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NORTH PACIFIC ALBACORE TUNA EXPLORATION-- 1951

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INTRODUCTION

In search of information on albacore tuna (Thunnus germo), an extensive area in the northeastern Pacific Ocean has been explored each year since 1949 by the Exploratory Fishing and Gear Development Section of the Branch of Commercial Fisheries, U. S. Fish and Wildlife Service. The objectives of the explorations have varied somewhat from year to year, but in general, knowledge has been sought concerning the migration habits, range, and areas of concentration of this commercially-important fish. In addition, experimental fishing gear of possible application to the fishery has been tested.

The first exploration was carried out with the Service's fishing vessel Oregon during the late summer and early fall of 1949 (Powell and Hildebrand 1950).

The second was made with the Service's vessel John N. Cobb, and was an extended operation lasting from June 12 to September 28, 1950 (Powell, Alverson, and Livingstone 1952). The third exploration (from June 11 to August 10) was made in 1951 when the John N. Cobb was again used to study albacore tuna. The 1951 exploration was not extended through the entire albacore season because of previous plans to use the John N. Cobb in deep-water dragging operations starting in late August (Alverson 1951). This report deals only with the actual period of exploration.



FIG. 1 - ALBACORE AND BLUE SHARK ENMESHED IN GILL NET BEING HAULD ABOARD THE JOHN N. COBB.

At the present time, definite knowledge concerning the migrations and distribution of albacore in the northeastern Pacific Ocean does not exist. The 1949 and 1950 exploratory work indicated that considerable variation may be expected in the geographical location of available concentrations of albacore from one year to another. This was substantiated by the results in 1951.

Albacore have been taken commercially in the North Pacific off the coasts of Oregon and Washington since 1937. An all-time high of 34 million pounds was landed at Oregon and Washington ports in 1944, but the catch has declined to less than 15 million pounds annually since 1945 (Powell and Hildebrand 1950). The 1951 landings

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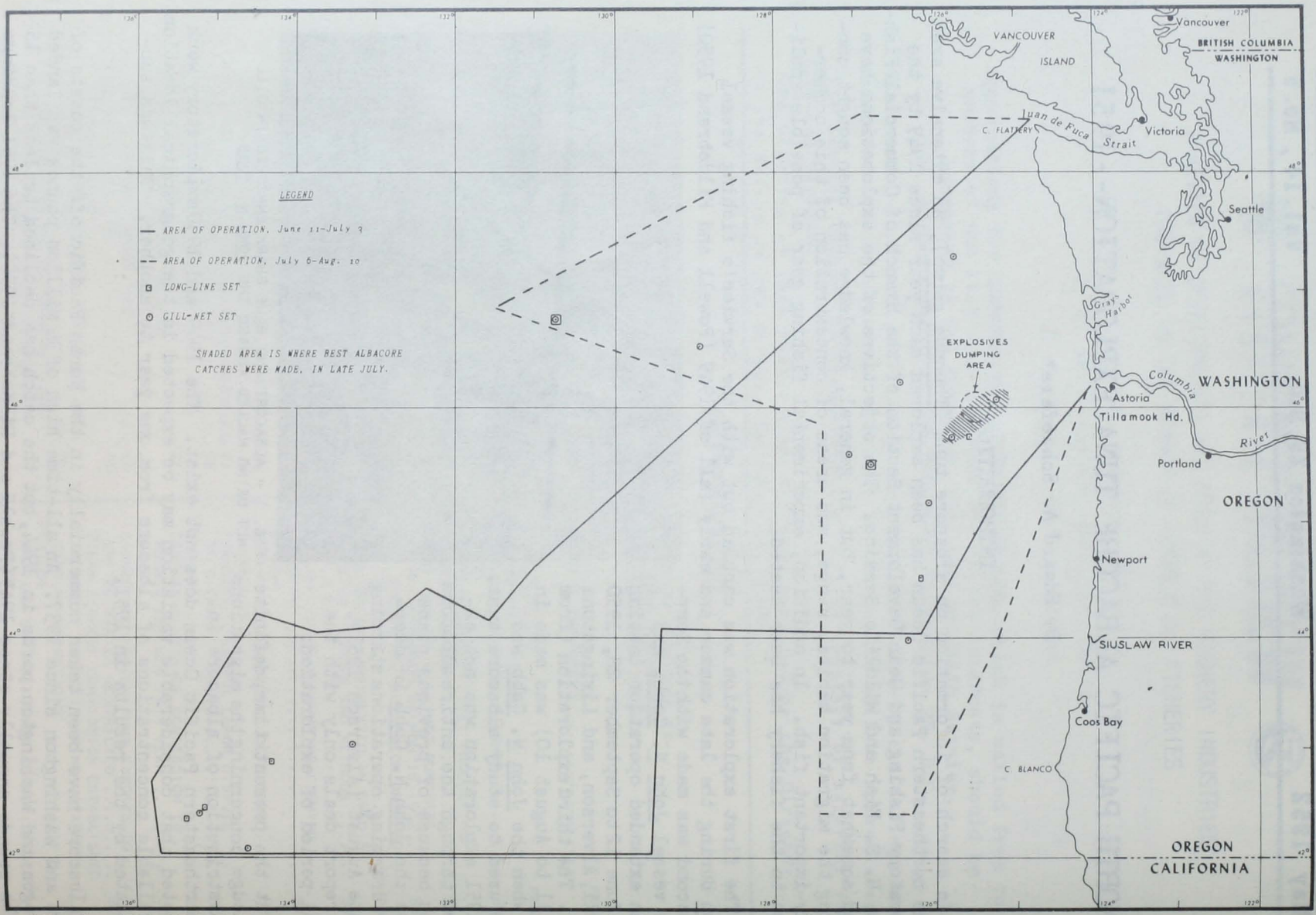


FIG. 2 - AREA OF OPERATION BY THE JOHN N. COBB DURING THE 1951 ALBACORE EXPLORATION.

of albacore in these two states were very low, amounting to approximately 3,500,000 pounds as compared with 1950 landings of approximately 10,500,000 pounds.^{1/}

OBJECTIVES AND PLAN OF 1951 EXPLORATION

In order to compare fishing results with those of 1950, the 1951 exploration commenced at approximately the same date in June, and early-season fishing operations were carried on in the same region off southern Oregon as in the previous year.

This paper reports the results of the 1951 exploration and briefly compares the 1950 and 1951 fishing results obtained by the John N. Cobb off the coasts of Oregon and Washington.

The 1951 exploration was carried on in the offshore waters of Oregon and Washington from June 11 to August 10. Aside from the main purpose of attempting to intercept the albacore in the early stages of their migration off Oregon and to gather comparative fishing information, there were several secondary objectives. These were to fish experimentally with gill nets and floating stainless-steel long-line gear in order to ascertain the feasibility of using such gear for capturing albacore commercially, and to make daily broadcasts to the commercial fleet regarding offshore weather conditions, surface water temperatures, and concentrations of albacore. Another secondary objective was to tag albacore, both as a possible means of tracing their migration and to test a newly-developed experimental streamer-type tag (Alverson and Chenoweth 1951).

During the cruise, certain oceanographic and biological observations also were recorded, including salinities, surface and subsurface water temperatures, and lengths, weights, and feeding habits of the albacore taken during the fishing operations.

For purposes of clarity this report on the 1951 albacore exploration is arbitrarily divided into two parts; a first phase from June 12 to July 3, and a second phase covering the period from July 6 to August 9. Most of June 11 and August 10 were spent in the Strait of Juan De Fuca, as the vessel proceeded to and from Seattle. July 4 and 5 were spent in Astoria, Oregon, obtaining supplies.

RESULTS OF FIRST PHASE OF 1951 EXPLORATION AND COMPARISON WITH 1950

RESULTS OF FIRST PHASE (JUNE 12-JULY 3, 1951): The John N. Cobb left Seattle on June 11. Actual trolling operations commenced on June 12 as the vessel headed for an area approximately 370 miles west of Cape Blanco, Oregon, where some of the early catches of albacore were made in June 1950. Surface water temperatures varied from 52° to 55° F. until the vessel was approximately 310 miles west of the Siuslaw River, Oregon, when a gradual warming of the water was noted. Water of 57° F. was encountered on June 14 approximately 370 miles west of Cape Blanco, Oregon. Fishing was then carried on until July 1 in an area extending from the Oregon-California boundary north to the Siuslaw River and as far as 500 miles offshore. Surface jigs were trolled almost continuously during daylight hours; and three nighttime gill-net sets and three daytime floating long-line sets were made during this first phase of the 1951 exploration (see figure 2). No albacore were captured in this area, although on June 29 while trolling approximately 450 miles west of the Siuslaw River, one albacore was brought to the stern of the vessel on trolling gear before the fish broke loose.

^{1/} PRELIMINARY STATISTICS SUPPLIED BY THE MARKET NEWS SERVICE, U. S. FISH AND WILDLIFE SERVICE. POUNDAGES DO NOT INCLUDE IMPORTED ALBACORE.

On July 1 trolling was continued on an eastward course from a position approximately 240 miles west of the Siuslaw River. Surface water temperatures of 60° F. were encountered 95 miles off the Siuslaw River, but no albacore were taken on this inshore portion of the trip. On July 3 water temperatures as high as 59.5° F. were recorded 40 miles west of Tillamook Bay, Oregon.

From June 14 to July 1, north to northwesterly winds were constantly present, sometimes reaching gale force, and often causing curtailment of gill-net and long-line operations.

COMPARISON OF FIRST PHASE OF 1951 EXPLORATION WITH 1950: Although surface water temperatures in the area fished were as warm in the early phase of the 1951 exploration as they were in this same general area during the 1950 exploration at the corresponding time of the year, only one albacore was hooked and no others were observed during this period in 1951, while 33 fish were boated and 11 more were lost from June 18 to June 30 the previous year.

Several times in 1950 the wind shifted from a northerly to a southerly direction, whereas during the period from June 14 to July 1 in the 1951 exploration the wind blew continuously from a northerly to a northwesterly direction. The weather encountered during the early part of the 1950 exploration was not as extreme or as continuously bad as was the weather encountered in 1951.

The fact that scattered albacore were taken in the early phase of the 1950 exploration and that signs of schooling were noted between July 7 and 14, contrasted with the negative results of the early 1951 exploration and correspondingly poor fishing during July and August, may indicate that results of early scouting might be used as a method of predicting the approximate time of availability of albacore off the coasts of Oregon and Washington. However, no definite conclusions can be drawn from the work of only two seasons, especially with just one vessel. Future operations will continue to explore the feasibility of predicting the availability of albacore by early season offshore scouting.

RESULTS OF SECOND PHASE OF 1951 EXPLORATION AND COMPARISON WITH 1950

RESULTS OF SECOND PHASE (JULY 6-AUGUST 9, 1951): From July 6 to August 9 the John N. Cobb prospected for albacore in an area from Cape Blanco to Cape Flattery at distances of from 46 to 275 miles offshore. No albacore were captured until July 14, when three were taken in a gill-net set 98 miles west of the Siuslaw River. Immediate trolling in the same area produced no albacore.



FIG. 3 - REMOVING ALBACORE FROM THE GILL NET. ROLLER AT RIGHT TAKES OFF FROM THE MAIN WINCH.

On July 17 several small schools of jumping albacore were observed in an area approximately 135 miles west of Tillamook Head, Oregon, but no albacore were caught

by trolling. A gill-net set at night produced only five blue shark. On July 18, in this same area, a single albacore was caught by trolling. Albacore were not caught again until July 25, when 10 were taken by trolling off Tillamook Head in the vicinity of the explosives dumping area (see figure 2). A gill-net set in this same area, from 8:00 p.m. July 25 to 5:00 a.m. July 26, netted 16 albacore; and during the day 37 were taken by trolling. On July 27 and 28 the John N. Cobb continued to catch albacore in this same area, but the number taken was not commercially significant. On July 29 the vessel trolled north to a position approximately 60 miles off Destruction Island. No albacore were taken on this northward run, which was made at normal trolling speed. The vessel on July 30, upon returning to the vicinity of the explosives dump, found albacore to be still in the area. Catches by several hundred boats of the commercial fleet ranged from poor to fair. A scarcity of fish caused most of the fleet to head for shore by August 1. The John N. Cobb personnel on August 3 again observed several schools of albacore in this same general area off Tillamook Head, but extensive trolling caught only two albacore, both of which were taken in the forenoon. A gill-net set on August 4 yielded 9 albacore. The vessel then trolled to the seamount area, approximately 270 miles west of Willapa Bay, Washington. Floating long-line and gill-net sets near the seamount caught many blue sharks but no albacore. Trolling gear on August 9 caught three albacore 47 miles west of Cape Johnson, Washington.

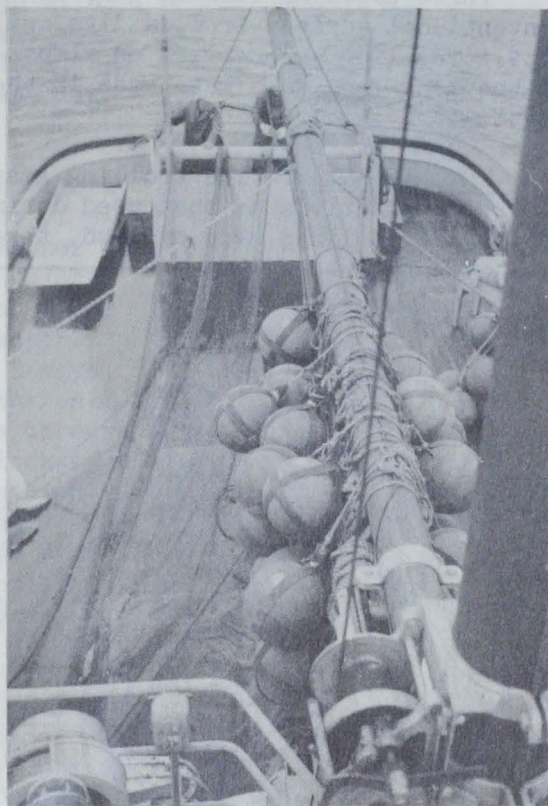


FIG. 4 - STOWING THE GILL NET IN THE BIN AT THE STERN OF THE JOHN N. COBB. INFLATED RUBBER FLOATS IN FOREGROUND WERE USED ON BOTH GILL NETS AND LONG LINES.

COMPARISON OF SECOND PHASE OF 1951 EXPLORATION WITH 1950: In comparing the second phase of the 1951 albacore exploration (July 6 to August 9) with the previous year's exploration for the same period, results were found to be quite different. As has already been indicated, the only concentration of albacore found during the entire 1951 exploration was in a rather restricted region in the vicinity of the explosives dumping area off Tillamook Head during the last days of July. On the other hand, in 1950 the John N. Cobb found signs of schooling between July 7 and 14, and a series of fishing efforts indicated that albacore were widely scattered off the entire Oregon and the southern Washington coasts. By July 16 of that year, good catches were being made 60 miles southwest of the Columbia River by the commercial fleet; and fishing was excellent during the remaining days of July, with good concentrations of albacore being found off Grays Harbor on July 19 and off Cape Flattery during the last few days of July.

GEAR USED

Three types of fishing gear were used during the 1951 albacore exploration: conventional surface-trolled jigs, gill nets, and floating stainless-steel long line. Trolling was carried on almost continuously during daylight hours. Most of the long-line sets were made in the daytime; all gill-net sets were made at night.

TROLLING GEAR: The trolling gear used during the 1951 exploration had the same specifications as that used during 1950 (Powell, Alverson and Livingstone 1952). Eight lines were trolled, three from each pole and two from the stern.

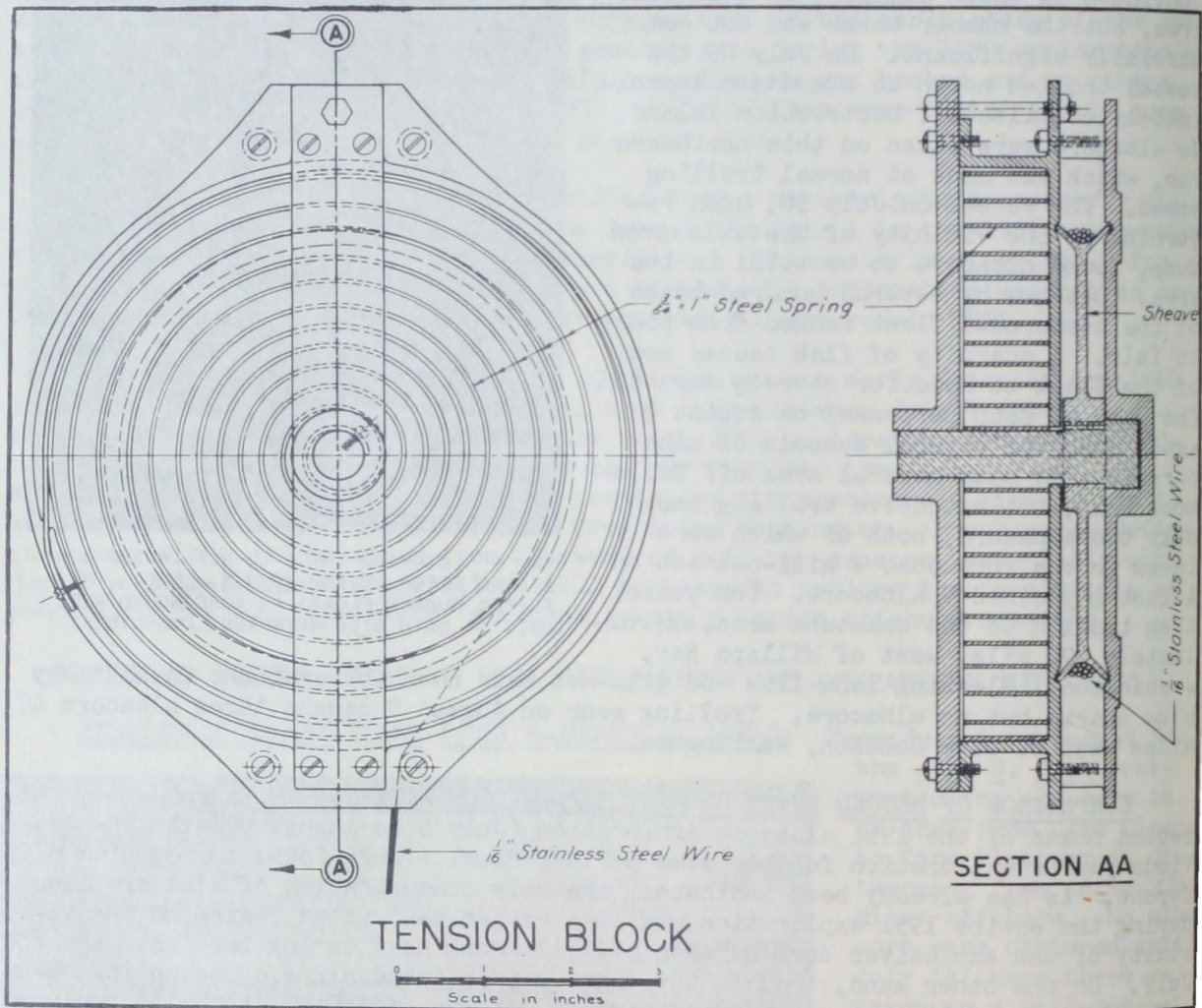


FIG. 5 - DETAIL DRAWING OF THE TENSION BLOCK.

Best results were obtained by trolling at a speed of approximately six knots. On several occasions albacore were taken from small schools previously observed breaking water, but most of the albacore captured were not observed prior to their striking the lures. Various types of lures were used, including white or gray bone jigs, amber-head or green-head plastic jigs with red and white feathers, one and one-half ounce metal-headed Japanese red-pearl-eyed jigs with red and white feathers, rubber squids, and catalyn-head jigs with colored plastic skirts. When small schools of albacore were encountered, all lines and lures took fish, but single fish bit the lures on the outside longer lines more often than they did those on the shorter inside lines.

Tension Block Device: The experience of commercial fishermen indicates that many striking albacore are lost before boating, notwithstanding the use of rubber and metal springs on the trolling lines. In an attempt to eliminate or reduce these losses, a self-paying and retrieving spring device, termed a tension block, has been experimentally developed by the staff (see figures 5 and 6).

The tension block is essentially a bronze block .7 inches in diameter with a sheave thickness of $\frac{1}{2}$ -inch. The device operates in much the same manner as self-retracting steel tape. In the tension block the tape is replaced by a preformed, stainless-steel wire, $\frac{1}{16}$ -inch in diameter and 20 feet in length. The wire is attached to and wound around the sheave. Pulling the wire out from the block brings tension on the wire, as the axle of the sheave protrudes through one side of the block and is attached to a clock-type spring housed on that side. (The clock-type spring is $\frac{1}{64}$ inch thick, 1 inch wide, and 20 feet long.) The running end of the wire is attached to one end of a rubber bumper 11 inches in length, and the trolling line is attached to the other end of the bumper.

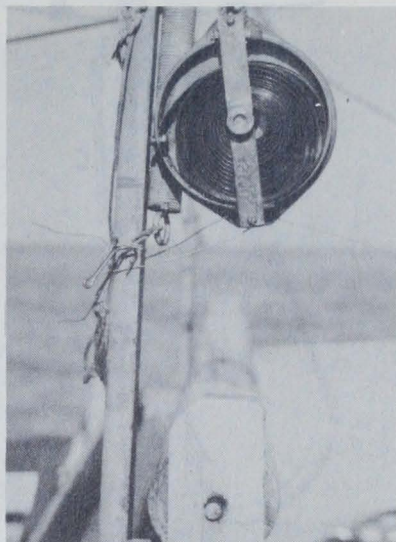


FIG. 6 - THE TENSION BLOCK WITH STRAIN APPLIED TO THE TROLLING LINE (ONE SIDE PLATE REMOVED TO SHOW SPRING).

The purpose of the tension block is to reduce the initial impact of the fish when striking, to give the fish slack when necessary, and to take up slack in the line when not needed. Only four strikes were noted while the tension block was in use, and all of the fish were boated. So far only one tension block has been used. The device is still in the experimental stage. After alterations have been made in the design, it is planned to fish tension blocks from the trolling poles during future operations instead of from the short, upright oak support used in 1951 (see figure 6).

GILL NETS: The gill nets used during the 1951 exploration were in 50-fathom shackles of either linen or nylon webbing, with mesh sizes of $7\frac{1}{2}$, $8\frac{1}{2}$, and $9\frac{1}{2}$ inches, stretched measure.

Results of successful gill-netting operations during the 1950 exploration, using nets 100-meshes deep, indicated that nets 50-meshes deep would probably be as effective; that is, most of the albacore were caught in the top 50 meshes of the net. A part of the 1951 program was to test whether 50-mesh nets would actually fish as effectively as the 100-mesh nets. In testing this, the usual procedure was as follows:

SIX SHACKLES WERE TIED TOGETHER AND FISHED IN A STRING. THREE OF THE SHACKLES WERE 50 MESHES DEEP, AND THREE WERE 100 MESHES DEEP. THE THREE 50-MESH SHACKLES WERE MADE UP OF ONE NYLON $7\frac{1}{2}$ INCHES, ONE LINEN $8\frac{1}{2}$ INCHES, AND ONE LINEN $9\frac{1}{2}$ INCHES. THE THREE 100-MESH SHACKLES WERE MADE UP OF ONE LINEN $7\frac{1}{2}$ INCHES, ONE LINEN $8\frac{1}{2}$ INCHES, AND ONE NYLON $9\frac{1}{2}$ INCHES. (ALL MESH SIZES REFER TO STRETCHED MEASURE.)

LONG LINE: The floating long-line gear consisted of a 3x7 (3 strands of 7 lines each) preformed stainless-steel main line $\frac{5}{64}$ -inch in diameter and 1,000 fathoms in length. To accommodate the gangions (leaders or branch lines), bronze marking beads were threaded on the wire main line at intervals of 3 fathoms. Two marking beads, from 4 to 6 inches apart, were used as line stops for each gangion to hold it at its proper place on the main line. The gangions were made of 3x7 preformed stainless steel, $\frac{3}{64}$ -inch in diameter and 6 feet in length with a loop

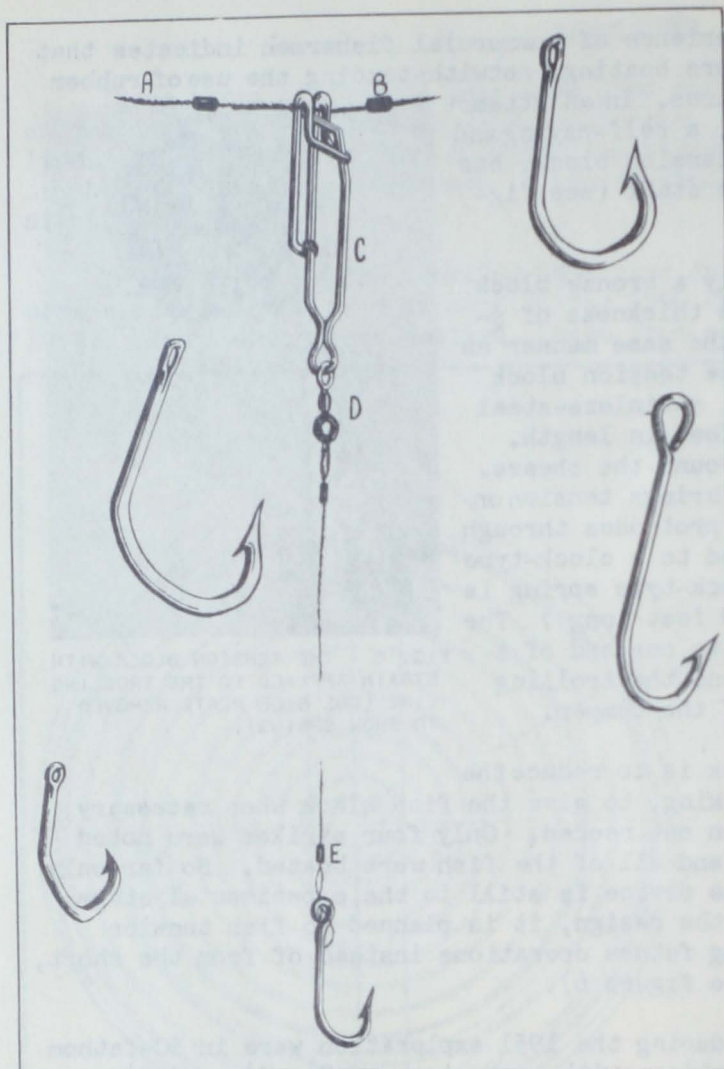


FIG. 7 - DETAIL SKETCH OF GANGION MAKE-UP AND VARIOUS TYPES OF LONG-LINE HOOKS USED. (NOT DRAWN TO SCALE)

- A. MAIN LINE.
 B. BRONZE MARKING BEAD USED FOR LINE STOP.
 C. SNAP-ON CONNECTOR. D. SWIVEL.
 E. BRONZE MARKING BEAD USED FOR MAKING LOOP.

36 fathoms. The drop lines on the floats were one fathom in length, and as the floats drifted together an estimated 50 percent at times, the gear fished at a depth range from 2 to 16 fathoms. When hauling the gear, the reel was attached to the power take-off of the winch. As the main line was reeled in, the gangions were unsnapped after coming over a shark gill-net roller on the vessel's starboard side.

RESULTS OF GEAR TESTS

Results of fishing with various types of gear during the 1951 exploration were poor. Of the few albacore taken, 119 were caught by trolling gear and 28 were caught by gill nets. No albacore were

in each end, one for the hook and the other for the snap-on connector. Various types of linen and nylon gangions were also used but were unsatisfactory because of the large number of hooks lost (up to 70 percent per set), due evidently to sharks. Hooks used included those of the Japanese long-line type, and various kinds of number 7/0 and larger hooks (see figure 7).

The main line was wound on a 19.5-inch diameter galvanized reel having a core 10.7 inches in diameter and 3.5 inches in width. In preparing to set the long line, a large bolt was passed through the opening in the core to serve as an axle for the reel. During setting operations, the reel was located near the hatch and was braked by hand. From the reel, the main line passed over a halibut chute on the stern and into the water. Men stationed on each side of the main line, just forward of the chute, snapped on gangions baited with either herring or squid as the line stops passed by. Buoyed bamboo poles with red flags were attached at the ends of the main line as markers. Inflated, 16-inch rubber floats were spaced along the main line at intervals of approximately

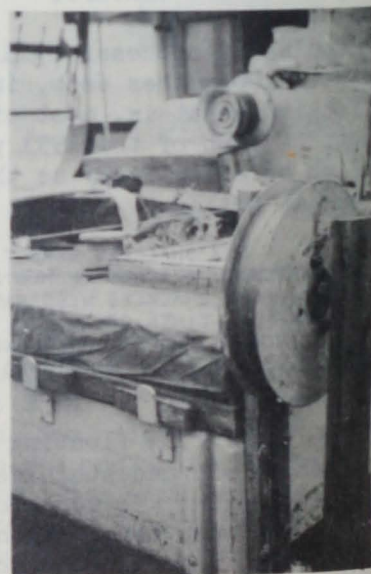


FIG. 8 - STAINLESS-STEEL LONG-LINE ON REEL DURING SETTING.

caught with the long line. Most of the albacore taken were caught off Tillamook Head in the vicinity of the explosives dumping area (see figure 2).

Albacore were caught in only 3 of the 3 gill-net sets made by the John N. Cobb during 1951. The 50-mesh nets took only 3 albacore, as compared with 25 in the 100-mesh nets. However, the test of the effectiveness of the 50-mesh nets was inconclusive because the total number of albacore taken was small in comparison with the sizable catches in 1950, and the results could have been due entirely to chance. There was no appreciable difference in the fishing ability of the nylon and linen nets. Although the gill nets did not produce albacore in commercial quantities during the 1951 exploration, they were helpful in indicating the presence of albacore when none could be observed or taken by trolling.

Blue shark (Prionace glauca) were taken in all gill-net sets. Other fish taken in the gill nets included mackerel shark (Lamna ditropis), soupfin shark (Galeorhinus zyopterus), jack mackerel (Trachurus symmetricus), and pomfret (Brama raii). One ocean sunfish (Mola mola) was also taken in the gill nets.

Six long-line sets were made. No albacore were caught, but blue shark were taken in numbers from 23 to 121 per set. Several mackerel shark and the anterior portion (the posterior portion was evidently eaten by shark) of a single handsaw fish (Alepisaurus aesculapius) were also caught.

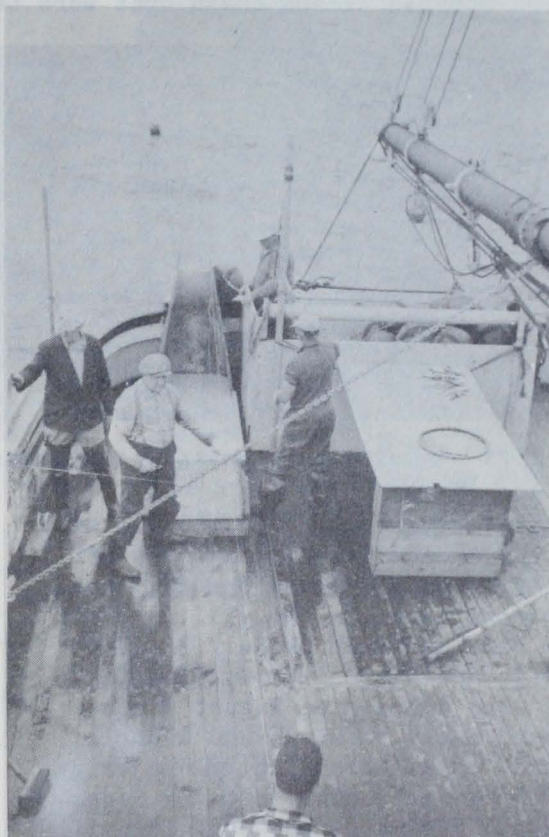


FIG. 9 - SNAPPING THE GANGIONS ON THE STAINLESS STEEL LONG LINE AS IT PAYS OUT OVER THE CHUTE AT STERN. TABLE AT RIGHT WAS USED FOR BAITING.

Results of long-lining operations during the 1951 exploration were not encouraging. The stainless-steel long-line gear as used did not appear to be commercially adaptable to capturing albacore off the coasts of Oregon and Washington. This is based on the fact that no albacore were taken (although the poor season probably did not provide a conclusive test), and on the evidence that the large number of blue shark present in these waters would probably take the bait before the albacore could. It is also believed that if any albacore were hooked, the blue shark would seriously damage many of them. Another factor is that this gear requires considerable labor in its utilization. Also, it is risky to set it in areas where fishing vessels are engaged in trolling because of the danger of fouling the gear.

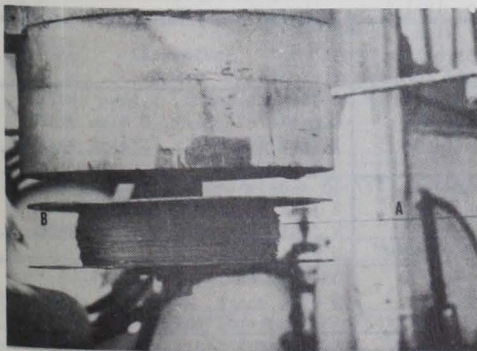


FIG. 10 - STAINLESS STEEL MAIN LINE WINDING ON REEL DURING HAULING OPERATIONS.
A. MAIN LINE. B. REEL.

MISCELLANEOUS OBSERVATIONS

SIZE OF ALBACORE: The lengths and the weights of all the albacore captured were recorded except those that were tagged or were too badly mutilated by sharks (while in the gill nets). The fish ranged from 22.75 inches to 34 inches in length, with an average length of 26.88 inches; and from 8.75 to 30 pounds in weight, with an average weight of 14.37 pounds. All but 5 of the fish that were measured and weighed came from the area off Tillamook Head.



FIG. 11 - HAULING STAINLESS-STEEL LONG LINE ABOARD THE JOHN N. COBB.

examined were caught in the vicinity of the explosives dumping area off Tillamook Head. The stomachs of three albacore taken in the gill nets off the Siuslaw River on July 14 were empty, and 2 troll-caught fish taken off Cape Johnson on August 9 contained small rockfish and 1 small squid. Small rockfish (the majority of which were believed to be *Sebastes alutus*) were the only identifiable items of food found in albacore stomachs from July 25 to August 4, except for 11 small squid taken from 9 albacore caught in the gill nets on August 4. During the 1951 exploration,



FIG. 12 - ALBACORE TAKEN IN A GILL-NET SET. NOTE ONE MUTILATED BY SHARK.

Date	Position of set	No. hrs. net soaked	No. albacore	Surface temperature	Wind direction and force ^{1/}	Incidental catch
6/15 - 6/16	42°25' N. 135°12' W.	8½	0	58.0° F.	N-4	2 jack mackerel, 1 blue shark.
6/23 - 6/24	42°05' N. 134°35' W.	9	0	59.5° F.	NW-5	2 mackerel shark, 5 blue shark.
6/26 - 6/27	43°02' N. 133°16' W.	9½	0	57.5° F.	NxW-4	1 jack mackerel, 11 blue shark, 3 pomfret.
7/13 - 7/14	43°59' N. 126°22' W.	8	3	58.0° F.	SE-0-4	10 jack mackerel, 14 blue shark.
7/14 - 7/15	45°10' N. 126°06' W.	9	0	60.0° F.	SE-4	2 jack mackerel, 6 blue shark.
7/16 - 7/17	45°30' N. 126°48' W.	8½	0	61.0° F.	S-4	2 jack mackerel, 4 blue shark.
7/17 - 7/18	45°36' N. 127°05' W.	8½	0	62.0° F.	SW-0-4	5 blue shark.
7/25 - 7/26	45°45' N. 125°48' W.	9	16	61.5° F.	NW-3	58 blue shark, 1 pomfret.
7/29 - 7/30 ^{2/}	47°17' N. 125°45' W.	9½	0	60.0° F.	NW-2-4	1 blue shark, 2 soupfin shark, 2 mackerel shark.
8/3 - 8/4	46°04' N. 125°15' W.	9½	9	62.0° F.	NE-2	1 mackerel shark, 28 blue shark.
8/4 - 8/5	46°13' N. 126°26' W.	9½	0	61.5° F.	NW-5-4	5 jack mackerel, 17 blue shark.
8/5 - 8/6	46°31' N. 128°56' W.	9½	0	62.0° F.	NW-3-4	4 blue shark, 1 ocean sunfish.
8/6 - 8/7	46°45' N. 130°46' W.	9½	0	62.5° F.	SE-2-NW-4	33 blue shark, 2 mackerel shark.

^{1/}WIND FORCE IS ACCORDING TO BEAUFORT SCALE.
^{2/}GLASS BALLS REMOVED AND 10 FATHOMS OF LINE ATTACHED TO RUBBER FLOATS.

no albacore stomach examined contained more than 10 small rockfish and 20 partially-digested fish, presumably rockfish; whereas 167 small rockfish were taken from the stomach of a single albacore during the 1950 exploration.

WATER TEMPERATURES: Surface water temperatures were recorded at hourly intervals, and subsurface temperatures were taken several times daily by means of a bathythermograph. In the area of best fishing off Tillamook Head, surface water temperatures ranged from 58° to 62° F.

TAGGING OF ALBACORE ABOARD THE VESSEL: Experimental tagging, using a new flexible plastic streamer-type tag, 8 mm. wide, 34 mm. long, and less than 1 mm. thick (Alverson and Chenoweth 1951), was planned; however, because of the scarcity of fish, only 42 albacore were tagged and released. To date none of these tags has been returned.

SUMMARY

Although albacore tuna have been taken commercially off the coasts of Oregon and Wash-



FIG. 13 - LARGE NUMBERS OF BLUE SHARK WERE TAKEN BY GILL NETS AND LONG LINE.

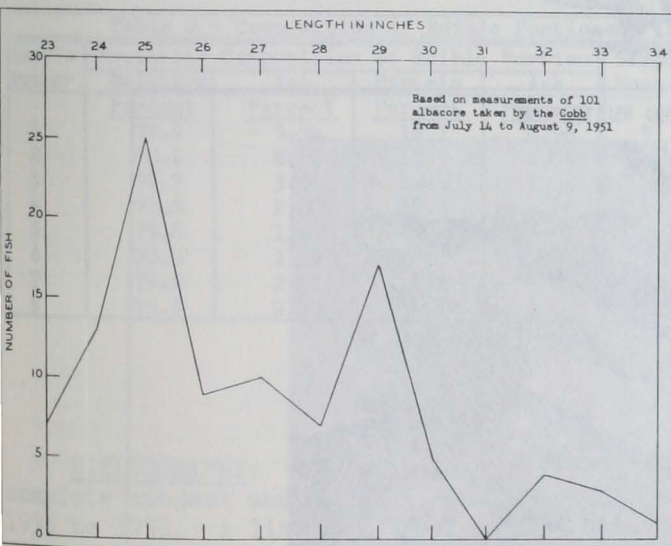


FIG. 14 - LENGTH-FREQUENCY CURVE OF ALBACORE.

ington since 1937, very little is known concerning the habits of the fish, and the catch fluctuates greatly from year to year. The 1951 landings of albacore in these two states amounted to only one-third (approximately 3.5 million pounds) of the landings in 1950 (approximately 10.5 million pounds), and results of early-season offshore scouting were likewise poor in 1951 as compared with the encouraging catches made in June 1950. The John N. Cobb failed to catch any albacore during the first phase of the 1951 exploration off the Oregon coast, and a good run of

Table 2 - Long-Line Catch Data, 1951

Date	Position	No. hooks	Bait	Time soaked	No. albacore	Incidental catch
7/15	42°27' N. 135°09' W.	300	Herring, 100 whole, 200 cut	4 hrs. 10 min.	0	26 blue shark, head of 1 handsaw fish.
7/27	42°53' N. 134°17' W.	290	Herring, 96 whole, 194 cut	4 hours	0	26 blue shark.
7/28	42°22' N. 135°21' W.	290	Herring, 80 whole, 210 cut	3 hrs. 50 min.	0	23 blue shark.
7/15-7/16	44°31' N. 126°12' W.	292	Herring, 52 whole, 200 cut; 40 squid	11 hrs. 45 min.	0	102 blue shark, 1 mackerel shark.
7/26-7/27	45°45' N. 125°35' W.	290	Herring, 60 whole, 200 cut; 30 squid	10 hrs. 45 min.	0	121 blue shark, 1 mackerel shark.
7/7	46°45' N. 130°45' W.	220	Herring, 100 whole, 50 cut; 70 squid	4 hrs. 55 min.	0	102 blue shark, 1 mackerel shark.

tuna failed to materialize off Oregon and Washington by August 10, when the exploratory vessel terminated the season's albacore exploration. Favorable water temperatures (over 57° F.) were found in most of the areas explored after the first of July; but trolling and gill-net results were generally poor, and the stainless-steel long line failed to catch albacore. There is a possibility that early-season scouting off the southern Oregon coast may aid in forecasting the time and degree of availability of albacore to the commercial fishery of Oregon and Washington, but more work needs to be done before any specific conclusions can be drawn.

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1952. NORTH PACIFIC ALBACORE TUNA EXPLORATION--1950. U. S. FISH AND WILDLIFE SERVICE, FISHERY LEAFLET 402, APRIL.



BAKED WHITEFISH



3- OR 4-POUND WHITEFISH, DRESSED
 $\frac{1}{2}$ TEASPOONS SALT
 4 TABLESPOONS BUTTER OR OTHER FAT, MELTED
 3 SLICES BACON (OPTIONAL)

Clean, wash and dry fish. Rub inside and out with salt. Place fish in a greased baking pan. Brush with melted fat and lay slices of bacon over the top. Bake in a moderate oven 350° F. for 40 to 60 minutes or until fish flakes easily when tested with a fork. If fish seems dry while baking, baste occasionally with drippings or melted fat. Serve immediately on a hot platter, plain or with a sauce. Serve 6.