NOAA Technical Memorandum NMFS-AFSC-6

Geographic and Bathymetric Distributions for Many Commercially Important Fishes and Shellfishes Off the West Coast of North America, Based on Research Survey and Commercial Catch Data, 1912-84

by

Robert J. Wolotira, Jr.[1], Terrance M. Sample,
Sandra F. Noel, and Constance R. lten

Resource Assessment and Conservation Engineering Division
Alaska Fisheries Science Center
7600 Sand Point Way N.E., BIN C-15700
Seattle, WA. 98115-0070

[1]Strategic Environmental Assessments Division
Office of Resource Conservation and Assessment
National Ocean Service
6001 Executive Blvd.
Rockville, MD. 20852

U.S. DEPARTMENT OF COMMERCE
Barbara Hackman Franklin, Secretary
National **Oceanic and Atmospheric Administration**
John A. Knauss, Administrator
National Marine Fisheries Service
William W. Fox, Jr., Assistant Administrator for Fisheries

February 1993

NOAA Technical Memorandum NMFS

The National Marine Fisheries Service's Alaska Fisheries Science Center uses the NOAA Technical Memorandum series to issue informal scientific and technical publications when complete formal review and editorial processing are not appropriate or feasible. Documents within this series reflect sound professional work and may be referenced in the formal scientific and technical literature.

The NMFS-AFSC Technical Memorandum series of the Alaska Fisheries Science Center continues the NMFS-F/NWC series established in 1970 by the Northwest Fisheries Center. The new NMFS-NWFSC series will be used by the Northwest Fisheries Science Center.

This document should be cited as follows:

Wolotira, R. J., Jr., T. M. Sample, S. F. Noel, and C. R. Iten. 1993. Geographic and bathymetric distributions for many commercially important fishes and shellfishes off the West Coast of North America, based on research survey and commercial catch data, 1912-84. U.S. Dep. Commer., NOAA Tech. Memo. NMFS-AFSC-6, 184p.

BIBLIOGRAPHIC INFORMATION

PB93-167682

Report Nos: NOAA-TM-NMFS-AFSC-6

Title: Geographic and Bathymetric Distributions for Many Commercially Important Fishes and Shellfishes Off the West Coast of North America, Based on Research Survey and commercial Catch Data, 1912-84.

Date: Feb 93

Authors: R. J. Wolotira, T. M. Sample, S. F. Noel, and C. R. Iten.

Performing Organization: National Marine Fisheries Service, Seattle, WA. Resource Assessment and Conservation Engineering Div. **National Ocean Service Rockville, MD. Strategic Environmental Assessments Div.

Type of Report and Period Covered: Technical memo.

Supplementary Notes: Prepared in cooperation with National Ocean Service, Rockville, MD. Strategic Environmental Assessments Div.

NTIS Field/Group Codes: 98F, 47D

Price: PC A08/MF A02

Availability: Available from the Nationa1 Technical Information Service, Springfield, VA. 22161

Number of Pages: 171p

Keywords : *Distribution(Property), *Commercial fish, *Commercial shellfish, *Fishes, Bathymetry, Abundance, Species diversity, Maps, Coastal waters, Tables (Data), Demersal fish, Harvesting, *Pacific Coast (North America), *Alaskan Gulf Coast (United States), Catch statistics.

Abstract: The report presents maps and tables that provide distribution information on 34 species of commercially important demersal fish and invertebrates found along the west coast of North America. They include such information as distributional range within the study region, relative abundance, presence by depth and region, frequency of occurrence by body size and depth, and locations of relatively recent (1981-83) commercial harvests. In addition to this information on demersal species, commercial harvest maps are also presented for six pelagic or anadromous fishes.

CONTENTS

THIS PAGE INTENTIONALLY LEFT BLANK

CONTENTS (Continued)

Page

INTRODUCTION

From 1984 to 1989, elements of the National Marine Fisheries Service's (NMFS) Alaska Fisheries Science Center (AFSC) collaborated with the National Ocean Survey's Strategic Environmental Assessment (SEA) Division in developing a data atlas for marine resources off the west coast of North America. The document, the West Coast of North America Coastal and Ocean Zones Strategic Assessment: Data Atlas (NOAA, 1990), summarizes important information on marine resources of the region, including descriptions of their utilization and their association with other human activities. A major component of the atlas is the synthesis of scientific information on over 100 species of marine mammals, birds, fishes, and invertebrates. The synthesis includes life history descriptions and extensive distribution maps for all species, along with details about recent commerical and recreational harvests for fish and invertebrates. Information was incorporated into a digitized data base that, through computer graphics, portrays spatial distribution of resources and harvest areas.

The large volume of collected information presented a problem in the development of the living marine resources portion of the data atlas. While the atlas is a thorough condensation of salient features for various resources, its format restricts the quantity of information presented for each species, and the cartographic rendition limits mapping detail. Important information on geographic distribution and human utilization, acquired through computer mapping of various data, simply could not be incorporated. Consequently, atlas project participants from the AFSC's Resource Assessment and Conservation Engineering (RACE) Division chose to present certain information for fish and invertebrates separately in this report. The report also documents computer procedures used to generate the maps and tables, describes information sets used to develop them, and evaluates their "representativeness" for depicting species distributions.

The following maps and tables that provide distribution information on 34 species of commercially important demersal fish and invertebrates found along the west coast of North America. They include such information as distributional range within the study region, relative abundance, presence by depth and region, frequency of occurrence by body size and depth, and locations of relatively recent (1981-83) commercial harvests. In addition to this information on demersal species, commercial harvest maps are also presented for six pelagic or anadromous fishes.

THIS PAGE INTENTIONALLY LEFT BLANK

METHODS FOLLOWED TO DEVELOP MAPS

Information in this report represents a consolidation of fishery research data and commercial harvest statistics from several sources within and outside the AFSC. The purpose of this data consolidation was to utilize as much information as possible for describing temporal and spatial distributions of commercially important species.

All computer mapping was conducted at the AFSC Sand Point facility located in Seattle, Washington, using RACE Division mapping software (Mintel and Oda 1983) as well as additional material specifically developed for producing computer maps for the West Coast of North America . . . Data Atlas. One such addition was the incorporation of an adequate base map. A Lambert Conformal Conic projection was selected because of its relatively undistorted presentation of the large area addressed in the atlas. Incorporation of this projection into mapping subroutines on the AFSC Burroughs 7800 computer system and CALCOMP plotter was achieved using algorithms acquired from the SEA Division in Rockville, Maryland,

Description of the Data

The region encompassed by the West Coast of North America...Data Atlas includes coastal and open ocean areas from arctic Alaska to northern Mexico. The focus is the Exclusive Economic Zones or synonomous areas for the United States, Canada, and Mexico. Data used for portraying species distributions in this region are largely from trawl surveys, although a minor amount of trap, pot, and long-line information is also utilized (Table 1). The following is a description of data sets used for mapping distributions.

AFSC RACE Division Surveys

This data set is the cornerstone of distribution analyses performed for most species in the data atlas. RACE Division’s resource assessment data is one of the most extensive sets of fishery research information in the world and includes decades of fishery data from throughout the northeast Pacific Ocean. The data base (RACEBASE) contains catch information (number and weight per species per sample or sampling location) and various biological data (e.g., size composition, length-weight-age, maturity) for hundreds of surveys performed off Alaska and the U.S. West Coast from 1953 through the present. Information from 1953 to 1984 was used.

Puke Bay Biological Laboratory Groundfish Surveys

The AFSC's Auke Bay Laboratory conducts periodic, coastal, bottom trawl surveys in northern Southeast Alaska. This data set contains unquantified catch information and sampling locations for nearly 60 surveys conducted from 1969 to 1982.

Table 1.-- Information on research data sets used for mapping distributions of fish and invertebrates off the west coast of North America.

Data set	Numbers of surveys	Years	Regions sampled	Numbers of samples (1)	Remarks (2)
NMFS-AFSC RACE Division Resource Assessment Surveys	257	1953-1984	Southern California Bight to Chukchi Sea	34,800	Mostly trawl data (>95%); longline (2%); other gear (2%)
NMFS-AFSC Auke Bay Laboratory Groundfish Surveys	57	1969-1982	Southeast Alaska	556	Mostly trawl data (99%)
Canada Department of Fisheries and Oceans Resource Assessment Surveys	62	1963-1980	British Columbia to Gulf of Alaska	2,457	Mostly trawl data (99%)
Alaska Department of Fish and Game Crab Assessment Surveys	2	1982-1983	Western Gulf of Alaska	242	Trawl data
U.S. Bureau of Commercial Fisheries Exploratory Fishing and Gear Research	71	1950-1970	Southern California Bight to Chukchi Sea	31,675	Mostly shrimp trap data (90%); trawls (8%); other gear (2%).
Southern California Coastal Water Research Project--Coastal Assessment	62	1912-1977	Southern California Bight	2,409	Trawl data
NMFS/State Cooperative Research Scallop Assessment	6	1968-1980	Oregon Coast to Western Gulf of Alaska	1,216	Scallop dredge data

(1) Samples are trawl hauls, pot lifts, longline sets, etc.

(2) Shrimp trap data were used only for mapping spot and coonstripe shrimps, and scallop dredge data only for weathervane scallops.

Canada Department of Fisheries and Oceans (CDFO) Fishery Resource Assessment

This data set contains quantified trawl catch information for over 60 Canadian trawl surveys conducted in British Columbia waters and the western Gulf of Alaska. These data were obtained from numerous Canadian publications and represent a subset of Canadian resource assessment data for 1963-79. It does not include information from joint U.S.-Canada surveys already contained in RACEBASE.

Alaska Department of Fish and Game Trawl Surveys

This data set contains quantified trawl catch information from crab assessment surveys conducted in the western Gulf of Alaska during 1982 and 1983.

Historic AFSC-archived Exploratory Fishing and Gear Research (EF&GR) Surveys

This data set contains quantified trawl, crab pot, shrimp pot, and longline data gathered by the Bureau of Commerical Fisheries EF&GR Bases in Juneau, Alaska and Seattle, Washington. during surveys conducted in Alaskan and U.S. West Coast waters from 1950 to 1970. This data set represents early survey information in addition to that already contained in RACEBASE.

Southern California Coastal Water Research Project (SCCWRP) Trawl Surveys

This data set contains enumerated trawl catch information (numbers caught per station or trawl haul) gathered by the SCCWRP in Southem California Bight from 1912 to 1977.

NMFS and State/Federal Cooperative Scallop Surveys

This data set contains quantified scallop dredge data gathered during assessments of scallop stocks conducted in the Gulf of Alaska during 1968-69, and off Oregon in 1980.

In addition to research surveys, commercial harvests were also mapped to enhance descriptions of species distribution. Information on species harvest by statistical subarea during the period 1981-83 was obtained from several publications (e.g., Brown et al. 1984, Canada Department of Fisheries and Oceans 1985, and International Pacific Halibut Commission 1986, and others) and from catch summaries from the Alaska Department of Fish and Game, Washington Department of Fisheries, Oregon Department of Fisheries and Wildlife, the Pacific Fisheries Information Network (PacFIN), and the NMFS Foreign Fishery Observer Program.

Consolidation of Catch Data for Mapping

Survey information was converted into data records compatible with RACEBASE. For example, survey data were coded according to two file types: “haul-position” files containing location information for each sample, and “catch” files containing catch data (number and weight caught) for each species in the sample or catch, with a cross-referencing survey/haul identifier. Specific information in haul-position records included a survey number, haul or sample number, date/time identifier, latitude and longitude coordinates, water depth, and gear type. Catch records usually included a survey/haul/sample number, species code, and weight and number caught. Some survey catch data were-not quantified since the original data listed catches as “few” or “many,” and required special treatment for compatability with subroutines used to analyze the information. This special treatment did not affect data integrity, as this information was only incorporated into analyses for presence/absence, and not for relative abundance. After all non-RACE survey data were converted to RACEBASE format, these data were combined with the RACE information in all-inclusive files.

Commercial catch data were handled somewhat differently. Maps of statistical subareas were obtained from each agency providing commercial catch information. The perimeter for each harvest subarea was then sketched onto a nautical chart overlaid with grid lines drawn at every 10 minutes of latitude and 20 minutes longitude. All cells within a statistical subarea were assigned to that subarea; large subareas were often associated with several cells, whereas several small subareas were sometimes found within the same cell. Yearly subarea catches were apportioned equally into cells associated with that subarea.

Commercial catch information from foreign fleets was acquired from the NMFS Foreign Fishery Observer Program. This program records catches by areas of 30 minutes of latitude by 60 minutes of longitude. Consequently, commercial catch maps that contained both foreign and domestic data used the smallest common area, 30 minutes latitude by 60 minutes longitude, for presentation of the data.

Development of Distribution Maps

Information from over 33,500 hauls or samples was derived from consolidating the various data sets. Distribution maps and figures were developed for

--overall range,

--range by stage of life stage (juveniles and adults),

--current relative abundance,

-distribution and relative abundance based on commercial harvests, and

--depth distribution by geographic region.

Geographic range maps and depth distribution profiles were generated through a simple “presence/absence” analysis of the combined data. Relative abundance or resource density was depicted using more detailed examinations of specific data subsets. The following describes how each distribution map/table was assembled.

Overall Range

The combined set of research survey data was reorganized to examine the occurrence of a species by geographic location. This was performed using the general utility program, DMS III, which

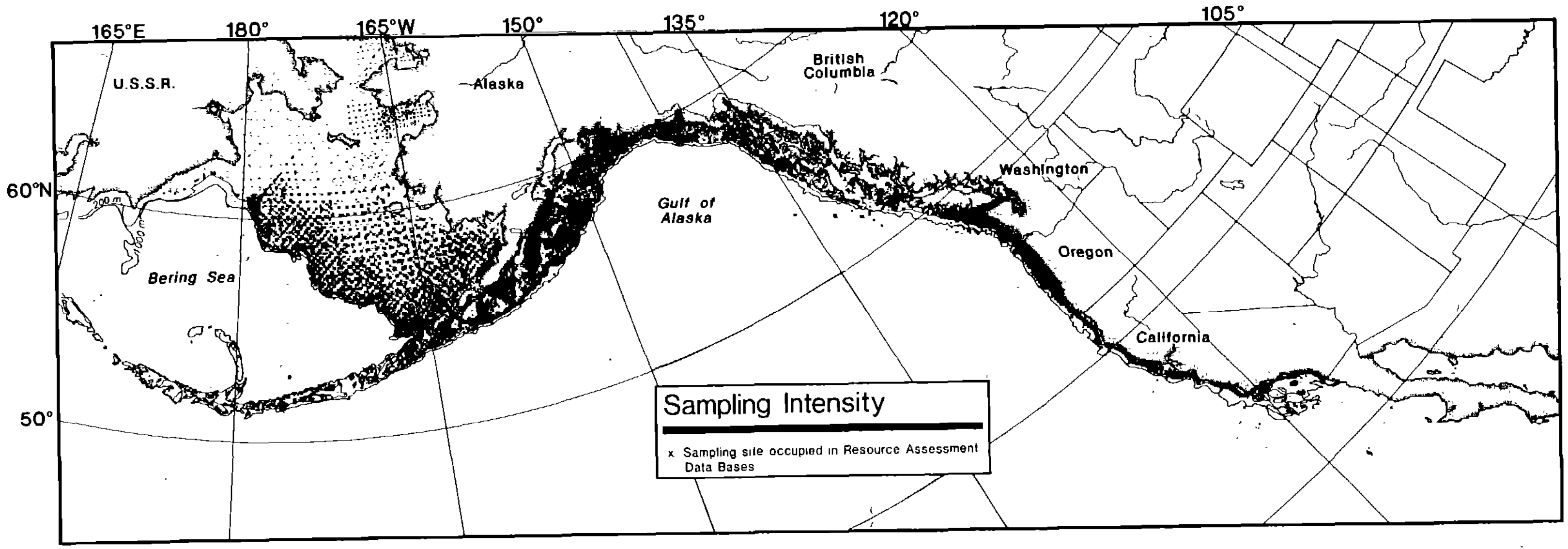


Figure 1.--Geographic location of all samples contained in the combined data sets used from mapping species ranges.

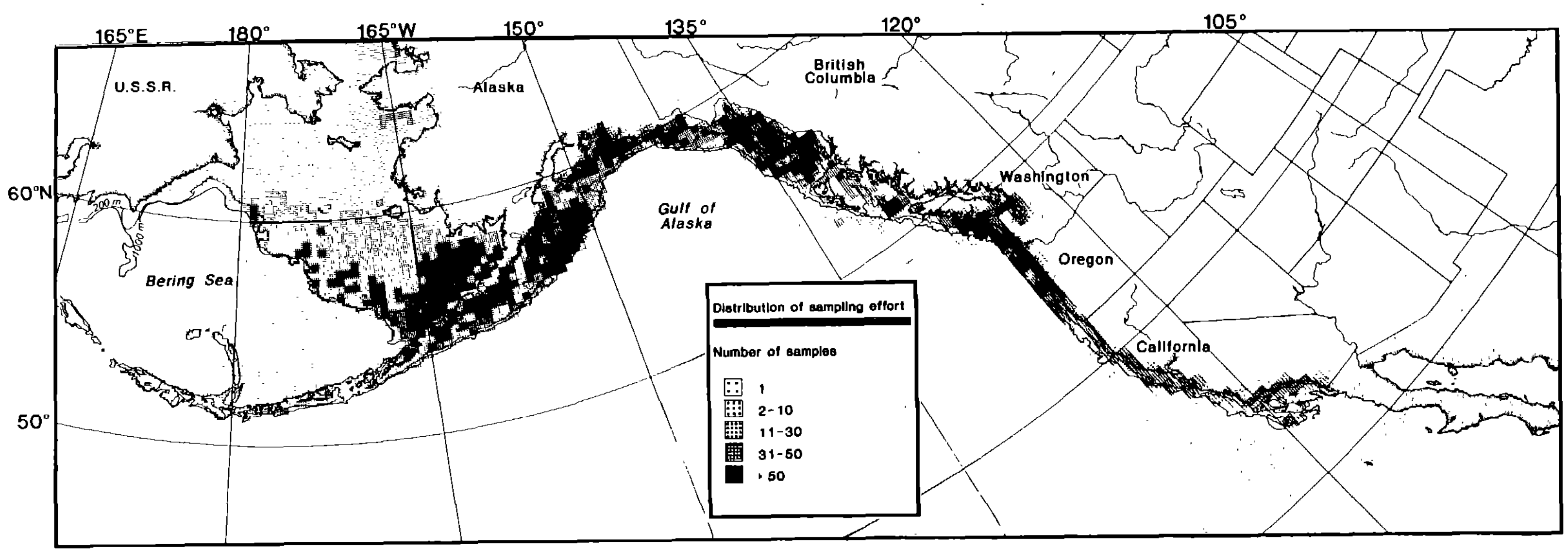


Figure 2.--The distribution of sampling effort in all 10 minute latitude by 20 minute longitude cells containing samples used in mapping species range.

selects a subset of records that correspond, to another subset. (A description of this program is found in Mintel and Smith 1981). Two files were created for each species:, a sample with catch or "presence" file, and a sample without catch, or "absence" file.

Mapping species presence required further refinement since numerous samples were often taken at or near the same location (Fig. 1). The utility mapping program, UNDERPLOT, was employed' to eliminate confusing over-plotting. This program combines all information from a defined area into a single data point (e.g., the sum, the mean value, or the initial value). The presence-absence fileswere combined into cells of 10 minutes of latitude by 20 minutes of longitude (Fig. 2). All "presence" records were assigned a value of "1, " and "absence" records were assigned zero. For maps shown in this report, values for all records in a cell were summed and those cells with values greater than zero were assigned a symbol and plotted on the range maps. It should be noted that other procedures also were used, such as dividing the sum of occurrences in a cell by the cell's total samples to identify the frequency of occurrence for a cell. In this case the frequency of species occurrence was indicated by symbol size. The frequency of occurrence data are not shown in this report because of the reduced size of the printed maps; symbols were too condensed and confusing.

Range by Life Stage

Maps of the distribution of juveniles and adults were developed only for certain fish species. These maps were developed in a manner similar to that used for the overall range maps. However, rather than using the master catch file, geographic occurrence by life stage was developed from the RACEBASE biological data file (Table 2). A similar, although much smaller, set of size composition data from SCCWRP surveys was also used. Once a size group was identified for a species, the biological data files were searched for data records in that size group. The selected records within each grid cell were condensed into a single data point using UNDERPLOT.

Size categories included in the two mapped life stages were based on size at maturity information in the literature. Since size at maturity varies by sex and occurs over a range of sizes, data for intermediate size intervals containing both adults and juveniles were eliminated. Consequently, the range maps focus on fully "adult" and "juvenile" distributions.

Relative Abundance

A subset of RACEBASE was used to develop maps of approximate population density. Only data from trawl surveys for 1980 through 1984 were used, as they were the most recent 5-year time series available during initial preparation of the atlas. Relative abundance was expressed in a standarized weight caught per unit area fished (kilograms per hectare). The area fished was based on the average measured width of a trawl and the distance fished during a trawl haul. Catch from the trawl haul was then divided by the total area fished.

Before weight caught per area data could be mapped, catch rates for each type of trawl were adjusted to a standard. A net's relative fishing power for a species, or species group, was determined

Table 2 .--Summary of length information used from data bases.

Species	West Coast (1)	British Columbia	Southeast Alaska	Gulf of Alaska	Aleutian Islands	Bering Sea	All areas combined
Walleye pollock	2,003	1,160	6,114	379,090	135,265	3,225,990 (2)	3,749,622
Pacific cod	298	224	294	63,014	39,784	250,504	354,118
Pacific hake	141,699	331					142,030
Sablefish	54,369	196	25,429	29,664	27,210	25,638	162,506
Atka mackerel				5,611	6,987	216	12,814
Pacific ocean perch	26,483	7,874	39,022	51,791	28,626	21,210	175,006
Widow rockfish	4,142	103	84	35			4,364
Bocaccio	4,005	51		1			4,057
Arrowtooth flounder	3,901	1,230	11,481	130,984	40,272	122,542	310,410
Rex sole	12,710		10,584	47,737	5,669	1,306	78,006
Flathead sole	870	199	2,502	104,476	22,206	239,901	370,154
Pacific halibut	197	15	829	41,334	8,126	23,924	74,425
Rock sole	69	94	892	58,397	24,364	221,731	305,547
Yellowfin sole			264	10,814	2,499	841,402	854,979
Dover sole	51,426	749	2,390	21,149	838		76,552
English sole	9,386		159	1,346	1		10,892
Starry flounder			117	1,044		1,733	2,894
Alaska plaice				227		149,444	149,671
Greenland turbot				46	26,478	243,546	270,070
Pacific herring	1,366			1,243	212	38,030	40,851

(1) Values for West Coast include measurements taken during Southern California Coastal Water Research Project surveys; all other measurements are from RACEBASE.

(2) Includes measurements that were extrapolated from smaller samples; actual measurements likely less than one million.

through documented gear comparison studies (Craig Rose, AFSC, pers.commun., August 1988) and by relating the effective fishing area of the net (i.e., the measured width and height **of** the trawl while fishing) to that of a selected standard trawl type. This simple approach was not designed to identify the precise magnitude of the resource, but rather to relate catches from an array of different nets to identify areas of relatively high or low density. The method of standardization and fishing power values are presented in Appendix A.

Once the data were standardized, they were averaged for each grid cell. Several levels of density were defined, based on the range of relative abundance values for a species; lightest shading was used for lowest density, darkest shading for the highest.

Distribution and Relative Abundance Based on Commercial Harvests

Relative abundance was also portrayed by mapping the locations of commercial harvests. This was performed in a manner similar to that described in the previous section, but with commercial catch data instead of research survey information. Catches of-a species were summed for all fishing gears and years in each map cell.

Depth Distribution by Geographic Region

Mapping information by area grid cells does not always provide a clear image of species distribution. The occurrence of a species is often depth dependent, and much of the atlas region contains steep seabed profiles. Consequently, a “frequency of occurrence by depth interval” table was developed for each species. Frequencies of occurrence (ratios of the number of samples containing a species to the total number of samples) were determined for nine depth intervals in six major geographic areas: Bering Sea, Aleutian Islands, Gulf of Alaska, Southeast Alaska, British Columbia, and the U.S. West Coast (fig. 3).

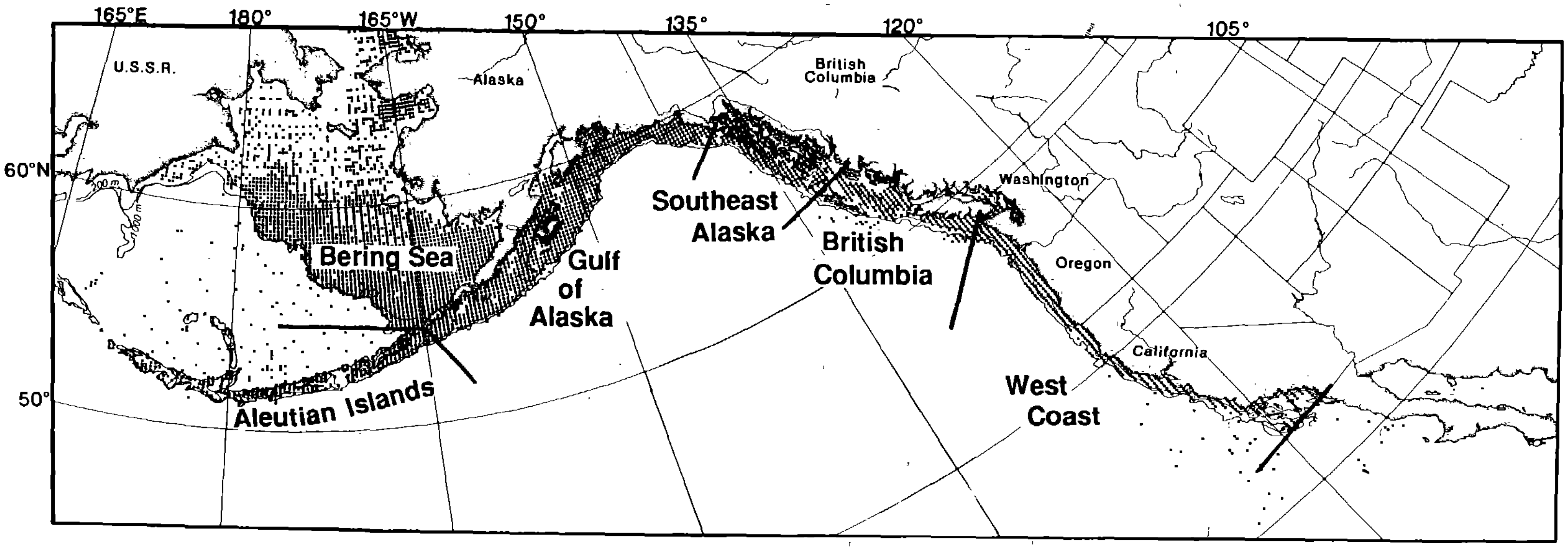


Figure 3.--Geographic location of the six regions used in describing species depth distribution by region. The "·"s indicate all 10 minute latitude by 20 minute longitude ceils where data are present.

THIS PAGE INTENTIONALLY LEFT BLANK

METHODS USED TO EVALUATE MAPS

These maps and tables are depictions of species distributions based on the assembled data, and they are only as good as the information used to create them. The adequacy of these-data for addressing species distribution depends on several factors, such as the economic value of the species, its abundance, distribution by life stage, substrate preference, and its depth distribution. Each of these factors influences data availability or representativeness as follows.

Economic Value

Most information in the data-sets was obtained during research surveys that focused on. demersal species of high economic interest. These surveys were designed to locate targeted species and identify their distributions, abundances, and biological characteristics. Examples of species with high economic values and resulting high data volumes are walleye pollock (Theragra chalcogramma), Pacific cod (Gadus macrocephalus), Pacific halibut (Hippoglossus stenolepis) and red king crab (Paralithodes camtschaticus). Another aspect of economic value is the availability of harvest statistics. Even if a species is not targeted by research surveys, substantial information about distribution may be available through catch statistics. These harvest data often reflect distribution and abundance through where, when and how much is taken. Pacific herring. (Clupea pallasi) and salmon (Oncorhynchus spp.) are examples of species that infrequently occur in our survey data, but a wealth of information about their distributions can be obtained from commercial catch statistics.

Abundance

Substantial information is sometimes acquired for species that are not economically important, but are highly abundant and have distributions which match those of targeted species. Arrowtooth flounder (Atheresthes stomias) is a demersal fish of low economic value. However, it is abundant, widely distributed, and frequently encountered during surveys for desirable species such as several other flatfishes, Pacific cod, sablefish (Anoplopoma fimbria), and walleye pollock.

Distribution by Life Stage

Some species are accessible to demersal sampling gear throughout most of their juvenile and adult lives. Others are accessible only at certain times, and the extent of their availability affects the magnitude of data gathered on them. An example is Atka mackerel (Pleurogrammus monopterygius). It is usually found on or near the bottom as adults, but juveniles inhabit epipelagic, oceanic waters. Other pelagic species, such as Pacific herring and salmon, are available to the sampling gear of our data sets in very limited amounts at any life stage.

Substrate preference

Most sampling gears used in research surveys (except for traps or longlines) are designed for use on relative smooth bottoms. Consequently, organisms that occur mostly in rocky or steep habitats are not likely to be extensively surveyed, and they are infrequently present in our combined data sets. Golden (or brown) king crab (Lithodes aequispina) is a species that prefers a steep slope habitat rarely sampled during surveys. Also, rockfishes often occur over rocky, difficult-to-sample substrates.

Depth distribution

Some species occur at depths shallower or deeper than most waters surveyed. Hence, their incidence in survey catches may be low even if they are abundant. Examples of this distribution pattern include Dungeness crab (Cancer magister) and starry flounder (Platichthys stellatus) in shallow water, and sablefish and Dover sole (Microstomus pacificus) in deep water.

We examined the accuracy and completeness of the developed maps and depth occurrence information by assessing how much data likely was available on each species and then rating each map and depth distribution table. An assessment of data content by species was accomplished by relating to each species the above listed factors that influence data availability. This was done by subjectively assigning high, moderate, or low values of data availability to each factor for every species. These values were represented numerically (3 = high, 2 = moderate, 1 = low) and an overall rating of data adequacy was derived by summing the factor scores. One factor, distribution by life stage, was evaluated separately for adults and for juveniles; consequently, the highest data adequacy score for a species was 18 (i.e., 3 x 6 factors). A score of 18 meant that our assembled data bases likely had sufficient quantity and quality of information to adequately depict the distribution of that species. Scores of 14 to 17 meant that slightly fewer data were available for our geographic and depth analyses, but information content was still adequate to depict distributions of species associated with those scores. Finally, scores of 11 to 13 meant that only marginally adequate data were probably available for our distribution analyses of species associated with those scores. No scores below 11 were identified.

After data content was assessed for each species, a rating was assigned to every map and depth distribution table: 3 to those judged very good for portraying geographic or depth distributions, 2 to those judged good, and 1 for those judged as marginal or poor.

RESULTS OF EVALUATING THE MAPS

Results of the evaluations suggest that our maps and tabular information are adequate for describing the distribution of species that are economically important, highly abundant, and readily available to the survey sampling gear (Table 3). Nine species fell into this category: Pacific whiting (Merluccius productus), cod, and halibut; walleye pollock; yellowfin sole (Pleuronectes asper); Chinoecetes bairdi and C. opilio Tanner crabs; and red and blue (Paralithodes platypus) king crabs. Except for juveniles-of some of those species, nearly all maps and tables represented thorough descriptions of distribution (Table 4). The few occurrences of C. opilio Tanner crab and blue king crab off Kodiak Island, and the latter species also in the Aleutian Islands region, are likely misidentifications or errors in recording species codes or sampling location. Occasional incorrect locations could occur throughout the data base; however, these errors are specifically mentioned because of the obvious gaps between a few isolated occurrences of blue king crab and all other occurrences of that species.

Information for 19 species was judged slightly less substantial than that for the previous group, but still adequate to generally describe their distributions (Table 3). Fishes and invertebrates in this category included sablefish; lingcod (Ophidon elongatus); Pacific ocean perch (Sebastes alutus); widow rockfish (S. entomelas); arrow-tooth and starry flounders (Platichthys stellatus); Dover, English (Pleuronectes vetulus), flathead (Hippoglossoides elassodon), petrale (Eopsetta jordani), rex (Errex zachirus), and rock (P. bilineatus) soles; Alaska plaice (P. quadrituberculatus); Greenland turbot (Reinharditius hippoglossoides); northern and ocean pink shrimps (Pandalus borealis, P. jordani); sidestripe and coonstripe shrimps (Pandalopsis dispar, Pandalus hypsinotus); and weathervane scallop (Patinopecten caurinus). In most instances a reduced overall rating occurred because the species were not sufficiently valuable economically or abundant enough to warrant directed surveys. Several individual maps and tables that were rated less than “high” (Table 4) lacked data for juveniles or complete species breakdowns in the catch statistics (e.g., “other flounders” rather than individual species). The lower ratings for the distribution information about two abundant species, flathead sole and arrowtooth flounder, were not due to a lack of data, but rather to a likely misidentification of species. Both fishes co-occur with very similar-looking species in the eastern Bering sea: flathead sole with Bering flounder (Hippoglossoides robustus), and arrowtooth flounder with Kamchatka flounder (Atheresthes evermani) (Allen and Smith 1988). Similar misidentifications of flathead sole as petrale sole are probable causes for the existence of a few records of the latter species in the western Gulf of Alaska, and for a reduced rating of the general range map for petrale sole.

Adequacy of the maps and tabular material for presenting details of species distributions was judged marginally adequate for the following species: Atka mackerel; bocaccio (Sebastes paucispinis); spiny dogfish (Squalus acanthias); golden king crab; Dungeness crab; and coonstripe

Table 3.-Evaluations of quantity and quality of information used to describe spatial and depth distributions of selected invertebrate and fish species that occur off the west coast of North America.

SPECIES	FACTORS INFLUENCING DATA AVAILABILITY						
	Economic value	Abundance	Availability of adults	Availability of juveniles	Depth distribution	Substrate preference*	Total ranking
Species for which data should be adequate							
Pacific cod	3	3	3	3	3	3	18
Pacific whiting	3	3	3	3	3	3	18
Walleye pollock	3	3	3	3	3	3	18
Pacific halibut	3	3	3	3	3	3	18
Yellowfin sole	3	3	3	3	3	3	18
Bairdi Tanner crab	3	3	3	3	3	3	18
Opilio Tanner crab	3	3	3	3	3	3	18
Red king crab	3	3	3	3	3	3	18
Blue king crab	3	3	3	3	3	3	18
Species for which fewer data are available, but still adequate							
Flathead sole	2	2	3	3	3	3	17
Arrowtooth flounder	1	3	3	3	3	3	16
Petrale sole	3	1	3	3	3	3	16
Rex sole	3	2	3	2	2	3	16
Greenland turbot	2	2	3	3	3	3	16
Rock sole	2	2	3	3	3	3	16
Northern pink shrimp	3	3	3	1	3	3	16
Ocean pink shrimp	3	3	3	1	3	3	16
Pacific ocean perch	3	2	2	3	3	2	15
Widow rockfish	2	3	2	3	3	2	15
Sablefish	3	2	2	3	2	3	15
English sole	2	1	3	3	3	3	15
Alaska plaice	1	2	3	3	3	3	15
Lingcod	2	2	3	2	3	2	14
Dover sole	3	2	2	3	1	3	14
Starry flounder	1	2	3	3	2	3	14
Weathervane scallop	3	1	2	2	3	3	14
Coonstripe shrimp	2	2	2	2	3	3	14
Sidestripe shrimp	2	2	2	2	3	3	14
Species for which data are marginally adequate							
Atka mackerel	2	2	1	2	3	2	13
Dungeness crab	3	3	1	1	1	3	13
Golden or brown king	3	1	2	2	2	2	12
Spiny dogfish	1	1	2	2	3	2	11
Bocaccio	1	1	2	2	3	2	11
Pacific herring	3	3	2	1	1	1	11
Pink salmon	3	3	2	1	1	1	11
Chum salmon	3	3	2	1	1	1	11
Sockeye salmon	3	3	2	1	1	1	11
Coho salmon	3	3	2	1	1	1	11
Chinook salmon	3	3	2	1	1	1	11
spot shrimp	3	1	2	1	2	2	11

3 = high; 2 = moderate; 1 = low.

*availability due to substrate preference by species

Table 4.--Rating of each map and table in this report for "completeness" or accuracy in depicting the distribution of a species.

SPECIES	MAPS					TABLES			Number of maps or tables by species
	Range general	Range large fish	Range small fish	Relative abundance	Commercial harvest	Depth distrib. overall	Depth distrib. large fish	Depth distrib. small fish	
Pacific cod	3	3	3	3	3	3	3	3	8
Pacific whiting	3	3	2	3	3	3	3	2	8
Walleye pollock	3	3	3	3	3	3	3	2	8
Pacific halibut	3	3	2	3	3	3	3	3	8
Yellowfin sole	3	3	3	3	3	3	3	3	8
Bairdi Tanner crab	3	--	--	2	3	3	--	--	4
Opilio Tanner crab	2	--	--	2	3	3	--	--	4
Red king crab	3	--	--	3	3	3	--	--	4
Blue king crab	3	--	--	2	3	2	--	--	4
Flathead sole	2	2	2	3	2	3	3	3	8
Arrowtooth flounder	2	2	2	3	--	3	3	3	7
Petrale sole	3	--	--	3	2	3	--	--	4
Rex sole	3	3	2	3	--	2	2	2	7
Greenland turbot	3	3	3	3	--	2	2	2	7
Rock sole	3	3	3	3	--	3	3	3	7
Northern pink shrimp	3	--	--	--	3	3	--	--	3
Ocean pink shrimp	3	--	--	--	2	3	--	--	3
Pacific ocean perch	3	3	2	3	2	3	3	2	8
Widow rockfish	2	2	2	2	2	3	1	1	8
Sablefish	3	3	2	3	3	2	2	2	8
English sole	3	3	2	3	3	3	2	2	8
Alaska plaice	3	3	3	3	--	3	3	3	7
Lingcod	3	--	--	2	3	3	--	--	4
Dover sole	3	3	3	3	3	2	2	2	8
Starry flounder	3	3	2	1	3	2	1	1	8
Weathervane scallop	3	--	--	--	3	3	--	--	3
Coonstripe shrimp	2	--	--	--	2	2	--	--	3
Sidestripe shrimp	3	--	--	--	2	2	--	--	3
Atka mackerel	2	2	1	2	3	2	3	1	8
Dungeness crab	2	--	--	--	3	2	--	--	3
Golden or brown king crab	1	--	--	--	3	1	--	--	3
Spiny dogfish	3	--	--	2	3	2	--	--	4
Bocaccio	3	3	2	2	--	3	1	1	7
Pacific herring	--	--	--	--	3	--	--	--	1
Pink salmon	--	--	--	--	3	--	--	--	1
Chum salmon	--	--	--	--	3	--	--	--	1
Sockeye salmon	--	-	--	--	3	--	--	--	1
Coho salmon	--	--	--	--	3	--	--	--	1
Chinook salmon	--	--	--	--	3	--	--	--	1
Spot shrimp	3	--	--	--	2	2	--	--	3
Totals	34	19	19	26	34	34	19	19	201

Adequacy ratings: 3 = High 2 = Moderate 1 = Low coonstripe and sidestripe shrimps. Reduced availability to the sampling gear was a common problem (Table 3). For example, Atka mackerel can be meso-benthopelagic as adults (Rutenberg 1962, Gorbunova 1962) and often oceanic, epipelagic as juveniles (e.g., some have been caught 900 km offshore (Fisheries Research Institute 1989)). Similar oceanic, epipelagic distributions occur with all salmon species. Other factors that reduced species occurrence in survey samples were low abundance (e.g., golden king crab), shallow-water distribution (e.g., Dungeness crab), and substrate preference. Despite these drawbacks, certain maps were judged as adequate representations of distribution. Examples are the general range maps for lingcod, bocaccio, spiny dogfish, and sidestripe and spot (Pandalus platyceros) shrimps, and the commercial harvest maps for Atka mackerel, all five salmon species (Oncorhynchus kisutch, O. keta O. gorbuscha, O. nerka and O. tshawytscha). Pacific herring, spiny dogfish, and golden king and Dungeness crabs (Table 4).

CONCLUSIONS

Computer mapping of research data and catch statisticsis a valuable technique for describing invertebrate and fish resources off the west coast of North America. We initiated this activity to map distributions of invertebrate and fish species at levels of detail not possible in other regional NOAA atlases. Our efforts were usually successful. An evaluation of the completeness or accuracy of the maps and depth occurrence tables provided the following conclusions.

- The combined data sets were often adequate for presenting general information such as overall range, area and bathymetric ranges for large adult fish, relative abundance, areas of commercial harvest, and overall depth distribution by region.

- The commercial harvest maps were also very good for describing distribution and areas of relative abundance when individual species information was available in the catch statistics.

- Computer mapping of the research surveys data was useful for depicting distributions of any species and was especially valuable for mapping demersal species that are commercially important or highly abundant.

- Accurate depictions of distributions for pelagic species was not always possible, in part because these maps were developed solely from commercial catch data.

- Although some catch statistics maps conveyed accurate images of distribution for certain pelagic species, those maps only showed the locations of those species when they were available to commercial fishing gear (e.g., salmon are typically caught only while returning to parent streams to reproduce).

- For shallow-occurring invertebrates, neither the research surveys nor commercial harvest data was sufficient for thoroughly mapping distributions.

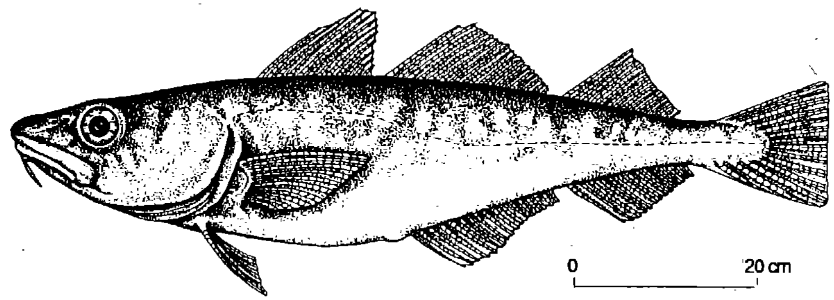
- Levels of data adequacy varied across information categories for a species and across species for a given category of information (e.g., range, commercial harvest, depth distribution, etc.).

- Presentations of the range of juveniles and the depth distributions of both large and small fish were usually judged lower in quality than those for all sizes combined.

Species maps and depth distributions to follow.

THIS PAGE INTENTIONALLY LEFT BLANK

Pacific cod



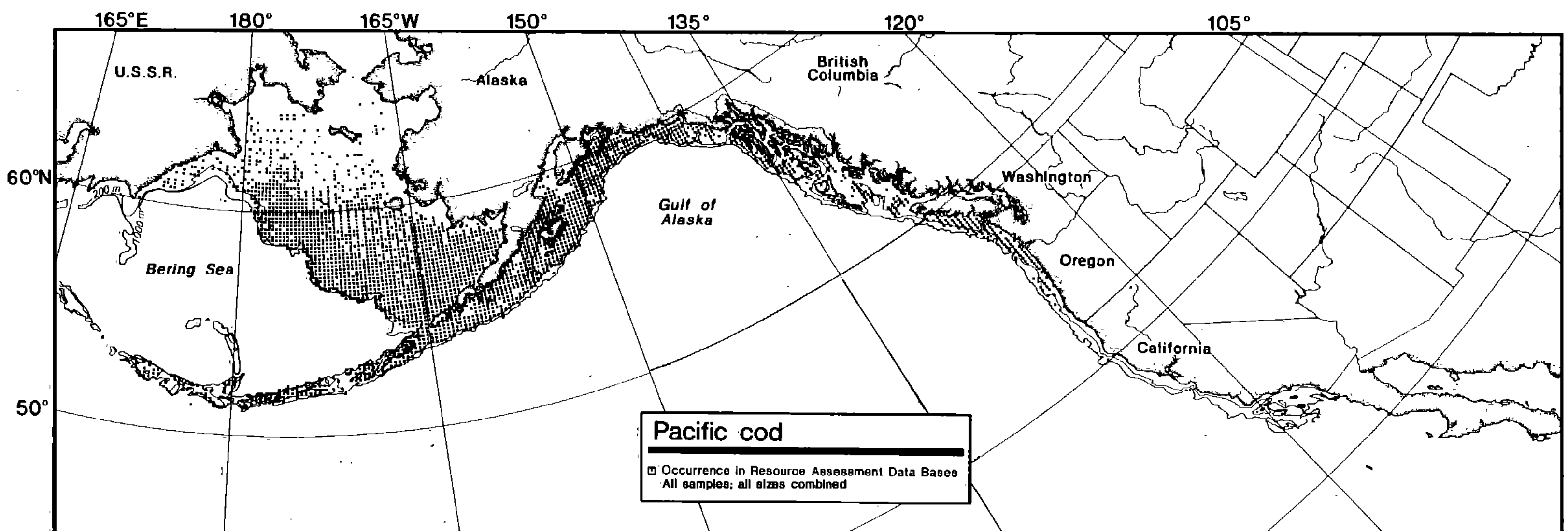


Figure 4.--The overall range of Pacific cod off the west coast of North America based on an analysis of several resource assessment data bases for 1912-84.

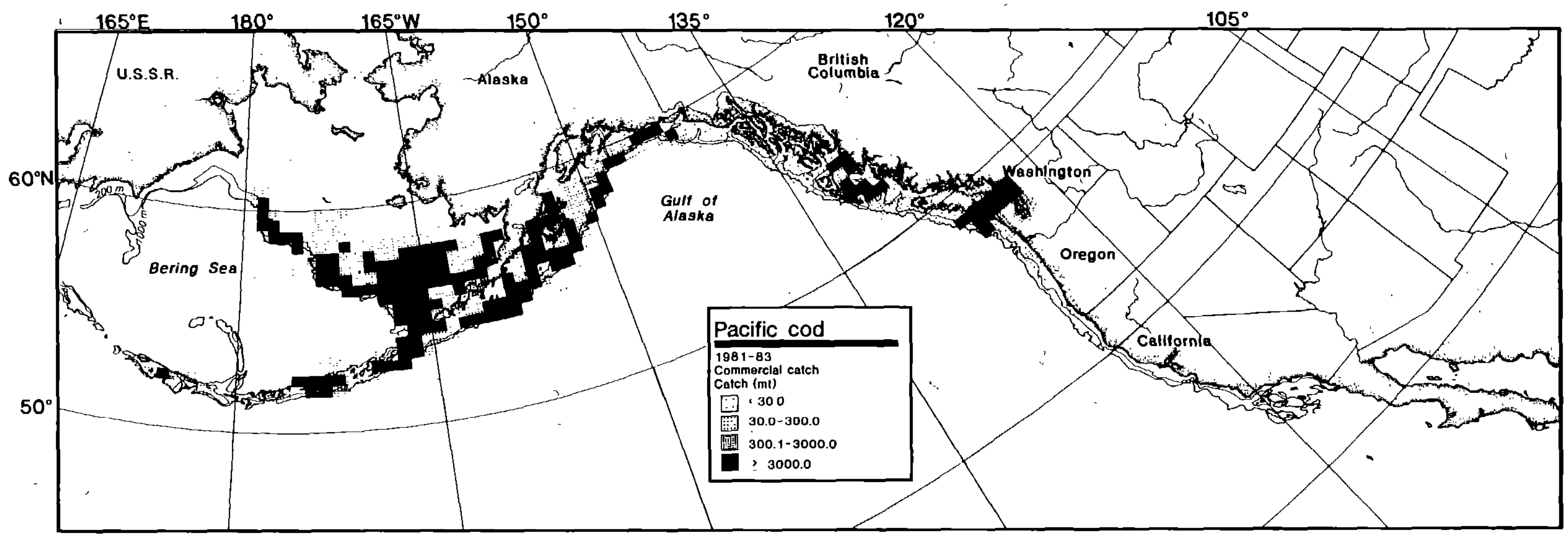


Figure 5.--Location of commercial harvests of Pacific cod off the west coast of North America, 1981-83; domestic, foreign and joint venture harvests combined.

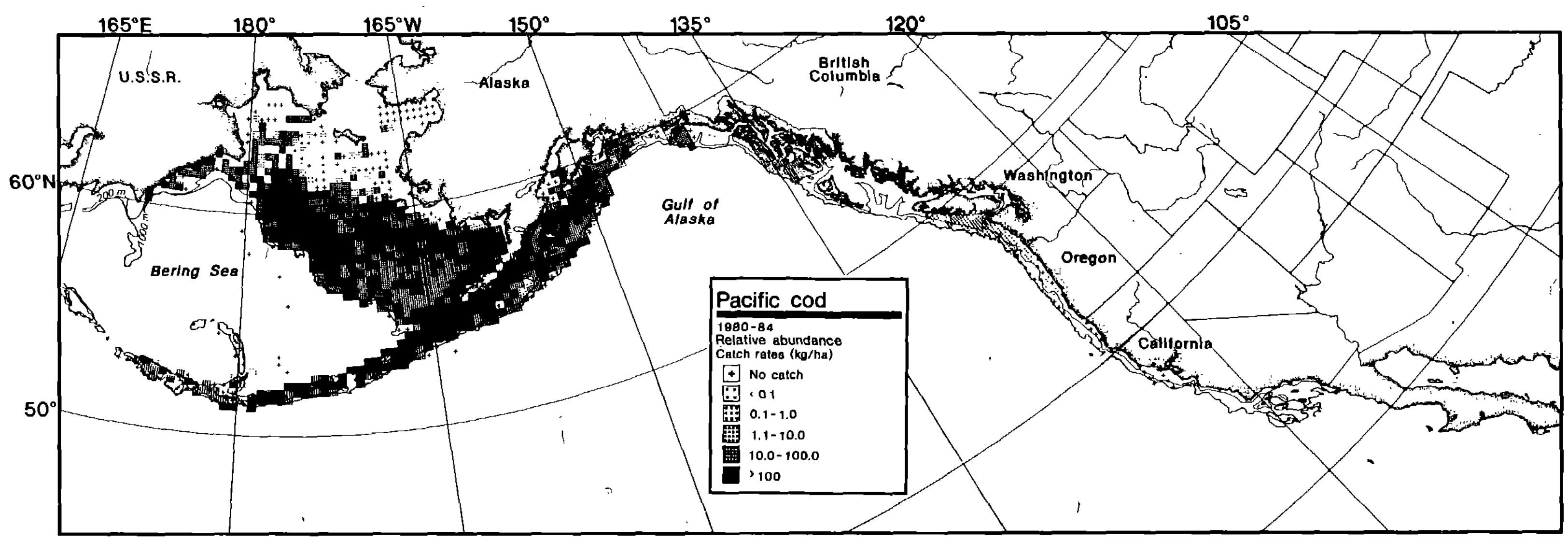


Figure 6.--The relative abundance of Pacific cod off the west coast of North America, 1980-84, based on catch information from various NMFS trawl surveys.

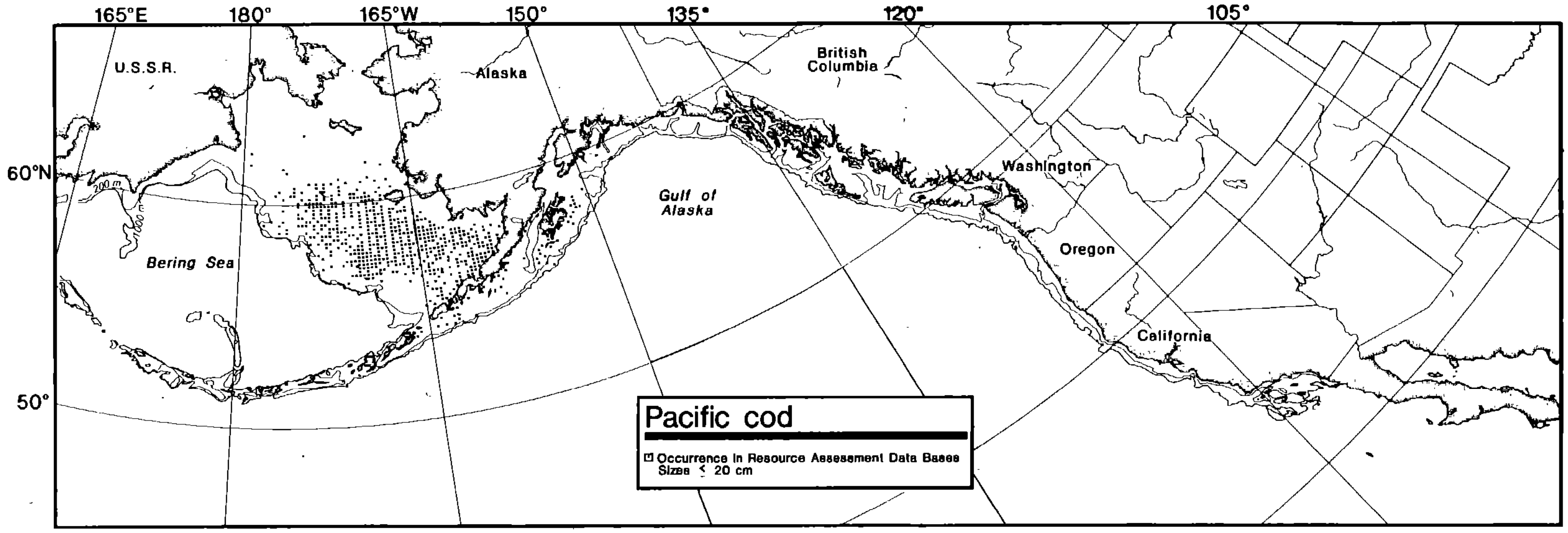


Figure 7.--The range of small (20 cm or less) Pacific cod off the west coast of North America based on data from several resource assessment data bases for 1912-84.

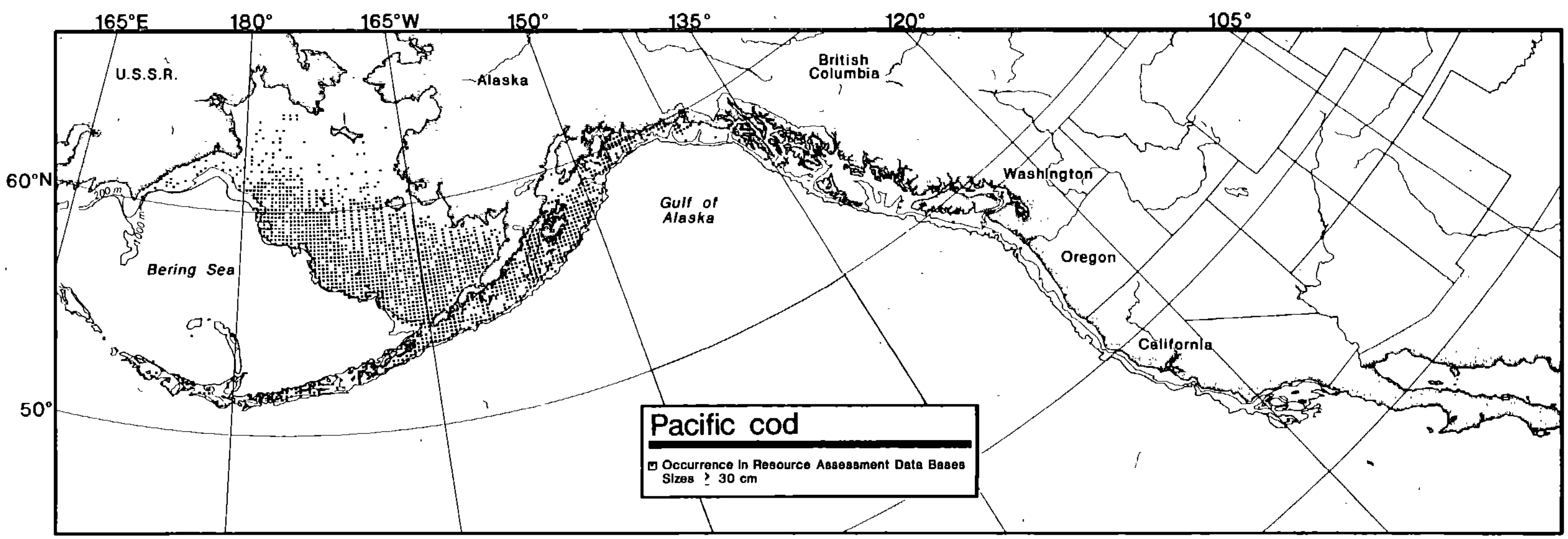


Figure 8.--The range of large (30 cm or larger) Pacific cod off the west coast of North America based on data from several resource assessment data bases for 1912-84.

Table 5.--Total numbers of samples (hauls) and numbers of samples containing Pacific cod by depth interval and geographic region from resource assessment surveys off the west coast of North America during 1912-84.

		West coast			British Columbia			Southeast Alaska			Gulf of Alaska			Aleutian Islands			Bering Sea			All areas combined		
	Depth (meters)	Total Hauls	Occ.	%	Total Hauls	Occ.	%	Total Hauls	Occ.	%	Total Hauls	Occ.	%	Total Hauls	Occ.	%	Total Hauls	Occ.	%	Total Hauls	Occ.	%
All occurrences	0-50	1608	53	3	119	--	--	145	17	12	432	184	43	74	12	16	3113	1218	39	5491	1484	27
	51-100	2270	139	6	139	42	30	486	100	21	2044	1143	56	194	92	47	4186	3056	73	9322	4574	49
	101-200	2551	323	13	326	108	33	527	211	40	5013	3365	67	623	523	84	2778	2436	88	11833	6977	59
	201-300	921	141	15	250	71	28	399	185	46	1451	980	68	244	201	82	256	234	91	3522	1813	51
	301-400	439	6	1	56	--	--	191	22	12	246	44	18	125	71	57	132	97	73	1190	240	20
	401-500	329	--	--	11	--	--	146	2	1	108	4	4	104	8	8	138	29	21	836	43	5
	501-600	144	--	--	2	--	--	192	--	--	40	1	3	62	--	--	66	3	5	506	4	1
	601-1000	321	--	--	6	--	--	243	--	--	60	--	--	89	--	--	134	3	2	853	3	0
	>1000	25	--	--	2	--	--	--	--	--	--	--	--	--	--	--	--	--	--	27	--	--
	TOTAL	8608	662	8	911	221	24	2329	537	23	9394	5721	61	1515	907	60	10803	7076	66	33580	15138	45
Small fish (≤ 20cm)	0-50	--	--	--	--	--	--	2	2	100	83	37	45	4	2	50	543	350	64	632	391	62
	51-100	--	--	--	--	--	--	--	--	--	506	56	11	47	3	6	1464	520	36	2020	579	29
	101-200	--	--	--	--	--	--	--	--	--	1010	14	1	323	4	1	1312	101	8	2664	119	4
	201-300	--	--	--	--	--	--	--	--	--	196	2	1	--	--	--	--	--	--	511	2	0
	301-400	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	401-500	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	501-600	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	601-1000	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	>1000	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	TOTAL	--	--	--	--	--	--	24	2	8	1800	109	6	538	9	2	3583	971	27	5952	1091	18
Large fish (≥ 30cm)	0-50	--	--	--	--	--	--	--	--	--	83	47	57	4	3	75	543	466	86	632	516	82
	51-100	--	--	--	1	1	100	2	2	100	506	473	93	47	47	100	1464	1382	94	2020	1905	94
	101-200	4	4	100	2	2	100	13	13	100	1010	1007	100	323	323	100	1312	1310	100	2664	2659	100
	201-300	--	--	--	--	--	--	7	7	100	196	196	100	125	125	100	183	183	100	511	511	100
	301-400	--	--	--	--	--	--	--	--	--	5	5	100	36	36	100	65	65	100	106	106	100
	401-500	--	--	--	--	--	--	--	--	--	--	--	--	3	3	100	14	14	100	17	17	100
	501-600	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	2	2	100	2	2	100
	601-1000	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	>1000	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	TOTAL	4	4	100	3	3	100	24	22	92	1800	1728	96	538	537	100	3583	3422	96	5952	5716	96

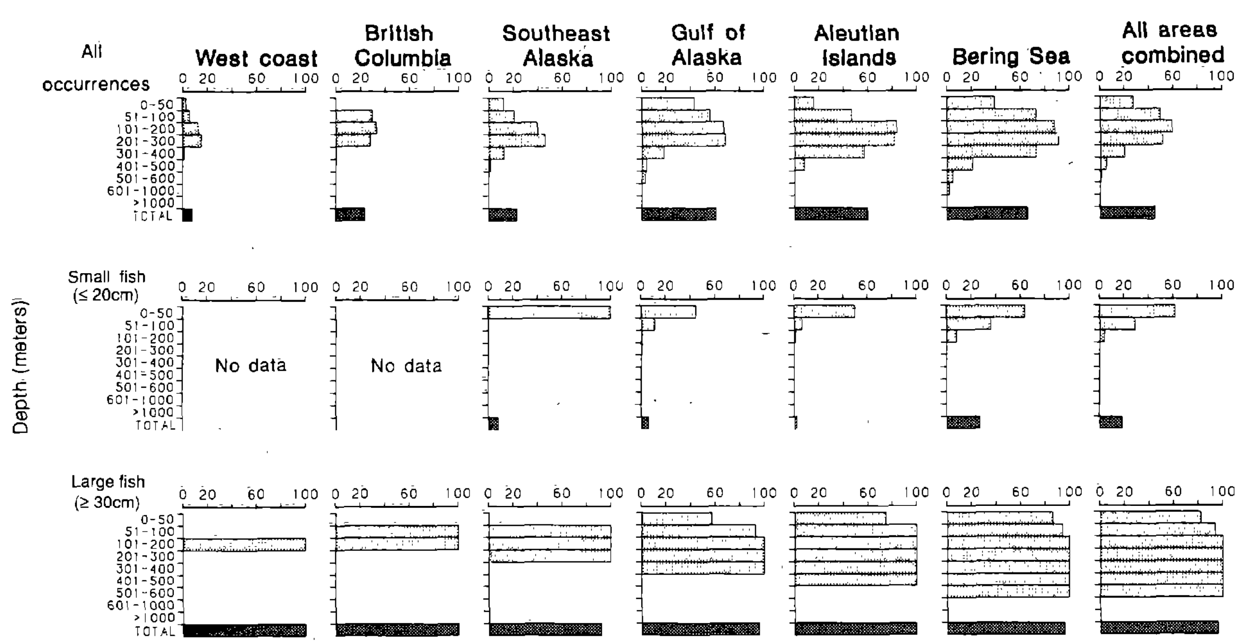
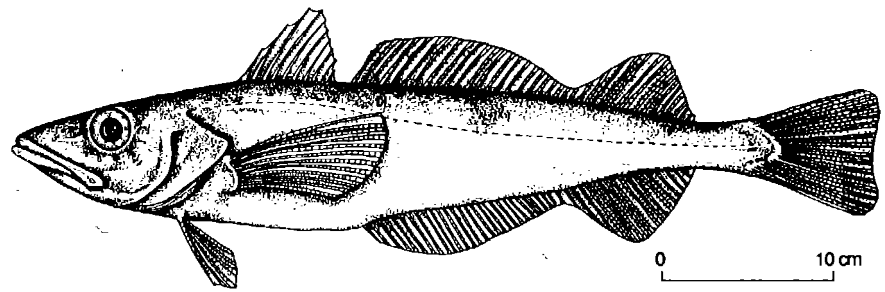


Figure 9.--Frequency of occurrence by depth interval by region for Pacific cod off the west coast of North America based on presence or absence in samples from resource assessment surveys during 1912-84.

Pacific whiting



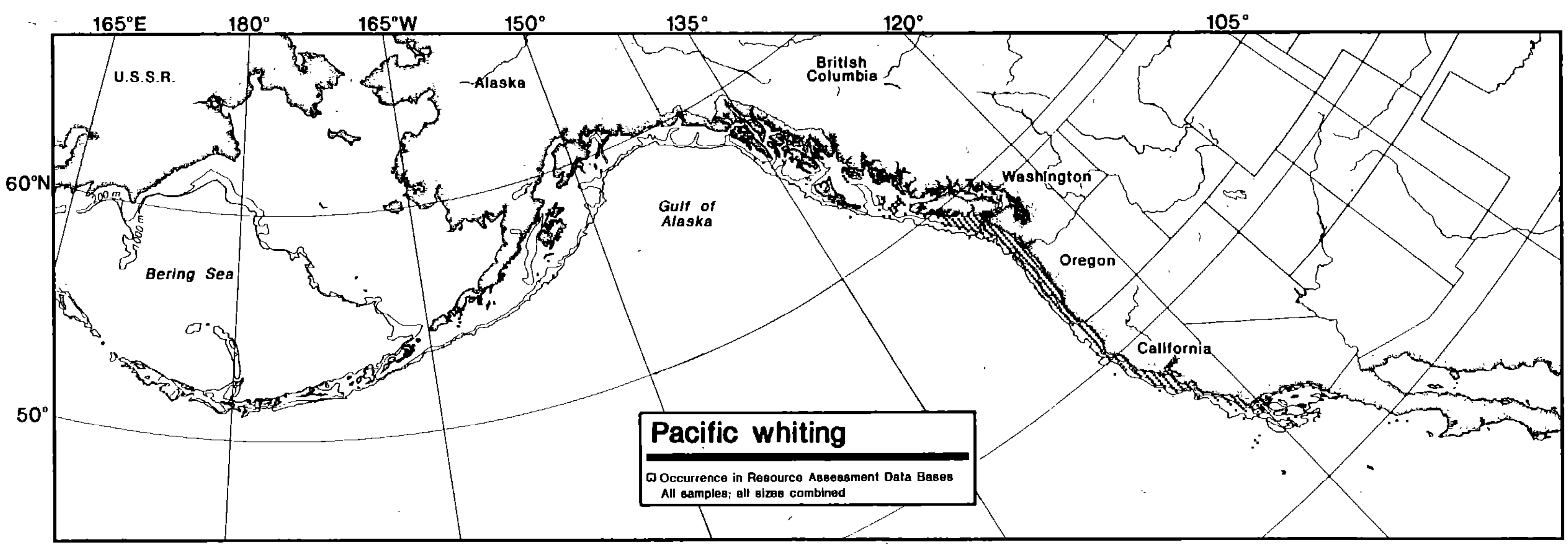


Figure 10.--The overall range of Pacific whiting off the west coast of North America based on an analysis of several resource assessment data bases for 1912-84.

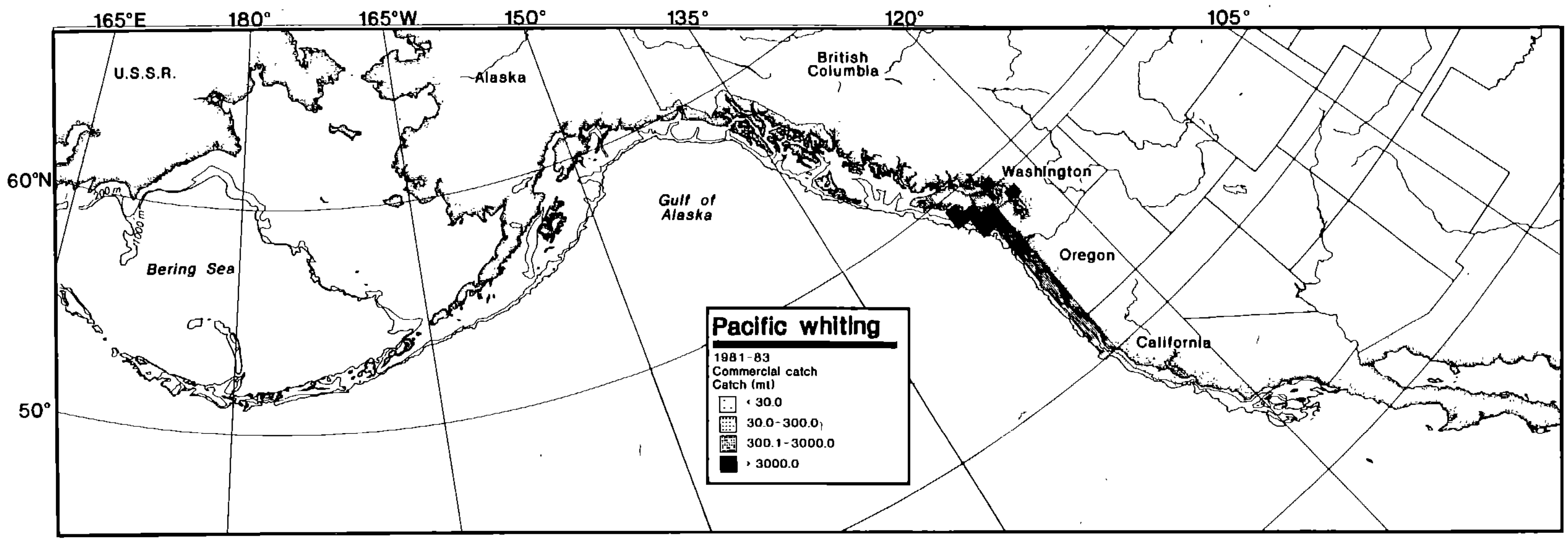


Figure 11.--Location of commercial harvests of Pacific whiting off the west coast of North America, 1981-83; domestic, foreign and joint venture harvests combined.

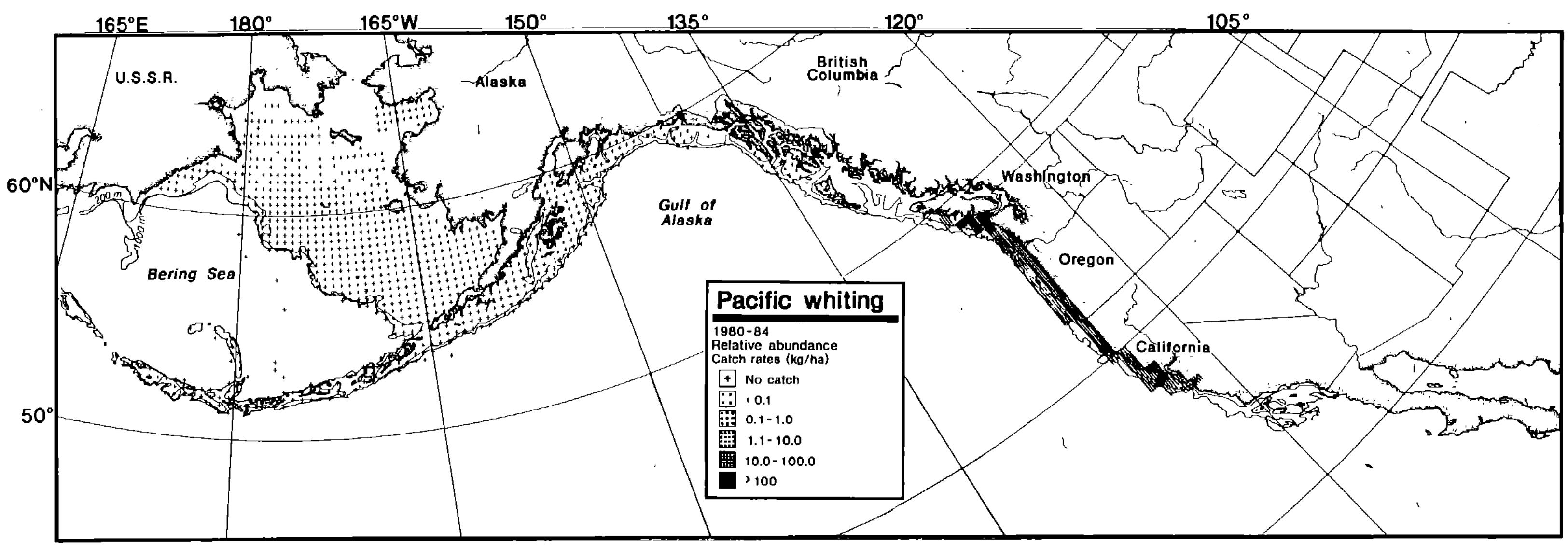


Figure 12.--The relative abundance of Pacific whiting off the west coast of North America 1980-84, based on catch information from various NMFS trawl surveys.

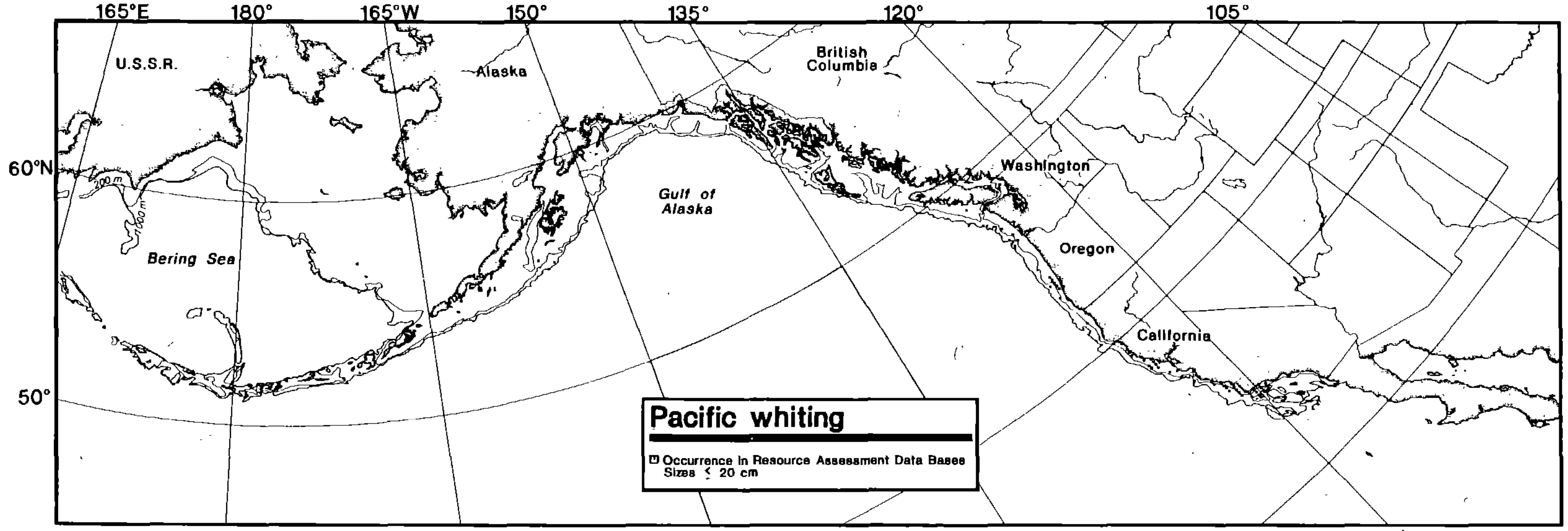


Figure 13.--The range of small (20 cm or less) Pacific whiting off the west coast of North America based on data from several resource assessment data bases for 1912-84.

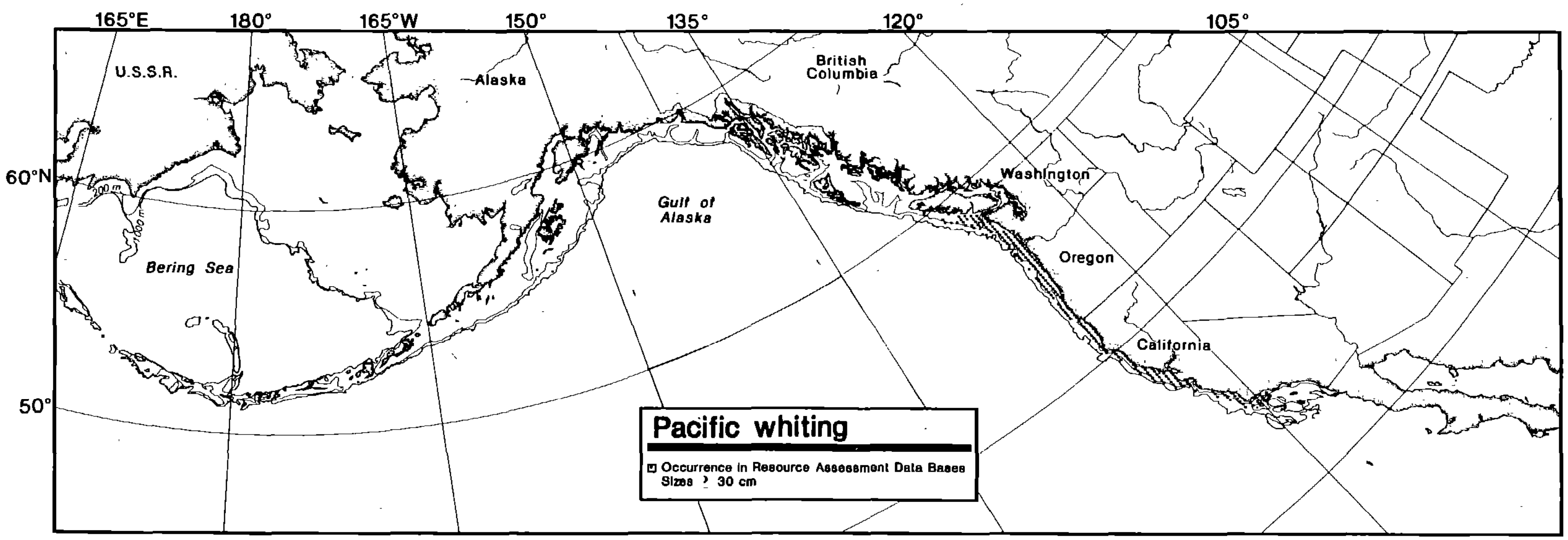


Figure 14.--The range of large (30 cm or larger) walleye pollock Off the west coast of North America based on data from several resource assessment data bases for 1912-84.

Table 6.--Total numbers of samples (hauls) and numbers of samples containing Pacific whiting by depth interval and geographic region from resource assessment surveys off the west coast of North America during 1912-84.

		West coast			British Columbia			Southeast Alaska			Gulf of Alaska			Aleutian Islands			Bering Sea			All areas combined		
	Depth (meters)	Total Hauls	Occ.	%	Total Hauls	Occ.	%	Total Hauls	Occ.	%	Total Hauls	Occ.	%	Total Hauls	Occ.	%	Total Hauls	Occ.	%	Total Hauls	Occ.	%
All occurrences	0-50	1608	83	5	119	2	2	145	--	--	432	--	--	74	--	--	3113	--	--	5491	85	2
	51-100	2270	595	26	139	17	12	486	3	1	2044	2	0	194	--	--	4186	--	--	9322	617	7
	101-200	2551	1316	52	326	42	13	527	9	2	5013	10	0	623	--	--	2778	--	--	11833	1377	12
	201-300	921	565	61	250	81	32	399	4	1	1451	3	0	244	--	--	256	--	--	3522	653	19
	301-400	439	354	81	56	13	23	191	--	--	246	--	--	125	--	--	132	--	--	1190	367	31
	401-500	329	182	55	11	2	18	146	--	--	108	--	--	104	--	--	138	--	--	836	184	22
	501-600	144	15	10	2	--	--	192	--	--	40	--	--	62	--	--	66	--	--	506	15	3
	601-1000	321	16	5	6	--	--	243	--	--	60	--	--	89	--	--	134	--	--	853	16	2
	>1000	25	--	--	2	--	--	--	--	--	--	--	--	--	--	--	--	--	--	27	--	--
	TOTAL	8608	3126	36	911	157	17	2329	16	1	9394	15	0	1515	--	--	10803	--	--	33580	3314	10
Small fish (≤ 20cm)	0-50	9	6	67	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	9	6	67
	51-100	257	25	10	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	258	25	10
	101-200	553	89	16	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	554	89	16
	201-300	200	31	16	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	202	31	15
	301-400	109	22	20	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	110	22	20
	401-500	34	10	29	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	34	10	29
	501-600	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	601-1000	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	>1000	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	TOTAL	1163	183	16	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	1168	183	16
Large fish (≥ 30cm)	0-50	9	2	22	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	9	2	22
	51-100	257	245	95	1	1	100	--	--	--	--	--	--	--	--	--	--	--	--	258	246	95
	101-200	553	514	93	1	1	100	--	--	--	--	--	--	--	--	--	--	--	--	554	515	93
	201-300	200	196	98	2	2	100	--	--	--	--	--	--	--	--	--	--	--	--	202	198	98
	301-400	109	109	100	1	1	100	--	--	--	--	--	--	--	--	--	--	--	--	110	110	100
	401-500	34	33	97	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	34	33	97
	501-600	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	601-1000	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	>1000	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	TOTAL	1163	1099	94	5	5	100	--	--	--	--	--	--	--	--	--	--	--	--	1168	1104	95

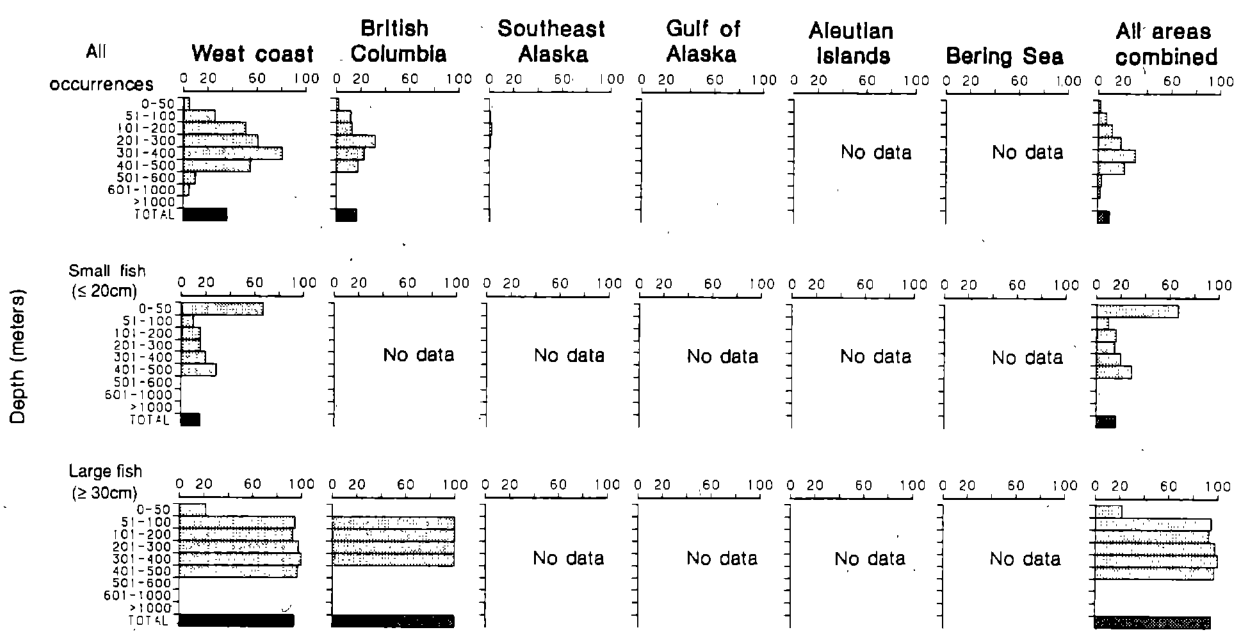
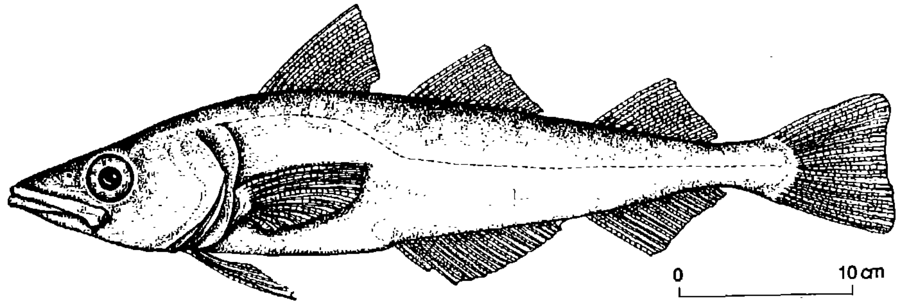


Figure 15.--Frequency of occurrence by depth interval by region for Pacific whiting off the west coast of North America based on presence or absence in samples from resource assessment surveys during 1912-84.

Walleye pollock



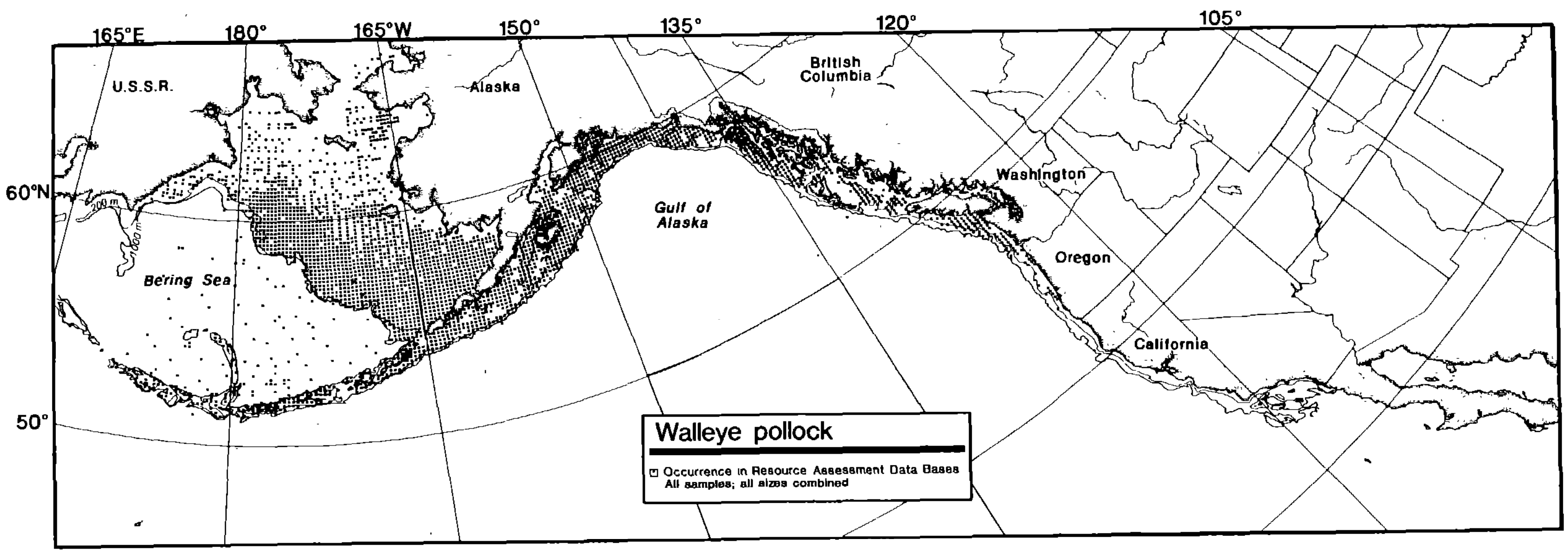


Figure 16.--The overall range of walleye pollock off the west coast of North America based on an analysis of several resource assessment data bases for 1912-84.

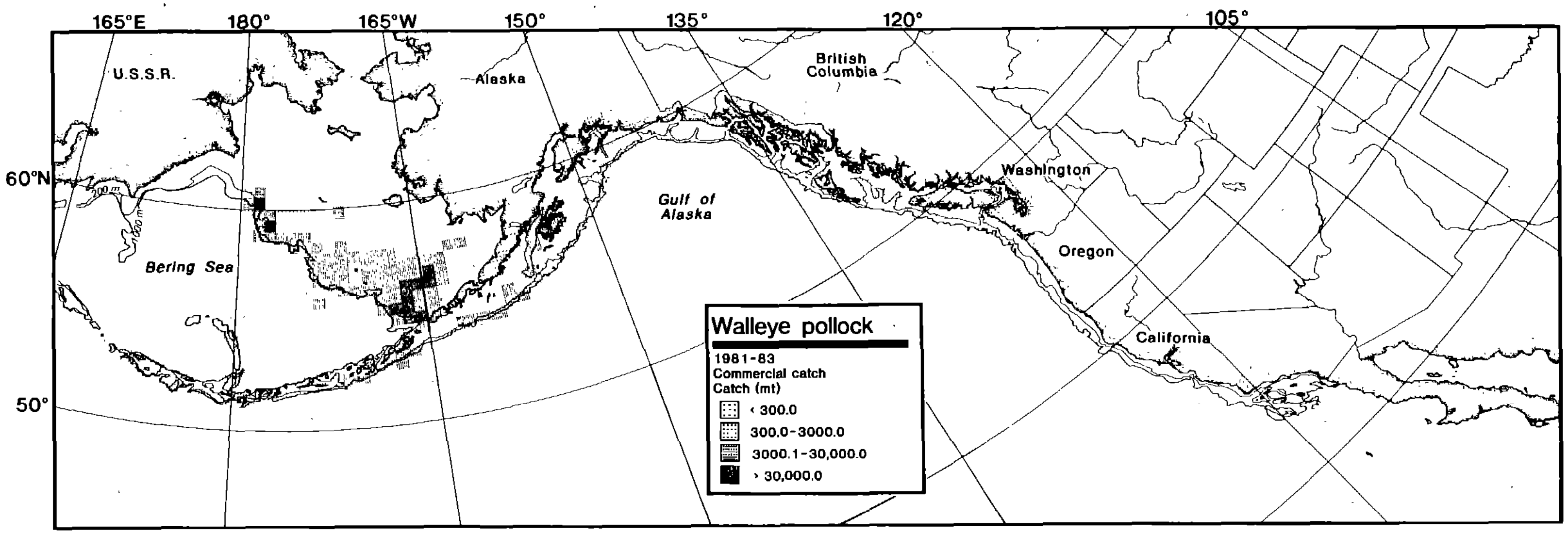


Figure 17.--Location of commercial harvests of walleye pollock off the west coast of North America, 1981-83; domestic, foreign and joint venture harvests combined.

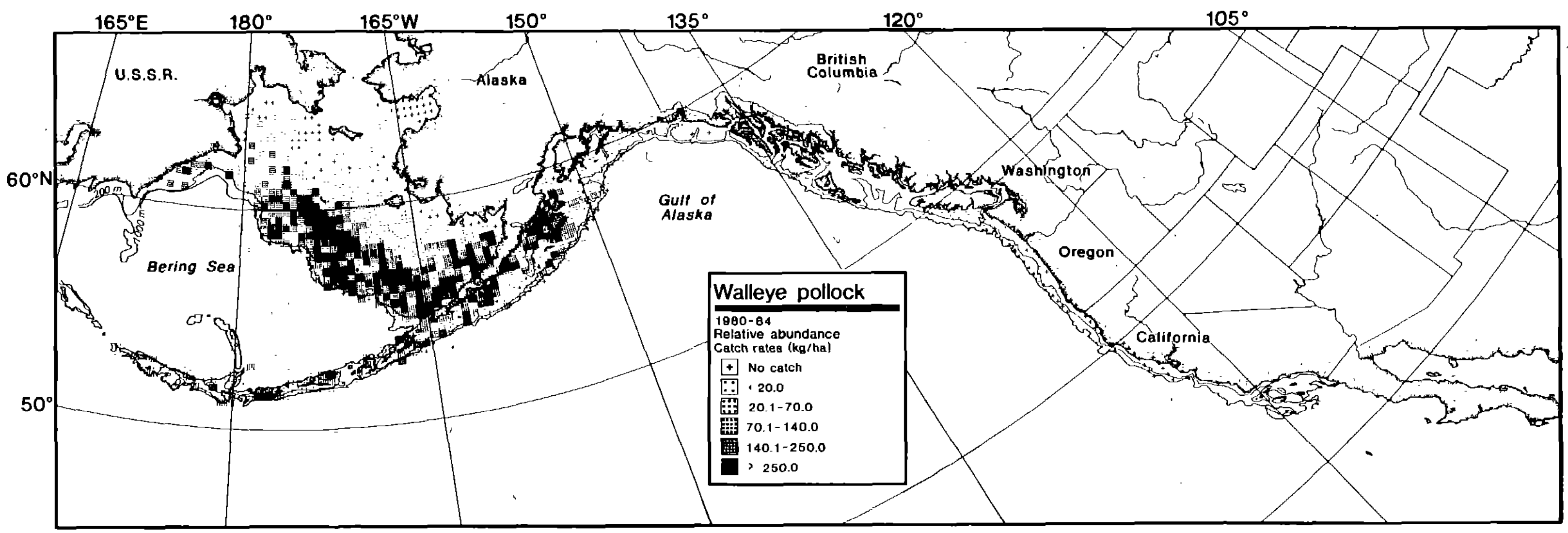


Figure 18.--The relative abundance of walleye pollock off the west coast of North America, 1980-84, based on catch information from various NMFS trawl surveys.

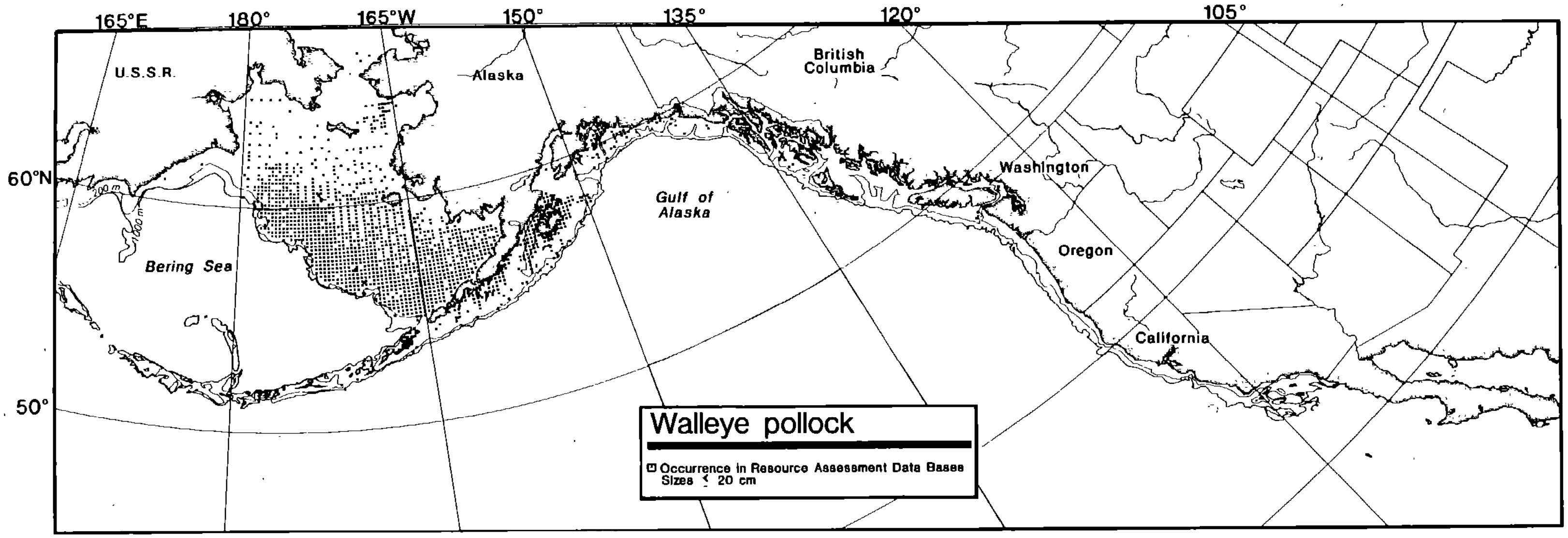


Figure 19.--The range of small (20 cm or less) walleye pollock off the west coast of North America based on data from several resource assessment data bases for 1912-84.

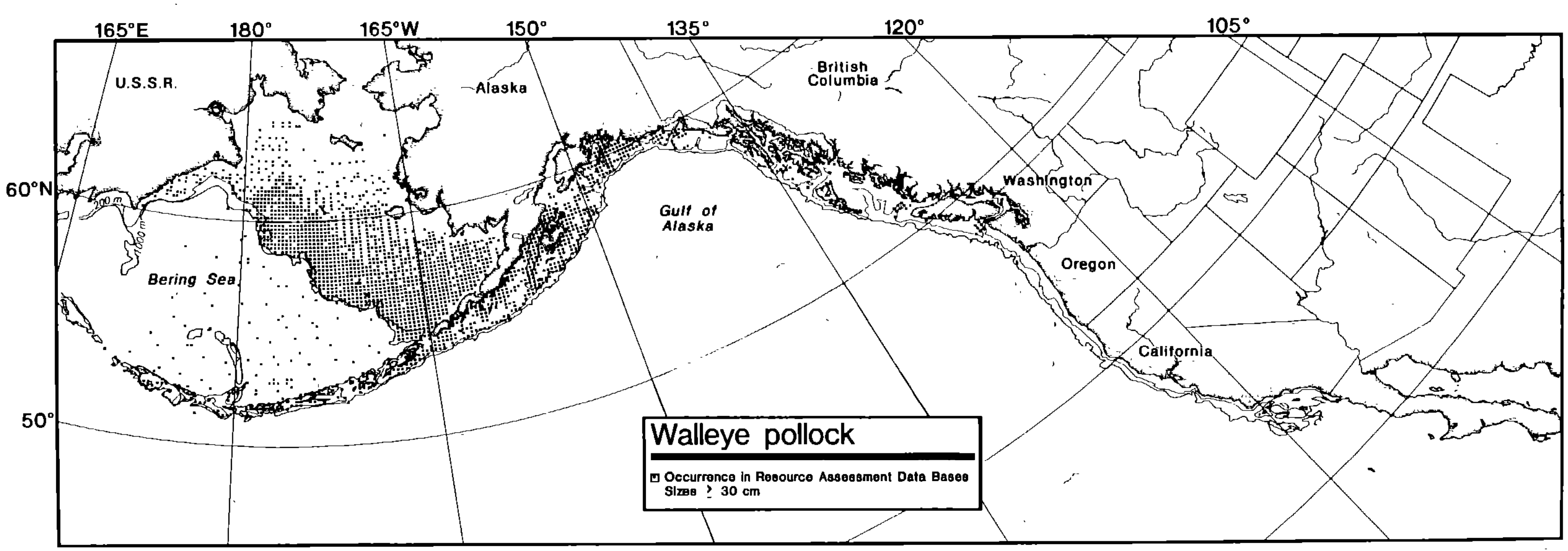


Figure 20.--The range of large (30 cm or larger) walleye pollock Off the west coast Of North America based on data from several resource assessment data bases for 1912-84.

Table 7.--Total numbers of samples (hauls) and numbers of samples containing walleye pollock by depth interval and geographic region from resource assessment surveys off the west coast of North America during 1912-84.

		West coast			British Columbia			Southeast Alaska			Gulf of Alaska			Aleutian Islands			Bering Sea			All areas combined		
	Depth (meters)	Total Hauls	Occ.	%	Total Hauls	Occ.	%	Total Hauls	Occ.	%	Total Hauls	Occ.	%	Total Hauls	Occ.	%	Total Hauls	Occ.	%	Total Hauls	Occ.	%
All occurrences	0-50	1608	24	1	119	3	3	145	65	45	432	124	29	74	12	16	3113	1282	41	5491	1510	27
	51-100	2270	109	5	139	42	30	486	342	70	2044	1149	56	194	122	63	4186	3514	84	9322	5281	57
	101-200	2551	205	8	326	136	42	527	324	61	5013	4131	82	623	508	82	2778	2724	98	11833	8043	68
	201-300	921	89	10	250	121	48	399	238	60	1451	1287	89	244	229	94	256	244	95	3522	2208	63
	301-400	439	13	3	56	8	14	191	60	31	246	164	67	125	99	79	132	119	90	1190	463	39
	401-500	329	1	0	11	--	--	146	22	15	108	46	43	104	69	66	138	92	67	836	230	28
	501-600	144	--	--	2	--	--	192	5	3	40	7	14	32	30	48	66	17	26	506	59	12
	600-1000	321	--	--	6	--	--	243	7	3	60	3	5	89	32	36	134	15	11	853	57	7
	>1000	25	--	--	2	--	--	--	--	--	--	--	--	--	--	--	--	--	--	27	--	--
	TOTAL	8606	441	5	911	310	34	2329	1063	46	9394	6911	74	1515	1101	73	10803	8007	74	33580	17851	53
Small fish (≤ 20cm)	0-50	--	--	--	--	--	--	2	1	50	51	43	84	7	1	14	781	588	75	841	633	75
	51-100	7	--	--	--	--	--	6	3	50	434	288	66	81	8	10	2378	1677	71	2906	1976	68
	101-200	9	1	11	--	--	--	41	12	29	1209	437	36	322	81	25	2271	1490	66	3868	2021	52
	201-300	1	--	--	--	--	--	--	--	--	521	137	26	172	8	5	207	10	5	920	155	17
	301-400	--	--	--	--	--	--	--	--	--	44	11	25	--	--	--	--	--	--	199	11	6
	401-500	--	--	--	--	--	--	5	1	20	19	3	16	34	1	3	50	1	2	108	6	6
	501-600	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	600-1000	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	>1000	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	TOTAL	17	1	6	--	--	--	79	17	22	2279	919	40	692	99	14	5788	3766	65	8874	4802	54
Large fish (≥ 30cm)	0-50	--	--	--	--	--	--	2	1	50	51	13	25	7	6	86	781	461	59	841	481	57
	51-100	7	7	100	--	--	--	6	6	100	434	262	60	81	76	94	2378	2109	89	2906	2460	85
	101-200	9	8	89	16	16	100	41	36	88	1209	1133	94	322	316	98	2271	2239	99	3866	3748	97
	201-300	1	1	100	3	3	100	16	16	100	521	520	99	172	172	100	207	207	100	920	919	99
	301-400	--	--	--	--	--	--	8	8	100	44	43	98	58	58	100	89	89	100	199	198	99
	401-500	--	--	--	--	--	--	5	5	100	19	19	100	34	34	100	50	49	98	108	107	99
	501-600	--	--	--	--	--	--	1	1	100	1	1	100	15	15	100	9	9	100	26	26	100
	600-1000	--	--	--	--	--	--	--	--	--	--	--	--	3	3	100	3	3	100	3	3	100
	>1000	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	TOTAL	17	16	94	19	19	100	79	73	92	2279	1991	87	692	680	98	5788	5166	89	8874	7945	90

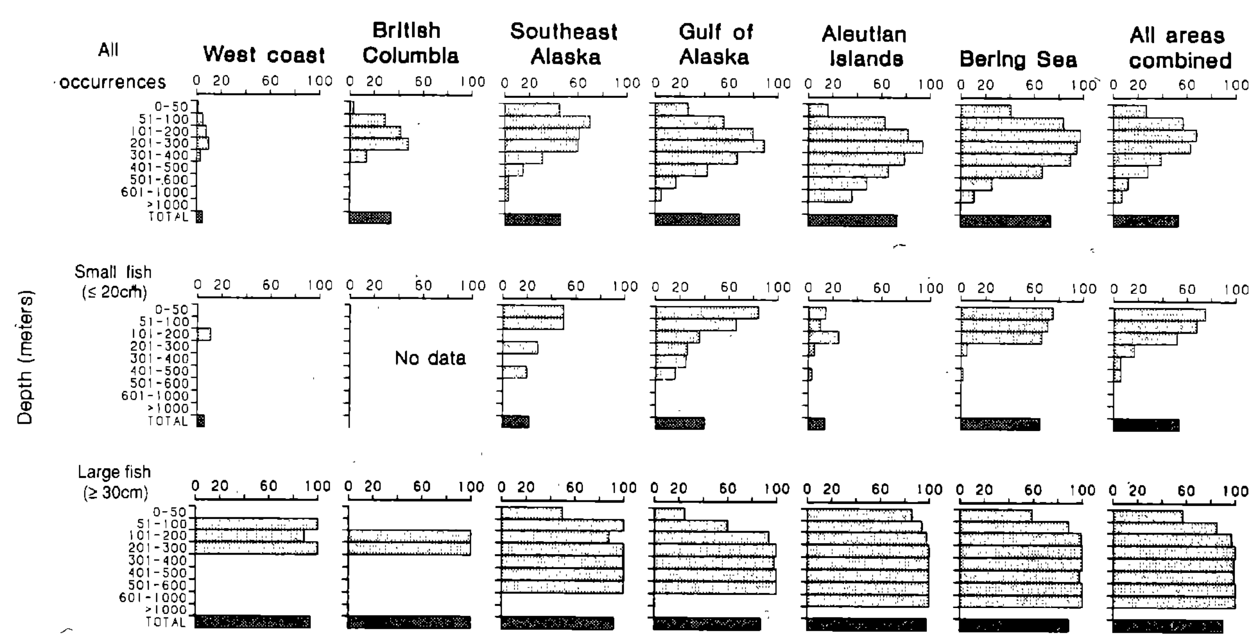
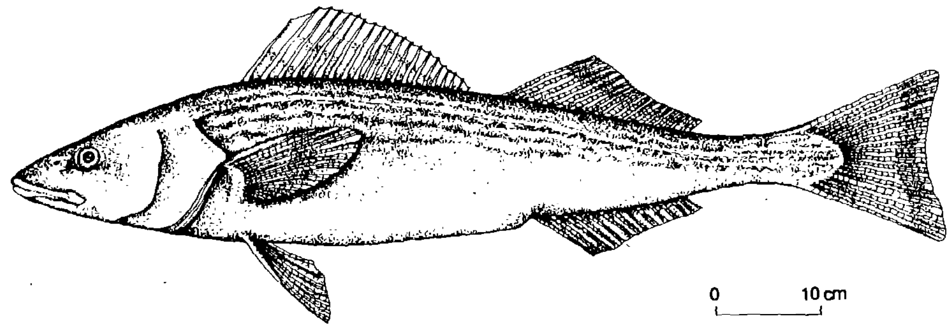


Figure 21 .--Frequency of occurrence by depth interval by region for walleye pollock off the west coast of North America based on presence or absence in samples from resource assessment surveys during 1912-84.

Sablefish



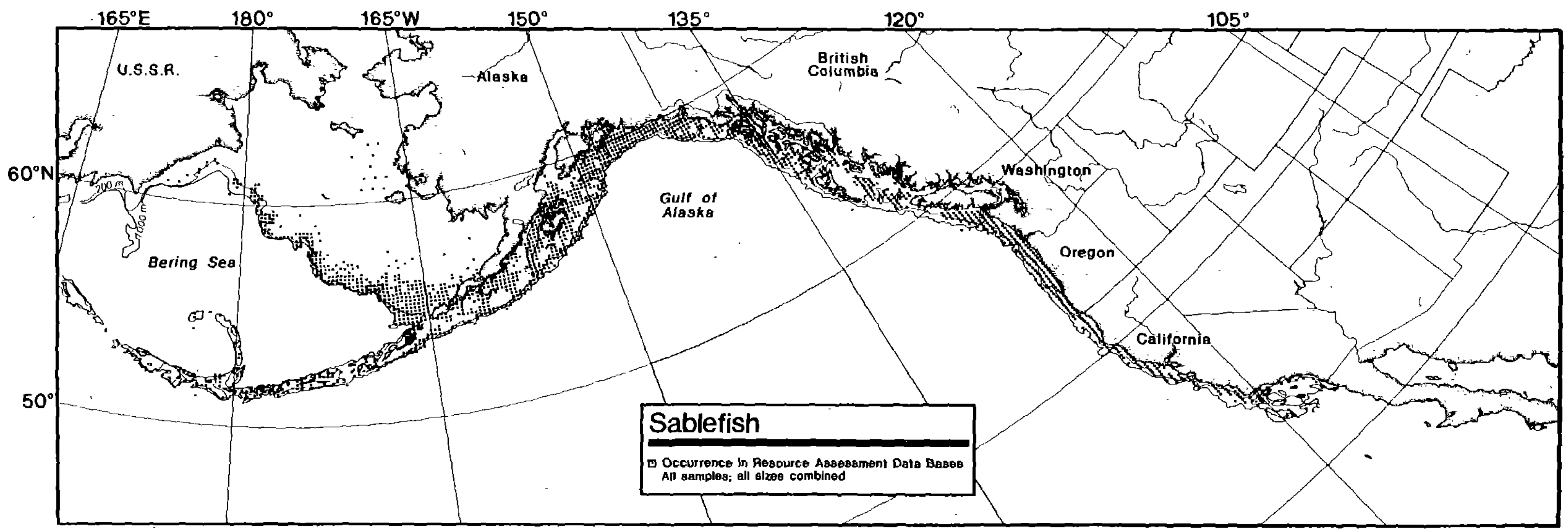


Figure 22.--The overall range of sablefish off the west coast of North America based on an analysis of several resource assessment data bases for 1912-84.

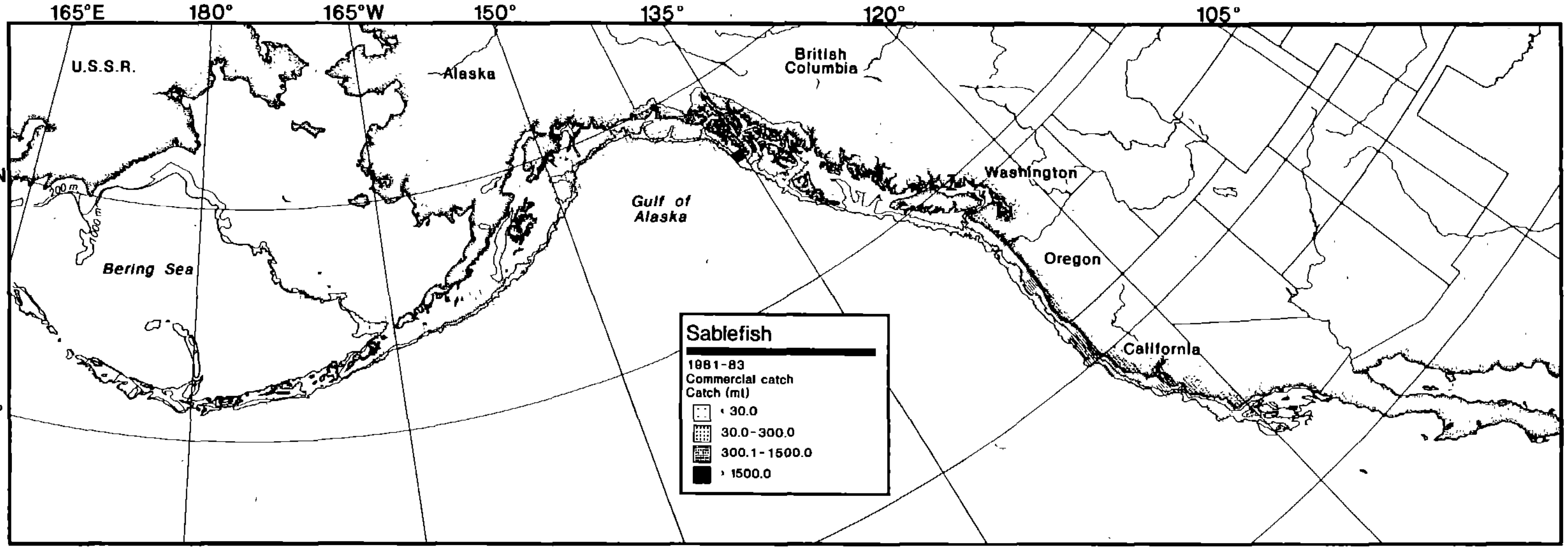


Figure 23.--Location of commercial harvests of sablefish off the west coast of North America, 1981-83; domestic, foreign and joint venture harvests combined.

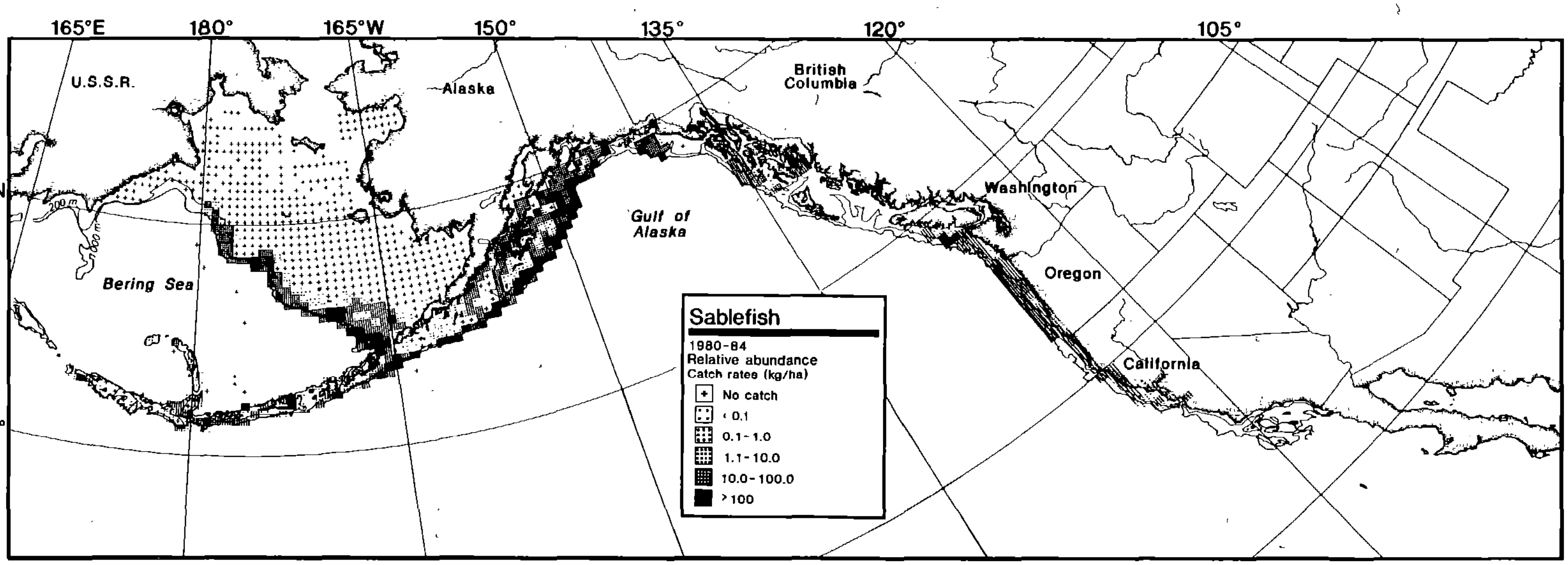


Figure 24.--The relative abundance of sablefish off the west coast of North America, 1980-84, based on catch information from various NMFS trawl surveys.

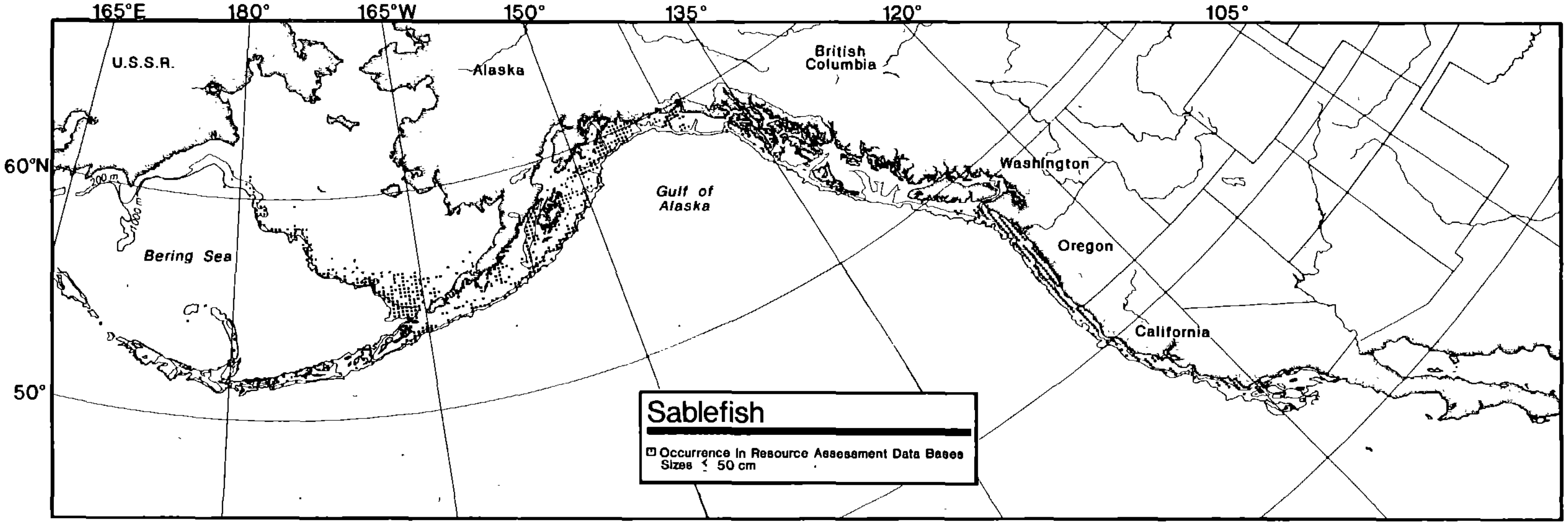


Figure 25.--The range of small (50 cm or less) sablefish off the west coast of North America based on data from several resource assessment data bases for 1912-84.

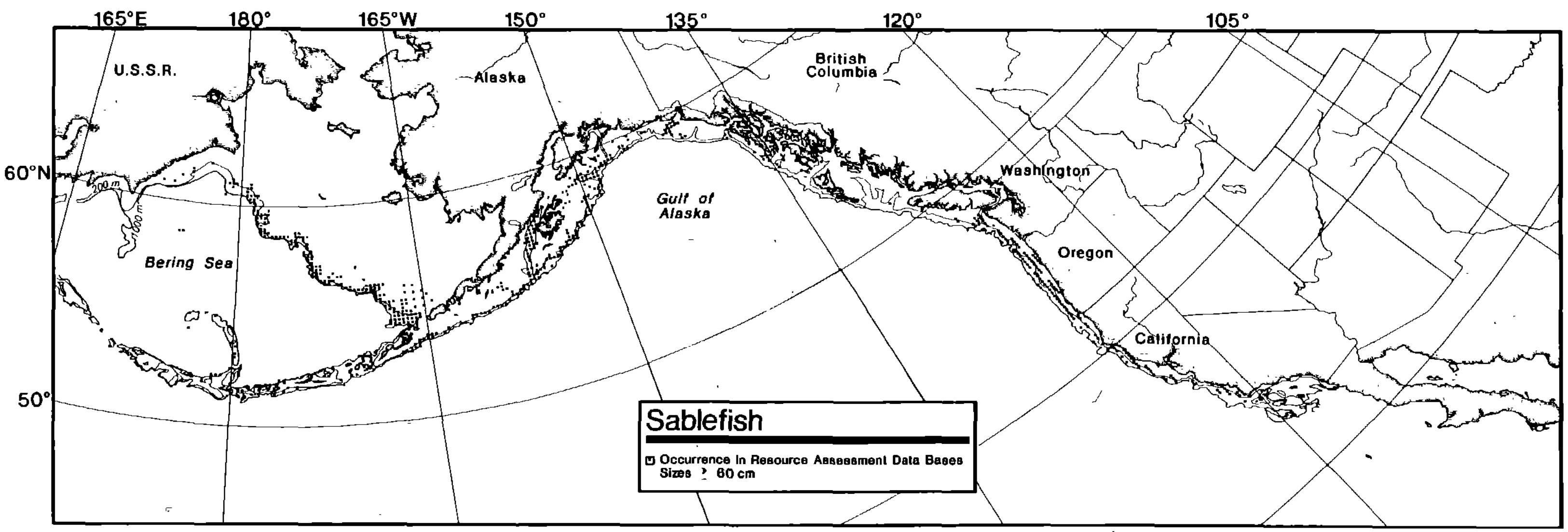


Figure 26.--The range of large (60 cm or larger) sablefish off the west coast of North America based on data from several resource assessment data bases for 1912-84.

Table 8.--Total numbers of samples (hauls) and numbers of samples containing sablefish by depth interval and geographic region from resource assessment surveys off the west coast of North America during 1912-84.

		West coast			British Columbia			Southeast Alaska			Gulf of Alaska			Aleutian Islands			Bering Sea			All areas combined		
	Depth (meters)	Total Hauls	Occ.	%	Total Hauls	Occ.	%	Total Hauls	Occ.	%	Total Hauls	Occ.	%	Total Hauls	Occ.	%	Total Hauls	Occ.	%	Total Hauls	Occ.	%
All occurrences	0-50	1608	42	3	119	7	6	145	6	4	432	81	19	74	1	1	3113	19	1	5491	156	3
	51-100	2270	268	12	139	23	17	486	74	15	2044	390	19	194	10	5	4186	82	2	9322	848	9
	101-200	2551	1195	47	326	104	32	527	161	31	5013	1725	34	623	120	19	2778	391	14	11833	3697	31
	201-300	921	674	73	250	196	78	399	299	75	1451	905	62	244	107	44	256	130	51	3522	2312	66
	301-400	439	355	81	56	38	68	191	178	93	246	200	81	125	91	73	132	87	66	1190	950	80
	401-500	329	295	90	11	1	9	146	139	95	108	98	91	104	86	83	138	92	67	836	711	85
	501-600	144	142	99	2	--	--	192	192	100	40	39	98	62	59	95	66	55	83	506	487	96
	601-1000	321	304	95	6	--	--	243	239	98	60	59	98	89	77	87	134	122	91	853	801	94
	>1000	25	25	100	2	--	--	--	--	--	--	--	--	--	--	--	--	--	--	27	25	93
	TOTAL	8608	3300	38	911	369	41	2329	1288	55	9394	3497	37	1515	551	36	10803	978	9	33580	9987	30
Small fish (≤ 50cm)	0-50	10	10	100	--	--	--	--	--	--	39	39	100	--	--	--	1	1	100	50	50	100
	51-100	74	74	100	--	--	--	3	3	100	125	125	100	2	2	100	26	25	96	230	229	100
	101-200	238	233	98	--	--	--	11	8	73	330	303	92	36	33	92	158	96	61	773	673	87
	201-300	184	174	95	--	--	--	108	65	60	187	158	84	50	41	82	93	34	37	624	473	76
	301-400	97	89	92	--	--	--	122	75	61	65	46	71	49	43	88	56	24	43	389	277	71
	401-500	142	135	95	--	--	--	127	64	50	52	34	65	62	52	84	64	36	56	447	321	72
	501-600	120	120	100	--	--	--	192	138	72	29	27	93	54	44	81	39	22	56	434	351	81
	601-1000	279	267	96	--	--	--	242	152	63	52	26	50	60	46	77	108	51	47	741	542	73
	>1000	25	19	76	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	25	19	76
	TOTAL	1169	1121	96	--	--	--	805	505	63	879	758	86	313	261	83	545	289	53	3713	2935	79
Large fish (≥ 60cm)	0-50	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	51-100	74	1	1	--	--	--	--	--	--	125	2	2	2	1	50	26	1	4	230	5	2
	101-200	238	72	30	--	--	--	11	5	45	330	92	28	36	10	28	158	63	40	773	242	31
	201-300	184	143	78	1	1	100	108	80	74	187	161	86	50	33	66	93	89	96	624	507	81
	301-400	97	89	92	--	--	--	122	113	93	65	62	95	49	45	92	56	53	95	389	362	93
	401-500	142	132	93	--	--	--	127	125	98	52	45	87	62	53	85	64	57	89	447	412	92
	501-600	120	117	98	--	--	--	192	189	98	29	29	100	54	49	91	39	39	100	434	423	97
	601-1000	279	263	94	--	--	--	242	241	100	52	52	100	60	58	97	108	105	97	741	719	97
	>1000	25	24	96	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	25	24	96
	TOTAL	1169	841	72	1	1	100	805	753	94	879	443	50	313	249	80	545	407	75	3713	2694	73

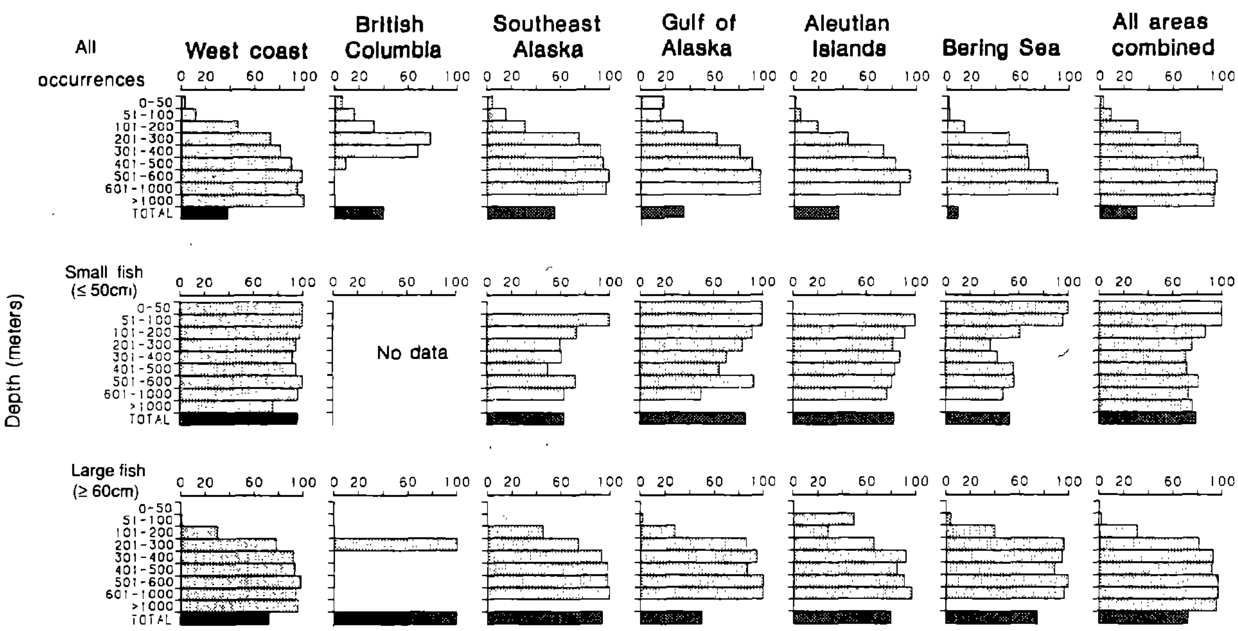
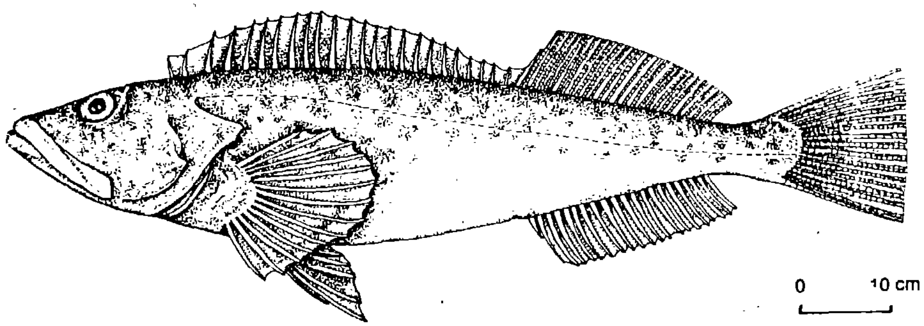


Figure 27.--Frequency of occurrence by depth interval by region for sablefish off the west coast of North America based on presence or absence in samples from resource assessment surveys during 1912-84.

Lingcod



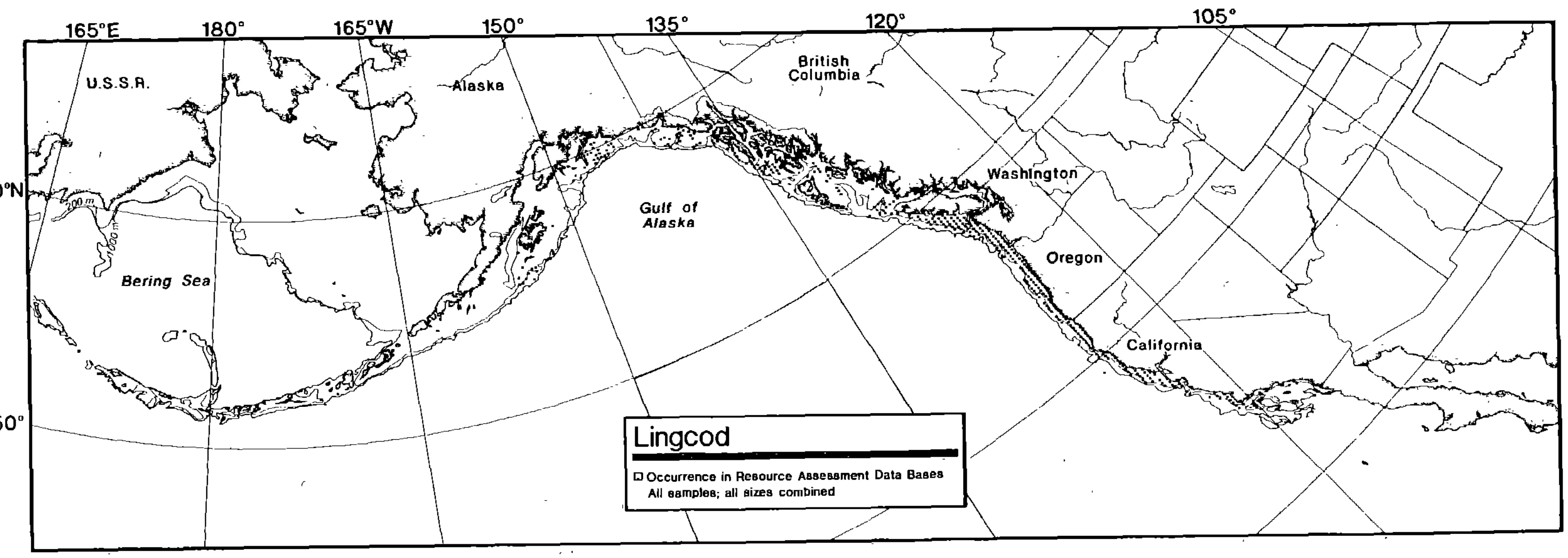


Figure 28.--The overall range of lingcod off the west coast of North America based on an analysis of several resource assessment data bases for 1912-84.

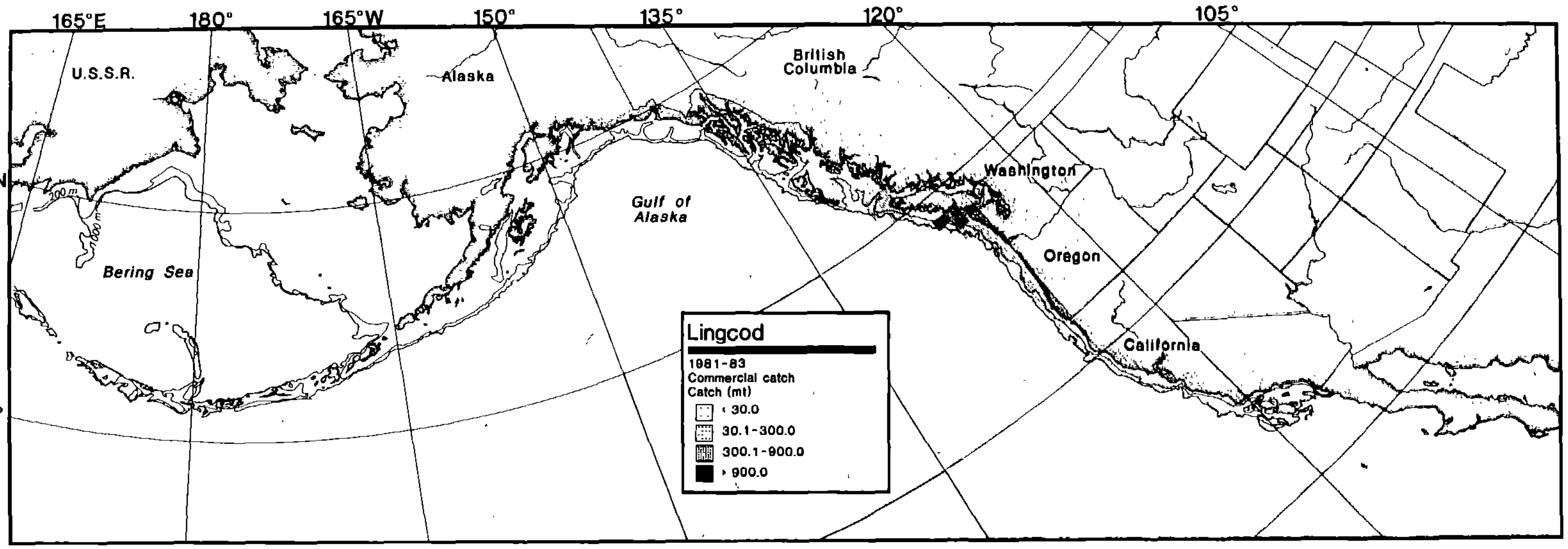


Figure 29.--Location of commercial harvests of lingcod off the west coast of North America, 1981-83; domestic, foreign and joint venture harvests combined.

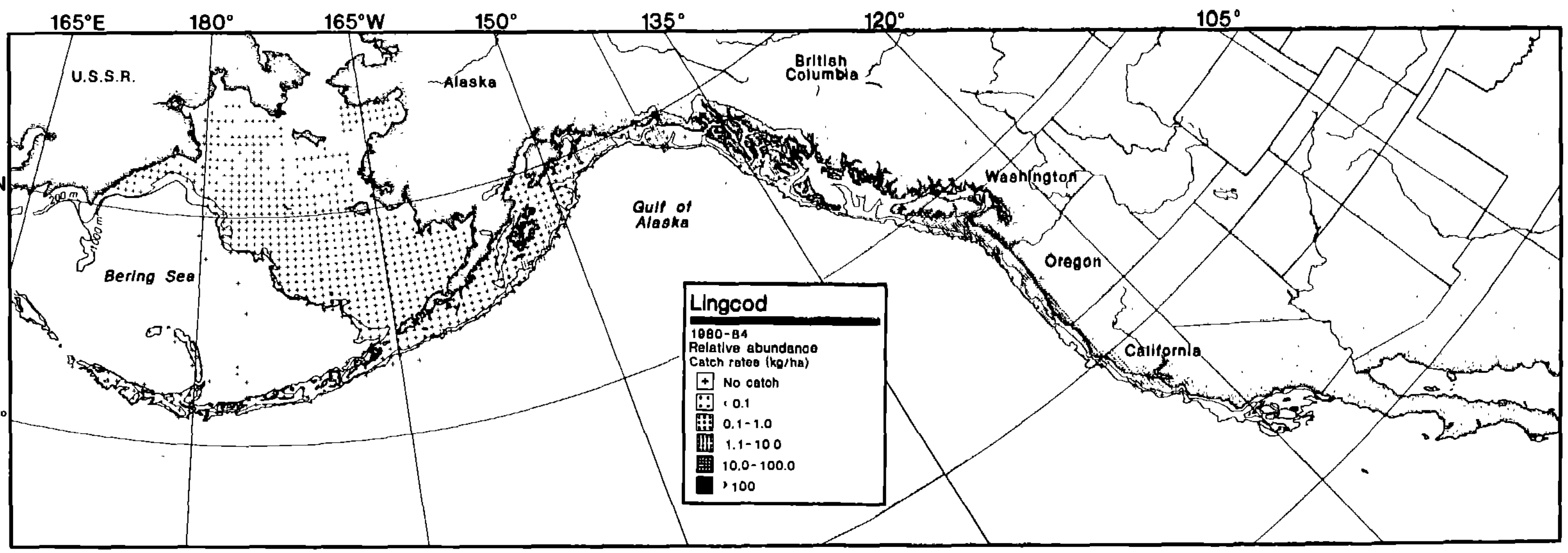


Figure 30.--The relative abundance of lingcod off the west coast of North America, 1980-84, based on catch information from various NMFS trawl surveys.

Table 9.--Total numbers of samples (hauls) and numbers of samples containing lingcod by depth interval and geographic region from resource assessment surveys off the west coast of North America during 1912-84.

All occurrences

Depth (meters)	West coast Total Hauls	West coast Occ.	West coast %	British Columbia Total Hauls	British Columbia Occ.	British Columbia %	Southeast Alaska Total Hauls	Southeast Alaska Occ.	Southeast Alaska %	Gulf of Alaska Total Hauls	Gulf of Alaska Occ.	Gulf of Alaska %	Aleutian Islands Total Hauls	Aleutian Islands Occ.	Aleutian Islands %	Bering Sea Total Hauls	Bering Sea Occ.	Bering Sea %	All areas combined Total Hauls	All areas combined Occ.	All areas combined %
0-50	1608	41	3	119	5	4	145	2	1	432	13	3	74	--	--	3113	--	--	5491	61	1
51-100	2270	392	17	139	36	26	486	18	4	2044	29	1	194	--	--	4186	--	--	9322	475	5
101-200	2551	701	27	326	45	14	527	41	8	5013	70	1	623	--	--	2778	--	--	11833	857	7
201-300	921	223	24	250	9	4	399	41	10	1451	18	1	244	--	--	256	--	--	3522	291	8
301-400	439	11	3	56	2	4	191	3	2	246	2	1	125	--	--	132	--	--	1190	18	2
401-500	329	8	2	11	--	--	146	--	--	108	--	--	104	--	--	138	--	--	836	8	1
501-600	144	--	--	2	--	--	192	--	--	40	--	--	62	--	--	66	--	--	506	--	--
601-1000	321	--	--	6	--	--	243	--	--	60	--	--	89	--	--	134	--	--	853	--	--
>1000	25	--	--	2	--	--	--	--	--	--	--	--	--	--	--	--	--	--	27	--	--
TOTAL	8608	1376	16	911	97	11	2329	105	5	9394	132	1	1515	--	--	10803	--	--	33580	1710	5

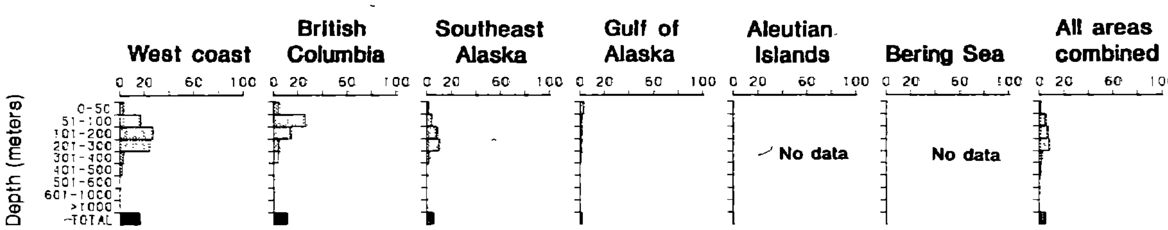
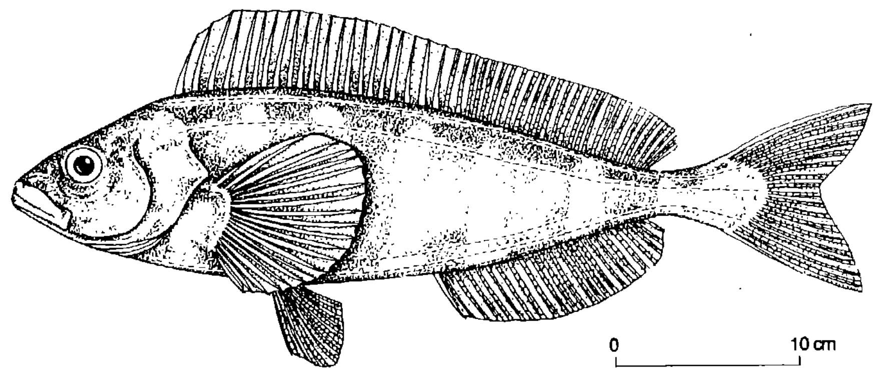


Figure 31.--Frequency of occurrence by depth interval by region for lingcod off the west coast of North America based on presence or absence in samples from resource assessment surveys during 1912-84.

THIS PAGE INTENTIONALLY LEFT BLANK

Atka mackerel



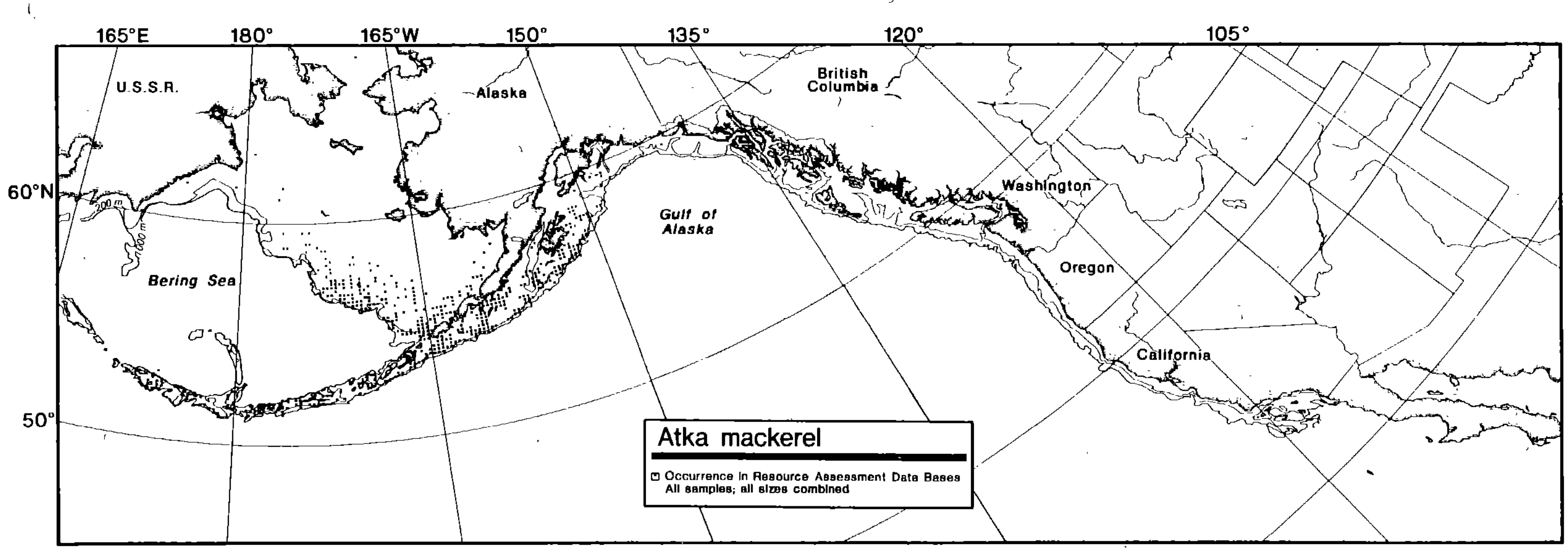


Figure 32.--The overall range of Atka mackerel off the west coast of North America based on an analysis of several resource assessment data bases for 1912-84.

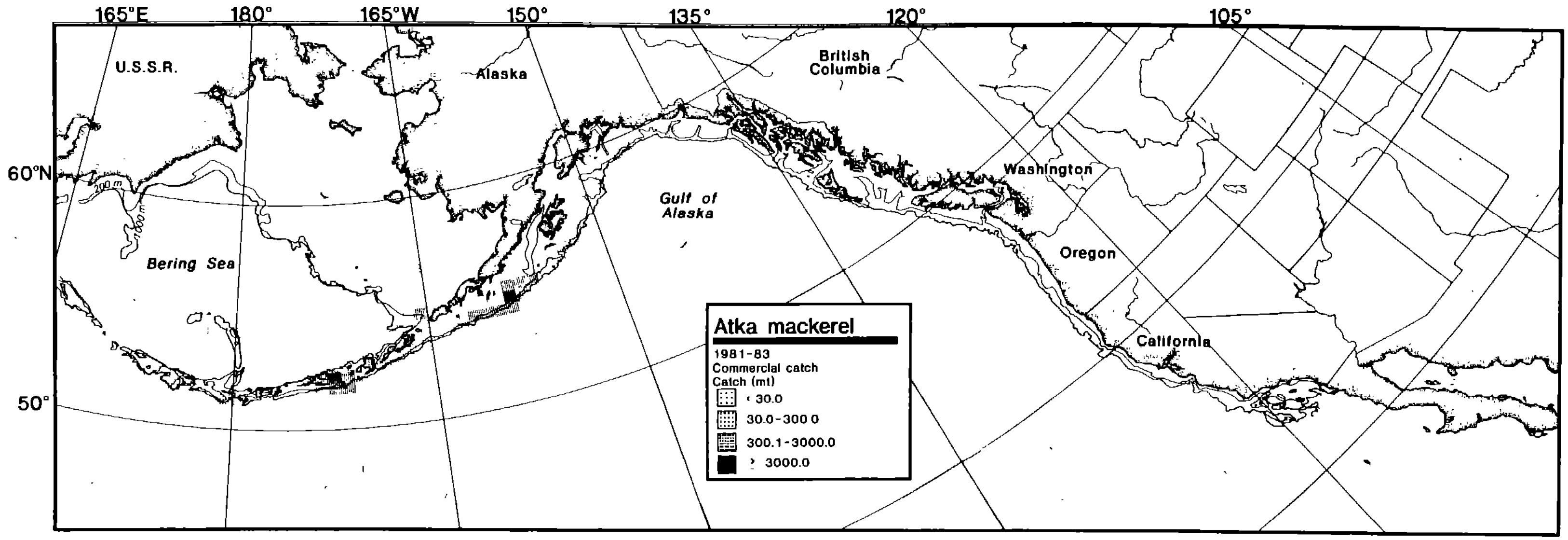


Figure 33.--Location of commercial harvests of Atka mackerel off the west coast Of North America, 1981-83; domestic, foreign and joint venture harvests combined.

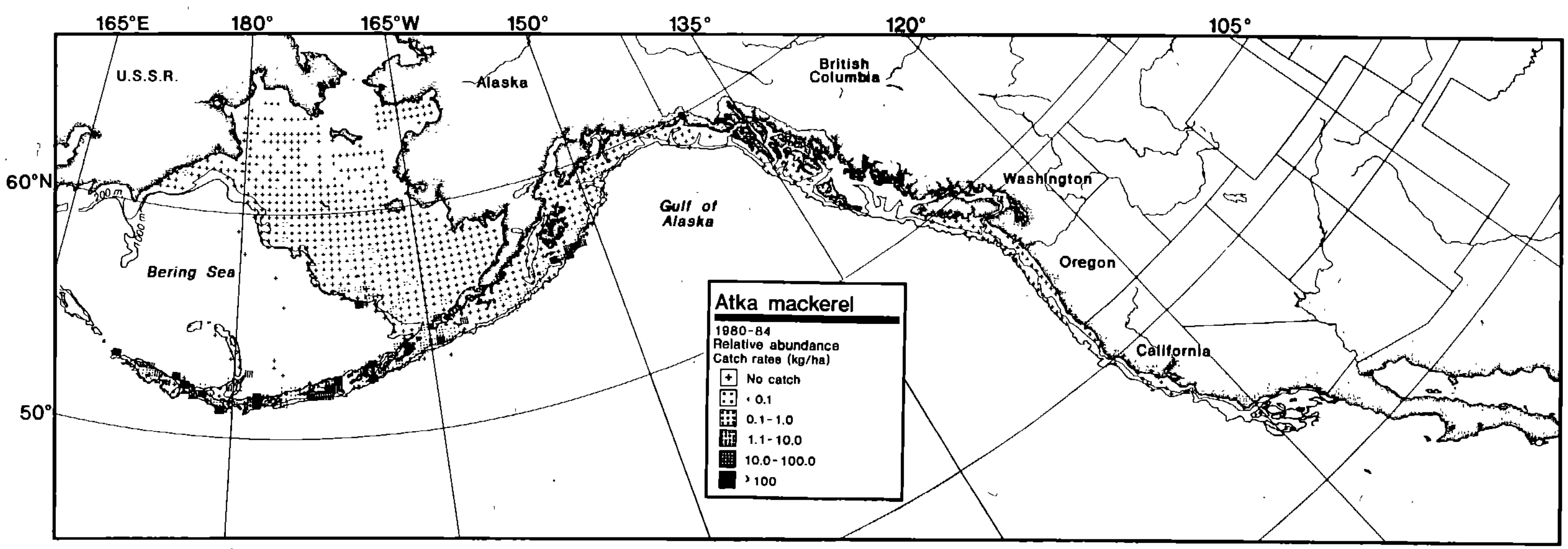


Figure 34.--The relative abundance of Atka mackerel off the west coast of North America, 1980-84, based on catch information from various NMFS trawl surveys.

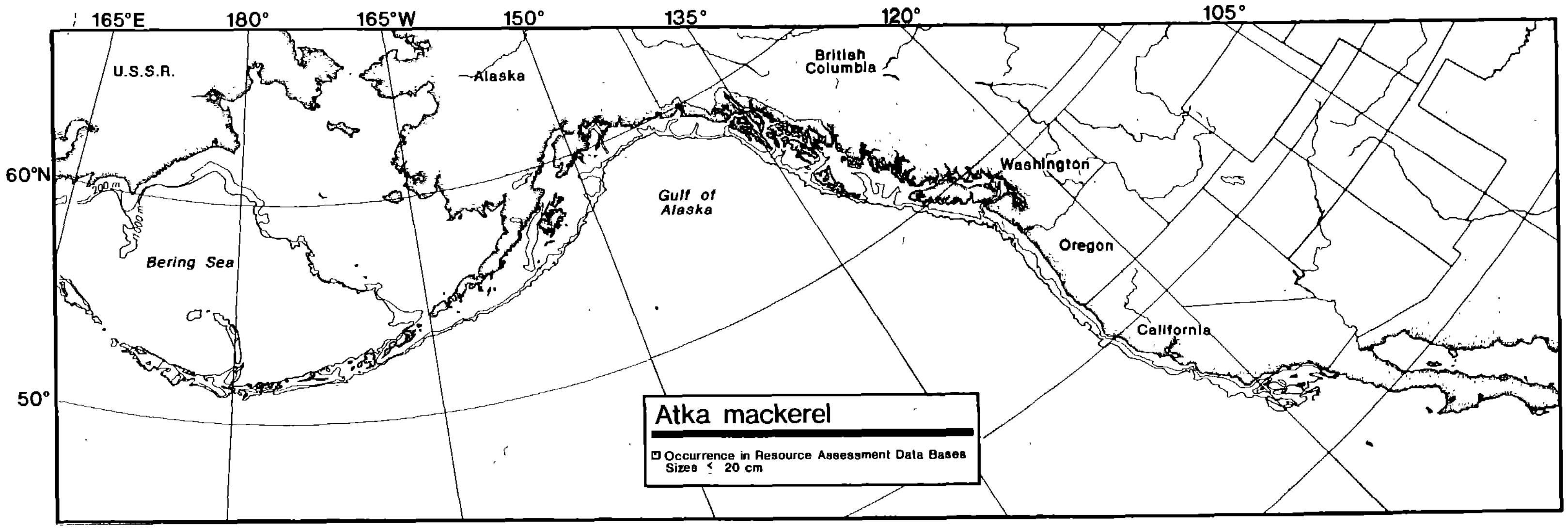


Figure 35.--The range of small (20 cm or less) Atka mackerel off the west coast of North America based on data from several resource assessment data bases for 1912-84.

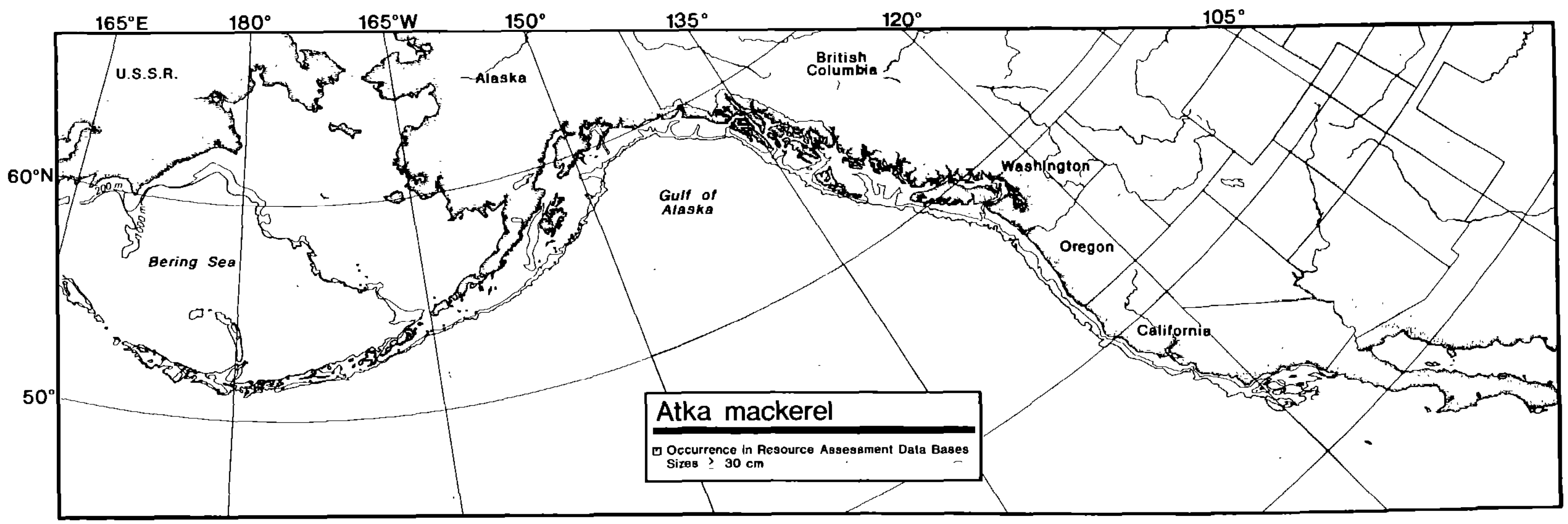


Figure 36.--The range of large (30 cm or larger) Atka mackerel off the west coast of North America based on data from several resource assessment data bases for 1912-84.

Table 10.--Total numbers of samples (hauls) and numbers of samples containing Atka mackerel by depth interval and geographic region from resource assessment surveys off the west coast of North America during 1912-84.

		West coast			British Columbia			Southeast Alaska			Gulf of Alaska			Aleutian Islands			Bering Sea			All areas combined		
	Depth (meters)	Total Hauls	Occ.	%	Total Hauls	Occ.	%	Total Hauls	Occ.	%	Total Hauls	Occ.	%	Total Hauls	Occ.	%	Total Hauls	Occ.	%	Total Hauls	Occ.	%
All occurrences	0-50	1608	--	--	119	--	--	145	--	--	432	10	2	74	10	14	3113	13	U	5491	33	1
	51-100	2270	--	--	139	--	--	486	--	--	2044	99	5	194	28	14	4186	84	2	9322	211	2
	101-200	2551	--	--	326	--	--	527	--	--	5013	338	7	623	146	23	2778	119	4	11833	603	5
	201-300	921	--	--	250	--	--	399	--	--	1451	135	9	244	51	21	256	7	3	3522	193	5
	301-400	439	--	--	56	--	--	191	--	--	246	8	3	125	14	21	132	4	3	1190	26	2
	401-500	329	--	--	11	--	--	146	--	--	108	1	1	104	6	6	138	2	1	836	9	1
	501-600	144	--	--	2	--	--	192	--	--	40	--	--	62	2	3	66	--	--	506	2	0
	601-1000	321	--	--	6	--	--	243	--	--	60	--	--	89	--	--	134	--	--	853	--	--
	>1000	25	--	--	2	--	--	--	--	--	--	--	--	--	--	--	--	--	--	27	--	--
	TOTAL	8608	--	--	911	--	--	2329	--	--	9394	591	6	1515	257	17	10803	229	2	33580	1077	3
Small fish (≤ 20cm)	0-50	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	1	1	100	3	1	33
	51-100	--	--	--	--	--	--	--	--	--	--	--	--	4	3	75	--	--	--	12	3	25
	101-200	--	--	--	--	--	--	--	--	--	29	1	3	--	--	--	--	--	--	61	1	2
	201-300	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	301-400	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	401-500	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	501-600	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	601-1000	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	>1000	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	TOTAL	--	--	--	--	--	--	--	--	--	53	1	2	49	3	6	7	1	14	109	5	5
Large fish (≥ 30cm)	0-50	--	--	--	--	--	--	--	--	--	2	2	100	--	--	--	--	--	--	3	2	67
	51-100	--	--	--	--	--	--	--	--	--	6	6	100	4	3	75	2	2	100	12	11	92
	101-200	--	--	--	--	--	--	--	--	--	29	28	97	28	28	100	4	4	100	61	60	98
	201-300	--	--	--	--	--	--	--	--	--	15	15	100	16	16	100	--	--	--	31	31	100
	301-400	--	--	--	--	--	--	--	--	--	1	1	100	1	1	100	--	--	--	--	--	--
	401-500	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	501-600	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	601-1000	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	>1000	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	TOTAL	--	--	--	--	--	--	--	--	--	53	52	98	49	48	98	7	6	86	109	106	97

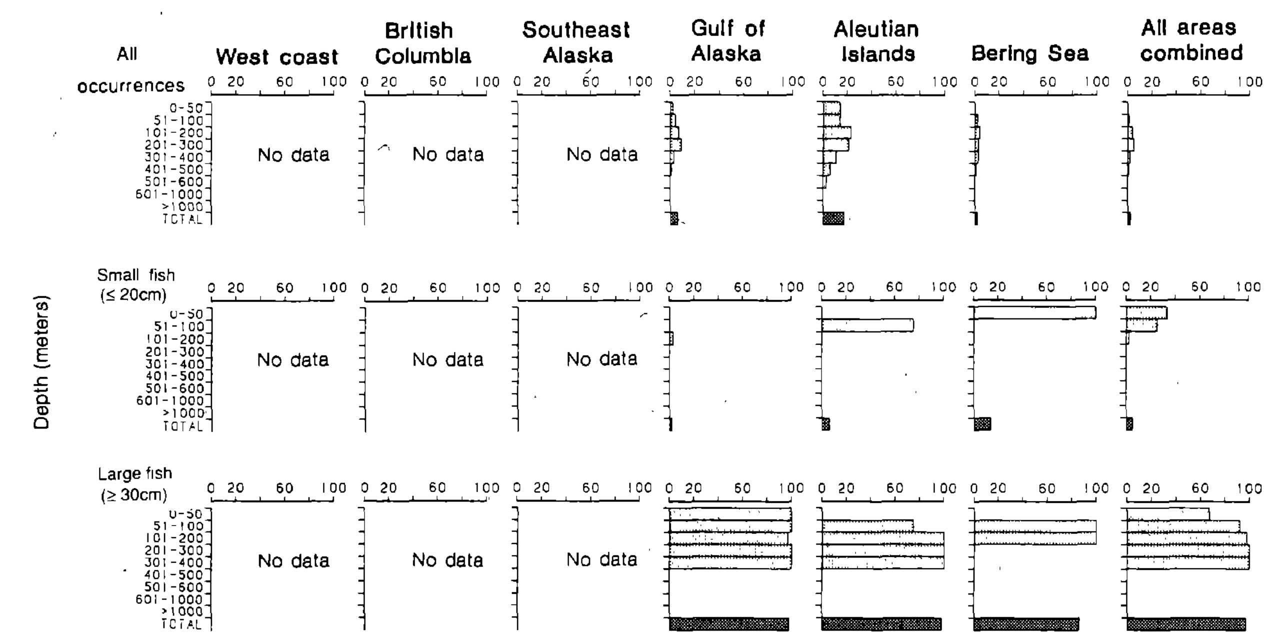
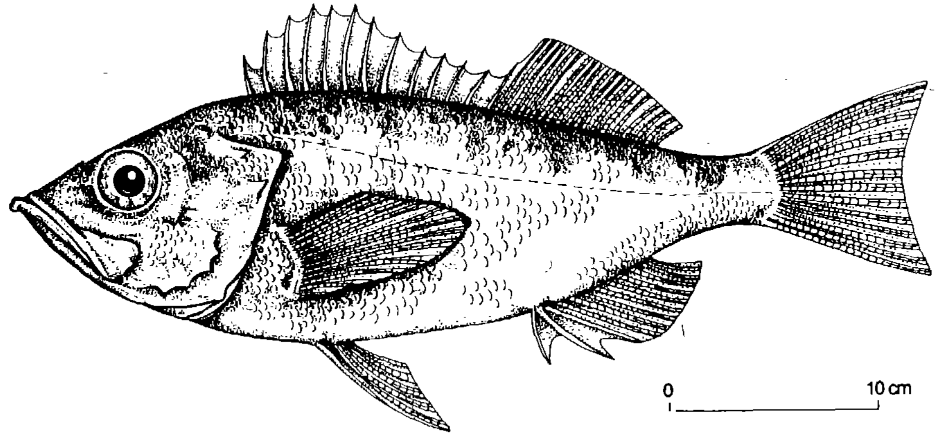


Figure 37.--Frequency of occurrence by depth interval by region for Atka mackerel off the west coast of North America based on presence or absence in samples from resource assessment surveys during 1912-84.

Pacific ocean perch



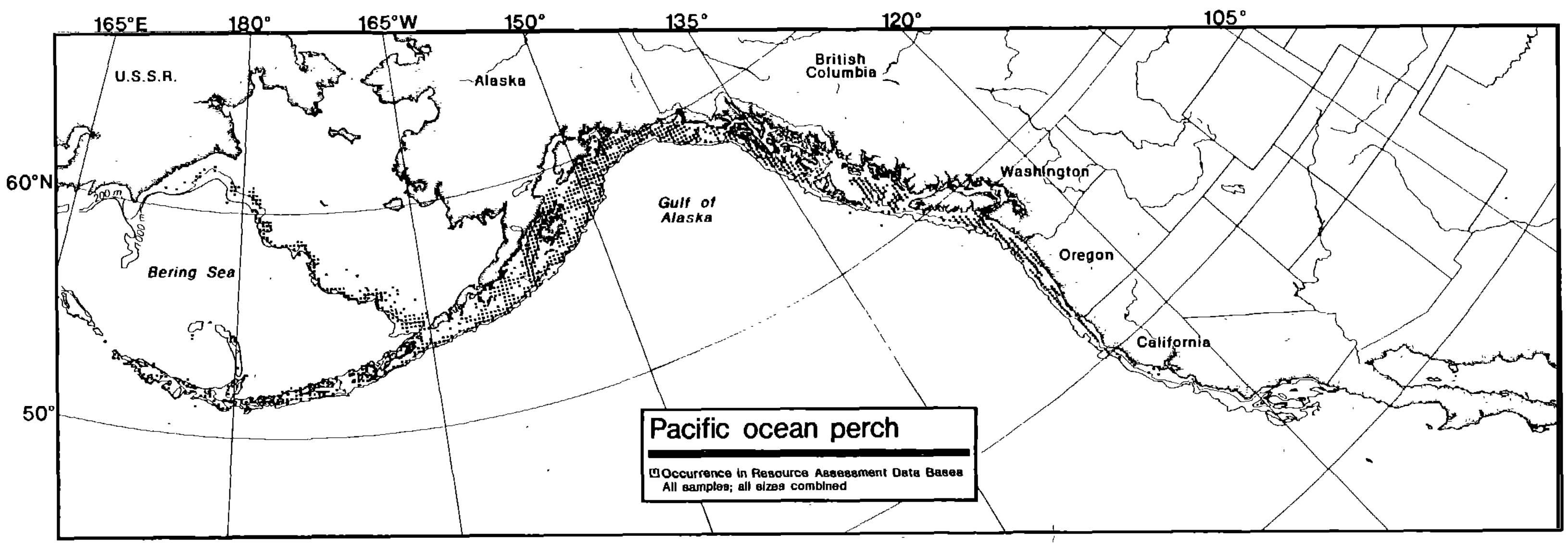


Figure 38.--The overall range of Pacific ocean perch off the west coast of North America based on an analysis of several resource assessment data bases for 1912-84.

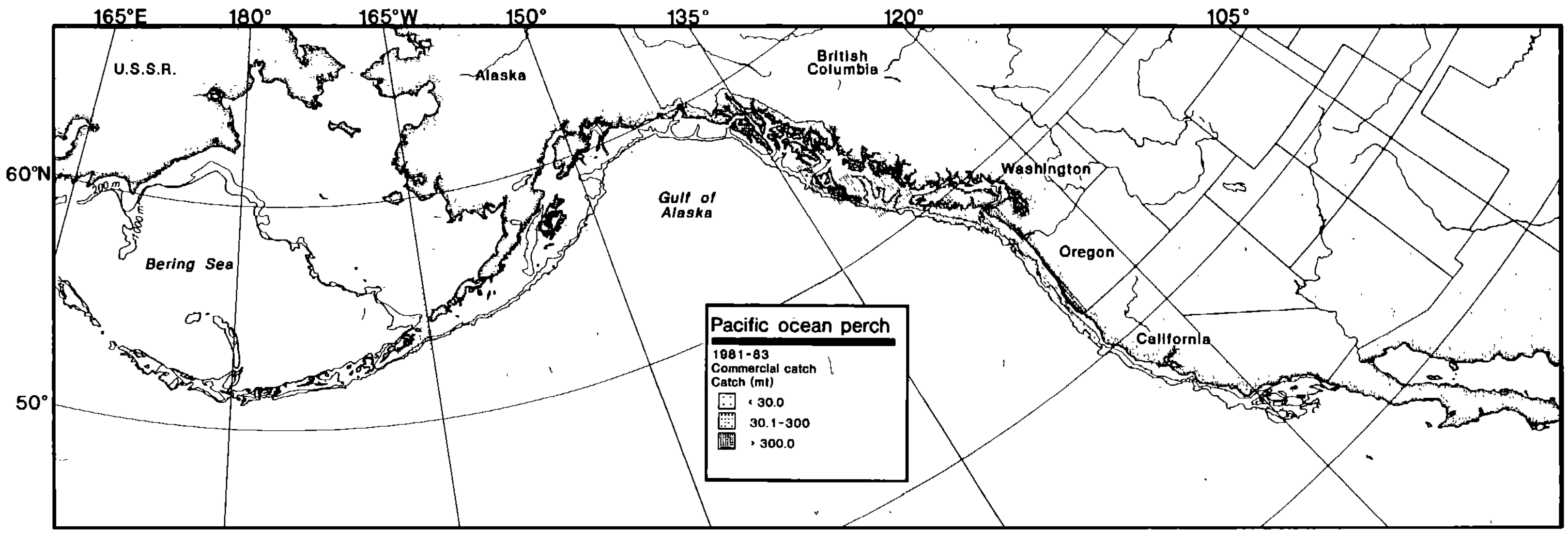


Figure 39.--Location of commercial harvests of Pacific ocean perch off the west coast of North America, 1981-83; domestic, foreign and joint venture harvests combined.

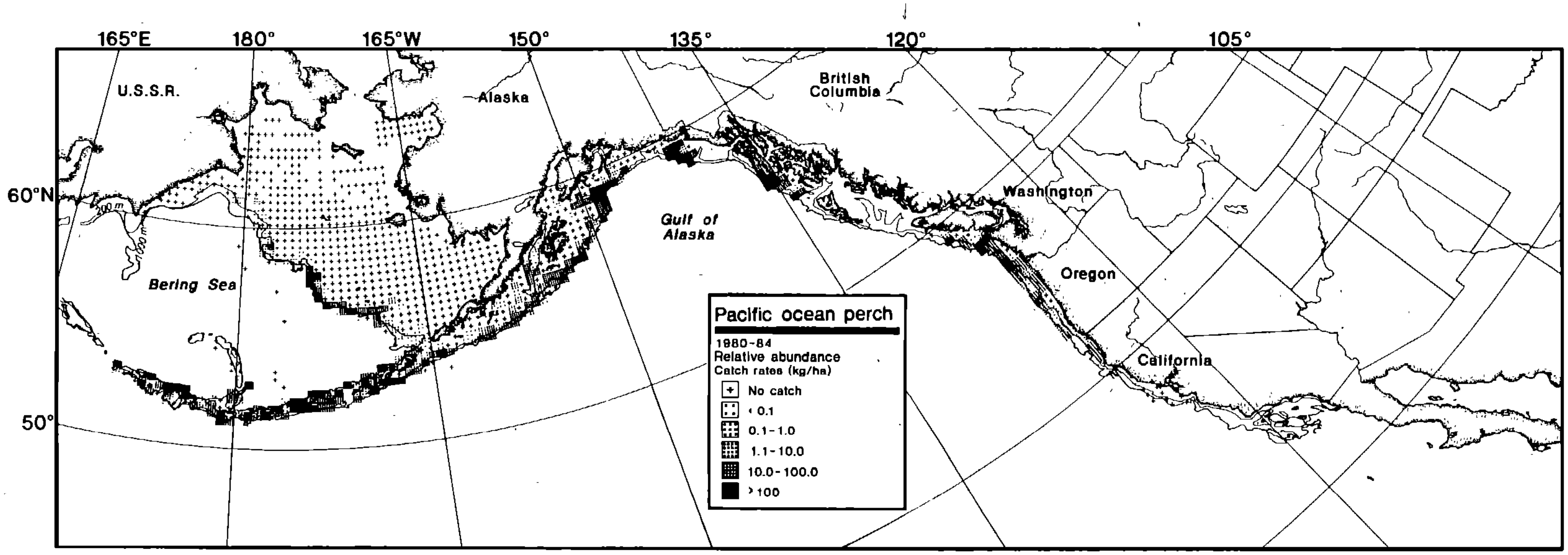


Figure 40.--The relative abundance of Pacific ocean perch off the west coast of North America, 1980-84, based on catch information from various NMFS trawl surveys.

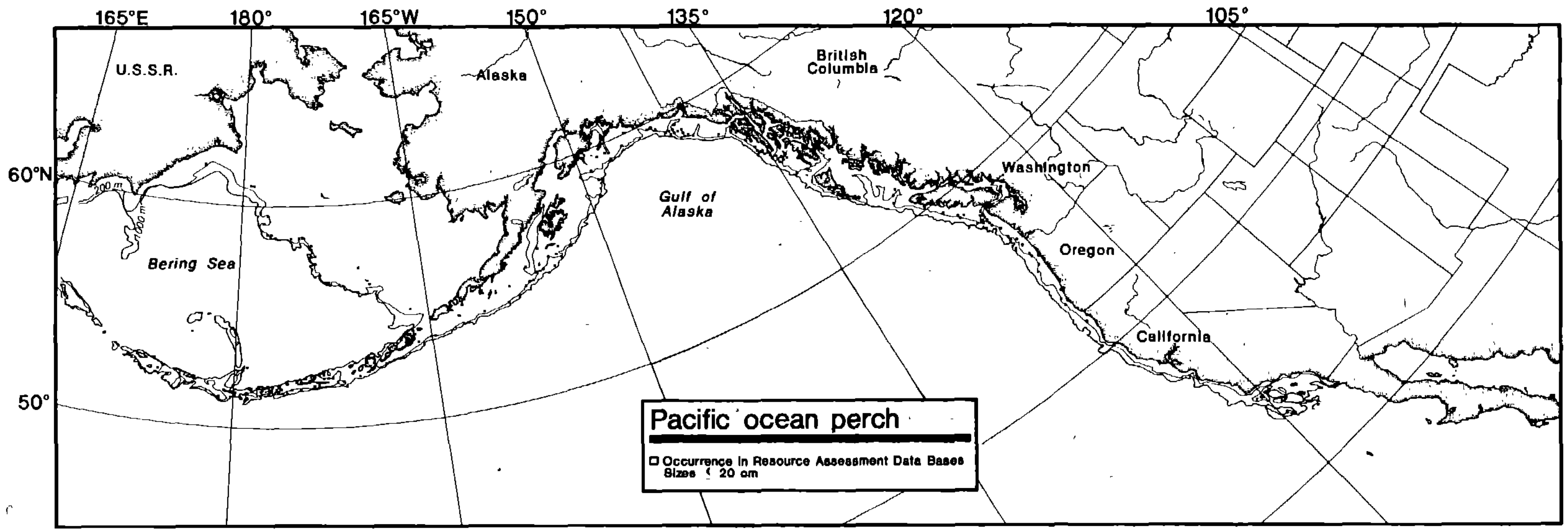


Figure 41.--The range of small (20 cm or less) Pacific ocean perch off the west coast of North America based on data from several resource assessment data bases for 1912-84.

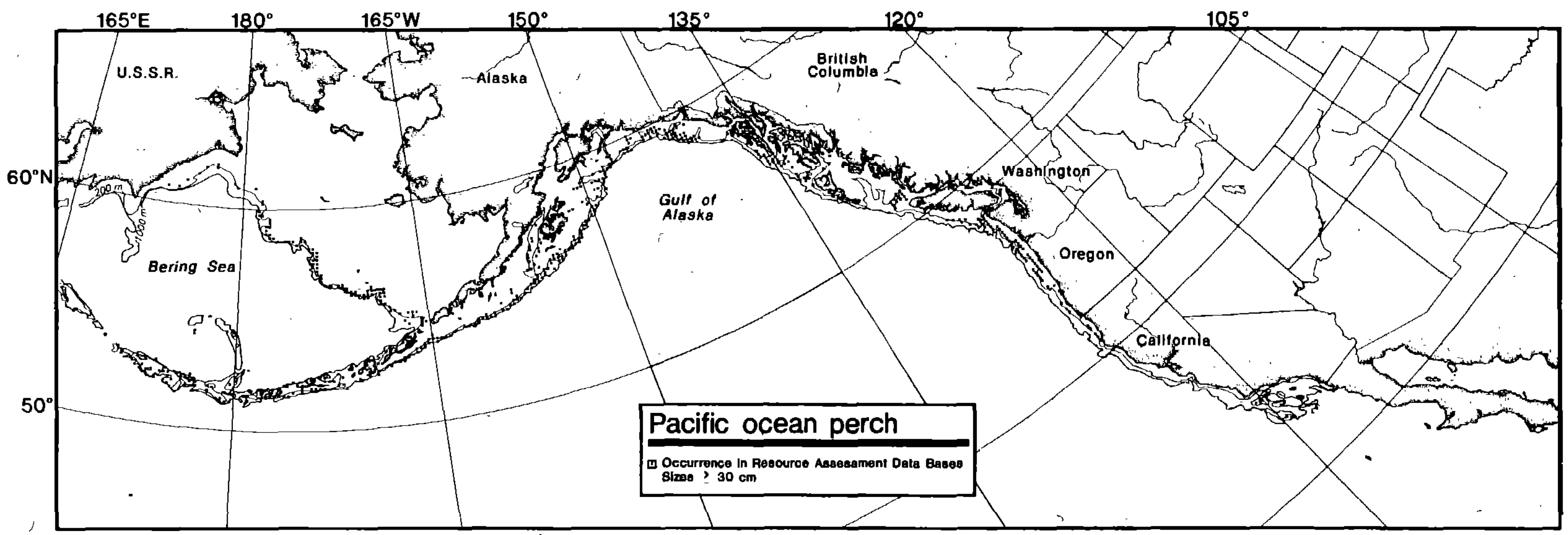


Figure 42.--The range of large (30 cm or larger) Pacific ocean perch off the west coast of North America based on data from several resource assessment data bases for 1912-84.

Table 11 .--Total numbers of samples (hauls) and numbers of samples containing Pacific ocean perch by depth interval and geographic region from resource assessment surveys off the west coast of North America during 1912-84.

		West coast			British Columbia			Southeast Alaska			Gulf of Alaska			Aleutian Islands			Bering Sea			All areas combined		
	Depth (meters)	Total Hauls	Occ.	%	Total Hauls	Occ.	%	Total Hauls	Occ.	%	Total Hauls	Occ.	%	Total Hauls	Occ.	%	Total Hauls	Occ.	%	Total Hauls	Occ.	%
All occurrences	0-50	1608	1	0	119	2	2	145	5	3	432	3	1	74	--	--	3113	--	--	5491	11	0
	51-100	2270	6	0	139	1	1	486	95	20	2044	73	4	194	12	6	4186	1	0	9322	188	2
	101-200	2551	348	14	326	126	39	527	164	31	5013	1235	25	623	161	26	2778	96	3	11833	2131	18
	201-300	921	533	58	250	209	84	399	247	62	1451	848	58	244	191	78	256	160	63	3522	2189	62
	301-400	439	236	54	56	47	84	191	77	40	246	138	56	125	98	78	132	105	80	1190	701	59
	401-500	329	115	35	11	3	27	146	17	12	108	18	17	104	29	28	138	45	33	836	227	27
	501-600	144	--	--	2	--	--	192	--	--	40	4	10	62	6	10	66	5	8	506	15	3
	601-1000	321	--	--	6	--	--	243	--	--	60	1	2	89	5	6	134	8	6	853	14	2
	>1000	25	--	--	2	--	--	--	--	--	--	--	--	--	--	--	--	--	--	27	--	--
	TOTAL	8608	1239	14	911	388	43	2329	605	26	9394	2320	25	1515	502	33	10803	420	4	33580	5476	16
Small fish (≤ 20cm)	0-50	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	51-100	--	--	--	--	--	--	--	--	--	2	1	50	5	4	80	--	--	--	7	5	71
	101-200	38	9	24	17	4	24	30	18	60	149	27	18	59	24	41	24	2	8	317	84	26
	201-300	187	23	12	21	1	5	126	49	39	268	23	9	99	29	29	88	21	24	789	146	19
	301-400	--	--	--	--	--	--	55	5	9	--	--	--	26	1	4	58	4	7	235	10	4
	401-500	--	--	--	--	--	--	--	--	--	--	--	--	7	1	14	24	1	4	68	2	3
	501-600	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	3	1	33	3	1	33
	601-1000	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	1	1	100	1	1	100
	>1000	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	TOTAL	325	32	10	38	5	13	219	72	33	446	51	11	196	59	30	198	30	15	1422	249	18
Large fish (≥30cm)	0-50	--	--	--	--	--	--	--	--	--	2	2	100	--	--	--	--	--	--	2	2	100
	51-100	--	--	--	--	--	--	--	--	--	2	2	100	5	3	60	--	--	--	7	5	71
	101-200	38	37	97	17	16	94	30	26	87	149	146	98	59	54	92	24	23	96	317	302	95
	201-300	187	185	99	21	21	100	126	121	96	268	268	100	99	97	98	88	86	98	789	778	99
	301-400	73	73	100	--	--	--	55	55	100	23	23	100	26	26	100	58	58	100	235	235	100
	401-500	27	27	100	--	--	--	8	8	100	2	1	50	7	7	100	24	24	100	68	67	99
	501-600	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	3	3	100	3	3	100
	601-1000	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	1	1	100	1	1	100
	>1000	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	TOTAL	325	322	99	38	37	97	219	210	96	446	442	99	196	187	95	198	195	98	1422	1393	98

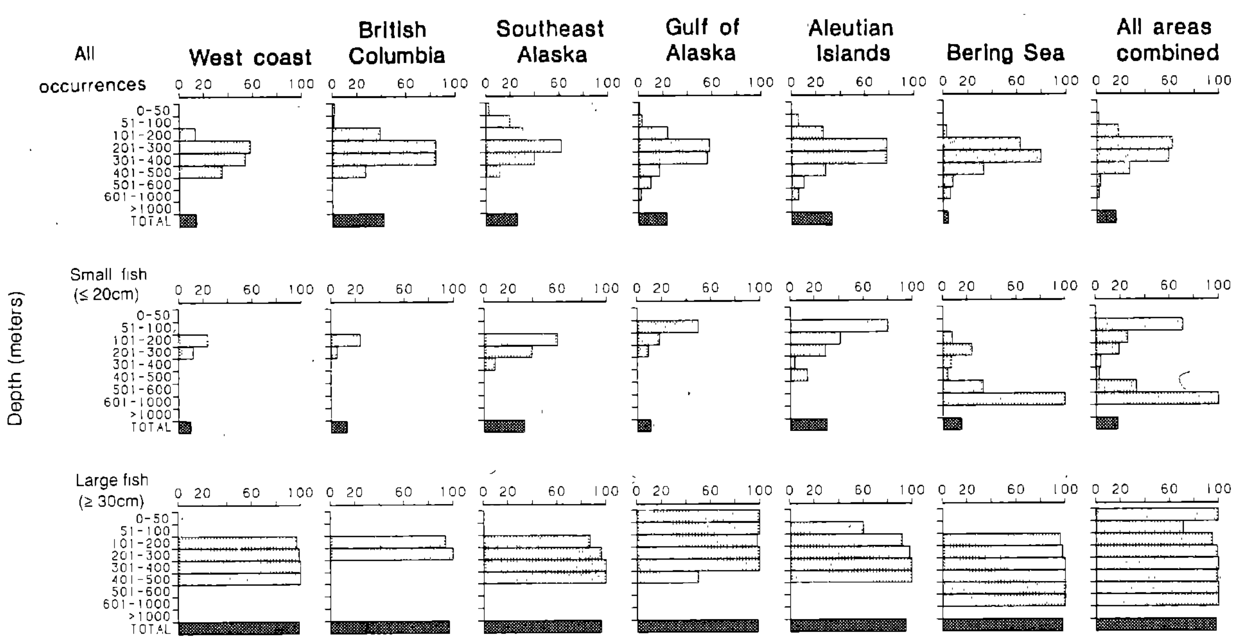
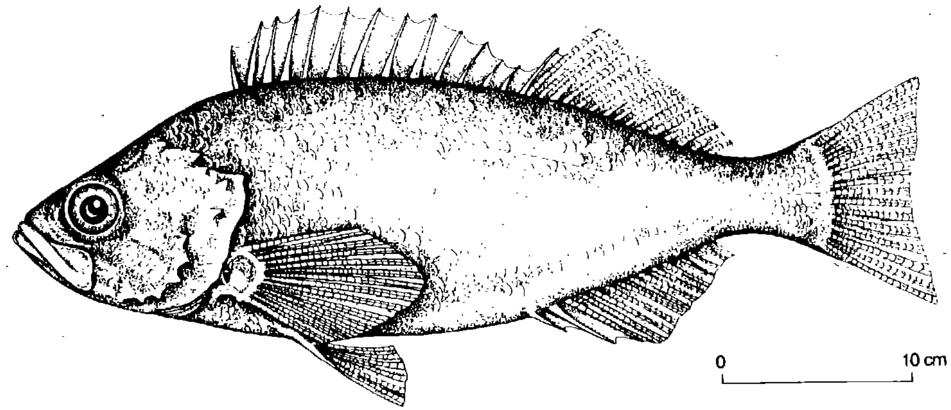


Figure 43.--Frequency of occurrence by depth interval by region for Pacific ocean perch off the west coast of North America based on presence or absence in samples from resource assessment surveys during 1912-84.

Widow rockfish



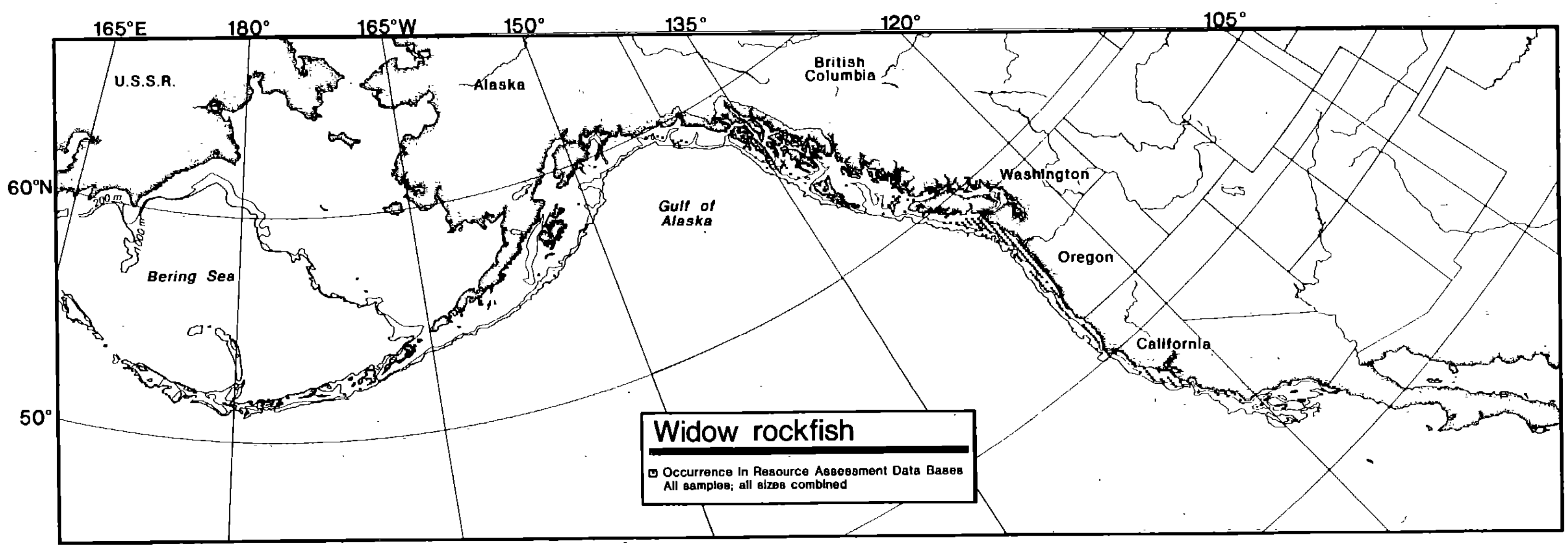


Figure 44.--The overall range of widow rockfish off the west coast of North America based on an analysis of several resource assessment data bases for 1912-84.

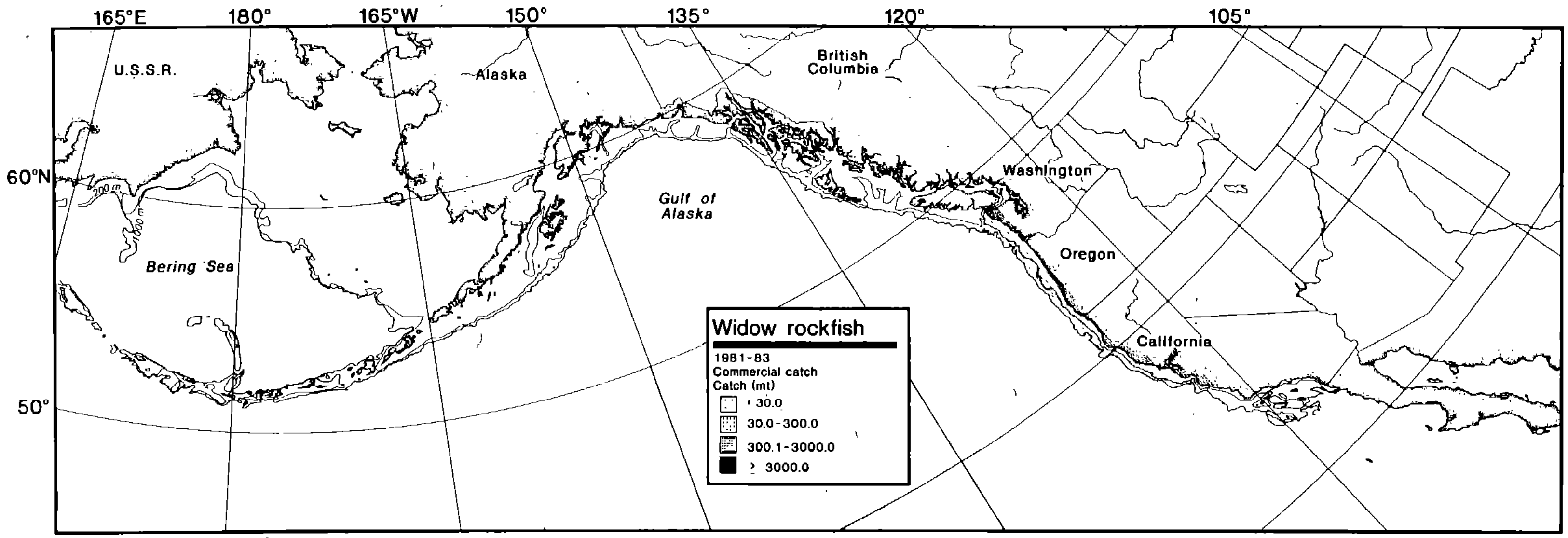


Figure 45.--Location of commercial harvests of widow rockfish off the west coast of North America, 1981-83; domestic, foreign and joint venture harvests combined.

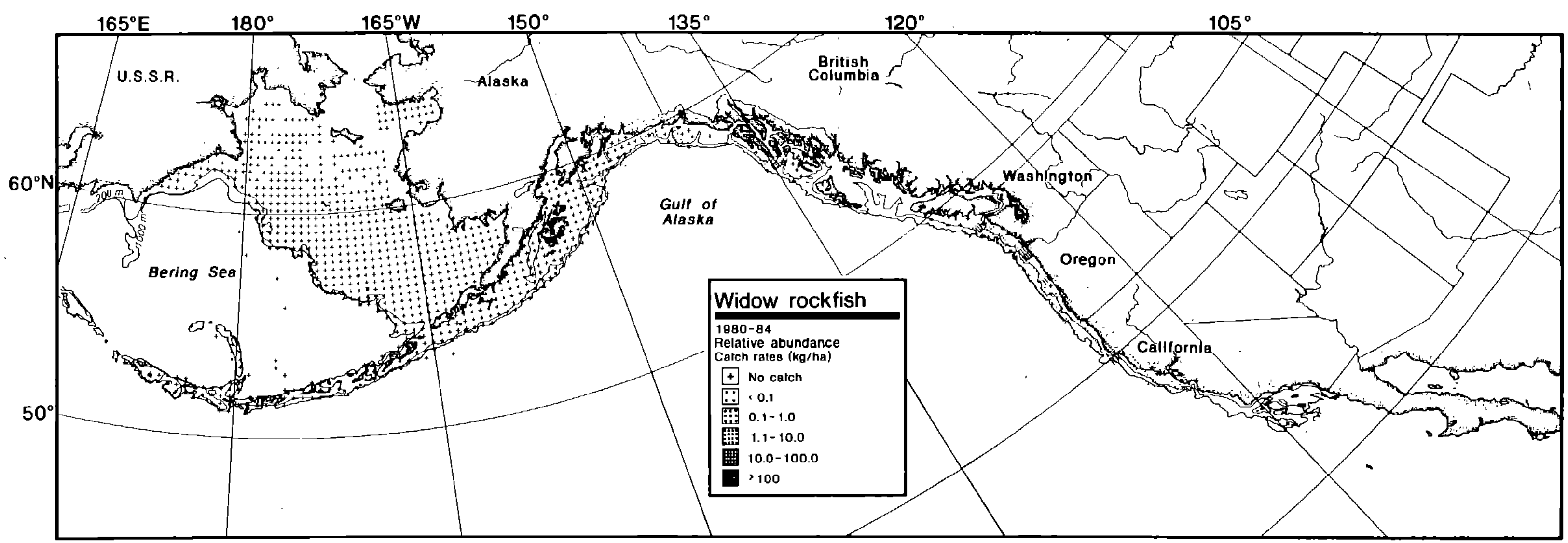


Figure 46.--The relative abundance of widow rockfish off the west coast of North America, 1980-84, based on catch information from various NMFS trawl surveys.

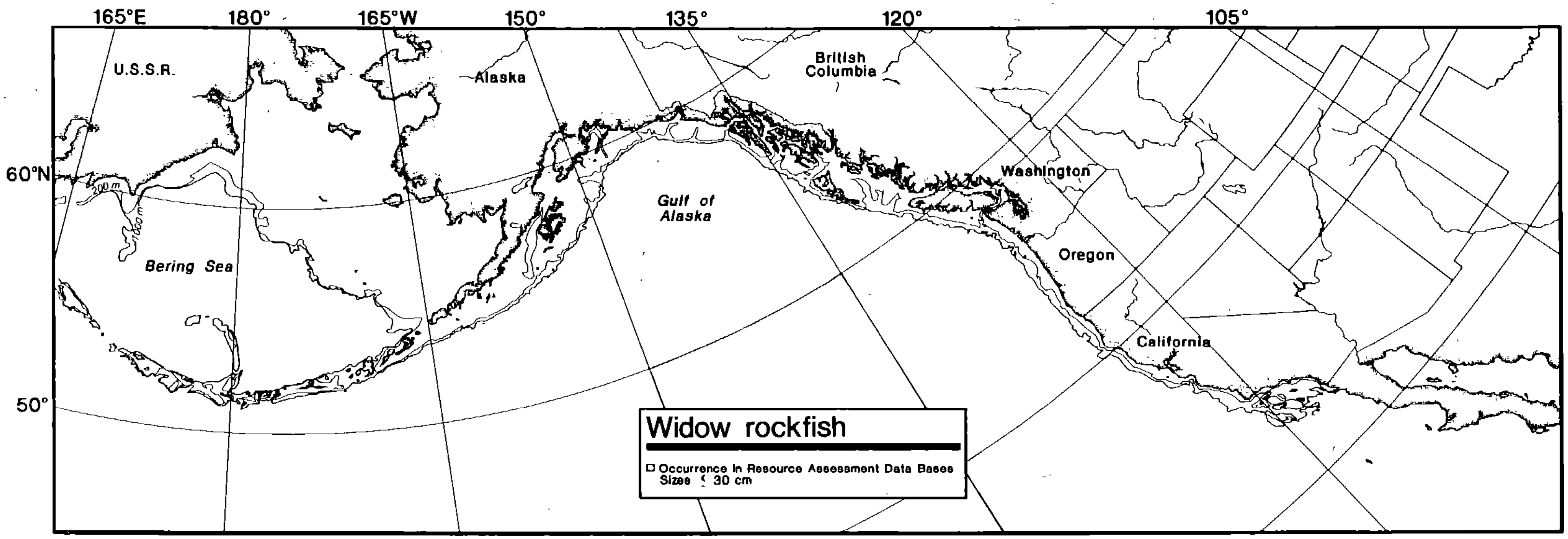


Figure 47.--The range of small (30 cm or less) widow rockfish off the west coast of North America based on data from several resource assessment data bases for 1912-84.

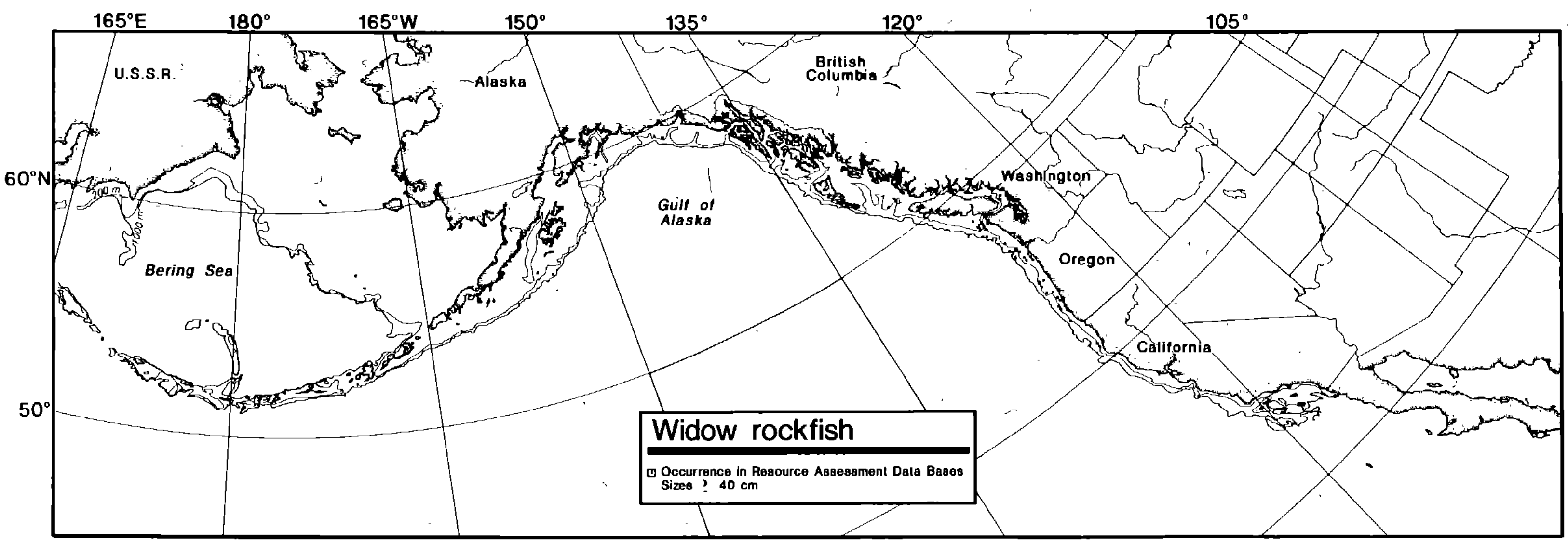


Figure 48.--The range of large (40 cm or larger) widow rockfish off the west coast of North America based on data from several resource assessment data bases for 1912-84.

Table 12.--Total numbers of samples (hauls) and numbers of samples containing widow rockfish by depth interval and geographic region from resource assessment surveys off the west coast of North America during 1912-84.

		West coast			British Columbia			Southeast Alaska			Gulf of Alaska			Aleutian Islands			Bering Sea			All areas combined		
	Depth (meters)	Total Hauls	Occ.	%	Total Hauls	Occ.	%	Total Hauls	Occ.	%	Total Hauls	Occ.	%	Total Hauls	Occ.	%	Total Hauls	Occ.	%	Total Hauls	Occ.	%
All occurrences	0-50	1608	3	0	119	4	3	145	1	1	432	--	--	74	--	--	3113	--	--	5491	8	0
	51-100	2270	47	2	139	3	2	486	2	0	2044	--	--	194	--	--	4186	--	--	9322	52	1
	101-200	2551	239	9	326	30	9	527	8	2	5013	12	0	623	--	--	2778	--	--	11833	289	2
	201-300	921	146	16	250	9	4	399	18	5	1451	3	0	244	--	--	256	--	--	3522	176	5
	301-400	439	30	7	56	1	2	191	4	2	246	--	--	125	--	--	132	--	--	1190	35	3
	401-500	329	--	--	11	--	--	146	--	--	108	--	--	104	--	--	138	--	--	836	--	--
	501-600	144	--	--	2	--	--	192	--	--	40	--	--	62	--	--	66	--	--	506	--	--
	601-1000	321	--	--	6	--	--	243	--	--	60	--	--	89	--	--	134	--	--	853	--	--
	>1000	25	--	--	2	--	--	--	--	--	--	--	--	--	--	--	--	--	--	27	--	--
	TOTAL	8608	465	5	911	47	5	2329	33	1	9394	15	0	1515	--	--	10803	--	--	33580	560	2
Small fish (≤ 30cm)	0-50	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	51-100	5	2	40	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	6	2	33
	101-200	31	2	6	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	36	2	6
	201-300	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	301-400	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	401-500	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	501-600	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	601-1000	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	>1000	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	TOTAL	39	4	10	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	45	4	9
Large fish (≥ 40cm)	0-50	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	51-100	5	4	80	--	--	--	1	1	100	--	--	--	--	--	--	--	--	--	6	5	83
	101-200	31	31	100	3	3	100	1	1	100	1	1	100	--	--	--	--	--	--	36	36	100
	201-300	3	3	100	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	3	3	100
	301-400	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	401-500	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	501-600	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	601-1000	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	>1000	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	TOTAL	39	38	97	3	3	100	2	2	100	1	1	100	--	--	--	--	--	--	45	44	98

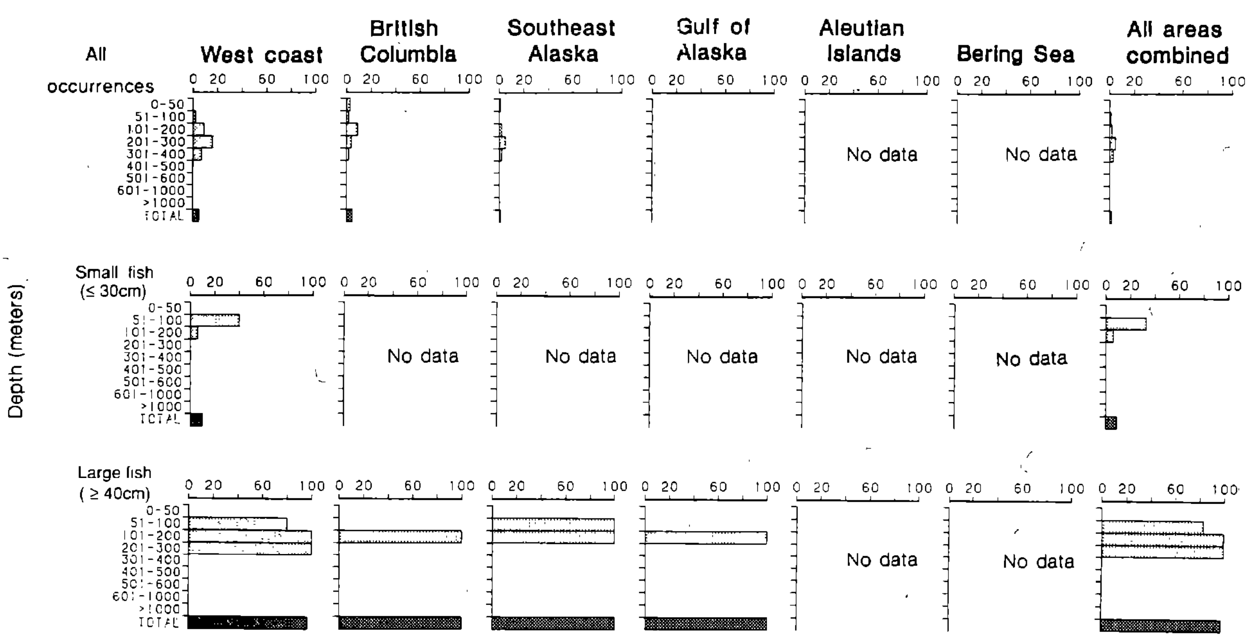
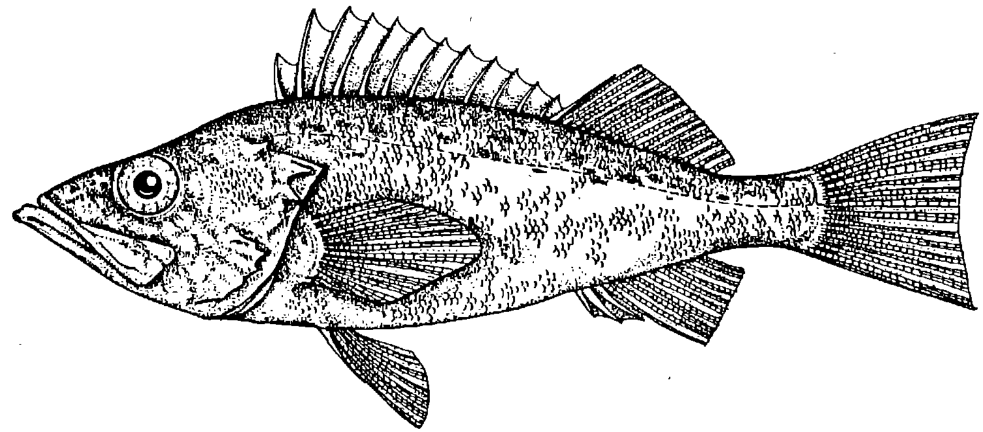


Figure 49.--Frequency of occurrence by depth interval by region for widow rockfish off the west coast of North America based on presence or absence in samples from resource assessment surveys during 1912-84.

Bocaccio



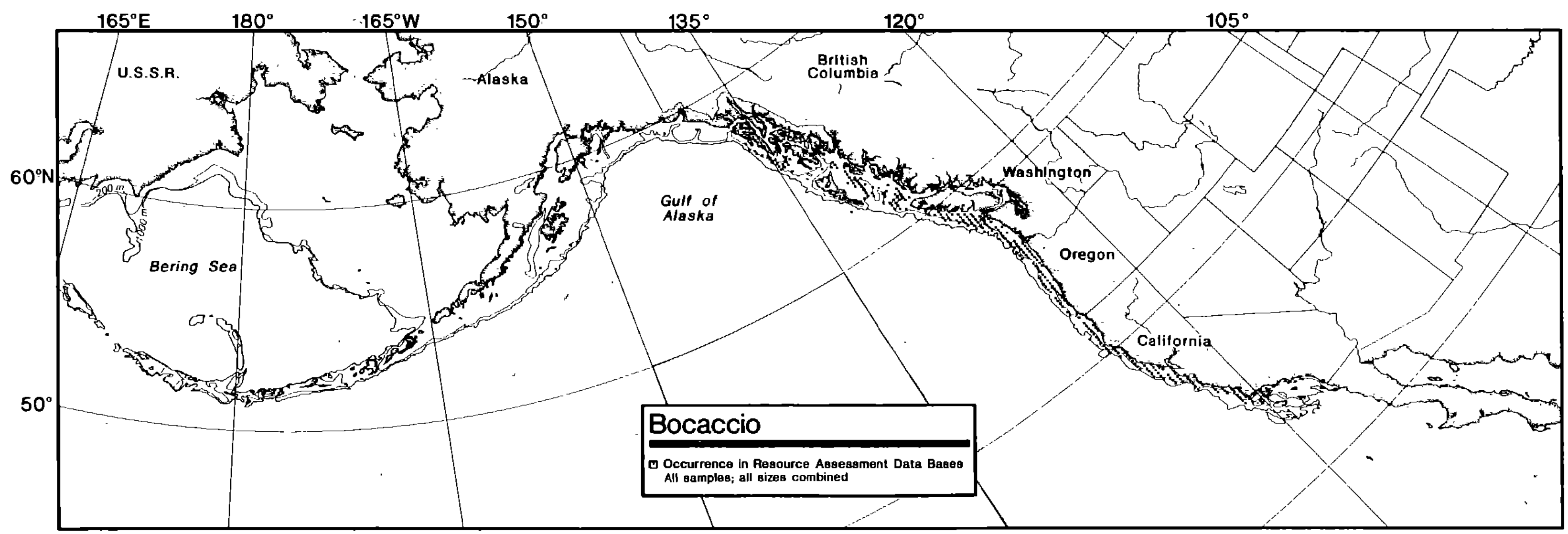


Figure 50.--The overall range of bocaccio off the west coast of North America based on an analysis of several resource assessment data bases for 1912-84.

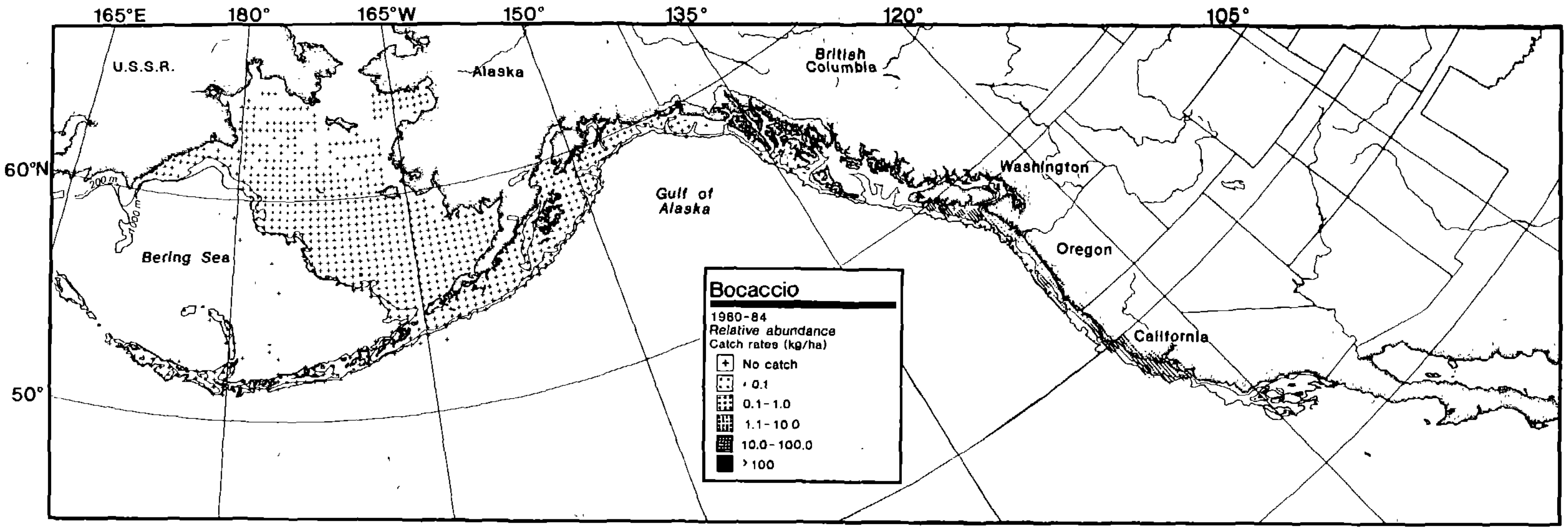


Figure 51.--The relative abundance of bocaccio off the west coast of North America, 1980-84, based on catch information from various NMFS trawl surveys.

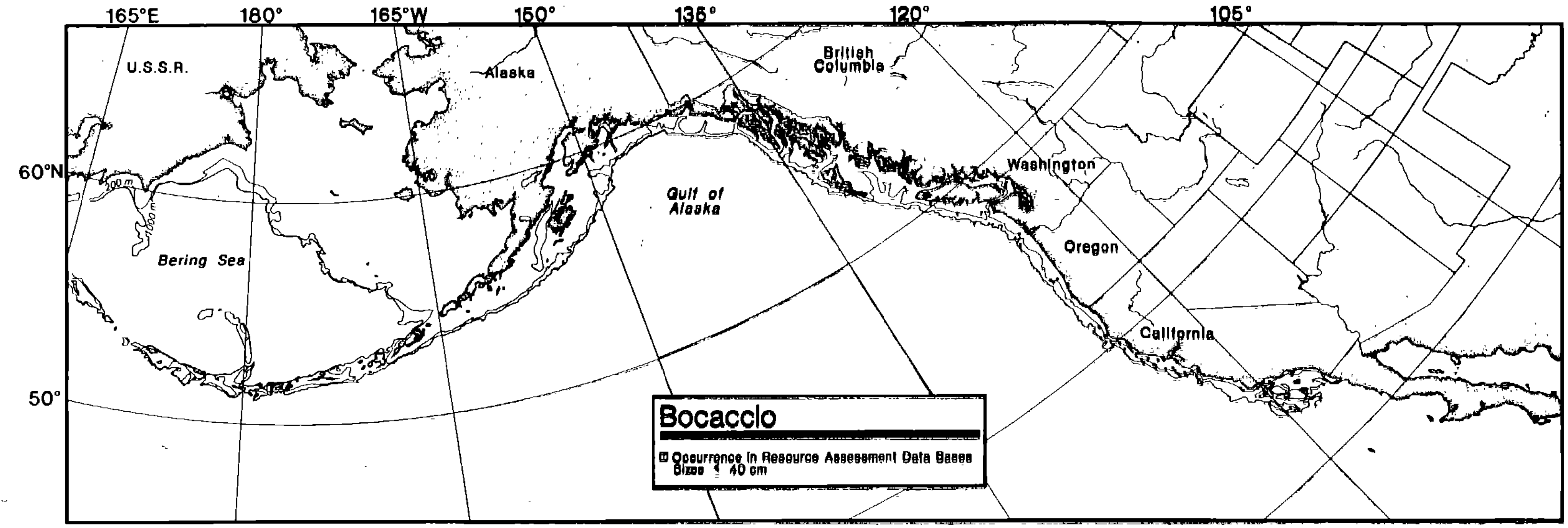


Figure 52.--The range of small (40 cm or less) bocaccio off the west coast of North America based on data from several resource assessment data bases for 1912-84.

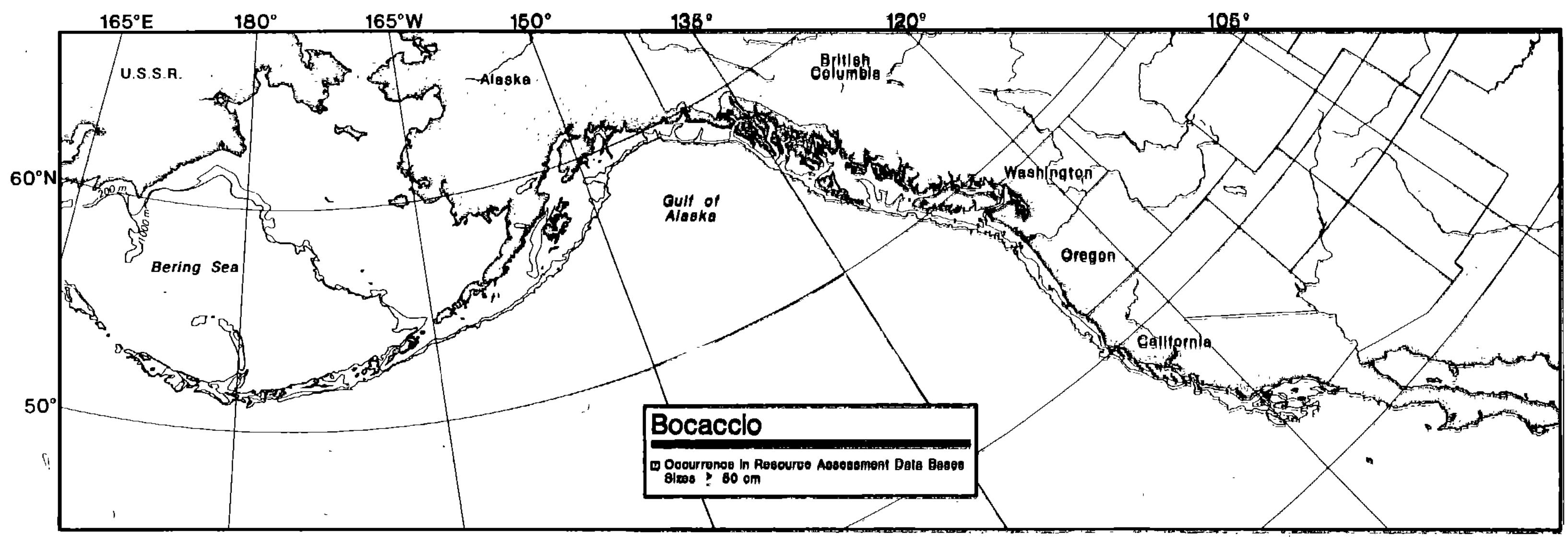


Figure 53.--The range of large (50 cm or larger) bocaccio off the west coast of North America based on data from several resource assessment data bases for 1912-84.

Table 13.--Total numbers of samples (hauls) and numbers of samples containing bocaccio by depth interval and geographic region from resource assessment surveys off the west coast of North America during 1912-84.

		West coast			British Columbia			Southeast Alaska			Gulf of Alaska			Aleutian Islands			Bering Sea			All areas combined		
	Depth (meters)	Total Hauls	Occ.	%	Total Hauls	Occ.	%	Total Hauls	Occ.	%	Total Hauls	Occ.	%	Total Hauls	Occ.	%	Total Hauls	Occ.	%	Total Hauls	Occ.	%
All occurrences	0-50	1608	52	3	119	2	2	145	--	--	432	--	--	74	--	--	3113	--	--	5491	54	1
	51-100	2270	150	7	139	17	12	486	11	2	2044	1	0	194	--	--	4186	--	--	9322	179	2
	101-200	2551	505	20	326	115	35	527	13	2	5013	4	0	623	--	--	2778	--	--	11833	637	5
	201-300	921	203	22	250	100	40	399	19	5	1451	5	0	244	--	--	256	--	--	3522	327	9
	301-400	439	19	4	56	1	2	191	--	--	246	--	--	125	--	--	132	--	--	1190	20	2
	401-500	329	5	2	11	--	--	146	--	--	108	--	--	104	--	--	138	--	--	836	5	1
	501-600	144	--	--	2	--	--	192	--	--	40	--	--	62	--	--	66	--	--	506	--	--
	601-1000	321	--	--	6	--	--	243	--	--	60	--	--	89	--	--	134	--	--	853	--	--
	>1000	25	--	--	2	--	--	--	--	--	--	--	--	--	--	--	--	--	--	27	--	--
	TOTAL	8608	934	11	911	235	26	2329	43	2	9394	10	0	1515	--	--	10803	--	--	33580	1222	4
Small fish (≤ 40cm)	0-50	22	22	100	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	22	22	100
	51-100	25	24	96	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	25	24	96
	101-200	88	75	85	2	1	50	--	--	--	1	1	100	--	--	--	--	--	--	91	77	85
	201-300	20	10	50	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	20	10	50
	301-400	2	1	50	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	2	1	50
	401-500	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	501-600	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	601-1000	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	>1000	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	TOTAL	157	132	84	2	1	50	--	--	--	1	1	100	--	--	--	--	--	--	160	134	84
Large fish (≥ 50cm)	0-50	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	51-100	25	3	12	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	25	3	12
	101-200	88	46	52	2	2	100	--	--	--	--	--	--	--	--	--	--	--	--	91	49	53
	201-300	20	18	90	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	20	18	90
	301-400	2	2	100	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	2	2	100
	401-500	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	501-600	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	601-1000	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	>1000	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	TOTAL	157	69	44	2	2	100	--	--	--	--	--	--	--	--	--	--	--	--	160	71	44

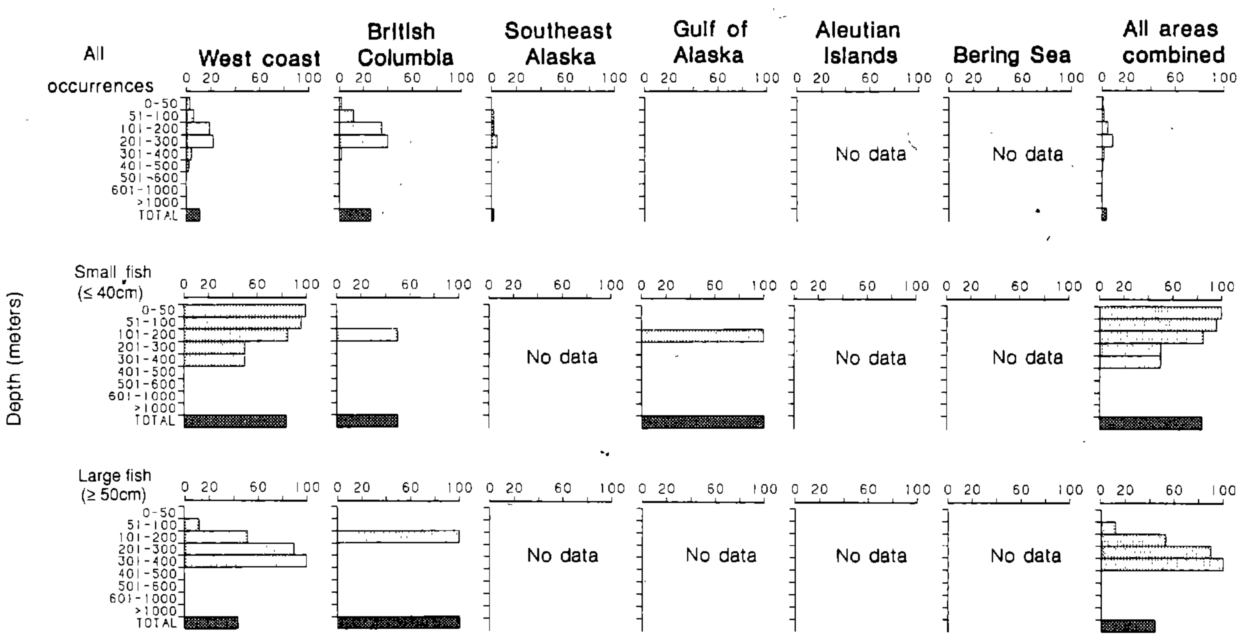
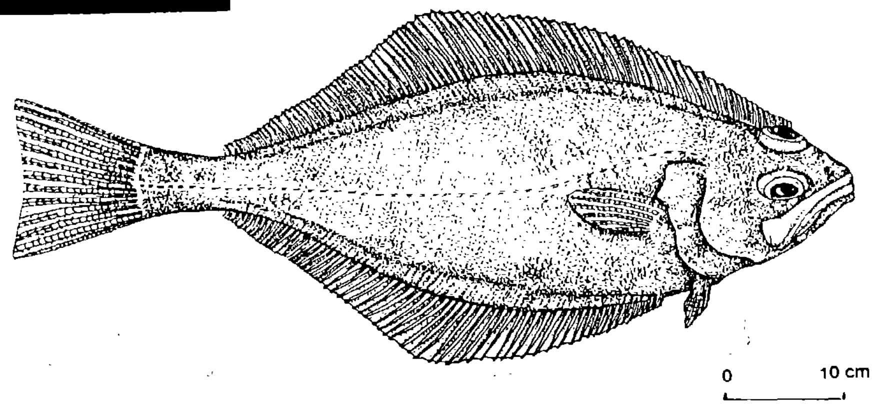


Figure 54.--Frequency of occurrence by depth interval by region for bocaccio off the west coast of North America based on presence or absence in samples from resource assessment surveys during 1912-84.

Arrowtooth flounder



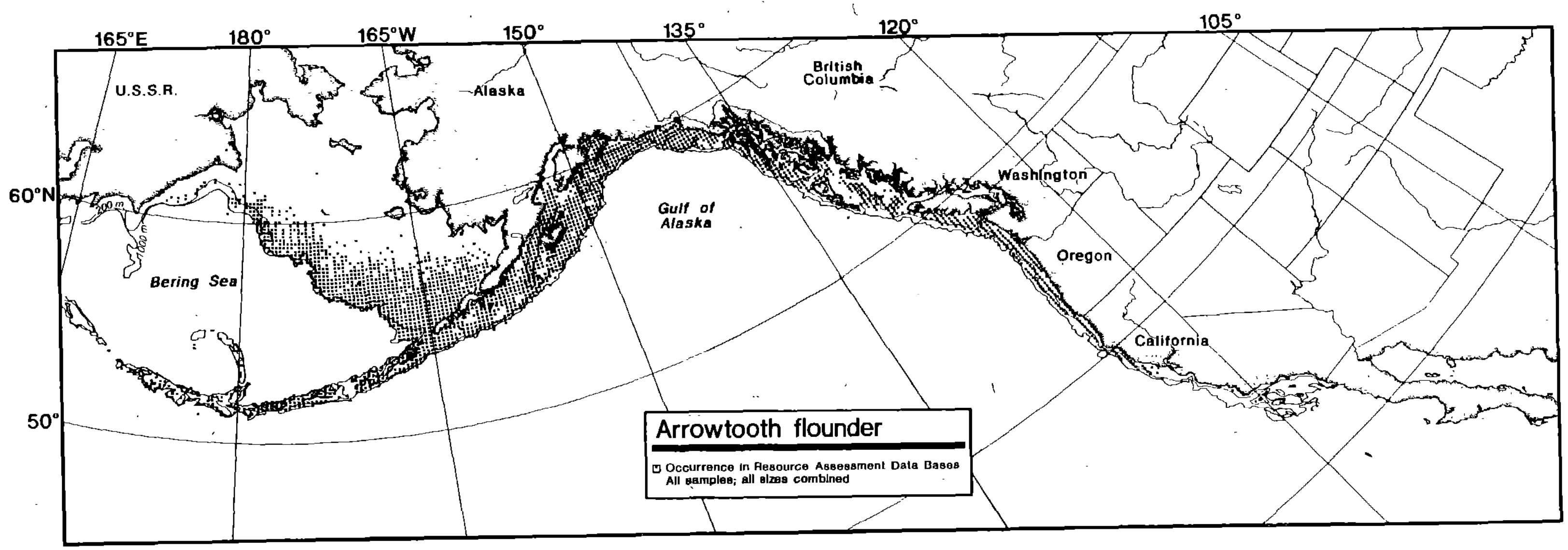


Figure 55.--The overall range of arrowtooth flounder off the west coast of North America based on an analysis of several resource assessment data bases for 1912-84.

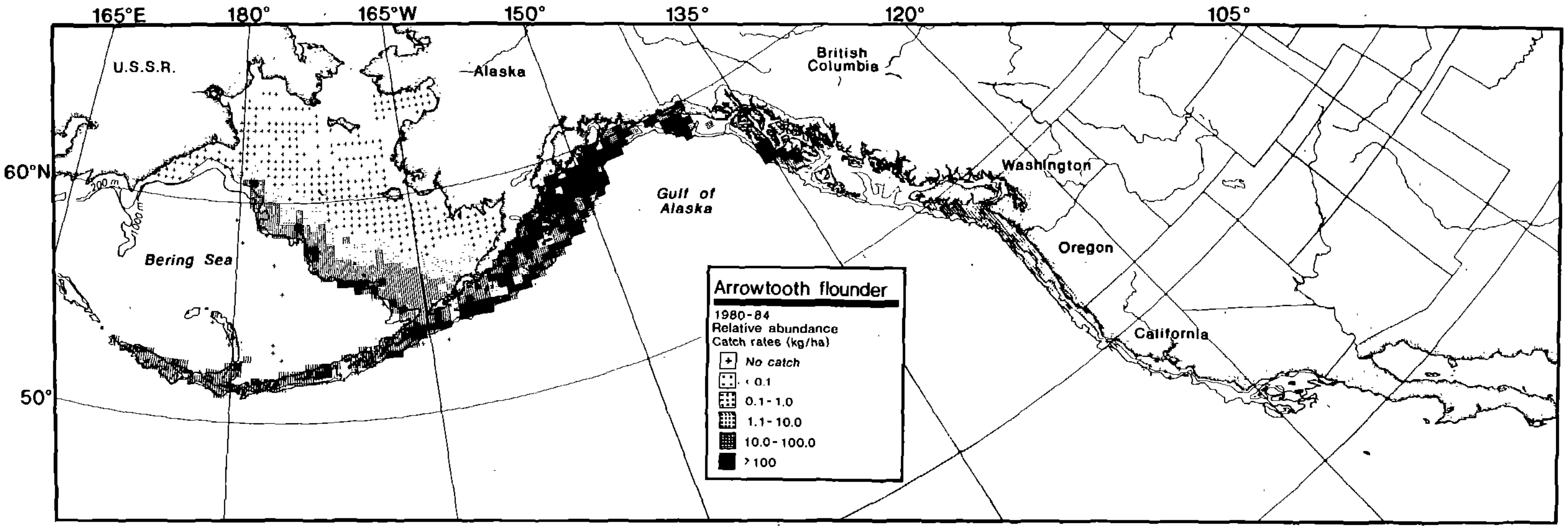


Figure 56.--The relative abundance of arrowtooth flounder off the west coast of North America, 1980-84, based on catch information from various NMFS trawl surveys.

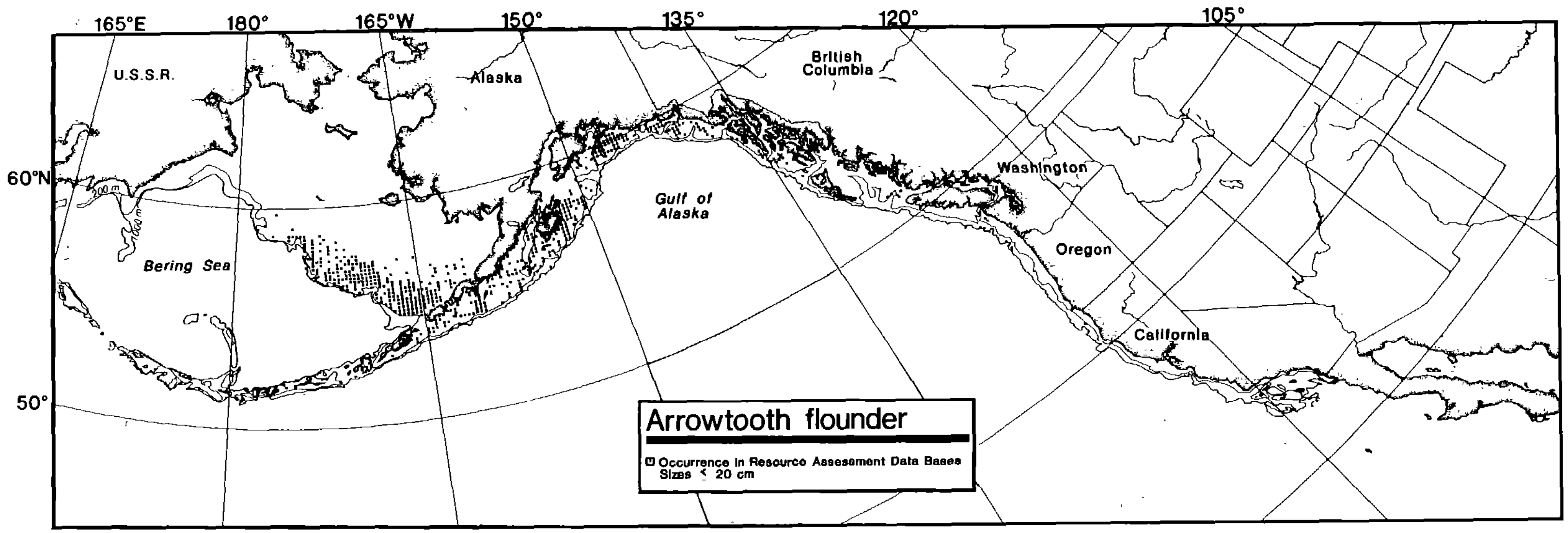


Figure 57.--The range of small (20 cm or less) arrowtooth flounder off the west coast of North America based on data from several resource assessment data bases for 1912-84.

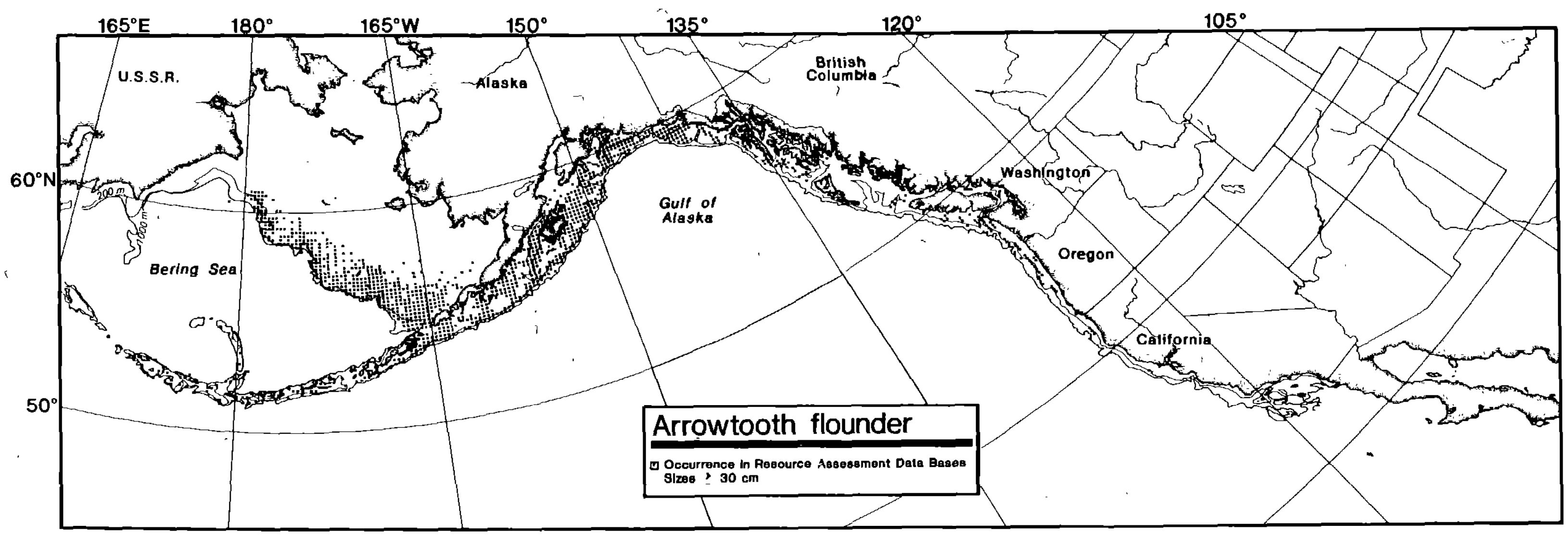


Figure 58.--The range of large (30 cm or larger) arrowtooth flounder off the west coast of North America based on data from several resource assessment data bases for 1912-84.

Table 14.--Total numbers of samples (hauls) and numbers of samples containing arrowtooth flounder by depth interval and geographic region from resource assessment surveys off the west coast of North America during 1912-84.

		West coast			British Columbia			Southeast Alaska			Gulf of Alaska			Aleutian Islands			Bering Sea			All areas combined		
	Depth (meters)	Total Hauls	Occ.	%	Total Hauls	Occ.	%	Total Hauls	Occ.	%	Total Hauls	Occ.	%	Total Hauls	Occ.	%	Total Hauls	Occ.	%	Total Hauls	Occ.	%
All occurrences	0-50	1608	9	1	119	9	8	145	18	12	432	145	34	74	8	11	3113	174	6	5491	363	7
	51-100	2270	239	11	139	47	34	486	227	47	2044	1285	63	194	92	47	4186	1255	30	9322	3148	34
	101-200	2551	1151	45	326	206	63	527	364	69	5013	4175	83	623	497	80	2778	1758	63	11833	8166	69
	201-300	921	541	59	250	222	89	399	334	84	1451	1316	91	244	223	91	256	234	91	3522	2871	82
	301-400	439	242	55	56	44	79	191	115	60	246	234	95	125	116	93	132	127	96	1190	879	74
	401-500	329	97	29	11	1	9	146	82	56	108	93	86	104	89	86	138	125	91	836	487	58
	501-600	144	10	7	2	--	--	192	45	23	40	21	53	62	46	74	66	48	73	506	170	34
	601-1000	321	2	1	6	--	--	243	15	6	60	6	10	89	31	35	134	35	26	853	89	10
	>1000	25	--	--	2	--	--	--	--	--	--	--	--	--	--	--	--	--	--	27	--	--
	TOTAL	8608	2291	27	911	529	58	2329	1200	52	9394	7275	77	1515	1102	73	10803	3756	35	33580	16173	48
Small fish (≤ 20cm)	0-50	--	--	--	--	--	--	5	5	100	54	43	80	--	--	--	6	6	100	65	54	83
	51-100	--	--	--	1	1	100	6	2	33	408	218	53	19	9	47	192	164	85	626	394	63
	101-200	31	4	13	6	2	33	40	12	30	1038	311	30	157	55	35	679	392	58	1951	776	40
	201-300	29	1	3	4	1	25	33	5	15	364	23	6	113	4	4	159	2	1	702	36	5
	301-400	--	--	--	--	--	--	--	--	--	75	2	3	64	1	2	--	--	--	271	3	1
	401-500	--	--	--	--	--	--	--	--	--	26	1	4	--	--	--	--	--	--	186	1	1
	501-600	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	601-1000	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	>1000	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	TOTAL	87	5	6	11	4	36	122	24	20	1967	598	30	446	69	15	1267	564	45	3900	1264	32
Large fish (≥ 30cm)	0-50	--	--	--	--	--	--	--	--	--	54	10	19	--	--	--	6	1	17	65	11	17
	51-100	--	--	--	1	1	100	6	6	100	408	321	79	19	18	95	192	180	94	626	526	84
	101-200	31	31	100	6	6	100	40	40	100	1038	981	95	157	156	99	679	674	99	1951	1888	97
	201-300	29	29	100	4	4	100	33	33	100	364	364	100	113	113	100	159	159	100	702	702	100
	301-400	24	24	100	--	--	--	25	25	100	75	75	100	64	64	100	83	83	100	271	271	100
	401-500	3	3	100	--	--	--	12	12	100	26	26	100	50	50	100	95	95	100	186	186	100
	501-600	--	--	--	--	--	--	1	1	100	2	2	100	31	31	100	32	32	100	66	66	100
	601-1000	--	--	--	--	--	--	--	--	--	--	--	--	12	12	100	21	20	95	33	32	97
	>1000	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	TOTAL	87	87	100	11	11	100	122	117	96	1967	1779	90	446	444	100	1267	1244	98	3900	3682	94

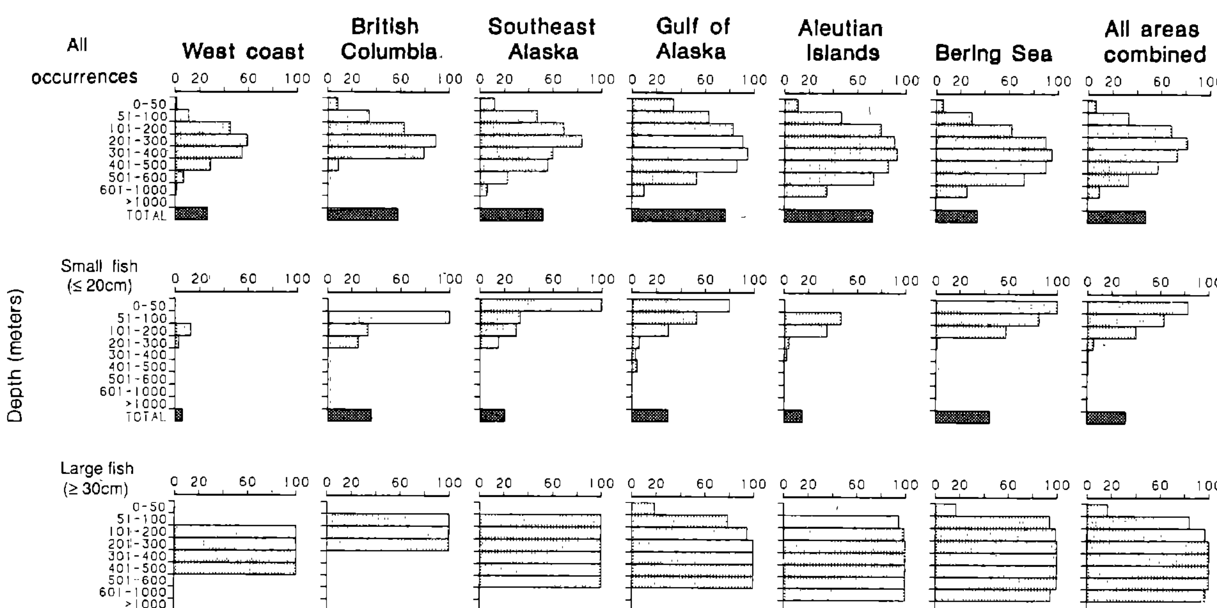
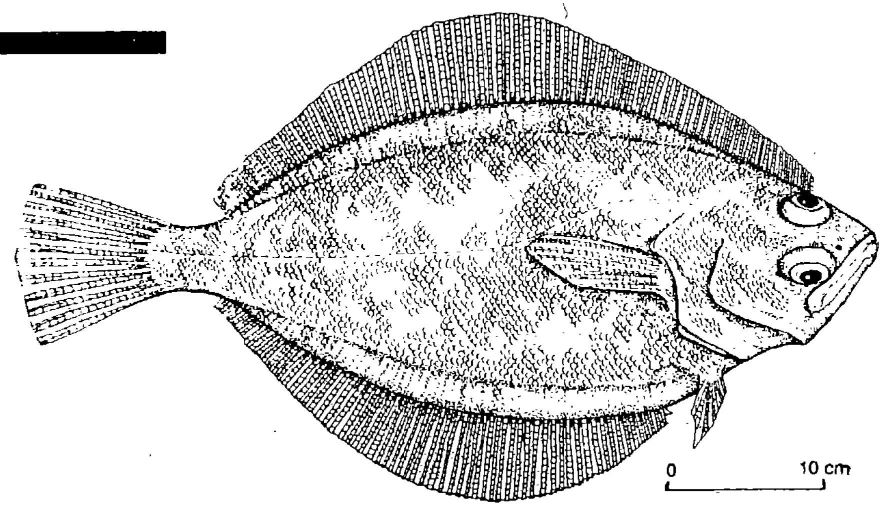


Figure 59.--Frequency of occurrence by depth interval by region for arrowtooth flounder off the west coast of North America based on presence or absence in samples from resource assessment surveys during 1912-84.

Petrale sole



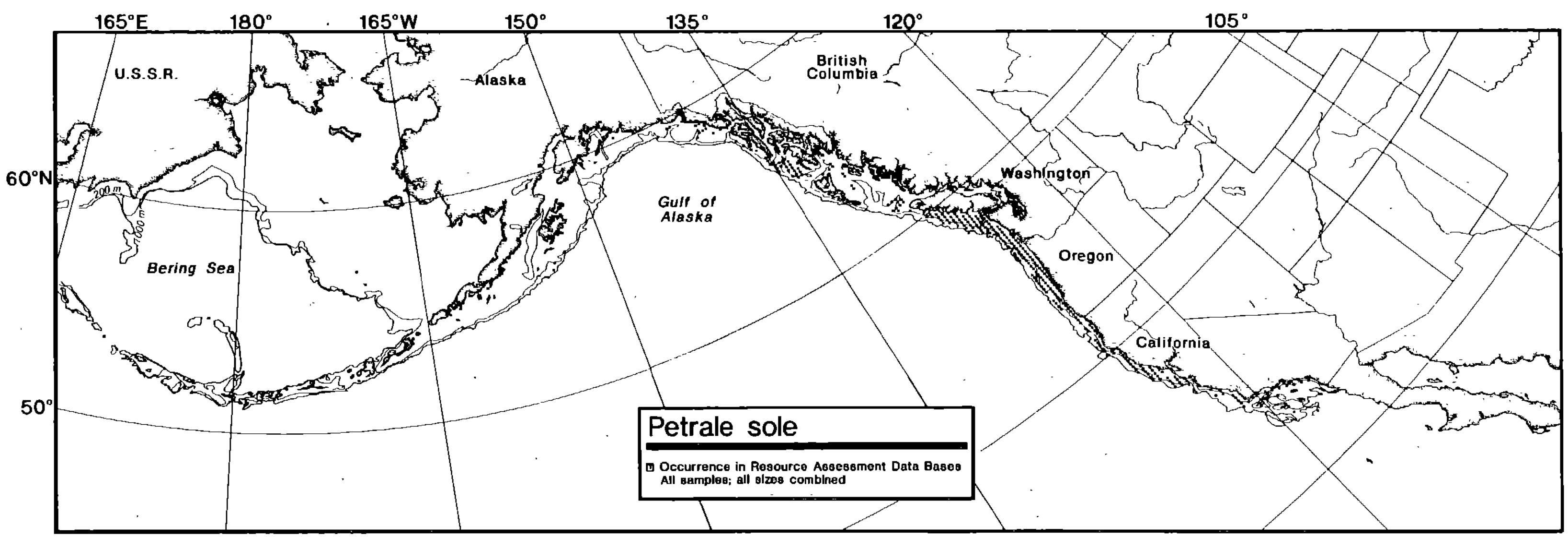


Figure 60.--The overall range of petrale sole off the west coast of North America based on an analysis of several resource assessment data bases for 1912-84.

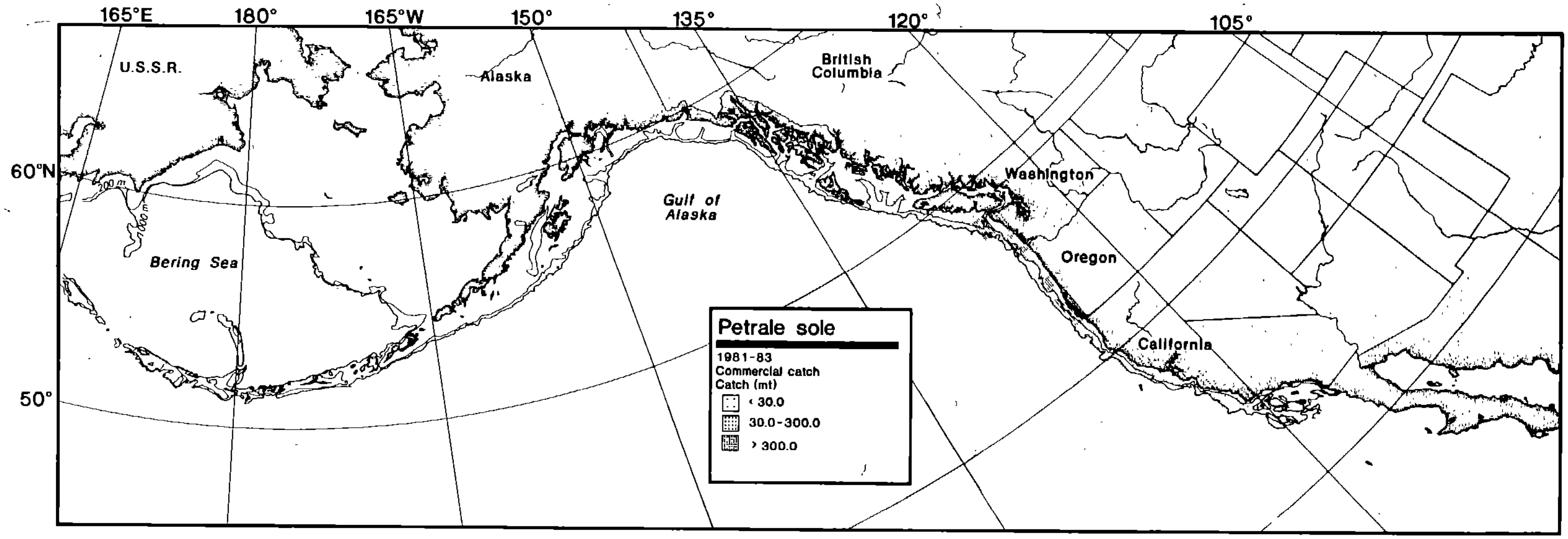


Figure 61 .--Location of commercial harvests of petrale sole off the west coast of North America, 1981-83; domestic, foreign and joint venture harvests combined.

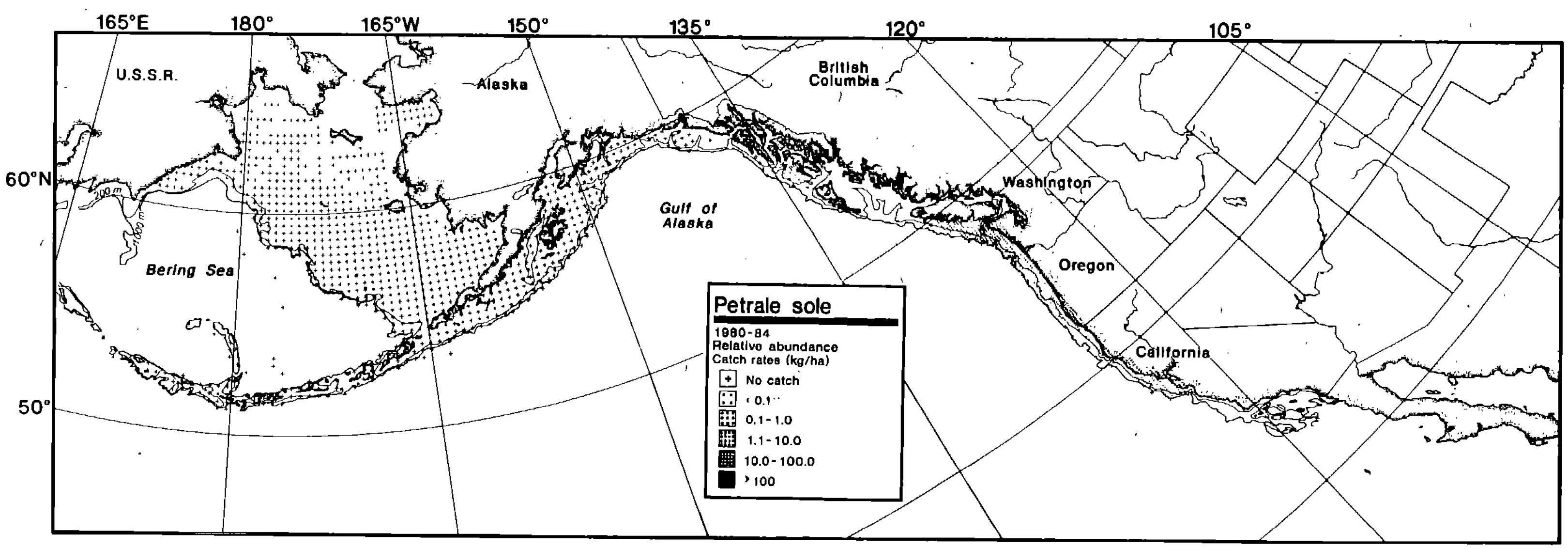


Figure 62.--The relative abundance of petrale sole off the west coast of North America, 1980-84, based on catch information from various NMFS trawl surveys.

Table 15.--Total numbers of samples (hauls) and numbers of samples containing petrale sole by depth interval and geographic region from resource assessment surveys off the west coast of North America during 1912-84.

		West coast			British Columbia			Southeast Alaska			Gulf of Alaska			Aleutian Islands			Bering Sea			All areas combined		
	Depth (meters)	Total Hauls	Occ.	%	Total Hauls	Occ.	%	Total Hauls	Occ.	%	Total Hauls	Occ.	%	Total Hauls	Occ.	%	Total Hauls	Occ.	%	Total Hauls	Occ.	%
All occurrences	0-50	1608	77	5	119	1	1	145	2	1	432	5	1	74	--	--	3113	--	--	5491	85	2
	51-100	2270	491	22	139	39	28	486	10	2	2044	8	0	194	--	--	4186	--	--	9322	548	6
	101-200	2551	780	31	326	61	19	527	92	17	5013	12	0	623	--	--	2778	--	--	11833	945	8
	201-300	921	165	18	250	7	3	399	34	9	1451	2	0	244	--	--	256	--	--	3522	208	6
	301-400	439	48	11	56	14	25	191	--	--	246	--	--	125	--	--	132	--	--	1190	62	5
	401-500	329	12	4	11	--	--	146	--	--	108	--	--	104	--	--	138	--	--	836	12	1
	501-600	144	--	--	2	--	--	192	--	--	40	--	--	62	--	--	66	--	--	506	--	--
	601-1000	321	--	--	6	--	--	243	--	--	60	--	--	89	--	--	134	--	--	853	--	--
	>1000	25	--	--	2	--	--	--	--	--	--	--	--	--	--	--	--	--	--	27	--	--
	TOTAL	8608	1573	18	911	122	13	2329	138	6	9594	27	0	1515	--	--	10803	--	--	33580	1860	6

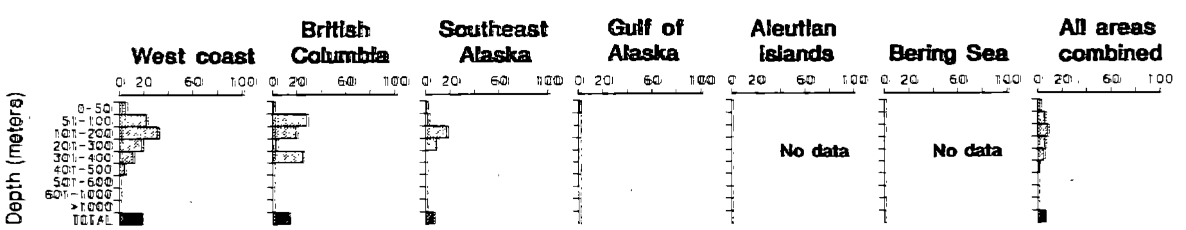
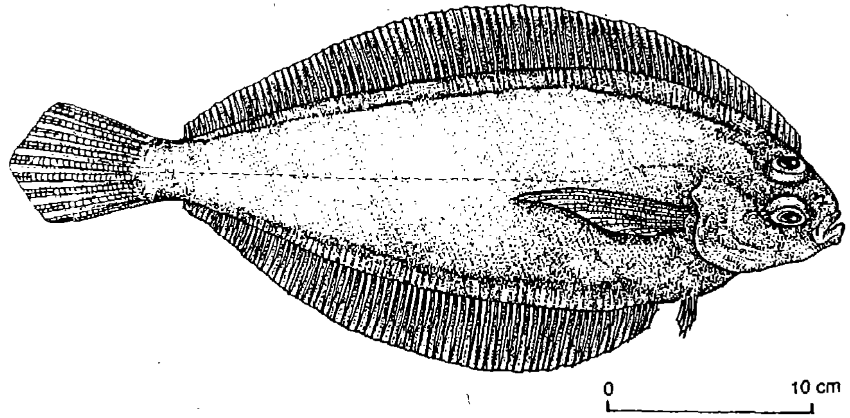


Figure 63.--Frequency of occurrence by depth interval by region for petrale sole off the west coast of North America based on presence or absence in samples from resource assessment surveys during 1912-44.

THIS PAGE INTENTIONALLY LEFT BLANK

Rex sole



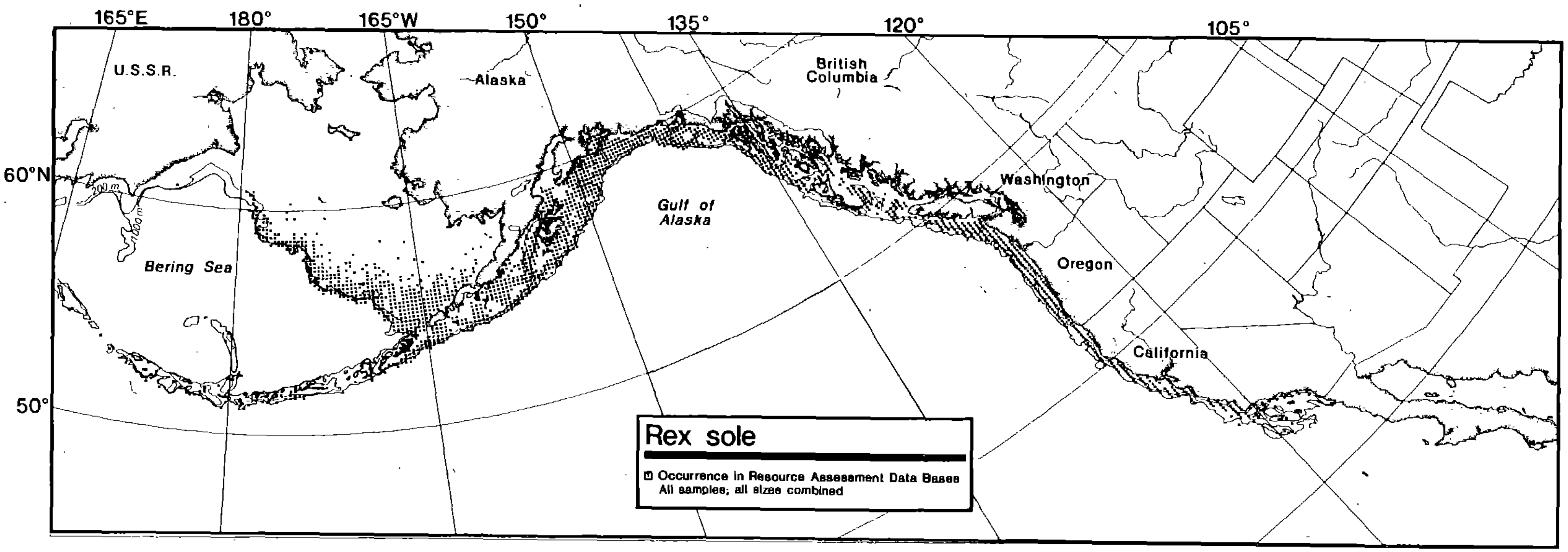


Figure 64.--The overall range of rex sole off the west coast of North America based on an analysis of several resource assessment data bases for 1912-84.

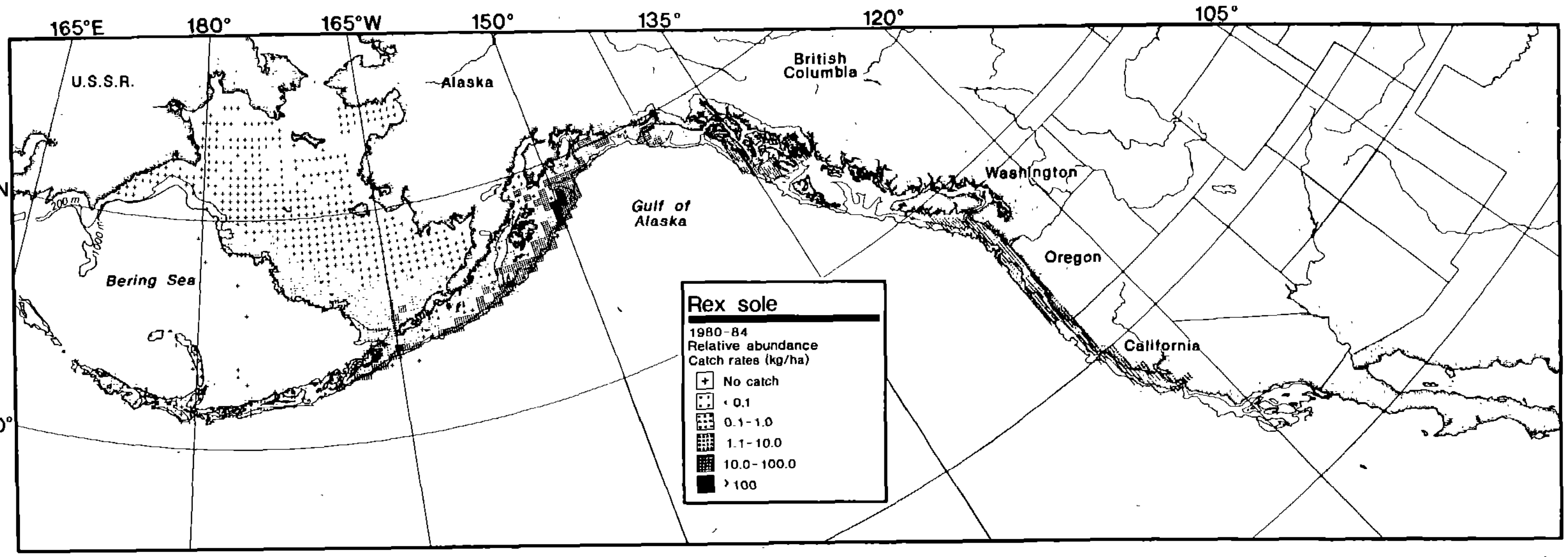


Figure 65.--The relative abundance of rex sole off the west coast of North America, 1980-84, based on catch information from various NMFS trawl surveys.

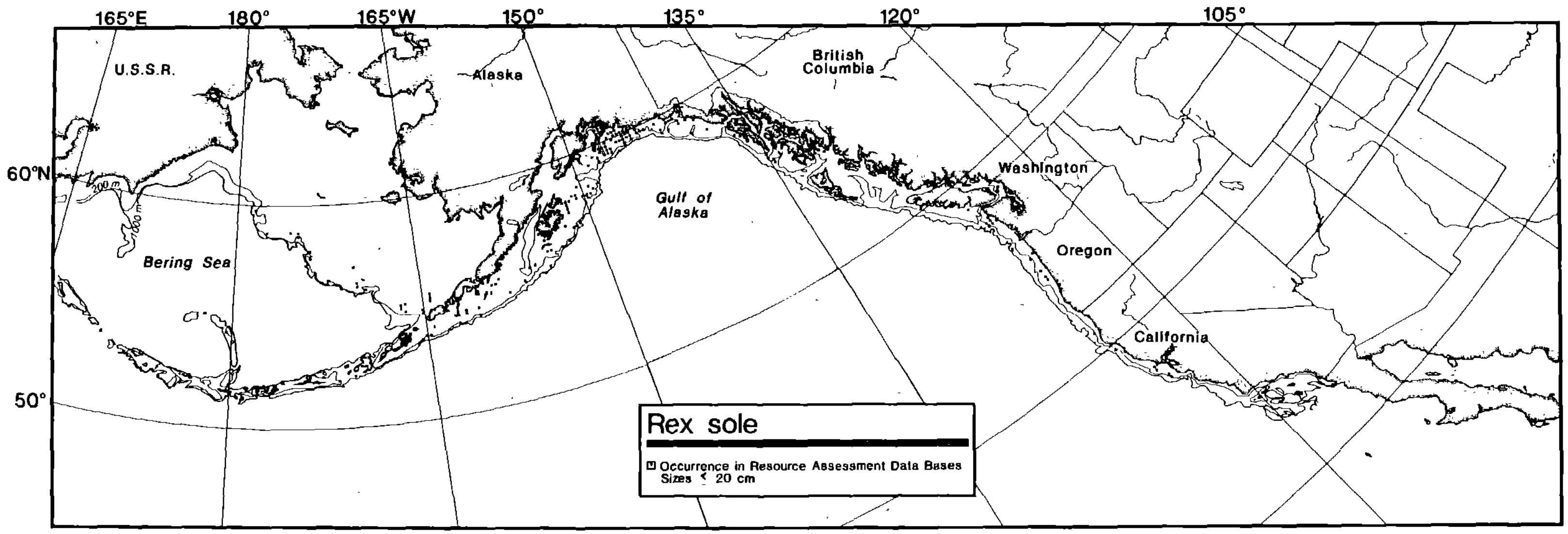


Figure 66.--The range of small (20 cm or less) rex sole off the west coast of North America based on data from several resource assessment data bases for 1912-84.

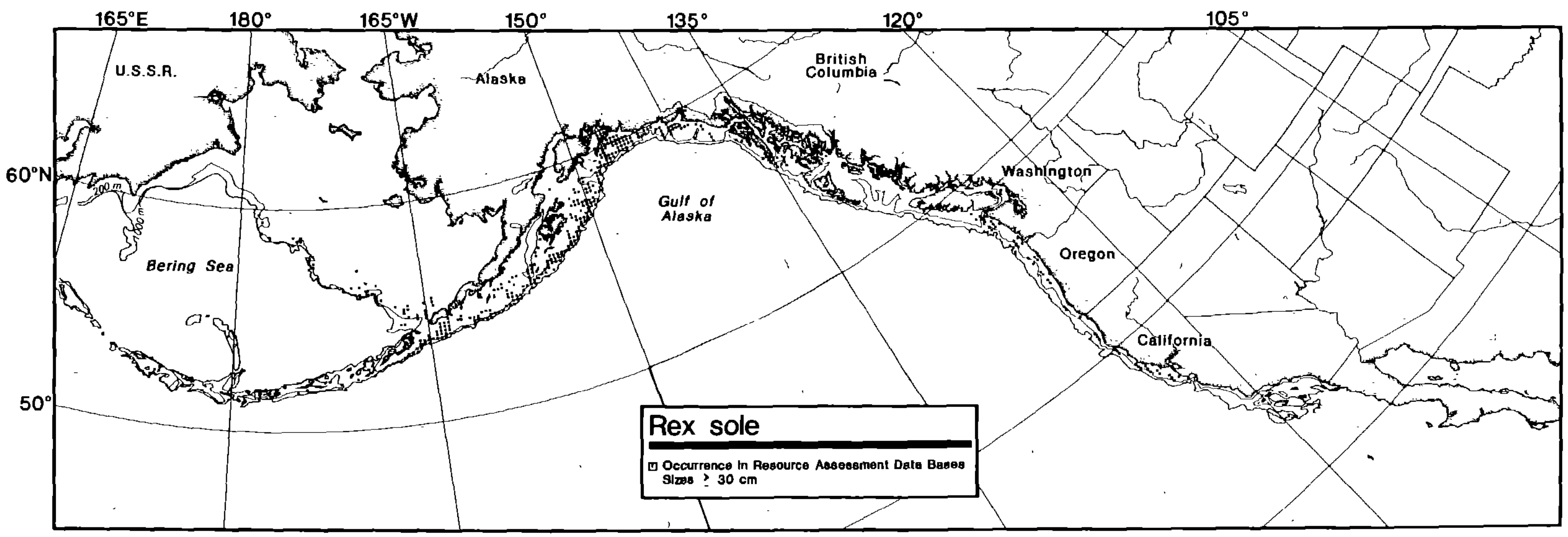


Figure 67.--The range of large (30 cm or larger) rex sole off the west coast of North America based on data from several resource assessment data bases for 1912-84.

Table 16.--Total numbers of samples (hauls) and numbers of samples containing rex sole by depth interval and geographic region from resource assessment surveys off the west coast of North America during 1912-84.

		West coast			British Columbia			Southeast Alaska			Gulf of Alaska			Aleutian Islands			Bering Sea			All areas combined		
	Depth (meters)	Total Hauls	Occ.	%	Total Hauls	Occ.	%	Total Hauls	Occ.	%	Total Hauls	Occ.	%	Total Hauls	Occ.	%	Total Hauls	Occ.	%	Total Hauls	Occ.	%
All occurrences	0-50	1608	59	4	119	1	1	145	27	19	432	81	19	74	--	--	3113	19	1	5491	187	3
	51-100	2270	690	30	139	46	33	486	230	47	2044	502	25	194	45	23	4186	329	8	9322	1844	20
	101-200	2551	1593	62	326	150	46	527	314	60	5013	2311	46	623	254	41	2778	785	28	11833	5419	46
	201-300	921	619	67	250	127	51	399	260	65	1451	904	62	244	115	47	256	108	42	3522	2134	61
	301-400	439	333	76	56	30	54	191	81	42	246	194	79	125	74	59	132	51	39	1190	764	64
	401-500	329	162	49	11	1	9	146	35	24	108	67	62	104	68	65	138	64	46	836	397	47
	501-600	144	15	10	2	--	--	192	2	1	40	27	68	62	19	31	66	19	29	506	82	16
	601-1000	321	9	3	6	--	--	243	--	--	60	8	13	89	7	8	134	15	11	853	39	5
	>1000	25	--	--	2	--	--	--	--	--	--	--	--	--	--	--	--	--	--	27	--	--
	TOTAL	8608	3480	40	911	355	39	2329	949	41	9394	4094	44	1515	582	38	10803	1390	13	33580	10866	32
Small fish (≤ 20cm)	0-50	14	14	100	--	--	--	--	--	--	33	28	85	--	--	--	--	--	--	47	42	89
	51-100	40	32	80	--	--	--	1	1	100	105	48	46	3	3	100	5	4	80	154	88	57
	101-200	175	147	84	--	--	--	25	16	64	347	93	27	30	6	20	18	8	44	595	270	45
	201-300	13	3	23	--	--	--	28	5	18	196	25	13	30	4	13	16	3	19	283	40	14
	301-400	7	2	29	--	--	--	27	3	11	48	6	13	17	2	12	3	1	33	102	14	14
	401-500	--	--	--	--	--	--	8	4	50	20	5	25	16	2	13	9	4	44	54	15	28
	501-600	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	601-1000	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	>1000	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	TOTAL	250	198	79	--	--	--	89	29	33	764	205	27	102	17	17	55	20	36	1260	469	37
Large fish (≥ 30cm)	0-50	--	--	--	--	--	--	--	--	--	33	6	18	--	--	--	--	--	--	47	6	13
	51-100	40	19	48	--	--	--	1	1	100	105	73	70	3	1	33	5	4	80	154	98	64
	101-200	175	42	24	--	--	--	25	25	100	347	313	90	30	25	83	18	17	94	595	422	71
	201-300	13	12	92	--	--	--	28	28	100	196	195	99	30	30	100	16	15	94	283	280	99
	301-400	7	7	100	--	--	--	27	27	100	48	48	100	17	17	100	3	2	67	102	101	99
	401-500	--	--	--	--	--	--	8	8	100	20	20	100	16	16	100	9	7	78	54	51	94
	501-600	--	--	--	--	--	--	--	--	--	13	13	100	5	5	100	3	3	100	21	21	100
	601-1000	--	--	--	--	--	--	--	--	--	2	2	100	1	1	100	--	--	--	4	3	75
	>1000	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	TOTAL	250	80	32	--	--	--	89	89	100	764	670	88	102	95	93	55	48	87	1260	982	78

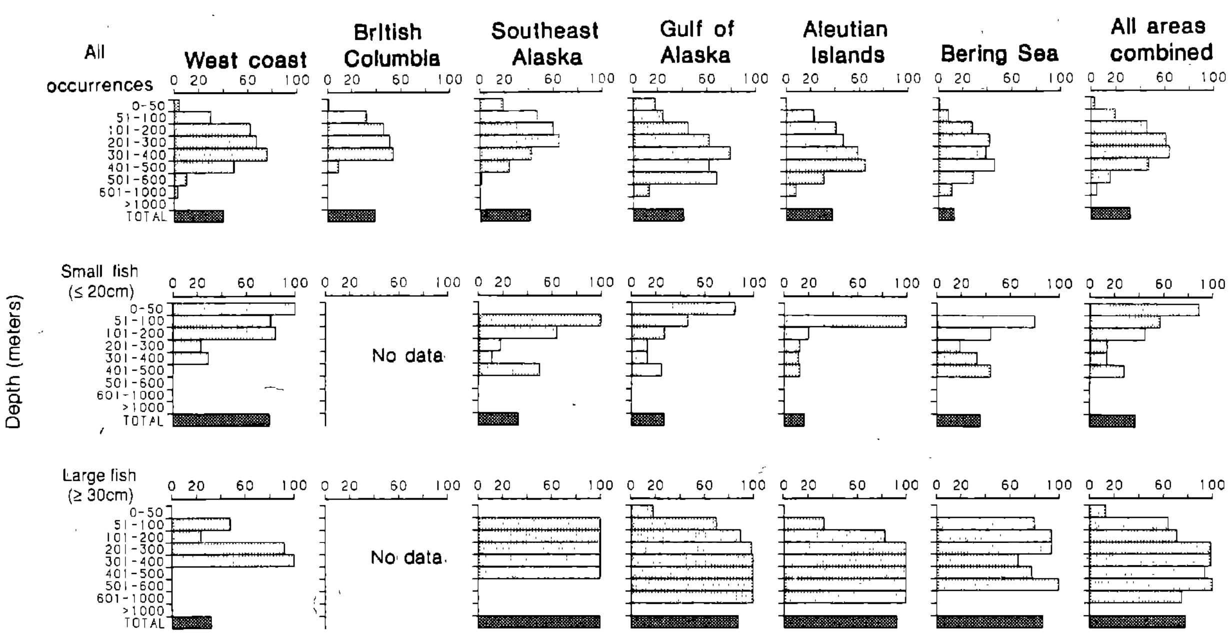
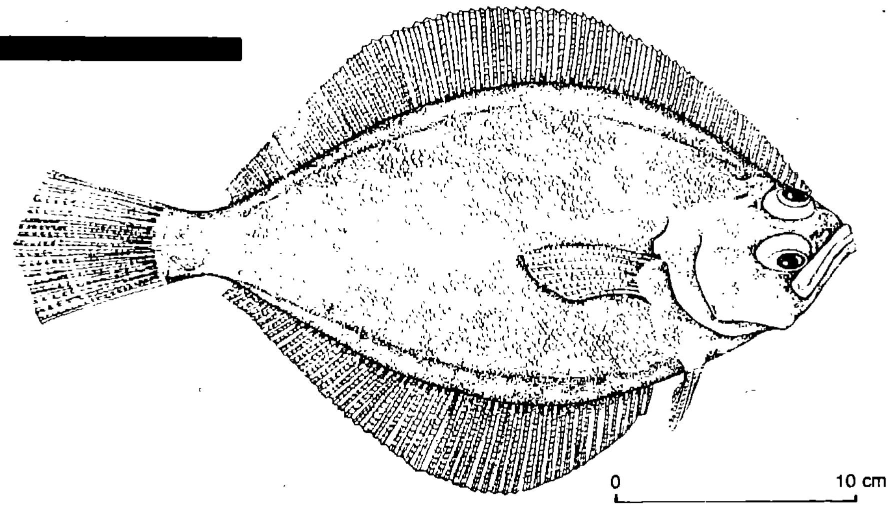


Figure 68.--Frequency of occurrence by depth interval by region for rex sole off the west coast of North America based on presence or absence in samples from resource assessment surveys during 1912-84.

Flathead sole



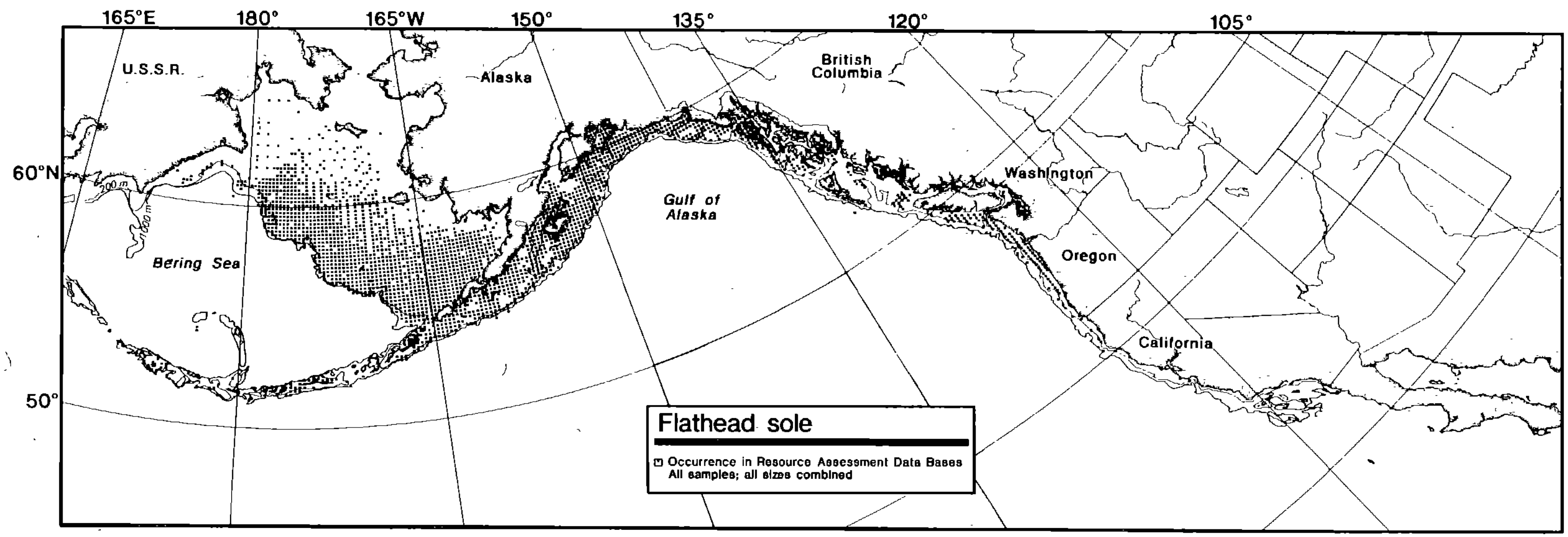


Figure 69.--The overall range of flathead sole off the west coast of North America based on an analysis of several resource assessment data bases for 1912-84.

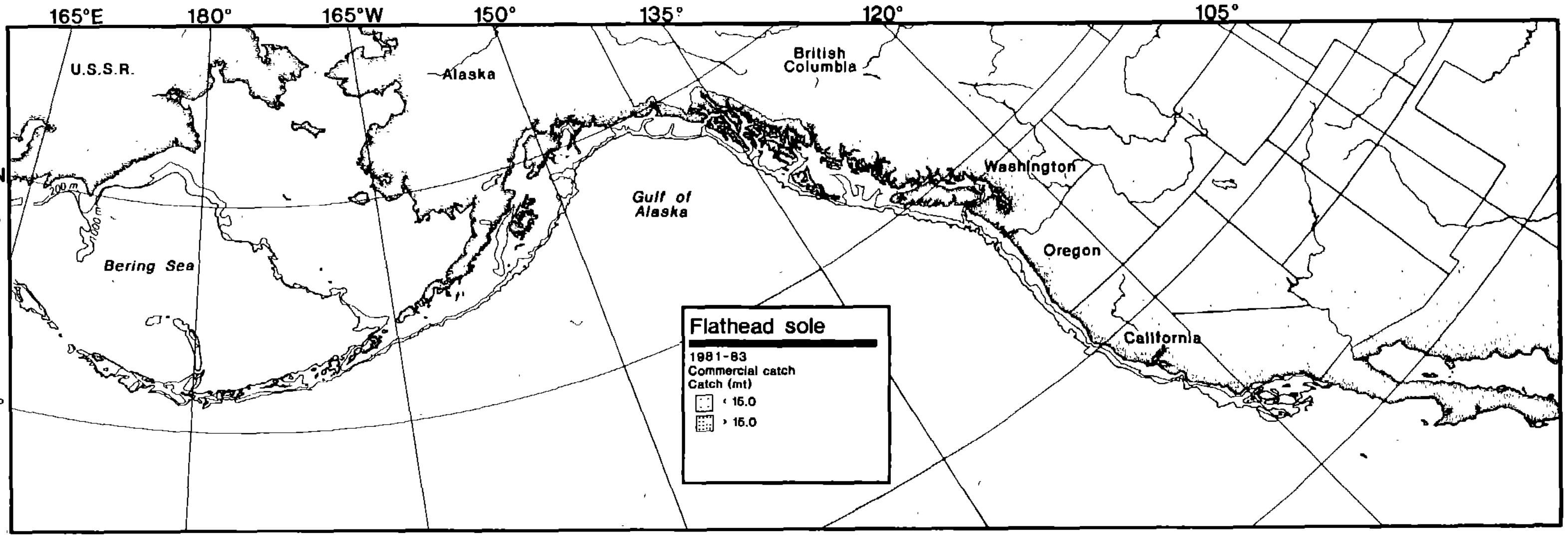


Figure 70.--Location of commercial harvests of flathead sole off the west coast of North America, 1981-83; domestic, foreign and joint venture harvests combined.

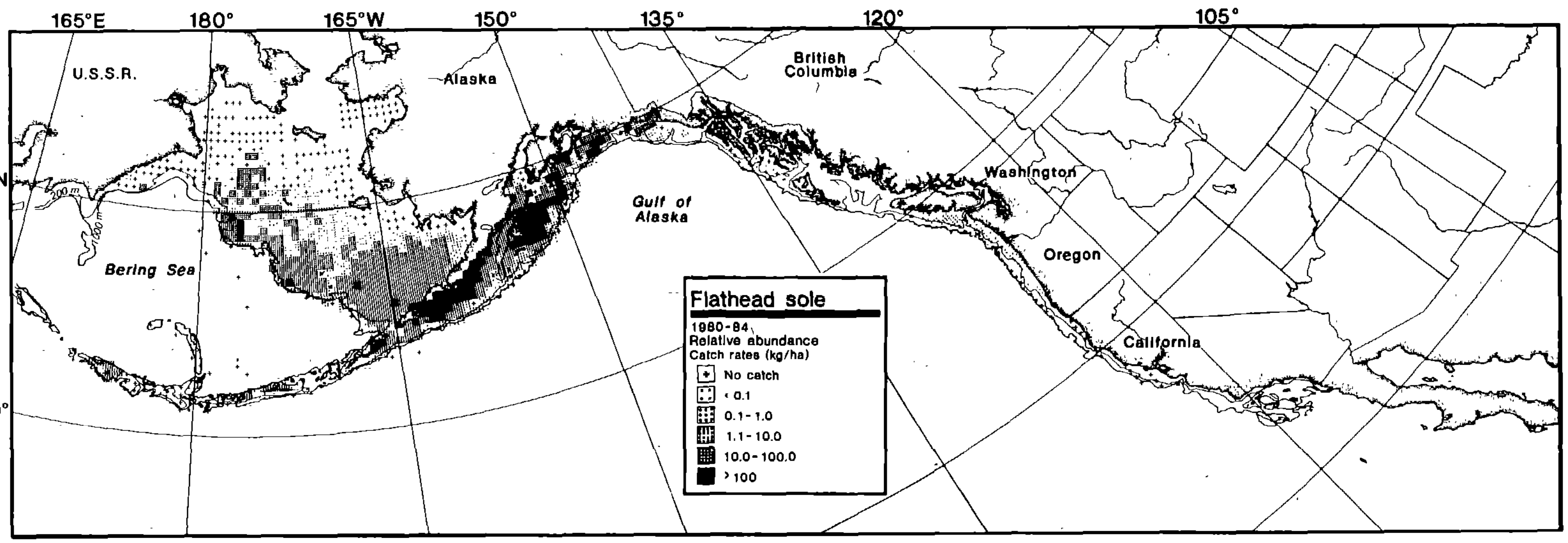


Figure 71.--The relative abundance of flathead sole off the west coast of North America, 1980-84, based on catch information from various NMFS trawl surveys.

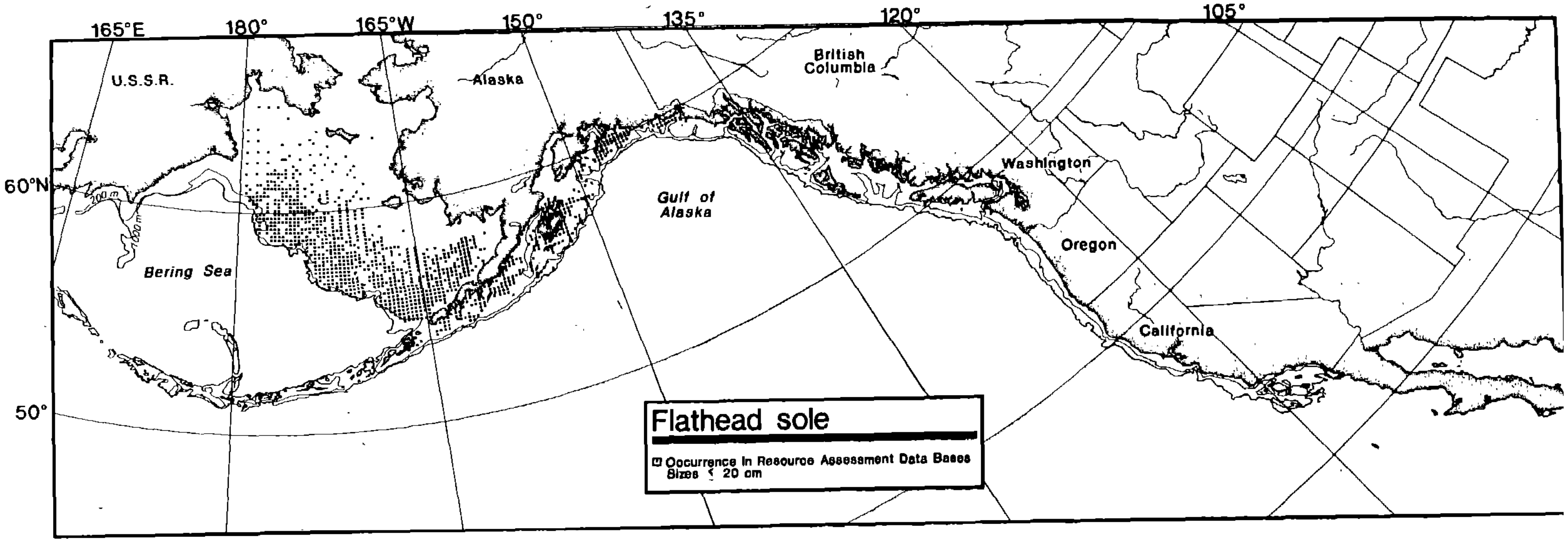


Figure 72.--The range of small (20 cm or less) flathead sole off the west coast of North America based on data from several resource assessment data bases for 1912-84.

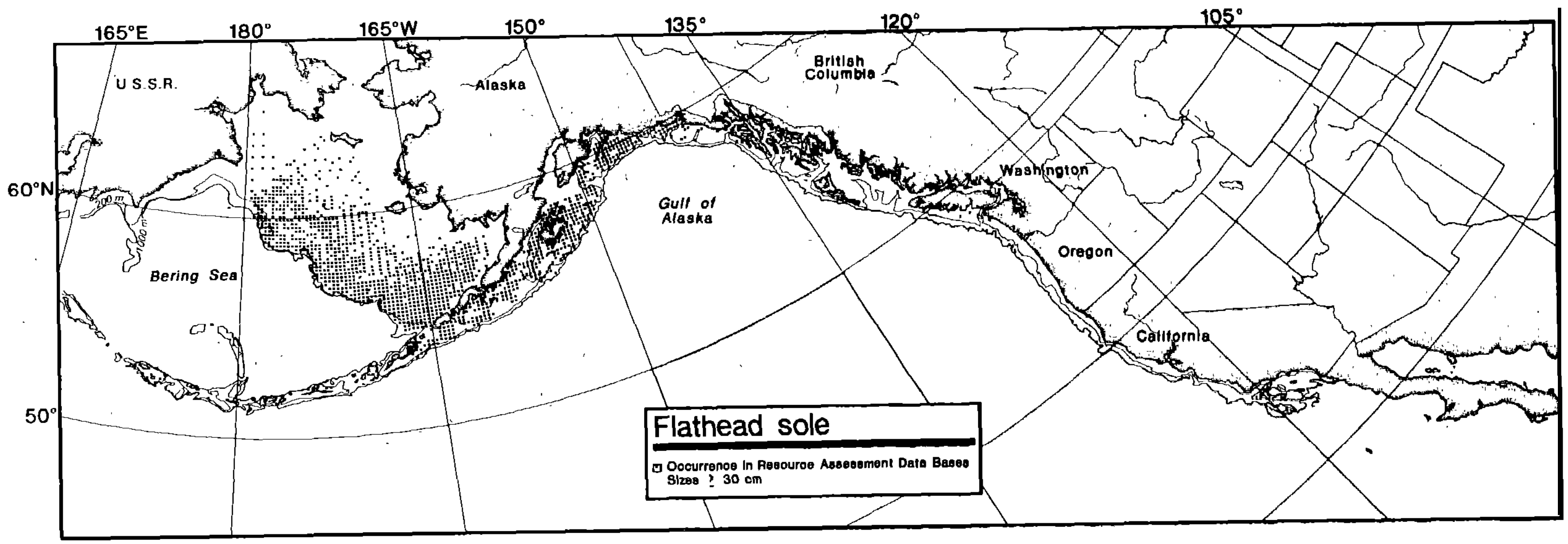


Figure 73.--The range of large (30 cm or larger) flathead sole off the west coast of North America based on data from several resource assessment data bases for 1912-84.

Table 17.--Total numbers of samples (hauls) and numbers of samples containing flathead sole by depth interval and geographic region from resource assessment surveys off the west coast of North America during 1912-84.

		West coast			British Columbia			Southeast Alaska			Gulf of Alaska			Aleutian Islands			Bering Sea			All areas combined		
	Depth (meters)	Total Hauls	Occ.	%	Total Hauls	Occ.	%	Total Hauls	Occ.	%	Total Hauls	Occ.	%	Total Hauls	Occ.	%	Total Hauls	Occ.	%	Total Hauls	Occ.	%
All occurrences	0-50	1608	39	2	119	1	1	145	58	40	432	142	33	74	3	4	3113	663	21	5491	906	16
	51-100	2270	54	2	139	9	6	486	330	68	2044	1346	66	194	62	32	4186	2973	71	9322	4777	51
	101-200	2551	324	13	326	58	18	527	239	45	5013	4128	82	623	334	54	2778	2375	85	11833	7473	63
	201-300	921	29	3	250	12	5	399	48	12	1451	946	65	244	125	51	256	216	84	3522	1377	39
	301-400	439	5	1	56	--	--	191	5	3	246	62	25	125	56	45	132	97	73	1190	225	19
	401-500	329	2	1	11	--	--	146	5	3	108	25	23	104	33	32	138	60	43	836	125	15
	501-600	144	--	--	2	--	--	192	--	--	40	--	--	62	4	6	66	10	15	506	14	3
	601-1000	321	--	--	6	--	--	243	--	--	60	--	--	89	--	--	134	3	2	853	3	0
	>1000	25	--	--	2	--	--	--	--	--	--	--	--	--	--	--	--	--	--	27	--	--
	TOTAL	8608	453	5	911	80	9	2329	685	29	9394	6649	71	1515	617	41	10803	6397	59	33580	14900	44
Small fish (≤ 20cm)	0-50	--	--	--	--	--	--	--	--	--	62	51	82	1	1	100	131	72	55	194	124	64
	51-100	--	--	--	--	--	--	6	5	83	426	278	65	16	10	63	1108	790	71	1556	1083	70
	101-200	6	3	50	1	1	100	19	6	32	895	582	65	109	79	72	1227	1017	83	2257	1688	75
	201-300	--	--	--	--	--	--	--	--	--	177	40	23	58	22	38	112	27	24	348	89	26
	301-400	--	--	--	--	--	--	--	--	--	10	1	10	--	--	--	36	2	6	72	3	4
	401-500	--	--	--	--	--	--	--	--	--	5	1	20	--	--	--	18	2	11	30	3	10
	501-600	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	601-1000	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	>1000	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	TOTAL	6	3	50	1	1	100	28	11	39	1575	953	61	215	112	52	2636	1910	72	4461	2990	67
Large fish (≥ 30cm)	0-50	--	--	--	--	--	--	--	--	--	62	27	44	--	--	--	131	103	79	194	130	67
	51-100	--	--	--	--	--	--	6	6	100	426	330	77	16	14	88	1108	1046	94	1556	1396	90
	101-200	6	6	100	1	1	100	19	19	100	895	863	96	109	105	96	1227	1185	97	2257	2179	97
	201-300	--	--	--	--	--	--	1	1	100	177	176	99	58	57	98	112	112	100	348	346	99
	301-400	--	--	--	--	--	--	1	1	100	10	10	100	25	25	100	36	36	100	72	72	100
	401-500	--	--	--	--	--	--	1	1	100	5	5	100	6	6	100	18	18	100	30	30	100
	501-600	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	3	3	100	3	3	100
	601-1000	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	1	1	100	1	1	100
	>1000	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	TOTAL	6	6	100	1	1	100	28	28	100	1575	1411	90	215	207	96	2636	2504	95	4461	4157	93

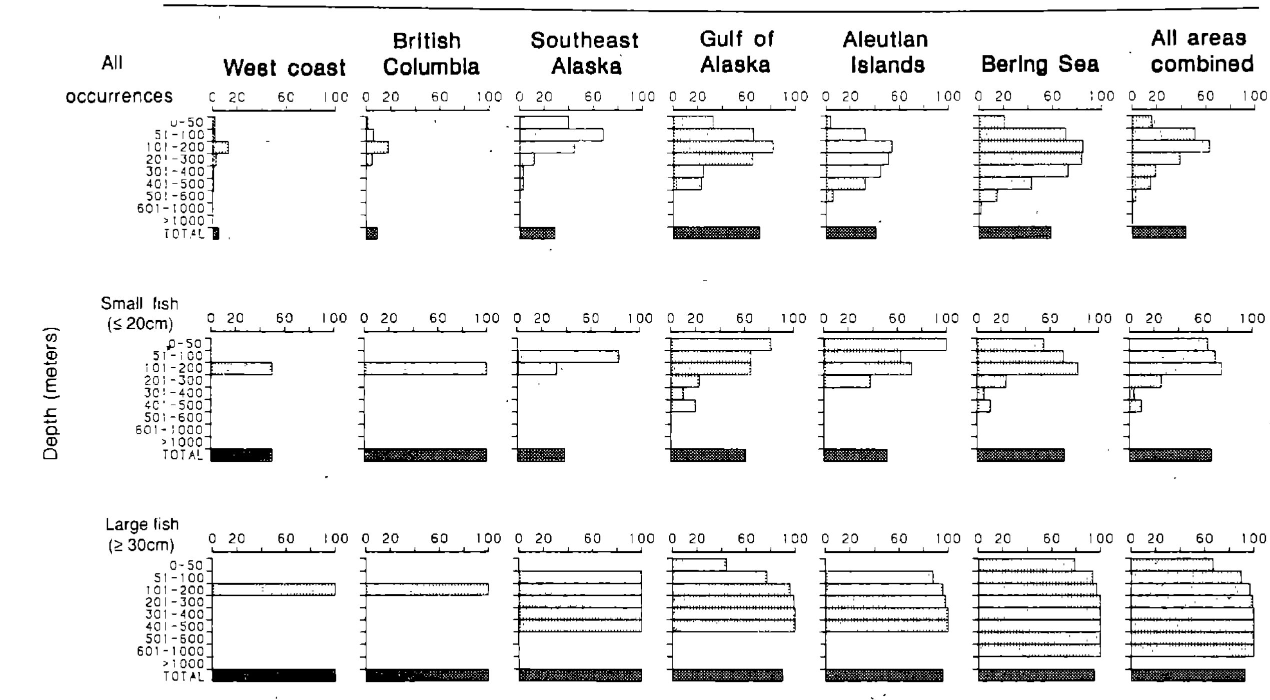
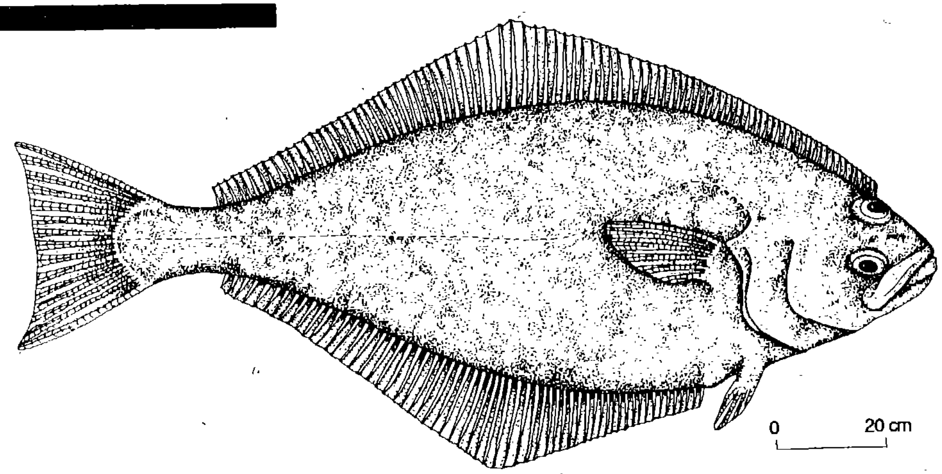


Figure 74.--Frequency of occurrence by depth interval by region for flathead sole off the west coast of North America based on presence or absence in samples from resource assessment surveys during 1912-84.

Pacific halibut



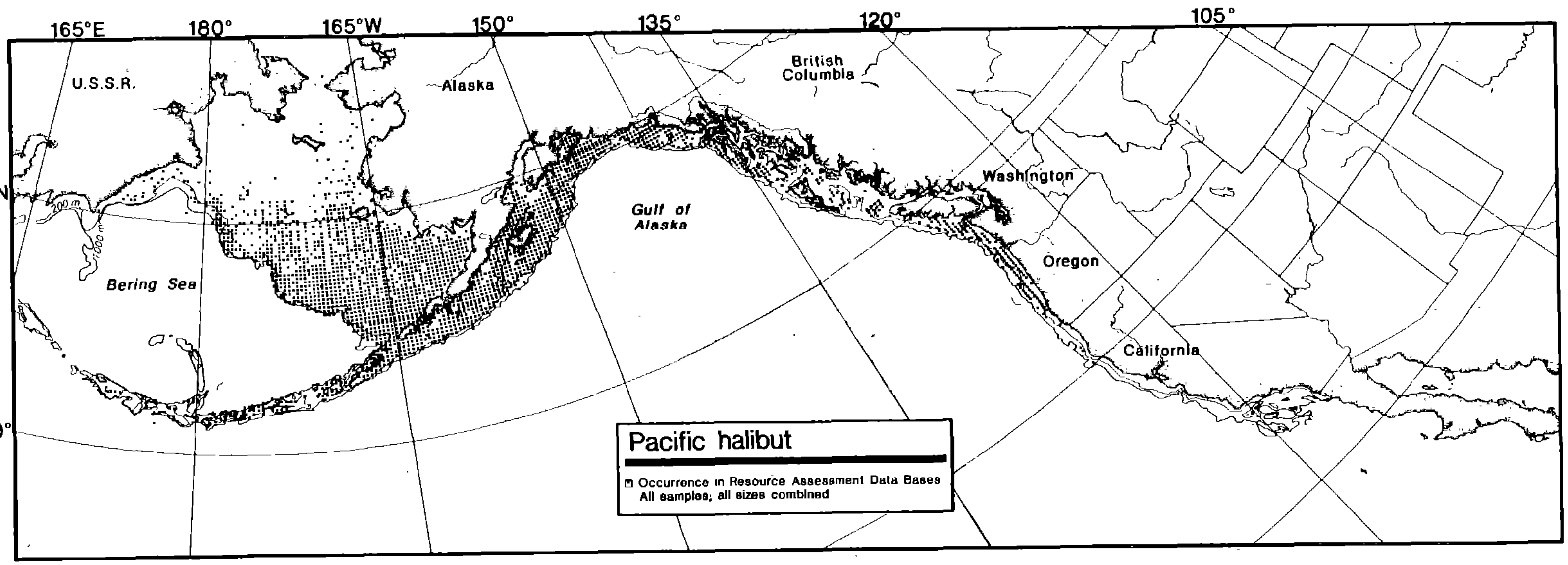


Figure 75.--The overall range of Pacific halibut off the west coast of North America based on an analysis of several resource assessment data bases for 1912-84.

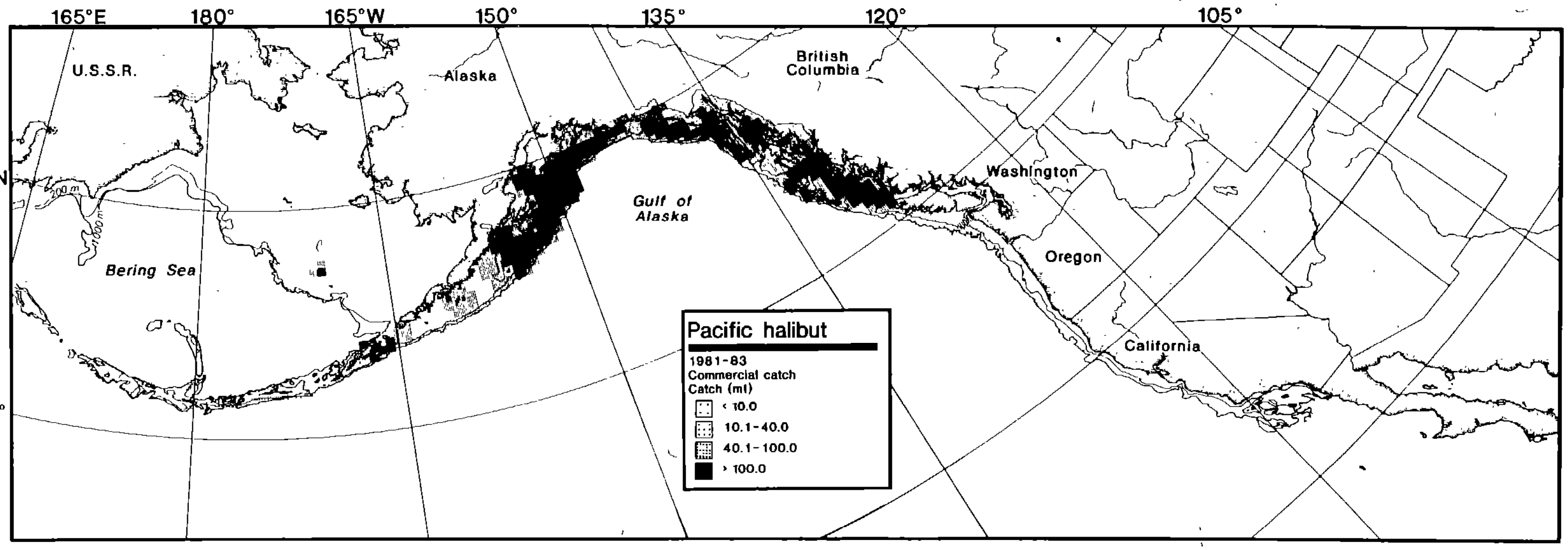


Figure 76.--Location of commercial harvests of Pacific halibut off the west coast of North America, 1981-83; domestic, foreign and join venture harvests combined.

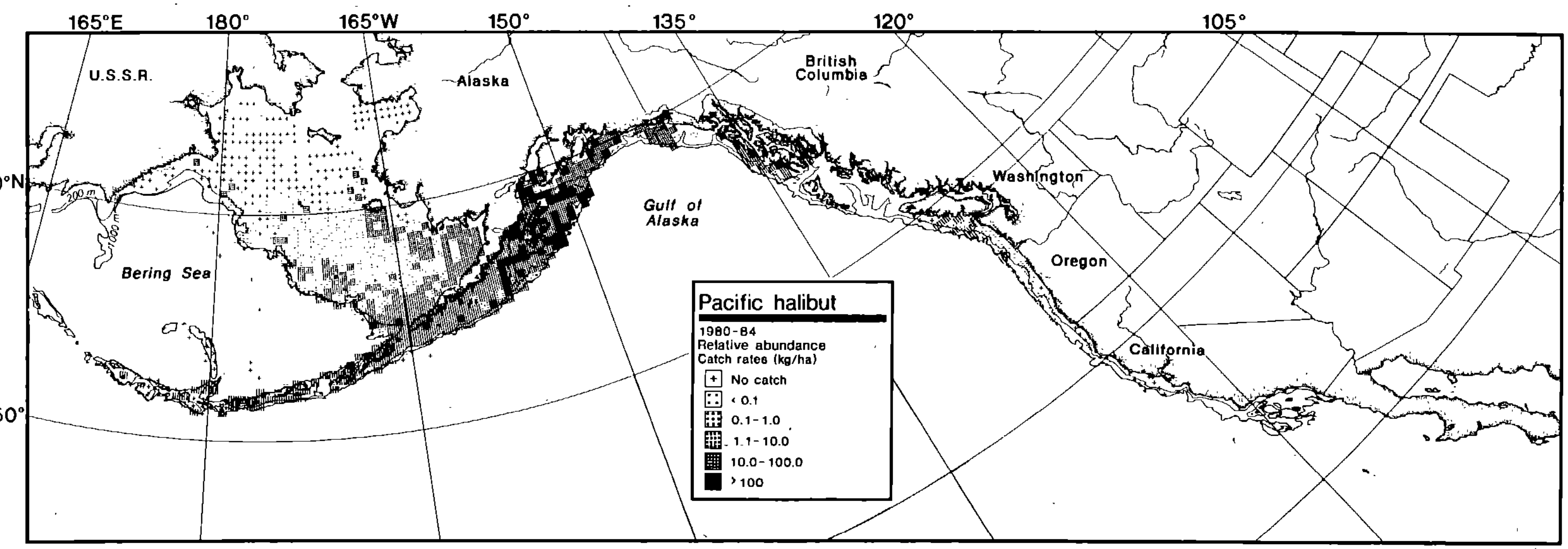


Figure 77.--The relative abundance of Pacific halibut off the west coast of North America, 1980-84, based on catch information from various NMFS trawl surveys.

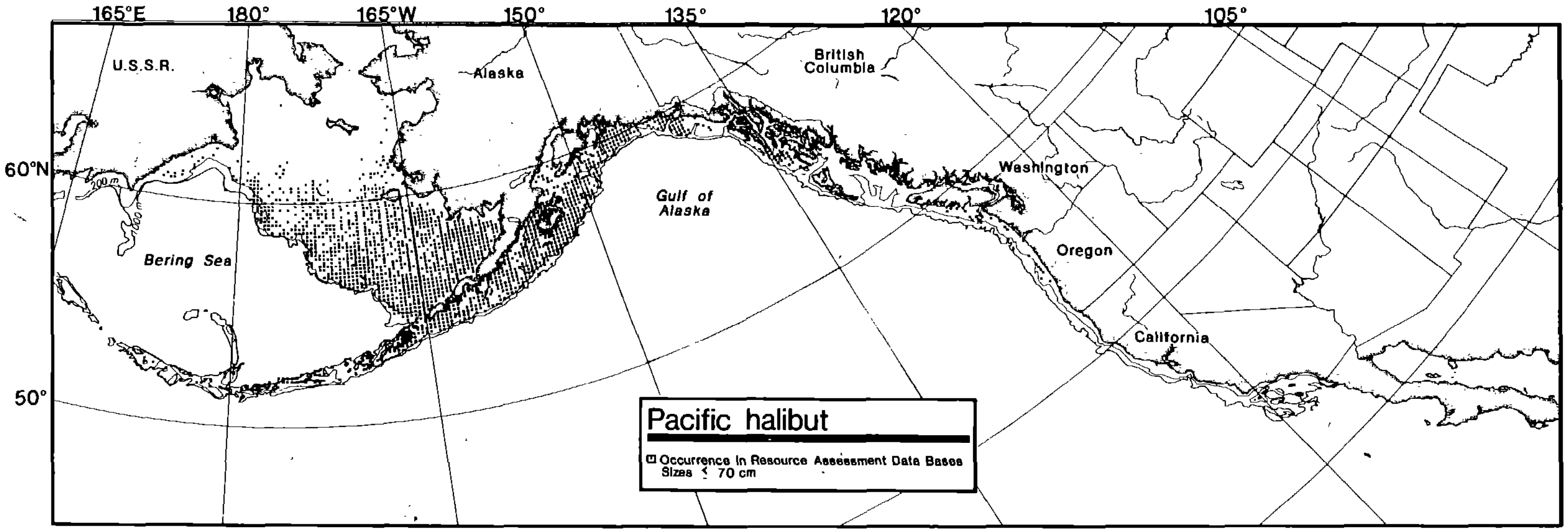


Figure 78.--The range of small (70 cm or less) Pacific halibut off the west coast of North America based on data from several resource assessment data bases for 1912-84.

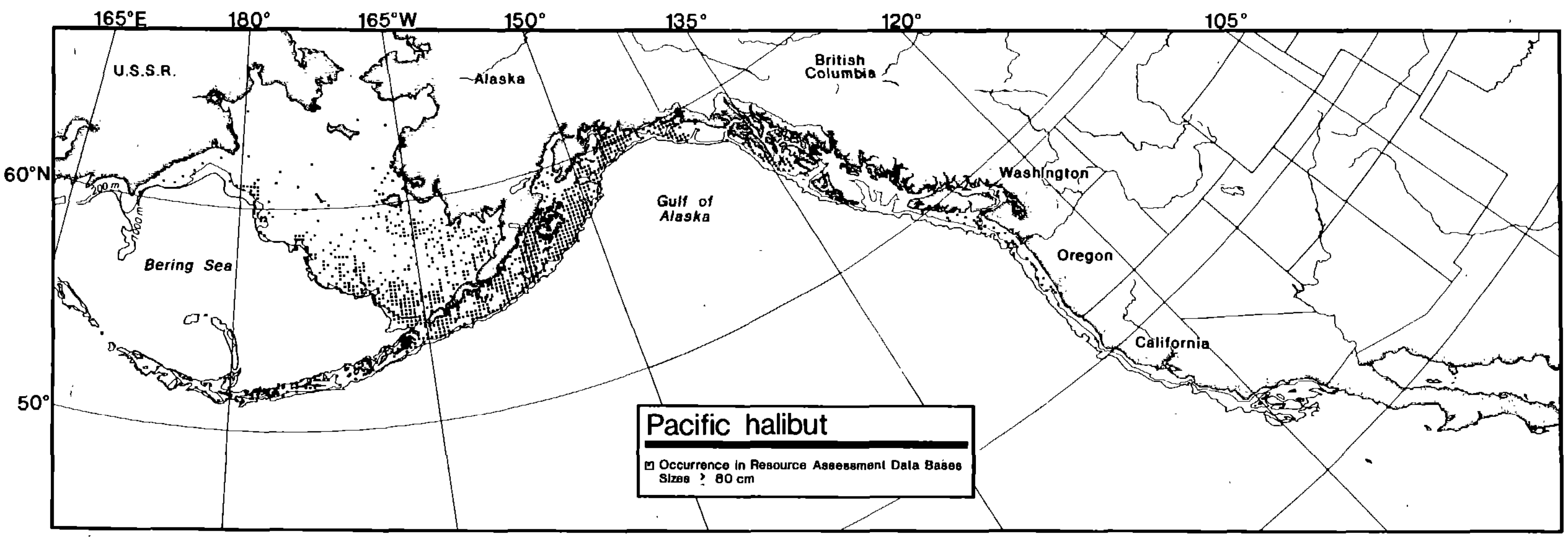


Figure 79.--The range of large (80 cm or larger) Pacific halibut off the west coast of North America based on data from several resource assessment data bases for 1912-84.

Table 18.--Total numbers of samples (hauls) and numbers of samples containing Pacific halibut by depth interval and geographic region from resource assessment surveys off the west coast of North America during 1912-84.

		West coast			British Columbia			Southeast Alaska			Gulf of Alaska			Aleutian Islands			Bering Sea			All areas combined		
	Depth (meters)	Total Hauls	Occ.	%	Total Hauls	Occ.	%	Total Hauls	Occ.	%	Total Hauls	Occ.	%	Total Hauls	Occ.	%	Total Hauls	Occ.	%	Total Hauls	Occ.	%
All occurrences	0-50	1608	3	0	119	1	1	145	41	28	432	364	84	74	27	36	3113	1378	44	5491	1814	33
	51-100	2270	100	4	139	41	29	486	70	14	2044	1405	69	194	87	45	4186	1767	42	9322	3473	37
	101-200	2551	124	5	326	56	17	527	136	26	5013	2815	56	623	346	56	2778	999	36	11833	4488	38
	201-300	921	77	8	250	31	12	399	175	44	1451	792	55	244	117	48	256	134	52	3522	1327	38
	301-400	439	15	3	56	12	21	191	60	31	246	112	46	125	54	43	132	61	46	1190	315	26
	401-500	329	6	2	11	1	9	146	36	25	108	34	31	104	38	37	138	45	33	836	160	19
	501-600	144	--	--	2	--	--	192	27	14	40	2	5	62	5	8	66	5	8	506	39	8
	601-1000	321	--	--	6	--	--	243	41	17	60	--	--	89	1	1	134	1	1	853	43	5
	>1000	25	--	--	2	--	--	--	--	--	--	--	--	--	--	--	--	--	--	27	--	--
	TOTAL	8608	325	4	911	142	16	2329	586	25	9394	5524	59	1515	675	45	10803	4390	41	33580	11659	35
Small fish (≤70cm)	0-50	--	--	--	--	--	--	15	15	100	183	179	98	9	9	100	772	743	96	979	946	97
	51-100	27	12	44	2	1	50	6	5	83	745	719	97	72	69	96	1137	1106	97	1989	1912	96
	101-200	53	18	34	6	2	33	65	50	77	1257	1059	84	319	280	88	823	732	89	2523	2141	85
	201-300	22	5	23	--	--	--	87	50	57	559	422	75	100	80	80	122	105	86	890	662	74
	301-400	5	2	40	--	--	--	29	20	69	96	62	65	49	39	80	51	31	61	230	154	67
	401-500	--	--	--	--	--	--	20	7	35	22	14	64	32	17	53	41	15	37	115	53	46
	501-600	--	--	--	--	--	--	15	3	20	--	--	--	5	2	40	5	1	20	27	6	22
	601-1000	--	--	--	--	--	--	18	1	6	--	--	--	--	--	--	--	--	--	20	1	5
	>1000	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	TOTAL	107	37	35	8	3	38	255	151	59	2864	2455	86	587	496	84	2952	2733	93	6773	5875	87
Large fish (≥ 80cm)	0-50	--	--	--	--	--	--	--	--	--	183	75	41	9	2	22	772	187	24	979	264	27
	51-100	27	6	22	2	1	50	6	2	33	745	341	46	72	28	39	1137	170	15	1989	548	28
	101-200	53	29	55	6	3	50	65	41	63	1257	731	58	319	108	34	823	198	24	2523	1110	44
	201-300	22	17	77	--	--	--	87	58	67	559	425	76	100	49	49	122	44	36	890	593	67
	301-400	5	4	80	--	--	--	29	20	69	96	75	78	49	37	76	51	31	61	230	167	73
	401-500	--	--	--	--	--	--	20	17	85	22	15	68	32	26	81	41	33	80	115	91	79
	501-600	--	--	--	--	--	--	15	14	93	2	2	100	5	4	80	5	4	80	27	24	89
	601-1000	--	--	--	--	--	--	18	16	89	--	--	--	1	1	100	1	1	100	20	18	90
	>1000	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	TOTAL	107	56	52	8	4	50	255	168	66	2864	1664	58	587	255	43	2952	668	23	6773	2815	42

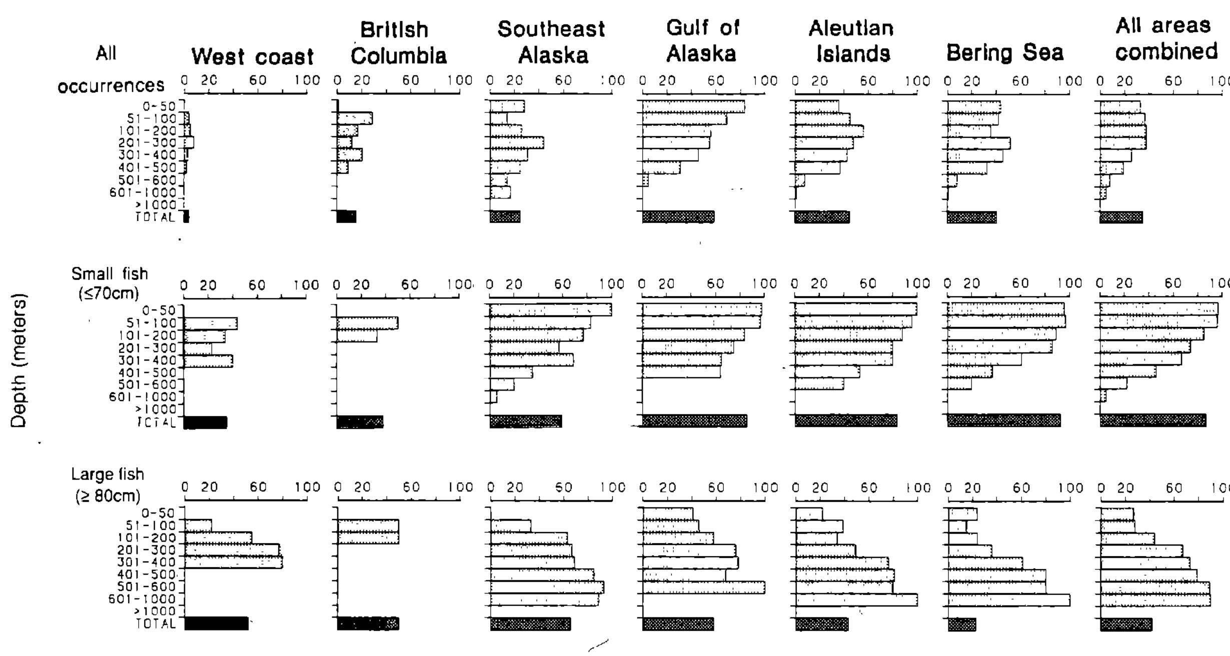
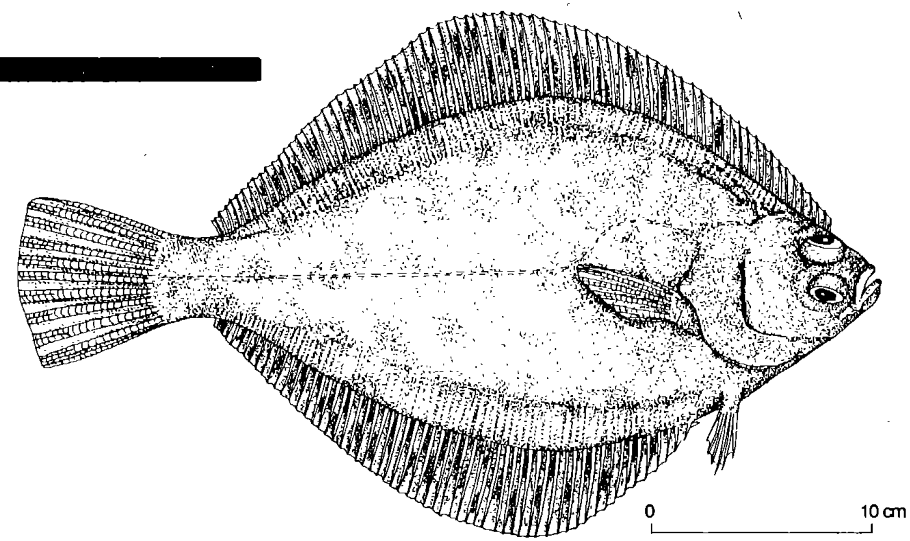


Figure 80.--Frequency of occurrence by depth interval by region for Pacific halibut off the west coast of North America based on presence or absence in samples from resource assessment surveys during 1912-84.

Rock sole



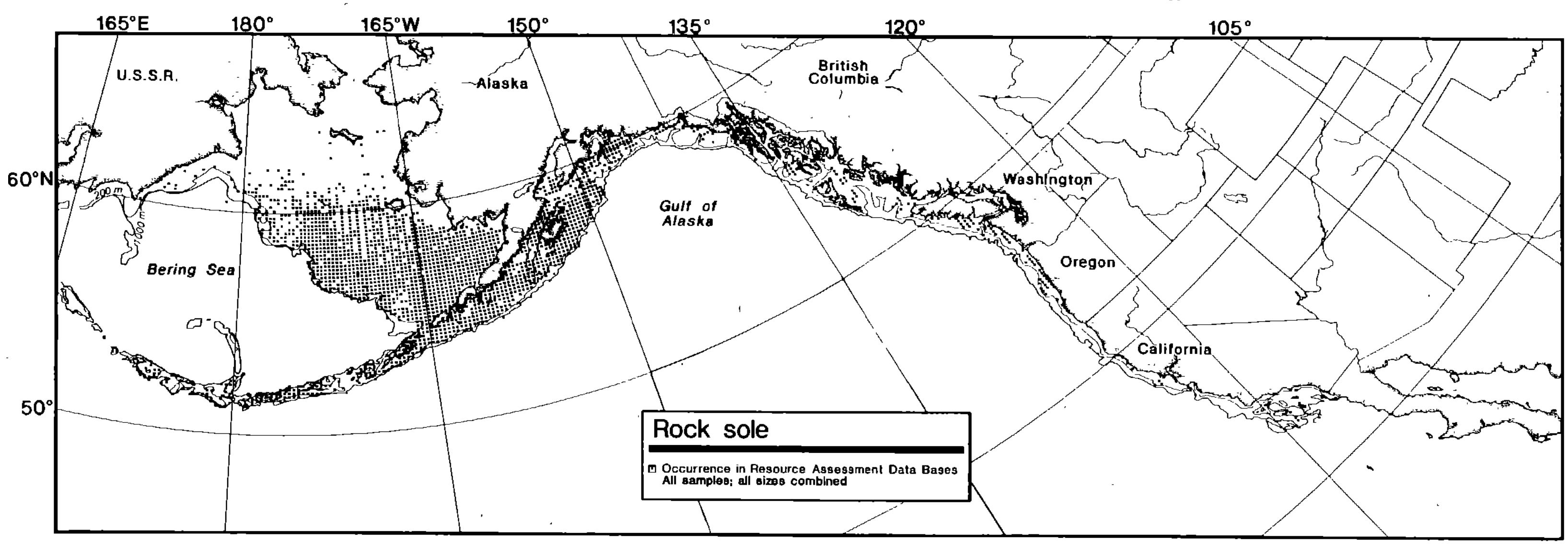


Figure 81.--The overall range of rock sole off the west coast of North America based on an analysis of several resource assessment data bases for 1912-84.

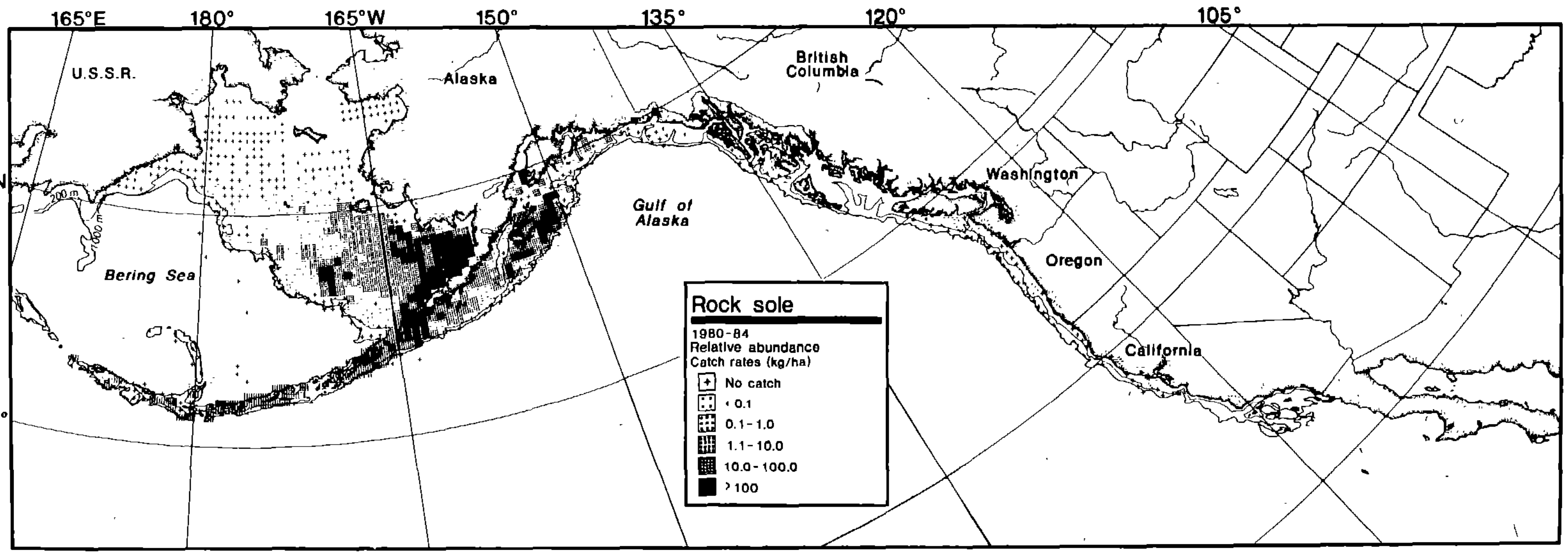


Figure 82.--The relative abundance of rock sole off the west coast of North America, 1980-84, based on catch information from various NMFS trawl surveys.

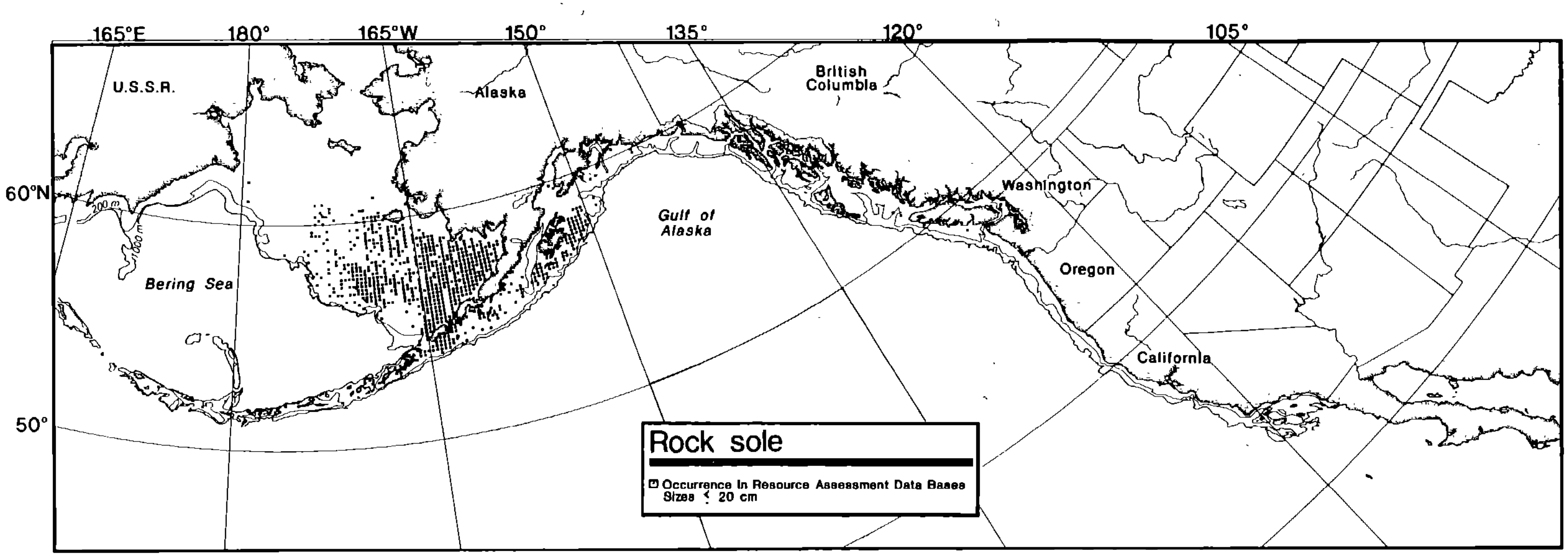


Figure 83.--The range of small (20 cm or less) rock sole off the west coast of North America based on data from several resource assessment data bases for 1912-84.

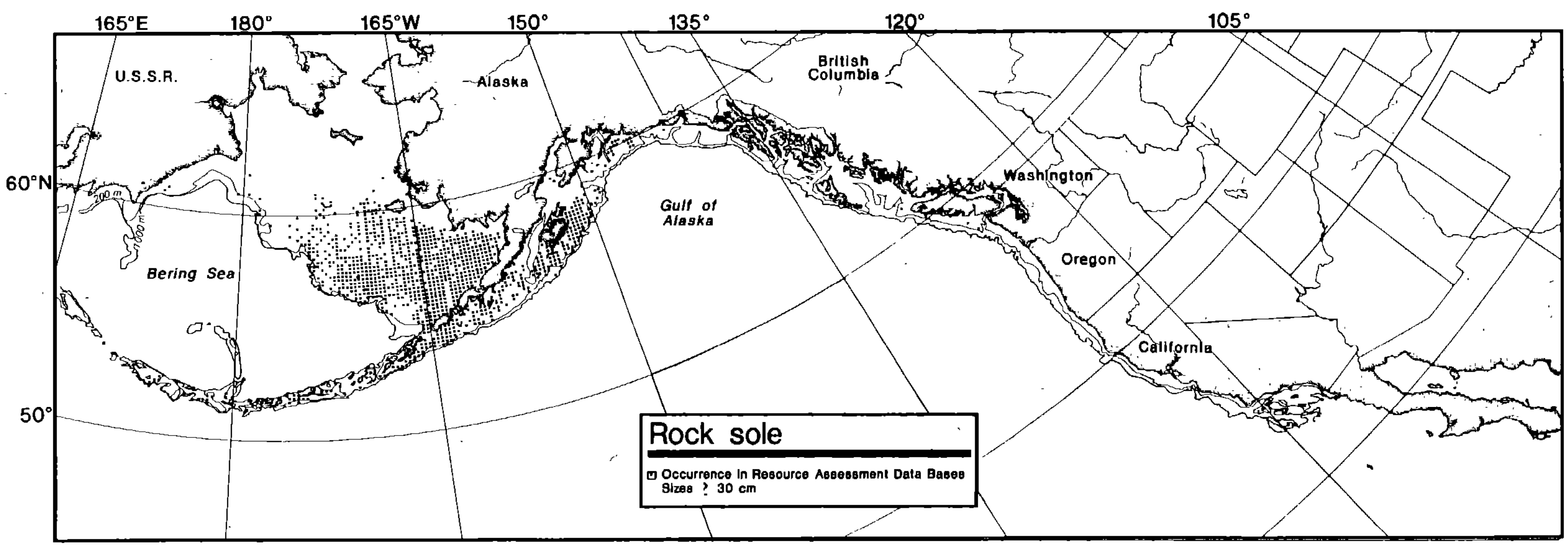


Figure 84.--The range of large (30 cm or larger) rock sole off the west coast of North America based on data from several resource assessment data bases for 1912-84.

Table 19--Total numbers of samples (hauls) and numbers of samples containing rock sole by depth interval and geographic region from resource assessment surveys off the west coast of North America during 1912-84.

		West coast			British Columbia			Southeast Alaska			Gulf of Alaska			Aleutian Islands			Bering Sea			All areas combined		
	Depth (meters)	Total Hauls	Occ.	%	Total Hauls	Occ.	%	Total Hauls	Occ.	%	Total Hauls	Occ.	%	Total Hauls	Occ.	%	Total Hauls	Occ.	%	Total Hauls	Occ.	%
All occurrences	0-50	1608	40	2	119	2	2	145	70	48	432	276	64	74	27	36	3113	1567	50	5491	1982	36
	51-100	2270	126	6	139	39	28	486	146	30	2044	1209	59	194	99	51	4186	3124	75	9322	4746	51
	101-200	2551	42	2	326	11	3	527	82	16	5013	1599	32	623	400	64	2778	1248	45	11833	3395	29
	201-300	921	2	0	250	--	--	399	3	1	1451	169	12	244	120	49	256	61	24	3522	355	10
	301-400	439	1	0	56	--	--	191	--	--	246	8	3	125	22	18	132	10	8	1190	41	3
	401-500	329	--	--	11	--	--	146	--	--	108	2	2	104	5	5	138	--	--	836	7	1
	501-600	144	--	--	2	--	--	192	--	--	40	--	--	62	4	6	66	--	--	506	4	1
	601-1000	321	--	--	6	--	--	243	--	--	60	--	--	89	1	1	134	--	--	853	1	0
	>1000	25	--	--	2	--	--	--	--	--	--	--	--	--	--	--	--	--	--	27	--	--
	TOTAL	8608	211	2	911	52	6	2329	301	13	9394	3263	35	1515	678	45	10803	6010	56	33580	10531	31
Small fish (≤ 20cm)	0-50	--	--	--	--	--	--	21	19	90	141	106	75	3	1	33	663	485	73	828	611	74
	51-100	--	--	--	2	2	100	--	--	--	484	286	59	49	40	82	1377	1022	74	1912	1350	71
	101-200	3	2	67	--	--	--	2	1	50	247	62	25	119	37	31	300	103	34	671	205	31
	201-300	--	--	--	--	--	--	--	--	--	10	1	10	34	2	6	12	2	17	56	5	9
	301-400	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	401-500	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	501-600	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	601-1000	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	>1000	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	TOTAL	3	2	67	2	2	100	23	20	87	882	455	52	209	80	38	2353	1612	69	3472	2171	63
Large fish (≥ 30cm)	0-50	--	--	--	--	--	--	21	18	86	141	124	88	3	2	67	663	626	94	828	770	93
	51-100	--	--	--	2	2	100	--	--	--	484	467	96	49	47	96	1377	1318	96	1912	1834	96
	101-200	3	2	67	--	--	--	2	2	100	247	232	94	119	115	97	300	291	97	671	642	96
	201-300	--	--	--	--	--	--	--	--	--	10	9	90	34	34	100	12	12	100	56	55	98
	301-400	--	--	--	--	--	--	--	--	--	--	--	--	3	3	100	1	1	100	4	4	100
	401-500	--	--	--	--	--	--	--	--	--	--	--	--	1	1	100	--	--	--	1	1	100
	501-600	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	601-1000	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	>1000	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	TOTAL	3	2	67	2	2	100	23	20	87	882	832	94	209	202	97	2353	2248	96	3472	3306	95

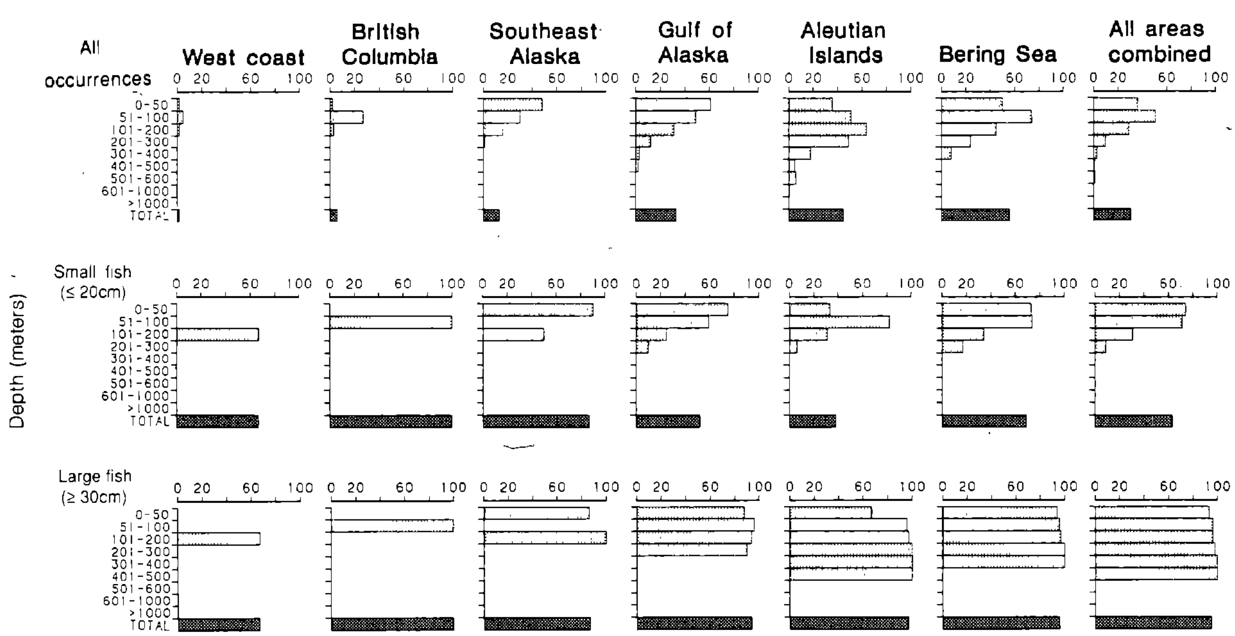
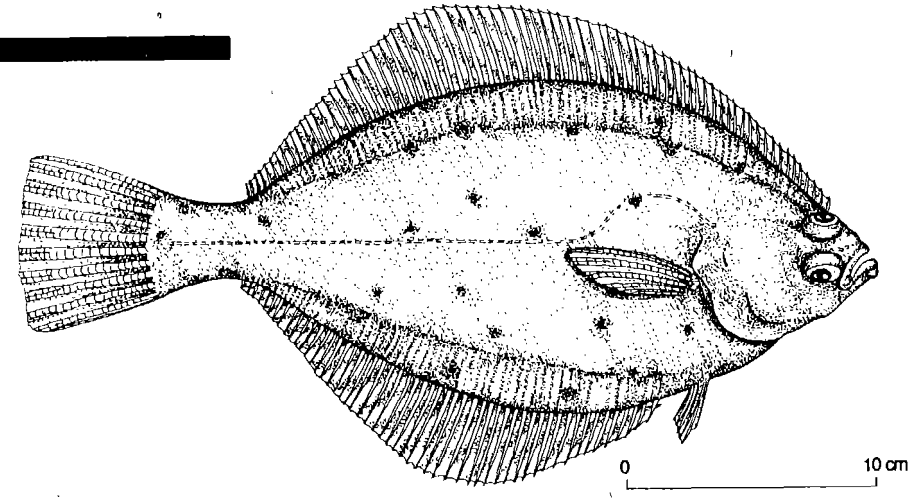


Figure 85.--Frequency of occurrence by depth interval by region for rock sole off the west coast of North America based on presence or absence in samples from resource assessment surveys during 1912-84.

Yellowfin sole



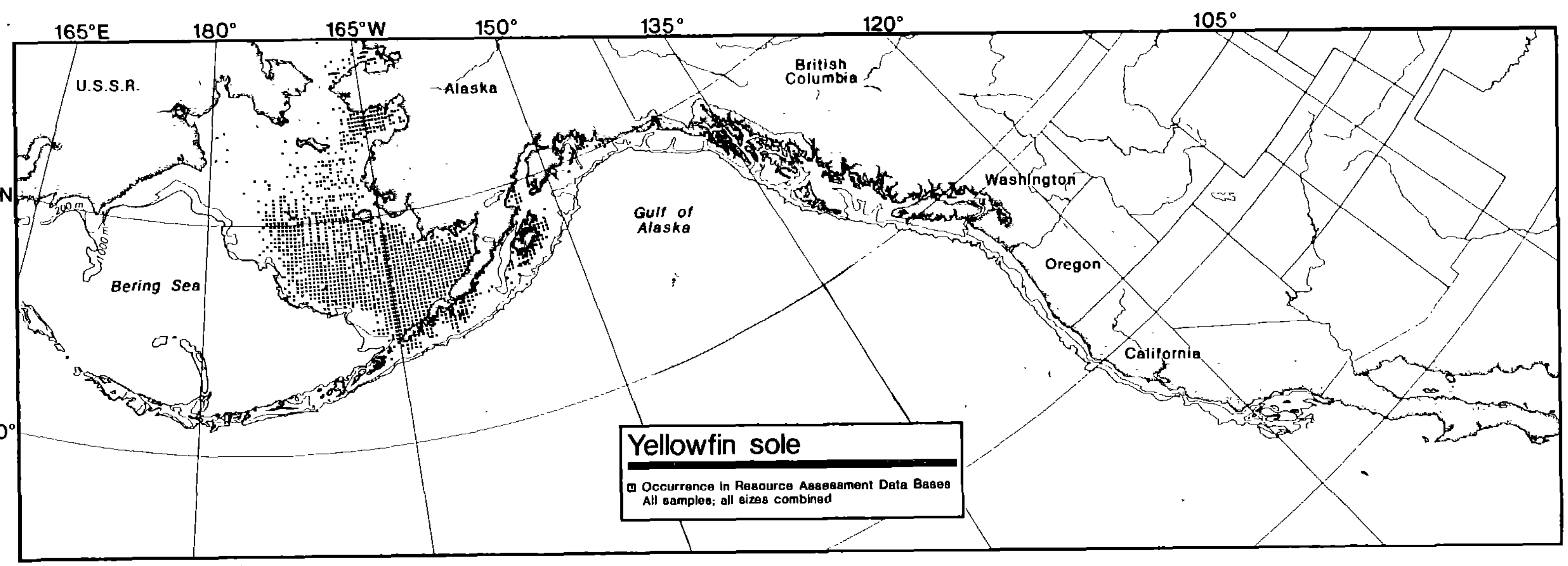


Figure 86.--The overall range of yellowfin sole off the west coast of North America based on an analysis of several resource assessment data bases for 1912-84.

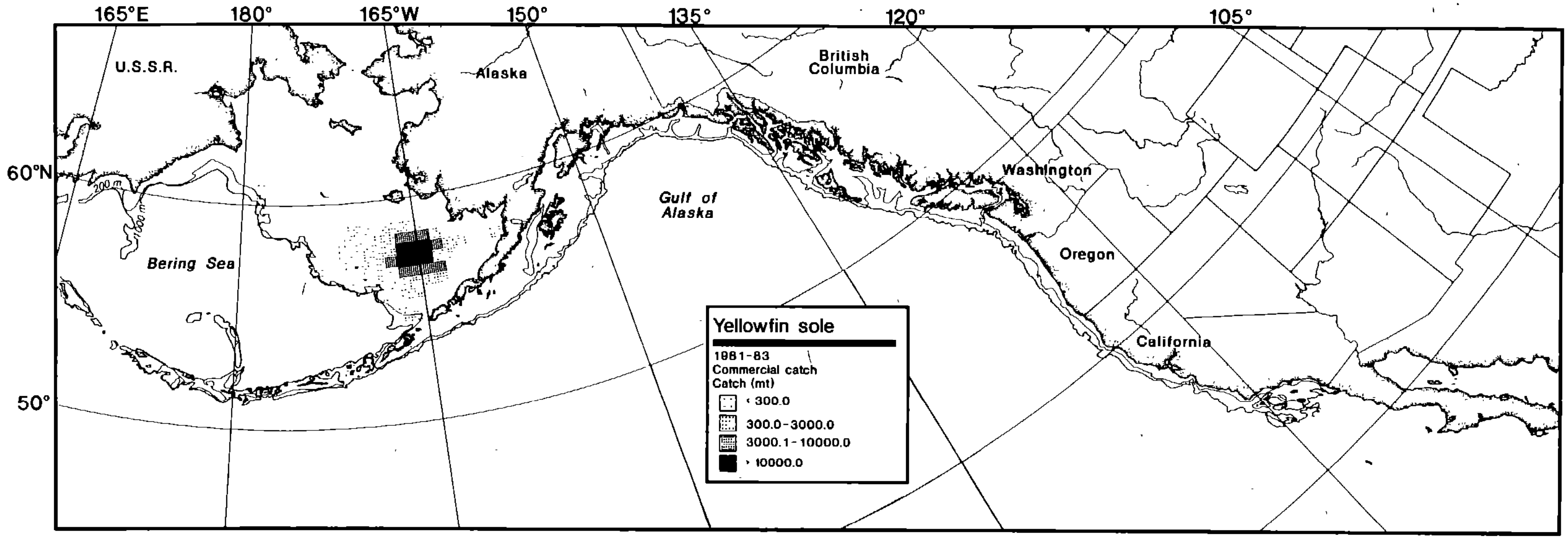


Figure 87.--Location of commercial harvests of yellowfin sole off the west coast of North America, 1981-83; domestic, foreign and joint venture harvests combined.

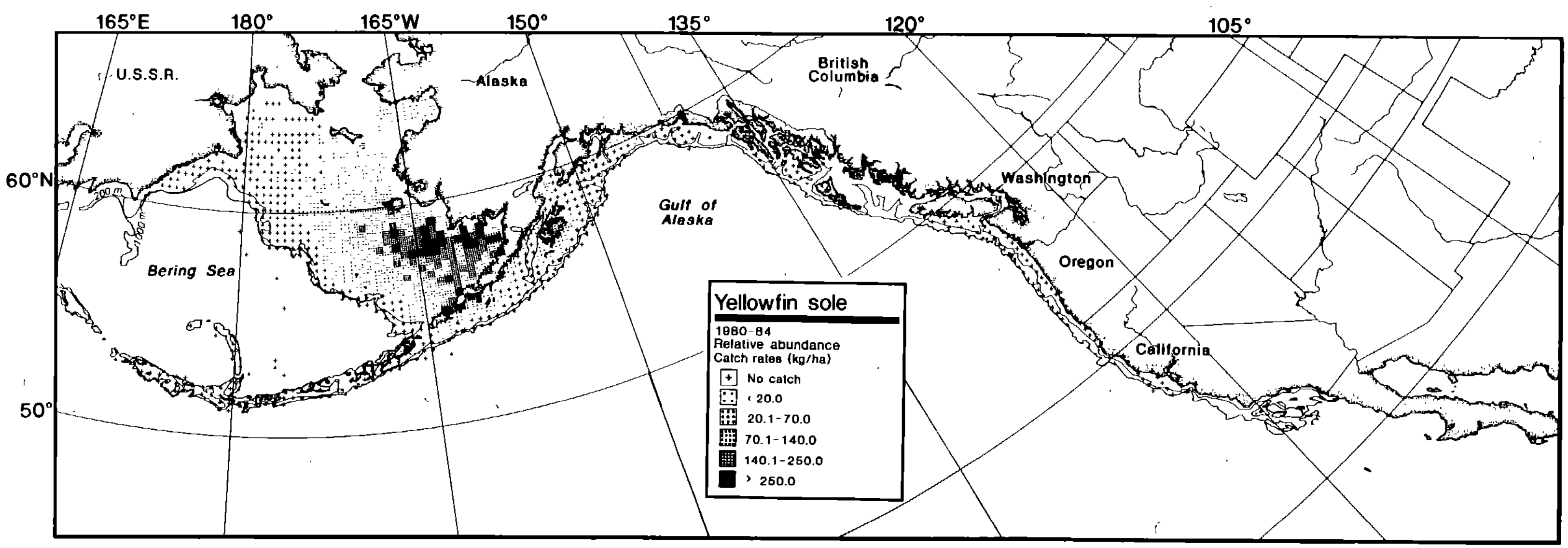


Figure 88.--The relative abundance of yellowfin sole off the west coast of North America, 1980-84, based on catch information from various NMFS trawl surveys.

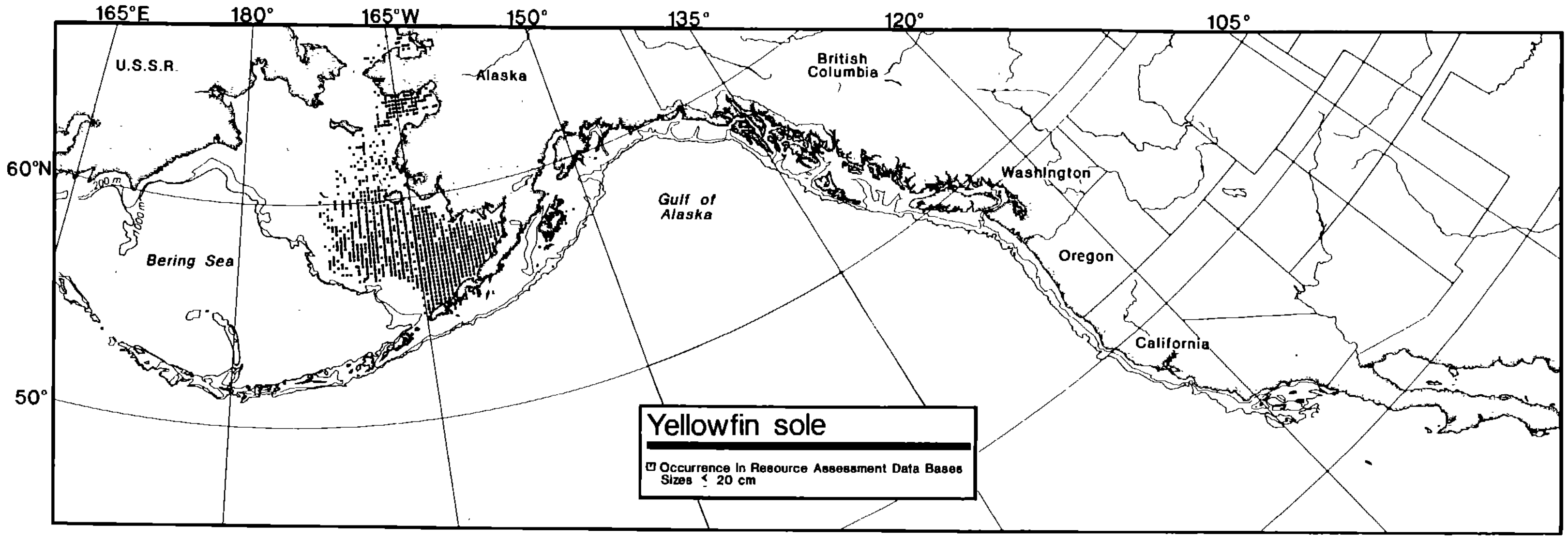


Figure 89.--The range of small (20 cm or less) yellowfin sole off the west coast of North America based on data from several resource assessment data bases for 1912-84.

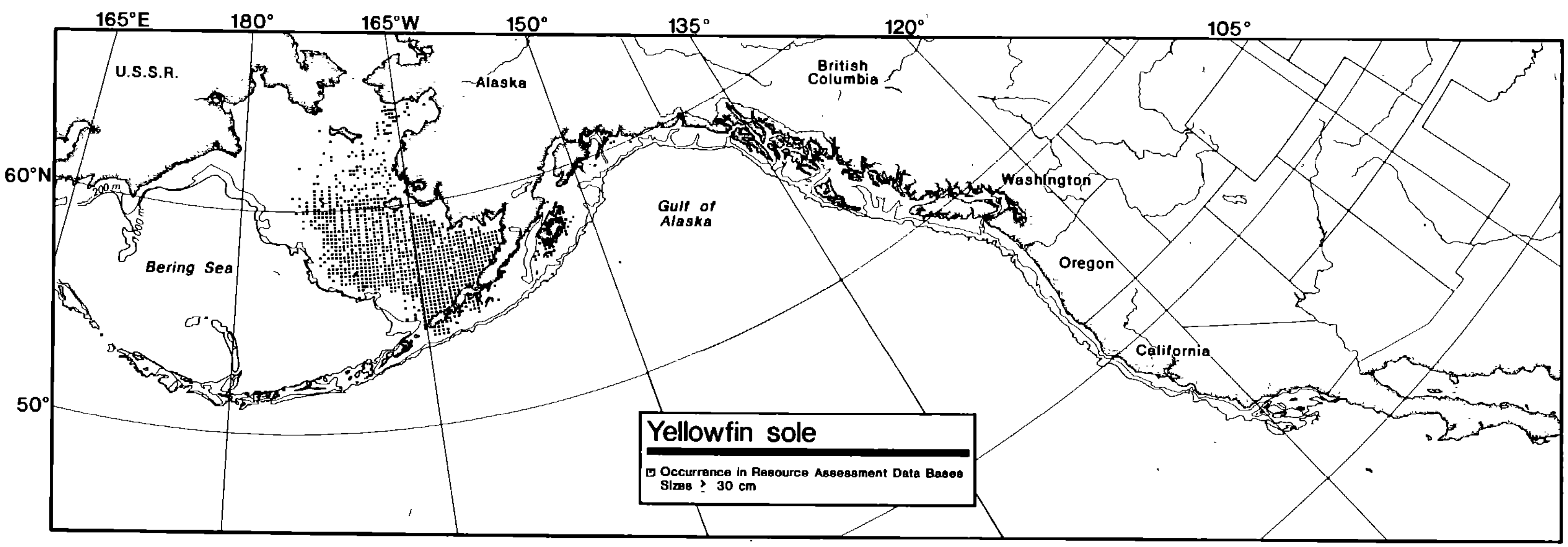


Figure 90.--The range of large (30 cm or larger) yellowfin sole off the west coast of North America based on data from several resource assessment data bases for 1912-84.

Table 20.--Total numbers of samples (hauls) and numbers of samples containing yellowfin sole by depth interval and geographic region from resource assessment surveys off the west coast of North America during 1912-84.

		West coast			British Columbia			Southeast Alaska			Gulf of Alaska			Aleutian Islands			Bering Sea			All areas combined		
	Depth (meters)	Total Hauls	Occ.	%	Total Hauls	Occ.	%	Total Hauls	Occ.	%	Total Hauls	Occ.	%	Total Hauls	Occ.	%	Total Hauls	Occ.	%	Total Hauls	Occ.	%
All occurrences	0-50	1608	--	--	119	--	--	145	53	37	432	217	50	74	4	5	3113	2210	71	5491	2484	45
	51-100	2270	--	--	139	--	--	486	195	40	2044	654	32	194	30	15	4186	3577	85	9322	4457	48
	101-200	2551	--	--	326	--	--	527	20	4	5013	642	13	623	30	5	2778	532	19	11833	1234	10
	201-300	921	--	--	250	--	--	399	--	--	1451	4	0	244	--	--	256	5	2	3522	9	0
	301-400	439	--	--	56	--	--	191	--	--	246	--	--	125	1	1	132	4	3	1190	5	0
	401-500	329	--	--	11	--	--	146	--	--	108	--	--	104	--	--	138	1	1	836	1	0
	501-600	144	--	--	2	--	--	192	--	--	40	--	--	62	--	--	66	--	--	506	--	--
	601-1000	321	--	--	6	--	--	243	--	--	60	--	--	89	--	--	134	--	--	853	--	--
	>1000	25	--	--	2	--	--	--	--	--	--	--	--	--	--	--	--	--	--	27	--	--
	TOTAL	8608	--	--	911	--	--	2329	268	12	9394	1517	16	1515	65	4	10803	6329	59	33580	8190	24
Small fish (≤ 20cm)	0-50	--	--	--	--	--	--	1	1	100	97	65	67	1	1	100	1466	1413	96	1565	1480	95
	51-100	--	--	--	--	--	--	--	--	--	173	34	20	19	7	37	2609	1816	70	2801	1857	66
	101-200	--	--	--	--	--	--	--	--	--	92	4	4	12	1	8	278	70	25	382	75	20
	201-300	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	301-400	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	401-500	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	501-600	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	601-1000	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	>1000	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	TOTAL	--	--	--	--	--	--	1	1	100	362	103	28	32	9	28	4353	3299	76	4748	3412	72
Large fish (≥ 30cm)	0-50	--	--	--	--	--	--	1	1	100	97	75	77	1	1	100	1466	1212	83	1565	1289	82
	51-100	--	--	--	--	--	--	--	--	--	173	159	92	19	19	100	2609	2384	91	2801	2562	91
	101-200	--	--	--	--	--	--	--	--	--	92	81	88	12	12	100	278	242	87	382	335	88
	201-300	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	301-400	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	401-500	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	501-600	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	601-1000	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	>1000	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	TOTAL	--	--	--	--	--	--	1	1	100	362	315	87	32	32	100	4353	3838	88	4748	4186	88

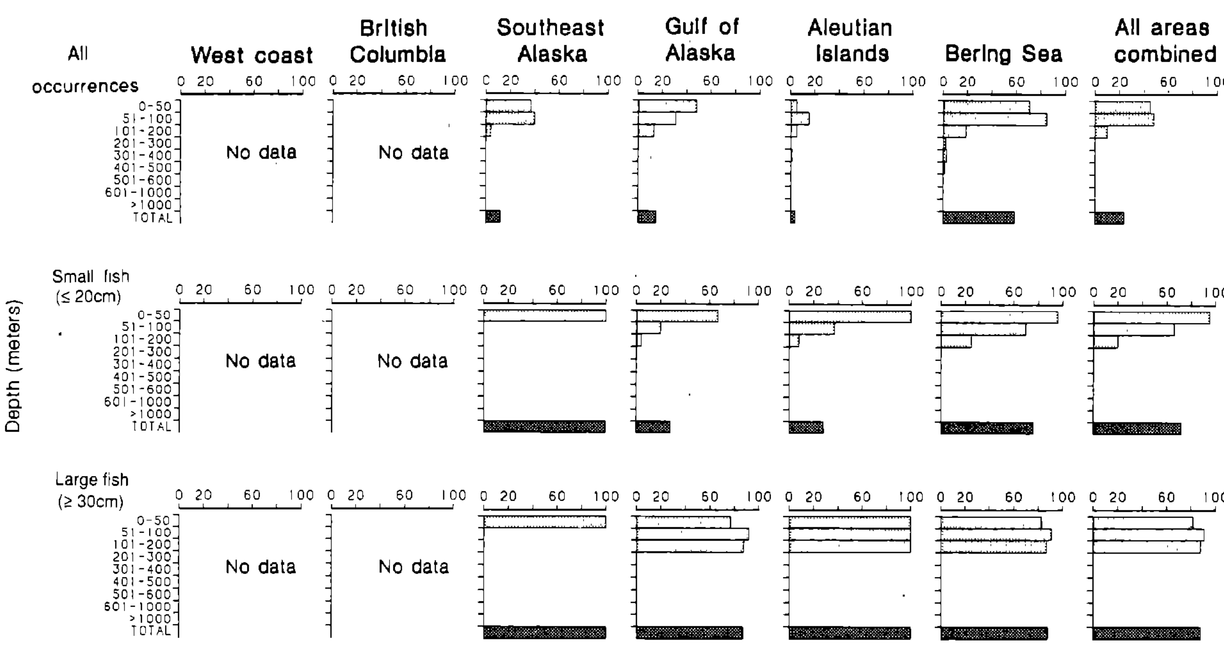
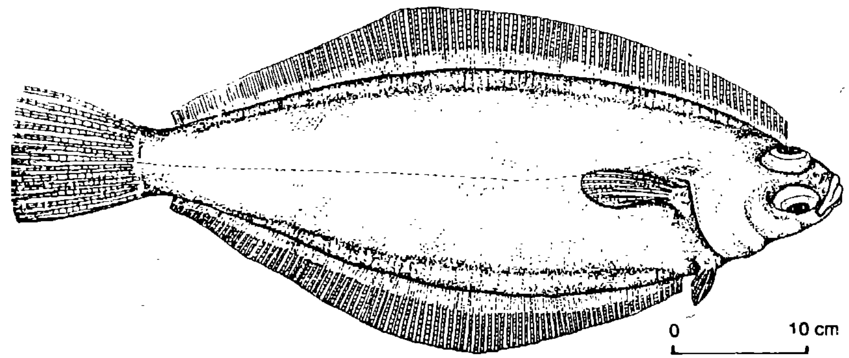


Figure 91 .--Frequency of occurrence by depth interval by region for yellow-fin sole off the west coast of North America based on presence or absence in samples from resource assessment surveys during 1912-84.

Dover sole



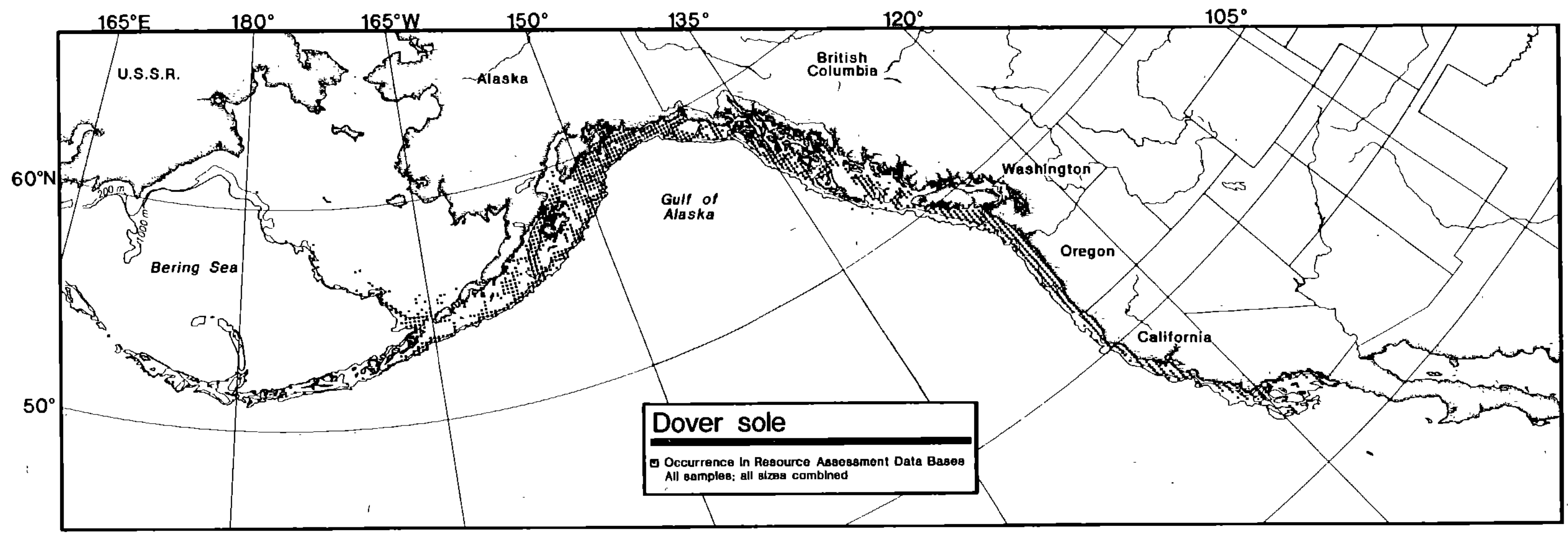


Figure 92.--The overall range of Dover sole off the west coast of North America based on an analysis of several resource assessment data bases for 1912-84.

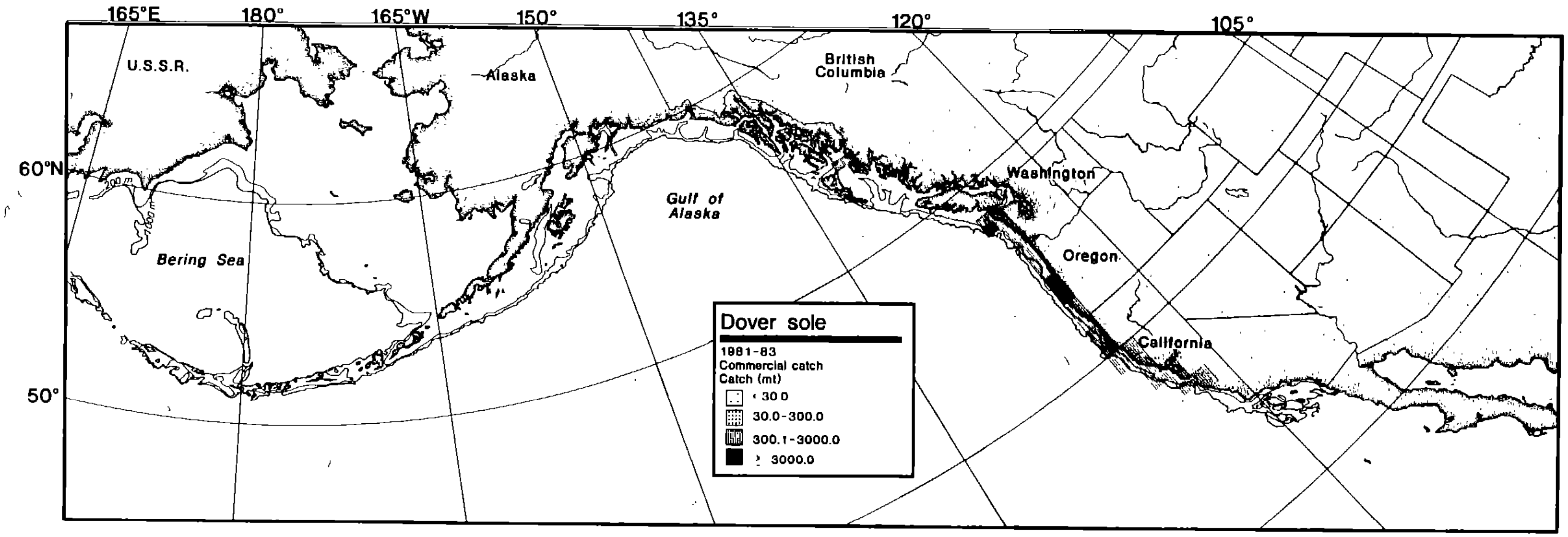


Figure 93.--Location of commercial harvests of Dover sole off the west coast of North America, 1981-83; domestic, foreign and joint venture harvests combined.

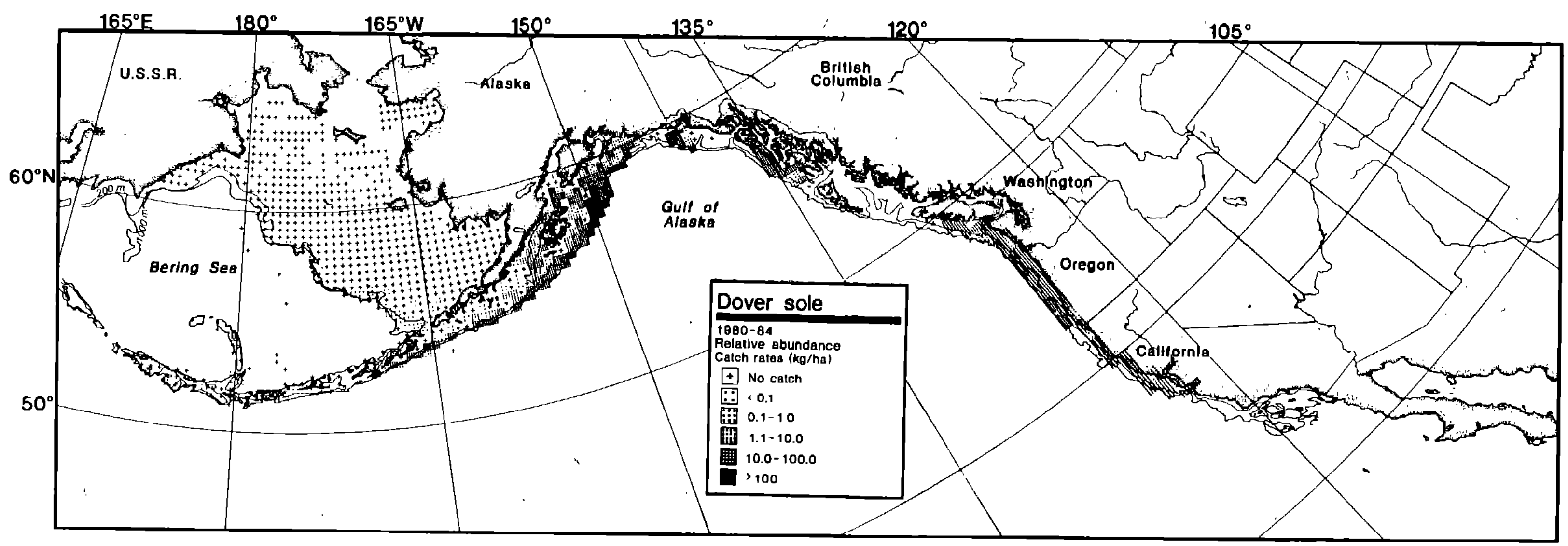


Figure 94.--The relative abundance of Dover sole off the west coast of North America, 1980-84, based on catch information from various NMFS trawl surveys.

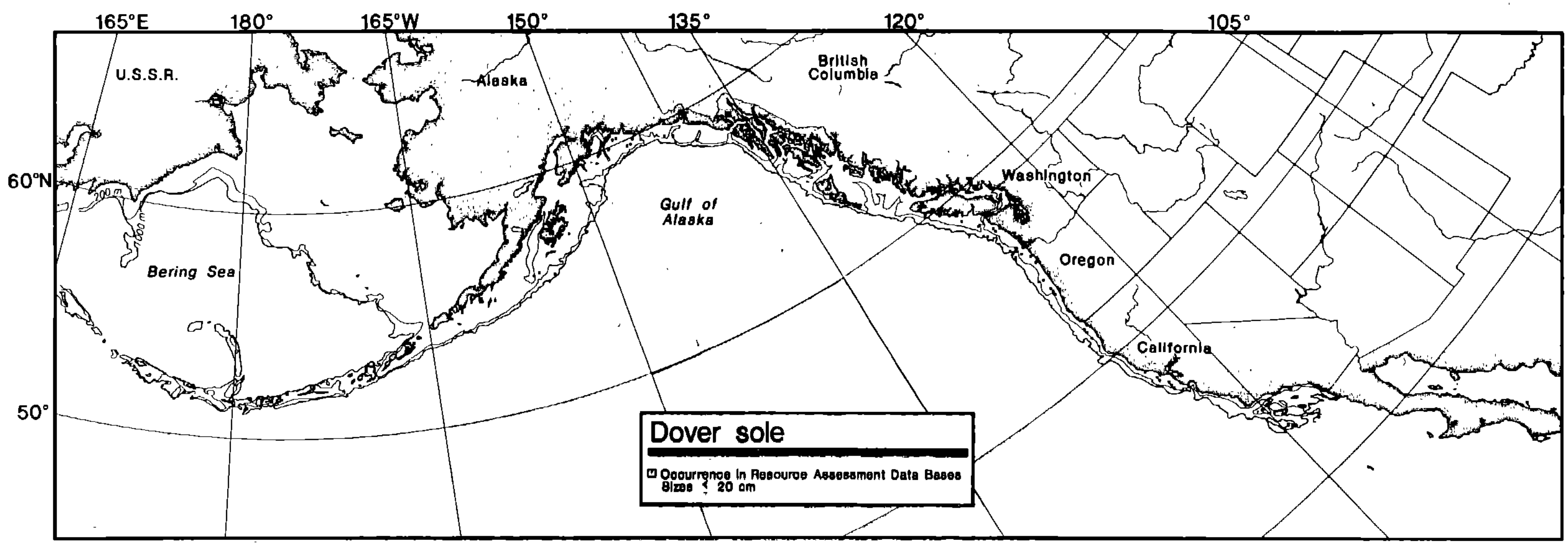


Figure 95.--The range of small (20 cm or less) Dover sole off the west coast of North America based on data from several resource assessment data bases for 1912-84.

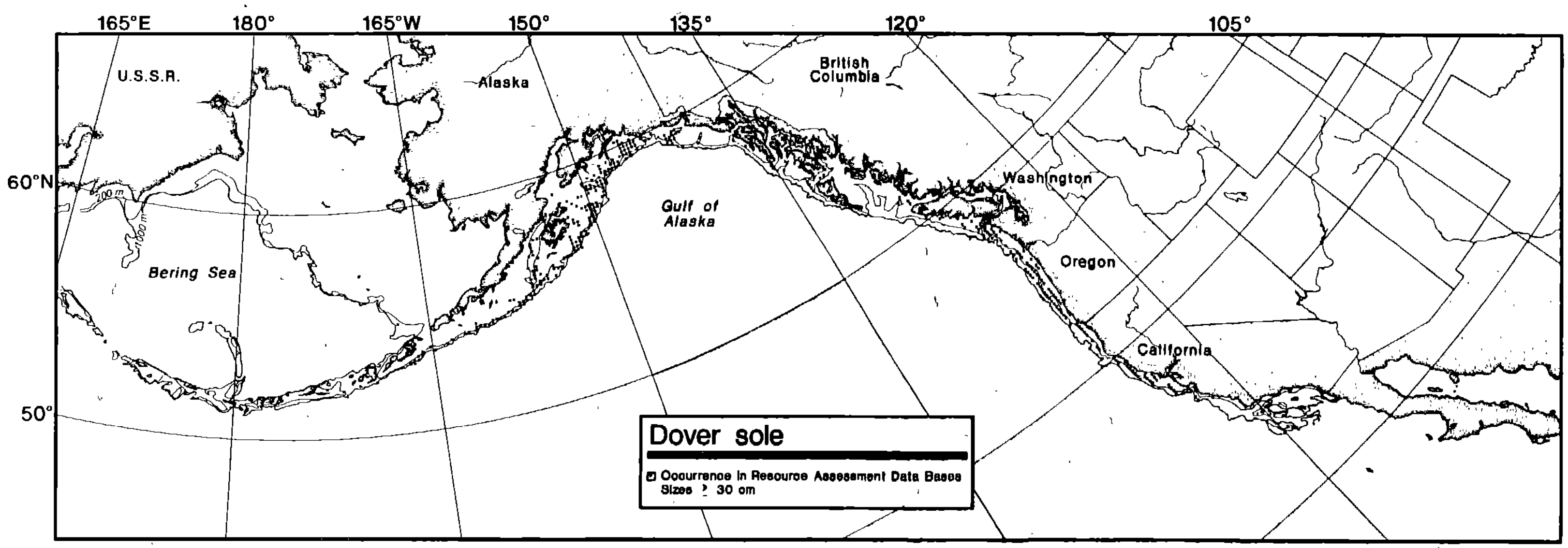


Figure 96--The range of large (30 cm or larger) Dover sole off the west coast of North America based on data from several resource assessment data bases for 1912-84.

Table 21.--Total numbers of samples (hauls) and numbers of samples containing Dover sole by depth interval and geographic region from resource assessment surveys off the west coast of North America during 1912-84.

		West coast			British Columbia			Southeast Alaska			Gulf of Alaska			Aleutian Islands			Bering Sea			All areas combined		
	Depth (meters)	Total Hauls	Occ.	%	Total Hauls	Occ.	%	Total Hauls	Occ.	%	Total Hauls	Occ.	%	Total Hauls	Occ.	%	Total Hauls	Occ.	%	Total Hauls	Occ.	%
All occurrences	0-50	1608	319	20	119	1	1	145	8	6	432	39	9	74	--	--	3113	2	0	5491	369	7
	51-100	2270	1086	48	139	31	22	486	51	10	2044	180	9	194	1	1	4186	7	0	9322	1357	15
	101-200	2551	1669	65	326	148	45	527	193	37	5013	1168	23	623	26	4	2778	15	1	11833	3221	27
	201-300	921	666	72	250	193	77	399	220	55	1451	859	59	244	34	14	256	9	4	3522	1981	56
	301-400	439	369	84	56	41	73	191	95	50	246	192	78	125	30	24	132	11	8	1190	739	62
	401-500	329	203	62	11	1	9	146	74	51	108	84	78	104	46	44	138	9	7	836	417	50
	501-600	144	48	33	2	--	--	192	76	40	40	39	98	62	34	55	66	3	5	506	200	40
	601-1000	321	98	31	6	--	--	243	84	35	60	24	40	89	17	19	134	7	5	853	230	27
	>1000	25	1	4	2	1	50	--	--	--	--	--	--	--	--	--	--	--	--	27	2	7
	TOTAL	8608	4459	52	911	416	46	2329	801	34	9394	2585	28	1515	188	12	10803	63	1	33580	8516	25
Small fish (≤ 20cm)	0-50	116	103	89	--	--	--	--	--	--	7	5	71	--	--	--	--	--	--	123	108	88
	51-100	216	209	97	2	2	100	--	--	--	32	10	31	--	--	--	--	--	--	250	221	88
	101-200	250	172	69	--	--	--	--	--	--	135	7	5	1	1	100	--	--	--	396	180	45
	201-300	37	2	5	--	--	--	--	--	--	132	5	4	--	--	--	--	--	--	187	7	4
	301-400	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	401-500	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	501-600	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	601-1000	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	>1000	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	TOTAL	705	486	69	6	2	33	--	--	--	428	27	6	24	1	4	--	--	--	1223	516	42
Large fish (≥ 30cm)	0-50	116	4	3	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	123	4	3
	51-100	216	16	7	--	--	--	--	--	--	32	15	47	--	--	--	--	--	--	250	33	13
	101-200	250	98	39	--	--	--	7	7	100	135	127	94	--	--	--	--	--	--	396	235	59
	201-300	37	36	97	--	--	--	16	16	100	132	131	99	1	1	100	--	--	--	187	185	99
	301-400	38	38	100	--	--	--	28	28	100	58	57	98	5	5	100	--	--	--	129	128	99
	401-500	16	15	94	--	--	--	7	7	100	19	19	100	7	7	100	--	--	--	49	48	98
	501-600	8	8	100	--	--	--	2	2	100	30	30	100	9	9	100	--	--	--	49	49	100
	601-1000	24	23	96	--	--	--	--	--	--	15	15	100	1	1	100	--	--	--	40	39	98
	>1000	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	TOTAL	705	238	34	--	--	--	60	60	100	428	394	92	24	23	96	--	--	--	1223	721	59

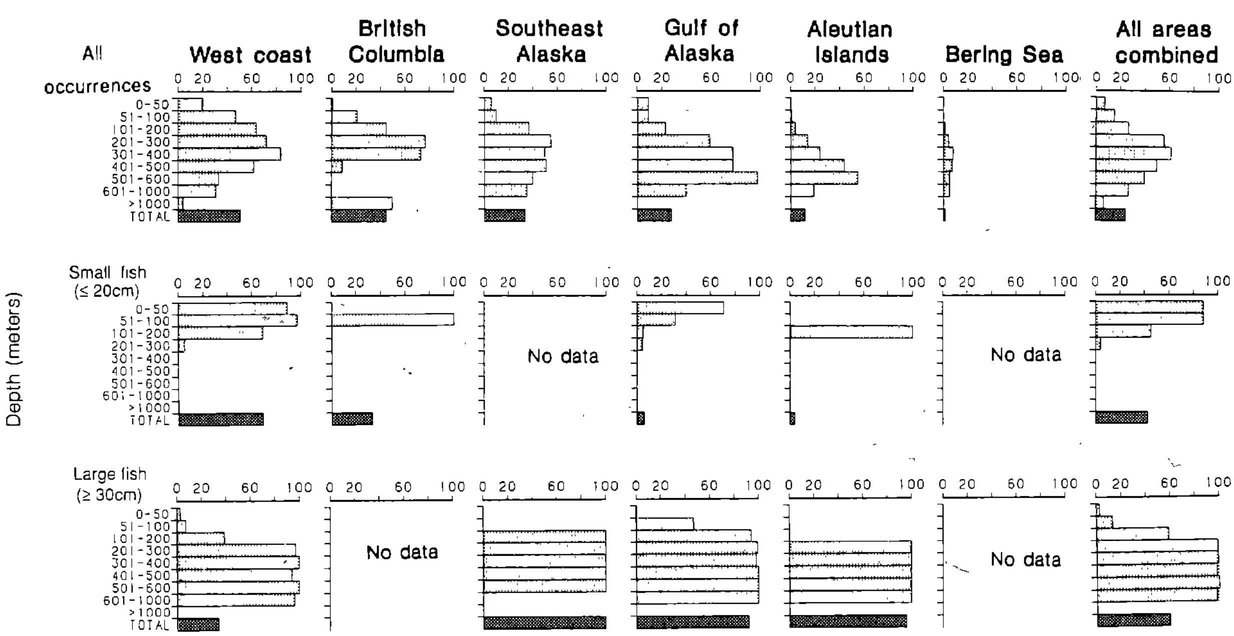
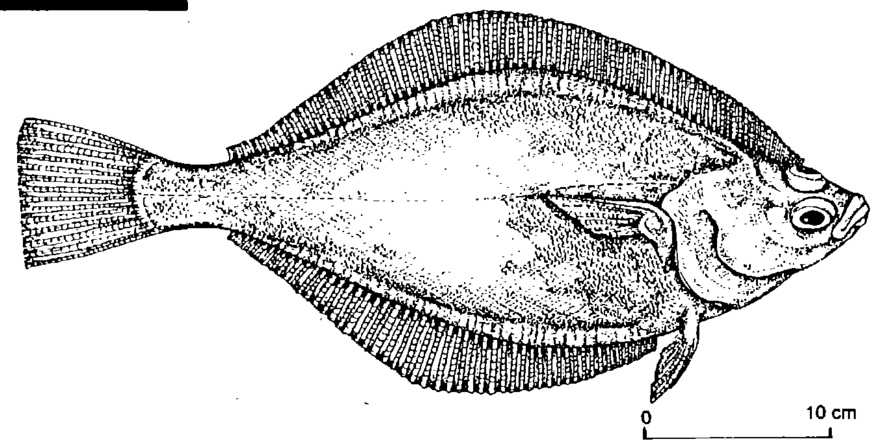


Figure 97.--Frequency of occurrence by depth interval by region for Dover sole off the west coast of North America based on presence or absence in samples from resource assessment surveys during 1912-84.

English sole



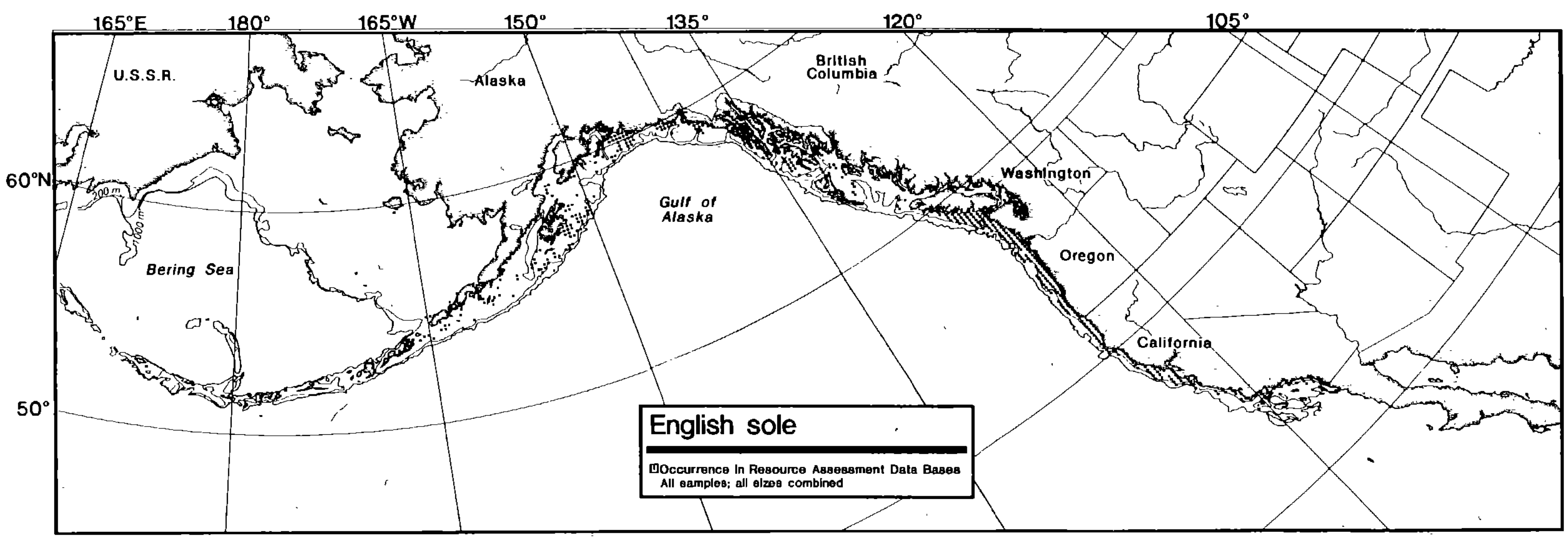


Figure 98.--The overall range of English sole off the west coast of North America based on an analysis of several resource assessment data bases for 1912-84.

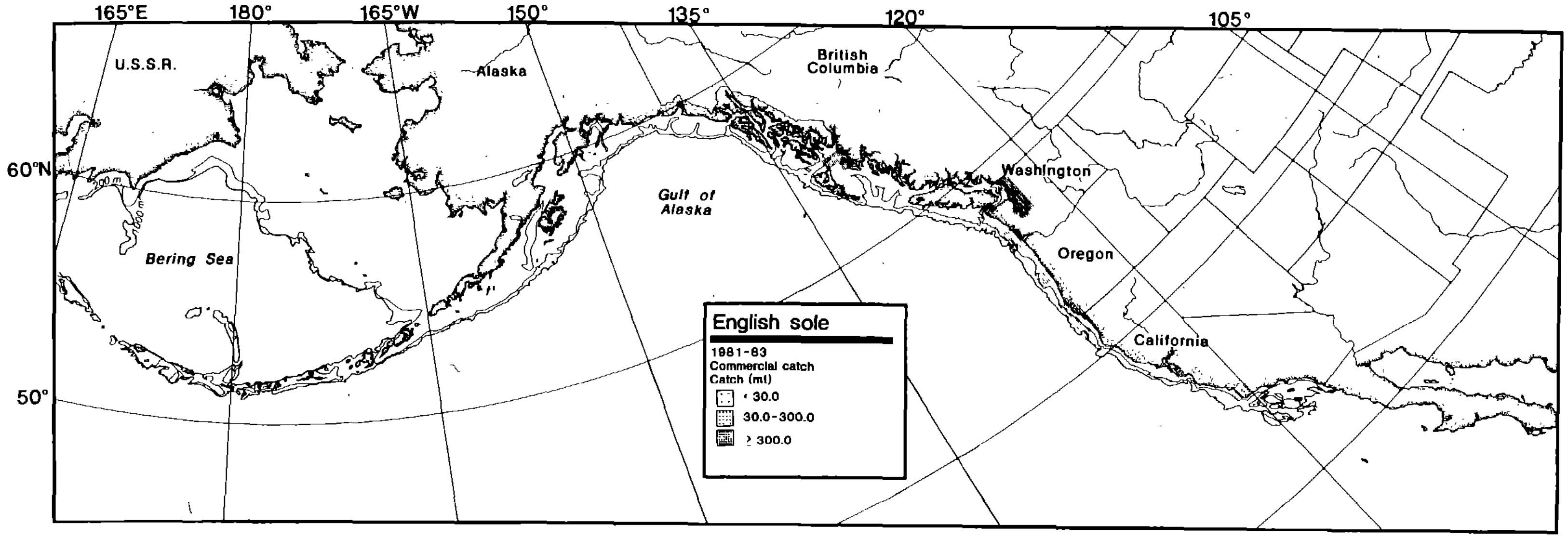


Figure 99.--Location of commercial harvests of English sole off the west coast of North America, 1981-83; domestic, foreign and joint venture harvests combined.

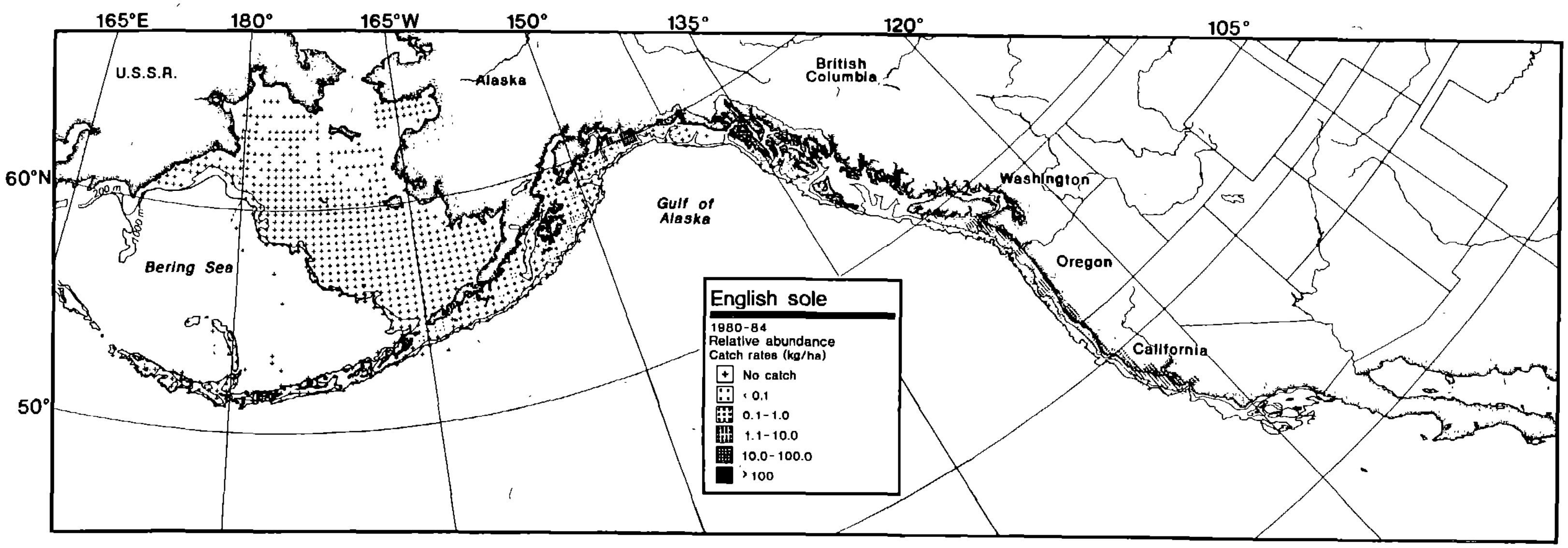


Figure 100.--The relative abundance of English sole off the west coast of North America, 1980-84, based on catch information from various, NMFS trawl surveys.

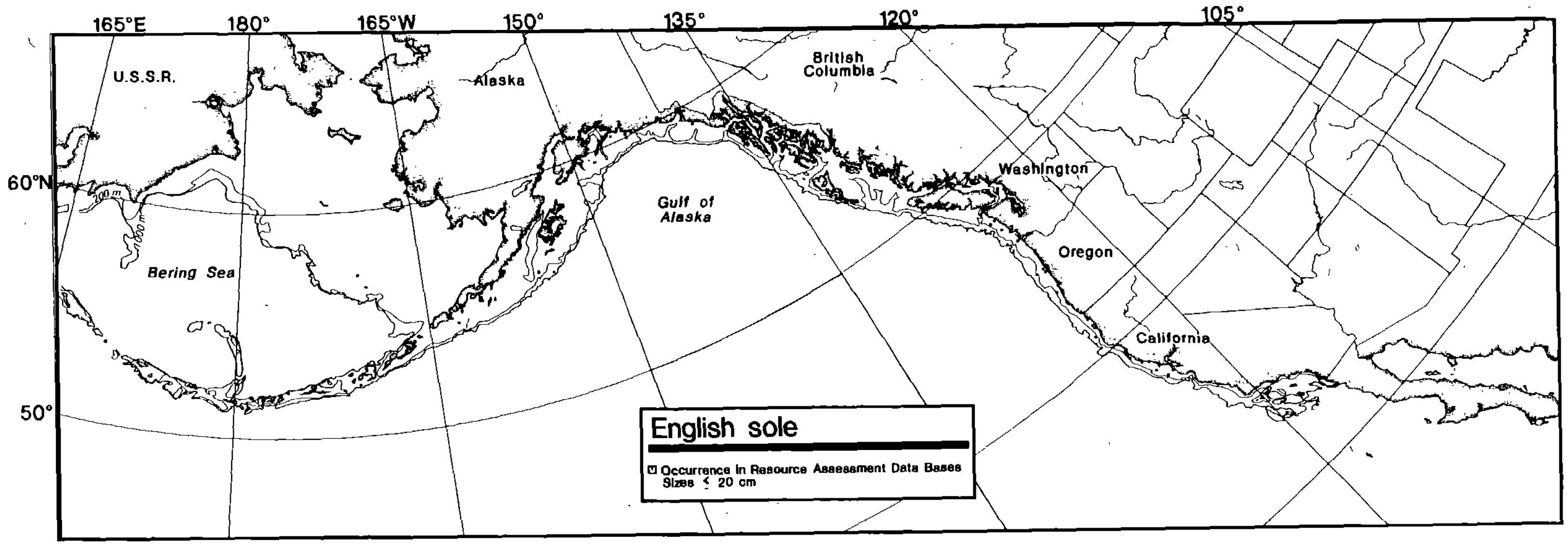


Figure 101 .--The range of small (20 cm or less) English sole off the west coast of North America based on data from several resource assessment data bases for 1912-84.

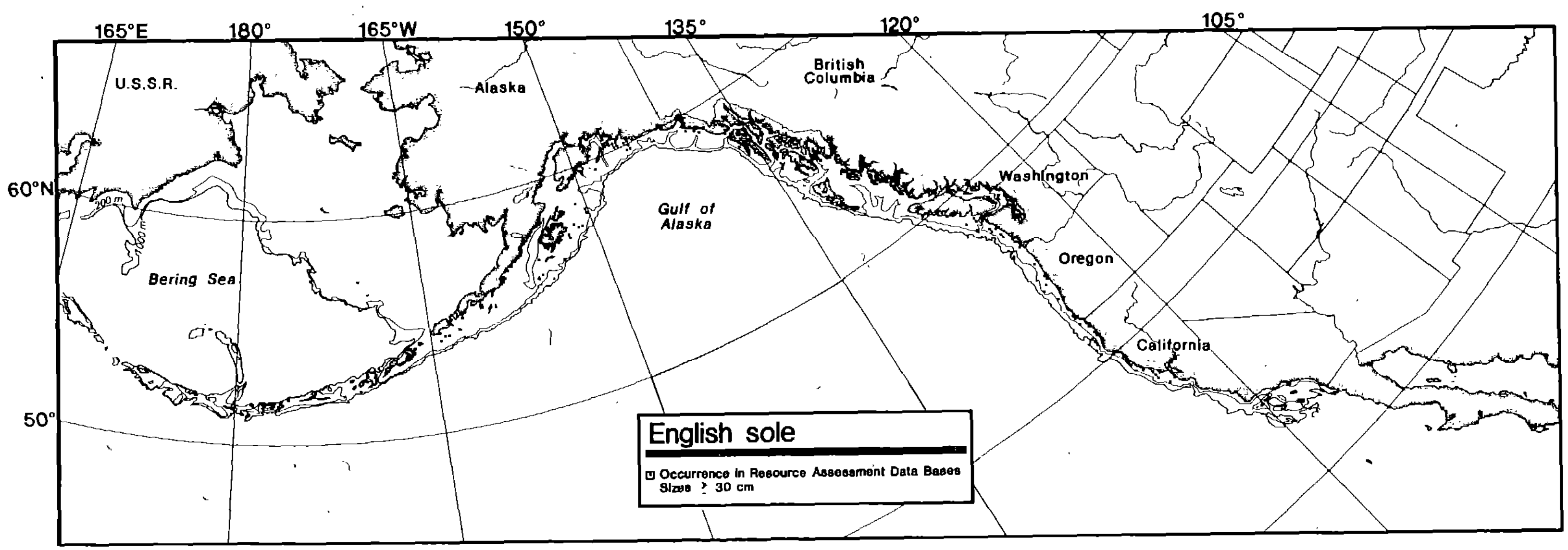


Figure 102.--The range of large (30 cm or larger) English sole off the west coast of North America based on data from several resource assessment data bases for 1912-84.

Table 22.--Total numbers of samples (hauls) and numbers of samples containing English sole by depth interval and geographic region from resource assessment surveys off the' west coast of North America during 1912-84.

		West coast			British Columbia			Southeast Alaska			Gulf of Alaska			Aleutian Islands			Bering Sea			All areas combined		
	Depth (meters)	Total Hauls	Occ.	%	Total Hauls	Occ.	%	Total Hauls	Occ.	%	Total Hauls	Occ.	%	Total Hauls	Occ.	%	Total Hauls	Occ.	%	Total Hauls	Occ.	%
All occurrences	0-50	1608	662	41	119	1	1	145	17	12	432	79	18	74	3	4	3113	6	0	5491	768	14
	51-100	2270	1136	50	139	50	36	486	100	21	2044	163	8	194	2	1	4186	--	--	9322	1451	16
	101-200	2551	831	33	326	33	10	527	96	18	5013	194	4	623	3	0	2778	--	--	11833	1157	10
	201-300	921	167	18	250	1	0	399	10	3	1451	34	2	244	--	--	256	--	--	3522	212	6
	301-400	439	40	9	56	--	--	191	1	1	246	--	--	125	--	--	132	--	--	1190	41	3
	401-500	329	6	2	11	--	--	146	1	1	108	--	--	104	--	--	138	--	--	836	7	1
	501-600	144	--	--	2	--	--	192	--	--	40	--	--	62	--	--	66	--	--	506	--	--
	601-1000	321	--	--	6	--	--	243	--	--	60	--	--	89	--	--	134	--	--	853	--	--
	>1000	25	--	--	2	--	--	--	--	--	--	--	--	--	--	--	--	--	--	27	--	--
	TOTAL	8608	2842	33	911	85	9	2329	225	10	9394	470	5	1515	8	1	10803	6	0	33580	3636	11
Small fish (≤ 20cm)	0-50	197	132	67	--	--	--	7	4	57	18	11	61	--	--	--	--	--	--	223	147	66
	51-100	176	119	68	--	--	--	--	--	--	28	1	4	--	--	--	--	--	--	204	120	59
	101-200	91	31	34	--	--	--	--	--	--	13	1	8	--	--	--	--	--	--	110	32	29
	201-300	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	301-400	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	401-500	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	501-600	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	601-1000	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	>1000	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	TOTAL	465	282	61	--	--	--	13	4	31	63	13	21	--	--	--	--	--	--	542	299	55
Large fish (≥ 30cm)	0-50	197	19	10	--	--	--	7	2	29	18	11	61	--	--	--	--	--	--	223	32	14
	51-100	176	56	32	--	--	--	--	--	--	28	26	93	--	--	--	--	--	--	204	82	40
	101-200	91	39	43	--	--	--	6	6	100	13	13	100	--	--	--	--	--	--	110	58	53
	201-300	1	1	100	--	--	--	--	--	--	4	4	100	--	--	--	--	--	--	5	5	100
	301-400	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	401-500	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	501-600	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	601-1000	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	>1000	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	TOTAL	465	115	25	--	--	--	13	8	62	63	54	86	--	--	--	--	--	--	542	177	33

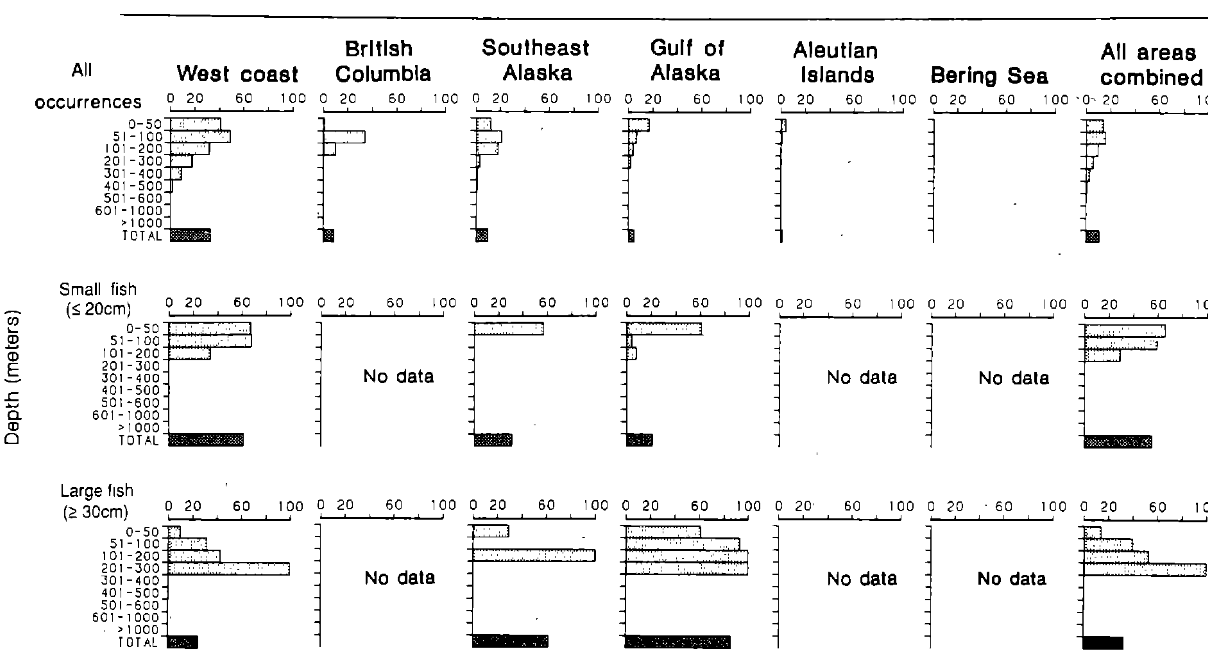
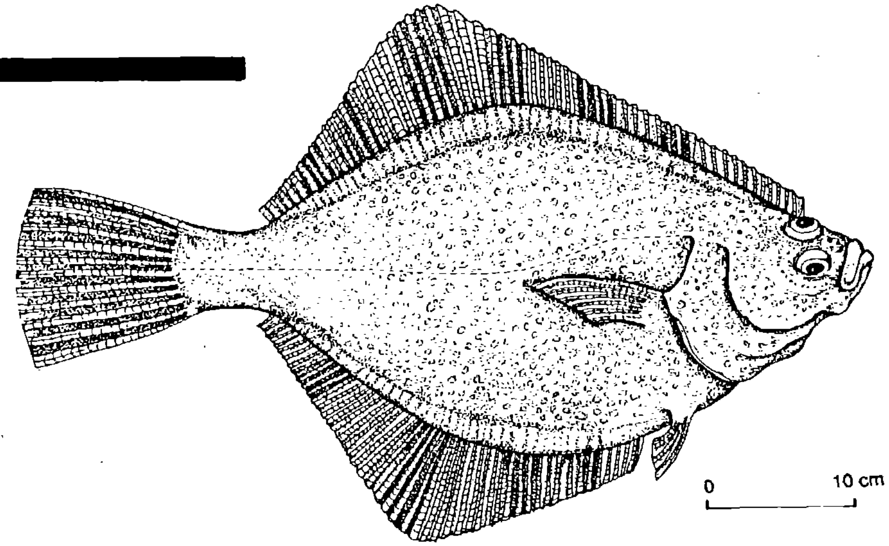


Figure 103.--Frequency of occurrence by depth interval by region for English sole off the west coast of North America based on presence or absence in samples from resource assessment surveys during 1912-84.

Starry flounder



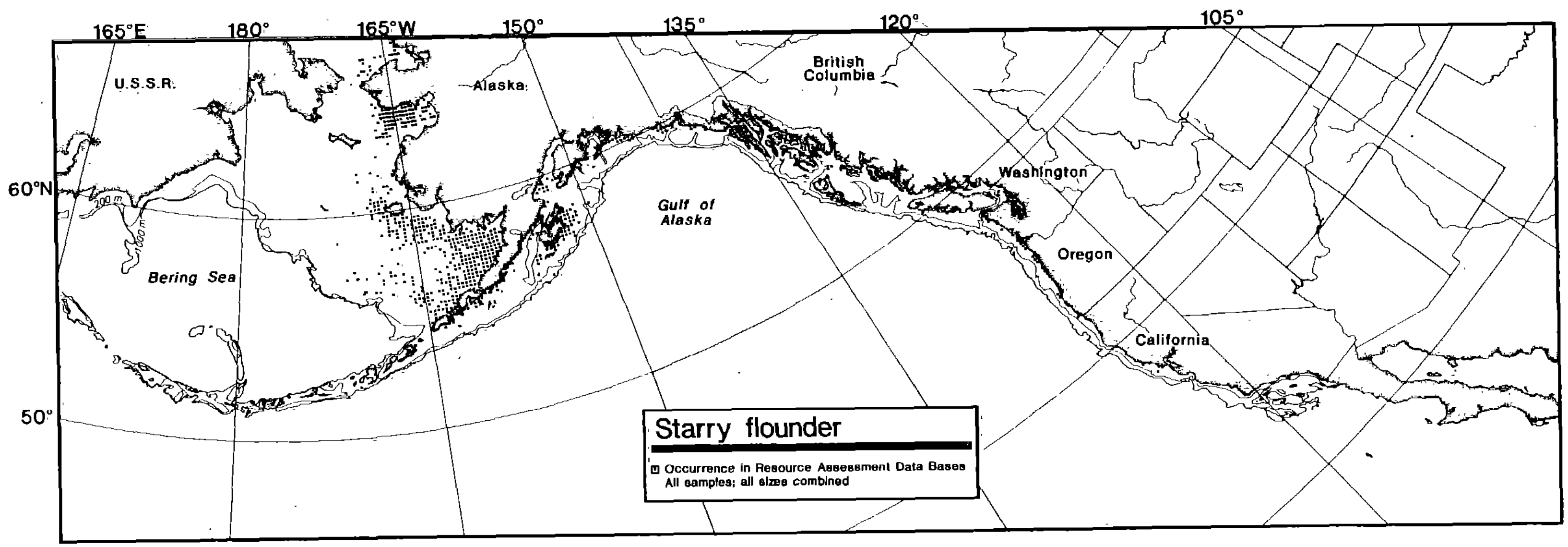


Figure 104.--The overall range of starry flounder off the west coast of North America based on an analysis of several resource assessment data bases for 1912-84.

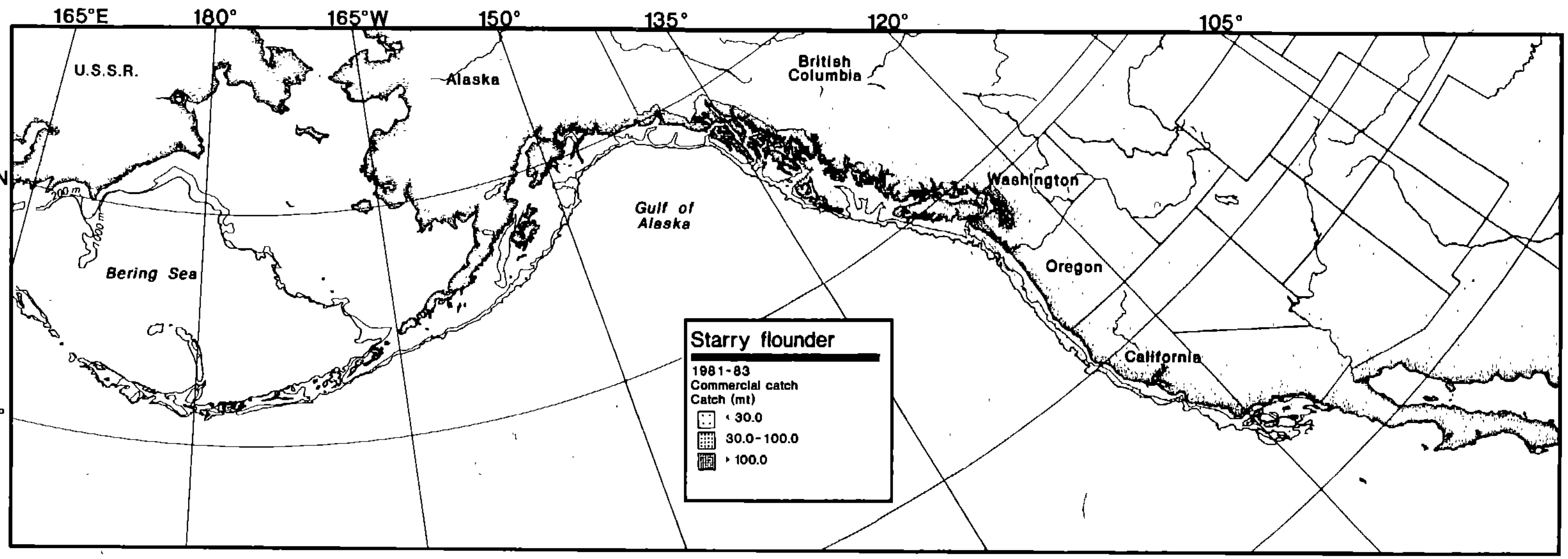


Figure 105.--Location of commercial harvests of starry flounder off the west coast of North America, 1981-83; domestic, foreign and joint venture harvests combined.

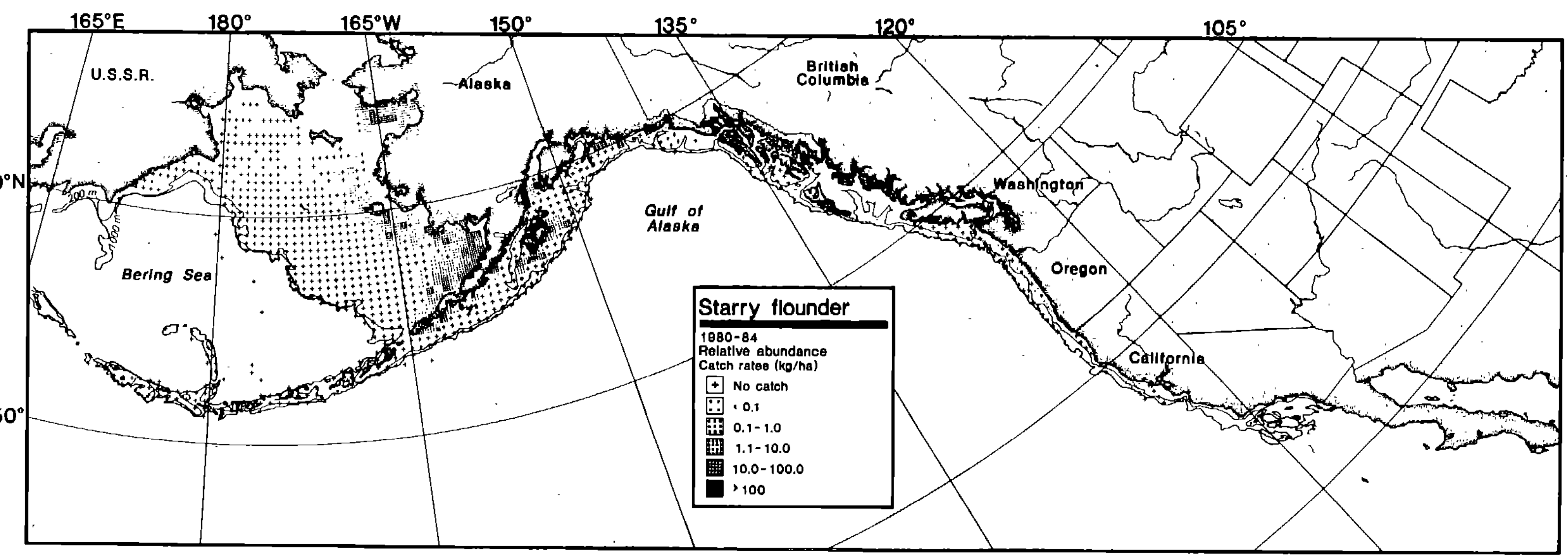


Figure 106.--The relative abundance of starry flounder off the west coast of North America, 1980-84, based on catch information from various NMFS trawl surveys.

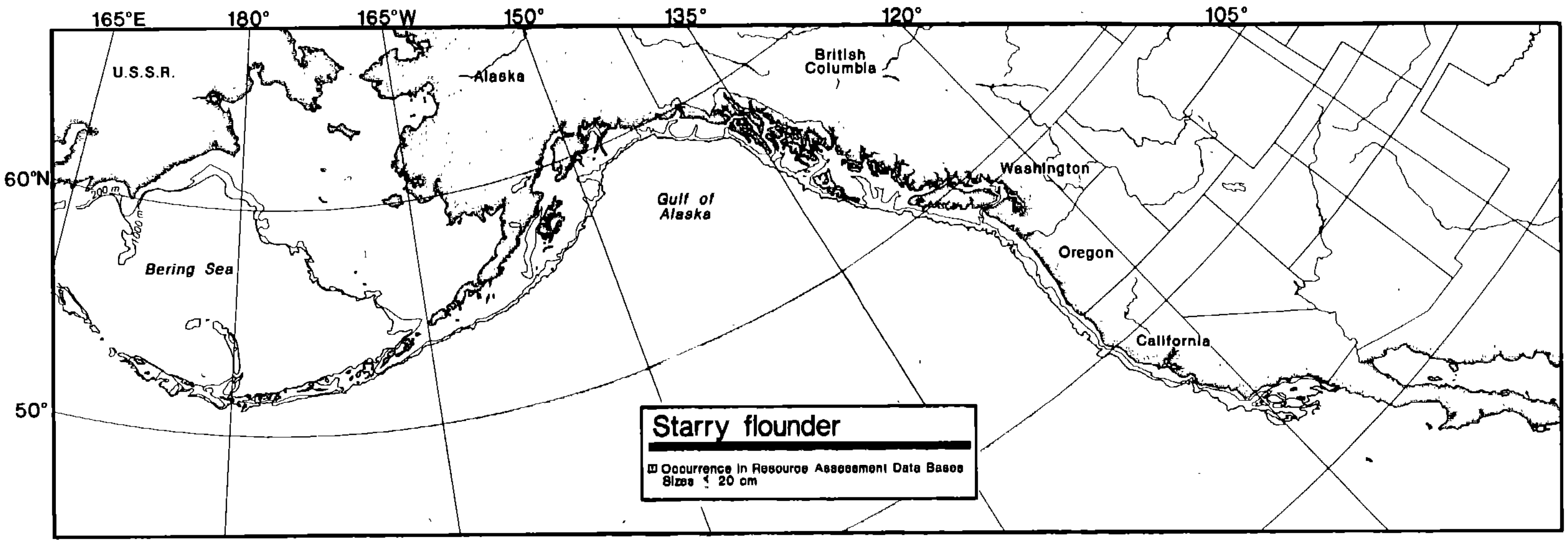


Figure 107.--The range of small (20 cm or less) starry flounder off the west coast of North America based on data from several resource assessment data bases for 1912-84.

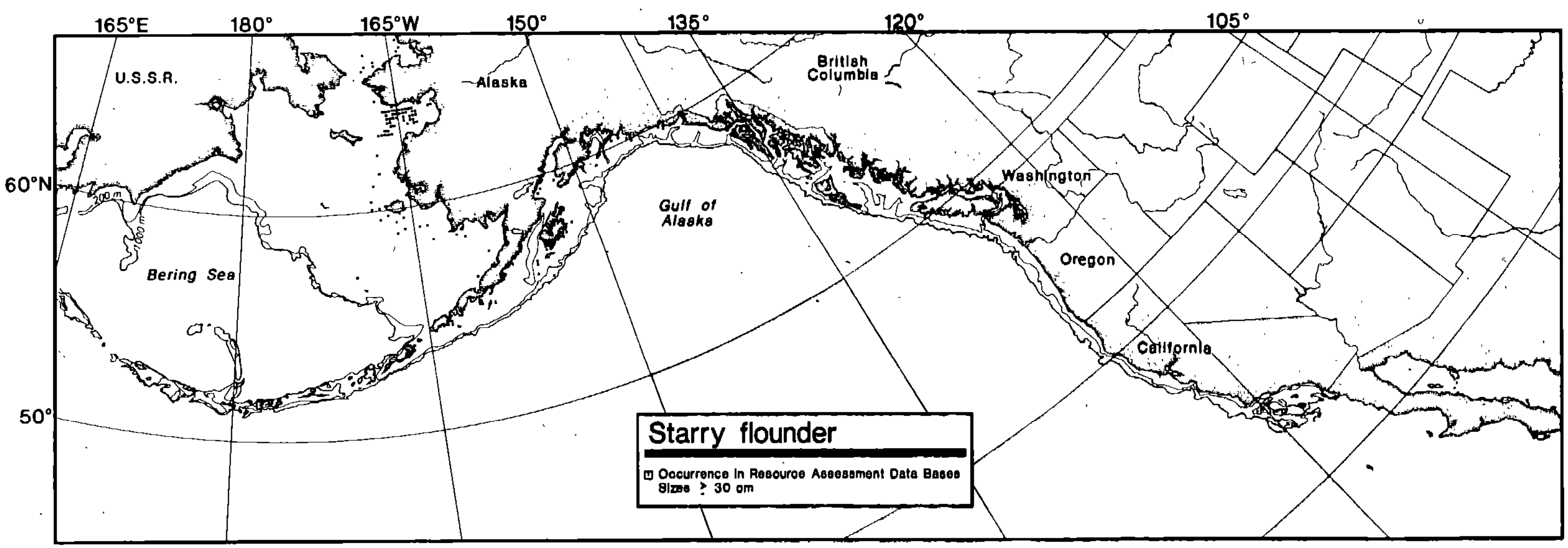


Figure 108.--The range of large (30 cm or larger) starry flounder off the west coast of North America based on data from several resource assessment data bases for 1912-84.

Table 23.--Total numbers of samples (hauls) and numbers of samples containing starry flounder by depth interval and geographic region from resource assessment surveys off the west coast of North America during 1912-84.

		West coast			British Columbia			Southeast Alaska			Gulf of Alaska			Aleutian Islands			Bering Sea			All areas combined		
	Depth (meters)	Total Hauls	Occ.	%	Total Hauls	Occ.	%	Total Hauls	Occ.	%	Total Hauls	Occ.	%	Total Hauls	Occ.	%	Total Hauls	Occ.	%	Total Hauls	Occ.	%
All occurrences	0-50	1608	35	2	119	--	--	145	44	30	432	187	43	74	--	--	3113	770	25	5491	1036	19
	51-100	2270	25	1	139	1	1	486	141	29	2044	238	12	194	--	--	4186	255	6	9322	660	7
	101-200	2551	1	0	326	--	--	527	34	6	5013	144	3	623	1	0	2778	16	1	11833	196	2
	201-300	921	--	--	250	--	--	399	--	--	1451	6	0	244	--	--	256	--	--	3522	6	0
	301-400	439	1	0	56	--	--	191	--	--	246	1	0	125	--	--	132	--	--	1190	2	0
	401-500	329	--	--	11	--	--	146	--	--	108	--	--	104	--	--	138	--	--	836	--	--
	501-600	144	--	--	2	--	--	192	--	--	40	--	--	62	--	--	66	--	--	506	--	--
	601-1000	321	--	--	6	--	--	243	--	--	60	--	--	89	--	--	134	--	--	853	--	--
	>1000	25	--	--	2	--	--	--	--	--	--	--	--	--	--	--	--	--	--	27	--	--
	TOTAL	8608	62	1	911	1	0	2329	219	9	9394	576	6	1515	1	0	10803	1041	10	33580	1900	6
Small fish (≤ 20cm)	0-50	--	--	--	--	--	--	--	--	--	37	1	3	--	--	--	130	5	4	169	6	4
	51-100	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	8	1	13	37	1	3
	101-200	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	201-300	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	301-400	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	401-500	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	501-600	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	601-1000	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	>1000	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	TOTAL	--	--	--	--	--	--	--	--	--	74	1	1	--	--	--	138	6	4	215	7	3
Large fish (≥ 30cm)	0-50	--	--	--	--	--	--	2	2	100	37	37	100	--	--	--	130	122	94	169	161	95
	51-100	--	--	--	--	--	--	--	--	--	29	29	100	--	--	--	8	7	88	37	36	97
	101-200	--	--	--	--	--	--	1	1	100	8	8	100	--	--	--	--	--	--	9	9	100
	201-300	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	301-400	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	401-500	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	501-600	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	601-1000	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	>1000	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	TOTAL	--	--	--	--	--	--	3	3	100	74	74	100	--	--	--	138	129	93	215	206	96

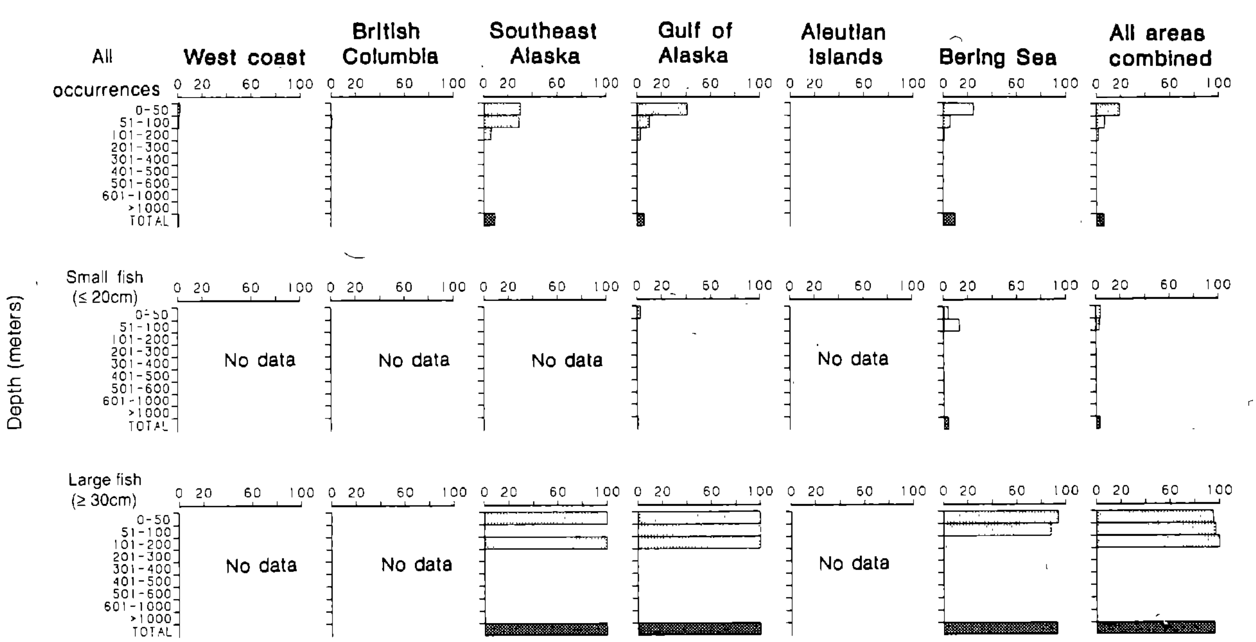
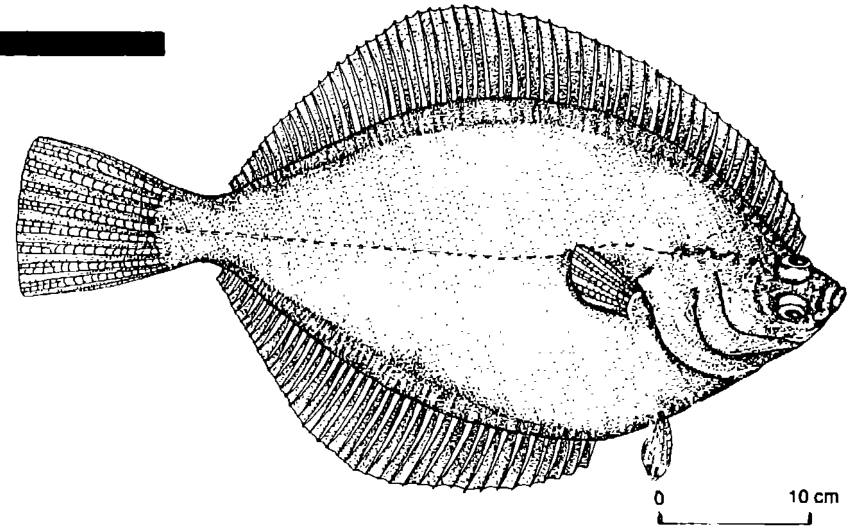


Figure 109.--Frequency of occurrence by depth interval by region for starry flounder off the west coast of North America based on presence or absence in samples from resource assessment surveys during 1912-84.

Alaska plaice



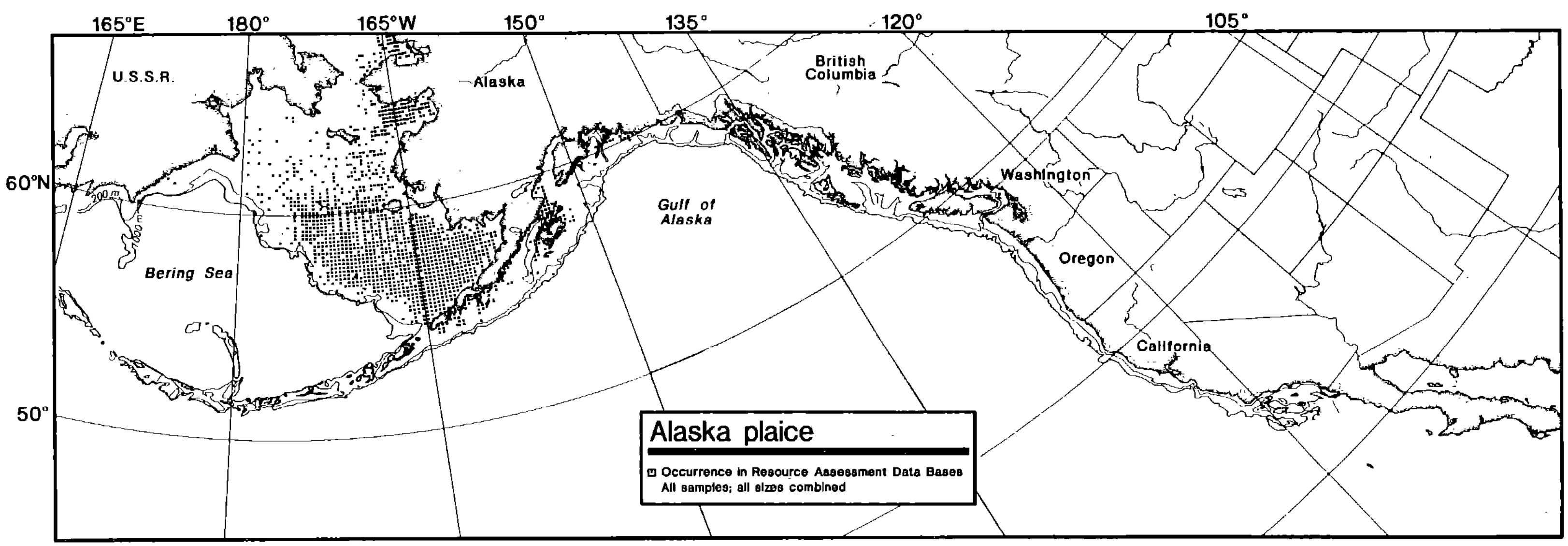


Figure 110.--The overall range of Alaska plaice off the west coast of North America based on an analysis of several resource assessment data bases for 1912-84.

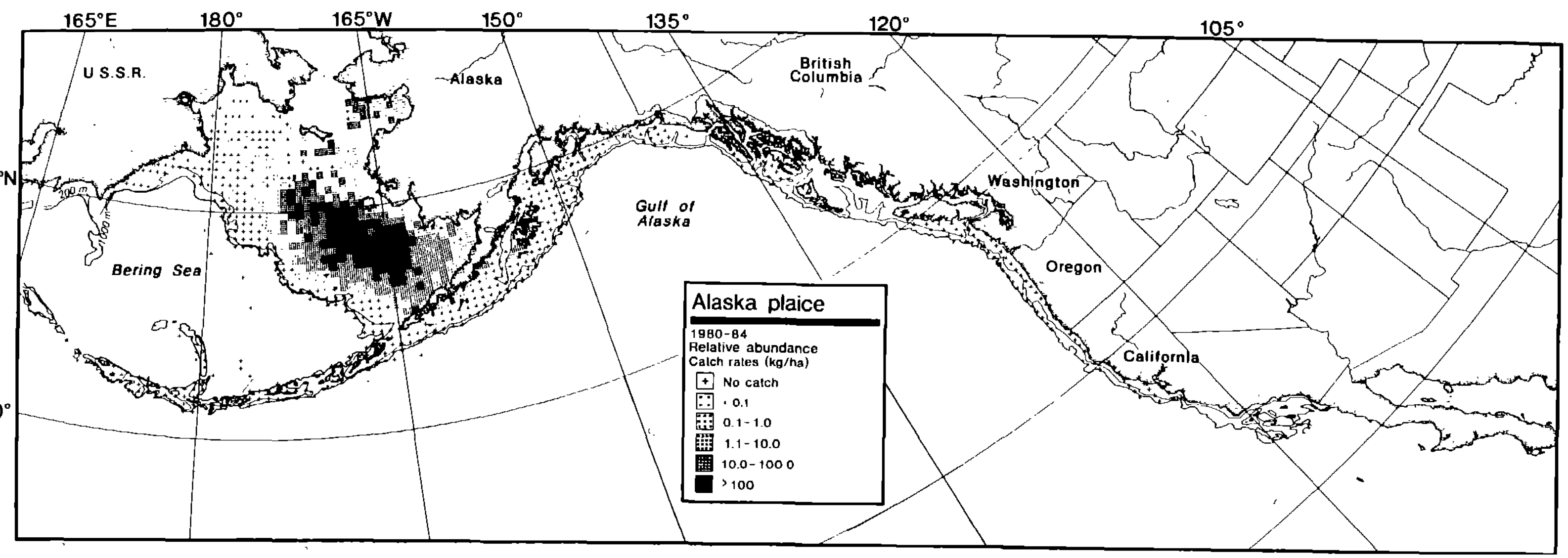


Figure 111 .--The relative abundance of Alaska plaice off the west coast of North America, 1980-84, based on catch information from various NMFS trawl surveys.

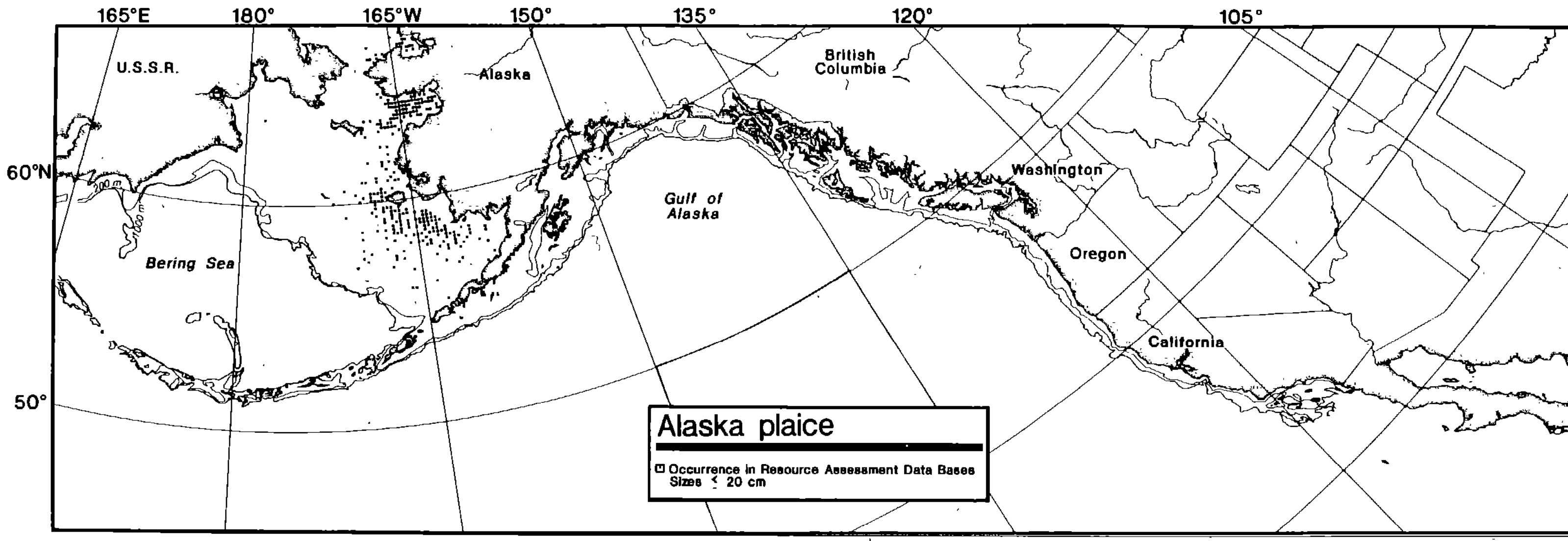


Figure 112.--The range of small (20 cm or less) Alaska plaice off the west coast of North America based on data from several resource assessment data bases for 1912-84.

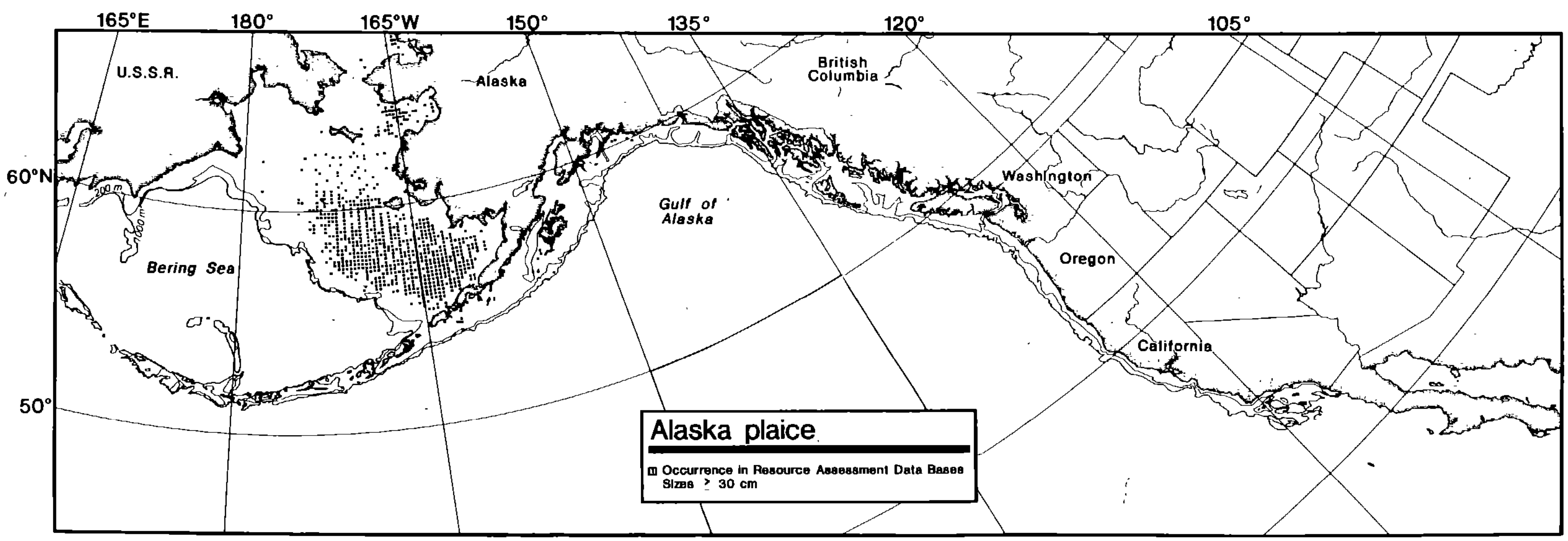


Figure 113.--The range of large (30 cm or larger) Alaska plaice off the west coast of North America based on data from several resource assessment data bases for 1912-84.

Table 24.--Total numbers of samples (hauls) and numbers of samples containing Alaska plaice by depth interval and geographic region from resource assessment surveys off the west coast of North America during 1912-84.

		West coast			British Columbia			Southeast Alaska			Gulf of Alaska			Aleutian Islands			Bering Sea			All areas combined		
	Depth (meters)	Total Hauls	Occ.	%	Total Hauls	Occ.	%	Total Hauls	Occ.	%	Total Hauls	Occ.	%	Total Hauls	Occ.	%	Total Hauls	Occ.	%	Total Hauls	Occ.	%
All occurrences	0-50	1608	--	--	119	--	--	145	2	1	432	91	21	74	1	1	3113	1687	54	5491	1781	32
	51-100	2270	--	--	139	--	--	486	21	4	2044	150	7	194	2	1	4186	3049	73	9322	3222	35
	101-200	2551	--	--	326	--	--	527	13	2	5013	172	3	623	4	1	2778	504	18	11833	693	6
	201-300	921	--	--	250	--	--	399	--	--	1451	16	1	244	--	--	256	5	2	3522	21	1
	301-400	439	--	--	56	--	--	191	--	--	246	--	--	125	--	--	132	3	2	1190	3	0
	401-500	329	--	--	11	--	--	146	--	--	108	--	--	104	--	--	138	1	1	836	1	0
	501-600	144	--	--	2	--	--	192	--	--	40	--	--	62	--	--	66	--	--	506	--	--
	601-1000	321	--	--	6	--	--	243	--	--	60	--	--	89	--	--	134	--	--	853	--	--
	>1000	25	--	--	2	--	--	--	--	--	--	--	--	--	--	--	--	--	--	27	--	--
	TOTAL	8608	--	--	911	--	--	2329	36	2	9394	429	5	1515	7	0	10803	5249	49	33580	5721	17
Small fish (≤ 20cm)	0-50	--	--	--	--	--	--	--	--	--	20	1	5	--	--	--	716	393	55	736	394	54
	51-100	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	1223	37	3	1250	37	3
	101-200	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	84	2	2	91	2	2
	201-300	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	301-400	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	401-500	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	501-600	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	601-1000	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	>1000	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	TOTAL	--	--	--	--	--	--	--	--	--	54	1	2	--	--	--	2025	432	21	2079	433	21
Large fish (≥ 30cm)	0-50	--	--	--	--	--	--	--	--	--	20	16	80	--	--	--	716	544	76	736	560	76
	51-100	--	--	--	--	--	--	--	--	--	27	27	100	--	--	--	1223	1200	98	1250	1227	98
	101-200	--	--	--	--	--	--	--	--	--	7	7	100	--	--	--	84	82	98	91	89	98
	201-300	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	301-400	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	401-500	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	501-600	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	601-1000	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	>1000	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	TOTAL	--	--	--	--	--	--	--	--	--	54	50	93	--	--	--	2025	1826	90	2079	1876	90

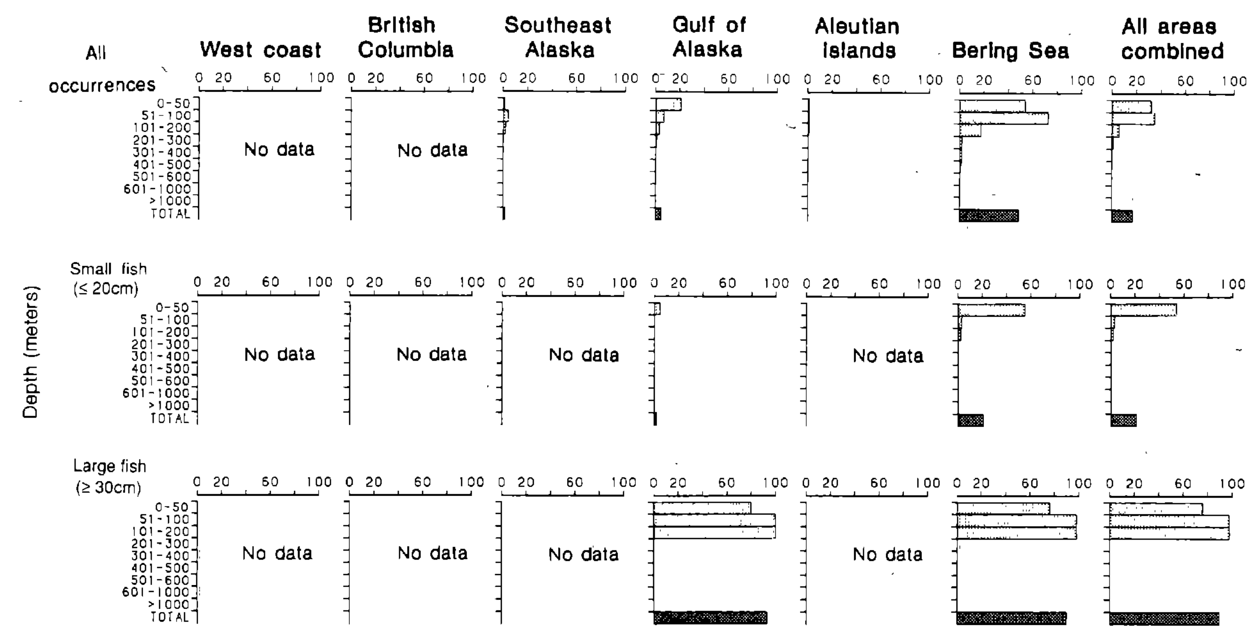
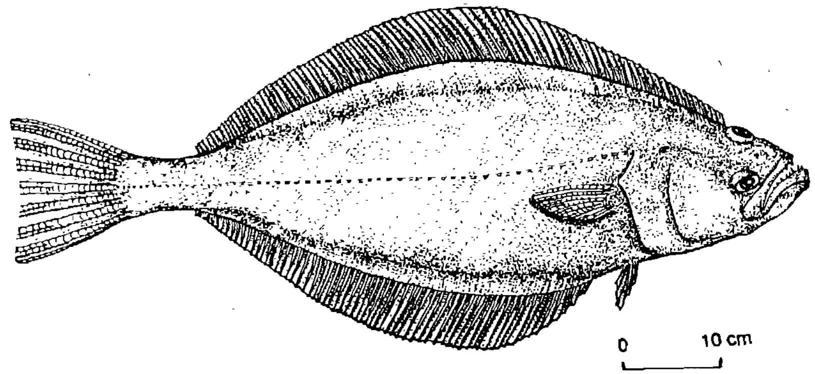


Figure 114.--Frequency of occurrence by depth interval by region for Alaska plaice off the west coast of North America based on presence or absence in samples from resource assessment surveys during 1912-84.

Greenland turbot



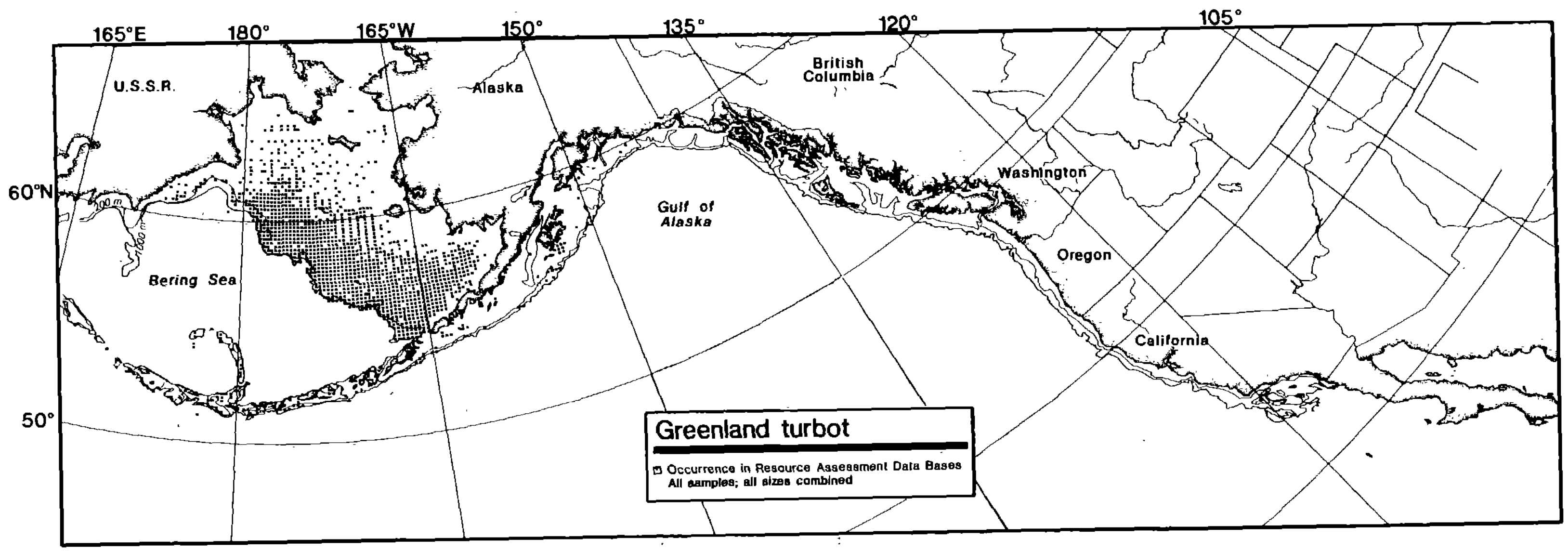


Figure 115.--The overall range of Greenland turbot off the west coast of North America based on an analysis of several resource assessment data bases for 1912-84.

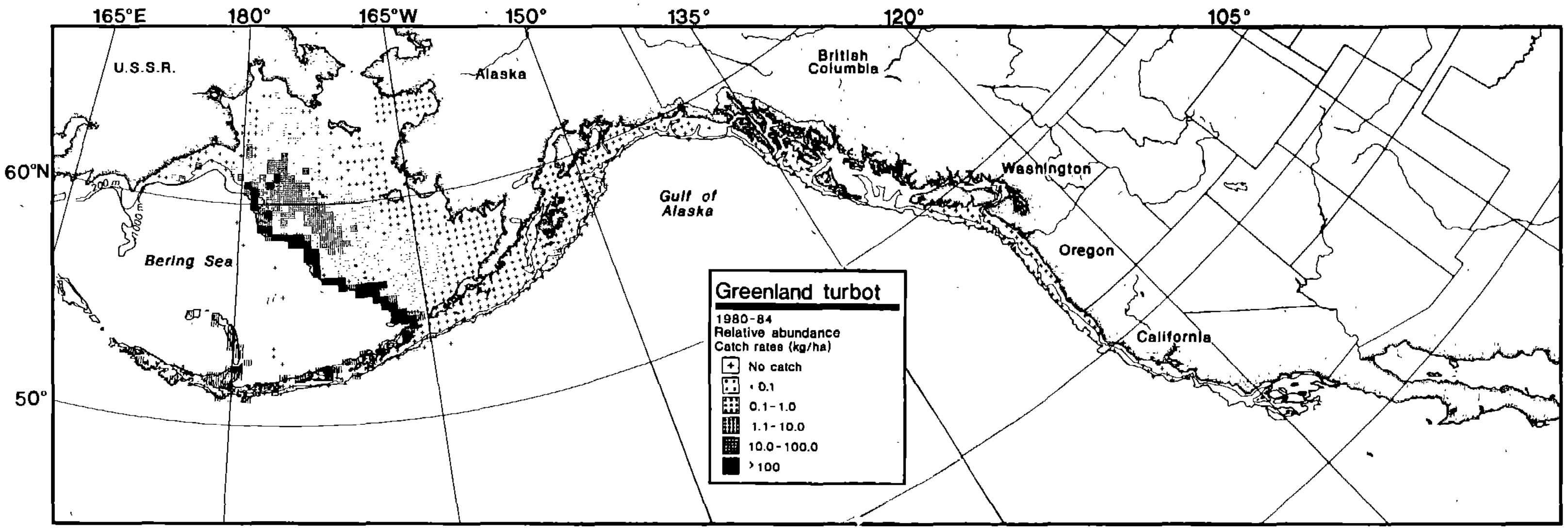


Figure 116.--The relative abundance of Greenland turbot off the west coast of North America, 1980-84, based on catch information from various NMFS trawl surveys.

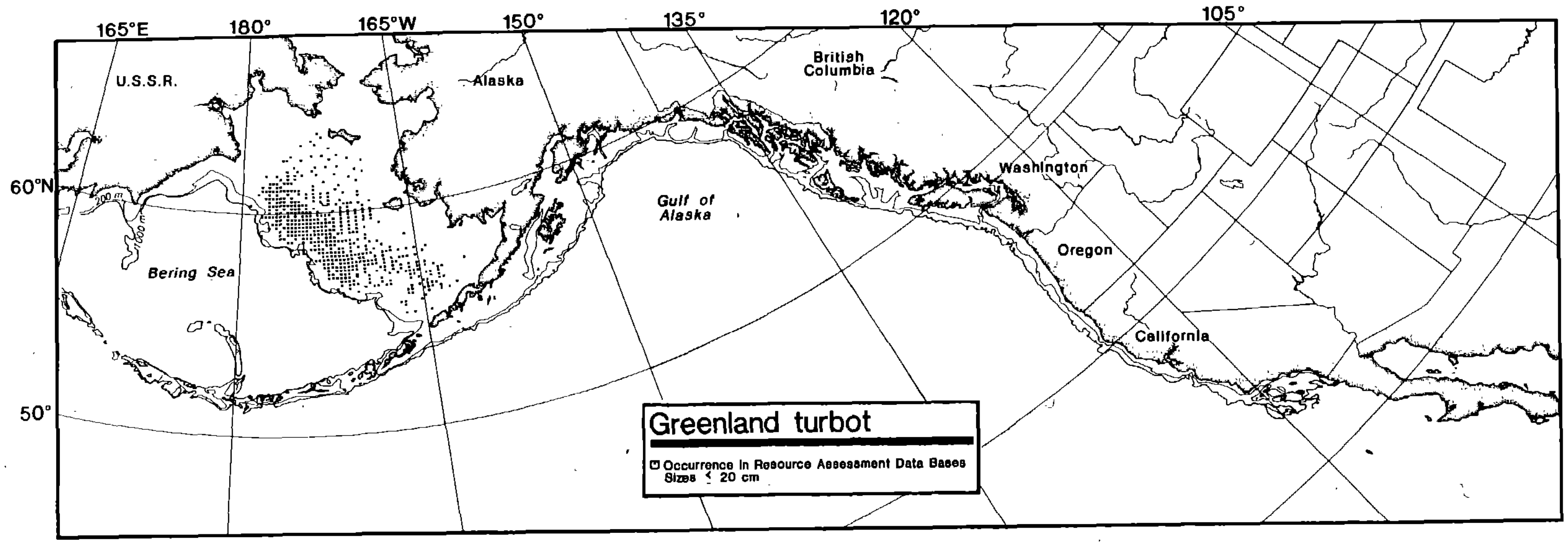


Figure 117.--The range of small (20 cm or less) Greenland turbot off the west coast of North America based on data from several resource assessment data bases for 1912-84.

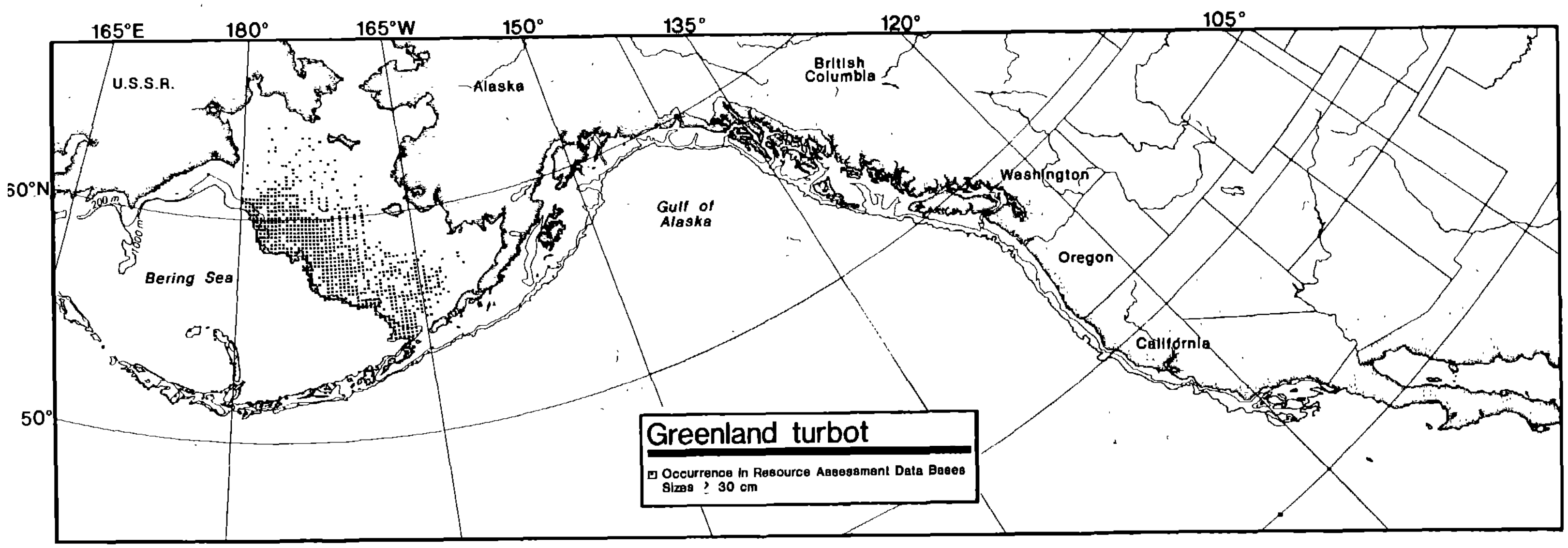


Figure 118.--The range of large (30 cm or larger) Greenland turbot off the west coast of North America based on data from Several resource assessment data bases for 1912-84.

Table 25.--Total numbers of samples (hauls) and numbers of samples containing Greenland turbot by depth interval and geographic region from resource assessment surveys off the west coast of North America during 1912-84.

		West coast			British Columbia			Southeast Alaska			Gulf of Alaska			Aleutian Islands			Bering Sea			All areas combined		
	Depth (meters)	Total Hauls	Occ.	%	Total Hauls	Occ.	%	Total Hauls	Occ.	%	Total Hauls	Occ.	%	Total Hauls	Occ.	%	Total Hauls	Occ.	%	Total Hauls	Occ.	%
All occurrences	0-50	1608	--	--	119	--	--	145	--	--	432	--	--	74	--	--	3113	179	6	5491	179	3
	51-100	2270	1	0	139	--	--	486	--	--	2044	6	0	194	6	3	4186	1824	44	9322	1837	20
	101-200	2551	--	--	326	--	--	527	--	--	5013	57	1	623	75	12	2778	2000	72	11833	2132	18
	201-300	921	--	--	250	--	--	399	--	--	1451	5	0	244	66	27	256	182	71	3522	253	7
	301-400	439	--	--	56	--	--	191	1	1	246	10	4	125	89	71	132	114	86	1190	214	18
	401-500	329	--	--	11	--	--	146	--	--	108	5	5	104	86	83	138	136	99	836	227	27
	501-600	144	--	--	2	--	--	192	--	--	40	5	13	62	51	82	66	66	100	506	122	24
	601-1000	321	--	--	6	--	--	243	1	0	60	3	5	89	79	89	134	128	96	853	211	25
	>1000	25	--	--	2	--	--	--	--	--	--	--	--	--	--	--	--	--	--	27	--	--
	TOTAL	8608	1	0	911	--	--	2329	2	0	9394	91	1	1515	452	30	10803	4629	43	33580	5175	15
Small fish (≤ 20cm)	0-50	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	42	36	86	42	36	86
	51-100	--	--	--	--	--	--	--	--	--	--	--	--	1	1	100	542	416	77	543	417	77
	101-200	--	--	--	--	--	--	--	--	--	--	--	--	15	5	33	711	383	54	726	388	53
	201-300	--	--	--	--	--	--	--	--	--	--	--	--	20	2	10	--	--	--	127	2	2
	301-400	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	401-500	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	99	2	2	164	2	1
	501-600	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	61	2	3	109	2	2
	601-1000	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	>1000	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	TOTAL	--	--	--	--	--	--	--	--	--	--	--	--	273	8	3	1749	839	48	2028	847	42
Large fish (≥ 30cm)	0-50	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	42	29	69	42	29	69
	51-100	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	542	507	94	543	507	93
	101-200	--	--	--	--	--	--	--	--	--	--	--	--	15	10	67	711	708	100	726	718	99
	201-300	--	--	--	--	--	--	--	--	--	1	1	100	20	19	95	106	106	100	127	126	99
	301-400	--	--	--	--	--	--	--	--	--	3	3	100	53	53	100	73	73	100	129	129	100
	401-500	--	--	--	--	--	--	--	--	--	2	2	100	63	63	100	99	99	100	164	164	100
	501-600	--	--	--	--	--	--	--	--	--	--	--	--	48	48	100	61	61	100	109	109	100
	601-1000	--	--	--	--	--	--	--	--	--	--	--	--	73	73	100	115	115	100	188	188	100
	>1000	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	TOTAL	--	--	--	--	--	--	--	--	--	6	6	100	273	266	97	1749	1698	97	2028	1970	97

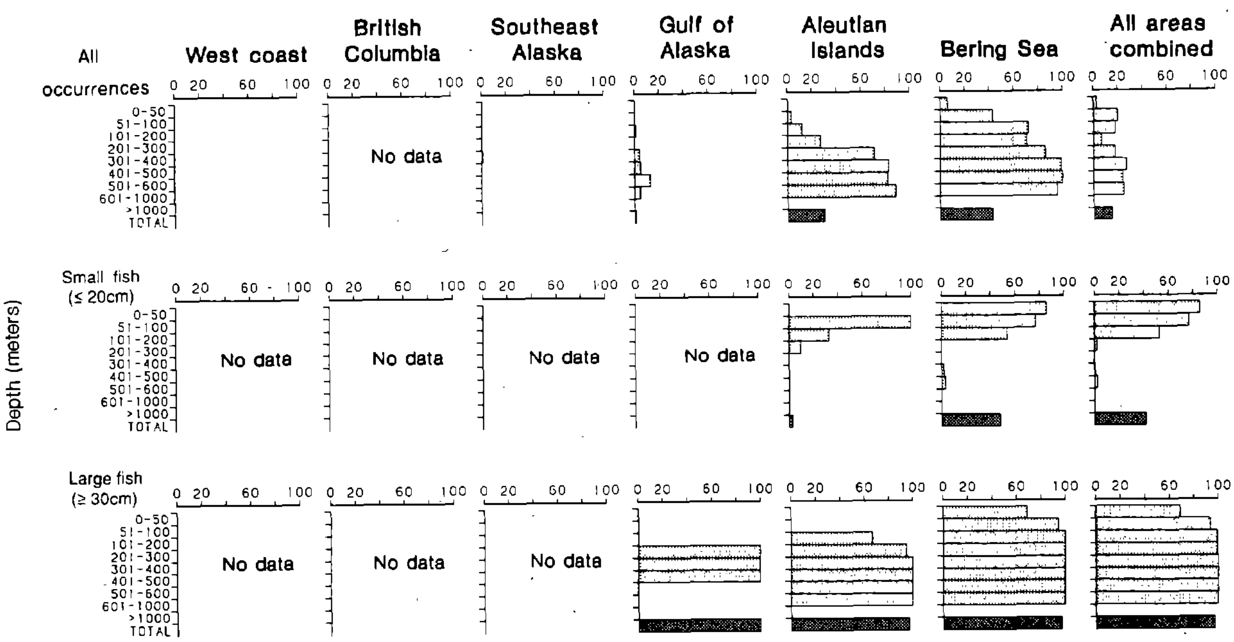
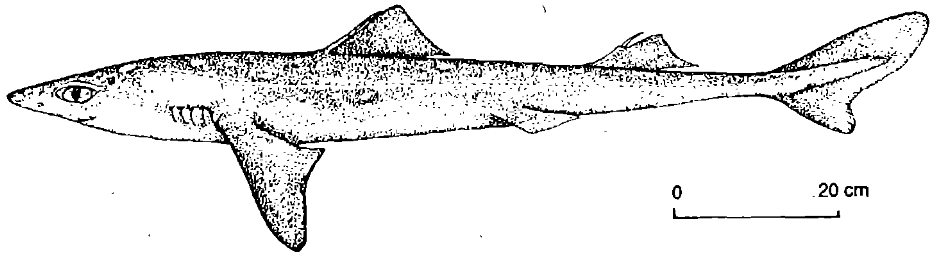


Figure 119.--Frequency of occurrence by depth interval by region for Greenland turbot off the west coast of North America based on presence or absence in samples from resource assessment surveys during 1912-84.

Spiny dogfish



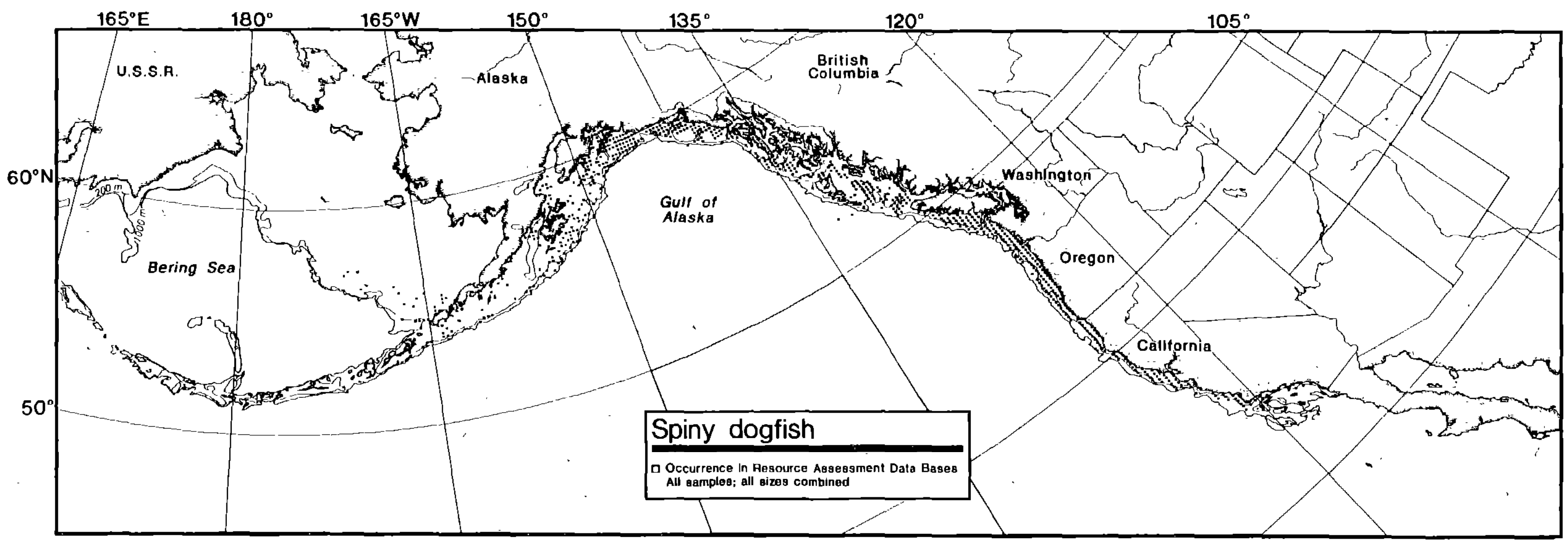


Figure 120.--The overall range of spiny dogfish off the west coast of North America based on an analysis of several resource assessment data bases for 1912-84.

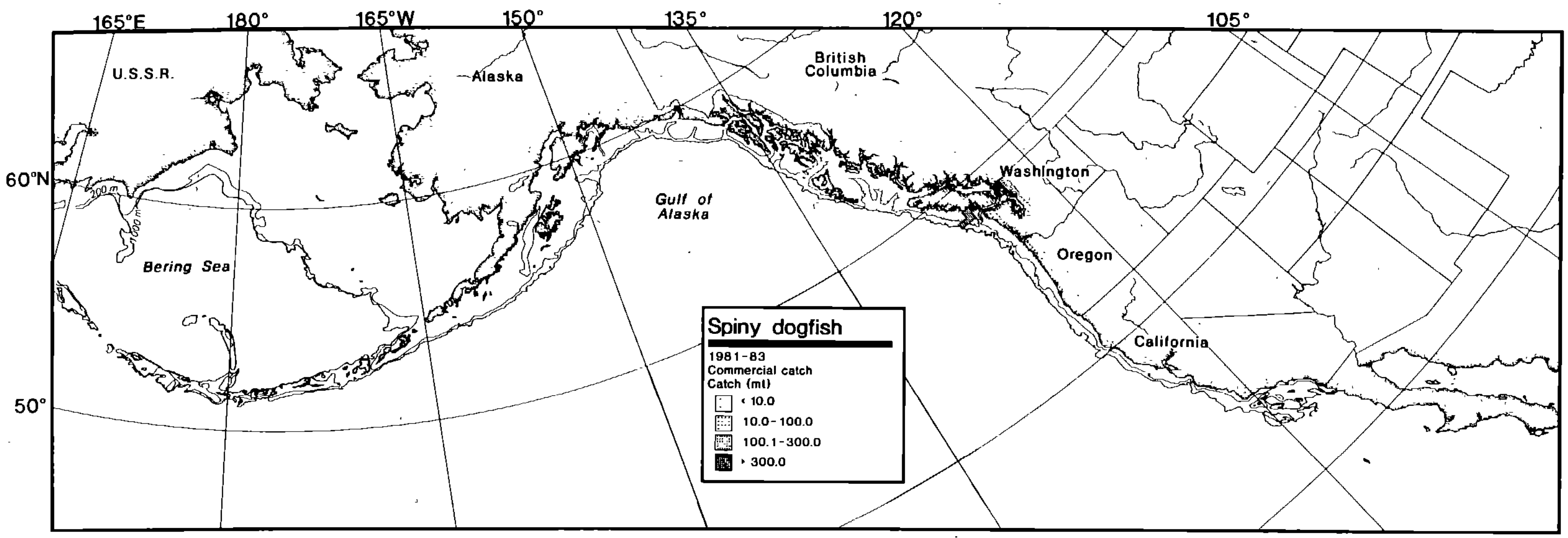


Figure 121.--Location of commercial harvests of spiny dogfish off the west coast of North America, 1981-83; domestic, foreign and joint venture harvests combined.

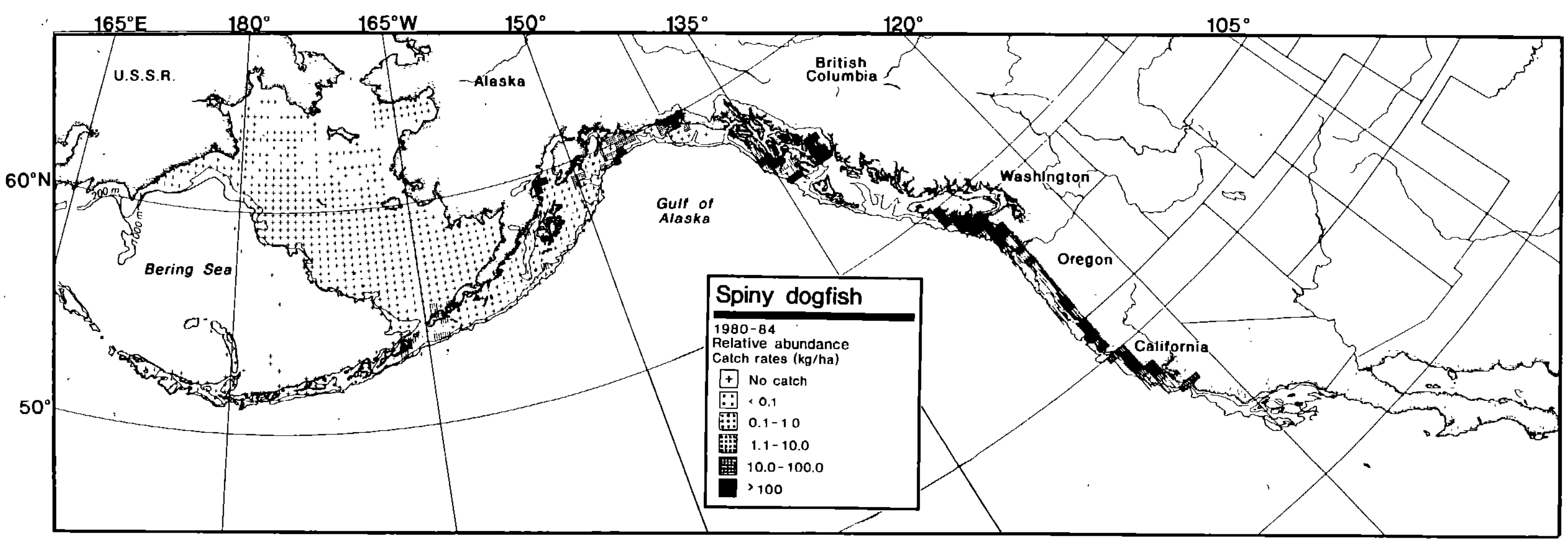


Figure 122.--The relative abundance of spiny dogfish off the west coast of North America, 1980-84, based on catch information from various NMFS trawl surveys.

Table 26.--Total numbers of samples (hauls) and numbers of samples containing spiny dogfish by depth interval and geographic region from resource assessment surveys off the west coast of North America during 1912-84.

All occurrences

Depth (meters)	West coast Total Hauls	West coast Occ.	West coast %	British Columbia Total Hauls	British Columbia Occ.	British Columbia %	Southeast Alaska Total Hauls	Southeast Alaska Occ.	Southeast Alaska %	Gulf of Alaska Total Hauls	Gulf of Alaska Occ.	Gulf of Alaska %
0-50	1608	140	9	119	45	38	145	4	3	432	48	11
51-100	2270	576	25	139	59	42	486	15	3	2044	134	7
101-200	2551	1034	41	326	139	43	527	118	22	5013	310	6
201-300	921	344	37	250	158	63	399	106	27	1451	88	6
301-400	439	108	25	56	12	21	191	41	21	246	8	3
401-500	329	25	8	11	1	9	146	21	14	108	11	10
501-600	144	--	--	2	1	50	192	6	3	40	--	--
601-1000	321	--	--	6	--	--	243	1	0	60	--	--
>1000	25	--	--	2	--	--	--	--	--	--	--	--
TOTAL	8608	2227	26	911	415	46	2329	312	13	9394	599	6

Depth (meters)	Aleutian Islands Total Hauls	Aleutian Islands Occ.	Aleutian Islands %	Bering Sea Total Hauls	Bering Sea Occ.	Bering Sea %	All areas combined Total Hauls	All areas combined Occ.	All areas combined %
0-50	74	--	--	3113	3	0	5491	240	4
51-100	194	3	2	4186	8	0	9322	796	9
101-200	623	14	2	2778	8	0	11833	1624	14
201-300	244	7	3	256	1	0	3522	705	20
301-400	125	1	1	132	--	--	1190	170	14
401-500	104	--	--	138	--	--	836	58	7
501-600	62	--	--	66	1	2	506	8	2
601-1000	89	--	--	134	--	--	853	1	0
>1000	--	--	--	--	--	--	27	--	--
TOTAL	1515	25	2	10803	21	0	33580	3602	11

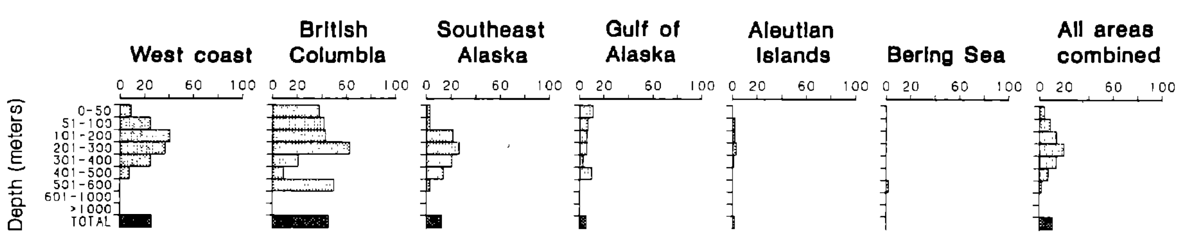
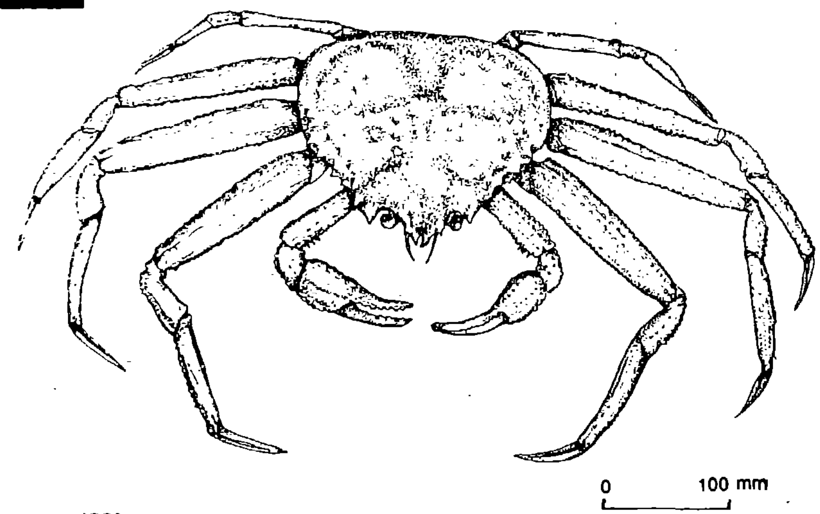


Figure 123.--Frequency of occurrence by depth interval by region for spiny dogfish off the west coast of North America based on presence or absence in samples from resource assessment surveys during 1912-84.

THIS PAGE INTENTIONALLY LEFT BLANK

Tanner crab (Chionoecetes bairdi)



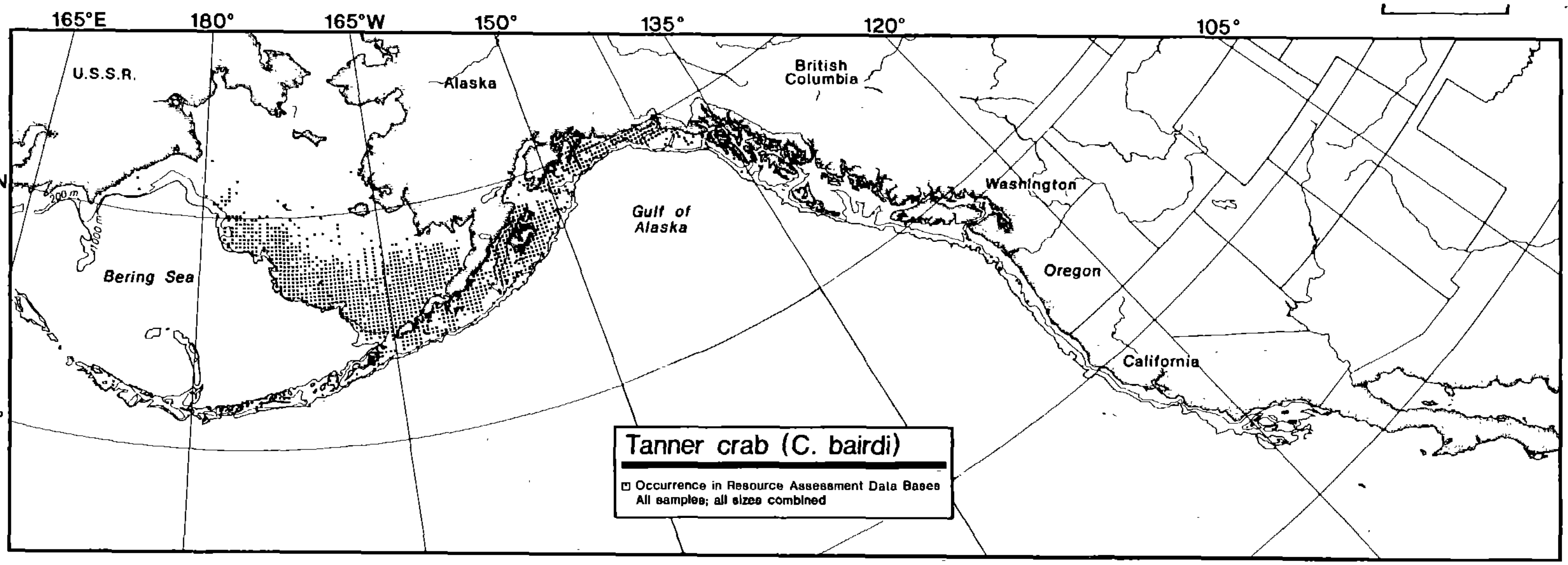


Figure 124.--The overall range of bairdi Tanner crab off the west coast of North America based on an analysis of several resource assessment data bases for 1912-84.

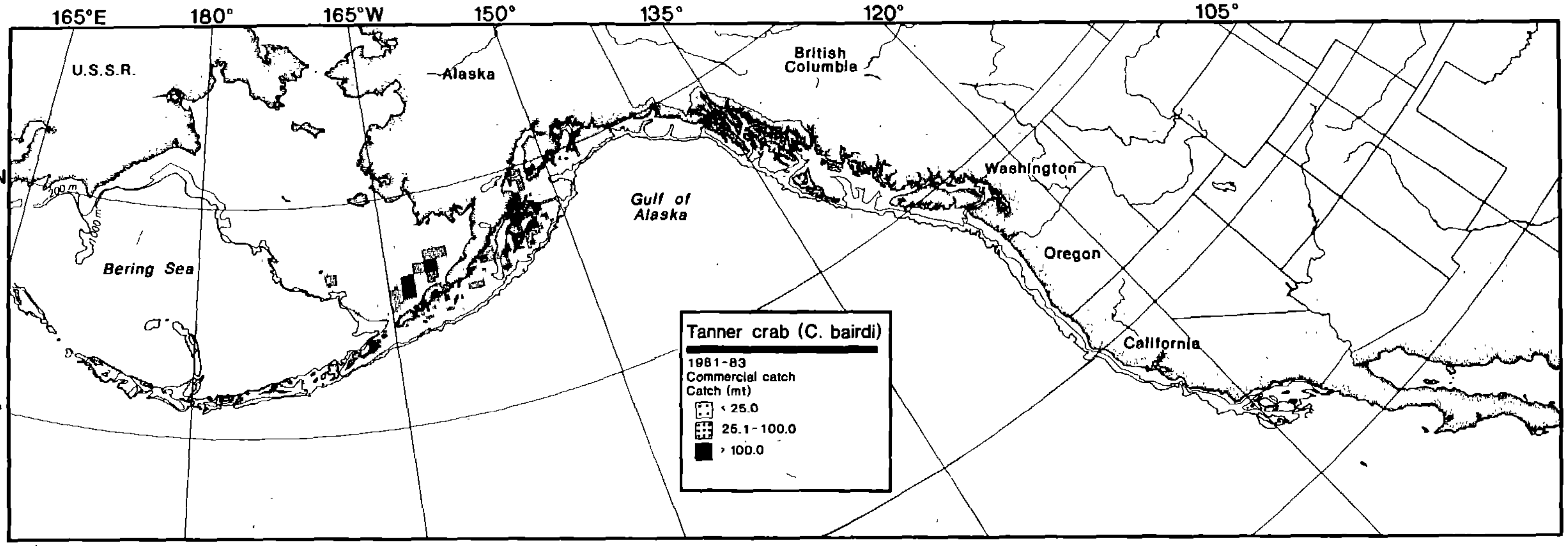


Figure 125.--Location of commercial harvests of bairdi Tanner crab off the west coast of North America, 1981-83 combined.

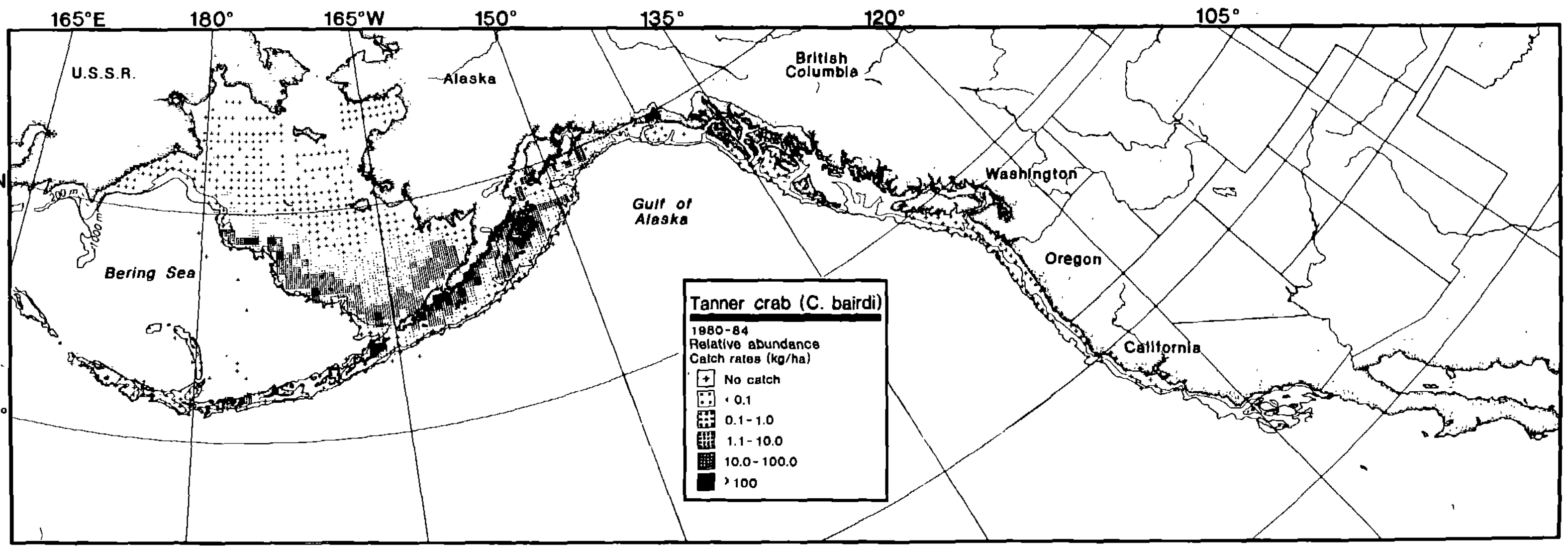


Figure 126.--The relative abundance of bairdi Tanner crab off the west coast of North America, 1980-84, based on catch information from various NMFS trawl surveys.

Table 27.--Total numbers of samples (hauls) and numbers of samples containing bairdi Tanner crab by depth interval and geographic region from resource assessment surveys off the west coast of North America during 1912-84.

All occurrences

	West coast			British Columbia			Southeast Alaska			Gulf of Alaska			Aleutian Islands			Bering Sea			All areas combined		
Depth (meters)	Total Hauls	Occ.	%	Total Hauls	Occ.	%	Total Hauls	Occ.	%	Total Hauls	Occ.	%	Total Hauls	Occ.	%	Total Hauls	Occ.	%	Total Hauls	Occ.	%
0-50	1608	--	--	119	--	--	145	28	19	432	62	14	74	4	5	3113	280	9	5491	374	7
51-100	2270	--	--	139	--	--	486	221	45	2044	592	29	194	41	21	4186	1804	43	9322	2658	29
101-200	2551	1	0	326	--	--	527	73	14	5013	1722	34	623	195	31	2778	1340	48	11833	3331	28
201-300	921	26	3	250	1	0	399	10	3	1451	327	23	244	40	16	256	33	13	3522	437	12
301-400	439	1	0	56	--	--	191	6	3	246	34	14	125	16	13	132	13	10	1190	70	6
401-500	329	1	0	11	--	--	146	3	2	108	14	13	104	6	6	138	16	12	836	40	5
501-600	144	--	--	2	--	--	192	5	3	40	--	--	62	--	--	66	4	6	506	9	2
601-1000	321	1	0	6	--	--	243	8	3	60	3	5	89	1	1	134	4	3	853	17	2
>1000	25	--	--	2	--	--	--	--	--	--	--	--	--	--	--	--	--	--	27	--	--
TOTAL	8608	30	0	911	1	0	2329	354	15	9394	2754	29	1515	303	20	10803	3494	32	33580	6936	21

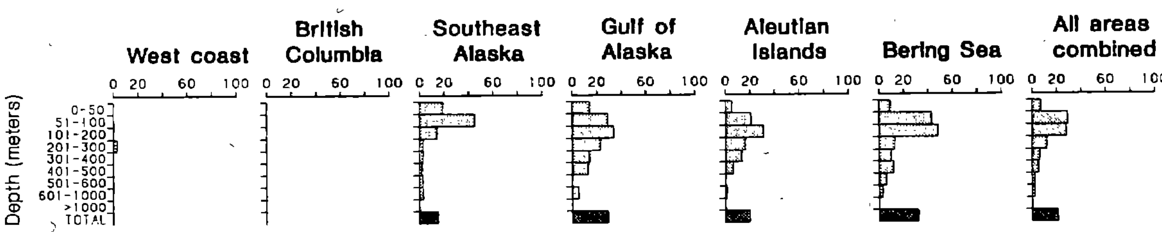
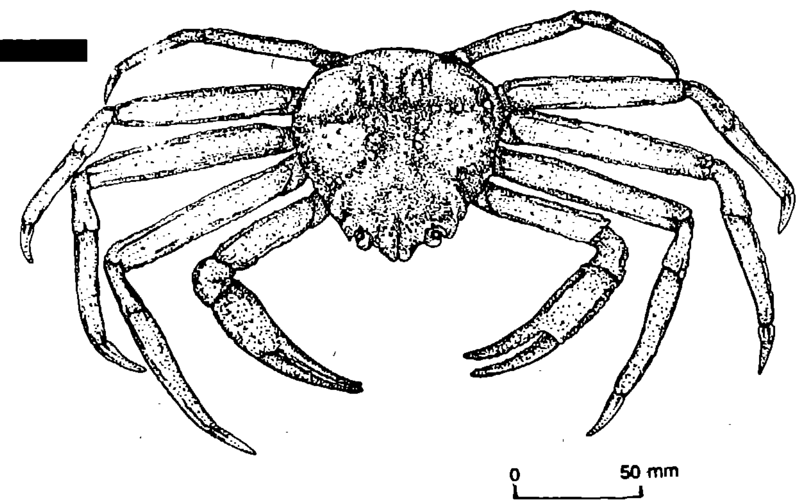


Figure 127.--Frequency of occurrence by depth interval by region for bairdi Tanner crab off the west coast of North America based on presence or absence in samples from resource assessment surveys during 1912-84.

THIS PAGE INTENTIONALLY LEFT BLANK

Tanner crab (Chionoecetes opilio)



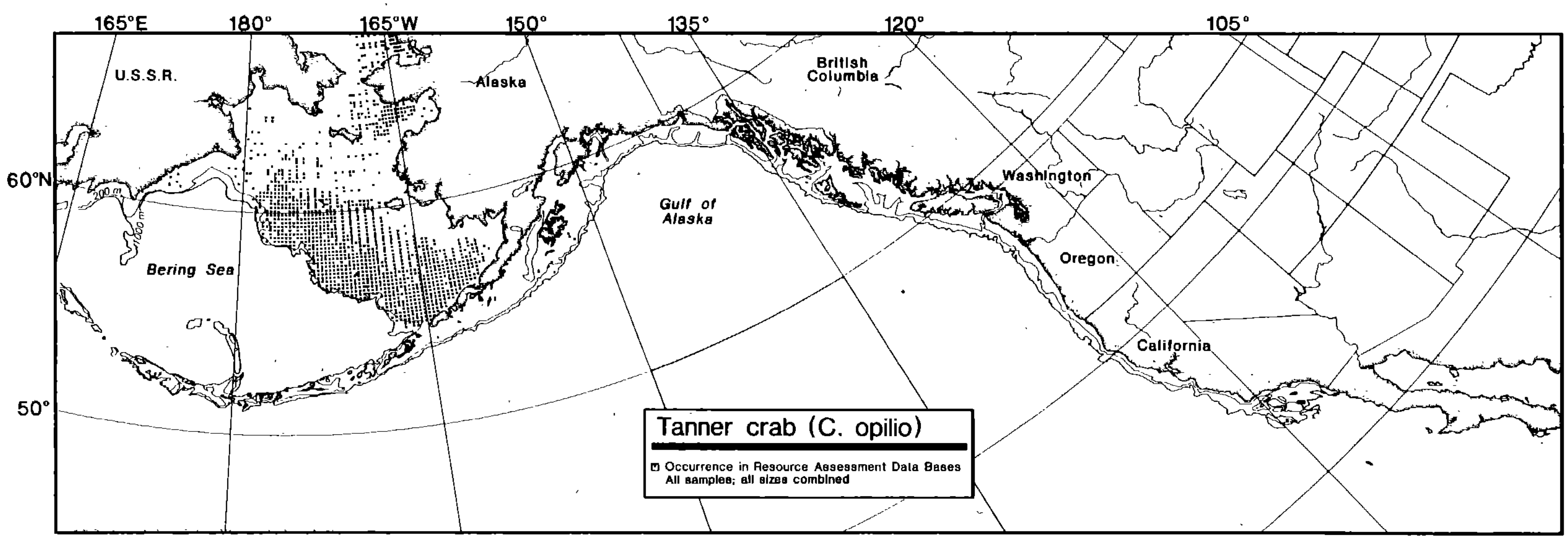


Figure 128--The overall range of opolio Tanner crab off the west coast of North America based on an analysis of several resource assessment data bases for 1912-84.

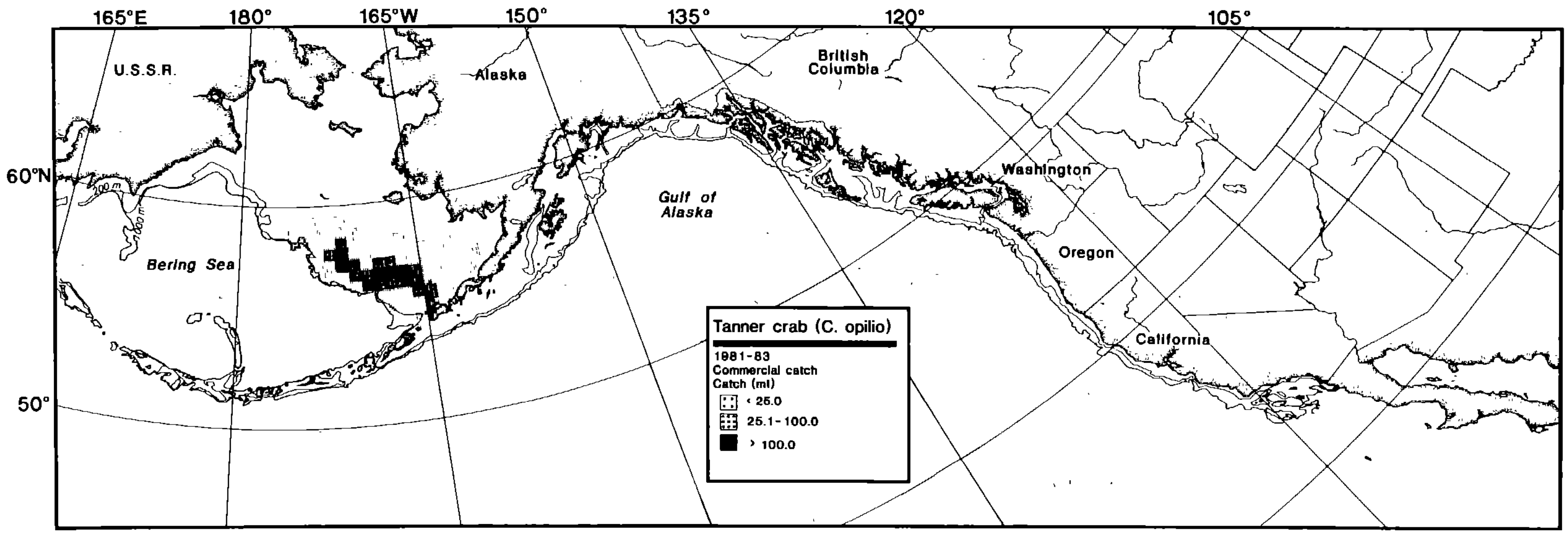


Figure 129.--Location of commercial harvests of opilio Tanner crab off the west coast of North America, 1981-83 combined

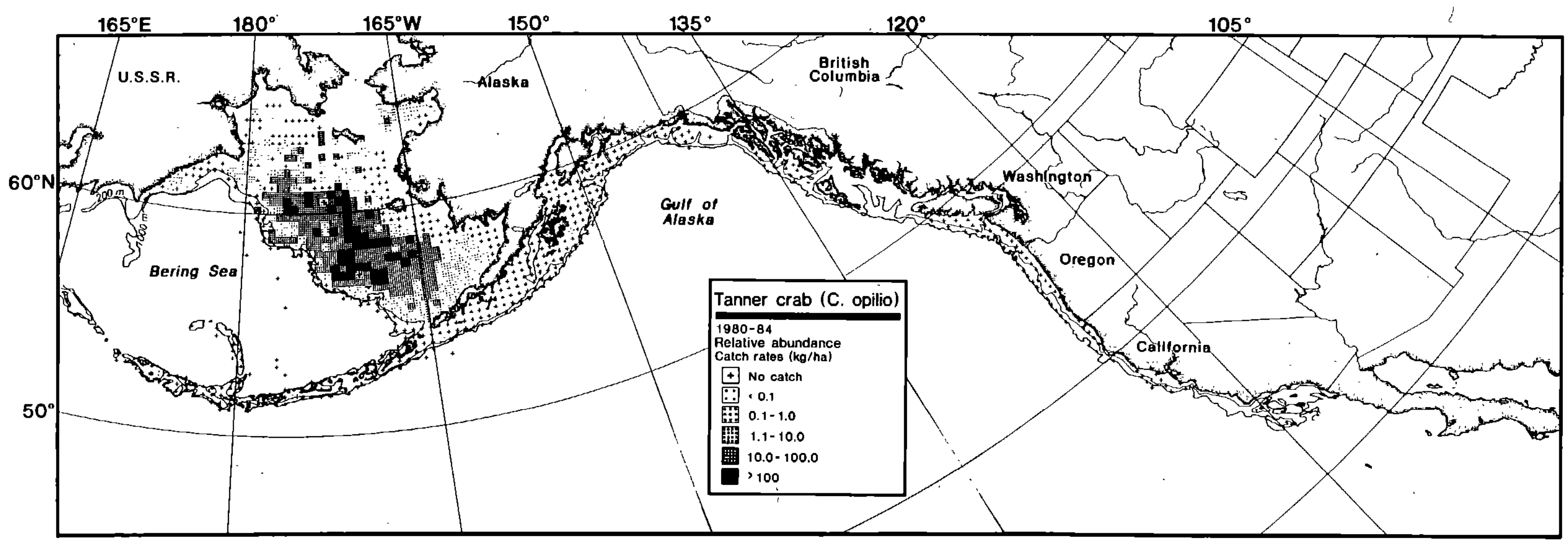


Figure 130.--The relative abundance of opilio Tanner crab off the west coast of North America, 1980-84, based on catch information from various NMFS trawl surveys.

Table 28.--Total numbers of samples (hauls) and numbers of samples containing opilio Tanner crab by depth interval and geographic region from resource assessment surveys off the west coast of North America during 1912-84.

		West coast			British Columbia			Southeast Alaska			Gulf of Alaska			Aleutians			Bering Sea			All areas combined		
	Depth (meters)	Total Hauls	Occ.	%	Total Hauls	Occ.	%	Total Hauls	Occ.	%	Total Hauls	Occ.	%	Total Hauls	Occ.	%	Total Hauls	Occ.	%	Total Hauls	Occ.	%
All occurrences	0-50	1608	--	--	119	--	--	145	--	--	432	--	--	74	--	--	3113	467	15	5491	467	9
	51-100	2270	--	--	139	--	--	486	--	--	2044	--	--	194	8	4	4185	2342	56	9322	2350	25
	101-200	2551	--	--	326	--	--	527	--	--	5013	5	0	623	72	12	2778	1535	55	11833	1612	14
	201-300	921	--	--	250	--	--	399	--	--	1451	1	0	244	15	6	256	24	9	3522	40	1
	301-400	439	--	--	56	--	--	191	--	--	246	--	--	125	10	8	132	8	6	1190	18	2
	401-500	329	--	--	11	--	--	146	--	--	108	--	--	104	4	4	138	19	14	836	23	3
	501-600	144	--	--	2	--	--	192	--	--	40	--	--	62	--	--	66	3	5	506	3	1
	601-1000	321	--	--	6	--	--	243	--	--	60	--	--	89	1	1	134	3	2	853	4	0
	>1000	25	--	--	2	--	--	--	--	--	--	--	--	--	--	--	--	--	--	27	--	--
	TOTAL	8608	--	--	911	--	--	2329	--	--	9394	6	0	1515	110	7	10803	4401	41	33580	4517	13

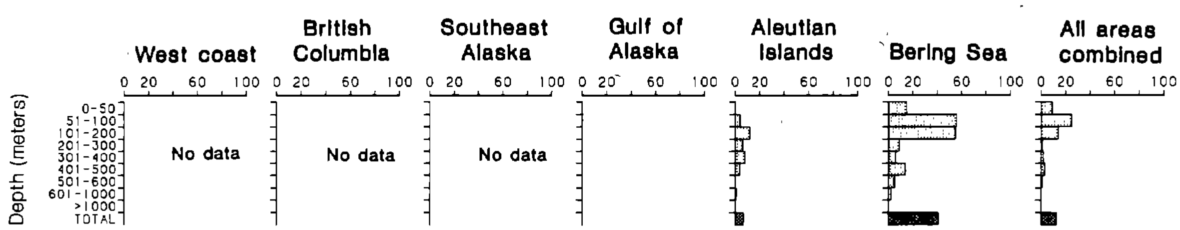
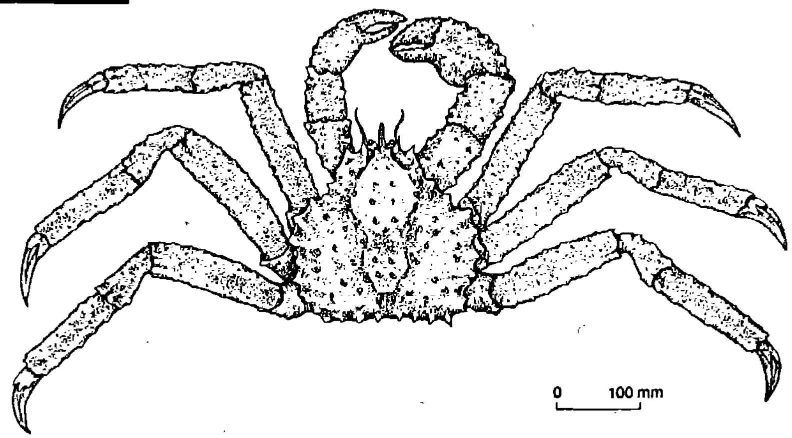


Figure 131 .--Frequency of occurrence by depth interval by region for opilio Tanner crab off the west coast of North America based on presence or absence in samples from resource assessment surveys during 1912-84.

THIS PAGE INTENTIONALLY LEFT BLANK

Red king crab



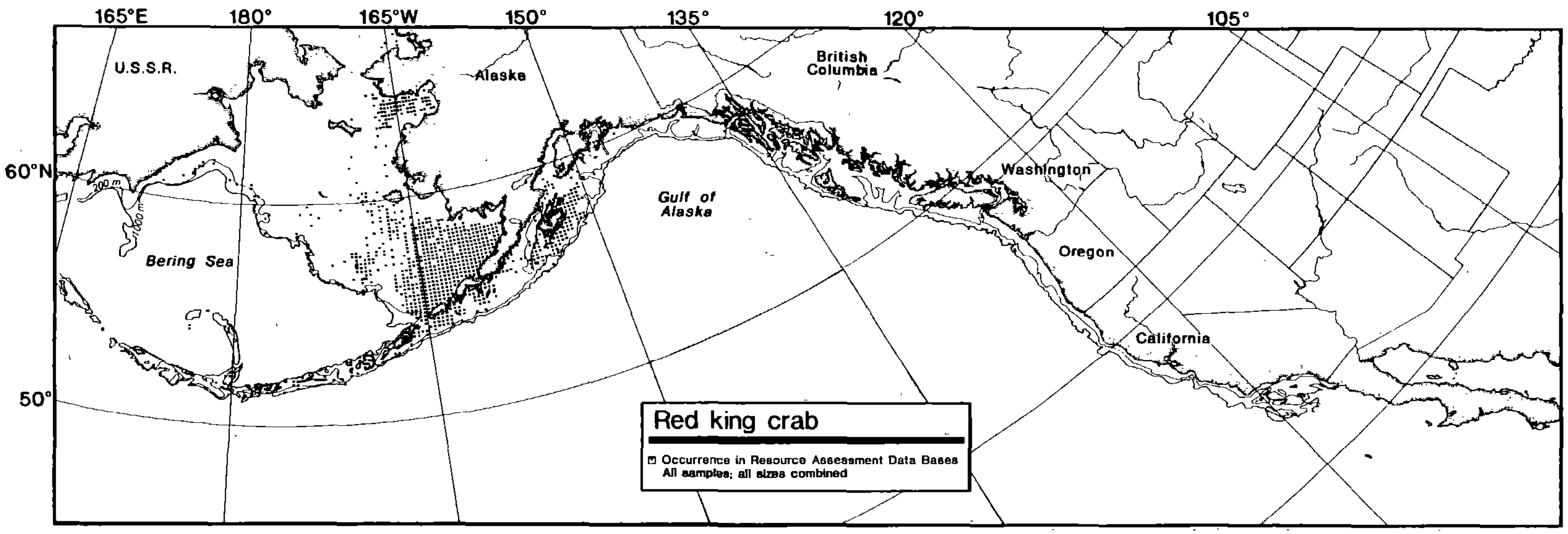


Figure 132.--The overall range of red king crab off the west coast of, North America based on an analysis of several resource assessment data bases for 1912-84.

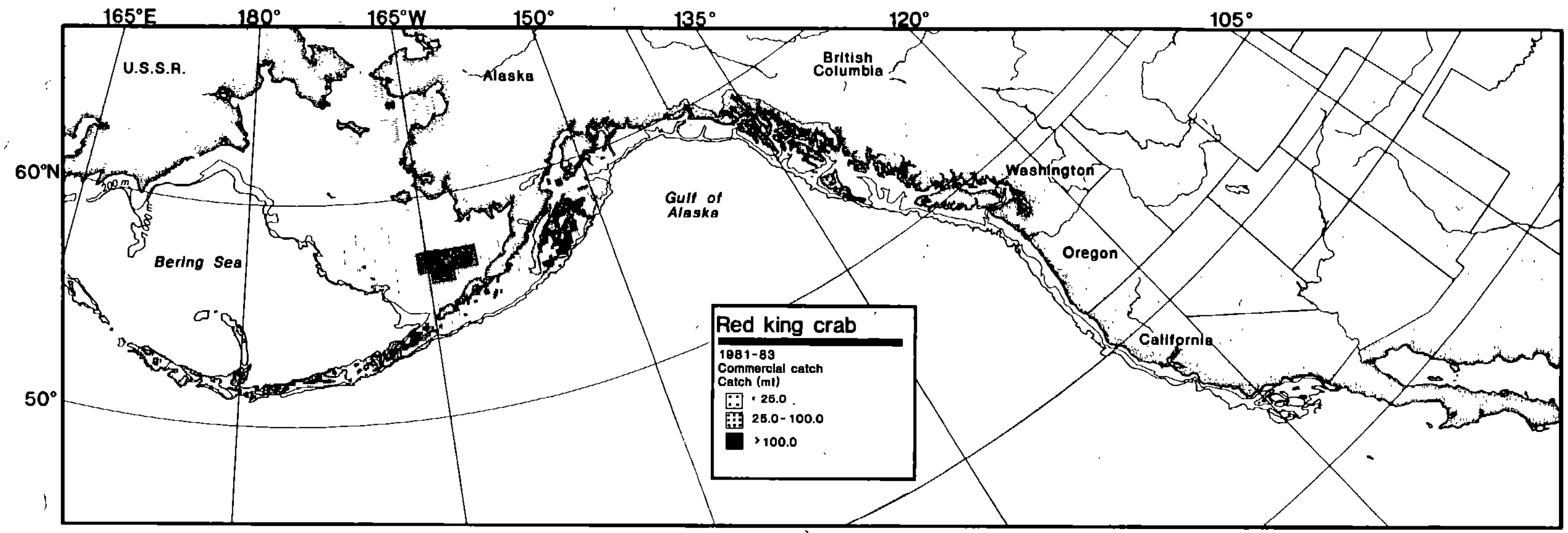


Figure 133.--Location of commercial harvests of red king crab off the west coast of North America, 1981-83 combined.

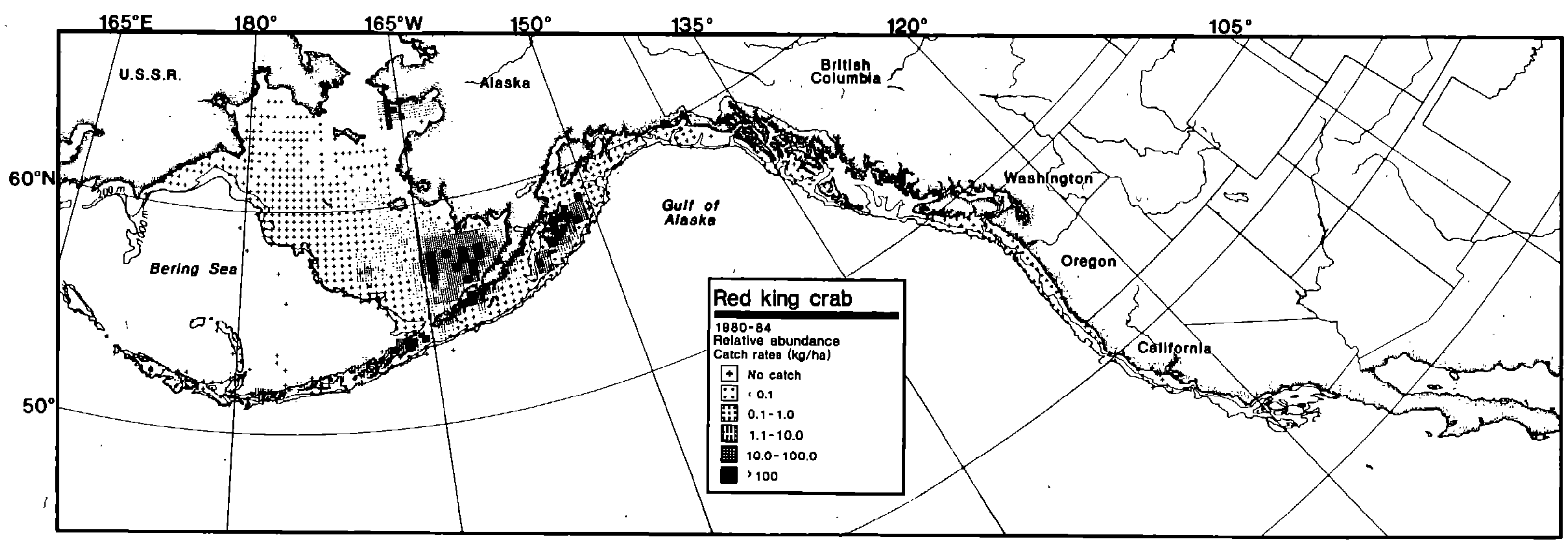


Figure 134.--The relative abundance of red king crab off the west coast of North America, 1980-84, based on catch information from various NMFS trawl surveys.

Table 29.--Total numbers of samples (hauls) and numbers of samples containing red king crab by depth interval and geographic region from resource assessment surveys off the west coast of North America during 1912-84.

		West coast			British Columbia			Southeast Alaska			Gulf of Alaska			Aleutian Islands			Bering Sea			All areas combined		
	Depth (meters)	Total Hauls	Occ.	%	Total Hauls	Occ.	%	Total Hauls	Occ.	%	Total Hauls	Occ.	%	Total Hauls	Occ.	%	Total Hauls	Occ.	%	Total Hauls	Occ.	%
All occurrences	0-50	1608	--	--	119	--	--	145	23	16	432	70	16	74	4	5	3113	898	29	5491	995	18
	51-100	2270	--	--	139	--	--	486	60	12	2044	397	19	194	41	21	4186	1401	33	9322	1899	20
	101-200	2551	--	--	326	--	--	527	13	2	5013	608	12	623	115	18	2778	217	8	11833	953	8
	201-300	921	--	--	250	--	--	399	1	0	1451	44	3	244	22	9	256	14	5	3522	81	2
	301-400	439	--	--	56	--	--	191	--	--	246	3	1	125	11	9	132	13	10	1190	27	2
	401-500	329	--	--	11	--	--	146	--	--	108	3	3	104	4	4	138	12	9	836	19	2
	501-600	144	--	--	2	--	--	192	--	--	40	--	--	62	3	5	66	--	--	506	3	1
	601-1000	321	--	--	6	--	--	243	--	--	60	--	--	89	4	4	134	--	--	853	4	0
	>1000	25	--	--	2	--	--	--	--	--	--	--	--	--	--	--	--	--	--	27	--	--
	TOTAL	8608	--	--	911	--	--	2329	97	4	9394	1125	12	1515	204	13	10803	2555	24	33580	3981	12

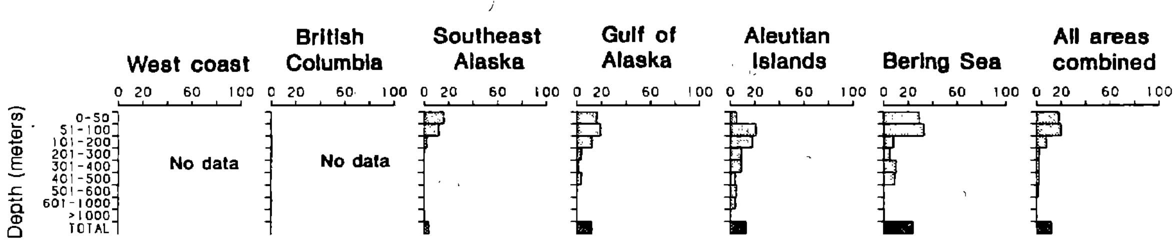
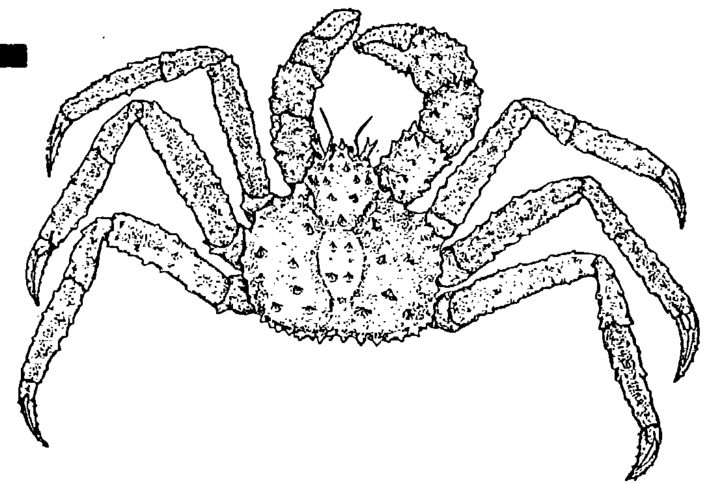


Figure 135.--Frequency of occurrence by depth interval by region for red king crab off the west coast of North America based on presence or absence in samples from resource assessment surveys during 1912-84.

THIS PAGE INTENTIONALLY LEFT BLANK

Blue king crab



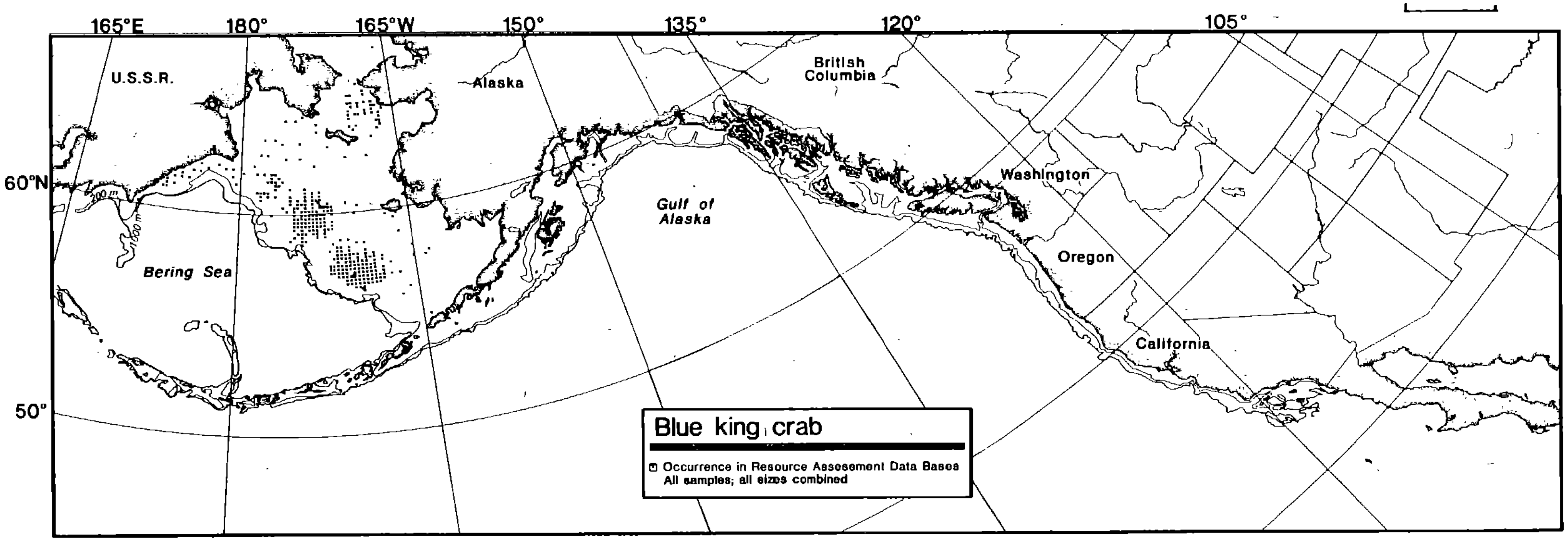


Figure 136.--The overall range of blue king crab off the west coast of North America based on an analysis of several resource assessment data bases for 1912-84.

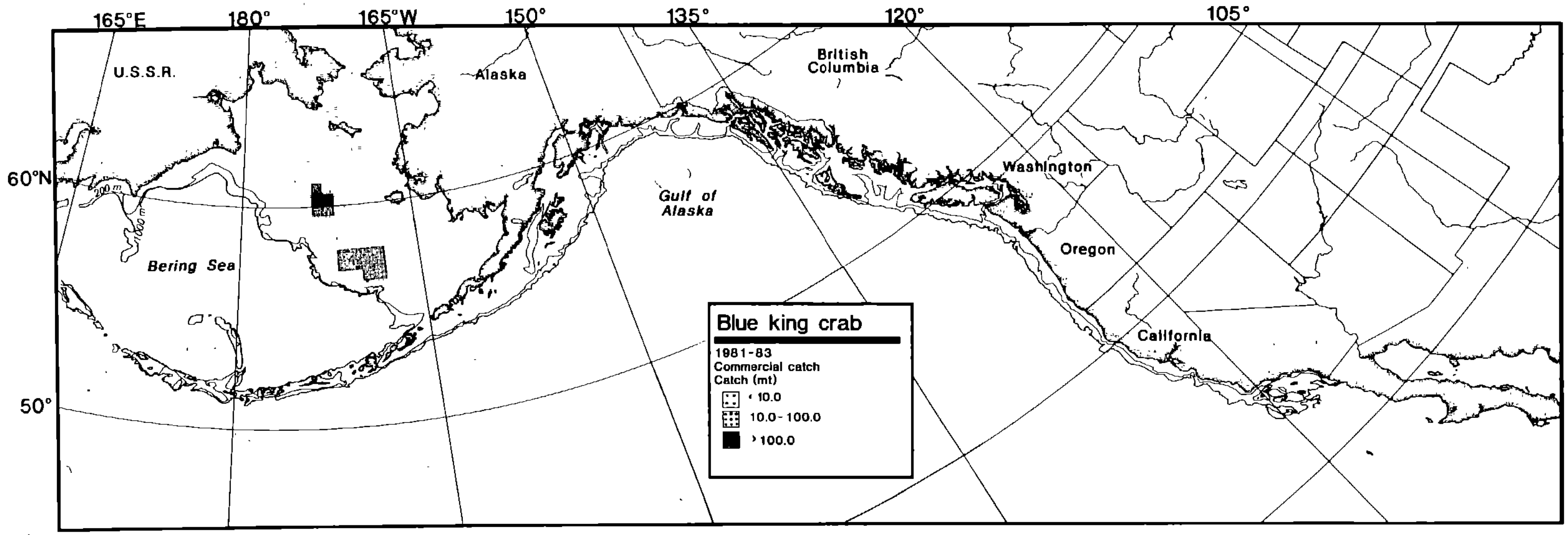


Figure 137.--Location of commercial harvests of blue king crab off the west coast of North America, 1981-83 combined.

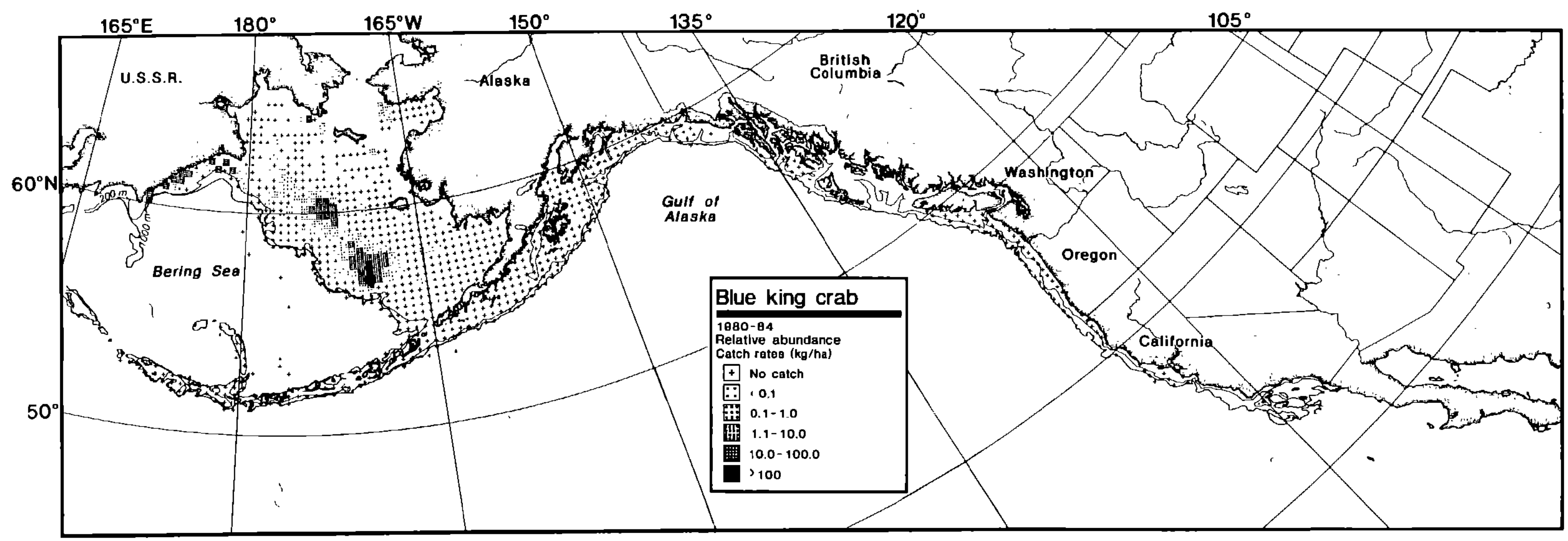


Figure 138.--The relative abundance of blue king crab off the west coast of North America, 1980-84 based on catch information from various NMFS trawl surveys.

Table 30.--Total numbers of samples (hauls) and numbers of samples containing blue king crab by depth interval and geographic region from resource assessment surveys off the west coast of North America during 1912-84.

		West coast			British Columbia			Southeast Alaska			Gulf of Alaska			Aleutian Islands			Bering Sea			All areas combined		
	Depth (meters)	Total Hauls	Occ.	%	Total Hauls	Occ.	%	Total Hauls	Occ.	%	Total Hauls	Occ.	%	Total Hauls	Occ.	%	Total Hauls	Occ.	%	Total Hauls	Occ.	%
All occurrences	0-50	1608	--	--	119	--	--	145	--	--	432	--	--	74	--	--	3113	45	1	5491	45	1
	51-100	2270	--	--	139	--	--	486	--	--	2044	2	0	194	--	--	4186	521	12	9322	523	6
	101-200	2551	--	--	326	--	--	527	--	--	5013	1	0	623	--	--	2778	185	7	11833	186	2
	201-300	921	--	--	250	--	--	399	--	--	1451	--	--	244	1	0	256	2	1	3522	3	0
	301-400	439	--	--	56	--	--	191	--	--	246	--	--	125	--	--	132	--	--	1190	--	--
	401-500	329	--	--	11	--	--	146	--	--	108	--	--	104	1	1	138	--	--	836	1	0
	501-600	144	--	--	2	--	--	192	--	--	40	--	--	62	--	--	66	--	--	506	--	--
	601-1000	321	--	--	6	--	--	243	--	--	60	--	--	89	--	--	134	--	--	853	--	--
	>1000	25	--	--	2	--	--	--	--	--	--	--	--	--	--	--	--	--	--	27	--	--
	TOTAL	8608	--	--	911	--	--	2329	--	--	9394	3	0	1515	2	0	10803	753	7	33580	758	2

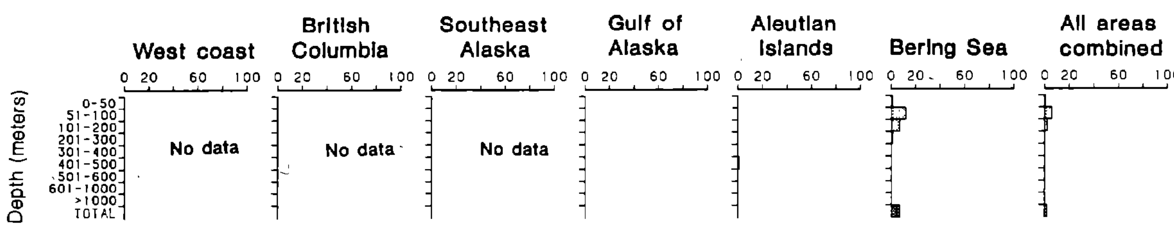
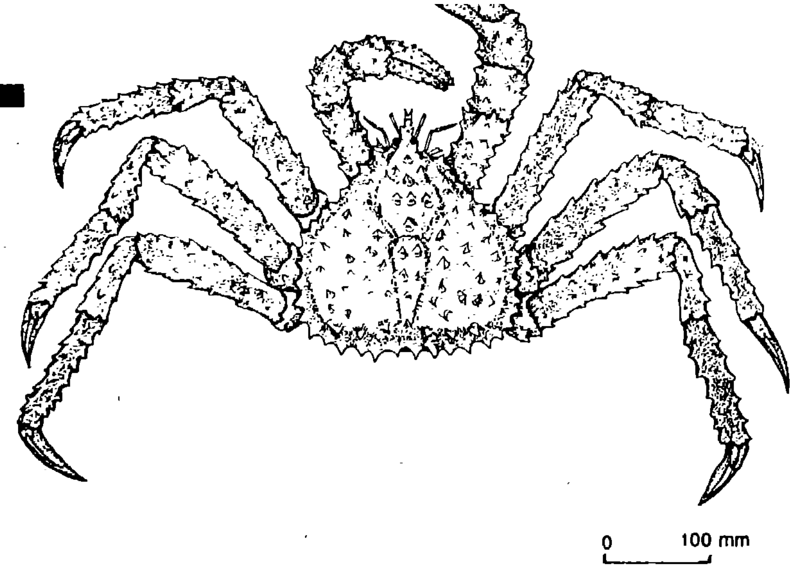


Figure 139.--Frequency of occurrence by depth interval by region for blue king crab off the west coast of North America based on presence or absence in samples from resource assessment surveys during 1912-84.

THIS PAGE INTENTIONALLY LEFT BLANK

Golden king crab



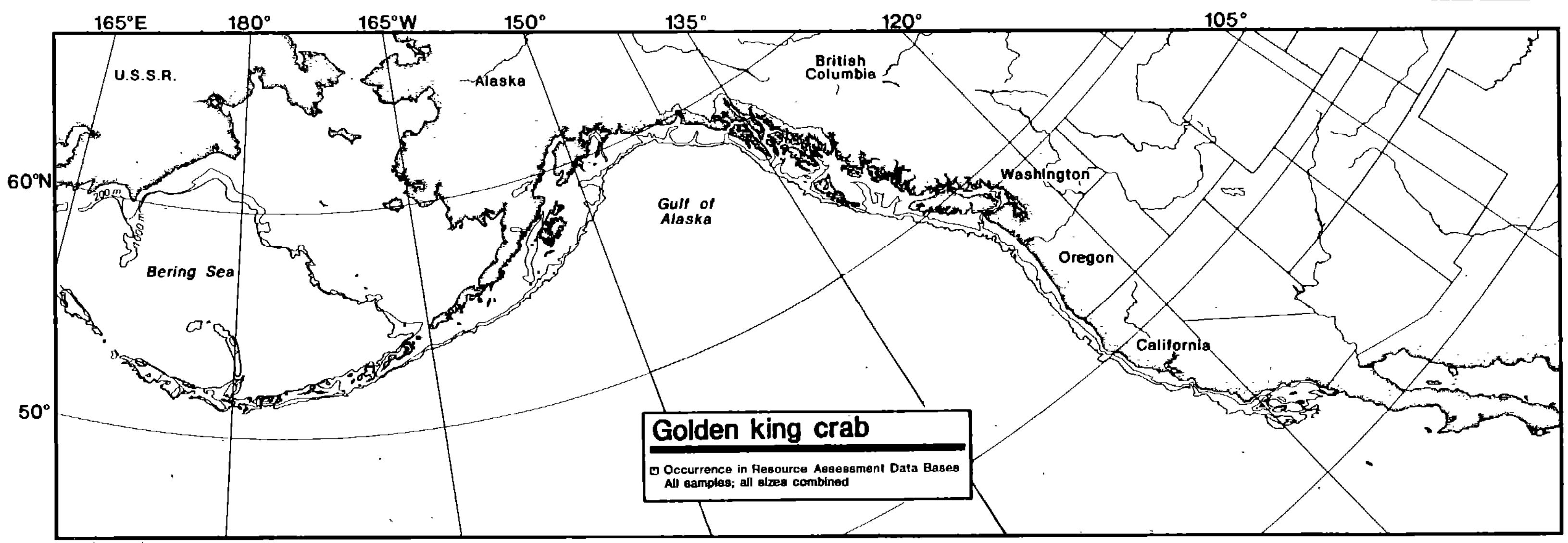


Figure 140.--The overall range of brown or golden king crab off the west coast of North America based on an analysis of several resource assessment data bases for 1912-84.

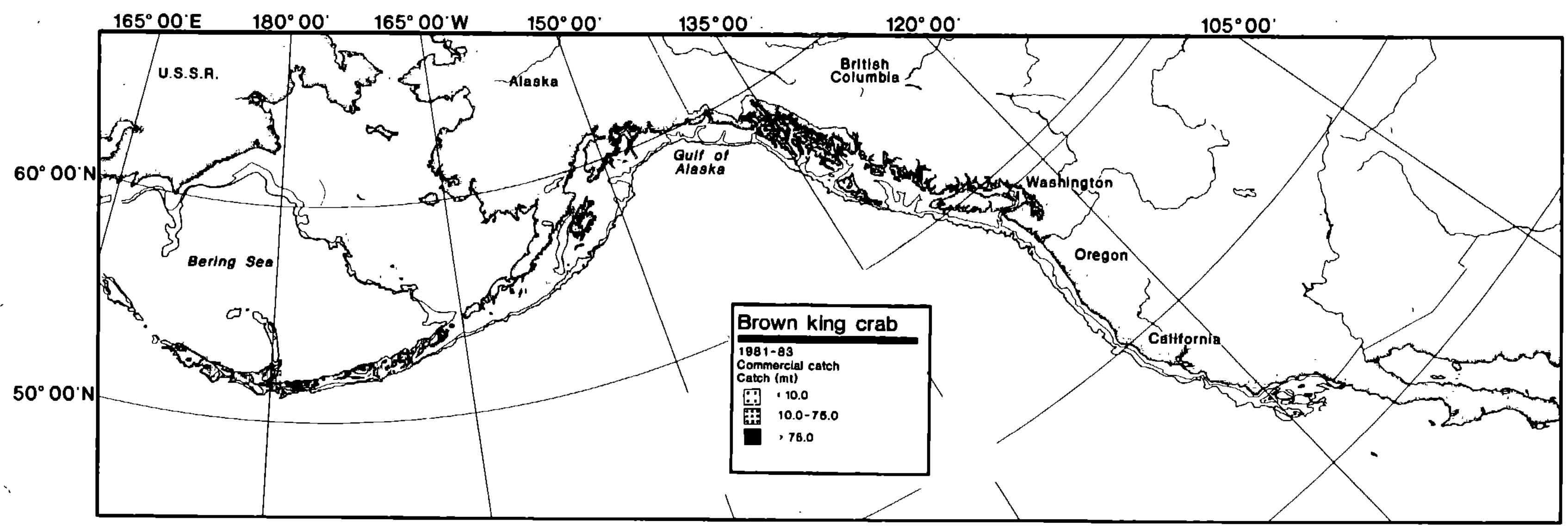


Figure 141.--Location of commercial harvests of brown or golden king crab off the west coast of North America, 1981-83.

Table 31.--Total numbers of samples (hauls) and numbers of samples containing brown king crab by depth interval and geographic region from resource assessment surveys off the west coast of North America during 1912-84.

All occurrences

	West coast			British Columbia			Southeast Alaska			Gulf of Alaska			Aleutian Islands			Bering Sea			All areas combined		
Depth (meters)	Total Hauls	Occ.	%	Total Hauls	Occ.	%	Total Hauls	Occ.	%	Total Hauls	Occ.	%	Total Hauls	Occ.	%	Total Hauls	Occ.	%	Total Hauls	Occ.	%
0-50	1608	--	--	119	--	--	145	--	--	432	--	--	74	--	--	3113	--	--	5491	--	--
51-100	2270	--	--	139	--	--	486	--	--	2044	1	0	194	--	--	4186	--	--	9322	1	0
101-200	2551	--	--	326	--	--	527	--	--	5013	--	--	623	--	--	2778	--	--	11833	--	--
201-300	921	--	--	250	--	--	399	--	--	1451	3	0	244	2	1	256	--	--	3522	5	0
301-400	439	--	--	56	--	--	191	--	--	246	--	--	125	1	1	132	--	--	1190	1	0
401-500	329	--	--	11	--	--	146	--	--	108	--	--	104	--	--	138	--	--	836	--	--
501-600	144	--	--	2	--	--	192	--	--	40	--	--	62	--	--	66	--	--	506	--	--
601-1000	321	--	--	6	--	--	243	--	--	60	--	--	89	--	--	134	--	--	853	--	--
>1000	25	--	--	2	--	--	--	--	--	--	--	--	--	--	--	--	--	--	27	--	--
TOTAL	8608	--	--	911	--	--	2329	--	--	9394	4	0	1515	3	0	10803	--	--	33580	7	0

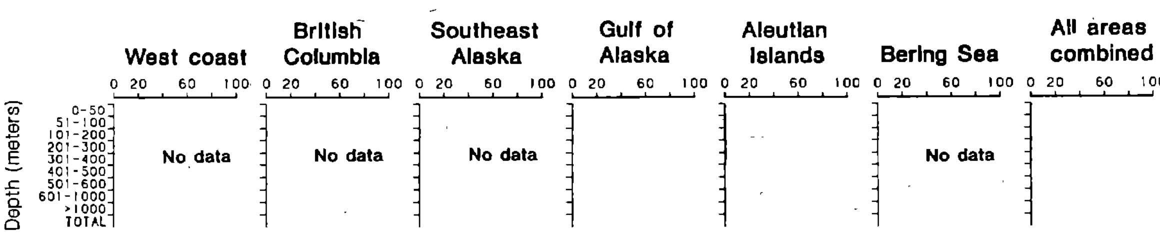
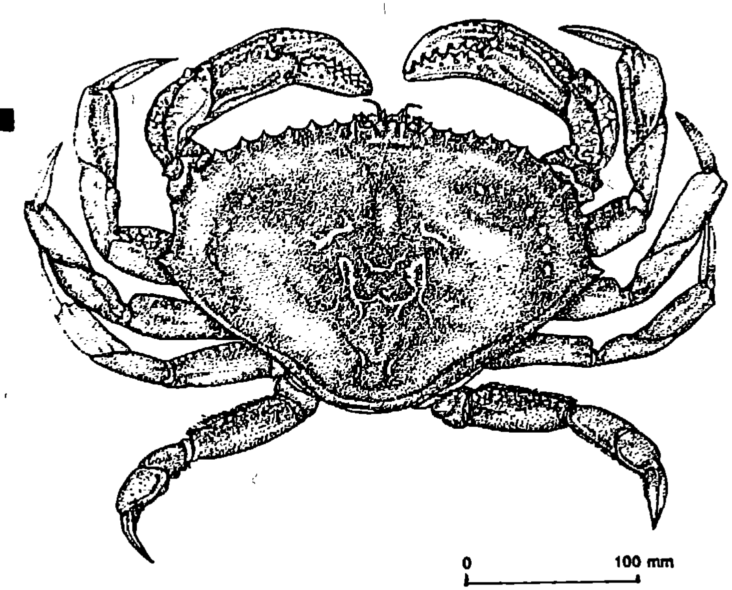


Figure 142.--Frequency of occurrence by depth interval by region for brown or golden king crab off the west coast of North America based on presence or absence in samples from resource assessment surveys during 1912-84.

THIS PAGE INTENTIONALLY LEFT BLANK

Dungeness crab



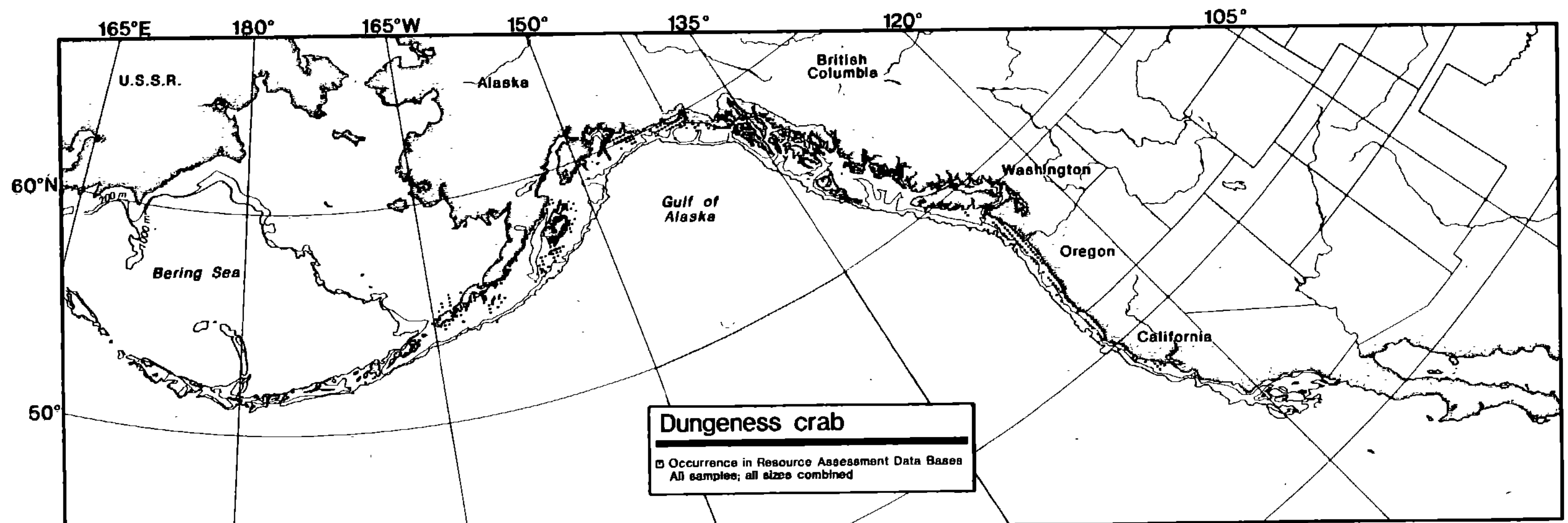


Figure 143.--The overall range of Dungeness crab off the west coast of North America based on an analysis of several resource assessment data bases for 1912-84.

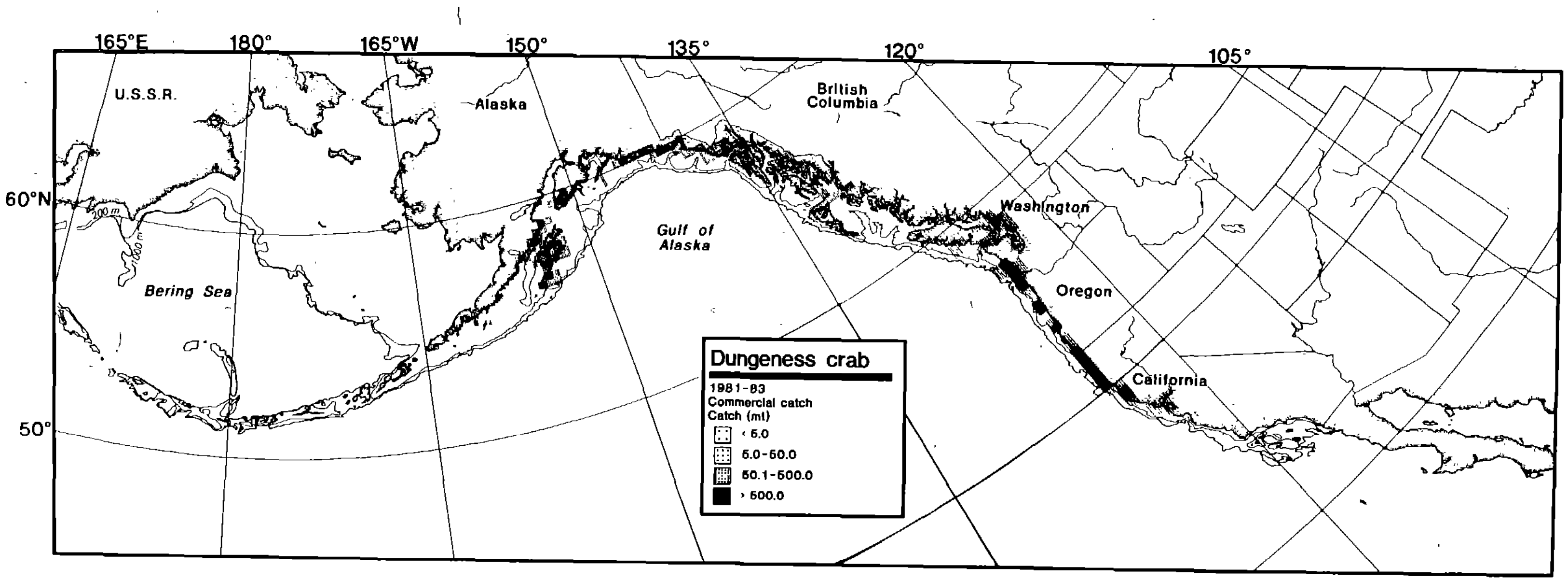


Figure 144.--Location of commercial harvests of Dungeness crab off the west coast of North America, 1981-83.

Table 32.--Total numbers of samples (hauls) and numbers of samples containing Dungeness crab by depth interval and geographic region from resource assessment surveys off the west coast of North America during 1912-84.

		West coast			British Columbia			Southeast Alaska			Gulf of Alaska			Aleutian Islands			Bering Sea			All areas combined		
	Depth (meters)	Total Hauls	Occ.	%	Total Hauls	Occ.	%	Total Hauls	Occ.	%	Total Hauls	Occ.	%	Total Hauls	Occ.	%	Total Hauls	Occ.	%	Total Hauls	Occ.	%
All occurrences	0-50	1608	108	7	119	1	1	145	28	19	432	183	42	74	4	5	3113	15	0	5491	339	6
	51-100	2270	228	10	139	--	--	486	38	8	2044	281	14	194	1	1	4186	9	0	9322	557	6
	101-200	2551	168	7	326	--	--	527	7	1	5013	113	2	623	--	--	2778	--	--	11833	288	2
	201-300	921	55	6	250	--	--	399	--	--	1451	8	1	244	--	--	256	--	--	3522	63	2
	301-400	439	6	1	56	--	--	191	--	--	246	1	0	125	--	--	132	--	--	1190	7	1
	401-500	329	--	--	11	--	--	146	--	--	108	1	1	104	--	--	138	--	--	836	1	0
	501-600	144	--	--	2	--	--	192	--	--	40	--	--	62	--	--	66	--	--	506	--	--
	601-1000	321	--	--	6	--	--	243	--	--	60	--	--	89	--	--	134	--	--	853	--	--
	>1000	25	--	--	2	--	--	--	--	--	--	--	--	--	--	--	--	--	--	27	--	--
	TOTAL	8608	565	7	911	1	0	2329	73	3	9394	587	6	1515	5	0	10803	24	0	33580	1255	4

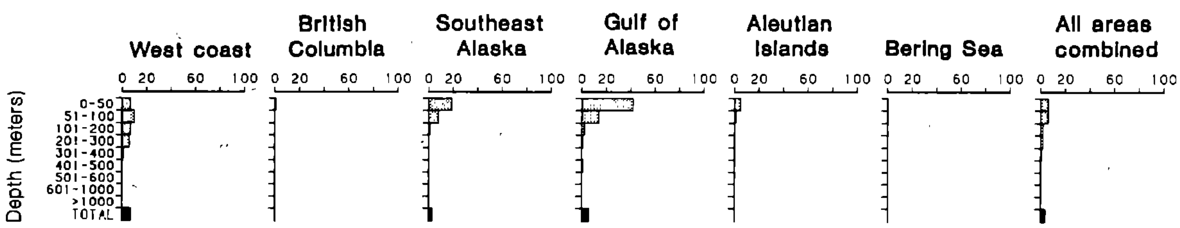
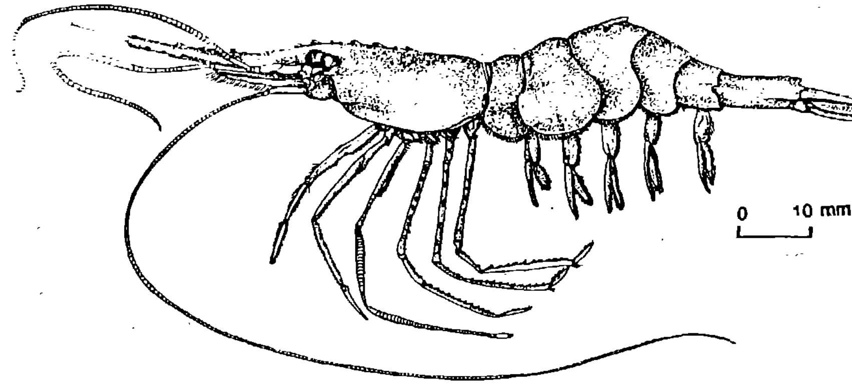


Figure 1451--Frequency of occurrence by depth interval by region for Dungeness crab off the west coast of North America based on presence or absence in samples from resource assessment surveys during 1912-84.

THIS PAGE INTENTIONALLY LEFT BLANK

Northern pink shrimp



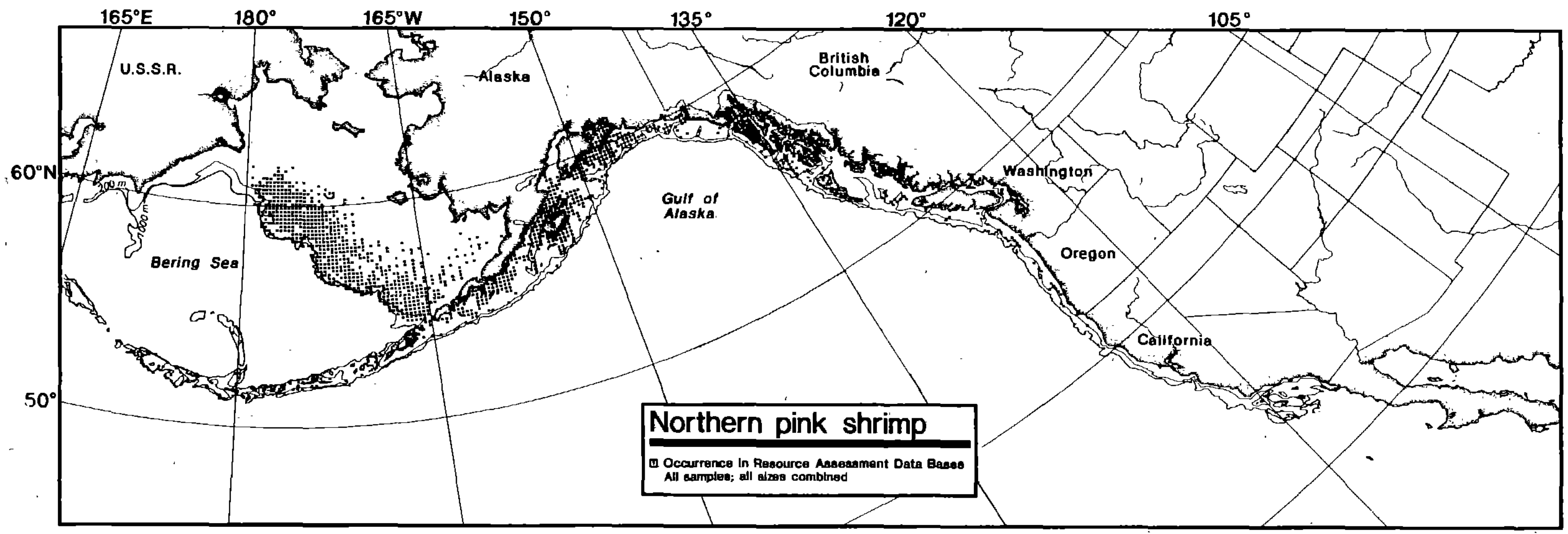


Figure 146.--The overall range of northern pink shrimp off the west coast of North America based on an analysis of several resource assessment data bases for 1912-84.

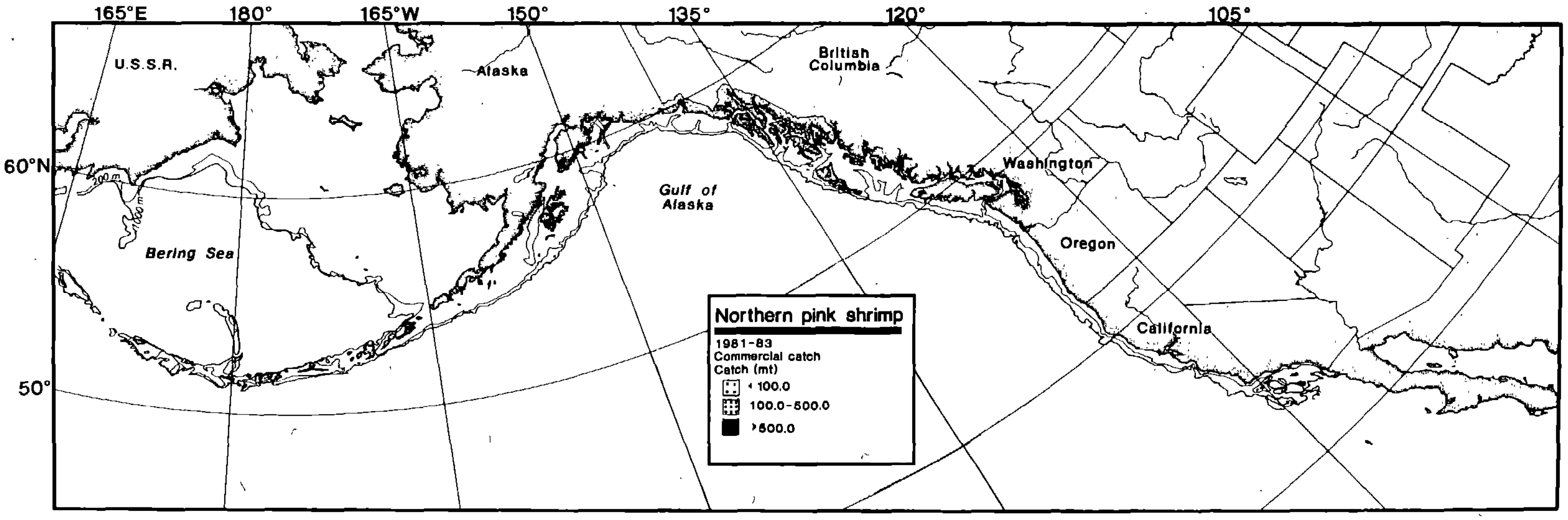


Figure 147.--Location of commercial harvests of northern pink shrimp off the west coast of North America, 1981-83.

Table 33.--Total numbers of samples (hauls) and numbers of samples containing northern pink shrimp by depth interval and geographic region from resource assessment surveys off the west coast of North America during 1912-84.

		West coast			British Columbia			Southeast Alaska			Gulf of Alaska			Aleutian Islands			Bering Sea			All areas combined		
	Depth (meters)	Total Hauls	Occ.	%	Total Hauls	Occ.	%	Total Hauls	Occ.	%	Total Hauls	Occ.	%	Total Hauls	Occ.	%	Total Hauls	Occ.	%	Total Hauls	Occ.	%
All occurrences	0-50	1608	--	--	119	--	--	145	27	19	432	38	9	74	--	--	3113	5	0	5491	70	1
	51-100	2270	--	--	139	--	--	486	279	57	2044	636	31	194	14	7	4186	327	8	9322	1256	13
	101-200	2551	42	2	326	6	2	527	215	41	5013	2322	46	623	134	22	2778	1094	39	11833	3813	32
	201-300	921	6	1	250	12	5	399	41	10	1451	190	13	244	62	25	256	100	39	3522	411	12
	301-400	439	3	1	56	1	2	191	4	2	246	14	6	125	41	33	132	55	42	1190	118	10
	401-500	329	--	--	11	--	--	146	1	1	108	8	7	104	15	14	138	47	34	836	71	8
	501-600	144	--	--	2	--	--	192	--	--	40	--	--	62	--	--	66	7	11	506	7	1
	601-1000	321	--	--	6	--	--	243	--	--	60	--	--	69	--	--	134	2	1	853	2	0
	>1000	25	--	--	2	--	--	--	--	--	--	--	--	--	--	--	--	--	--	27	--	--
	TOTAL	8608	51	1	911	19	2	2329	567	24	9394	3208	34	1515	266	18	10803	1637	15	33580	5748	17

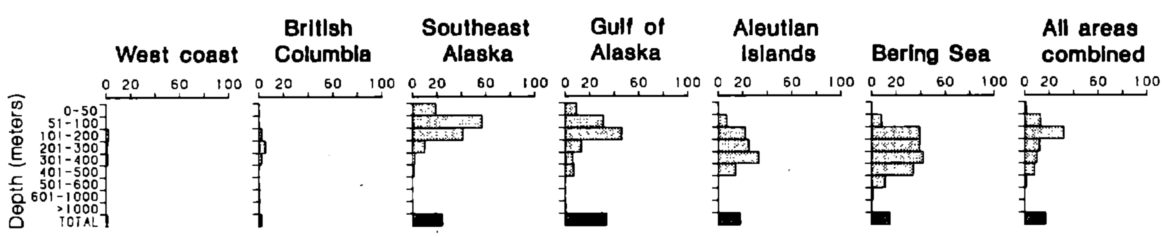
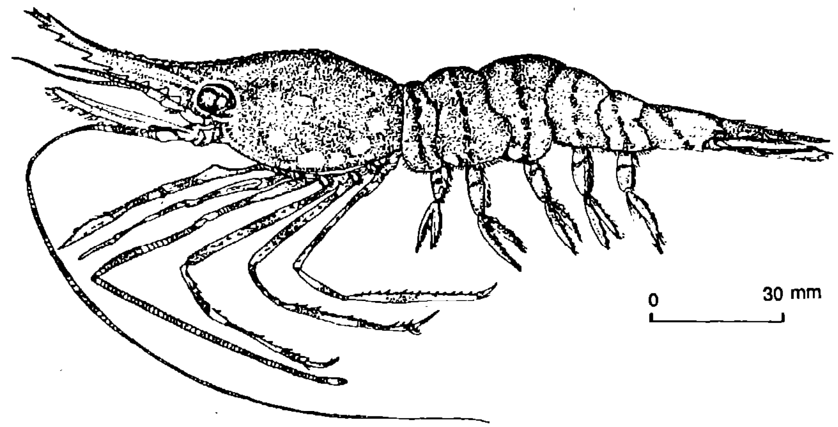


Figure 148.--Frequency of occurrence by depth interval by region for northern pink shrimp off the west coast of North America based on presence or absence in samples from resource assessment surveys during 1912-84.

THIS PAGE INTENTIONALLY LEFT BLANK

Coonstripe shrimp



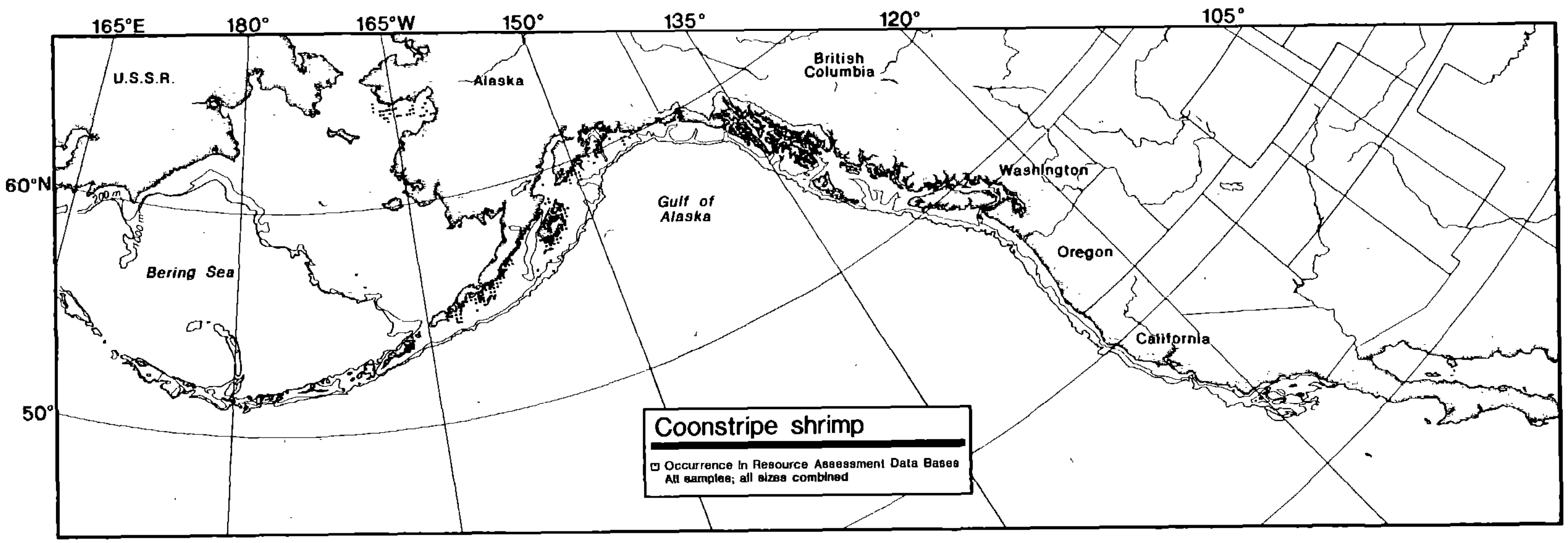


Figure 149.--The overall range of coonstripe shrimp off the west coast of North America based on an analysis of several resource assessment data bases for 1912-84.

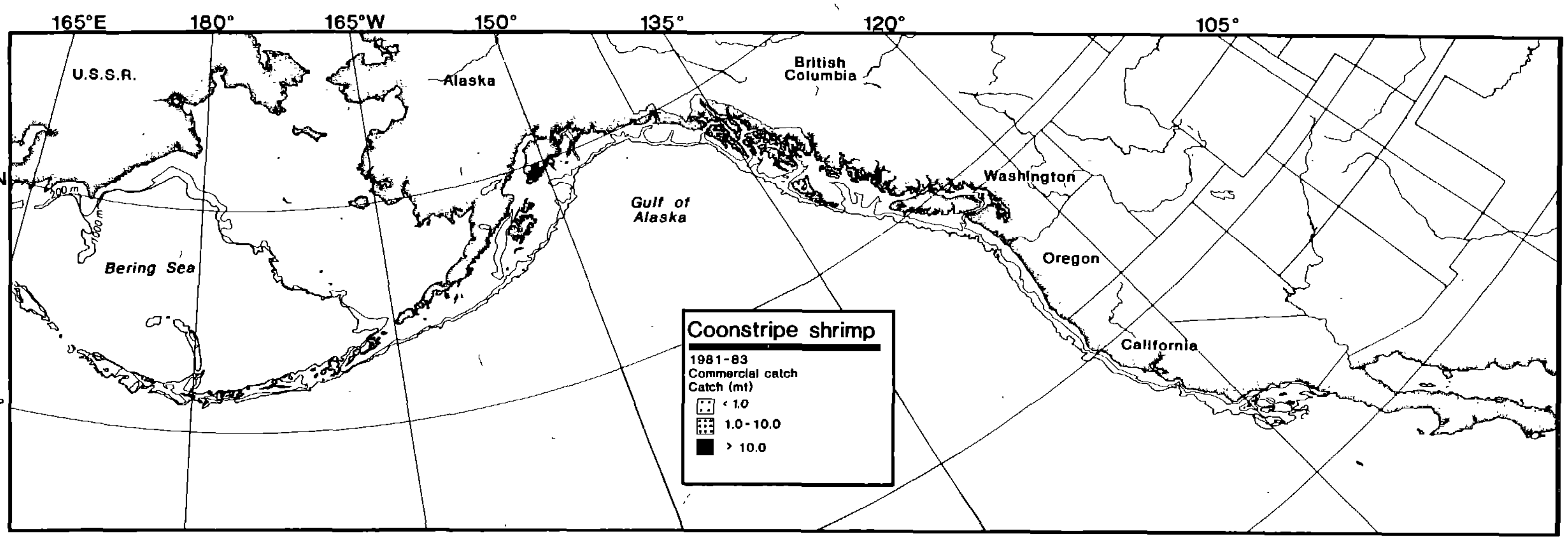


Figure 150.--Location of commercial harvests of coonstripe shrimp off the west coast of North America, 1981-83.

Table 34.--Total numbers of samples (hauls) and numbers of samples containing coonstripe shrimp by depth interval and geographic region from resource assessment surveys off the west coast of North America during 1912-84.

		West coast			British Columbia			Southeast Alaska			Gulf of Alaska			Aleutians			Bering Sea			All areas combined		
	Depth (meters)	Total Hauls	Occ.	%	Total Hauls	Occ.	%	Total Hauls	Occ.	%	Total Hauls	Occ.	%	Total Hauls	Occ.	%	Total Hauls	Occ.	%	Total Hauls	Occ.	%
All occurrences	0-50	1614	1	0	119	--	--	1579	409	26	452	24	5	74	2	3	3114	38	1	6952	474	7
	51-100	2320	1	0	146	6	4	6846	2464	36	2463	375	15	195	14	7	4197	6	0	16170	2866	18
	101-200	2590	15	1	326	--	--	3997	705	18	5132	605	12	623	29	5	2778	--	--	15461	1354	9
	201-300	921	2	0	250	--	--	399	--	--	1451	14	1	244	6	2	256	--	--	3560	22	1
	301-400	439	--	--	56	--	--	197	2	1	246	1	0	125	9	7	132	--	--	1196	3	0
	401-500	329	--	--	11	--	--	146	--	--	108	--	--	104	2	2	138	--	--	842	--	--
	501-600	144	--	--	2	--	--	192	--	--	40	--	--	62	1	2	66	--	--	506	--	--
	601-1000	321	--	--	6	--	--	243	--	--	60	--	--	89	--	--	134	--	--	853	--	--
	>1000	25	--	--	2	--	--	--	--	--	--	--	--	--	--	--	--	--	--	27	--	--
	TOTAL	8703	19	0	918	6	1	13643	3580	26	9952	1019	10	1516	51	3	10815	44	0	45567	4719	10

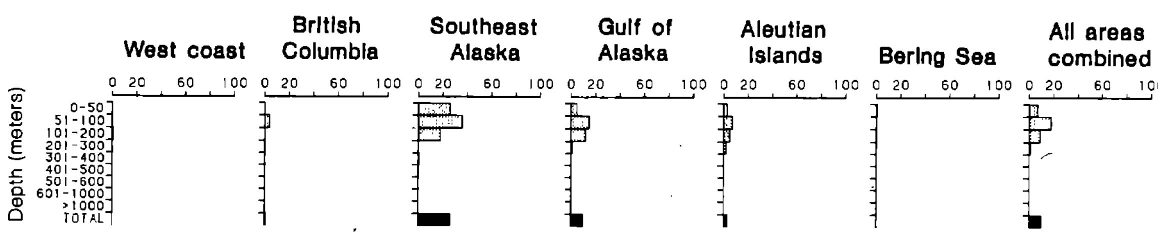
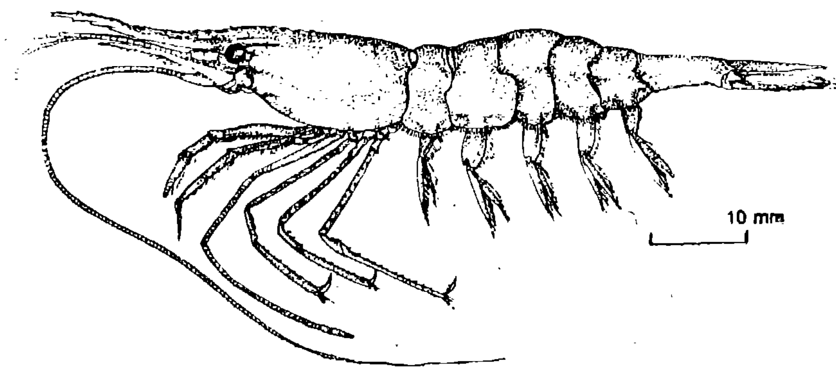


Figure 151.--Frequency of occurrence by depth interval by region for coonstripe shrimp off the west coast of North America based on presence or absence in samples from resource assessment surveys during 1912-84.'

THIS PAGE INTENTIONALLY LEFT BLANK

Ocean pink shrimp



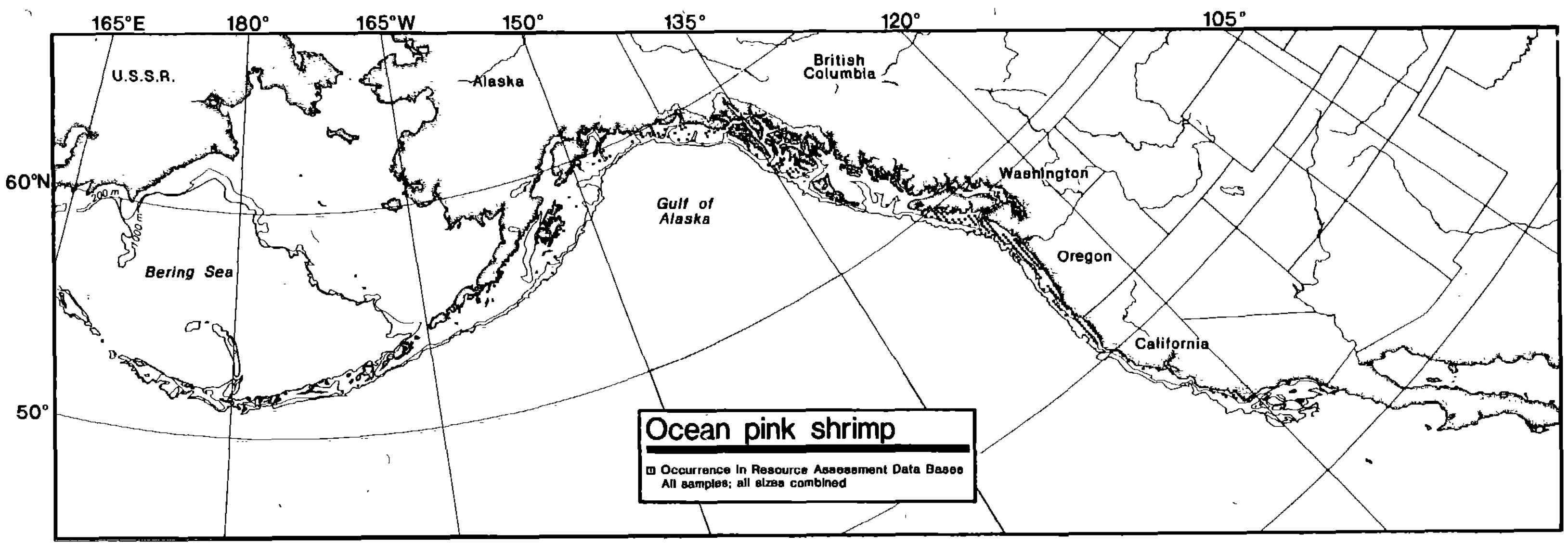


Figure 152.--The overall range of ocean pink shrimp off the west coast of North America based on an analysis of several resource assessment data bases for 1912-84.

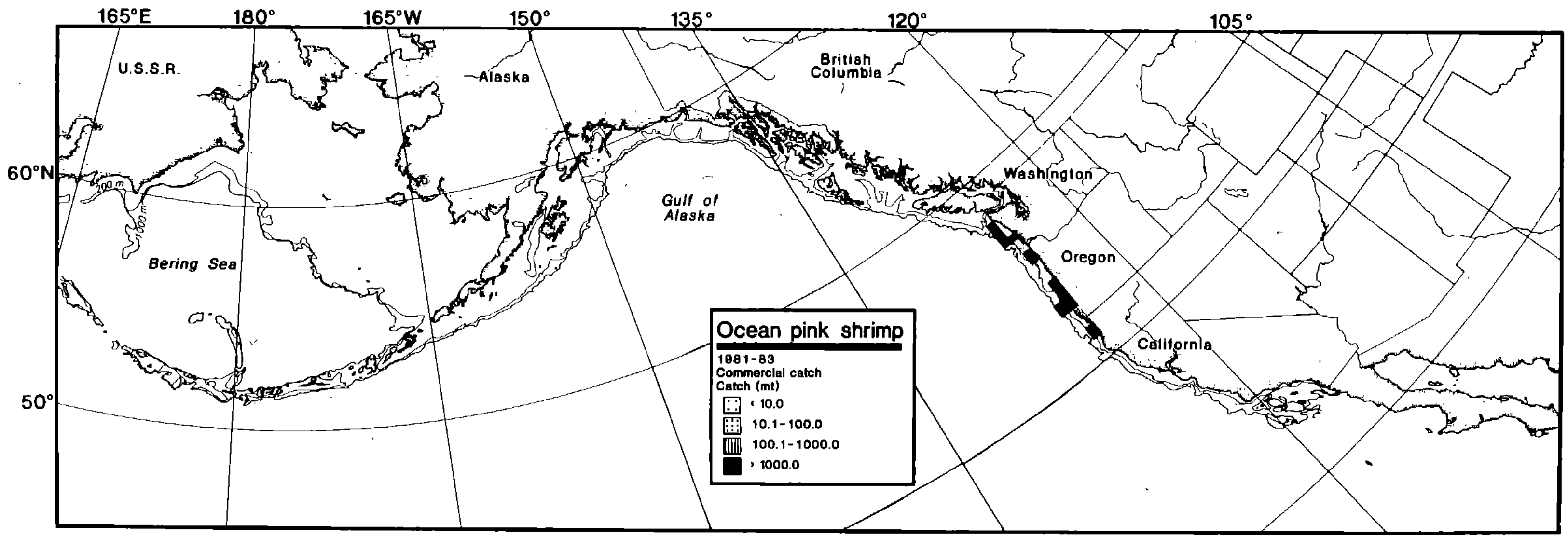


Figure 153.--Location of commercial harvests of ocean pink shrimp off the west coast of North America, 1981-83.

Table 35.--Total numbers of samples (hauls) and numbers of samples containing ocean pink shrimp by depth interval and geographic region from resource assessment surveys off the west coast of North America during 1912-84.

		West coast			British Columbia			Southeast Alaska			Gulf of Alaska			Aleutian Islands			Bering Sea			All areas combined		
	Depth (meters)	Total Hauls	Occ.	%	Total Hauls	Occ.	%	Total Hauls	Occ.	%	Total Hauls	Occ.	%	Total Hauls	Occ.	%	Total Hauls	Occ.	%	Total Hauls	Occ.	%
All occurrences	0-50	1608	5	0	119	1	1	145	--	--	432	--	--	74	--	--	3113	--	--	5491	6	0
	51-100	2270	46	2	139	2	1	486	7	1	2044	5	0	194	--	--	4186	2	0	9322	62	1
	101-200	2551	463	18	326	32	10	527	29	6	5013	44	1	623	2	0	2778	2	0	11833	572	5
	201-300	921	82	8	250	--	--	399	18	5	1451	4	0	244	--	--	256	--	--	3522	104	3
	301-400	439	13	3	56	--	--	191	--	--	246	--	--	125	--	--	132	--	--	1190	13	1
	401-500	329	3	1	11	--	--	146	--	--	108	--	--	104	--	--	138	--	--	836	34	0
	501-600	144	--	--	2	--	--	192	--	--	40	--	--	62	--	--	66	--	--	506	--	--
	601-1000	321	--	--	6	--	--	243	--	--	60	--	--	89	--	--	134	--	--	853	--	--
	>1000	25	--	--	2	--	--	--	--	--	--	--	--	--	--	--	--	--	--	27	--	--
	TOTAL	8608	612	7	911	35	4	2329	54	2	9394	53	1	1515	2	0	10803	4	0	33580	760	2

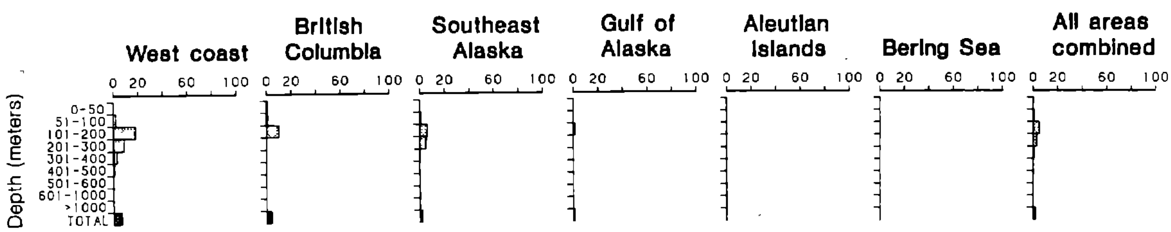
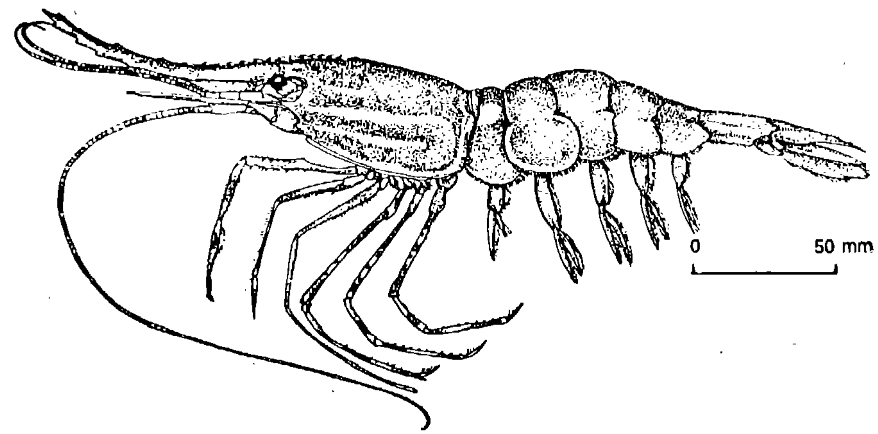


Figure 154.--Frequency of occurrence by depth interval by region for ocean pink shrimp off the west coast of North America based on presence or absence in samples from resource assessment surveys during 1912-84.

THIS PAGE INTENTIONALLY LEFT BLANK

Spot shrimp



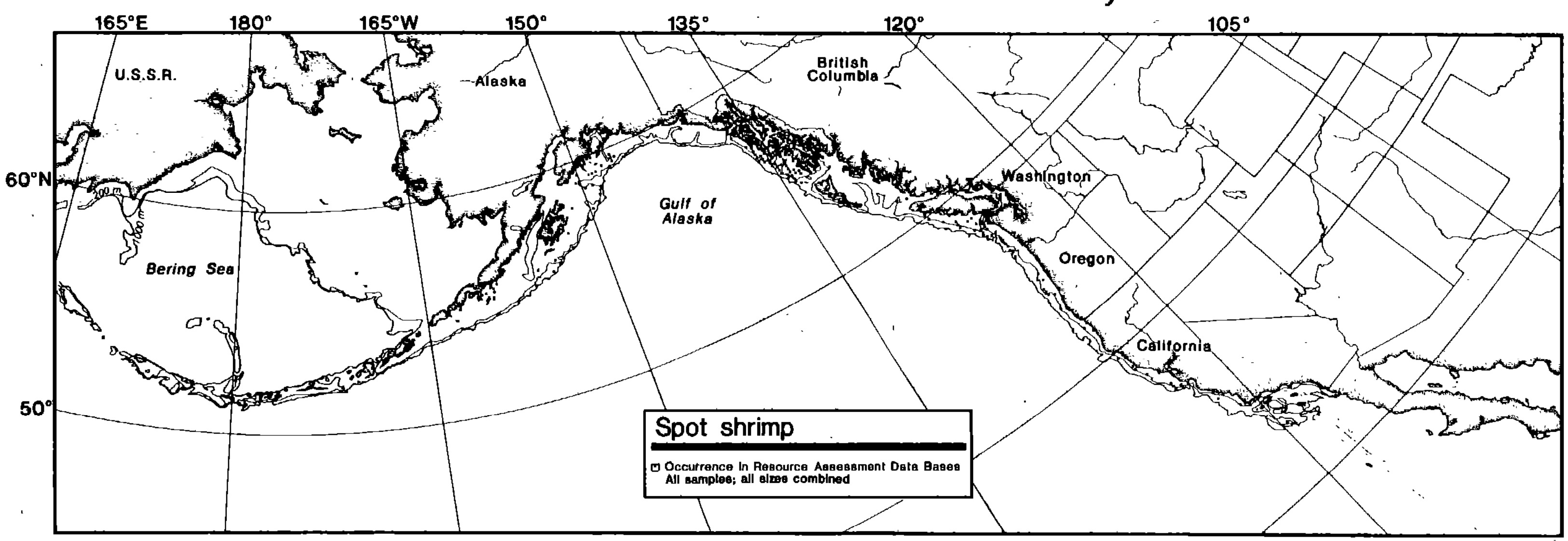


Figure 155.--The overall range of spot shrimp off the west coast of North America based on an analysis of several resource assessment data bases for 1912-84.

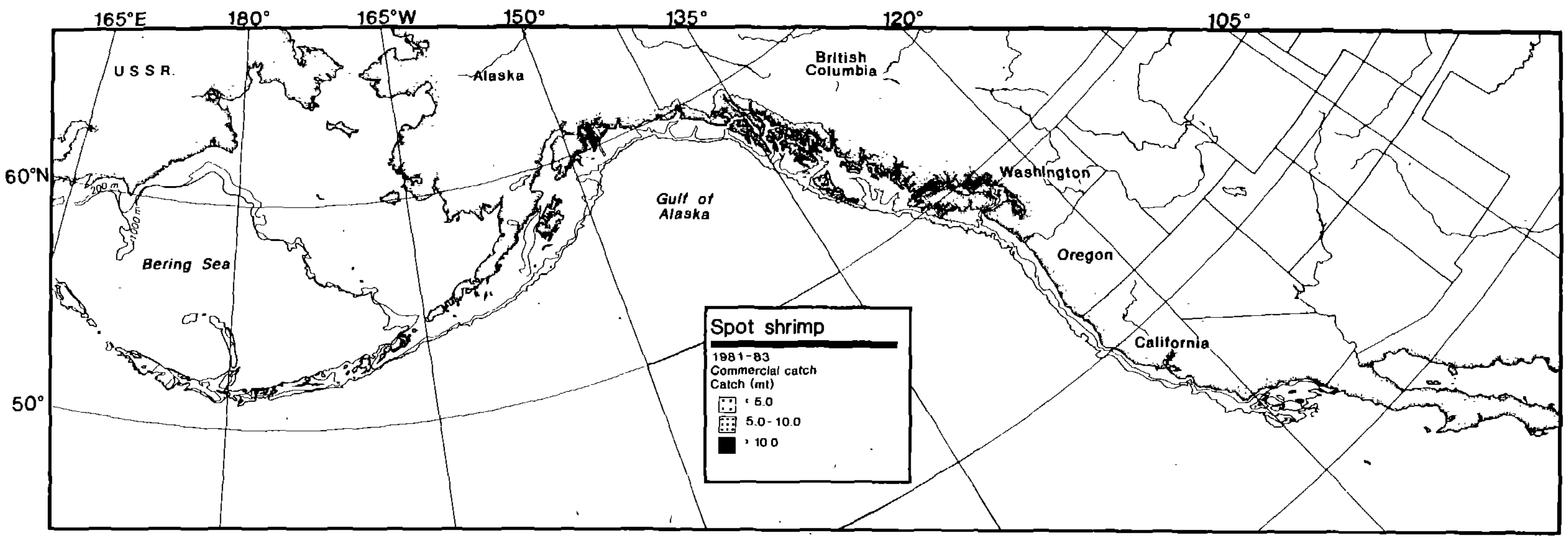


Figure 156.--Location of commercial harvests of spot shrimp off the west coast of North America, 1981-83 domestic.

Table 36.--Total numbers of samples (hauls) and numbers of samples containing spot shrimp by depth interval and geographic region from resource assessment surveys off the west coast of North America during 1912-84.

All occurrences

	West coast			British Columbia			Southeast Alaska			Gulf of Alaska			Aleutian Islands			Bering Sea			All areas combined		
Depth (meters)	Total Hauls	Occ.	%	Total Hauls	Occ.	%	Total Hauls	Occ.	%	Total Hauls	Occ.	%	Total Hauls	Occ.	%	Total Hauls	Occ.	%	Total Hauls	Occ.	%
0-50	1614	--	--	119	--	--	1579	313	20	452	1	0	74	1	1	3114	--	--	6952	315	5
51-100	2320	3	0	146	1	1	6846	3307	48	2463	23	1	195	14	7	4197	9	0	16170	3343	21
101-200	2590	49	2	326	5	2	3997	2289	57	5132	73	1	623	2	0	2778	--	--	15461	2418	16
201-300	921	34	4	250	1	0	437	48	11	1451	24	2	244	--	--	256	--	--	3560	107	3
301-400	439	3	1	56	--	--	197	1	1	246	--	--	125	--	--	132	--	--	1196	4	0
401-500	329	1	0	11	--	--	146	--	--	108	--	--	104	--	--	138	--	--	842	1	0
501-600	144	--	--	2	--	--	192	--	--	40	--	--	62	--	--	66	--	--	506	--	--
601-1000	321	--	--	6	--	--	243	--	--	60	--	--	89	--	--	134	--	--	853	--	--
>1000	25	--	--	2	--	--	--	--	--	--	--	--	--	--	--	--	--	--	27	--	--
TOTAL	8703	90	1	918	7	1	13643	5958	44	9952	121	1	1516	3	0	10815	9	0	45567	6188	14

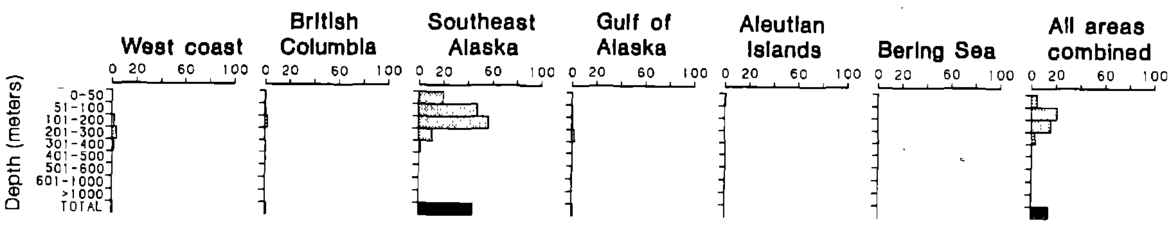
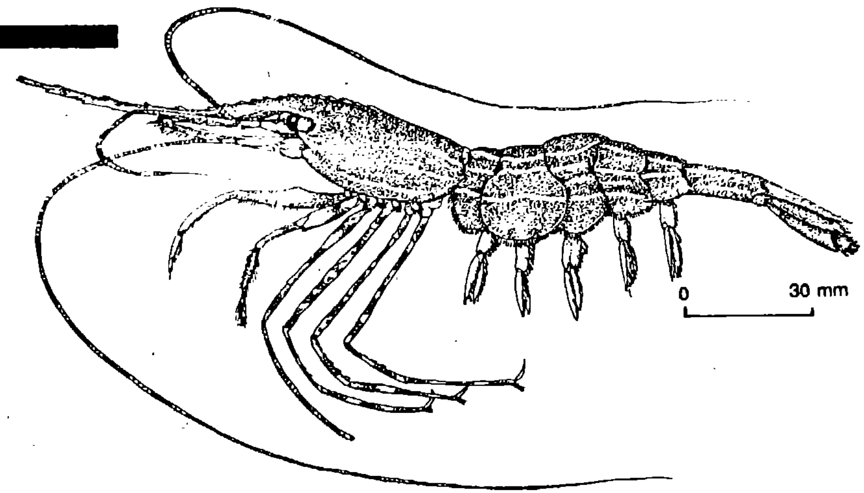


Figure 157.--Frequency of occurrence by depth interval by region for spot shrimp off the west coast of North America based on presence or absence in samples from resource assessment surveys during 1912-84.

THIS PAGE INTENTIONALLY LEFT BLANK

Sidestripe shrimp



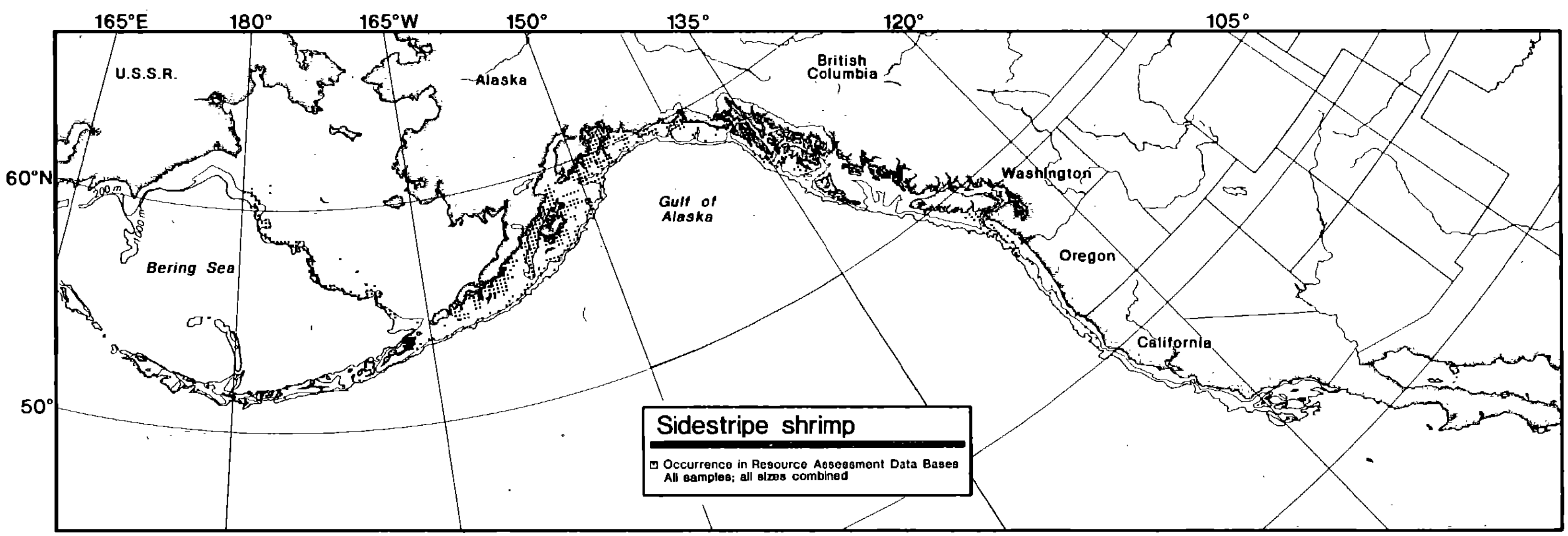


Figure 158.--The overall range of sidestripe shrimp off the west coast of North America based on an analysis of several resource assessment data bases for 1912-84.

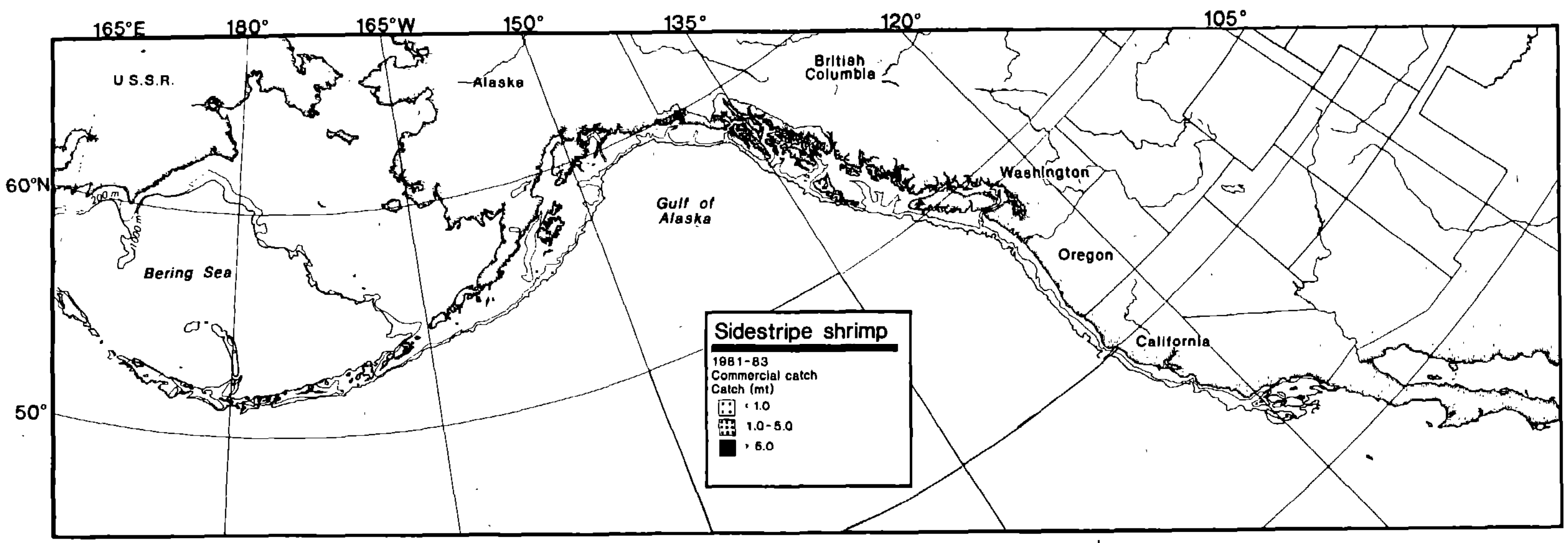


Figure 159.--Location of commercial harvests of sidestripe shrimp off the west coast of North America, 1981-83.

Table 37.--Total numbers of samples (hauls) and numbers of samples containing sidestripe shrimp by depth interval and geographic region from resource assessment surveys off the west coast of North America during 1912-84.

		West coast			British Columbia			Southeast Alaska			Gulf of Alaska			Aleutian Islands			Bering Sea			All areas combined		
	Depth (meters)	Total Hauls	Occ.	%	Total Hauls	Occ.	%	Total Hauls	Occ.	%	Total Hauls	Occ.	%	Total Hauls	Occ.	%	Total Hauls	Occ.	%	Total Hauls	Occ.	%
	0-50	1608	--	--	119	--	--	145	3	2	432	10	2	74	--	--	3113	--	--	5491	13	0
	51-100	2270	6	0	139	--	--	486	78	16	2044	259	13	194	5	3	4186	1	0	9322	349	4
	101-200	2551	85	1	326	--	--	527	201	38	5013	1571	31	623	33	5	2778	4	0	11833	1894	16
	201-300	921	25	3	250	--	--	399	56	14	1451	470	32	244	23	9	256	38	15	3522	612	14
All	301-400	439	14	3	56	--	--	191	12	6	246	74	30	125	9	7	132	56	42	1190	112	13
	401-500	329	--	--	11	--	--	146	8	5	108	16	15	104	2	2	138	86	62	836	26	5
occurrences	501-600	144	--	--	2	--	--	192	--	--	40	--	--	62	1	2	66	25	38	506	6	1
	601-1000	321	--	--	6	--	--	243	--	--	60	--	--	89	--	--	134	6	4	853	--	--
	>1000	25	--	--	2	--	--	--	--	--	--	--	--	--	--	--	--	--	--	27	--	--
	TOTAL	8608	130	2	911	--	--	2329	358	15	9394	2400	26	1515	73	5	10803	216	2	33580	3177	9

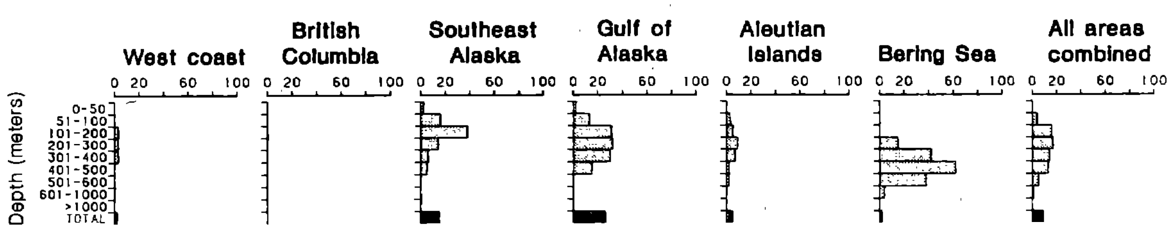
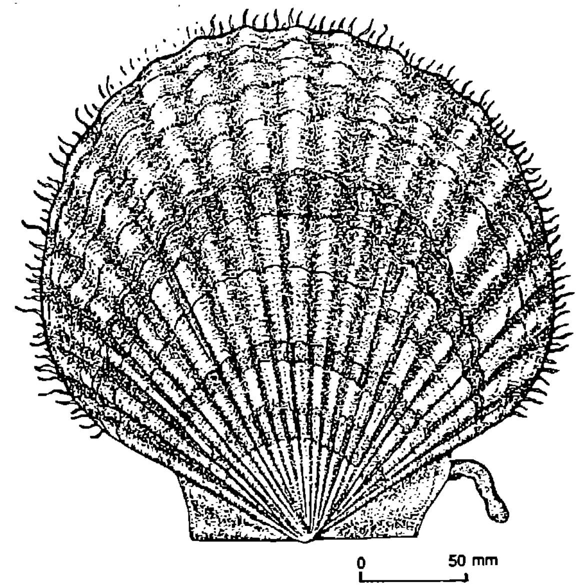


Figure 160.--Frequency of occurrence by depth interval by region for sidestripe shrimp off the west coast of North America based on presence or absence in samples from resource assessment surveys during 1912-84.

THIS PAGE INTENTIONALLY LEFT BLANK

Weathervane scallop



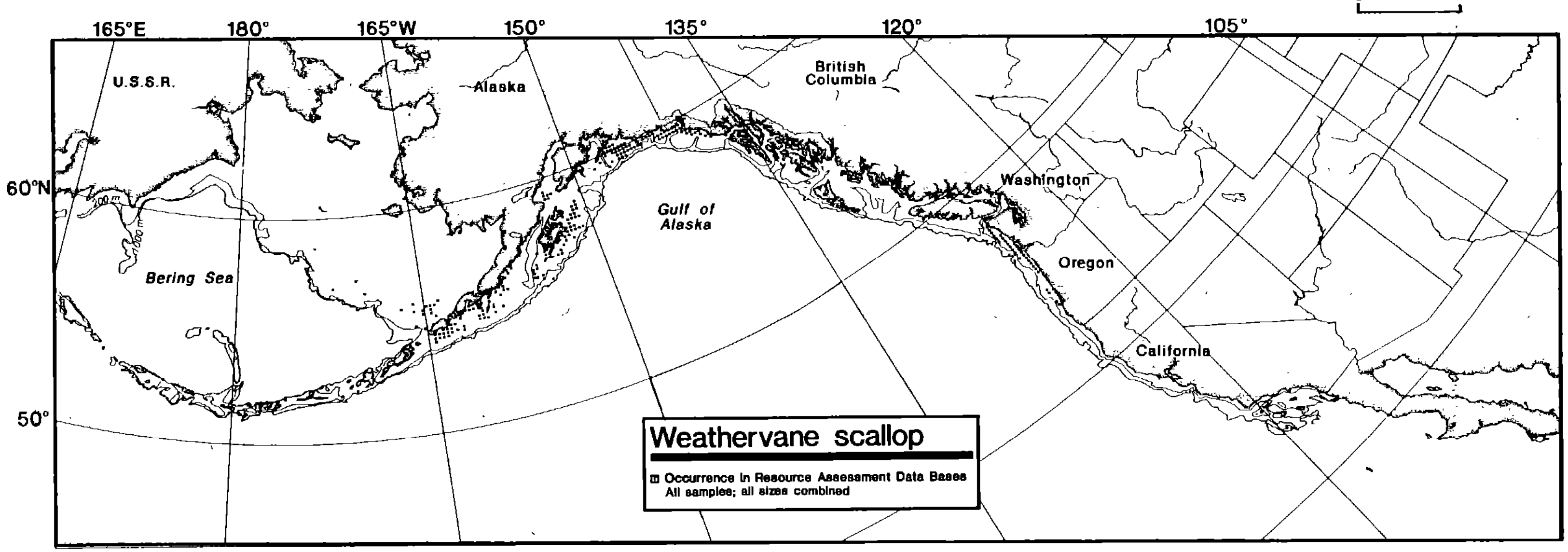


Figure 161 .--The overall range of weathervane scallop off the west coast of North America based on an analysis of several resource assessment data bases for 1912-84.

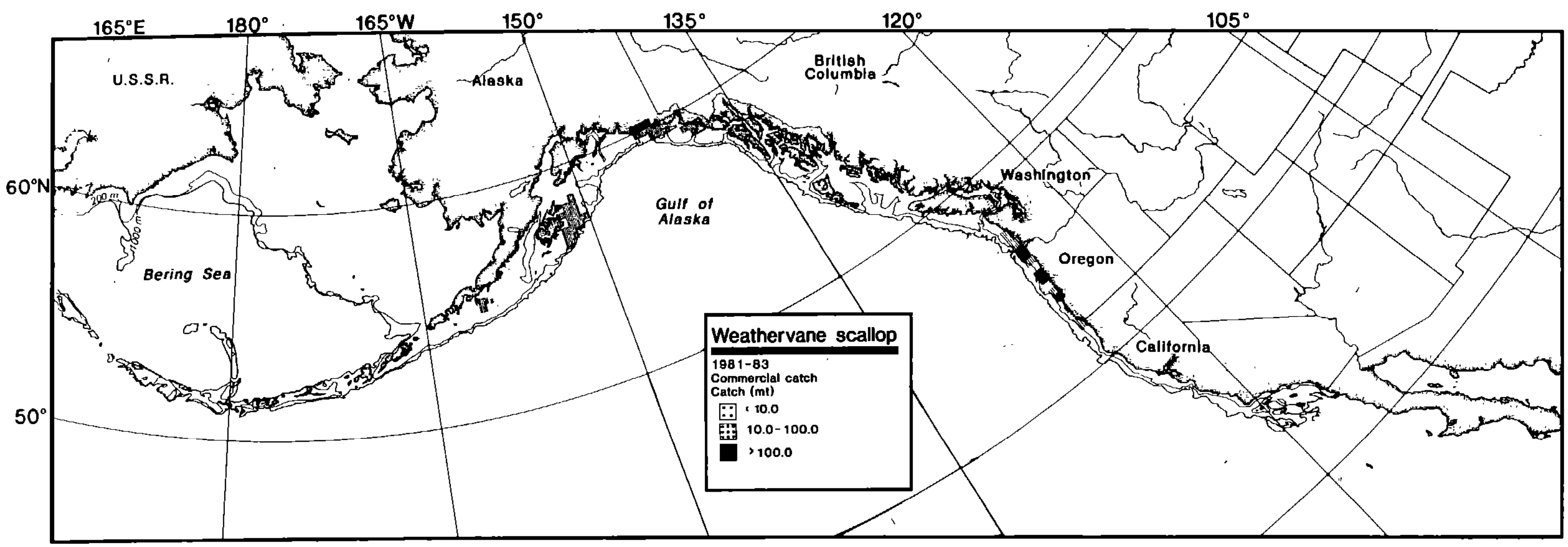


Figure 162.--Location of commercial harvests of weathervane scallop off the west coast of North America, 1981-83.

Table 38.--Total numbers of samples (hauls) and numbers of samples containing weathervane scallop by depth interval and geographic region from resource assessment surveys off the west coast of North America during 1912-84.

All occurrences

Depth (meters)	West coast Total Hauls	West coast Occ.	West coast %	British Columbia Total Hauls	British Columbia Occ.	British Columbia %	Southeast Alaska Total Hauls	Southeast Alaska Occ.	Southeast Alaska %	Gulf of Alaska Total Hauls	Gulf of Alaska Occ.	Gulf of Alaska %	Aleutian Islands Total Hauls	Aleutian Islands Occ.	Aleutian Islands %	Bering Sea Total Hauls	Bering Sea Occ.	Bering Sea %	All areas combined Total Hauls	All areas combined Occ.	All areas combined %
0-50	1614	10	1	119	--	--	145	4	3	443	5	1	74	1	1	3113	--	--	5509	20	0
51-100	2340	168	7	139	--	--	486	3	1	2138	129	6	195	2	1	4190	10	0	9471	312	3
101-200	2590	75	3	326	--	--	527	--	--	5036	73	1	623	2	0	2778	10	0	11895	160	1
201-300	921	--	--	250	--	--	399	--	--	1451	7	0	244	--	--	256	--	--	3522	7	0
301-400	439	--	--	56	--	--	191	--	--	246	--	--	125	--	--	132	--	--	1190	--	--
401-500	329	--	--	11	--	--	146	--	--	108	--	--	104	--	--	138	--	--	836	--	--
501-600	144	--	--	2	--	--	192	--	--	40	--	--	62	--	--	66	--	--	506	--	--
601-1000	321	--	--	6	--	--	243	--	--	60	--	--	89	--	--	134	--	--	853	--	--
>1000	25	--	--	2	--	--	--	--	--	--	--	--	--	--	--	--	--	--	27	--	--
TOTAL	8703	253	3	911	--	--	2329	7	0	9522	214	2	1516	5	0	10808	20	0	33809	499	1

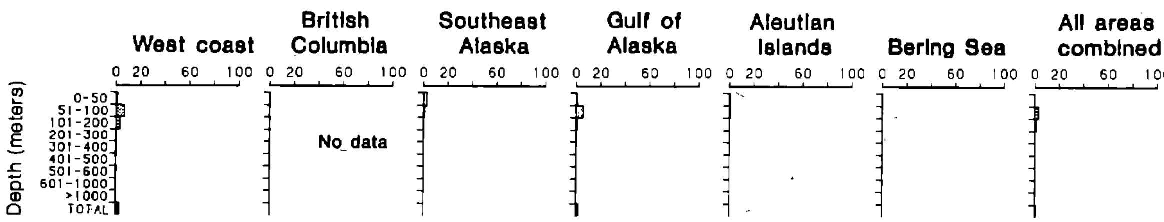
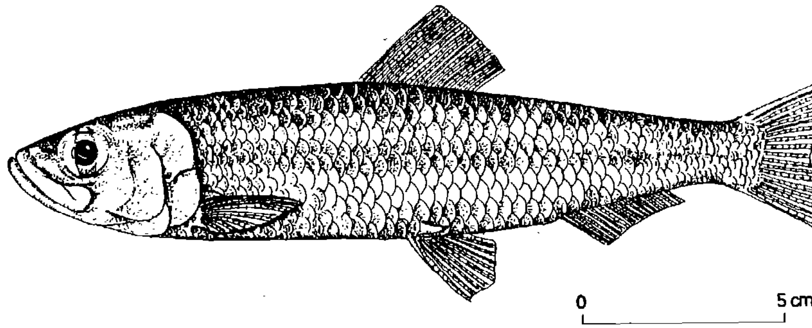


Figure 163.--Frequency of occurrence by depth interval by region for weathervane scallop off the west coast of North America based on presence or absence in samples from resource assessment surveys during 1912-84.

Pacific herring



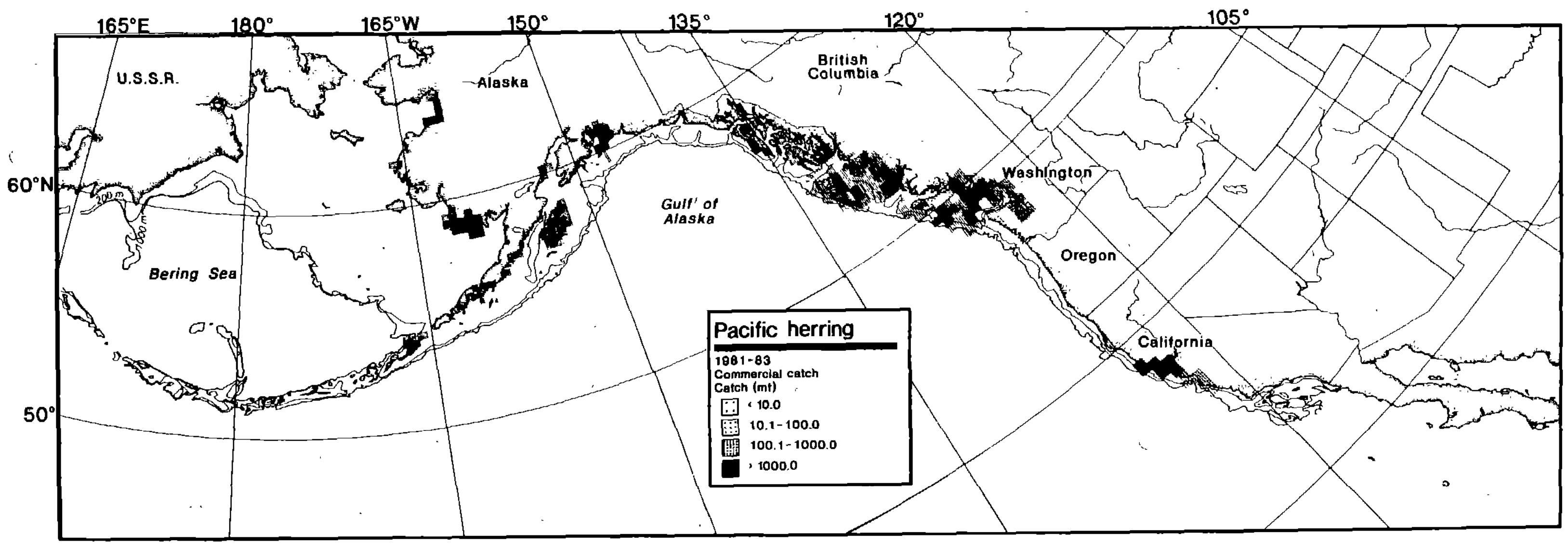
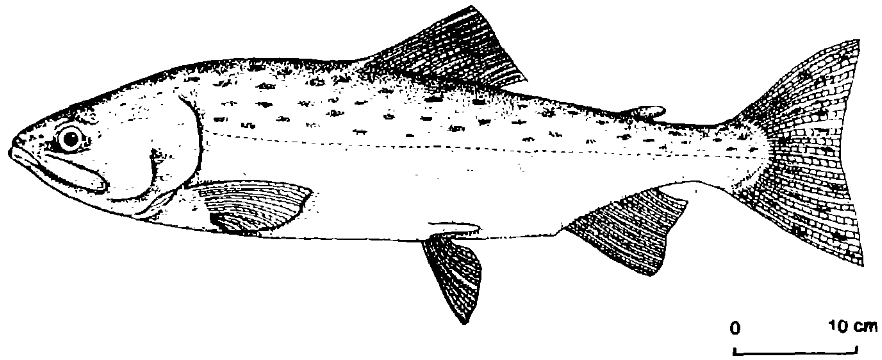


Figure 164.--Location of commercial harvests of Pacific herring off the west coast of North America, 1981-83.

Pink salmon



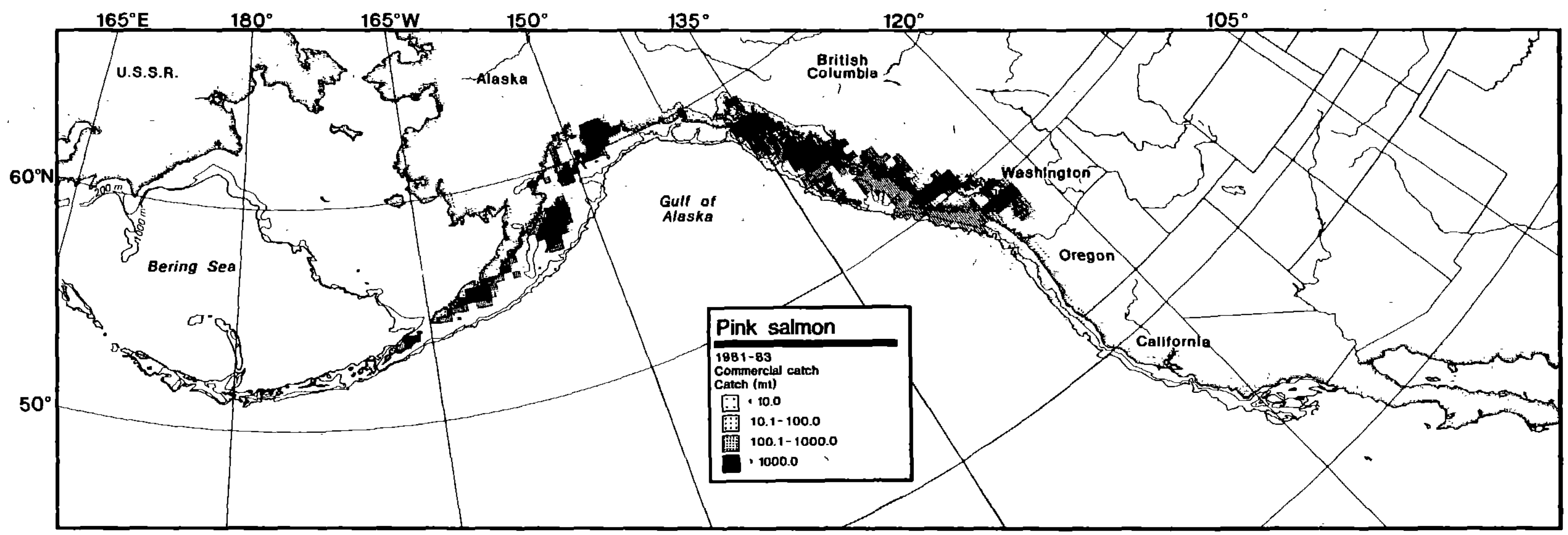
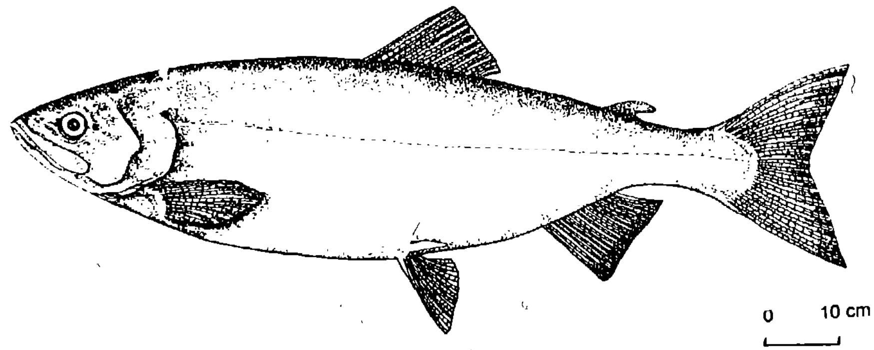


Figure 165.--Location of commercial harvests of pink salmon off the west coast of North America, 1981-83; U.S. and Canadian catches.

Chum Salmon



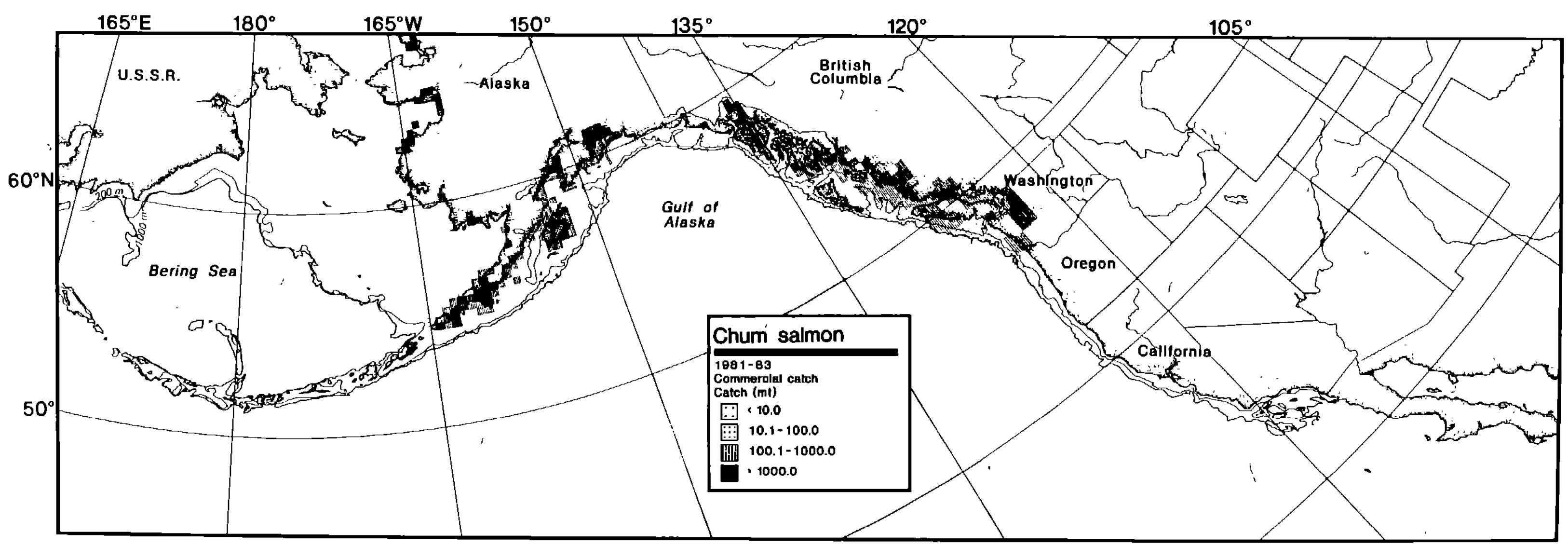
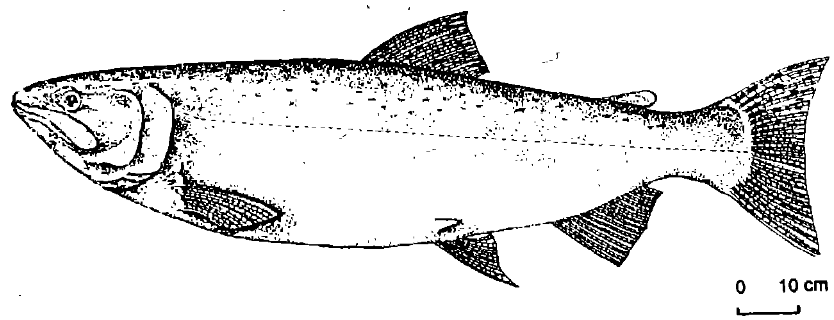


Figure i66.--Location of commercial harvests of chum salmon off the west coast of North America, 1981-83; U.S. and Canadian catches.

Coho Salmon



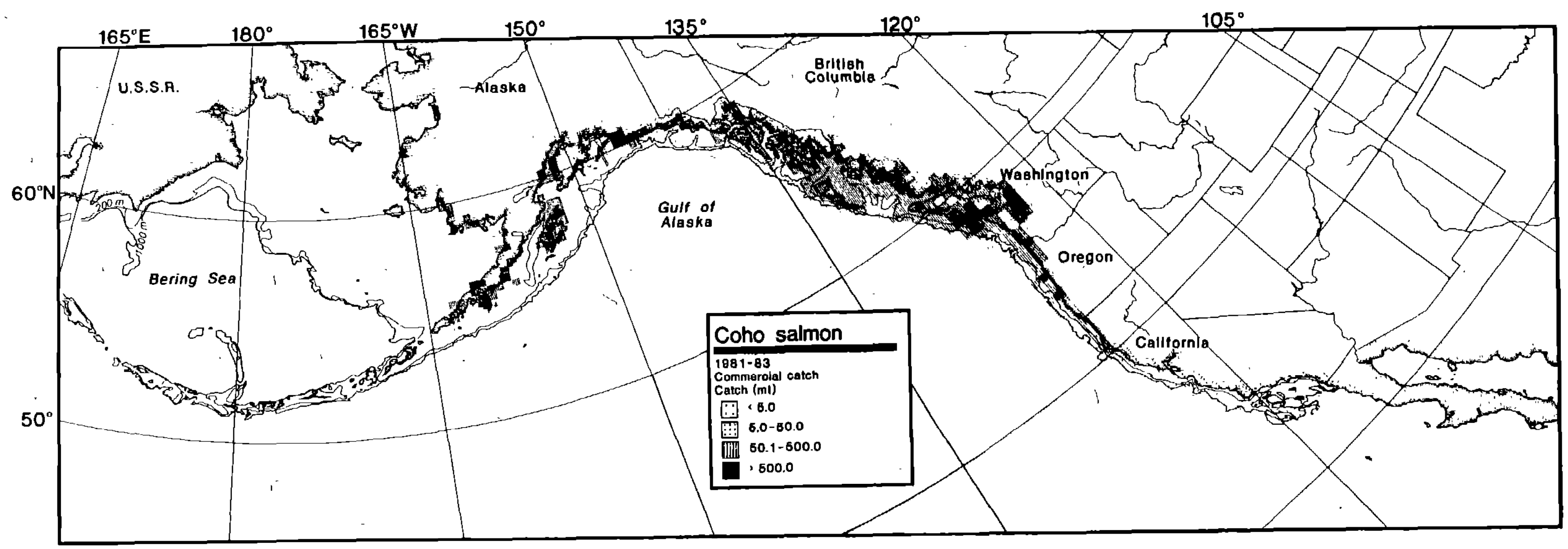
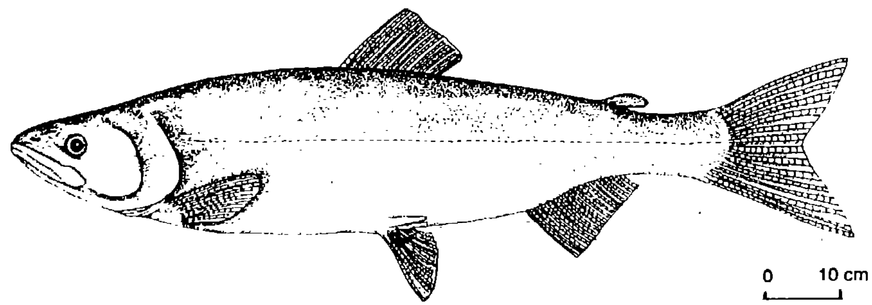


Figure 167.--Location of commercial harvests of coho salmon off the west coast of North America, 1981-83; U.S. and Canadian catches.

Sockeye salmon



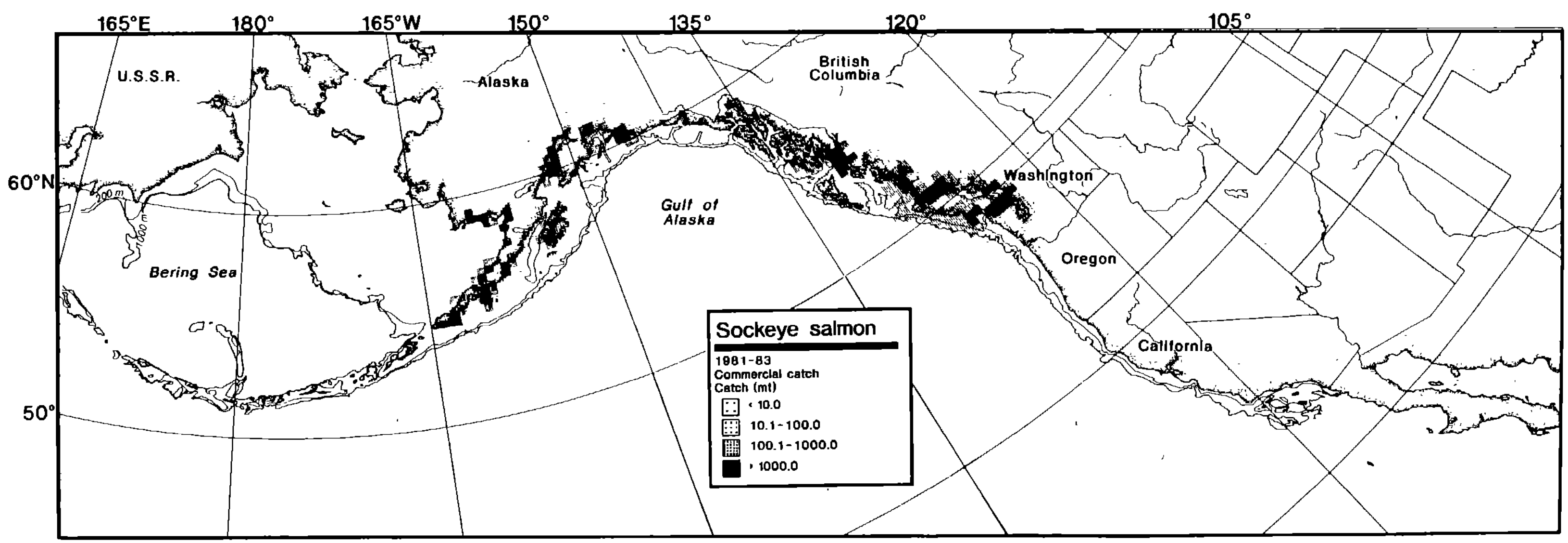
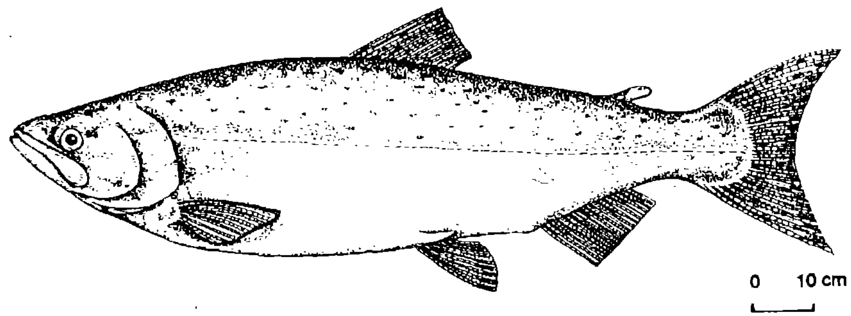


Figure 168.--Location of commercial harvests of sockeye salmon off the west coast of North America, 1981-83; U.S. and Canadian catches.

Chinook salmon



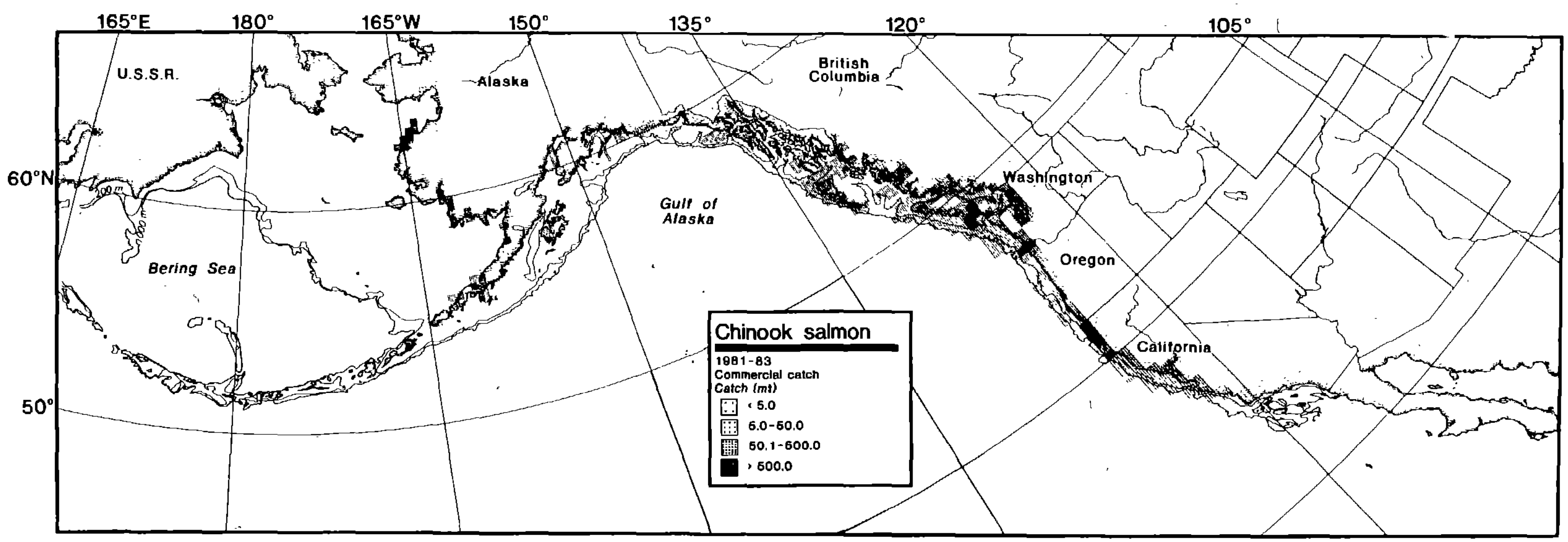


Figure 169.--Location of commercial harvests of chinook salmon off the west coast of North America, 1981-83; U.S. and Canadian catches.

THIS PAGE INTENTIONALLY LEFT BLANK

ACKNOWLEDGMENTS

We wish to express our appreciation to those persons who provided extensive data sets for inclusion in our work. Dick Carlson of the NOAA/NMFS Auke Bay Laboratory at Auke Bay, Alaska, provided original data from Auke Bay Laboratory's coastal groundfish trawl surveys for Southeast Alaska. Jeff Cross of the Southern California Coastal Water Research Project in Long Beach, California, provided data files and raw forms from SCCWRP's coastal trawl surveys in the Southern California Bight. Acquisition of these two data sets greatly enhanced our maps and depth occurrence summaries. Lastly, we wish to thank Susan Farady for her assistance in final preparation of this report.

THIS PAGE INTENTIONALLY LEFT BLANK

REFERENCES

Alaska Department of Fish and Game (ADF&G). [1985a]. Commercial catches of salmon by species and statistical subarea for Alaska, 1981-83. Computer printout compiled and provided by Carmine DiCostanzo, Chief, Computer Services Section, Alaska Dep. Fish and Game, P.O. Box 3-2000, Juneau, AK 99802.

ADF&G. [1985b] Commercial domestic catches of groundfish by statistical subarea for Alaska, 1981-83. Computer file compiled and provided by Fritz Funk, Alaska Dep. Fish and Game, P.O. Box 3-2000, Juneau, AK 99802.

ADF&G. [1985c]. Commercial harvests of herring by year, statistical subarea, and fishery 1981-83, 30 p. Computer printout compiled and provided by Carmine DiCostanzo. Chief, Computer Services Section, Alaska Dep. Fish and Game, P.O. Box 3-2000, Juneau, AK 99802.

Allen, M. J. and G. B. Smith. 1988. Atlas and zoogeography of common marine fishes in the Bering Sea and northeast Pacific Ocean. U.S. Dep. Commer., NOAA Tech. Rep. NMFS 66:151 p.

Barner, L W. and F. H. C. Taylor. 1974. The offshore herring survey of southwest Vancouver Island in 1972 and 1973, GBR 72-4, GBR 73-1, and GBR 73-2. Fish. Res. Board. Can. Tech. Rep. 469, 69 p.

Beamish, R. J. 1976. Pacific hake and walleye pollock study, Strait of Georgia cruise, A. P. Knight. November 18-20, 1974. Fish. Res. Board Can. Fish and Marine Services Manuscr. Rep. 1379, 15 p.

Beamish, R. J., C. Houle, and R. Scarsbrook. 1980. A summary of sablefish taging and biological studies conducted during 1979 by the Pacific Biological Station. Fish. Res. Board Can. Fish and Marine Services Manuscr. Rep. 1588,194 p.

Beamish, R. J., D. Davenport, and R. Scarsbrook. 1976. Pacific hake and walleye pollock study, Strait of Georgia cruise, A. P. Knight. July 29-31, 1974. Fish. Res. Board Can. Fish and Marine Services Manuscr. Rep. 1374, 13 p.

Beamish, R. J., D. Eftoda, M. Smith, R. Scarsbrook, and R. U'ren. 1976. Pacific hake and walleye pollock study, Strait of Georgia cruise, A. P. Knight. May 5-14, 1975. Fish. Res. Board Can. Fish and Marine Services Manuscr. Rep. 1381, 65 p.

Bernard, F. R. (editor). 1982. Assessments of invertebrate stocks off the west coast of Canada (1981). Fish. Res. Board Can. Tech. Rep. 1074,39 p.

Brown, K., R. Berry, J. Lukas, and C. Carter. 1984. 1981 Pounds and value of commercially caught fish and shellfish landed in Oregon. Ore. Dep. Fish. and Wildl., P.O. Box 59, Portland, OR 97207,54 p.

Butler, T. H. and M. S. Smith. 1968. Shrimp sampling and temperature data obtained during exploratory fishing off British Columbia, 1966 and 1967. Fish. Res. Board Can. Tech Rep. 61, 92 p.

California Department of Fish and Game (CDF&G). [1982]. California commercial fish landings by region - December 1981 (preliminary). Computer printout from Calif. Dep. Fish and Game, 1416 Ninth St., Sacramento, CA.

CDF&G. [1983]. California commercial fish landings by region - December, 1982 (preliminary). Computer printout from Calif. Dep. Fish. and Game, 1416 Ninth St., Sacramento, CA 95814.

CDF&G. [1984]. California commercial fish landings by region - December, 1983 (preliminary). Computer printout from Calif. Dep. Fish and Game, 1416 Ninth St., Sacramento, CA 95814.

Canada Department of Fisheries and Oceans (CDF&O). 1982. British Columbia catch statistics by area and type of gear for 1981. Dep. Fish. and Oceans, Pacific Region, 410-555 W.Hastings St., Vancouver, BC V6B 5G3, 223 p.

CDF&O. 1983. British Columbia catch statistics by area and type of gear for 1982. Dep. Fish. and Oceans, Pacific Region, 410-555 W.Hastings St., Vancouver, BC V6B 5G3.239 p.

CDF&O. 1985. British Columbia catch statistics by area and type of gear for 1983. Dep. Fish. and Oceans, Pacific Region, 410-555 W.Hastings St., Vancouver, BC V6B 5G3,239 p.

Davenport, D. and R. M. Wallis. 1978. Arctic Harvester groundfish cruise No. 77-3, October 11-28. 1977. Can. Fish. and Marine Services Data Rep. 51, 16 p.

Davenport, D., J. E. Smith, U. Kristiansen, J. E. Peters, and S. J. Westreheim. 1971. The G. B. Reed groundfish cruise No. 71-1. June 9-29, 1971. Fish. Res. Board Can. Tech. Rep. 269, 27 p.

Ellis, D. V. 1967. Quantitative benthic investigations: II, Satellite channel, species data, February 1965-May 1967. Fish. Res. Board Can. Tech. Rep. 35, unnumbered.

Ellis, D. V. 1968. Quantitative benthic investigations: V, species data from selected stations. Fish. Res. Board Can. Tech. Rep. 73,314 p.

Fisheries Research Institute. [1989]. Summary of incidental catch data for Atka mackerel from the Fishery Research Institute's high seas salmonid tagging data base for 1956-1978, 1980, and 1982-1986. Computer summary provided by Katherine W. Myers, Fisheries Biologist, Univ. Wash., Fish. Res. Inst., School of Fisheries, WH-10, Seattle, WA 98195. February, 1989.

Gorbunova, N. N. 1962. Spawning and development of greenlings (family Hexagrammidae). In: Terpugovye ryby i vozmozhonosti ikh mezhokeanskoi transplantatsii T. S. Rass (ed.). (Greenlings: taxonomy, biology, interocean transplantation). Akad. Nauk SSSR. Tr. Inst. Okeanologii, p.121-185,. Israel Program for Scientific Translation, 1970; available from Clearinghouse Federal Science Technical Information (CFSTI, Springfield, VA 22161).

Harling, W. R., D. Davenport, and S. J. Westrheim. 1967. The G. B. Reed Cruise 67-1, February 1 -April 24, 1967. Fish. Res. Board Can. Tech. Rep. 22, 56 p.

Harling, W. R., D. Davenport, J. E. Smith, and R. Wilson. 1969. The G. B. Reed groundfish cruise No. 69-3, September 8-25, 1969. Fish Res. Board Can. Tech. Rep. 144, 35 p.

Harling, W. R., D. Davenport, J. E. Smith, and W. E. Wowchuck. 1970. The G. B. Reed groundfish cruise No. 70-3, September 9-25, 1970. Fish. Res. Board Can. Tech. Rep. 221, 35 p.

Harling, W. R., D. Davenport, J. E. Smith, N. C. Phillips, and W. R. Wowchuck. 1973. The G. B. Reed groundfish cruise No. 73-2, September 5-25, 1973. Fish. Res. Board Can. Tech. Rep. 424, 37 p.

Harling, W. R., D. Davenport, J. E. Smith, U. Kristiansen, and S. J. Westrheim. 1970. The G. B. Reed groundfish cruise No. 70-1, March 5-June 18, 1970. Fish. Res. Board Can. Tech. Rep. 205, 82 p

Harling, W. R., D. Davenport. J. E. Smith, W. E. Wowchuck, and S. J. Westrheim. 1971. The G. B. Reed groundfish cruise No. 71-3, October 1-29, 1971. Fish. Res. Board Can. Tech. Rep. 290, 35 p.

Harling, W. R., D. Davenport, R. M. Wowchuck, and-K. R. Weir. 1976. The G. B. Reed groundfish cruise No. 75-3, Octover 7-24, 1975. Fish. Res. Board Can. Fish and Marine Services Manuscr. Rep. 1371, 31 p.

International Pacific Halibut Commission. [1986]. Catch Statistics by statistical subarea for the Pacific halibut commercial fishery 1981-1983. Tablesprovided by IPHC staff, Univ. Sta., Box 95009, Seattle, WA 98105.

Leaman, J.-E. 1982. Catch and effort statistics of the Canadian groundfish fishery on the Pacific coast in 1981. Can. Tech. Rep. Fish. Aquat. Sci. 1124. 90 p.

Leaman, J. E. 1983. Catch and effort statistics of the Canadian groundfish fishery on the Pacific coast in 1982. Can. Tech. Rep. Fish. Aquat. Sci. 1226, 90 p.

Leaman, J. E. 1984. Catch and effort statistics of the Canadian groundfish fishery on the Pacific coast in 1983. Can. Tech. Rep. Fish. Aquat. Sci. 1312, 87 p.

LeBrasseur, R. 1970. Larval fish species collected in zooplankton samples from the northeast Pacific Ocean, 1965-69. Fish. Res. Board Can. Tech, Rep. 175, 47 p.

Levings, C. D. 1968. Report on the groundfish cruise of CGS G. B. Reed to Hecate Strate in February, 1968. Fish. Res. Board Can. Tech. Rep. 62, 41 p.

Levings, C. D. 1973. Sediments and abundance of Lycadopsis pacifica [Pices, Zoarcidae) near Point Grey, B. C., with catch data for associated fish. Fish. Res. Board Can. Tech. Rep. 393, 15 p.

Lukas, J. and C. Carter. 1984. 1982 pounds and value of commercially caught fish and shelffish landed in Oregon. Ore. Dep. Fish. and Wildl., P.O. Box 59, Portland, OR 97207, 53 p.

Lukas, J. and C. Carter. 1985. 1983 pounds and value of commercially caught fish and shellfish landed in Oregon. Ore. Dep. Fish. and Wildl., .P.O. Box 59, Portland, OR 97207, 70 p.

Mintel, R. J. and G. B. Smith. 1981. A description of the resource survey data-base system of the Northwest and Alaska Fisheries Center, 1981. U.S. Dep. Commer., NOAA Tech. Memo. NMFS F/NWC-18, 111 p.

Mintel, R. J. and G. R. Oda. 1983. User's guide to the (RACE0010) map program. NWAFC Processed Rep. 83-07, 140 p. Alaska Fish. Sci. Cent., 7660 Sand Point Way NE, BIN C15700, Seattle, WA 98115.

National Marine Fisheries Service. [1985]. Catches of groundfish in U.S. waters by foreign nation and by 1/2 degree' Lat by 1 degree Long, 1981-1983. Resource Ecology and Fisheries Management Division computer files. Alaska Fisheries Science Center, 7600 Sand Point Way NE, BIN Cl5700. Seattle, WA 98115.

National Oceanic and Atmospheric Administration (NOAA), 1990. West Coast of North America Coastal and Ocean Zone Strategic Assessment Data Atlas. Invertebrates and Fishes Volume. U.S. Dep. Commerce, National Ocean Service, Strategic Assessment Branch (now Strategic Environmental Assessments Division), and National Marine Fisheries Service, Northwest and Alaska Fisheries Center (now Alaska Fisheries Science Center). 45 plates and text.

Rutenberg, E. P. 1962. Survey of the fishes of the family Hexagrammidae. In: Terpugovye ryby i vozmozhnosti ikh mezhokeanskoi transplantatsii. T. S. Rass (ed.). [Greenlings: Taxonomy, biology, interoceanic transplantation], p. 1-103. Akad. Nauk SSSR. Trudy Inst. Okeanologii. Israel Program for Scientific Translation, 1962; available from Clearinghouse Federal Science Technical Information (CFSTI, Springfield, VA 22161).

Shaw, W., R. M. Wallis, F. W. Mottl, and S. J. Westrheim. 1978. The Freeport groundfish cruise No. 78-1, July 21-August 11, 1978. Can. Fish. and Marine Services Data Rep. 112, 39 p.

Sigmund, N., R. J. Beamish, J. Fargo, C. Kingston, and M. Stocker. 1979. Exploratory bottom trawling for sablefish southwest of Vancouver Island, 1978. Fish. Res. Board Can. Fish and Marine Services Manuscr. Rep. 1517, 45 p.

Stocker, M., J. Fargo, and D. M. A. Bennett. 1980. Dover sole tagging, eastern Dixon Entrance, September 18-29, 1979. Fish. Res. Board Can. Fish and Marine Services Manuscr. Rep. 1565, 56 p.

Taylor, F. H. C. 1967. Midwater catches from the Queen Charlotte Sound and the open ocean adjacent to the Queen Charlotte Islands. Fish: Res. Board Can. Tech. Rep. 11, 44 p.

Taylor, F. H. C. 1969. The British Columbia offshore herring survey, 1968-1969. Fish. Res. Board Can. Tech. Rep. 140,54p.

Taylor, F. H. C. 1970. The British Columbia offshore herring survey, 1969-1970. Fish. Res. Board Can. Tech. Rep. 174, 74 p.

Taylor, F. H. C. and L. W. Barner. 1974. The herring survey of the Juan de Fuca Strait in 1971: report on the A. P. Knight cruise APK71-3,4,5,6, and 7 (July 22-December 12, 1971). Fish. Res. Board Can. Tech. Rep. 503, 72 p.

Taylor, F. H. C., L. W. Barner, and D. C. Miller. 1970a. The British Columbia offshore herring survey, 1969-1970. Fish. Res. Board Can. Tech. Rep. 190,47 p.

Taylor, F. H. C., L. W. Barner, and D. C. Miller. 1970b. The British Columbia offshore herring survey, 1969-1970. Fish. Res. Board Can. Tech. Rep. 213, 75 p.

Washington Department of Fisheries. [1985]. Commercial catches of fish and shellfish by statistical subarea and year for Washington, 1981-1983. A computer printout, October, 1985, provided by D. Ward. Wash. Dep. Fish., General Admin. Bldg., Olympia, WA 98504.

Westrheim, S. J. 1967a. The G. B. Reed groundfish cruise reports, 1963-1966. Fish. Res. Board Can. Tech. Rep. 30, 289 p.

Westrheim, S. J. 1967b. Catch rates, size composition, and sex ratios of Pacific ocean perch (Sebastodes alutus) caught in the eastern north Pacific Ocean (Vancouver Island, British Columbia to southeastern Alaska) by the G. B. Reed, August-October, 1966. Fish. Res. Board Can. Tech. Rep. 16, 32 p.

Westrheim, S. J. 1974. Explorations of deep water trawling grounds in the Strait of Georgia in 1974. Fish. Res. Board Can. Fish and Marine Services Manuscr. Rep. 1320.

Westrheim, S., J., D. Davenport, and W. R. Harling. 1977. The G. B. Reed groundfish cruise No. 77-1, March 8-30. 1977. Can. Fish. and Marine Services Data Rep. 40,35 p.

Westrheim, S. J., D. Davenport, W. R. Harling, and J. E. Smith. 1972. The G. B. Reed groundfish cruise No. 72-3, September 9-28, 1972. Fish. Res. Board Can. Tech. Rep. 345,28 p.

Westrheim, S J., D. Davenport, W. R. Harling, M. S. Smith, R. M. Wowchuck. 1969. The G. B. Reed groundfish cruise No. 69-1, February 11-27, 1969. Fish. Res. Board Can. Tech. Rep. 113, 23 p.

Westrheim, S. J., D. Davenport, J. E. Smith, and W. R. Harling. 1972. The G. B. Reed groundfish cruise No. 72-1, June 13-29, 1972. Fish. Res. Board Can. Tech. Rep. 328, 17 p.

Westrheim. S. J., C. W. Haegele, U. B. G. Kristianson, and N. A. Webb. 1970. The G. B. Reed groundfish cruise No. 70-2, August 7-20, 1970. Fish. Res. Board Can. Tech. Rep. 210, 15 p.

Westrheim, S. J., W. R. Harling, and D. Davenport. 1968. The G. B. Reed groundfish cruise No. 67-2, September 6-October 4, 1967. Fish. Res. Board Can. Tech. Rep. 46, 45 p.

Westrheim, S. J., W. R. Harling, D. Davenport, and J. E. Smith. 1974a. The G. B. Reed groundfish cruise No. 74-3, June 4-26, 1974. Fish. Res. Board Can. Tech. Rep. 478, 59 p.

Westrheim, S. J., W. R. Harling. D. Davenport, and J. E. Smith. 1974b. The G. B. Reed groundfish cruise No. 74-4. Fish. Res. Board Can. Tech. Rep. 497, 37 p.

Westrheim, S. J., W. R. Harling, D. Davenport, J. E. Smith, and N. C. Phillips. 1973. The G. B. Reed groundfish cruise No. 73-1, June 5-July 26, 1973. Fish. Res. Board Can. Tech. Rep. 410, 51 p.

Westrheim, S. J., W. R. Harling, D. Davenport, and R. M. Wowchuck. 1975. The G. B. Reed groundfish cruises 75-1 (April 8-24) and 75-2 (July 8-24) (Data Record). Fish. Res. Board Can. Fish and Marine Services Manuscr. Rep. 1367.

Westrheim, S. J., J. E. Smith, W. R. Harling, U. R. Kristiansen, and J. E. Peters. 1971. The G. B. Reed groundfish cruise No. 71-2, August 2-September 3, 1971. Fish. Res. Board Can. Tech. Rep. 278, 15 p.

THIS PAGE INTENTIONALLY LEFT BLANK

APPENDIX A: Methodology for combining catch information from various trawl types to map relative abundance.

Correction factors were needed to relate catches from different sized and designed trawls for mapping relative abundance. Catches from all trawl types used in NMFS resource assessment surveys during 1980-84 were related to a standard: a “noreastern” demersal trawl (code number 161 in the RACE Division data base). The basis for this relationship was a simple ratio between the effective fishing area of a trawl (i.e., width and height of the trawl’s mouth while fishing) and that of a standard trawl.

Regardless of net size, some trawl designs are more effective than others at capturing different species groups, and additional catch adjustments were needed. These adjustments were calculated using results from fishing power experiements conducted by NMFS in i983 (Craig Rose, AFSC, pers. commun., August 1988) and applying assumptions to that information.

Several results of the gear experiments were pertinent to our correction factors, such as:

- Flatfish catch rates between trawls equipped and not equipped with roller gear differed significantly;
- When footropes were the same length, a trawl with a high mouth opening caught similar amounts of Pacific cod as a trawl with a lower vertical opening, suggesting that Pacific cod were close enough to the bottom to be equally available to both trawl types;
- When footropes were the same length, trawls with high& mouth openings caught greater amounts of walleye pollock than trawls with lower vertical openings;
- When footropes were the same length, trawls without roller gear caught more flatfishes and crabs than trawls with roller gear by a factor of 1.36; and
- Bottom trawls with and without roller gear caught similar amounts of Pacific cod and other semidemersal roundfishes (e.g., sablefish, lingcod, etc.).

Several assumptions were developed from results of the gear experiments. First, catches of semidemersal and pelagic species were assumed proportional to the area of a trawl's mouth opening (i.e., the effective trawl width X the effective trawl height). For example, the standard “noreastern” trawl with a mouth opening of 92.4 m^2 was 4.4 times more effective at catching pollock than a trawl with an opening of only 20.7 m^2 Second, the effective fishing width of a pelagic trawl equalled its effective fishing height (unless otherwise specified). Third, a bottom trawl without roller gear opened an average width of 0.66 of its headrope length. And lastly, a bottom trawl with roller gear opened an average width of 0.56 of its headrope length.

Table A-l is a listing of information for all gear types with catches that were incorporated into the relative abundance maps.

Table A-l. Summary of Information associated with. fishing power factors calculated from 1980 lo 1994 NMFS resource assessment survey data for mapping relative abundance,

Gear code	Trawl name	Trawl type	Headrope length (m)	Footrope length (m)	Fishing width (m)	Fishing height (m)	Effective fishing area (sq m)	Correction factors for			Remarks
								Flatfishes and crabs	Demersal roundfishes*	Pollock and whiting	
20	400-mesh eastern fish trawl	bottom	28.40	21.40	12.20	1.70	20.70	1.01	1.38	4.46	Standard bottom trawl used during early exploratory fishing surveys.
21	400-mesh eastern fish trawl	bottom	28.40	21.40	12.20	1.70	20.70	1.10	1.38	4.46	Similar to No. 020 but with more floats on headrope.
22	400-mesh eastern fish trawl	bottom with roller gear	28.40	21.40	12.20	1.70	20.70	1.10	1.38	4.46	
24	400-mesh eastern fish trawl	bottom	28.40	21.40	13.60	1.50**	20.40	0.91	1.24	4.53	
25	400-mesh eastern fish trawl	bottom	28.40	21.40	13.60	1.50	20.40	0.92	1.25	4.53	Used by R/V Alaska during early part of 1981 survey.
26	400-mesh eastern fish trawl	bottom	28.40	21.40	14 30	1.40	20.00	0.86	1.18	4.62	Used by R/V Alaska during late part of 1981 survey.
30	83/112 eastern fish trawl	bottom	25.30	34.10	17.00	2.30	39.10	0.74	0.99	2.36	Standard resource assessment trawl used after 1978 in the eastern Bering Sea.
31	83/112 eastern fish trawl	bottom	25.30	34.10	17.00	2.30	39.10	0.74	0.99	2.36	Similar to No.030 but with fewer floats.
32	83/112 eastern fish trawl	bottom	25.30	34.10	19.80	2.00	38.40	0.63	0.85	2.41	
33	83/112 eastern fish trawl	bottom	25.30	34.10	16.70	2.30	39.10	0.74	1.01	2.36	Used on R/V Chapman during cruise 82-3
34	83/112 eastern fish trawl	bottom	25.30	34.10	16.30	2.40	39.10	0.76	1.03	2.36	Used by F/V Pat San Marie dunng Cruise 82-1.
35	83/112 eastern fish trawl	bottom	25.30	34.10	18.00	2.20	39.10	0 69	0.93	2.36	Used on R/V Chapman during cruise 81-3.
37	83/112 eastern fish trawl	bottom	25.30	34.10	16.50	2.30	39.10	0.75	1.02	2.36	Used on R/V Chapman during cruise 83-3.
38	83/112 eastern fish trawl	bottom	25.30	34.10	16.40	2.40	39.10	0.75	1.02	2.36	Used by R/V Alaska during Cruise 83-1.
155	95/105 high opening demersal trawl	bottom	30.00	32.00	19.10	9.10	173.80	0.65	0.88	0.53	Used by F/V Annhilator.
156	modified Atlantic western dem. trawl	bottom with roller gear	33.00	39.00	15.20	7.60	115.80	1.11	1.11	0.80	Used by F/V Queen Victoria.
160	noreastern demersal fish trawl	bottom with roller gear	27.40	32.00	13.40	9.20	123.30	1.25	1.25	0.75	
161	noreastern demersal fish trawl	bottom with roller gear	27.40	32.00	16.80	5.50	92 40	1.00	1.00	1.00	**Standard resource assessment trawl used in Northeast Pacific during 1980-1984.**
162	noreastern (heavier twine)	bottom with roller gear	27.40	32.00	16.80	5.50	92.40	1.00	1.00	1.00	
300	Alaska "dimond" pelagic trawl	midwater	?	?	23.80	23.80	566.40	0.71	0.71	0.16	
305	"Marinovich" pelagic trawl	midwater	9.00	9.00	6.10	6.10	37.20	2.75	2.75	2.48	
310	3/4 scale "norse" pelagic trawl	midwater	?	?	19.90	19.90	396.40	0.84	0.84	0.23	
311	"norse" pelagic trawl	midwater	?	?	26.50	26.50	704.50	0.63	0.63	0.13	
312	Gurock Polish rope trawl	midwater	?	?	23.50	23.50	533.70	0.72	0.72	0.17	
313	"No.9A Gurock Polish rope wing trawl	midwater/bottom	?	?	23.50	23.50	533.70	0.72	0.72	0.17	Assumed similar dimensions to Trawl No. 312.
506	flat Gulf(of Mexico) shrimp trawl	bottom	13.40	13.10	8.90	1.00	8.90	1.39	1.89	10.38	Used during early exploratory fishing surveys.
508	"high opening" shrimp trawl	just off bottom	18.60	18.60	9.80	3.80	37.10	1.71	1.71	2.49	Standard Alaska shrimp resource assessment trawl.
706	Japanese flounder trawl	bottom	18.80	59.00	32.00	3.80	121.60	0.39	0.53	0.76	Used by F/V Hatsue Maru No. 62 in 1980.
707	Japanese rough bottom trawl	bottom with roller gear	46.80	57.50	28.80	4.10	118.10	0.58	0.58	0.78	Used by F/V Hatsue Maru No. 62 in 1980.
708	Japanese bottom trawl	bottom with roller gear	56.40	64.60	24 30	5.60	136.10	0.69	0.69	0.68	
709	Japanese rough bottom trawl	bottom with roller gear	54.50	64.00	23.00	4.60	105.80	0.73	0.73	0.87	Used by F/V Ryujin Maru No. 8 in 1982.
750	400-mesh eastern fish trawl	bottom	21.60	28.70	12.20	1.70	20.70	1.01	1.38	4.46	Used during Int. Pac. Halibut Com. surveys; rubber washers are attached along entire footrope.
751	small-mesh Pacific Coast 2-seam trawl	bottom	14.30	17.40	9.40	1.00	9.40	1.31	1.79	9.83	Used during Int. Pac. Halibut Com. surveys.
777	Soviet demersal trawl	bottom	31.00	36.00	20.00	6.00	120.00	0.62	0.84	0.77	Used by R/V Shantar during cooperative US-USSR surveys.
778	Soviet pelagic trawl	midwater	77.40	77.40	30.00	20 00	600.00	0.56	0.56	0.15	Used by R/V Shantar during cooperative US-USSR surveys.
779	Soviet demersal trawl	bottom with roller gear	31.00	47.00	17.40	6.50	113.00	0.97	0.97	0.82	Used by R/V Mys Dalniy during coop. US-USSR surveys.
780	Soviet demersal trawl	bottom with roller gear	43.00	59.00	24.10	12.00	289.20	0.70	0.70	0.32	Used by R/V Mys Dalniy during coop. US-USSR surveys.
781	Soviet demersal trawl	bottom with roller gear	28.00	41.00	15.80	6.00	94.80	1.06	1.06	0.98	Used by R/V Mys Dalniy dunng coop US-USSR surveys.
782	Soviet pelagic trawl	midwater	77.40	77.40	30.00	25 00	750.00	0.56	0.56	0.12	Used by R/V Mys Dalnly during coop. US-USSR surveys.
784	Soviet demersal trawl	bottom	37.90	32.90	16.00	7.50	120.10	0.77	1.05	0.77	Used by SRTM-8459 during coop. US-USSR survey.
785	Soviet demersal trawl	bottom	27.10	27.40	14.00	9.00	126.00	0.88	1.20	0.73	Used by SRTM-8459 during coop. US-USSR survey.
786	Soviet demersal trawl	bottom with roller gear	43.00	60.80	29.50	6.00	177.00	0.57	0.57	0.52	Used by R/V Milogradova during coop. US-USSR survey.
801	Korean demersal trawl	bottom with roller gear	50.00	63.00	28.10	5.20	146.10	0.60	0.60	0.63	Used by R/V Oh Dae San during coop US-ROK survey.

* Includes species such as Pacific cod, sablefish, rockfishes, lingcod, etc.

** Numbers in shaded blocks are approximate and based on assumptions listed in this appendix.

Appendix B: Listings of data sets.

Table B-l. Log of NMFS-AFSC resource assessment surveys.

Table B-2. Summary of data from Auke Bay Laboratory resource assessment surveys.

Table B-3. Summary of data from Canada Department of Fisheries and Oceans surveys (in addition to data already in RACEBASE).

Table B-4. Summary of data from Alaska Department of Fish and Game surveys.

Table B-5. Summary of data from Juneau Exploratory Fishing and Gear Research Base surveys (shrimp pot work is listed at end).

Table B-6. Summary of data from Seattle Exploratory Fishing and Gear Research Base surveys.

Table B-7. Summary of data from Southern California Coastal Water Research Project surveys.

Table B-8. Summary of data from NMFS and federa/state cooperative scallop surveys.

Table B-1. Log of NMFS-AFSC resource assessment surveys.

Vessel	Cruise No.	Year	Begin Mo.	Begin Day	End Mo.	End Day	N. Latitude Min.	N. Latitude Max.	W. Longitude Min.	W. Longitude Max.	No. of samples
Chapman	802	80	10	1	10	29	32.60	38.20	119.40	123.63	93
Chapman	812	81	4	12	4	24	42.97	44.70	124.62	124.93	26
Chapman	813	81	5	1	8	31	54.69	61.63	160.91	179.07	230
Chapman	814	81	8	1	9	31	53.66	55.44	160.19	166.98	57
Chapman	821	82	4	1	5	30	54.71	56.79	164.21	171.02	25
Chapman	822	82	5	11	5	28	55.46	57.81	160.52	166.38	79
Chapman	823	82	5	1	7	30	55.00	60.66	158.32	174.14	149
Chapman	824	82	8	8	8	31	56.26	59.51	161.47	171.10	15
Chapman	825	82	9	11	9	18	55.45	56.39	163.20	166.01	31
Chapman	826	82	9	1	10	30	53.70	56.22	162.76	167.24	85
Chapman	831	83	3	4	3	20	56.46	58.22	153.57	156.54	52
Chapman	832	83	3	1	4	31	56.61	57.84	149.76	155.38	14
Chapman	833	83	6	1	8	31	55.00	61.00	159.54	178.80	190
Chapman	834	83	8	1	9	31	52.25	54.74	165.21	174.45	63
Chapman	842	84	6	1	8	30	54.98	61.01	158.31	178.18	251
Chapman	844	84	8	29	8	30	55.19	55.41	161.53	161.98	13
John N. Cobb	15	53	3	1	4	31	59.42	59.92	139.62	140.25	79
John N. Cobb	18	54	2	1	4	31	59.50	61.12	145.67	148.62	120
John N. Cobb	20	54	7	1	9	31	59.22	61.12	144.87	148.43	178
John N. Cobb	39	58	7	1	8	31	56.92	59.60	150.35	154.92	109
John N. Cobb	43	59	8	6	8	30	65.33	69.28	163.80	168.88	59
John N. Cobb	44	59	10	1	11	31	59.37	61.03	145.87	150.22	101
John N. Cobb	52	61	9	4	10	30	59.27	60.30	144.75	148.87	98
John N. Cobb	54	62	4	1	5	31	57.33	60.23	144.97	150.63	82
John N. Cobb	725	72	5	10	5	31	56.47	57.17	152.70	153.83	60
John N. Cobb	726	72	7	1	8	31	56.45	57.95	151.38	155.00	62
John N. Cobb	733	73	5	1	6	31	56.80	58.77	151.45	155.35	45
John N. Cobb	734	73	8	1	10	30	56.23	58.82	150.03	156.70	82
John N. Cobb	742	74	4	3	5	30	34.10	41.42	119.40	124.45	60
John N. Cobb	744	74	7	1	8	31	53.03	54.50	162.23	167.87	60
John N. Cobb	752	75	3	1	5	30	33.98	41.63	118.67	124.48	69
John N. Cobb	753	75	6	1	8	31	55.17	59.97	147.87	157.28	98
John N. Cobb	754	75	9	2	10	28	36.95	49.92	122.20	127.42	115
John N. Cobb	762	76	4	4	5	29	54.73	59.43	130.95	139.95	87
John N. Cobb	763	76	8	3	9	23	36.30	51.52	121.92	129.65	100
John N. Cobb	773	77	7	1	8	31	54.88	57.65	133.92	136.47	27
John N. Cobb	783	78	6	7	8	29	55.40	59.67	134.90	142.87	80
John N. Cobb	792	79	6	3	9	29	43.45	57.85	124.37	137.05	197
John N. Cobb	802	80	6	6	9	29	43.38	57.85	124.36	137.06	196
John N. Cobb	812	81	6	2	9	30	43.45	58.27	124.36	137.06	216
John N. Cobb	813	81	11	10	11	21	32.59	32.74	119.53	119.70	25
John N. Cobb	822	82	5	4	6	31	54.56	57.86	132.85	137.06	74
John N. Cobb	824	82	10	5	11	31	32.60	38.23	119.53	123.59	48
John N. Cobb	831	83	4	9	4	20	58.17	58.67	134.94	135.68	39
John N. Cobb	833	83	5	2	6	30	54.54	57.87	132.83	137.07	90
John N. Cobb	834	83	10	13	10	28	43.44	47.89	124.37	125.37	40
John N. Cobb	841	84	5	3	7	31	54.55	58.42	132.80	137.07	185
Pacific Harvester	801	80	6	1	8	31	53.90	60.30	135.79	164.50	208
Pacific Harvester	811	81	6	7	7	30	53.90	60.30	135.80	164.52	193
Commando	713	71	6	1	7	30	56.48	57.65	151.87	153.82	184
Commando	715	71	9	1	10	30	44.25	46.17	123.98	124.75	103
Commando	724	72	9	2	9	13	42.75	44.38	124.15	124.83	60
Commando	732	73	5	1	6	31	56.57	57.00	152.97	153.80	52
Commando	735	73	9	1	10	30	44.32	46.18	123.98	124.75	102
Commando	749	74	9	1	10	30	42.75	44.82	124.17	124.88	94
Commando	754	75	9	1	10	30	46.28	48.35	124.23	125.28	82
Commando	771	77	7	1	9	31	34.05	48.48	119.30	125.70	288
Mary Lou	801	80	7	5	9	28	36.80	49.55	121.87	127.23	293
Calif. Horizon	791	79	4	18	4	27	46.27	48.32	124.38	125.73	67
Washington	791	79	4	1	5	30	45.40	46.33	124.35	124.80	64

Table B-1. Log of NMFS-AFSC resource assessment survey (Continued).

Vessel	Cruise No.	Year	Begin Mo.	Begin Day	End Mo.	End Day	N. Latitude Min.	N. Latitude Max.	W. Longitude Min.	W. Longitude Max.	No. of samples
New Life	791	79	4	18	4	27	44.47	45.33	124.23	124.87	61
G. B. Reed	636	63	7	1	8	31	54.17	59.85	131.58	148.50	68
G. B. Reed	637	63	8	7	9	28	55.90	58.32	148.83	154.53	71
G. B. Reed	648	64	8	2	8	16	53.12	55.85	154.95	167.10	40
G. B. Reed	652	65	2	14	2	28	56.27	59.50	140.45	152.92	34
G. B. Reed	653	65	8	1	9	31	54.69	57.87	134.00	136.88	39
G. B. Reed	662	66	8	1	9	31	51.27	56.82	128.90	135.98	43
G. B. Reed	672	67	9	25	9	28	55.94	56.32	135.08	135.49	42
G. B. Reed	701	70	3	7	5	18	54.04	59.63	133.47	142.57	71
Sunset Bay	792	79	7	1	8	31	56.91	61.84	171.03	178.83	123
Discovery Bay	792	79	7	1	8	31	54.33	61.47	162.72	179.37	178
Ocean Leader	821	82	3	19	3	31	42.98	44.67	124.70	124.93	10
Oregon	712	71	4	12	5	30	56.57	57.30	151.50	153.48	88
Oregon	714	71	7	1	8	31	54.67	58.68	160.30	170.25	53
Oregon	722	72	5	1	7	31	54.63	58.67	159.60	168.87	103
Oregon	723	72	8	1	9	31	54.10	55.87	158.92	162.65	103
Oregon	734	73	7	1	8	31	54.65	58.00	158.97	165.83	94
Oregon	735	73	8	1	10	31	54.38	56.40	157.20	162.68	145
Oregon	741	74	4	15	5	22	56.55	57.08	153.02	153.78	40
Oregon	742	74	6	1	8	31	54.63	57.67	161.58	172.53	101
Oregon	743	74	9	1	10	30	54.37	56.57	157.62	163.10	177
Oregon	751	75	4	1	5	28	57.80	58.65	150.03	152.55	58
Oregon	752	75	6	1	8	31	54.67	58.02	158.33	172.67	155
Oregon	753	75	9	1	10	31	53.73	56.57	157.65	166.52	167
Oregon	762	76	5	1	8	31	54.67	58.33	158.35	172.57	186
Oregon	763	76	9	2	10	30	54.45	56.57	157.63	163.28	156
Oregon	770	77	5	1	6	31	55.40	55.67	163.53	163.90	22
Oregon	773	77	6	1	8	30	54.67	58.68	158.32	172.98	173
Oregon	774	77	8	1	9	31	54.45	56.57	157.58	163.20	146
Oregon	781	78	4	2	5	30	59.67	60.87	145.85	148.42	70
Oregon	782	78	5	1	7	31	54.53	57.67	159.05	170.85	114
Oregon	783	78	8	1	10	31	53.50	56.55	157.63	167.20	171
Oregon	791	79	3	1	4	28	46.93	48.38	124.80	125.70	51
Oregon	792	79	5	1	8	31	54.98	58.00	158.95	172.42	165
Oregon	802	80	5	1	7	31	54.67	59.67	162.70	177.60	127
Oregon	803	80	8	1	9	31	53.43	55.59	158.82	167.53	92
Pacific Lady	703	70	8	1	10	31	58.33	61.12	146.15	152.40	107
Mark I	733	73	6	1	7	30	54.67	57.67	164.58	171.53	63
Anna Marie	743	74	6	1	7	30	54.62	58.72	158.27	171.57	97
Anna Marie	751	75	8	4	9	31	54.62	61.68	158.07	178.48	224
Anna Marie	761	76	4	1	6	29	54.52	59.15	158.10	175.77	161
North Pacific	751	75	5	1	8	31	59.17	60.28	140.17	147.80	148
Pat San Marie	751	75	8	4	9	31	54.62	61.88	158.02	178.75	211
Pat San Marie	761	76	4	1	6	30	54.85	59.83	159.15	174.73	219
Pat San Marie	762	76	8	9	9	24	36.25	51.58	121.98	129.93	27
Pat San Marie	801	80	7	5	9	28	36.82	49.71	122.11	127.45	318
Pat San Marie	811	81	4	2	5	30	53.81	57.68	154.31	163.96	120
Pat San Marie	812	81	5	5	6	31	55.05	59.43	133.74	142.00	152
Pat San Marie	821	82	5	1	8	31	55.01	62.63	158.92	177.58	218
Smarag	771	77	7	1	8	31	53.93	58.75	157.80	166.63	230
Miller Freeman	751	75	8	1	10	31	54.62	60.38	159.62	171.93	219
Miller Freeman	761	76	4	1	5	31	54.60	58.77	159.87	174.55	117
Miller Freeman	762	76	9	1	10	30	63.07	68.30	161.25	171.85	268
Miller Freeman	763	76	9	1	10	30	63.07	68.18	161.30	169.20	33
Miller Freeman	771	77	1	1	3	31	55.47	58.47	149.03	156.52	156

Table El. Log of NMFS-AFSC resource assessment survey (Continued).

Vessel	Cruise No.	Year	Begin Mo.	Begin Day	End Mo.	End Day	N. Latitude Min.	N. Latitude Max.	W. Longitude Min.	W. Longitude Max.	No. of samples
Miller Freeman	772	77	7	1	9	31	34.10	49.75	119.67	127.37	116
Miller Freeman	780	78	2	3	3	28	54.58	59.95	165.77	177.20	41
Miller Freeman	781	78	3	21	3	24	57.62	58.22	150.02	151.70	28
Miller Freeman	782	78	9	10	9	17	56.65	57.08	152.53	153.30	7
Miller Freeman	783	78	3	1	4	31	56.07	58.10	149.64	156.16	55
Miller Freeman	785	78	9	1	11	31	55.62	60.18	144.67	155.73	63
Miller Freeman	791	79	1	1	4	31	55.57	58.11	134.46	155.49	103
Miller Freeman	792	79	7	1	8	31	63.17	64.77	161.53	169.58	118
Miller Freeman	793	79	6	1	7	30	52.33	60.98	166.50	178.65	35
Miller Freeman	794	79	8	2	10	30	47.85	49.20	124.03	126.77	34
Miller Freeman	800	80	1	1	2	30	54.28	59.67	165.78	178.08	17
Miller Freeman	801	80	2	1	4	29	55.18	58.18	152.44	156.68	204
Miller Freeman	803	80	7	1	9	31	36.98	49.32	122.41	127.13	77
Miller Freeman	804	80	11	9	11	20	54.68	58.28	133.49	135.74	42
Miller Freeman	811	81	2	11	2	24	54.12	57.01	164.18	170.10	70
Miller Freeman	812	81	3	2	4	29	55.59	58.12	154.08	156.20	54
Miller Freeman	813	81	4	2	5	29	55.59	58.06	152.31	155.96	118
Miller Freeman	814	81	5	8	5	17	55.91	57.09	151.45	154.00	175
Miller Freeman	815	81	9	1	10	30	55.67	63.08	160.86	174.21	93
Miller Freeman	816	81	10	1	11	29	53.79	57.40	163.42	170.67	41
Miller Freeman	817	81	11	13	11	28	55.52	56.65	134.31	135.84	69
Miller Freeman	821	82	5	1	6	31	56.12	56.39	135.05	135.18	35
Miller Freeman	822	82	9	1	9	15	56.50	64.50	161.49	174.74	107
Miller Freeman	823	82	9	1	10	30	54.25	57.40	163.44	170.80	54
Miller Freeman	830	83	1	1	2	31	56.12	58.76	134.11	135.16	14
Miller Freeman	831	83	2	12	2	24	53.72	57.66	159.68	170.16	62
Miller Freeman	832	83	3	6	4	31	53.43	58.60	152.79	165.83	45
Miller Freeman	833	83	7	1	8	31	51.20	52.31	174.67	182.68	99
Miller Freeman	841	84	2	9	2	24	54.28	56.56	152.07	160.51	81
Miller Freeman	842	84	3	1	4	31	56.15	60.71	146.85	156.05	48
Miller Freeman	847	84	10	20	10	28	54.79	58.11	130.94	135.06	27
Pacific Raider	762	76	8	7	9	28	36.27	51.57	121.93	130.05	77
Pacific Raider	771	77	7	1	9	31	34.45	48.43	120.70	125.65	237
Dominator	821	82	6	1	8	30	52.81	62.30	163.84	180.06	75
Dominator	841	84	9	1	10	28	32.39	42.27	118.89	124.91	100
Nore-Dick	781	78	7	1	9	31	54.12	59.55	131.83	155.05	99
Nore-Dick	791	79	5	1	8	31	53.68	59.90	134.92	165.15	215
Nore-Dick	821	82	6	6	7	29	53.76	60.29	135.80	164.78	178
David Star Jordan	775	77	7	3	8	30	39.83	43.65	124.00	124.75	85
Discoverer	771	77	8	2	8	31	55.08	58.25	159.08	171.63	77
Heidi-J	781	78	6	1	7	30	55.00	60.25	163.07	175.27	58
Heidi-J	782	78	7	1	9	31	54.23	59.30	131.10	155.67	105
Paragon II	781	78	6	1	8	31	54.90	61.00	158.95	178.25	202
Paragon II	791	79	5	1	8	31	54.82	63.65	157.98	178.58	339
Sea Hawk	781	78	7	1	8	31	55.94	57.78	158.07	161.79	488
Freeport	781	78	7	1	8	31	54.02	56.25	130.98	134.97	39
Ocean Harvester	801	80	5	1	7	31	54.98	61.66	158.30	178.72	259
Ocean Harvester	802	80	7	1	8	31	52.30	54.87	165.23	170.90	89
Ocean Harvester	811	81	6	1	8	31	55.09	59.78	134.09	152.62	226
Ocean Harvester	821	82	2	2	3	30	52.26	55.12	164.73	173.90	119
New Hope	601	60	9	1	10	30	54.75	58.87	133.80	138.13	37
Yaquina	621	62	7	2	8	31	57.18	58.78	148.55	152.05	63
Yaquina	622	62	8	1	10	29	58.95	60.78	144.27	150.48	92
Yaquina	632	63	7	1	9	31	55.67	60.27	146.87	155.68	229
John R. Manning	631	63	5	1	6	31	58.20	60.02	134.43	144.55	85

Table B-1. Log of NMFS-AFSC resource assessment survey (Continued)

Vessel	Cruise No.	Year	Mo.	Day	Mo.	Day	Min.	Max.	Min.	Max.	samples
John R. Manning	673	67	7	7	8	31	58.77	60.08	148.33	150.58	79
John R. Manning	682	68	7	1	9	31	56.63	58.68	151.30	156.42	102
Annihilator	801	80	9	9	9	13	47.00	47.00	125.00	125.00	8
Queen Victoria	801	80	8	13	8	21	40.00	40.00	124.50	124.50	27
Alaska	811	81	5	1	7	31	54.68	59.67	158.36	170.61	179
Alaska	812	81	8	1	9	31	55.26	58.29	151.25	160.94	138
Alaska	831	83	6	1	8	31	54.68	60.99	158.33	177.56	190
Alaska	832	83	8	11	8	12	55.21	55.42	161.56	161.98	12
Alaska	841	84	6	1	8	30	54.69	61.00	158.97	174.13	209
Paragon I	642	64	6	1	9	31	53.55	58.65	150.83	170.13	308
Warrior II	831	83	7	1	9	31	36.81	48.86	121.86	126.21	277
Nordfjord	831	83	7	1	9	31	36.75	49.26	122.09	126.79	319
Resolution	801	80	9	9	9	23	57.39	59.75	139.86	153.94	35
Resolution	811	81	9	3	10	30	56.74	58.33	151.24	155.52	141
Commander	801	80	8	1	9	31	55.04	57.71	155.52	162.17	131
Royal Baron	801	80	8	2	9	30	56.73	58.20	152.16	154.92	76
Royal Baron	821	82	8	1	9	31	56.22	58.33	152.16	158.29	145
Half Moon Bay	801	80	7	2	8	31	51.24	52.60	172.89	186.62	129
Half Moon Bay	841	84	9	2	10	30	43.09	46.24	124.17	125.03	320
Steller	811	81	5	19	5	28	56.70	58.07	134.44	134.90	32
Gold-N-Sun	831	83	8	1	9	31	40.43	48.99	124.26	126.47	38
Viking Queen	841	84	6	1	8	30	52.43	59.53	145.56	169.74	270
Murre II	841	84	6	1	8	31	55.28	60.28	144.69	157.44	198
Blue Waters	791	79	9	21	9	28	54.16	54.51	131.04	131.36	49
Kawachi Maru	661	66	5	1	7	31	51.32	58.87	160.28	180.57	134
Nisshin Maru	671	67	7	2	9	29	51.23	61.03	160.22	195.25	106
Chosui Maru	681	68	6	1	7	30	55.13	62.97	160.25	172.25	180
Yoko Maru	691	69	6	1	9	31	51.25	61.95	159.77	187.30	287
Inase Maru#3	701	70	7	1	8	31	55.15	61.38	160.25	172.23	143
TanshuMaru	711	71	5	1	6	31	54.62	59.87	160.23	175.75	230
Wakatori Maru#2	731	73	5	2	6	24	54.75	65.17	158.50	179.50	154
Shunyo Maru	741	74	5	1	6	31	54.60	59.12	162.27	174.88	86
Shunyo Maru	751	75	5	1	7	31	54.62	60.08	161.80	178.28	123
Shunyo Maru	761	76	5	1	7	31	54.60	60.12	161.77	178.25	104
Tomi Maru #52	781	78	6	1	7	30	52.32	60.85	167.62	188.32	78
Yakushi Maru#21	791	79	6	2	7	30	54.32	59.90	160.35	178.95	455
ShotokuMaru#35	791	79	6	1	8	31	57.00	63.33	166.32	179.47	341
Ryoan Maru #31	811	81	7	1	10	31	54.10	60.91	165.48	179.80	269
Ryujin Maru #8	821	82	7	1	11	31	54.08	62.61	165.41	179.63	401
Hatsue Maru #62	801	80	7	1	11	31	51.32	56.41	165.11	189.27	217
Daikichi Maru #37	841	84	7	1	10	31	52.43	59.75	145.35	169.74	355
St. Michael	618	61	5	1	7	30	54.90	58.90	151.40	158.50	263
St. Michael	619	61	8	1	11	30	56.10	58.90	151.00	155.00	402
St. Michael	627	62	2	1	4	30	53.80	58.75	148.72	164.50	462
St. Michael	628	62	6	1	8	30	57.70	60.05	142.75	150.50	140
St. Michael	629	62	9	1	11	27	56.85	59.75	140.25	151.75	290
St. Michael	637	63	1	1	3	25	55.85	60.25	142.25	155.50	328
Morning Star	618	61	5	1	7	31	53.65	58.93	151.20	165.02	293
Morning Star	619	61	8	1	11	31	53.63	58.27	151.47	165.05	403
Morning Star	627	62	2	1	4	30	53.63	58.77	148.88	165.03	480
Western Flyer	628	62	6	1	8	30	57.58	60.33	145.75	150.47	189
Western Flyer	629	62	9	1	12	26	57.67	60.32	140.33	151.48	307
Western Flyer	637	63	1	1	3	30	57.92	60.25	137.80	153.62	375
Tordenskjold	2	57	7	4	9	31	53.77	55.50	160.32	166.50	61
Tordenskjold	3	57	9	6	9	30	53.73	55.80	159.80	166.52	36

Table B-1. Log of NMFS-AFSC resource assessment survey (Continued)

Vessel	Cruise No.	Year	Begin Mo.	Begin Day	End Mo.	End Day	N. Latitude Min.	N. Latitude Max.	W. Longitude Min.	W. Longitude Max.	No. of samples
Tordenskjold	611	61	6	1	9	30	57.85	60.02	136.75	150.53	207
Tordenskjold	612	61	9	17	9	25	58.82	59.20	152.05	153.18	25
Tordenskjold	651	65	6	1	8	31	54.75	59.25	158.50	169.25	247
Tordenskjold	731	73	6	18	6	29	54.67	58.00	159.32	165.00	39
Tordenskjold	741	74	6	2	6	10	54.65	58.03	159.30	165.00	45
Tordenskjold	761	76	6	4	6	19	54.17	58.08	159.28	165.95	77
Tordenskjold	771	77	6	6	6	19	54.53	58.02	158.52	166.05	48
Tordenskjold	772	77	8	1	9	31	45.38	46.32	124.13	124.77	76
Tordenskjold	781	78	6	1	8	31	52.63	60.30	130.82	166.28	236
Don Edwards	701	70	5	1	6	31	54.73	58.75	159.25	165.25	104
Don Edwards	711	71	6	1	8	31	53.85	59.07	159.25	174.00	152
Ocean Star	721	72	6	6	6	27	53.37	58.00	160.00	167.83	70
Arthur H	618	61	5	1	7	30	54.65	59.08	150.73	158.83	298
Arthur H	619	61	8	1	11	31	54.42	58.20	151.42	160.52	404
Arthur H	627	62	2	1	4	30	53.65	58.73	148.50	164.83	476
Arthur H	628	62	6	1	8	30	57.97	60.27	137.25	146.32	192
Arthur H	629	62	9	1	10	19	58.27	59.43	137.28	140.17	266
Arthur H	631	63	5	4	8	30	54.50	58.50	159.00	168.75	100
Arthur H	637	63	3	1	3	11	55.67	58.05	151.73	155.50	46
Arthur H	661	66	6	1	8	30	54.75	60.00	158.00	172.00	109
Harmony	671	67	5	1	7	31	54.75	62.50	158.75	170.00	159
Harmony	681	68	6	1	7	30	54.68	61.00	159.25	174.00	101
Tonquin	691	69	6	1	6	25	54.58	58.75	158.75	165.25	66
Siedlecki	772	77	7	1	9	31	39.07	59.95	123.78	150.85	137
Ekvator	801	80	1	1	12	29	56.38	62.48	162.99	177.29	399
Posiden	841	84	4	1	5	30	43.09	45.96	124.18	124.99	86
Oh Dae San	811	81	7	1	8	31	56.48	60.17	137.84	153.05	91
Oh Dae San	821	82	9	1	10	30	55.96	60.00	145.91	154.24	87
Shantar	811	81	3	1	5	30	54.12	57.82	151.00	161.84	182
Mys.Dalniy	821	82	4	1	7	31	51.86	59.40	148.07	189.27	231
Milogradova	831	83	4	1	5	30	53.33	58.23	150.01	166.34	77
Milogradova	832	83	6	1	8	31	54.66	61.98	158.37	178.96	349
SRTM 8459	821	82	6	1	8	27	55.79	65.00	163.92	189.17	217

Table B-2. Summary of data from Auke Bay Laboratory resource assessment surveys.

Vessel	Cruise No.	Year	Begin Mo.	Begin Day	End Mo.	End Day	N. Latitude Min.	N. Latitude Max.	W. Longitude Min.	W. Longitude Max.	No. of samples
Murre II	691	69	7	8	7	12	57.85	58.17	136.08	136.57	15
Murre II	692	69	9	9	9	13	57.48	58.32	135.52	136.46	15
Murre II	701	70	5	27	5	28	57.86	58.15	136.06	136.33	9
Murre II	702	70	8	26	8	27	56.28	56.37	134.65	134.81	5
Murre II	711	71	3	17	3	19	56.26	56.38	134.23	134.74	16
Murre II	712	71	4	13	4	17	57.38	58.12	135.59	136.46	10
Murre II	713	71	5	19	5	25	56.64	57.04	134.86	135.34	34
Murre II	714	71	9	1	9	8	56.28	58.15	134.65	136.46	20
Murre II	721	72	4	24	4	30	56.10	58.15	134.64	136.46	29
Murre II	731	73	4	10	4	11	58.32	58.37	134.67	134.72	12
Murre II	741	74	1	18	1	25	58.33	58.35	134.67	134.68	4
Murre II	742	74	2	7	2	25	58.33	58.37	134.66	134.67	6
Murre II	743	74	3	14	3	14	58.33	58.37	134.66	134.68	3
Murre II	744	74	12	12	12	18	58.24	58.37	134.??	134.77	11
Murre II	751	75	1	29	1	29	58.33	58.37	134.66	134.67	5
Murre II	752	75	2	6	2	8	57.74	57.88	135.19	135.58	8
Murre II	753	75	3	20	3	27	58.33	58.75	134.66	135.16	5
Murre II	754	75	4	17	9	24	58.24	58.50	134.66	134.83	6
Murre II	755	75	9	17	9	19	58.24	58.50	134.64	134.95	8
Murre II	756	75	11	13	11	19	58.33	59.30	134.66	135.50	6
Murre II	761	76	3	23	3	30	58.22	58.37	134.55	134.72	8
Murre II	762	76	4	12	4	14	58.44	58.44	134.78	134.81	6
Murre II	763	76	5	11	5	16	58.33	58.37	134.68	134.70	3
Murre II	764	76	7	27	7	29	57.19	57.79	134.00	134.29	5
Murre II	765	76	10	19	10	20	58.20	58.33	134.61	134.71	6
Murre II	766	76	11	17	11	18	58.33	58.38	134.64	134.67	6
Murre II	771	77	1	6	1	7	58.26	58.33	134.33	134.68	3
Murre II	772	77	3	16	3	22	58.33	58.53	134.67	134.86	7
Murre II	773	77	4	5	4	12	58.37	58.47	134.67	134.97	5
Murre II	774	77	5	17	5	19	58.20	58.47	134.61	134.97	5
Murre II	775	77	7	13	7	20	57.48	58.35	135.85	136.88	24
Murre II	776	77	9	14	9	17	57.74	57.98	135.14	135.81	6
Murre II	781	78	4	11	4	12	58.33	58.50	134.66	134.82	3
Murre II	782	78	5	6	5	9	57.91	58.37	134.67	136.33	6
Murre II	783	78	6	15	6	20	58.33	59.33	134.64	134.67	7
Murre II	784	78	10	4	10	26	57.74	58.61	134.64	135.81	26
Murre II	785	78	12	14	12	15	58.33	58.37	134.64	134.67	4
Murre II	791	79	3	7	3	7	58.33	58.37	134.67	134.67	4
Murre II	792	79	4	16	4	17	58.16	58.37	134.17	134.67	8
Murre II	793	79	5	16	5	17	58.18	58.42	134.23	134.70	8
Murre II	794	79	10	9	10	16	56.28	58.37	134.65	134.71	9
Murre II	801	80	1	15	1	18	58.33	58.49	134.66	134.83	10
Murre II	802	80	4	14	4	15	58.17	58.37	134.21	134.70	7
Murre II	803	80	5	1	5	2	58.30	58.33	134.66	134.78	6
Murre II	804	80	6	17	6	18	58.21	58.37	134.61	134.67	5
Murre II	805	80	9	3	9	5	58.17	58.37	134.21	134.69	7
Murre II	806	80	10	1	11	31	57.92	58.33	134.21	136.46	13
Murre II	807	80	11	24	11	25	58.17	58.33	134.21	134.70	6
Murre II	811	81	1	12	1	16	58.17	58.35	134.21	134.71	9
Murre II	812	81	2	9	2	13	58.17	58.33	134.21	134.70	12
Murre II	813	81	4	14	4	16	58.17	58.18	134.21	134.26	8
Murre II	814	81	5	5	5	26	58.17	58.33	134.07	134.70	11
Murre II	815	81	6	4	6	4	58.30	58.33	134.66	134.70	4
Murre II	816	81	7	15	7	22	56.71	57.91	135.44	136.60	20
Murre II	817	81	12	6	12	10	58.30	58.37	134.66	134.70	7
Murre II	821	82	3	3	3	5	58.25	58.37	134.66	134.71	11
Murre II	822	82	5	7	5	7	58.17	58.22	134.19	134.64	2
Murre II	823	82	7	10	7	18	56.28	58.15	134.65	136.58	22
Murre II	824	82	10	20	10	25	57.92	58.38	134.67	136.46	10

Table B-3. Summary of data from Canada Department of Fisheries and Oceans surveys (in addition to data already in RACEBASE).

Vessel	Cruise No.	Year	Begin Mo.	Begin Day	End Mo.	End Day	N. Latitude Min.	N. Latitude Max.	W. Longitude Min.	W. Longitude Max.	No. of samples
G. B. Reed	633	63	2	9	3	25	49.05	51.90	126.92	129.08	39
G. B. Reed	636	63	7	3	7	10	51.30	52.20	129.03	130.13	19
G. B. Reed	637	63	8	1	9	31	56.71	58.63	150.33	153.37	81
G. B. Reed	642	64	2	1	3	29	48.94	51.85	126.52	129.78	44
G. B. Reed	646	64	6	9	6	23	50.67	52.00	128.25	131.17	47
G. B. Reed	648	64	7	8	8	28	51.28	54.22	127.53	161.52	22
G. B. Reed	649	64	10	7	11	29	51.36	54.19	129.00	132.93	21
G. B. Reed	652	65	1	9	3	31	48.29	52.41	125.17	131.58	47
G. B. Reed	653	65	8	3	9	25	42.99	56.30	124.22	135.48	84
G. B. Reed	657	65	7	8	7	18	51.47	53.30	131.05	135.68	35
G. B. Reed	662	66	8	5	9	30	48.35	56.83	125.85	135.88	64
G. B. Reed	671	67	2	2	4	22	48.33	51.33	124.55	129.54	98
G. B. Reed	672	67	9	1	10	30	50.87	55.98	128.39	135.05	50
G. B. Reed	681	68	2	2	2	28	48.79	54.30	126.55	132.36	55
G. B. Reed	691	69	2	12	2	26	48.35	49.05	126.10	126.61	34
G. B. Reed	693	69	9	11	9	24	48.78	51.45	126.39	129.53	35
G. B. Reed	701	70	3	4	6	17	48.77	58.11	126.53	136.97	109
G. B. Reed	702	70	8	8	8	19	48.28	48.65	125.13	125.86	22
G. B. Reed	703	70	9	10	9	24	48.35	48.91	125.69	126.55	46
G. B. Reed	711	71	6	18	6	28	51.24	51.42	128.74	129.42	36
G. B. Reed	712	71	8	1	9	31	51.67	56.24	129.55	135.44	16
G. B. Reed	713	71	10	3	11	28	50.83	51.48	128.53	129.56	46
G. B. Reed	721	72	6	14	6	16	51.29	51.87	129.05	130.05	10
G. B. Reed	723	72	9	10	9	27	48.35	48.94	126.05	126.58	42
G. B. Reed	724	72	10	1	11	31	48.07	48.94	124.92	125.86	28
G. B. Reed	731	73	1	19	1	31	48.45	48.59	124.91	125.59	16
G. B. Reed	732	73	3	14	3	28	48.36	48.91	124.78	125.87	25
G. B. Reed	733	73	6	5	7	25	51.32	53.19	128.55	130.87	65
G. B. Reed	734	73	9	7	9	24	51.05	52.07	128.20	130.03	46
G. B. Reed	743	74	6	5	6	25	51.01	53.30	128.67	131.94	24
G. B. Reed	744	74	9	6	9	23	51.32	53.17	129.28	130.75	45
G. B. Reed	751	75	4	9	4	22	48.51	54.31	125.53	131.99	37
G. B. Reed	752	75	7	10	7	23	48.52	54.31	124.60	131.39	34
G. B. Reed	753	75	10	10	10	22	48.48	54.31	125.53	131.39	38
G. B. Reed	771	77	3	18	3	29	48.80	48.96	125.62	125.81	10
Belina	661	66	2	1	8	31	50.47	53.78	127.53	131.89	129
Ocean Trawler	672	67	7	3	9	30	49.32	53.31	126.37	130.97	274
Sharlene K.	691	69	6	1	7	30	47.73	49.31	124.86	127.43	43
Sharlene K.	692	69	7	19	7	30	52.30	54.28	130.19	131.43	38
Sharlene K.	693	69	8	8	8	20	50.82	52.40	127.76	131.25	33
Sharlene K.	701	70	1	6	1	21	48.08	49.33	123.43	127.11	28
Sharlene K.	702	70	1	3	2	28	52.86	53.80	129.19	131.32	8
Sharlene K.	703	70	2	1	3	28	50.78	52.34	127.80	131.21	20
Sharlene K.	704	70	3	1	4	31	48.06	49.26	124.94	127.09	25
Sharlene K.	705	70	4	10	4	21	52.63	54.14	129.56	131.97	24
Sharlene K.	706	70	5	2	5	13	50.90	52.33	127.85	130.91	24
Sharlene K.	707	70	5	1	6	31	48.23	51.37	124.74	129.56	36
Royal Canadian	681	68	6	1	7	30	48.22	49.49	124.50	126.78	32
Royal Canadian	682	68	7	2	8	31	48.01	50.61	125.60	128.43	33
Royal Canadian	684	68	9	5	9	21	47.97	49.33	124.98	126.63	31
Royal Canadian	685	68	9	1	10	30	48.52	50.19	123.34	126.50	32
A.K. Knight	713	71	7	22	7	26	48.28	48.48	123.03	124.52	12
A.K. Knight	714	71	8	1	9	31	48.22	48.52	123.16	124.56	19
A.K. Knight	715	71	9	1	10	30	48.23	48.40	123.06	123.84	22
A.K. Knight	716	71	11	4	11	9	48.21	48.50	123.30	124.43	19

Vessel	Cruise No.	Year	Begin Mo.	Begin Day	End Mo.	End Day	N. Latitude Min.	N. Latitude Max.	W. Longitude Min.	W. Longitude Max.	No. of samples
A.K. Knight	717	71	12	9	12	14	48.21	49.00	123.04	124.45	12
A.K. Knight	741	74	7	29	7	31	49.20	49.24	123.60	123.76	7
A.K. Knight	742	74	11	19	11	20	48.98	49.22	123.69	123.88	12
A.K. Knight	751	75	5	12	5	14	49.24	49.40	123.73	124.30	7
Blue Waters	791	79	9	21	9	23	54.36	54.54	131.04	131.16	24
Arctic Harvester	773	77	10	12	10	23	48.07	51.70	125.45	130.06	15
Arctic Harvester	781	78	10	4	10	10	48.40	48.88	125.96	126.55	28

Table B-4. Summary of data from Alaska Department of Fish and Game surveys.

Vessel	Cruise No.	Year	Begin Mo.	Begin Day	End Mo.	End Day	N. Latitude Min.	N. Latitude Max.	W. Longitude Min.	W. Longitude Max.	No. of samples
Royal Baron	822	82	7	2	8	31	55.34	58.82	152.91	159.49	113
Royal Baron	832	83	7	1	8	31	55.15	58.82	152.84	161.97	129

Table B-5. Summary of data from Juneau Exploratory Fishing and Gear Research Base surveys (shrimp pot work is listed at end).

Vessel	Cruise No.	Year	Begin Mo.	Begin Day	End Mo.	End Day	N. Latitude Min.	N. Latitude Max.	W. Longitude Min.	W. Longitude Max.	No. of samples
Commando	652	65	7	7	8	31	54.70	56.95	131.32	134.70	80
Commando	682	68	7	3	8	30	55.78	57.93	134.70	136.83	53
Yaquina	633	63	9	25	9	28	54.30	55.65	132.03	134.75	15
John R. Manning	651	65	5	1	6	27	55.28	55.72	133.50	134.87	32
John R. Manning	653	65	11	2	12	23	56.43	57.33	133.35	134.30	13
John R. Manning	664	66	11	3	12	22	56.40	58.33	132.17	135.50	8
John R. Manning	674	67	9	2	10	30	56.12	57.55	132.37	135.03	11
shrimp pot surveys											
John R. Manning	653	65	10	1	12	27	52.78	58.04	133.04	135.00	9,014
John R. Manning	664	66	11	1	12	30	55.97	58.83	131.56	136.58	2,783
John R. Manning	671	67	4	5	5	30	55.08	56.37	131.11	133.08	2,883
John R. Manning	675	67	11	1	12	18	54.83	56.52	132.47	134.25	1,555
Little Lady	661	66	4	3	6	31	54.83	55.54	131.97	132.73	9,048
Cape Falcon	681	68	4	1	5	30	55.98	57.13	113.29	173.30	3,496

Table B-6. Summary of data from Seattle Exploratory Fishing and Gear Research Base surveys.

Vessel	Cruise No.	Year	Begin Mo.	Begin Day	End Mo.	End Day	N. Latitude Min.	N. Latitude Max.	W. Longitude Min.	W. Longitude Max.	No. of samples
John N. Cobb	6	50	11	1	12	30	56.87	58.00	134.35	136.18	92
John N. Cobb	7	51	3	1	4	30	56.85	59.47	133.70	136.23	119
John N. Cobb	9	51	8	1	10	31	47.72	48.52	124.72	126.17	61
John N. Cobb	10	52	3	3	4	31	55.90	59.00	133.55	136.70	96
John N. Cobb	11	52	5	1	6	31	47.42	48.37	124.60	124.90	40
John N. Cobb	13	52	8	1	9	31	44.77	48.73	124.35	125.70	50
John N. Cobb	22	55	3	23	3	30	47.95	49.10	125.58	126.98	18
John N. Cobb	24	55	10	2	11	31	46.50	48.37	123.73	125.02	59
John N. Cobb	25	56	2	1	3	29	48.17	48.47	123.10	124.67	61
John N. Cobb	26	56	3	1	4	31	46.38	47.67	124.40	125.00	94
John N. Cobb	27	56	5	2	6	31	47.08	51.50	124.27	129.38	66
John N. Cobb	29	56	10	1	11	25	54.45	55.67	132.40	134.78	40
John N. Cobb	35	58	2	18	2	27	48.02	48.17	122.73	123.46	53
John N. Cobb	37	58	4	2	5	30	45.85	48.77	124.52	125.70	66
John N. Cobb	38	58	6	11	6	25	44.75	46.20	124.15	124.52	64
John N. Cobb	40	58	10	2	11	29	44.70	48.63	124.30	125.67	50
John N. Cobb	45	60	3	1	4	31	47.72	48.33	123.70	125.62	71
John N. Cobb	46	60	5	2	6	31	48.18	48.77	124.93	126.25	44
John N. Cobb	47	60	7	2	9	28	50.48	51.05	128.33	129.47	18
John N. Cobb	48	60	9	1	11	31	43.03	44.53	124.27	124.77	54
John N. Cobb	50	61	4	1	6	30	44.02	44.65	124.53	124.97	63
John N. Cobb	55	62	8	1	9	31	27.77	46.88	116.98	130.60	73
John N. Cobb	56	62	10	8	11	29	48.10	49.98	124.90	127.77	63
John N. Cobb	58	63	3	1	3	27	29.20	34.67	115.52	123.32	36
John N. Cobb	59	63	5	7	5	30	47.95	48.80	124.72	126.23	80
John N. Cobb	61	63	8	17	8	29	51.27	51.70	176.37	176.70	41
John N. Cobb	62	63	10	1	11	20	43.33	48.30	124.05	124.70	128
John N. Cobb	65	64	4	13	5	29	46.58	48.43	124.40	125.23	57
John N. Cobb	67	64	8	1	10	31	42.98	48.38	124.23	125.02	41
John N. Cobb	68	64	10	5	11	29	47.30	48.97	122.37	124.95	24
John N. Cobb	71	65	3	4	5	31	45.05	48.17	122.38	125.00	29
John N. Cobb	72	65	7	2	8	30	42.30	47.88	122.35	24.67	29
John N. Cobb	73	65	9	1	9	18	37.85	46.87	122.95	124.92	10
John N. Cobb	74	65	10	7	11	22	47.58	48.70	122.58	126.20	9
John N. Cobb	75	66	1	10	1	27	46.28	48.43	122.37	124.97	23
John N. Cobb	76	66	2	1	3	28	29.52	47.73	115.88	122.52	8
John N. Cobb	77	66	4	23	4	30	46.18	46.78	124.20	124.57	7
John N. Cobb	78	66	5	3	6	31	46.43	48.10	122.27	124.72	18
John N. Cobb	79	66	7	2	8	29	46.00	48.60	124.32	125.50	18
John N. Cobb	80	66	3	15	8	31	46.00	48.45	122.35	125.25	25
John N. Cobb	81	66	4	4	10	3	46.30	48.73 ?		125.63	15
John N. Cobb	82	66	11	11	11	11	46.78	47.03	124.23	124.30	2
John N. Cobb	84	67	2	20	2	23	47.50	48.15	124.67	125.03	3
John N. Cobb	85	67	3	7	3	23	45.05	48.27	123.12	124.48	4
John N. Cobb	86	67	4	2	5	28	44.15	48.15	122.37	124.70	12
John N. Cobb	87	67	5	1	6	28	44.18	47.58	124.13	124.77	8
John N. Cobb	88	67	7	11	7	30	46.17	47.87	124.27	124.77	34
John N. Cobb	92	68	1	8	1	23	47.82	48.47	122.45	124.98	21
John N. Cobb	93	68	2	4	3	24	33.02	35.00	117.37	121.20	6
John N. Cobb	94	68	4	1	5	30	47.35	48.83	122.47	123.10	102
John N. Cobb	95	68	5	3	6	31	45.85	48.87	122.75	124.98	149
John N. Cobb	117	63	5	28	5	28	48.12	48.12	125.67	125.67	69
John N. Cobb	692	69	2	21	2	26	46.05	46.38	124.23	124.38	14
John N. Cobb	694	69	5	1	6	28	46.02	48.97	122.73	125.77	87
John N. Cobb	911	69	9	12	9	25	43.43	48.17	123.00	124.33	100
Pacific Harvester	701	70	9	18	9	27	45.37	48.43	124.18	125.23	10
New Life	696	69	5	15	5	28	42.50	46.62	124.10	125.10	32
Miller Freeman	702	70	5	6	5	9	40.47	40.78	124.50	124.82	18

Table B-7. Summary of data from Southern California Coastal Water Research Project surveys.

			Begin		End		N. Latitude		W. Longitude		No. of
Vessel	Cruise No.	Year	Mo.	Day	Mo.	Day	Min.	Max.	Min.	Max.	samples
Marine Surveyor	701	70	5	6	5	6	33.98	33.98	133.98	133.98	1
Marine Surveyor	711	71	6	21	9	23	33.95	34.03	118.51	118.86	17
Marine Surveyor	721	72	5	1	11	31	33.82	34.03	118.41	133.97	41
Marine Surveyor	731	73	4	17	4	24	33.90	33.98	118.45	118.65	9
Marine Surveyor	741	74	2	1	8	23	33.90	33.96	118.45	118.59	39
Marine Surveyor	751	75	1	1	5	29	33.46	34.13	118.46	119.24	21
Marine Surveyor	761	76	8	5	12	29	33.51	34.01	117.80	118.84	16
Marine Surveyor	771	77	4	1	6	28	32.56	34.45	117.19	120.37	49
Sea-S-Dee	711	71	2	2	12	30	33.30	33.82	118.11	133.71	74
Sea-S-Dee	721	72	1	2	12	26	33.45	33.82	118.26	118.62	67
Sea-S-Dee	731	73	3	5	12	27	33.45	33.82	118.26	119.05	96
Sea-S-Dee	741	74	5	3	12	31	33.45	33.82	118.26	118.62	68
Sea-S-Dee	751	75	6	2	12	30	33.43	33.82	118.26	118.59	65
Sea-S-Dee	761	76	5	5	12	17	33.45	33.82	118.26	118.59	53
Sea-S-Dee	771	77	5	11	5	19	33.60	33.82	118.26	118.46	24
Fury II	691	69	8	19	11	29	33.57	33.62	117.89	118.11	14
Fury II	701	70	2	20	5	26	33.57	33.62	117.89	118.11	16
Fury II	702	70	12	18	12	18	33.50	33.52	117.76	117.80	2
Fury II	711	71	1	1	12	31	33.31	33.63	117.57	118.02	260
Fury II	721	72	8	15	8	15	33.46	33.59	117.74	117.90	10
Fury II	731	73	2	8	11	15	33.46	33.54	117.74	117.80	33
Fury II	732	73	1	1	12	31	33.30	33.61	117.57	118.00	280
Fury II	741	74	1	9	12	26	33.04	33.54	117.68	118.59	47
Unknown	671	67	3	2	5	27	34.32	34.41	119.57	119.74	13
Unknown	691	69	3	1	8	29	34.01	34.40	118.75	119.71	54
Van Tuna	701	70	8	9	12	19	33.57	33.62	117.89	118.11	16
Van Tuna	711	71	2	10	12	25	33.57	33.62	117.89	118.11	32
Van Tuna	712	71	10	1	10	1	33.41	33.46	118.36	118.50	6
Van Tuna	713	71	12	20	12	21	34.09	34.14	119.18	119.22	11
Van Tuna	714	71	1	3	12	30	33.39	33.73	118.09	118.35	41
Van Tuna	721	72	2	8	11	12	33.57	33.62	117.89	118.11	32
Van Tuna	722	72	2	20	2	20	34.11	34.16	119.24	119.31	14
Van Tuna	723	72	1	3	7	29	33.45	33.70	117.98	118.46	19
Van Tuna	731	73	2	5	11	14	33.57	33.62	117.89	118.11	32
Van Tuna	732	73	9	24	9	26	33.56	34.03	117.99	118.63	28
Van Tuna	733	73	10	12	10	12	33.70	33.70	118.36	118.36	1
Van Tuna	741	74	2	8	12	18	33.57	33.62	117.89	118.11	30
Van Tuna	751	75	2	8	10	26	33.57	33.62	117.97	118.06	29
Van Tuna	761	76	1	6	10	28	33.57	33.62	117.97	118.06	28
Van Tuna	771	77	1	2	7	12	33.57	33.62	117.96	118.09	23
Vallero IV	721	72	9	16	9	17	33.98	35.12	120.17	120.70	5
Vallero IV	771	77	3	7	7	28	32.64	34.42	119.15	120.46	28
Prowler	571	57	9	2	10	18	33.92	33.96	118.52	118.58	11
Prowler	581	58	1	1	12	31	33.86	34.00	118.41	118.76	97
Prowler	591	59	1	1	12	28	33.85	34.02	118.41	118.76	129
Prowler	601	60	1	7	12	24	33.81	34.02	118.41	118.76	154
Prowler	611	61	1	9	8	26	33.81	34.02	118.41	118.76	65
Anton Doran	121	12	3	24	11	30	33.63	33.76	118.18	118.29	3
Anton Doran	131	13	4	1	12	29	33.65	34.01	118.24	118.54	14
Anton Doran	141	14	2	12	8	22	33.67	34.01	118.19	118.62	13
Anton Doran	151	15	3	1	7	31	33.32	34.02	118.30	118.96	15
Anton Doran	161	16	3	1	12	30	33.29	33.97	118.00	118.60	19
Anton Doran	171	17	4	5	7	28	33.59	33.86	117.97	118.44	6
Anton Doran	221	22	7	5	10	22	33.66	33.76	118.17	118.43	9
name unknown	721	72	8	3	8	3	35.37	35.38	120.88	120.88	4

Table B-7. Summary of data from SCCWRP surveys (Continued).

Vessel	Cruise No.	Year	Begin Mo.	Begin Day	End Mo.	End Day	N. Latitude Min.	N. Latitude Max.	W. Longitude Min.	W. Longitude Max.	No. of samples
name unknown	541	54	10	1	11	31	32.58	34.19	119.07	120.40	8
name unknown	691	69	7	1	8	31	32.63	34.00	117.34	118.77	35
name unknown	661	66	4	25	4	25	33.73	33.75	118.11	118.13	6
name unknown	751	75	2	10	9	12	32.62	32.75	117.26	117.35	17
name unknown	731	73	12	4	12	4	34.07	34.13	119.16	119.22	14
name unknown	741	74	3	4	9	20	34.07	34.13	119.16	119.22	42
name unknown	621	62	3	3	3	3	33.38	33.38	118.57	118.57	4

Table B-8. Summary of data from NMFS and federal/state cooperative scallop surveys.

Vessel	Cruise No.	Year	Begin Mo.	Begin Day	End Mo.	End Day	N. Latitude Min.	N. Latitude Max.	W. Longitude Min.	W. Longitude Max.	No. of samples
North Pacific	691	69	5	1	8	31	53.99	57.94	154.91	165.05	175
Viking Queen	681	68	4	1	8	31	56.17	60.19	137.32	155.77	472
name unknown	9801	68	5	18	5	18	59.69	59.69	146.61	146.61	247
name unknown	815	81	10	1	11	31	43.44	46.14	124.01	124.72	110
name unknown	801	80	8	11	8	13	44.56	44.67	124.62	124.81	103
name unknown	9801	80	8	11	8	13	44.58	44.71	124.60	124.84	109