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NORTH PACIFIC ALBACORE TUNA EXPLORATION, 1952

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SUMMARY

To gain information on the migration pattern and the habits of albacore tuna (Thunnus germo), the John N. Cobb explored the offshore waters of northern California, Oregon, and Washington from June 16 to August 8. The first albacore was caught on June 24--525 miles west of Trinidad Head, California. Water temperatures of 57° F. and over were not located in the area off Cape Blanco during the first phase of the 1952 exploration. In 1950 and 1951 warm water was prevalent in this area at the same time of the year. Results of fishing efforts during the first phase of the 1952 exploration were slightly better than 1951, but poor when compared with 1950 results. Favorable water temperatures (57° F. and over) were found in most areas after the first of July 1952.

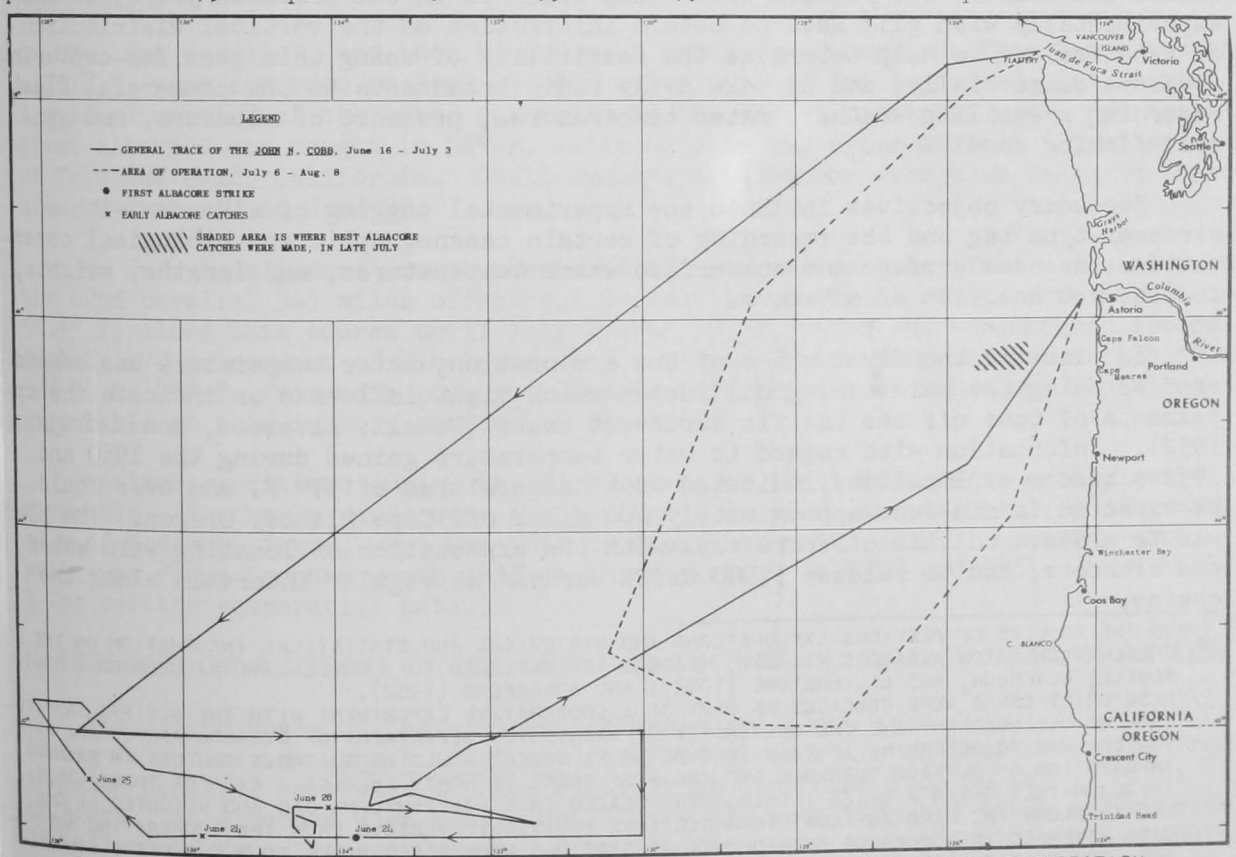

FIG. 1 - AREA OF OPERATION BY THE JOHN N. COBB DURING THE 1952 ALBACORE EXPLORATION

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Result of the second phase of the 1952 exploration were as poor as the results of the 1951 exploration, as contrasted with good results obtained during this phase of the 1950 exploration. The only concentration of albacore encountered by the John N. Cobb during the 1952 exploration was in a small area betwee Cape Mears and Cape Falcon, Oregon. In 1951 the only concentration of albacore was encountered in late July in the vicinity of the explosives dumping area off Tillamook Head, Oregon. But in 1950 signs of schooling were noted during the sec ond week of July and good concentrations of albacore were found off Grays Harbor on July 19 and off Cape Flattery during the last few days of July.

The 1952 commercial albacore landings in the states of Oregon and Washingto amounted to approximately 2,744,000 pounds--the lowest in the past 15 years.

OBJECTIVES AND PLAN OF 1952 EXPLORATION

The fourth[1/] in a series of investigations to gain information on the migration pattern and the habits of albacore tuna (Thunnus germo) in the northeastern Pacific Ocean was conducted with the Service's exploratory fishing vessel John N Cobb from June 16 to August 8, 1952, in the offshore waters of northern California, Oregon, and Washington.

The main objectives of the 1952 exploration were: to attempt to intercept albacore early in the season off the Oregon coast and trace their movements into areas of commercial exploitation; to gain fishing information in the offshore waters and compare the results with those obtained in the previous years; to fis experimentally with gill nets to obtain information on the vertical distribution of albacore and to help determine the feasibility of using this gear for capturi albacore commercially; and to make daily radio broadcasts to the commercial flee regarding prevailing weather, water temperatures, presence of albacore, and general fishing conditions.

Secondary objectives included the experimental tagging of albacore with a streamer-type tag and the recording of certain oceanographic and biological obse vations, such as surface and subsurface water temperatures, and lengths, weights and stomach analyses of albacore.

In planning the first phase of the exploration, water temperature was consi ered as being the main ecological factor which might influence or indicate the a pearance of tuna off the Pacific Northwest coast (Powell, Alverson, and Livingsto 1952). Information with regard to water temperature gained during the 1950 and 1951 albacore explorations indicated that temperatures of 57° F. and over could be expected in mid-June approximately 400 miles off Cape Blanco, Oregon. The pl was to proceed to this offshore area with the expectation of locating warm water and albacore, and to release 5,000 drift cards[2/] at regular intervals along the course.

1/FOR THE RESULTS OF PREVIOUS EXPLORATIONS AND HISTORICAL AND STATISTICAL INFORMATION ON THE OREGON-WASHINGTON ALBACORE FISHERY, READERS ARE REFERRED TO: POWELL AND HILDEBRAND (1950 POWELL, ALVERSON, AND LIVINGSTONE (1952); AND SCHAEFERS (1952).

2/THESE DRIFT CARDS WERE RELEASED AS PART OF A COOPERATIVE EXPERIMENT WITH THE SCRIPPS INSTI TION OF OCEANOGRAPHY AND THE UNIVERSITY OF WASHINGTON DEPARTMENT OF OCEANOGRAPHY. THE MA PURPOSE WAS TO DETERMINE IF THIS TYPE OF DRIFT OBJECT WOULD BE SUITABLE FOR USE IN GAININ INFORMATION ON SURFACE CURRENTS OFF THE WEST COAST OF NORTH AMERICA. EACH OF THESE CARDS APPROXIMATELY 3-1/4 X 5-1/2 INCHES, WERE PLACED IN A POLYETHYLENE BAG AND WEIGHTED AT ONE END TO ALLOW THE CARD TO FLOAT IN A VERTICAL POSITION. VESSELS FROM THE COOPERATING AGEN CIES RELEASED 15,000 CARDS BY MID-JULY AT STATIONS FROM A FEW MILES TO 500 MILES OFFSHORE AND FROM BRITISH COLUMBIA, CANADA, TO BAJA CALIFORNIA, MEXICO. RESULTS OF THIS EXPERIMEN ARE BEING ANALYZED BY THE SCRIPPS INSTITUTION OF OCEANOGRAPHY.

RESULTS OF FIRST PHASE (JUNE 16-JULY 3) OF 1952 EXPLORATION

Trolling operations commenced on June 19 approximately 500 miles west of Cape Blanco, Oregon, soon after the last of the drift cards were released. Surface water temperatures varied from 54.5° F. to 56° F. in this area. In an attempt to locate more favorable tuna water (57° F. and above) the John N. Cobb headed on an easterly course along the 42nd paralled from a position approximately 600 miles off the coast. Surface water temperatures varied from 55.5° F. to 56.5° F. to a position 260 miles offshore. At this point the vessel turned south

Table 1 - Brief Comparisons of Certain Data for the First Phase (June 16-July 3) of 1950, 1951, and 1952 Albacore Explorations

	1950	1951	1952
Weather (wind)	Variable southerly to northerly direction. Usually force 5 or under.	Predominately northerly direction. Usually force 6 or under.	Variable southerly to northerly direction Usually force 5 or under
Surface water temperatures	57°-F. surface water first encountered on June 17 approximately 345 miles off Cape Blanco, Oregon	57°-F. surface water first encountered on June 14 approximately 370 miles off Cape Blanco, Oregon	57°-F. surface water first encountered on June 22, 270 miles west of Trinidad Head, California
First albacore encountered	June 18 by trolling at position 42°12' N., 135°05' W.	June 29 by trolling at position 43°48' N., 134°52' W.	June 24 by trolling at position 40°59' N., 133°44' W.
Number of albacore strikes	44	1	9
Number of albacore caught	33	None	6

to the 41st parallel, and then headed on a westerly course. Surface temperatures of 57° F. were recorded on June 22--270 miles west of Trinidad Head, California. A gradual warming of the water was noted as the vessel continued west, and the first albacore was caught in 58°-F. water on June 24, approximately 525 miles west of Trinidad Head, California. Small numbers of albacore were also taken in this area on June 25 and June 28.

On July 1, a general north-northeasterly course was taken from a position on the 42nd parallel 345 miles offshore. Surface temperatures varied from 56° F. to 56.5° F. along this course until July 2 when 58°-F. water was encountered approximately 170 miles west of Winchester Bay, Oregon. Water temperatures varied from 58° F. to 60° F. from this point to 25 miles off Cape Falcon, Oregon. No albacore were taken on this inshore portion of the trip.

Weather conditions during the first phase of the trip were generally quite favorable. Southerly winds were present until June 22, and northerly winds, usually of moderate force, were encountered from then until July 3; however, warm water was found farther south than at the same time in 1950 and 1951. (See table 1 for certain comparative data.)

RESULTS OF SECOND PHASE (JULY 6-AUGUST 8) OF 1952 EXPLORATION

The second phase of the exploration was carried out from July 6[3/] to August 8. During this time the John N. Cobb explored for albacore in an area extending from the 42nd parallel northward to Cape Flattery at distances from 30 to 255 miles offshore. No albacore were caught until July 11, when two were taken approximately 175 miles off Cape Blanco, Oregon. Five albacore were caught in this same general area on July 12. Results were negative from that date until July 24, when 27 albacore were taken between Cape Mears and Cape Falcon, Oregon, at distances from 40 to 72 miles offshore. A gill-net set during the night of the 24th failed to

3/ JULY 4 AND 5 WERE SPENT IN ASTORIA OBTAINING SUPPLIES.

produce any albacore. Trolling results in this area from July 25 to July 29 varied from 4 to 89 albacore per day, with an average catch of 30 per day. The majority of these fish were taken at a distance of 43 to 52 miles off Cape Mears.

During the remainder of the trip, fishing operations were carried on from Cape Mears to Cape Flattery, and only a few scattered fish were taken between

Table 2 - Brief Comparisons of Certain Data for the Second Phase (July 6-August 8) of 1950, 1951, and 1952 Albacore Explorations

	1950	1951	1952
Surface water temperatures	Generally favorable, 57° F. and over	Generally favorable, 57° F. and over	Generally favorable, 57° F. and over
First albacore encountered	July 8 in gill nets at position 43°07' N., 127°00' W.	July 14 in gill nets at position 43°57' N., 126°30' W.	July 11 by trolling at position 42°07' N., 128°27' W.
Concentrations of albacore encountered	By July 16 good catches being made by commercial fleet 60 miles southwest of Columbia. John N. Cobb encountered good concentrations of albacore off Grays Harbor on July 19, and off Cape Flattery during the last few days of July.	The only concentration of albacore encountered was in a rather restricted region in the vicinity of the explosives dumping area off Tillamook Head during the latter part of July.	The only concentration of albacore encountered was in a small area between Cape Mears and Cape Falcon during the latter part of July.
Fishing results	Generally good	Generally poor	Generally poor
Stomach contents of albacore	Predominately juvenile rockfish in numbers up to 167 per stomach.	Predominately juvenile rockfish in numbers up to 30 per stomach.	Predominately juvenile rockfish in numbers up to 46 per stomach.

the Columbia River and Willapa Bay. A gill-net set 30 miles off Cape Falcon on the night of August 5 captured two albacore. Results of the second phase of the 1952 exploration were poor as contrasted with good results obtained during this phase of the 1950 exploration (table 2).

The 1952 commercial albacore landings in Oregon and Washington amounted to approximately 2,744,000 pounds[4]--the lowest in the past 15 years.

GEAR USED AND ITS EFFECTIVENESS

Two types of fishing gear were used during the 1952 albacore exploration: (1) conventional surface-trolled jigs and (2) gill nets. Trolling was usually carried on from before daylight to after dark. The two gill-net sets were made at night.

TROLLING GEAR: The trolling gear was of the same specifications as that us during the 1950 exploration of the John N. Cobb (Powell, Alverson, and Livingsto 1952). Tension blocks (Schaefers 1952) were used as shock absorbers on both ste lines and on the port inside and middle lines in place of coiled springs, and c parative records of strikes in relation to fish landed were maintained. The li rigged with tension blocks retained 6 percent more fish than the lines rigged w the conventional coiled springs (table 3). But the experimental data are insuf-

Table 3 - Comparison of Fishing Results of Lines With and Without Tension Blocks

No Tension Blocks			Tension Blocks		
Starboard Inside and Middle Lines			Port Inside and Middle Lines		
Strikes	Caught	Percent	Strikes	Caught	Percent
68	43	63	65	49	75
Starboard and Port Tip Lines			Starboard and Port Stern Lines		
81	58	72	63	43	68

ficient to termt difference signi cant.

Various typ of lures were us including plasti jigs of assorted colors, plastic-h

4/PRELIMINARY STATISTICS SUPPLIED BY THE MARKET NEWS SERVICE, U. S. FISH AND WILDLIFE SERVIC DO NOT INCLUDE IMPORTED ALBACORE.

jigs with red-and-white feathers, rubber squids, 1½-ounce Japanese red-pearl-eyed jigs with red-and-white feathers, and catalyn-head jigs with colored plastic skirts. Although all lines and lures took fish when schools of albacore were encountered, single fish bit the lures on the longer outside lines more often than those on the shorter inside lines. During the best day's fishing on July 26, when most of the albacore were taken from small schools, 29 strikes were noted on the stern lines; and on the lines from the poles, 22 strikes were on inside lines, 55 on the middle lines, and 33 on the tip or outside lines.

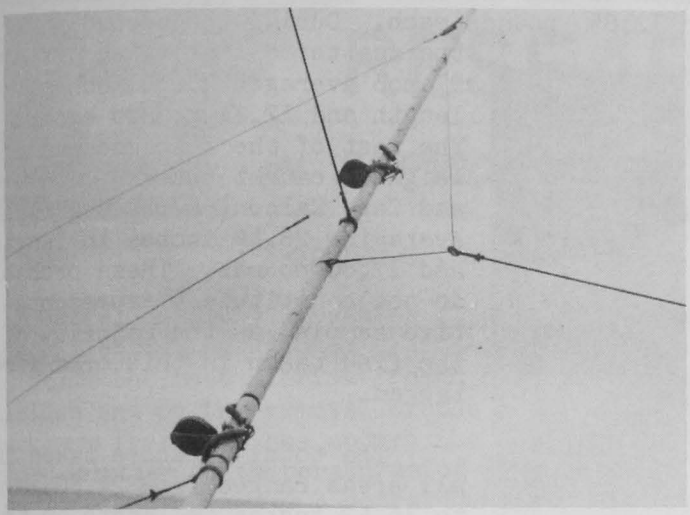

FIG. 2 - TENSION BLOCKS ON THE PORT TROLLING POLE OF THE JOHN N. COBB. A COILED SPRING ALLOWS THE LINE TO PAY OUT UNDER TENSION WHEN THE ALBACORE STRIKE, THUS REDUCING THE INITIAL IMPACT.

GILL NETS: The gill nets were in 50-fathom shackles of either linen or nylon webbing, with mesh sizes of 7½, 8½, and 9½ inches, stretched measure (Powell, Alverson, and Livingstone 1952). The nets were fished in the following manner: eight shackles were tied together and fished in a string. Four of the shackles were 50 meshes deep, and four were 100 meshes deep. The four 50-mesh shackles were: one nylon, 7½ inches stretched measure; one linen, 8½ inches; one nylon, 8½ inches; and one linen, 9½ inches. The four 100-mesh shackles were of the same material and mesh sizes as the 50-mesh shackles.

Lack of albacore limited the testing of gill nets and precluded obtaining data on the effectiveness of this gear as a means of gaining information on vertical distribution and as a possible method of capturing albacore commercially.

Only two gill-net sets were made, both in the area off Cape Falcon. The first of these, on the night of July 24, captured only two blue shark (Prionace glauca) and one mackerel shark (Lamna ditropis). The second set on the night of August 5 captured 2 albacore, 7 hake (Merluccius productus), 2 soupfin shark (Galeorhinus zyopterus), 2 Dall porpoise (Phocoenoides dalli), 1 thresher shark (Alopias vulpinus), 1 jack mackerel (Trachurus symmetricus), 2 blue shark, and 1 mackerel shark.

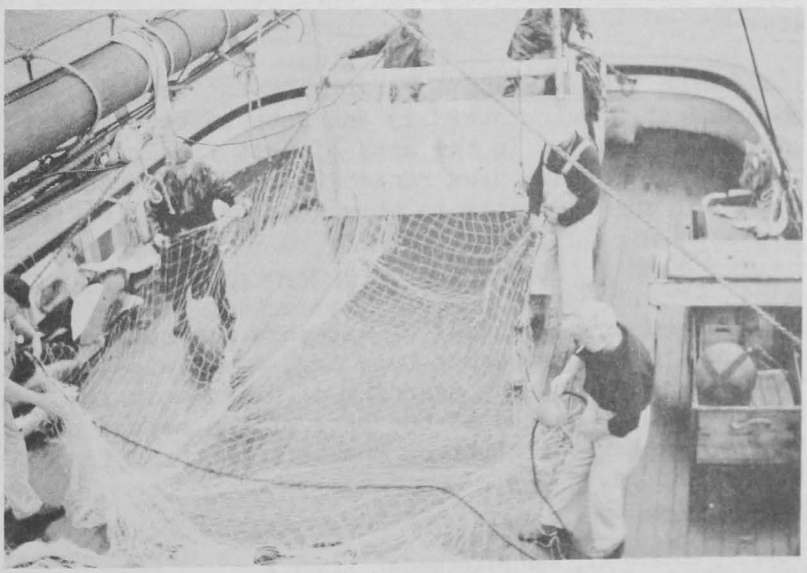

FIG. 3 - CLEARING AND STOWING THE NYLON GILL NET ABOARD THE JOHN N. COBB. THE NET IS SET FROM THE STERN BIN WHILE THE VESSEL MOVES AHEAD SLOWLY.

MISCELLANEOUS OBSERVATIONS

SIZE OF ALBACORE: Albacore taken during the first phase of the exploration averaged 25.73 inches in length and 12.85 pounds each. During the second phase, the scattered fish taken off Cape Blanco averaged 25.50 inches in length and 12.21 pounds each. The rest of the fish measured and weighed (caught between Cape Mear and Cape Falcon) were larger, averaging 28.48 inches in length and 17.80 pounds. These probabl do not constitute a representative sample, as the majority of the fish taken in this area were tagged.

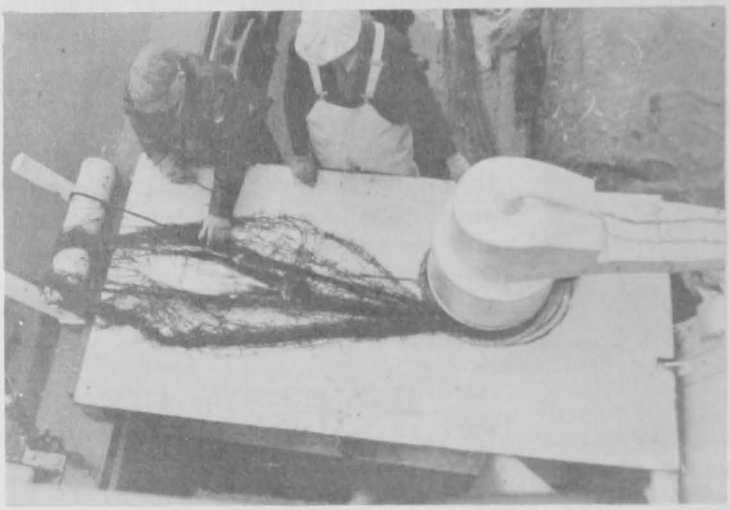

FIG. 4 - REMOVING AN ALBACORE FROM THE LINEN GILL NET. THE NET IS PICKED UP ON THE STARBOARD SIDE AMIDSHIP. EXPERIMENTAL FISHING WITH GILL NETS WAS LIMITED IN 1952 BY THE VERY POOR RUN OF ALBACORE.

The total albacore taken in all areas ranged from 24.80 inche to 36.42 inches in length, with an average length of 27.79 inches and from 10.50 to 34.00 pounds, with an average weight of 16.53 pounds.

FOOD OF ALBACORE: Saury and squid were the predominate food items found in albacore stomachs in the area off Trinidad Head and Cape Blanco. Juvenile rockfish were noted in the stomach of on albacore taken off Cape Blanco. In the area between Cape Mears and Cape Falcon, small rockfish, the majority of which were Sebastodes alutus from 1¼ to 3 inches in length, made up the bulk of the diet. Of 28 albacore stomachs examined in thi area, juvenile rockfish were noted in 21; saury, in 1; squid, in 1; and 7 were empty. The juvenile rockfish were found in numbers varying from 1 to 46 per sto ach.

WATER TEMPERATURES: During the entire trip, surface water temperatures were recorded at hourly intervals and subsurface temperatures were taken daily with a bathythermograph. In the area of best fishing (between Cape Mears and Cape Falco the surface temperatures ranged from 58.5° F. to 60° F. The warm layer (57° F. a above) of surface water in this area averaged 66 feet in depth.

TAGGING OF ALBACORE

Experimental tagging of albacore was carried out aboard the vessel using a flexible plastic streamer-type tag, 8 mm. wide, 34 mm. long, and less than 1 mm. thick. Because of the scarcity of fish, only 147 albacore were tagged and releas Most fish were tagged at the base of the second dorsal; and the remainder, at the base of either the right or the left pectoral fin. To date none of these tags ha been returned.

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