John N. Cobb, water temperature was considered as being the main ecological factor which might indicate the appearance of tuna off the Northwest Coast. Examination of existing surface-water temperature records showed that the 57.5° F. isotherm should be found to reach as far north as Cape Blanco, Oregon, at a distance of 400-500 miles offshore by the middle of June. The plan was to fish along the edge of this warm-water bulge as it moved northward and shoreward, with the purpose of intercepting incoming schools of albacore and tracing their movements into the areas of commercial fishing.

The John N. Cobb left Seattle on June 12 and steered a general southwest course from Cape Flattery. While on this course, surface water temperatures were found to be cold (52° to 54° F.) past the mouth of the Columbia River and south, but a general warming of the water was noted 300 miles off the southern Oregon coast. On the evening of June 17, 58° F. water was encountered and the following morning the first albacore were caught on trolled jigs at a position 42°12' N. latitude, 135°05' W. longitude, approximately 480 miles off Cape Blanco, Oregon. The fish struck at intervals, usually in pairs, over a period of several hours, but no large concentration was found at this time. Several days later, on June 23, 24, and 25, tuna were found 200 miles closer to shore but still in small scattered groups.

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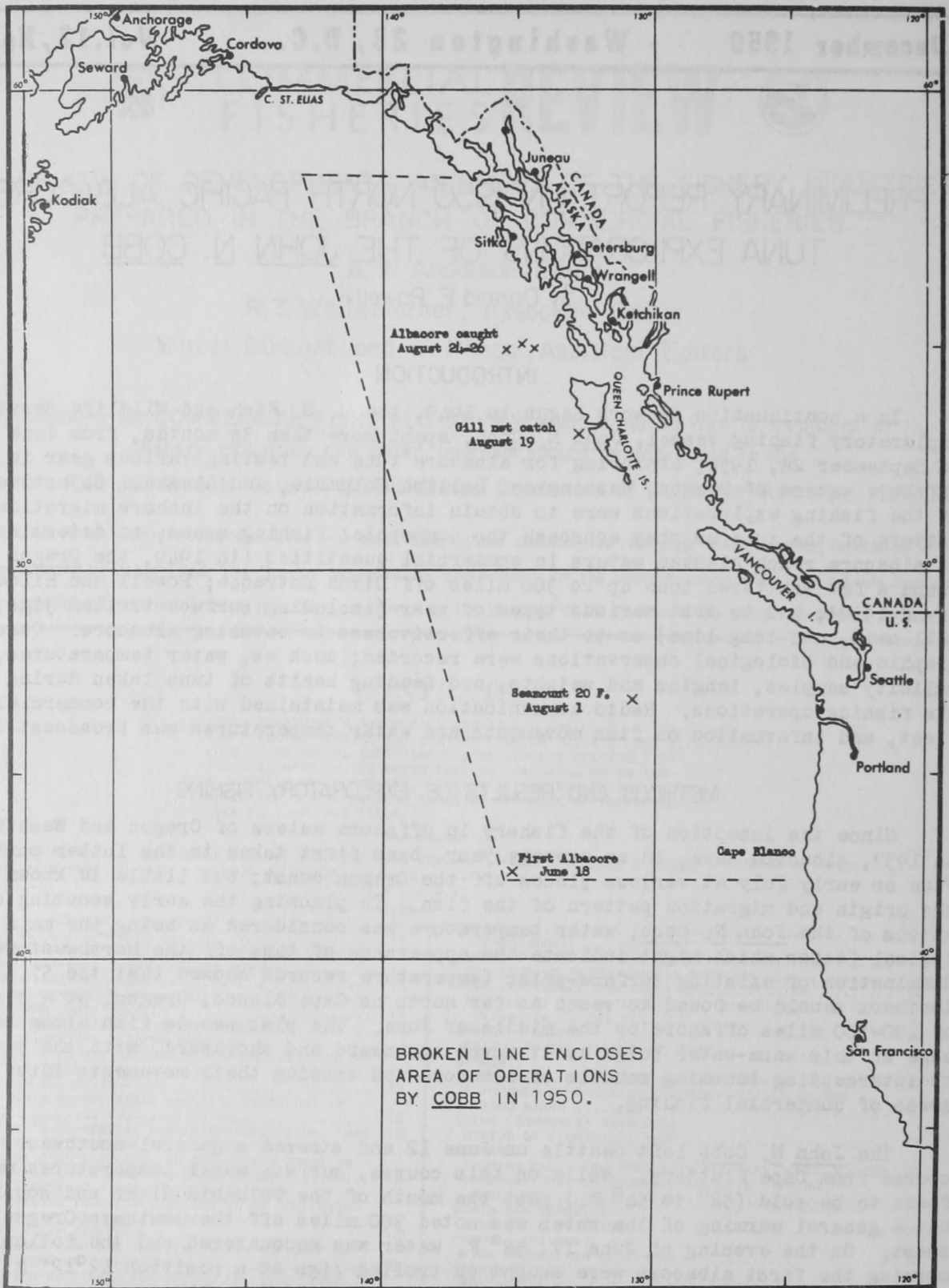


FIGURE 1 - CHART OF THE NORTHEASTERN PACIFIC.

A relatively rapid warming of the surface water off the Oregon coast was noted during the last of June and the first few days of July; temperatures of 59° F. were found within 35 miles of the mouth of the Columbia River on July 3. Between July 7 and 14 the first signs of schooling were noted, and a series of fishing efforts from Cape Blanco north to Grays Harbor, Washington, at distances of 50 to 120 miles offshore indicated the albacore were widely scattered off the entire Oregon and southern Washington coasts. During this time, the commercial fishing fleet began to assemble on the grounds, and by July 16 good catches were being made 60 miles S.W. of the Columbia River.

Fishing was excellent during the remaining days of July, good concentrations of albacore being found off Grays Harbor on July 19 and off Cape Flattery during the last few days of July. Exploratory fishing and gear-testing was continued off the Washington and British Columbia coasts until the middle of August when the John N. Cobb headed north to explore the waters of southeastern Alaska for commercial quantities of tuna.

Concentrations of albacore were observed off the Queen Charlotte Islands, where the Canadian fleet experienced good fishing from the middle of August to mid-September. Over two weeks of intensive fishing in Alaskan waters from Dixon Entrance to within

100 miles of Cape St. Elias and up to 300 miles offshore indicated no evidence of tuna in quantities of commercial significance. A few scattered albacore were taken north of Dixon Entrance, but water temperatures were cold (as low as 51° F.) over most of the area covered, and stormy weather curtailed fishing operations somewhat.

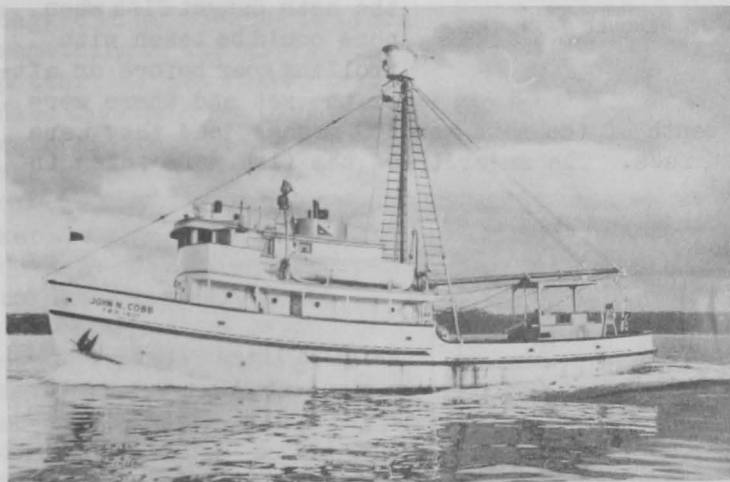


FIGURE 2 - JOHN N. COBB, THE SERVICE'S EXPLORATORY FISHING VESSEL OPERATING IN THE NORTH PACIFIC.

This year's findings are in close agreement with the results of 1949 when the Oregon reported that no concentrations of albacore could be found in Alaskan waters. Water movements and temperatures undoubtedly have an important influence on the migrations of tuna, and it may

be possible that an unusual occurrence of warm water off the Alaskan coast in certain years could produce conditions favorable to a commercial fishery for albacore in these waters; but such conditions were not found to exist in 1949 or 1950. In contrast to the good results of July, the tuna fishery was very poor off the Oregon and Washington coasts during most of August and September, and the John N. Cobb found no albacore north of Cape Blanco during the last two weeks of September.

RESULTS OF GEAR TESTS

Standard commercial surface-trolled jigs were used as the principal means of locating and taking albacore. Long-line gear and gill nets were also fished whenever conditions were favorable. Very meager results were obtained with the long-line, only one albacore being taken in the few sets made with this gear. On the other hand, considerable success was experienced with the gill nets, up to 169 albacore being taken in one set. The nets proved valuable in locating albacore when the fish were not showing or biting and also served as a medium for determining vertical distribution of the schools.

Both nylon and linen gill nets were used with mesh sizes (stretched measure) of $7\frac{1}{2}$, $8\frac{1}{2}$, and $9\frac{1}{2}$ inches. Six 50-fathom shackles, one of each size of linen and nylon



FIGURE 3 - A GOOD CATCH OF ALBACORE TUNA IS REMOVED FROM THE GILL NETS.

nets, were drifted in a string free from the vessel; all fish were caught at night, with two daylight sets producing no tuna. On August 19, over a ton of albacore was taken in a set of the nets off the Queen Charlotte Islands. All sizes of mesh caught fish, weighing in the range of 11 to 35 pounds. Indications are that the $8\frac{1}{2}$ -inch mesh is probably the most efficient size for albacore tuna of this region, which average about 14 pounds.

On several occasions the nets caught fish when none could be taken with trolling gear before or after the set and there were no signs of tuna in the vicinity. Depth of the nets was 100 meshes, and they were drifted with the cork line on the surface. The majority of the fish were taken in the top half of the net, very few near the lead line. From this observation it may be that a net 50 meshes deep will be practically as effective as the 100-mesh net, but further tests will be required to establish this point. Considerable economy in gear could be expected through use of 50-mesh nets if proven satisfactory. Preliminary examination of fishing records reveal very little difference in the fishing ability of the nylon and linen nets. Numerous blue shark, pomfret, and mackerel scad were caught in the nets along with the tuna, the shark quite often inflicting damage to the web and occasionally eating a tuna enmeshed in the net. Some damage to the albacore occurred when the nets were hauled in choppy seas, due to the meshes cutting into the flesh. Canning tests are being conducted by the Service's Technological Laboratory at Seattle to determine the suitability of the gill net-caught albacore for canning purposes.

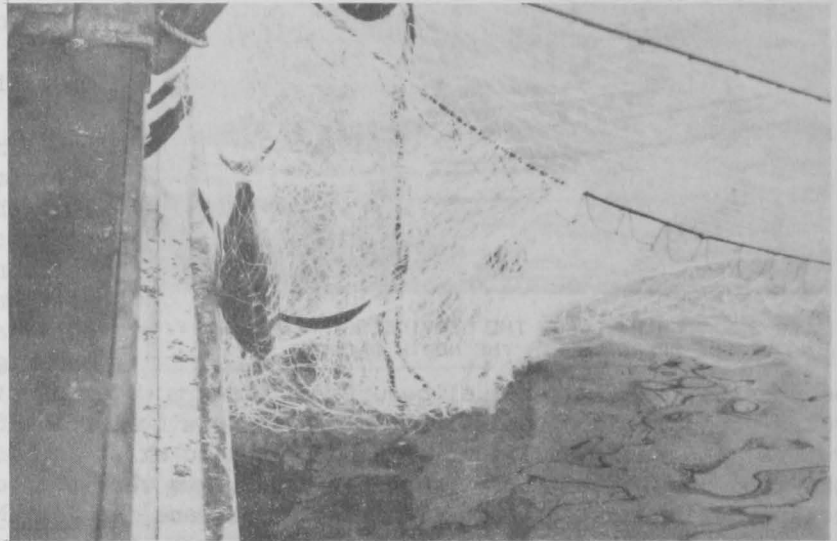


FIGURE 4 - A LARGE ALBACORE TUNA IS HAULED ABOARD ENMESHED IN THE NYLON GILL NET FISHED BY THE JOHN N. COBB.

OCEANOGRAPHIC AND BIOLOGICAL OBSERVATIONS

Very close attention was paid to water temperatures during the entire cruise, especially in relation to the abundance of albacore. Surface temperature readings were taken at hourly intervals, and several bathythermograph casts were made daily to determine vertical distribution of the warm water. There were approximately 100 water samples taken and a number of plankton tows made in an effort to correlate abundance of tuna with the chemical and organic constituents of the water. Ordinarily, the best fishing was found in blue water from 58° to 61° F., but occasionally scattered tuna were taken in green water, and, on two occasions, at temperatures as low as 54° to 55° F. Stomach analyses suggest that at times the fish will leave the warm blue water and enter colder green water in search of food.

Length and weight measurements were made on all fish taken, with a weight range of 8 to 35 pounds recorded. Data on albacore feeding habits were obtained by means of stomach samples taken immediately after the fish were landed on deck. Small rockfish constituted the bulk of the diet, 167 being taken from the stomach of one albacore. Squid, saury, small blackcod, and lantern fish were also present in varying amounts.

Over 400 albacore were tagged in an attempt to learn something of the migration pattern of the fish. Plastic disc tags held by nickel pins were attached at the base of the second dorsal fin on half of the fish and on the caudal keel of the remainder. No recoveries have been reported to date; however, three fishing vessels have reported catching tuna bearing tag marks, which is considered as evidence that at least some of the fish are surviving even though the tags may be torn loose in the water. Tagged albacore were kept alive up to 18 hours in the bait tanks of the vessel.



FIGURE 5 - NUMEROUS BLUE SHARK WERE TAKEN IN THE GILL NETS ALONG WITH THE ALBACORE TUNA.

NEW SEAMOUNT DISCOVERED

While engaged in investigating a report of large schools of tuna off the Columbia River on August 1, the John N. Cobb discovered a previously uncharted seamount at a position 46°44' N. latitude, 130°47' W. longitude, approximately 270 miles west of Willapa Bay, Washington. Recording fathometer traces¹ revealed a peak several miles in extent with depths as shallow as 20 fathoms and surrounding water 1600 fathoms deep. Long-line gear set at 70 fathoms yielded a good catch of large red rockfish (Sebastes ruberrimus), averaging 15 pounds each. While passing over the seamount again on September 15 and 16, seven sets of long-line gear were again fished at depths from 40 to 110 fathoms. There were three species of rockfish taken this time, plus 4 halibut weighing up to 43 pounds each. Bottom samples and depth recorder traces indicate the bottom to be quite rough and hard with some fairly flat ledges. Further exploration will be necessary in order to determine if the grounds can be successfully trawled.

¹/SEE COMMERCIAL FISHERIES REVIEW, NOVEMBER 1950, P. 42.

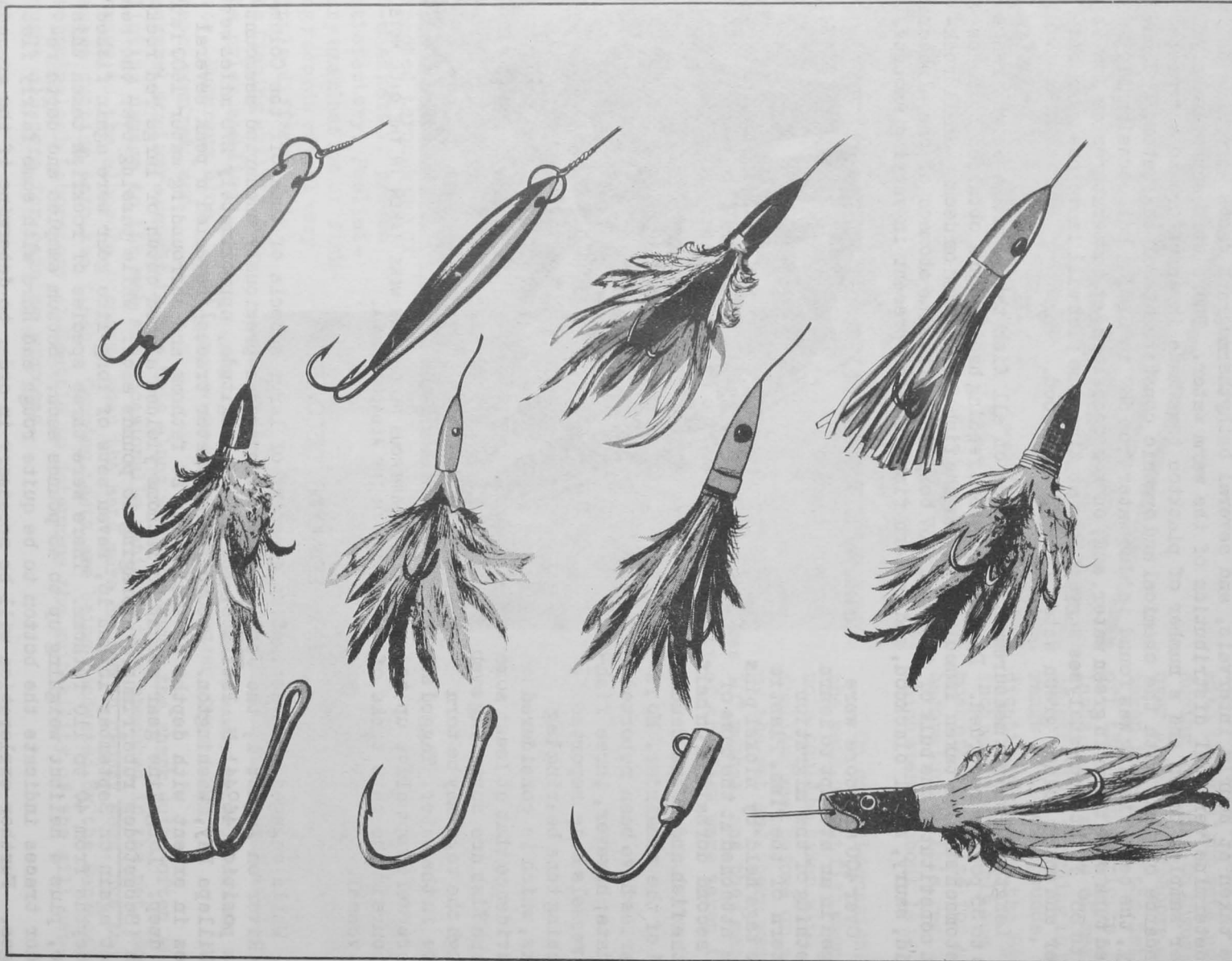


FIGURE 6 - MOST OF THE ALBACORE TUNA TAKEN BY THE JOHN N. COBB WERE CAUGHT ON SURFACE-TROLLED JIGS OF VARIOUS SIZES AND COLORS. SOME OF THOSE SHOWN WERE USED.

CONCLUSION

Very little is known concerning the origin and migration pattern of the albacore tuna which enter the fishery off the Oregon and Washington coasts in early summer. The John N. Cobb found albacore

500 miles off Cape Blanco on June 18, and subsequent catches indicate the movement of the fish was shoreward and then north along the coast in early July. Warm water (58° to 61° F.) and abundance of feed (mostly small rockfish) were found to be very important factors in determining the location and movements of the tuna. Although a few scattered albacore were caught north of Dixon Entrance, water

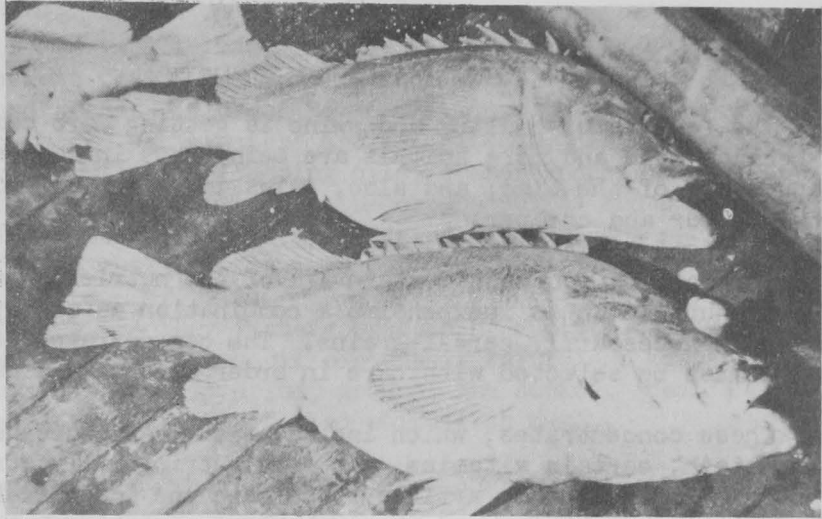


FIGURE 7 - RED ROCKFISH (SEBASTODES RUBERRIMUS) WERE CAUGHT BY THE JOHN N. COBB ON THE SEAMOUNT WITH LONG-LINE GEAR SET AT 70 FATHOMS.

temperatures were generally low off the Alaskan coast and no evidence of commercial quantities of the fish were found north of the Queen Charlotte Islands.

Both linen and nylon gill nets were used successfully in catching albacore on many occasions. Over a ton was taken in a single set with 300 fathoms of this gear, and gill nets proved of value as exploratory gear as well as a method of determining vertical distribution of the fish. Canning tests now under way to determine suitability of gill net-caught tuna for canning purposes will have an important bearing on the future use of gill nets in the albacore fishery.

Note: A FINAL AND MORE DETAILED REPORT ON THE 1950 NORTH PACIFIC ALBACORE TUNA EXPLORATIONS BY THE JOHN N. COBB WILL BE ISSUED IN THE NEAR FUTURE.

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