

## A Uniform U.S. West Coast Logbook for Albacore, *Thunnus alalunga* (Bonnaterre), and Coastwide Albacore Fishery Data System

R. MICHAEL LAURS, CHARLES HOOKER, LARRY HREHA, and RICHARD LINCOLN

Adequate catch and effort statistics are required to evaluate the effects of harvesting and environmental factors on exploited fish populations for it is only through the understanding of such relationships that the aims of fishery research and management can be fully realized. A uniform U.S. West Coast Albacore Logbook was adopted in 1973 to improve the system for collecting catch and effort information for the U.S. fishery on albacore tuna, *Thunnus alalunga* (Bonnaterre). The purpose of this paper is to describe the design of the logbook, the system for handling the logbook data on a U.S. Pacific coastwide basis, and the dissemination of albacore catch information to cooperating fishermen in return for keeping logbook records.

The new uniform U.S. West Coast Albacore Logbook is intended to simplify record-keeping for the fishermen by making necessary only one logbook for the entire U.S. albacore

fishery with a format that is efficient and easy to use. Also, it is designed to obtain more complete information on the U.S. albacore fishery and to provide a common system of record-keeping among the States so that information obtained can be more readily processed and made available to fishermen and resource managers.

A voluntary albacore tuna logbook has been issued by the California Department of Fish and Game since 1954 (Craig, 1963) to California albacore fishermen, and by the Fish Commission of Oregon since 1967 to Oregon albacore fishermen. Prior to using logbooks, both states collected catch locality and fishing effort information by interviewing fishermen engaged in albacore fishing. Fishermen interviews were continued by the States after the States adopted logbooks and are being continued in conjunction with the new ones to obtain information from fishermen who did not keep logbooks. Until 1973, there was no logbook or formal interview system for collecting catch and effort information for the Washington albacore fishery. However, boats fishing out of Washington ports often kept logbooks issued by Oregon and California.

Since the mid-1950's, fisheries scientists have recognized the desirability of adopting a uniform coastwide logbook and data system for the albacore tuna fishery, and representatives

of state and federal agencies have developed tentative formats for them. Added impetus for this cooperative effort was provided in 1973 as a result of American Fishermen's Research Foundation's active involvement in albacore research, using fisherman-generated funds derived from a self-imposed tax on albacore landings. This program also stimulated funding by NOAA's Sea Grant Program of a 3-year coordinated project in albacore studies via the Pacific Marine Fisheries Commission. This project materially facilitated completion of the uniform logbook and data system, and provided limited funding for additional field personnel to aid in their implementation.

### DESIGN OF THE LOGBOOK

The design of the logbook resulted from the cooperative efforts of fishery scientists of the National Marine Fisheries Service (NMFS), California Department of Fish and Game, Fish Commission of Oregon, Washington Department of Fisheries, Pacific Marine Fisheries Commission, and members of the albacore fishing industry.

The logbook measures  $8\frac{1}{2} \times 11$  inches, and contains sufficient log sheets for 36 weeks. It is bound by a plastic spiral so that the pages can be folded back enabling the logbook to be hung on the bulkhead if desired. Heavy-gauge paper stock is used for the cover (Fig. 1) and fold-out flap,

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and National Cash Register (NCR)<sup>1</sup> "carbonless" paper is used for the logbook sheets. Instructions for using the logbook are printed on the fold-out flap which is inserted under the "carbon" of the NCR paper to prevent carry through. The inside of the cover contains information on what to do in the event that a tagged fish is caught (Fig. 2), and on the inside of the back cover is a length-weight table for albacore.

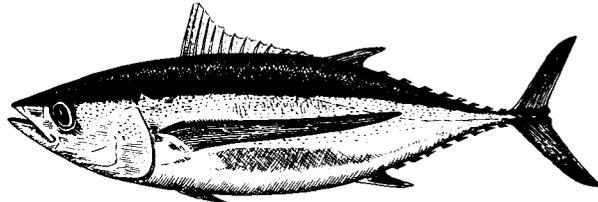
The logbook is divided into two portions: 1) an albacore fishing operations information sheet; and 2) fishing log sheets for keeping daily records. The fishing operations information section (Fig. 3) provides data on the composition and characteristics of the albacore fishing fleet so that changes in fleet efficiency may be evaluated and the summarized logbook data may be more readily standardized from year to year. Fishermen are requested to provide information on the size, speed, and hold capacity of the vessel, navigation, radio, and special equipment, refrigeration type, crew size, and crew fishing experience.

The fishing log sheets (Fig. 4) consist of daily entries divided into necessary information, desired information, and remarks. Fishermen are requested as a minimum to fill out the necessary information category and are encouraged to also complete the desired information category and record pertinent remarks. The necessary information category includes data essential for the calculation of catch per unit of effort including catch localities, amount of catch, amount of fishing effort, and type of fishing gear used. The desired information category includes data which are useful in evaluating catch per unit of effort statistics and in studies involving catch per unit information derived from the logbook records. The desired information includes an estimate of the amount of fish in the area fished, estimated weight of fish caught, sea surface temperature, wind conditions, and sea conditions.

Under remarks fishermen are requested to record observations that may be of interest such as movement

<sup>1</sup>Reference to trade names does not imply endorsement by the National Marine Fisheries Service, NOAA.

## U.S. WEST COAST ALBACORE LOGBOOK



CALIFORNIA DEPARTMENT OF FISH & GAME  
FISH COMMISSION OF OREGON  
WASHINGTON DEPARTMENT OF FISHERIES  
U. S. NATIONAL MARINE FISHERIES SERVICE

Figure 1.—Cover of uniform U.S. West Coast Albacore Logbook.

of fish, type of feed, temperature "edges" or "fronts," water color, bird flocks, etc.

### DISTRIBUTION OF LOGBOOKS AND COLLECTION OF LOGBOOK RECORDS

The logbook is distributed to albacore fishermen by an albacore fishermen's association, the state fisheries agencies, and NMFS. Each year, the Western Fishboat Owners Association mails a logbook and a letter endorsing the use of the logbook to its approximately 625 members representing about 70 percent of the tonnage capacity of the U.S. albacore fleet. Fishery technicians from the

California, Oregon, and Washington State fisheries agencies canvass the waterfront prior to the start of the albacore fishing season and distribute logbooks to vessels that do not have them. A small number of logbooks are mailed by NMFS to fishermen requesting them.

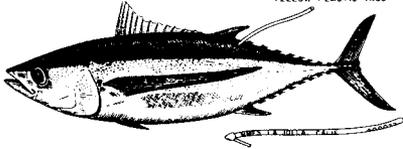
Most of the logbook records are collected by State fishery technicians who visit the waterfront regularly during the fishing season while the boats are unloading. The technicians also obtain catch and effort information by interviewing fishermen who did not keep a logbook.<sup>2</sup> About 20 percent of

<sup>2</sup>In addition, the technicians measure the fork length of samples of fish from catches.

**\$ REWARD \$**

**FOR ALBACORE TUNA TAGS**

YELLOW PLASTIC TAGS



THE  
NATIONAL MARINE FISHERIES SERVICE WILL PAY \$ 2.00 FOR  
EACH TAG RETURNED (SOME FISH HAVE MORE THAN ONE TAG).

**WRITE:**

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

**FISH WAS CAUGHT**

FORWARD TO NMFS ADDRESS ON TAG, TO AFRF  
4904 N. HARBOR DRIVE, SAN DIEGO, CALIF., OR  
STATE FISHERIES AGENCIES.

the logbook records are mailed by fishermen to one of the State fisheries agencies or NMFS.

About 900 of the new logbooks were distributed to fishermen for use during the 1973 and 1974 albacore fishing seasons. In 1973, logbooks or interviews were received from 470 boats for a total of 813 trips representing 7,260 boat-days of fishing. The latter represents about 26 percent of the 27,416 total number of boat-days of fishing for the 1973 fishing season as estimated by California Department of Fish and Game (Hooker, pers. commun.). In 1974, logbooks or interviews were received from 520 boats for a total of 999 trips representing 10,333 boat-days of fishing. An estimate of the total number of boat-days for the 1974 fishing season is not available at this time.

It can be seen in Table 1 that a) the number of boats which kept logbooks or were interviewed, b) the number of

Figure 3.—Fishing operations information sheet from U.S. West Coast Albacore Logbook.

Figure 2.—Inside cover of logbook containing information concerning recovery of tagged albacore.

boat-days in a season for which catch and effort data were recorded, and c) the mean number of days that boats kept logbooks (or interview data are available) are higher in 1973 and 1974 than they were on the average during the 1961-1970 period.

We expect that the increase in logbook and interview coverage which was observed between 1973, when the

Table 1.—Number of boats that kept logbooks or were interviewed, number of boat-days for which catch and effort data were recorded, and mean number of days boats kept logbooks or interview data are available.

Year	Number of boats	Number of boat-days	Mean number of days log kept
1961-70	1418	6,025	14.4
1973	470	7,260	15.5
1974	520	10,333	19.9

<sup>1</sup>Mean value for 1961-1970.

FISHING OPERATIONS INFORMATION

CAPTAIN'S NAME \_\_\_\_\_

VESSEL NAME \_\_\_\_\_ RADIO CALL SIGN \_\_\_\_\_

CAL F&G NO. \_\_\_\_\_ ORE. NO. \_\_\_\_\_ OTHER NO. \_\_\_\_\_

VESSEL LENGTH (DOCUMENTED FEET) \_\_\_\_\_ OVERALL LENGTH (FEET) \_\_\_\_\_

VESSEL HORSEPOWER \_\_\_\_\_ CRUISING SPEED \_\_\_\_\_

HOLD CAPACITY (NET TONS) \_\_\_\_\_

<p>NAVIGATION EQUIPMENT</p> <p><input type="checkbox"/> RDF</p> <p><input type="checkbox"/> LORAN</p> <p><input type="checkbox"/> RADAR</p> <p><input type="checkbox"/> OMEGA</p> <p><input type="checkbox"/> OTHER (SPECIFY) _____</p>	<p>RADIO EQUIPMENT</p> <p><input type="checkbox"/> AM</p> <p><input type="checkbox"/> CB</p> <p><input type="checkbox"/> VHF</p> <p><input type="checkbox"/> SSB</p> <p><input type="checkbox"/> OTHER (SPECIFY) _____</p>
<p>REFRIGERATION TYPE</p> <p><input type="checkbox"/> ICE</p> <p><input type="checkbox"/> BRINE</p> <p><input type="checkbox"/> SPRAY BRINE</p> <p><input type="checkbox"/> BLOWER</p> <p><input type="checkbox"/> OTHER (SPECIFY) _____</p>	<p>SPECIAL EQUIPMENT</p> <p><input type="checkbox"/> HYDRAULIC POWER GURDY SYSTEM</p> <p><input type="checkbox"/> LINE PULLER</p> <p><input type="checkbox"/> XBT</p> <p><input type="checkbox"/> SOUNDER, <input type="checkbox"/> WITH WHITE LINE</p> <p><input type="checkbox"/> SEA SURFACE TEMPERATURE SENSOR</p> <p><input type="checkbox"/> OTHER (SPECIFY) _____</p>

CREW SIZE (INCLUDING CAPTAIN) \_\_\_\_\_

<p>CAPT. ALBACORE FISHING EXPERIENCE</p> <p><input type="checkbox"/> 0 SEASONS</p> <p><input type="checkbox"/> 1-3 SEASONS</p> <p><input type="checkbox"/> 3-10 SEASONS</p> <p><input type="checkbox"/> &gt; 10 SEASONS</p>	<p>CREW FISHING EXPERIENCE</p> <p>_____ NUMBER WITH 0 SEASONS</p> <p>_____ NUMBER WITH 1-3 SEASONS</p> <p>_____ NUMBER WITH 3-10 SEASONS</p> <p>_____ NUMBER WITH &gt; 10 SEASONS</p>
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Vessel Name \_\_\_\_\_ Radio Call Sign \_\_\_\_\_ Year \_\_\_\_\_

DATE	NECESSARY INFORMATION	DESIRED INFORMATION	REMARKS
	IN PORT <input type="checkbox"/> IN TRANSIT <input type="checkbox"/> BAITING <input type="checkbox"/> FISHING <input type="checkbox"/> POSITION(S) _____ NO. FISH CAUGHT _____ JIG <input type="checkbox"/> POLE & LINE <input type="checkbox"/> HOURS FISHED _____ LINES TROLLED _____ POLES FISHED _____	AMT. FISH IN AREA: VERY MANY <input type="checkbox"/> MANY <input type="checkbox"/> FEW <input type="checkbox"/> NONE <input type="checkbox"/> AVE. WT. FISH _____ SEA TEMP _____ AVE. WIND SPEED(KTS): CALM <input type="checkbox"/> <10 <input type="checkbox"/> 10-20 <input type="checkbox"/> 20-30 <input type="checkbox"/> >30 <input type="checkbox"/> SEA CONDITIONS: CALM <input type="checkbox"/> ROUGH <input type="checkbox"/> MODERATE <input type="checkbox"/> UNWORKABLE <input type="checkbox"/>	
	IN PORT <input type="checkbox"/> IN TRANSIT <input type="checkbox"/> BAITING <input type="checkbox"/> FISHING <input type="checkbox"/> POSITION(S) _____ NO. FISH CAUGHT _____ JIG <input type="checkbox"/> POLE & LINE <input type="checkbox"/> HOURS FISHED _____ LINES TROLLED _____ POLES FISHED _____	AMT. FISH IN AREA: VERY MANY <input type="checkbox"/> MANY <input type="checkbox"/> FEW <input type="checkbox"/> NONE <input type="checkbox"/> AVE. WT. FISH _____ SEA TEMP _____ AVE. WIND SPEED(KTS): CALM <input type="checkbox"/> <10 <input type="checkbox"/> 10-20 <input type="checkbox"/> 20-30 <input type="checkbox"/> >30 <input type="checkbox"/> SEA CONDITIONS: CALM <input type="checkbox"/> ROUGH <input type="checkbox"/> MODERATE <input type="checkbox"/> UNWORKABLE <input type="checkbox"/>	
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INSERT FOLDED COVER FLAP UNDER YELLOW COPY

Figure 4.—Fishing log sheet from U.S. West Coast Albacore Logbook.

new logbook was introduced and port sampling was expanded, and 1974 will continue. In general it appears that fisherman acceptance of the logbook and interview system has increased and we anticipate that the acceptance will increase more as fishermen become more familiar with the data collection system and are provided feedback from it.

### COASTWIDE DATA SYSTEM

A coastwide albacore data system has been developed to provide a mechanism whereby the albacore catch and effort data collected by the individual States may be combined and uniformly standardized to obtain information over the entire range of the U.S. albacore fishery in a timely manner. This information is then readily available for resource assessment, fishery-oceanography, and other studies involving that segment which is harvested by the U.S. fishery, or the entire north Pacific albacore population if the U.S. data are combined with similar data from other nations fishing on the north Pacific population of albacore. Concerning the latter, for example, a study was recently initiated between the NMFS and the Japanese Far Seas Fisheries agency to cooperatively study the population dynamics of the north Pacific albacore.

The processing, standardization, and management of the U.S. logbook data are shared by the states and NMFS. Processing, including editing and quality control, is accomplished by state fishery personnel who examine each logbook for completeness and errors. (California and Oregon have capabilities for complete processing of the albacore fishery data collected by their respective fishery agencies, while at present, some processing of data collected by the State of Washington fishery agency is shared by California and NMFS.) Boat lengths, radio call signs, and vessel registration or license numbers are checked through State registration records. Catch locations, which are usually recorded as Loran coordinates, are also assigned to a 1° latitude-longitude quadrangle. In addition,

code numbers are assigned to the records for each vessel for later use to protect the confidentiality of the information provided. The data are keypunched and transferred to magnetic computer tape, and further quality control is exercised. The assignment of the data to the proper 1° quadrangle is checked and the average weight for fish landed is compared against arbitrary limits to eliminate unrealistic weight data. The landing date on the log is also checked against the landing date on the state records of the buyer's receipts. The states use the finalized data tapes to prepare various summaries for their needs.

In addition, a computer tape containing the edited information from the logbooks with boat names replaced by code numbers is prepared for transfer to NMFS. These scientists check by computer for duplication of records and a final basic data tape is prepared. The fishing effort then is standardized using a modified version of the computer program FPOW (Berude and Abramson, 1972) as described by Laurs, Clemens, and Hreha<sup>3</sup>. The fishing effort standardization involves a three-way process to adjust for differences in fishing power among 1) vessel length, 2) time during the fishing season, and 3) geographic area of fishing. Fishing effort for jig vessels of all length classes is expressed in terms of a 45-foot jigboat and estimates of mean standardized catch per unit effort are computed by 15-day period and 1° quadrangle. Paucity of information has limited attempts to generate catch per unit data for baitboats, and efforts are being made to increase the logbook coverage of baitboats which catch about 25 percent of the albacore taken in the U.S. albacore fishery.

The standardized catch per unit of effort data for the U.S. albacore fishery are put on computer tape by NMFS where they are archived and are being used in albacore research studies. In addition, copies of the data tape(s) for the entire fishery or

<sup>3</sup>Laurs, R. M., H. B. Clemens, and L. H. Hreha. Catch per unit effort of albacore tuna, *Thunnus alalunga* (Bonnaterra) caught by U.S. jig vessels during 1961-1970. In preparation.

for a specified portion are available to the state fishery agencies. Also should the north Pacific albacore tuna population come under some form of management, the data could be readily available to resource managers in a relatively timely manner.

The processing, merging, and standardization of the albacore catch and effort data are usually completed in April or early May following the albacore fishing season, which usually lasts from July to early November.

### DISSEMINATION OF CATCH-EFFORT INFORMATION TO COOPERATING FISHERMEN

In discussions with albacore fishing industry representatives concerning the need to obtain increased catch and effort information and the design of the proposed new logbook, they emphasized the desire of having timely feedback to fishermen of catch information summarized from the logbooks. The rationale for doing so was that fishermen would be more likely to keep a logbook if they could see tangible results and possibly benefit from them.

As an incentive for fishermen to keep logbooks, charts showing catch per unit of effort summarized by 15-day period and 1° quadrangle (Fig. 5) and size composition by area (Fig. 6) for the preceding season are distributed to fishermen with logbooks for use during the upcoming season. The charts are also distributed to other members of the albacore fishing industry who request them, e.g., buying station operators, processors, boat dock operators, etc. The charts are issued as a cooperative product of the state fishery agencies and NMFS.

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

While the dissemination of the catch charts to fishermen appears to be popular and successful, questions

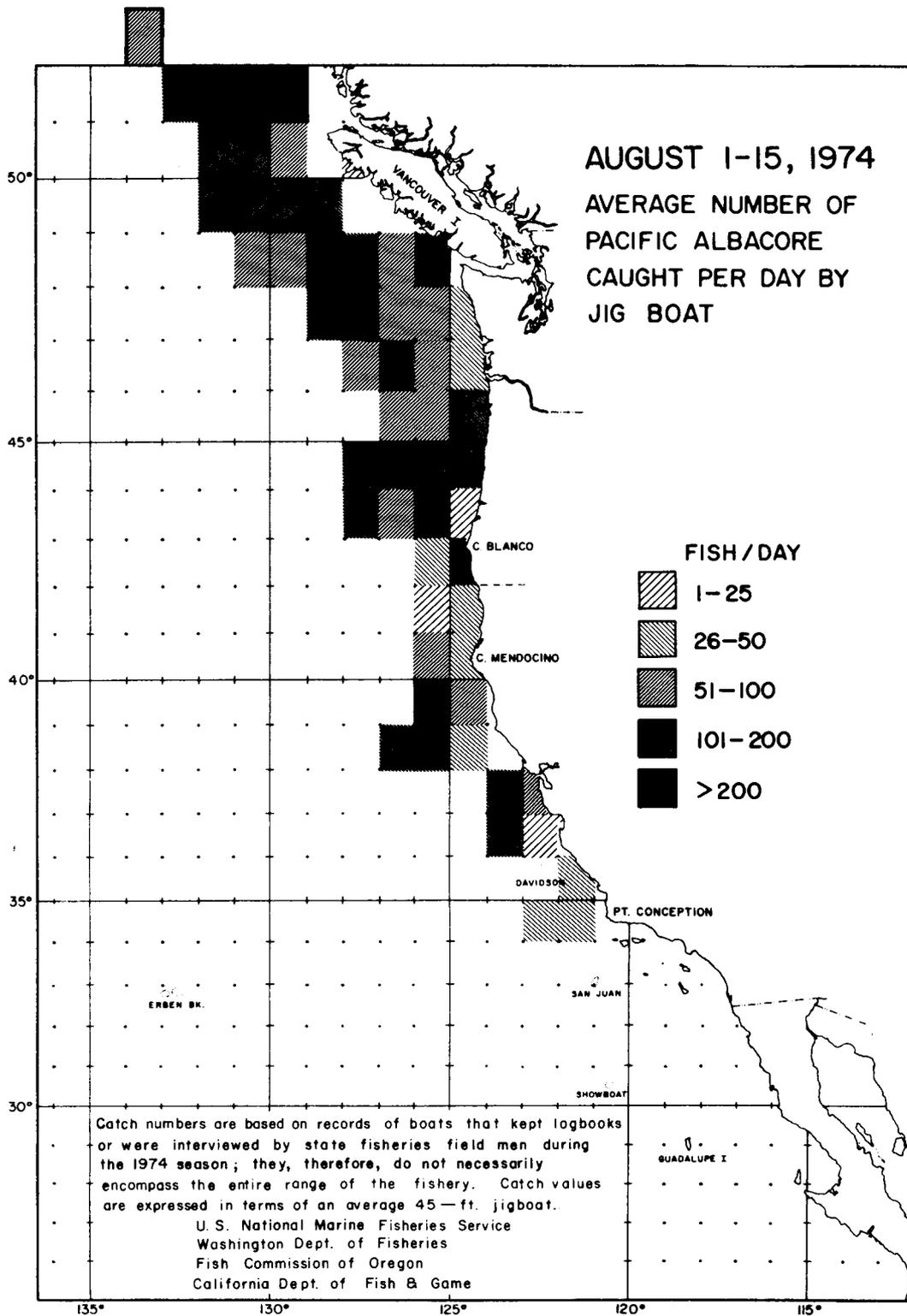


Figure 5.—Mean catch per unit effort of albacore tuna by 15-day period and 1° quadrangle.

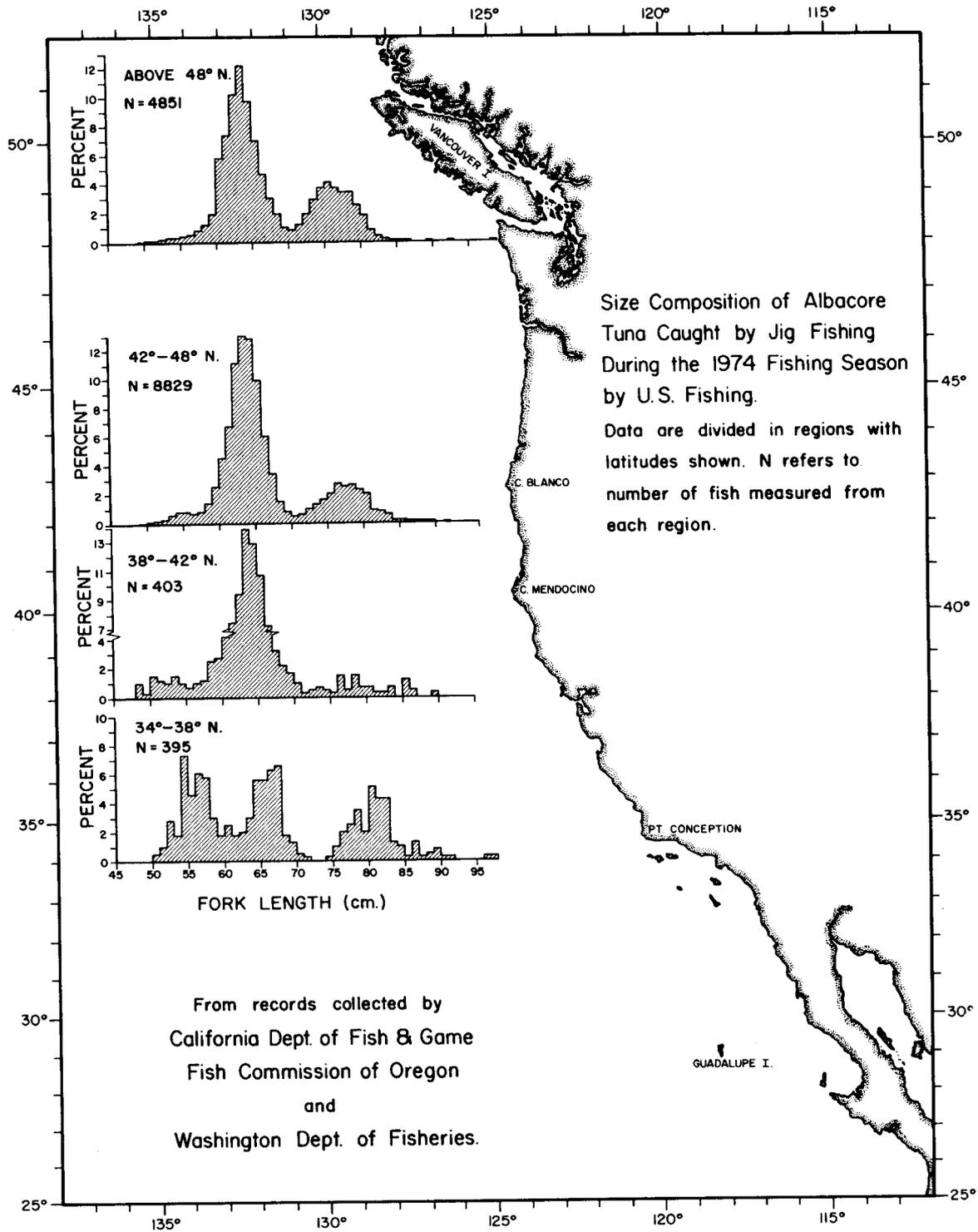


Figure 6.—Size composition of commercially caught albacore tuna by geographic area.

by fishermen to port samplers indicate that an educational program concerning the importance and scientific use of catch per unit of effort would be very beneficial. A limited educational program has been provided to fishermen by NMFS and state fishery scientists at fishermen's association meetings and Sea Grant sponsored "Town Hall" meetings or workshops. However, we feel that additional educational efforts would result in an increase in the number of fishermen who keep logbooks, the number of boat-days that a given fisherman would keep a logbook, and improve

the overall quality of the logbook data.

#### **ACKNOWLEDGMENTS**

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support; and to the many albacore fishermen who have kept logbooks and made comments concerning their use. A major portion of the costs for printing the logbook and the expanded port sampling program was funded by Sea Grant Contract 04-3-158-35, administered by the Pacific Marine Fisheries Commission.

#### **LITERATURE CITED**

- Berude, C. L., and N. J. Abramson. 1972. Relative fishing power. CDC 6600. Fortran IV. Trans. Am. Fish. Soc. 101:133.  
Craig, W. L. 1963. The California albacore fishery logbook system. FAO World Sci. Meet. on the Biology of Tuna and Related Species. La Jolla, Calif. 3(13):1217-1225.

*MFR Paper 1166. From Marine Fisheries Review, Vol. 37, No. 11, November 1975. Copies of this paper, in limited numbers, are available from D825, Technical Information Division, Environmental Science Information Center, NOAA, Washington, DC 20235. Copies of Marine Fisheries Review are available from the Superintendent of Documents, U.S. Government Printing Office, Washington, DC 20402 for \$1.10 each.*