

8. ALBACORE ADVISORY PROGRAMME AT THE SOUTHWEST FISHERIES
CENTER, LA JOLLA, Ca., U.S.A.

by

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8.1 Introduction

The National Oceanic and Atmospheric Administration, National Marine Fisheries Service (NOAA/NMFS), La Jolla Laboratory (and predecessor organizations) has operated an albacore fishery forecasting/advisory services programme since the early 1960's. For the past several years this programme has been a sub-unit of a multidisciplinary research programme on North Pacific albacore, intended to develop optimal management policy recommendations with respect to U.S. interests in North Pacific albacore fisheries and to produce information for optimal planning and operating decisions in the U.S. albacore industry.

8.2 Users of fishery forecast/advisory materials

The users of the albacore fishery forecasting/monitoring services are many and varied. Strategic forecast materials are being used by

- the commercial albacore fishing industry, especially the fish processing and wholesaling components, and operators and owners of fishing vessels or fleets of fishing vessels;
- the recreational fishing community, notably operators of charter boats;
- the management agencies of the State and (potentially) Federal governments.

Tactical fishery forecasting/monitoring materials are used mainly by

- the U.S. albacore jigfishing and baitboat fishing fleets, fish buying stations and other components of the industry;
- recreational albacore fishermen;
- resource managers

The needs of the U.S. albacore tuna fishing industry and fishery managers for strategic and tactical fishery forecasting/monitoring services have been specified through dialogues with members of various components of the industry and fishery scientists, and in literature. A re-evaluation of the needs of the user groups is periodically required due to changes in the fisheries for North Pacific albacore. For example, information on fleet allocation will no doubt need to be added to the strategic list of needs of the U.S. industry.

The strategic needs of all user groups are on time-scales of up to several forthcoming seasons and on an ocean-area basis space-scale. The strategic needs include: (i) the general area in which the stock of fish will be available in the forthcoming season relative to its area of availability in the long-term, specifically the seasonal geographic location of centers of the fishery, e.g., north-south and nearshore-offshore; (ii) range of the fishery in time and space; (iii) the probable level of abundance of the stock of fish over the fishery area in the forthcoming season, relative to its long-term abundance; (iv) variation in expected size composition of fish; (v) the probable long-term oceanographic conditions which may affect fishing operations due to predicted broad-scale anomalies, specifically information on general ocean surface and subsurface temperature conditions; and (vi) the probable long-term wind and sea conditions which may affect fishing operations by broad area due to predicted climatic anomalies.

The tactical needs of all the user groups are similar to the strategic needs, but on time-scales of a few days or weeks and on a "local" area space-scale.

8.3 Albacore fishery forecast advisory/materials

8.3.1 Seasonal forecast

The seasonal forecast is issued in early June about 4 to 6 weeks before the usual beginning of the fishing season. The basic elements of the forecast include a) the proportions of the total catch that are expected to be caught off the Pacific Northwest and off California (north and south of San Francisco), b) an account of trends in oceanographic and atmospheric conditions as they pertain to "set-up" conditions for the forthcoming season, c) long-range outlook of oceanographic, atmospheric and weather conditions that may affect the fishery, and d) information on the catches and landings by state for prior and recent years.

The prediction of the percentages of the seasonal catch expected to be taken north and south of San Francisco is based on an index which qualitatively relates the north-south geographic distribution of albacore catch with oceanographic conditions during spring months in offshore waters through which albacore immigrate to the North American West Coast. In addition, relationships between geographic shifts in the fishery, including oceanographic frontal boundary features, geographic trends in catch and, to a lesser degree, the nearshore ocean conditions and projected distribution of atmospheric conditions are used. The discussions of trends in oceanographic and atmospheric conditions are based on analyses conducted at the La Jolla Laboratory. The long-range outlook for oceanographic conditions that may affect the fishery is based on an evaluation of recent trends in broad-scale anomaly patterns and the probable effects that the long-range atmospheric conditions will have on oceanographic conditions. The projection of long-range weather conditions is obtained from the National Weather Service.

8.3.2 Biweekly fish bulletins

Albacore fish bulletins (Figure 1a and b) are issued in conjunction with 15-day sea surface temperature charts (see below). Included in the bulletins are short-term projections of albacore distribution and locations of productive fishing areas, information on oceanographic and meteorological conditions, and other information as appropriate. The bulletins are mailed to fishermen and others upon request and are bulk-mailed to fish buyers and processors for further dissemination to fishermen. The bulletins are based on fishery information radioed ashore from cooperating fishermen, from fish buyers and processors, fishermen's associations, and State fishery agencies. Oceanographic information is based on analysis of ocean conditions conducted at the La Jolla Laboratory and an extended weather forecast is provided by the National Weather Service.

8.3.3 Albacore fishing information daily forecasts

Daily broadcasts of albacore fishing information are prepared by the La Jolla Laboratory staff and transmitted to the fishing fleet at sea. The broadcasts include the latest albacore fishing information obtained from research vessels, cooperating fishing vessels, unloading station operators, processors, fishermen's foundations and State fishery agencies. Highlights include location of active centres of fishing, typical fishing scores, size of fish, sea surface temperature and subsurface temperature information when available, and other information as appropriate. A weather and sea state summary prepared by the National Weather Service is also given, including large-scale weather features, regional wind, weather and sea state conditions between 20-250 miles offshore, and storm development. The broadcasts are made twice daily on weekdays and once on Saturday mornings during the albacore fishing season. The broadcasts are transmitted by radio station WWD which is licensed to the National Marine Fisheries Service and Coast Guard radio station NMC on several single side band frequencies and by a number of commercial radio stations along the U.S. Pacific coast on commercial AM frequencies.

8.3.4 Oceanographic advisory information

(i) Biweekly sea surface temperature (SST) charts

The biweekly SST charts cover the area between central Baja California, Mexico and Vancouver Island, British Columbia, Canada out to 135°W (see R.H. Evans, section 7, Figure 1). The SST charts are distributed year-round, but during the albacore fishing season, from about July through October, they are included with the Albacore Fish Bulletins described in section 8.3.2. R.H. Evans gives additional information concerning the SST charts.

(ii) Weekly sea surface temperature (SST) charts

The weekly SST charts cover the same area as the biweekly charts and are transmitted by radio station WWD via radiofacsimile to albacore fishing vessels on the fishing grounds each Friday during the fishing season. Approximately 25 albacore vessels are fitted with radiofacsimile recording equipment. These vessels often pass information on SST gained from the charts to other vessels via voice radio communication.

8.4 Additional information

8.4.1 Vertical sections of ocean temperature

Vertical profiles of ocean temperature and surface temperature and salinity observed between the U.S. west coast and Hawaii (Figures 2a and 2b) have application to the U.S. albacore fishery. The subsurface temperature structure is made from expendable bathythermograph (XBT) drops by cooperating merchant vessels; surface temperature and salinity observations are also made at each XBT station (Saur and Stevens 1972). The charts are published monthly in Fishing Information. In recent years there has been an expansion in the albacore fishery to much farther offshore and about 2 months earlier than the historical start of the fishing season. Fishermen have used the vertical thermal profiles and accompanying information to assist in planning strategy for fishing in the offshore waters during the early season. The isotherms between 16° and 19°C are shaded as an aid to follow variations in distribution of these isotherms which are within the habitat temperature preference for albacore. The charts can also be used to locate oceanic boundary features where the relative abundance of albacore has been found to be high in offshore waters (Laurs and Lynn, in press).

8.4.2 Charts of nominal CPUE and size composition

As an incentive for fishermen to keep logbooks, charts showing nominal catch per unit effort summarized by 15-day period and 1° quadrangle (Figure 3) and size composition by area (Figure 4) for the preceding season are distributed to fishermen with logbooks for use during the forthcoming season. The charts are issued as cooperative products of the state fishery agencies and NMFS. The processing, standardization, and management of a uniform U.S. West Coast logbook for albacore (Laurs, Hooker, Hreha, and Lincoln, 1975) are shared by the states and NMFS. Processing, including editing and quality control, is accomplished by state fishery personnel. The data from each of the states are then made available to the La Jolla Laboratory in ADP form. NMFS scientists merge the data from the states, and the fishing effort is standardized using a modified version of the computer programme FPOW (Berude and Abramson, 1972) as described by Laurs, Clemens, and Hreha (1976).

Comments received from fishermen indicate satisfaction with the CPUE and size composition charts. According to some fishermen, they are more conscientious in keeping logbooks because of the receipt of the catch charts.

1/ Data are processed under supervision of personnel at NMFS Pacific Environmental Group, Monterey, California, using computer facilities of the Navy Fleet Numerical Weather Central, Monterey, California. The project is partially supported by the National Science Foundation and Office of Naval Research

8.5 References

- Berube, C.L. and N.J. Abramson, Relative fishing power, CDC 6600, FORTRAN IV.
1972 Trans.Am.Fish.Soc., 101:133
- Laur, R.M. and R.J. Lynn, Seasonal migration of North Pacific albacore, Thunnus
in press alalunga, into North American coastal waters: distribution, relative
abundance, and association with Transition Zone waters. U.S.Fish.Bull.
- Laur, R.M., H.B. Clemens and H.R. Hreha, Nominal catch-per-unit effort of albacore,
1976 Thunnus alalunga (Bonnaterre), caught by U.S. jig vessels during 1961-1970.
Mar.Fish.Rev., 38(5):1-32
- Laur, R.M. et al., A uniform U.S. west coast logbook for albacore, Thunnus alalunga
1975 (Bonnaterre), and coastwide albacore fishery data system. Mar.Fish.Rev.,
37(11):14-21
- Saur, J.F.T. and P.D. Stevens, Expendable bathythermograph observations from ships
1972 of opportunity. Mariners Weather Log, 16(1):1-8
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U.S. DEPARTMENT OF COMMERCE
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION
NATIONAL MARINE FISHERIES SERVICE
Southwest Fisheries Center
La Jolla, California 92038

Bulletin No. 77-3

ALBACORE FISHING SCATTERED AND MOSTLY IN SOUTHERN AREAS

Two jigboats in transit from Hawaii to the North American coast were able to locate commercial quantities of albacore near 35°N lat., 135°W long. during early July. For approximately 8 days these boats averaged 150-300 fish per day on predominantly 12-14 pound (5.5-6.4 kg) albacore. These fish are believed to be migrating into the North American fishery. In other areas, fishing was generally scattered and spotty during the first 2 weeks of July. Jigboats fishing in the Guadalupe Island-San Martin Island area averaged 20-40 fish a day with a few high scores of up to 150 fish. Fishing in other areas was also spotty and located farther than 100 miles from shore. Boats worked from San Juan Seamount to the Columbia River with only a few catches greater than 100 fish reported from California waters. Only a few small catches were made north of Cape Blanco. Most of the fish caught north of the San Juan Seamount were 11-13 pounds (5-5.9 kg).

Although baitboat catches were not heard on a daily basis from Baja California, some of these boats were reported to have made catches of 4-5 tons on some days.

On July 18, all three of the American Fishermen's Research Foundation's (AFRF) chartered jigboats were at sea. The Lady Olga worked the San Juan Seamount area from July 1-5 and reported small catches of albacore which averaged 7-12 pounds (3.2-5.5 kg) in sea-surface temperatures of 59.5-62.5°F (15.3-17.0°C). The Lady Olga was in port between July 6-10. Since returning to sea, she has fished from southwest of Point Arguello to Morro Bay. Her best catch averaging 12 pounds (5.5 kg) was 140 albacore taken 200 miles west of Morro Bay in waters with sea-surface temperatures approximately 59°F (15.0°C). The Lusty left Ventura, California on July 5 and worked northward to Cape Flattery. The Lusty reported small catches near the Davidson Seamount and small, scattered catches off Point Arena and northward. Its best days of fishing were on July 11-12 when 41 and 59 albacore were caught from approximately 100-110 miles west of Point Arena. These fish averaged 12½-13 pounds (5.7-5.9 kg) and the sea-surface temperature was about 59°F (15.0°C). The third AFRF chartered jigboat, Four C's, left Astoria on July 13 and fished offshore to Cobb Seamount and off Newport, Oregon. The Four C's has caught only two albacore.

The Oregon Department of Fish and Wildlife also chartered a jigboat to scout the areas off Oregon during part of the first 2 weeks of July; however, no albacore were caught.

Catches made by San Diego based sportboats have ranged from less than one fish per passenger to better than three fish per passenger during the first 2 weeks of July. These boats generally fished from 60-90 miles south of San Diego, with the best catches in the second week of July being made in an area about 60 miles south of San Diego.

Sea-surface temperatures (SST) warmed from July 1-15 over the offshore areas of the eastern Pacific (see chart) at near-normal rates. Along the coast near Cape Blanco and east of 126°W, the 15-day warming trend was 1-2°F above normal and west of San Francisco between 124°W and 125°W, the SST's actually cooled 1-2° more than normal during the first half of July. The cooling of SST's west of San Francisco was associated with frequent periods of strong northerly winds and heavy mixing of colder, upwelled water from the coast. Near Cape Blanco the light winds and relative clear skies from July 1-15 resulted in more surface heating and less ocean mixing and upwelling than normal.

During the last half of July, based on the National Weather Service forecast of slightly above-normal surface pressures centered near 40°N, 140°W, it appears that off shore there will be a near-normal warming trend in SST's. However, south of Cape Mendocino and east of 125°W, SST's have been 1-2°F below normal during the past 15 days. It is expected that SST's will remain more than 1°F below normal in this area, especially within 100 miles of the coast where wind mixing and upwelling are expected to be most pronounced during the latter half of July. The areas with greatest warming of 1-2°F above normal will continue to be north of Cape Blanco from 50 to 200 miles off shore. This area is shown in the attached SST chart where the 56°F and 58°F isotherms bulge to the northeast.

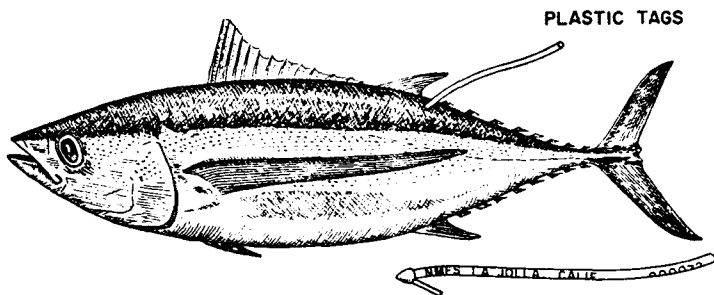
July 18, 1977

Staff, Albacore Fisheries Program
R. Michael Laurs, Leader

Figure 1a. Example of biweekly albacore Fish Bulletin.

\$ REWARD \$

FOR ALBACORE TUNA TAGS



YELLOW TAGS

THE NATIONAL MARINE FISHERIES SERVICE WILL PAY \$ 2.00 FOR EACH YELLOW TAG RECOVERED. (NO NEED TO RETURN FISH)

RECORD:

- ▶ WHERE
 - ▶ WHEN
 - ▶ HOW
 - ▶ LENGTH OF FISH (TIP OF LOWER JAW TO FORK OF TAIL)
- } *FISH WAS CAUGHT*

FORWARD TO NMFS ADDRESS ON TAG

RED TAGS

THE NATIONAL MARINE FISHERIES SERVICE WILL PAY \$ 50.00 FOR EACH RED TAG & FISH RETURNED. (FISH WITH TAG INTACT MUST BE RETURNED)

RECORD:

- ▶ WHERE
 - ▶ WHEN
 - ▶ HOW
 - ▶ LENGTH OF FISH (TIP OF LOWER JAW TO FORK OF TAIL)
- } *FISH WAS CAUGHT*

NOTIFY NMFS P.O. BOX 271, LA JOLLA, CA. TEL. (714) 453-2820

THE AMERICAN FISHERMEN'S RESEARCH FOUNDATION WILL AWARD CASH PRIZES FOR YELLOW & RED TAG NUMBERS DRAWN IN AN ANNUAL LOTTERY.

Figure 1b. Albacore tagging information included with biweekly Fish Bulletin.

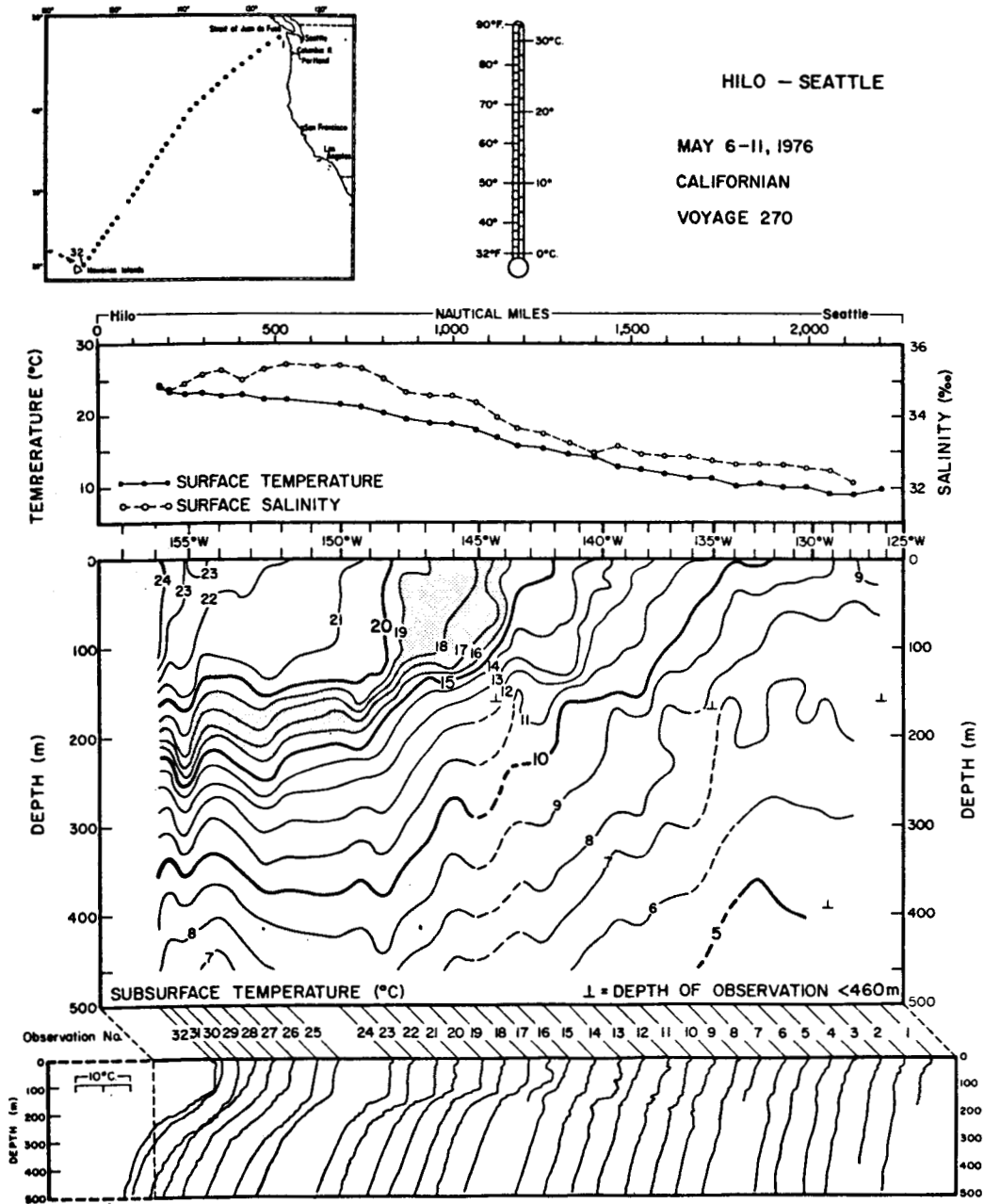


Figure 2a. Surface temperature and salinity and subsurface temperature structure from expendable bathythermograph observations between Seattle and Hawaii.

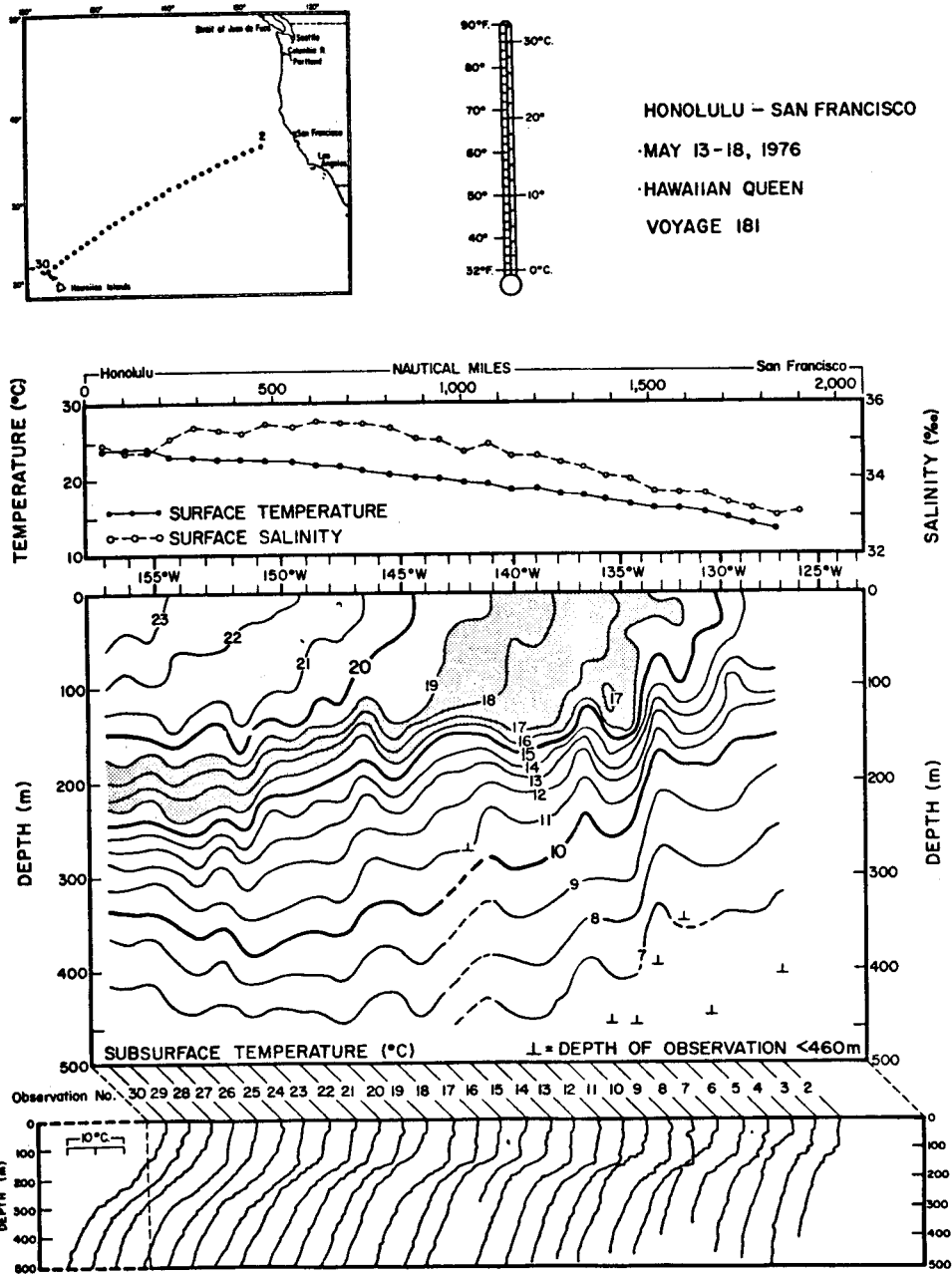


Figure 2b. Surface temperature and salinity and subsurface temperature structure from expendable bathythermograph observations between San Francisco and Hawaii.

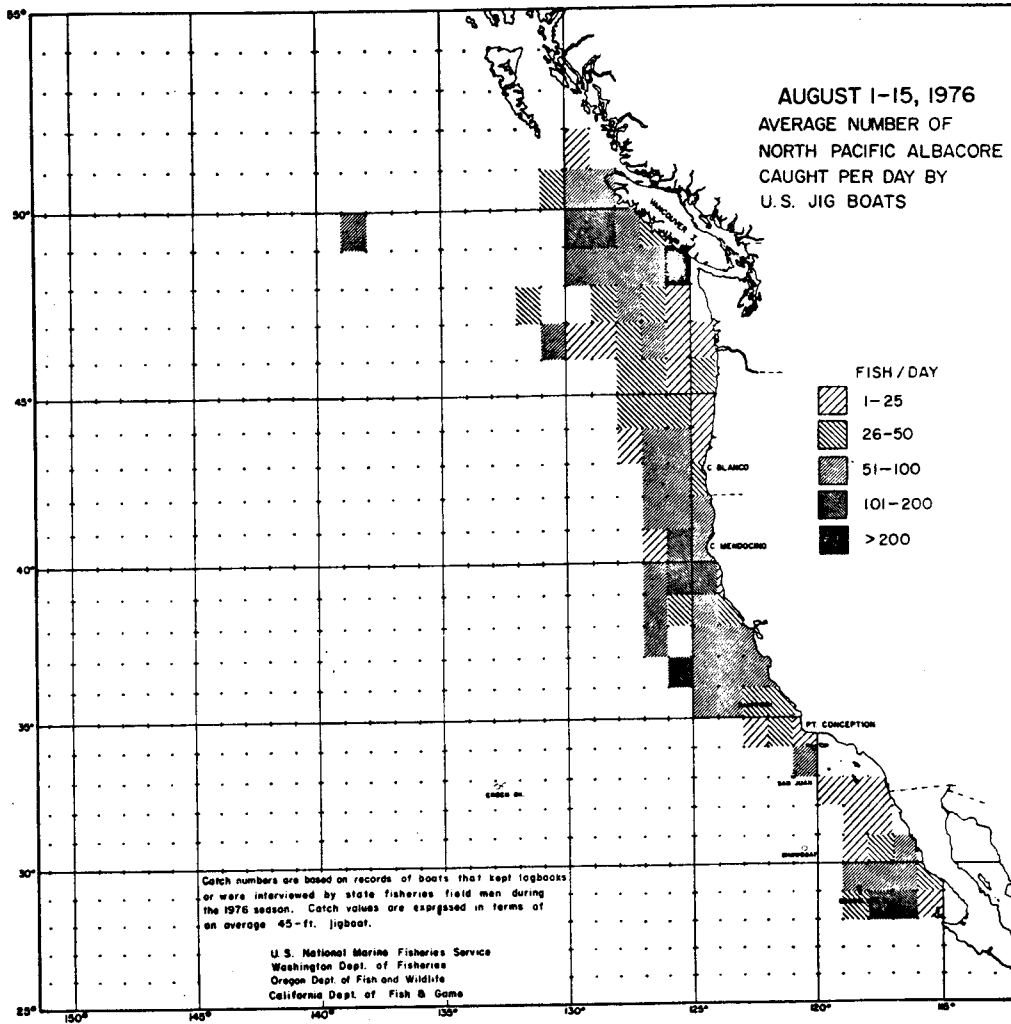


Figure 3. Chart distributed to fishermen showing nominal catch per unit effort by 15-day period and 1° quadrangle.

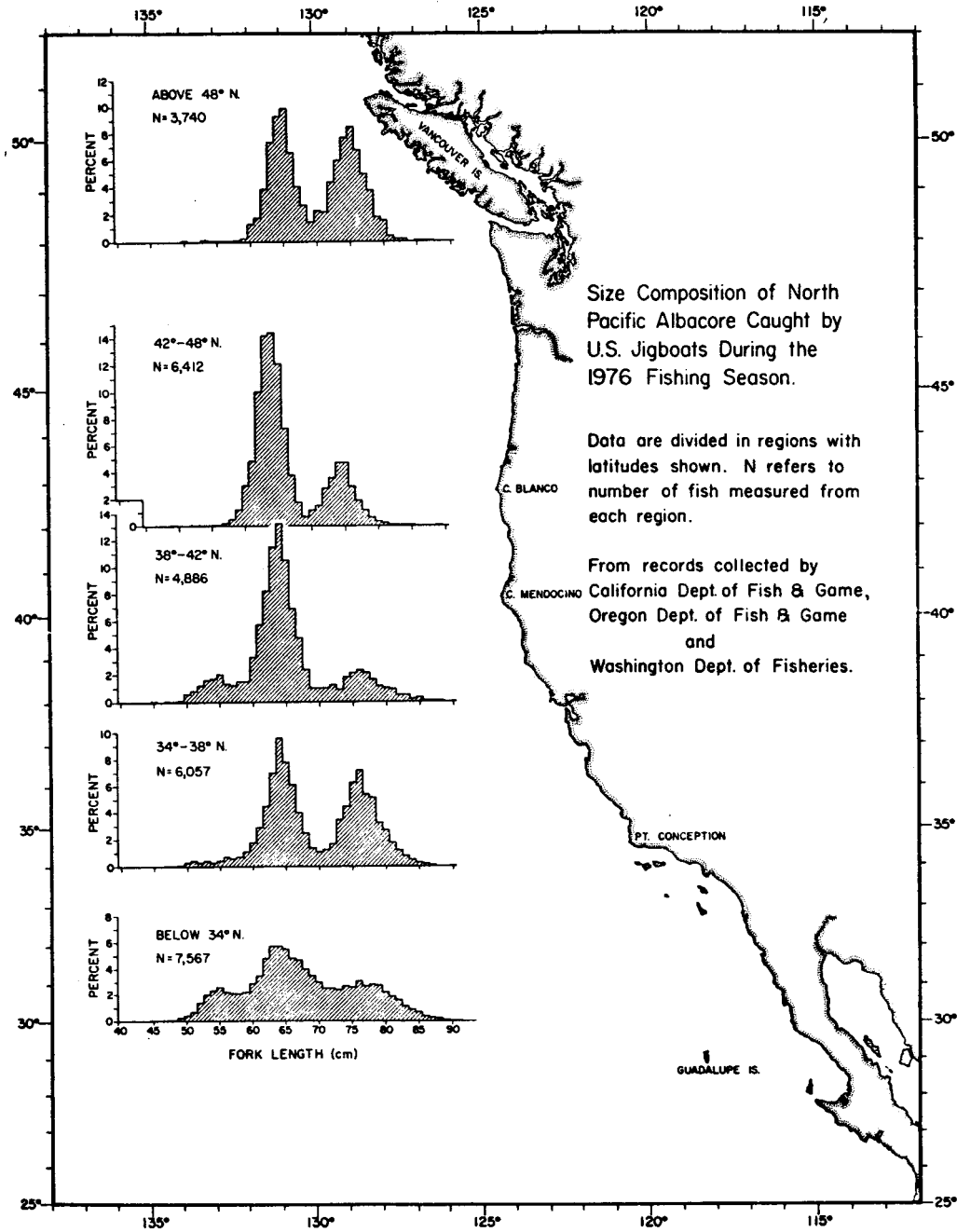


Figure 4. Chart distributed to fishermen showing size composition of albacore caught in commercial fishing.