

SH
11
.A2
N6
no.144



NOAA Technical Memorandum NMFS F/NWC-144

Catch and Revenue Characteristics of Vessels Harvesting Sablefish off the West Coast of the United States

by
James D. Hastie

September 1988

U.S. DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
National Marine Fisheries Service

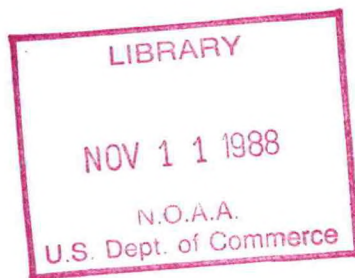
This TM series is used for documentation and timely communication of preliminary results, interim reports, or special purpose information, and has not received complete formal review, editorial control, or detailed editing.

SH
11
A2
N6
no.144

CATCH AND REVENUE CHARACTERISTICS OF VESSELS HARVESTING
SABLEFISH OFF THE WEST COAST OF THE UNITED STATES

by

James D. Hastie



Resource Ecology and Fishery Management Division
Northwest and Alaska Fisheries Center
National Marine Fisheries Service
National Oceanic and Atmospheric Administration
Building 4, BIN C15700
7600 Sand Point Way N.E.
Seattle, Washington 98115-0070

September 1988

This document is available to the public through:

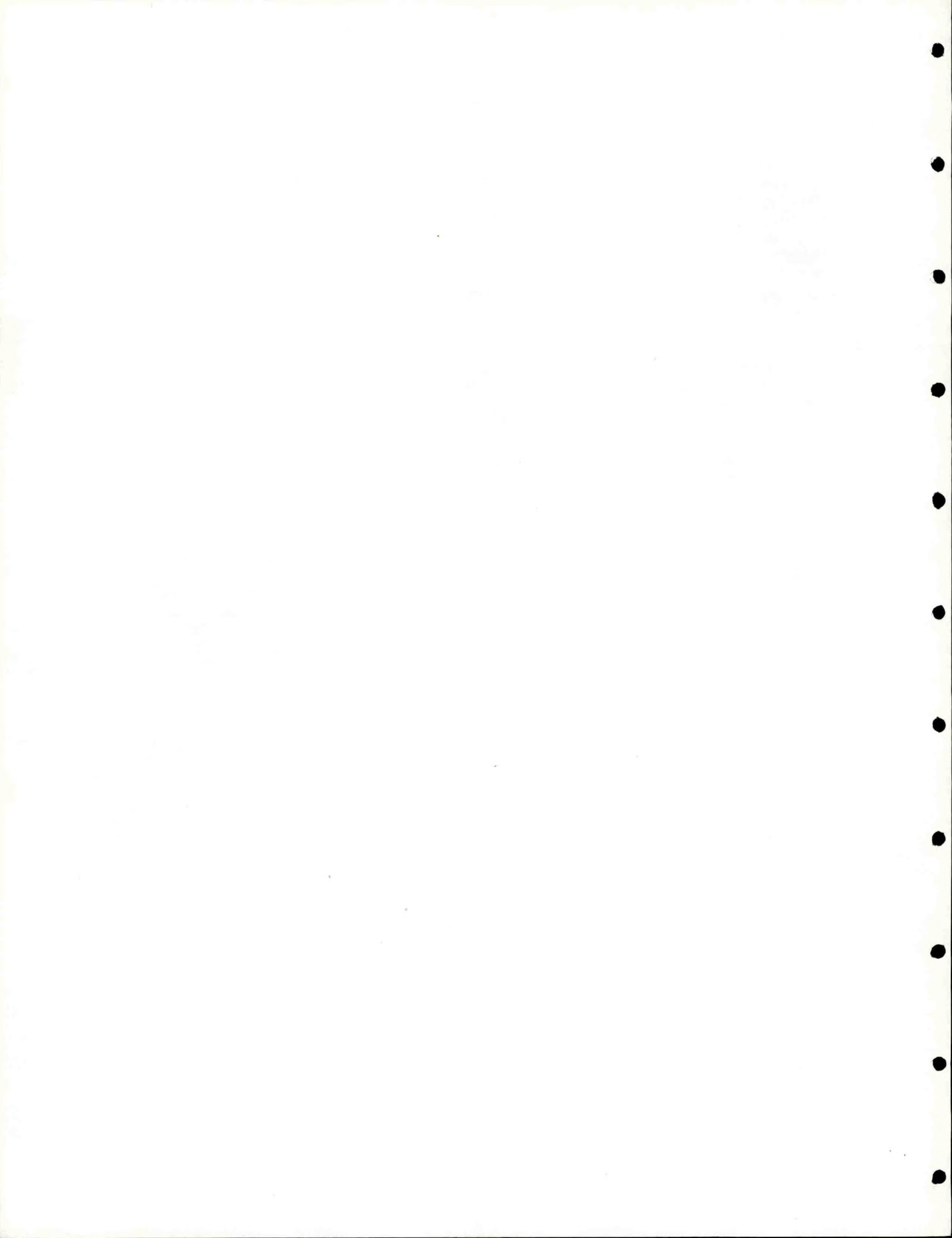
National Technical Information Service
U.S. Department of Commerce
5285 Port Royal Road
Springfield, VA 22161

ABSTRACT

Sablefish (Anoplopoma fimbria), also known as blackcod, has become a species of considerable importance to managers of and participants in west coast groundfish fisheries. This report is intended to provide the Pacific Fishery Management Council and other interested parties with a concise statistical overview of sablefish fisheries located off the coasts of Washington, Oregon, and California from 1983-87. Synthesized from three major Pacific fisheries databases, the report presents coastwide sablefish landing information, as well as gear-group summaries of vessel-level harvest data.

Analysis of coastwide fisheries data reveals that, while overall west coast harvest has fallen by roughly 12% since 1983, the division of catch between trawl and fixed-gear fleets has remained relatively stable. Within the fixed-gear group, however, the pot share of landings has fallen from 84 to 33% over the period 1983-87, with longline gear now accounting for the majority of non-trawl landings. In addition, since 1986 more annual ex-vessel revenue from sablefish has been generated by longline gear than with any other type of gear.

Vessel-level data included in the study is drawn from all boats harvesting more than 1,000 pounds (lb) of west coast sablefish during 1984 or 1985. During 1985, the percentage of vessel revenue contributed by west coast sablefish was found to be highest for pot vessels (an average of 70%), followed by longline (47%) and trawl (7%). When Alaskan income was included in revenue totals, the longline percentage dropped to 33%. Finally, a moderately high degree of harvest concentration was found in each of the gear categories, with the top 40% of vessels accounting for more than 80% of each group's landings.



CONTENTS

	Page
Introduction.....	1
Methods.....	1
Management Database Statistics.....	3
Research Database Statistics.....	5
Contribution by Sablefish to Vessel Revenue from West Coast Fisheries.....	6
Contribution by Sablefish to Vessel Revenue from West Coast and Alaskan Fisheries	8
Industry Concentration in the West Coast Sablefish Fishery.....	9
Conclusion.....	10
Reference.....	12

INTRODUCTION

The economic importance of the west coast sablefish (Anoplopoma fimbria) fishery (Korson and Silverthorne 1987) and the need for reliable information prompted the Pacific Fishery Management Council (Council) to request that the National Marine Fisheries Service organize a discussion of current economic research objectives. On 19-20 November 1987, representatives from the Northwest and Alaska Fisheries Center (NWAFC), the Southwest Center (SWC), Southwest Region (SWR), and the Council met in Seattle to prioritize economic research projects pertaining to sablefish (also known as blackcod) which would provide input to the Council's current sablefish management plan. A descriptive analysis of the vessels participating in the sablefish fishery in the Council's region was given initial priority. This report presents the findings of the 1988 study of sablefish catch and revenue data and is intended to provide the Council with improved information regarding the composition of the fishing fleet. It is also hoped that this material may assist in identifying needs for additional information.

METHODS

Summary information on sablefish catch and revenue was derived from three separate databases: the Pacific Coast Fishery Information Network (PacFIN) management database (MDB), maintained by the Pacific Marine Fisheries Commission at the NWAFC; the PacFIN research database (RDB), maintained by the SWR and SWC; and the Alaska research database (RDB), maintained at the NWAFC.

The PacFIN MDB is designed to provide expedient access to coastwide harvest statistics. Using the PacFIN MDB, numerous vantage points can be taken when analyzing the data. Detailed information regarding the species,

gear, area of harvest, reporting agency, and port of landing can be obtained from this database.

In contrast to the coast-wide geographical orientation of the PacFIN MDB, the PacFIN RDB provides access to vessel-level information, ranging in aggregation from yearly summaries down to individual fish tickets. The current report makes use of yearly summary files that identified landing and value data for each species-gear combination for each vessel landing more than 1,000 lb of sablefish in 1984 or 1985. In addition to information regarding sablefish harvest, this database allows a more detailed examination of other harvest activities and vessel characteristics than is possible with the PacFIN MDB.

The greater detail afforded by the PacFIN RDB, however, comes at a price of timeliness. While preliminary harvest data for the first half of 1988 is available now from the PacFIN MDB, the most recent year currently available from the PacFIN RDB is 1986. The Alaska RDB is similar to the PacFIN RDB in terms of both record detail and timeliness. It was used to quantify Alaskan fishing activities of west coast sablefish vessels included in this analysis. Throughout this document, the term west coast refers to harvest activity off the coasts of Washington, Oregon, and California. All instances where specific reference is made to sablefish harvest refer to west coast landings of sablefish.

It should be noted that harvest totals from the two PacFIN data sets utilized herein will differ. One factor contributing to this difference is the exclusion of all PacFIN RDB data for vessels which did not meet the criterion of 1,000 lb of sablefish landings. This means that the PacFIN RDB data summarized within this report will reflect a lesser overall amount of landed catch reported from the PacFIN MDB. In fact, the sablefish catch

accounted for by the vessels included in this part of the study is smaller than the PacFIN MDB amount by roughly 3.2% for 1984 and 7.6% for 1985.

A second factor involves the apportionment of landings where the type of gear is recorded as "unspecified". For purposes of this report, the considerable amount of PacFIN RDB landings lacking a specified gear were attributed to one of the three major gear types (longline, trawl, pot), if the vessel in question had other landings with only one of these three types. In contrast to this approach, all data entering the PacFIN MDB without a specified type of gear retain their "unspecified" classification^{1/}. In addition to the presence of "unspecified" gear, some California longline landings may carry other designations not normally associated with commercial longline catch^{2/}. For the purposes of this report, no attempt was made to determine which of these landings should be included in the longline category.

MANAGEMENT DATABASE STATISTICS

Figures 1-6 illustrate the 1983-87 PacFIN MDB data which are shown in Tables 1-3. Figures 1-3 illustrate changes in west coast sablefish landings, ex-vessel sablefish price, and revenue for each major gear group from 1983-87. The landings shown in Table 1 show that overall sablefish harvest has remained relatively stable over this 5-year period, particularly when the 1987 quota reduction is taken into account. Additionally, the proportion of total landings by trawl gear has remained fairly constant at around 50%.

^{1/}Will Daspit, Pacific Marine Fisheries Commission, Metro Center Suite 170, 2000 SW First Ave., Portland, OR 97201-5346. Pers. commun., June 1988.

^{2/}Charles Korson, National Marine Fisheries Service, Southwest Region, 300 S. Ferry St., Terminal Island, CA 90731-7415. Pers. commun., May 1988.

While the remaining portion of catch available for fixed gear harvest has remained nearly constant, a steadily increasing share of it has been acquired by longline vessels. Figure 1 illustrates the growing amount of west coast sablefish landings produced with longline gear. Recorded longline landings rose from 1,004 metric tons (t) in 1983 to 4,153 t in 1987, an increase of 314%. During the same period, trawl landings fell from 7,148 t to 6,430 t (-10%) and pot harvest fell from 5,399 t to 2,017 t (-63%). Accordingly, the longline share of fixed gear harvest rose from less than 20% in 1983 to 67% in 1987.

It is important to note that, prior to 1987, significant quantities of sablefish landings, most notably those from California, were recorded with unspecified gear. For nearly one-fifth of California's landed sablefish weight in 1986, for example, no gear was specified. In 1984, the next worst year, the harvesting gear for roughly 15% of their landings was unspecified. Naturally, if these landings were not distributed proportionately among gear groups, trends witnessed in the existing data might not accurately reflect the true conditions of the fishery.

As presented in Table 2, coastwide average sablefish prices rose from \$0.24 in 1983 to \$0.47 in 1987. This increase is indicative of price changes within each of the gear groups over this period. With very few exceptions, longline landings have commanded the highest prices throughout west coast areas from 1983 to 1987. In general, longline prices have been at least double those of trawl landings, with pot prices lying near the upper end of the intervening range.

Despite reductions in landed catch, rising prices elevated yearly west coast ex-vessel sablefish revenues by \$5.7 million (74%) between 1983 and 1987. With dramatic increases in both landings and price, annual longline ex-vessel revenue from sablefish increased by 663% (\$5.4 million). Price

increases in the trawl fishery more than offset reduced harvest, with revenues up 79% (\$2.1 million) over the same period. Annual pot revenues fell by 36% (\$1.3 million).

Figures 4-6 provide a more detailed look at gear-group landings over the 1983-87 period. These data are displayed according to International North Pacific Fisheries Commission statistical areas (as depicted in Fig. 7). The geographic shift northward in the execution of the fixed gear fishery can be seen most clearly in 1) the decline of pot fishing in the Conception area (1,667 t to 20 t), and 2) the increase in longline activity in the two northernmost areas (755 t to 3,217 t).

RESEARCH DATABASE STATISTICS

Tables 4-8 and Figures 8-20 provide complementary views of the PacFIN RDB and Alaska RDB data. The tabular results include numerous statistics summarizing fleet activity over all vessels in each gear group, and for subsets defined by 1) the amount of west coast sablefish harvested, or 2) participation in Alaskan fisheries. The figures, rather than portraying the tabular summarized data, display information from every vessel in the gear group (or subgroup), for a particular characteristic, for example, the percentage of vessel revenue obtained from sablefish.

The issues which provided primary focus for analysis of this vessel data were 1) the extent to which west coast sablefish revenue contributes to vessel income, and 2) the degree to which landings within each of the three major gear groups are concentrated among the most productive vessels. The contribution which sablefish makes to vessel revenue is assessed with respect to west coast revenue alone and also with combined revenue from the west coast and Alaska.

Contribution by Sablefish to Vessel Revenue
from West Coast Fisheries

Figures 8-10 illustrate the share of west coast revenue contributed by sablefish for vessels of each gear group. The graphs were created by ordering vessel data according to the percentage of each vessel's west coast revenue contributed by sablefish, in an ascending fashion. This sablefish revenue share was then plotted against the percentage of vessels accumulated by that point in each gear-group ordering. A curve lying farther to the right than another would reflect vessels receiving a larger share of their revenue directly from sablefish. Complete dependence on west coast sablefish by all vessels in a group would be represented by a vertical curve at the extreme right (100%) of the diagram.

Thus, Figure 8 shows that for 20% of the longline vessels landing more than 1,000 lb of sablefish in 1985, sablefish revenue contributed from 0 to 15% of their total west coast income. The same point on the graph may also be used to illustrate that for 80% of the longline vessels, sablefish accounted for more than 15% of west coast revenue. The pattern of vessel receipts from sablefish varies widely across gear types, with pot vessels, on average, deriving more, and trawl vessels less of their revenue from sablefish than do longliners.

In Figures 11-13, sablefish revenue share is seen to vary between the most productive and least productive vessels in the sablefish fishery. These figures are constructed in a similar manner to the preceding three, but each provides a comparison of two subgroups within each gear type: 1) the 20% of a gear-group's vessels which harvested the most west coast sablefish, and 2) the 20% which harvested the least. These diagrams illustrate that, in most instances, vessels which landed the most west coast sablefish were more likely to obtain a higher percentage of their west coast revenue from

sablefish than other vessels using the same gear that landed relatively little.

In the longline group, for example, over 80% of the lower-group vessels generated less than 20% of their west coast revenue from sablefish. In contrast, over 80% of the vessels in the upper group received more than 40% of their revenue from sablefish. This disparity is by no means a necessary result. If vessels harvesting small amounts of sablefish tended to be small-scale or part-time operations, the average sablefish contribution to total revenue could be as high or higher in the bottom group as in the top. In this regard, it may be noted in Figure 12 that several of the bottom-group pot vessels, represented by the extreme right portion of the dotted curve, reflect a higher degree of dependence on sablefish than many vessels—with far greater sablefish landings—which comprise the left-hand portion of the solid curve.

This pattern of dependence can also be observed in the tabular summary statistics. Table 6 shows that, while there was a very large difference between the average amount of sablefish harvested in the top and bottom groups of pot vessels during 1985 (302 t versus 5 t), vessels in both groups averaged more than 70% of their west coast revenue from sablefish. The longline and trawl vessels, on the other hand, are shown to have a much greater difference between the revenue dependence of the top and bottom groups. In the 1985 longline fleet, for instance, sablefish accounted for an average 67% of revenue among the top vessels and only 16% among those harvesting the least (Table 4). Also during that year, trawl vessels from the top and bottom groups received an average 16% and 1% (Table 7), respectively, of their west coast income from sablefish.

Contribution by Sablefish to Vessel Revenue
from West Coast and Alaskan Fisheries

Alaskan fisheries have provided considerable revenue to many vessels participating in the west coast sablefish fishery. While the Alaskan participation of pot boats could not be revealed because of the small number of vessels, the tables for longline and trawl vessels report the additional income these subgroups received from Alaskan fisheries.

Nearly 36% of the west coast longline vessels studied had Alaska landings in 1985, up from 25% the previous year. The number of joint-region longline vessels increased during this period from 12 to 32. Of these 32 boats, only two had been strictly west coast vessels in 1984. Eight of the boats participated in both fisheries the previous year, while the remaining 22 either had no 1984 west coast sablefish landings or had sablefish landings which did not meet the 1,000 lb criterion adopted for this study. Thus, the increase in joint-fishery participation is apparently more indicative of existing Alaskan participants joining the west coast fishery than vice versa. Most striking is the fact that the one-third of longliners fishing both regions in 1985 earned an average of 50% more in Alaska than from their harvest of all west coast species (Table 4). While fewer trawl vessels participated in Alaskan fisheries, those that did added an average of 47% to their total west coast earnings in 1985 (Table 7).

Figures 14-17 illustrate the degree to which Alaskan revenue has affected the share of vessel income contributed by west coast sablefish. Figures 14 and 15 provide a comparison of longline vessel revenues in 1985 and 1984, respectively. Figures 16 and 17 present a similar depiction for trawl vessels. With less than 6% of the west coast sablefish trawlers participating in Alaskan fisheries during 1984-85 (see Tables 7-8), the already low contribution of sablefish to these vessels' west coast income was not greatly reduced by the inclusion of Alaskan earnings.

On the other hand, the contribution which sablefish made to longline revenues was altered substantially by the inclusion of revenue from Alaskan fisheries, particularly with the increased cross-participation witnessed in 1985. Forty percent of the longline vessels included in the analysis received up to 30% of their west coast revenue from sablefish in 1985. If Alaskan revenue is included, however, the percentage of vessels that received no more than 30% of their total revenue from west coast sablefish increases to roughly 60% (Fig. 14). As shown in Table 4, the average dependence on west coast sablefish for the entire longline group for 1985 dropped from 47% to 33% with the inclusion of Alaskan revenue. This drop-off was considerably greater for the subset of longline vessels fishing both regions. That group was dependent upon west coast sablefish for 59% of their west coast income, but for only 24% of their combined west coast-Alaskan income.

The preceding discussion has focused solely upon the actual contribution made by sablefish to the revenue of these vessels. The statistics reported are not intended to summarize the economic impact that would accompany changes in sablefish allocation. Estimation of such impacts would require, among other things, a more rigorous assessment of the possibilities for species substitution during harvest and information concerning harvest costs.

Industry Concentration in the West Coast Sablefish Fisheries

Figures 18-20 show the concentration of west coast sablefish landings within each gear type. These curves were created by ordering vessel landing amounts, in descending fashion, and then plotting the accumulated percentage of harvest against the proportion of vessels encountered by that point in the ordering. The farther the curve is bowed above the diagonal through the origin, the greater the degree of harvest concentration.

As depicted in Figure 18, the top 20% of the longline vessels contributed nearly 70% of the longline landings in 1985, meaning also that

the other 80% of longliners accounted for only 30% of the 1985 production. This represented a slight reduction in this fleet's concentration from the previous year, when the top 20% of vessels accounted for 80% of the longline sablefish landings. The 85% increase in the number of longline participants (harvesting over 1,000 lb) in 1985, many of which were relatively large vessels from Alaskan fisheries, was likely responsible for most of this reduction. The remaining gear groups also showed a moderately high degree of concentration, with the top 40% of the vessels accounting for at least 80% of the landings in each case. As with longliners, the concentration witnessed in the pot fishery was also slightly lower in 1985 than in 1984.

CONCLUSION

West coast harvests of sablefish declined roughly 12% from 1983 to 1987. During this period, while apportionment of harvest to trawl and fixed gears remained stable, longlining emerged as the predominant form of fixed-gear harvest. And, while longline landings remained less than those with trawl gear, the former now generate more ex-vessel revenue from sablefish than does any other type of gear.

Analysis of vessel-level data shows that all three major gear segments of the west coast sablefish fleet have been characterized by a moderately high degree of harvest concentration. During both 1984 and 1985, the top 40% of vessels within each gear group consistently harvested more than 80% of that gear's catch.

On the other hand, each gear group retained a distinct profile with respect to the proportion of vessel revenue contributed by sablefish. Trawl vessels averaged less than 10% of their west coast income from sablefish, while the mean for pot vessels was more than 70%. Most longline vessels were dispersed throughout a 20 to 60% range, with the average sablefish revenue share increasing from 29% to 47% over the study period.

Finally, those vessels that also participated in Alaskan fisheries received a large portion of their earnings from northern waters. In 1985, the longline vessels fishing both regions earned 50% more in Alaska than they did on the west coast. And, even though this group accounted for only about one third of the west coast longline vessels, their Alaskan income alone was nearly 80% of the combined revenue from all west coast longline landings by the vessels included in the study. While fewer trawl vessels participated in both regions during 1985, those that did also added nearly 50% to their west coast earnings.

REFERENCE

Korson, C. S., and W. Silverthorne. 1987. Economic status of the Washington, Oregon, and California groundfish fishery in 1986. U.S. Dep. Commer., NOAA Tech. Memo. NMFS-SWR-014, 39 p.

Table 1.—Domestic west coast landings (t) of sablefish (*Anoplopoma fimbria*), by gear type and area, 1983-87.

Gear and area	1983	1984	1985	1986	1987
All gears^a					
Vancouver	2,654	3,626	2,951	1,632	1,590
Columbia	4,305	4,798	5,300	5,030	6,293
Eureka	2,694	2,357	2,530	2,531	1,930
Monterey	2,526	2,220	3,221	3,570	2,807
Conception	1,923	1,070	269	359	64
Unknown	413	TR	1	44	46
All areas ^b	14,513	14,071	14,272	13,167	12,730
West coast quota	13,600	13,600	13,600	13,600	12,000
Trawl					
Vancouver	1,302	2,138	472	473	480
Columbia	2,435	2,484	2,795	1,954	2,655
Eureka	1,754	1,718	1,591	1,716	1,461
Monterey	1,582	1,467	2,086	1,757	1,799
Conception	76	122	230	108	30
Unknown	TR	—	—	TR	4
All areas ^b	7,148	7,929	7,173	6,008	6,430
Longline					
Vancouver	262	546	1,713	1,120	1,107
Columbia	493	424	577	1,616	2,110
Eureka	190	33	236	346	199
Monterey	57	19	226	488	723
Conception	TR	TR	TR	3	7
Unknown	1	TR	TR	TR	6
All areas ^b	1,004	1,023	2,754	3,574	4,153
Pot					
Vancouver	892	563	475	37	—
Columbia	1,316	1,877	1,890	1,410	1,479
Eureka	735	396	660	278	257
Monterey	789	58	608	389	226
Conception	1,667	928	3	1	20
Unknown	—	—	1	—	36
All areas ^b	5,399	3,823	3,637	2,116	2,017
Other/unspecified gear^c					
All areas	962	1,296	708	1,469	130

Source: Pacific Marine Fisheries Commission, Pacific Fishery Information Network (PacFIN) management database, 7600 Sand Point Way N.E., Seattle, WA 98115 (report no. 112, 18 May 1988).

Notes: TR = Trace. ^a "All gear" includes landings for unspecified or other types of gear. ^b Differences due to rounding. ^c Landings recorded with an unspecified gear are predominantly from California and include significant but undetermined catch by the three major gear types.

Table 2.—Domestic west coast ex-vessel prices (\$/lb, round weight) for sablefish (*Anoplopoma fimbria*), by gear and area, 1983-87.

Gear and area	1983	1984	1985	1986	1987
All gears					
Vancouver	0.255	0.239	0.526	0.492	0.649
Columbia	0.220	0.218	0.308	0.383	0.493
Eureka	0.211	0.187	0.266	0.332	0.401
Monterey	0.196	0.168	0.261	0.345	0.376
Conception	0.336	0.325	0.235	0.315	0.357
Unknown	0.262	0.265	0.377	0.379	0.553
All areas	0.237	0.218	0.334	0.374	0.472
Trawl					
Vancouver	0.163	0.150	0.250	0.271	0.344
Columbia	0.174	0.167	0.225	0.273	0.327
Eureka	0.164	0.170	0.211	0.278	0.346
Monterey	0.154	0.162	0.206	0.255	0.305
Conception	0.161	0.156	0.187	0.246	0.288
Unknown	0.160	—	—	0.247	0.325
All areas	0.165	0.162	0.217	0.268	0.326
Longline					
Vancouver	0.371	0.418	0.583	0.578	0.782
Columbia	0.360	0.392	0.504	0.517	0.682
Eureka	0.335	0.308	0.473	0.481	0.645
Monterey	0.555	0.304	0.445	0.489	0.532
Conception	0.327	0.425	0.582	0.607	0.508
Unknown	0.451	0.267	0.247	0.496	1.110
All areas	0.369	0.401	0.546	0.529	0.681
Pot					
Vancouver	0.328	0.292	0.563	0.725	—
Columbia	0.252	0.246	0.373	0.387	0.525
Eureka	0.292	0.225	0.321	0.491	0.519
Monterey	0.269	0.180	0.368	0.606	0.468
Conception	0.344	0.350	0.651	0.650	0.404
Unknown	—	—	0.392	—	0.484
All areas	0.301	0.275	0.388	0.447	0.516

Source: Pacific Marine Fisheries Commission, Pacific Fishery Information Network (PacFIN) management database, 7600 Sand Point Way N.E., Seattle, WA 98115 (report no. 112, 18 May 1988).

Note: "All gear" includes prices from unspecified or other types of gear in addition to the three major types shown.

Table 3.—West coast domestic ex-vessel revenue (\$1,000s) from sablefish (*Anoplopoma fimbria*), by gear type, 1983-87.

Gear	1983	1984	1985	1986	1987
Trawl	2,600	2,835	3,430	3,555	4,654
Longline	817	906	3,313	4,165	6,233
Pot	3,581	2,316	3,109	2,085	2,285
All gear	7,594	6,777	10,506	10,868	13,245

Source: Pacific Marine Fisheries Commission, Pacific Fishery Information Network (PacFIN) management database, 7600 Sand Point Way N.E., Seattle, WA 98115 (report no. 112, 18 May 1988).

Note: "All gear" includes revenue from unspecified or other types of gear in addition to the three major types shown.

Table 4.—Fleet characteristics of domestic longline vessels landing more than 1,000 lb of sablefish from west coast areas, 1985.

Fleet characteristics	Total All vessels	Average			
		All vessels	Top 20% vessels	Bottom 20% vessels	Vessels with Alaska landings
Number of vessels	89	89	18	18	32
WC sablefish landings (t)	2,493	28 (44)	95 (58)	1 (0.5)	29 (31)
WC sablefish revenue (\$1,000s)	3,671	41 (59)	131 (75)	2 (1)	59 (62)
Total WC revenue (\$1,000s)	7,467	84 (87)	197 (89)	25 (19)	119 (107)
Percentage of WC vessel revenue from sablefish ^a	—	47% (32)	67% (24)	16% (24)	59% (29)
Alaskan revenue (\$1,000s)	5,800	—	—	—	181
Total WC and Alaskan revenue (\$1,000s)	13,267	—	—	—	300
Percentage of vessel revenue from WC sablefish ^a	—	33%	—	—	24%
Length (ft)	—	45	51	36	53
Year constructed	—	1953	1962	1955	1947

Sources: Pacific Fishery Information Network (PacFIN) research database, NMFS Southwest Fisheries Center, P.O. Box 271, La Jolla, CA 92038 (August 1987), and the Alaska Research Database, NMFS Northwest and Alaska Fisheries Center, 7600 Sand Point Way N.E., Seattle, WA 98115 (March 1988).

Notes: The top- and bottom-20% groupings reflect the ranking of all vessels in this gear group on the basis of their amount of west coast sablefish landings. Selected standard errors shown in parentheses. WC = west coast of Washington, Oregon, and California.
^a Average revenue-share percentages calculated as the mean of vessel observations, not as the ratio of group revenue totals.

Table 5.--Fleet characteristics of domestic longline vessels landing more than 1,000 lb of sablefish from west coast areas, 1984.

Fleet characteristics	Total		Average		
	All vessels	All vessels	Top 20% vessels	Bottom 20% vessels	Vessels with Alaska landings
Number of vessels	48	48	10	10	12
WC sablefish landings (t)	843	18 (36)	68 (55)	(0.7) (0.2)	32 (39)
WC sablefish revenue (\$1,000s)	993	21 (42)	82 (61)	(0.7) (0.2)	46 (60)
Total WC revenue (\$1,000s)	2,620	55 (61)	132 (71)	17 (21)	113 (75)
Percentage of WC vessel revenue from sablefish	--	29% (26)	56% (16)	13% (19)	38% (33)
Alaskan revenue (\$1,000s)	1,700	--	--	--	142
Total WC and Alaskan revenue (\$1,000s)	4,320	--	--	--	255
Percentage of vessel revenue from WC sablefish ^a	--	23%	--	--	17%
Length (ft)	--	42	51	36	56
Year constructed	--	1952	1954	1949	1943

Sources: Pacific Fishery Information Network (PacFIN) research database, NMFS Southwest Fisheries Center, P.O. Box 271, La Jolla, CA 92038 (August 1987), and the Alaska Research Database, NMFS Northwest and Alaska Fisheries Center, 7600 Sand Point Way N.E., Seattle, WA 98115 (March 1988).

Notes: The top- and bottom-20% groupings reflect the ranking of all vessels in this gear group on the basis of their amount of west coast sablefish landings. Selected standard errors shown in parentheses. WC = west coast of Washington, Oregon, and California.
^a Average revenue-share percentages calculated as the mean of vessel observations, not as the ratio of group revenue totals.

Table 6.--Fleet characteristics of domestic pot vessels landing more than 1,000 lb of sablefish from west coast areas, 1984-85.

Fleet characteristics	1985				1984					
	Total All vessels	Average		Top 20% ves.	Bottom 20% ves.	Total All vessels	Average		Top 20% ves.	Bottom 20% ves.
		All ves.	Top 20% ves.				All ves.	Top 20% ves.		
Number of vessels	30	30	6	6	26	26	6	6		
WC sablefish landings (t)	3,345	112 (117)	302 (99)	5 (3)	3,826	147 (208)	449 (250)	7 (4)		
WC sablefish revenue (\$1,000s)	2,907	97 (112)	258 (138)	5 (4)	2,230	86 (130)	274 (165)	5 (3)		
Total WC revenue (\$1,000s)	4,283	143 (123)	294 (129)	17 (22)	2,801	108 (133)	319 (117)	11 (10)		
Percentage of WC vessel revenue from sablefish ^a	—	70% (33)	87% (18)	71% (42)		74% (27)	81% (30)	72% (37)		
Length (ft)	—	57	81	55		57	70	61		
Year constructed	—	1956	1966	1963		1970	1978	1971		

Sources: Pacific Fishery Information Network (PacFIN) research database, NMFS Southwest Fisheries Center, P.O. Box 271, La Jolla, CA 92038 (August 1987).

Notes: Because fewer than four WC pot vessels took part in Alaska fisheries, confidentiality requirements prohibit the disclosure of revenue data for that gear group.

The top- and bottom-20% groupings reflect the ranking of all vessels in this gear group on the basis of their amount of west coast sablefish landings. Selected standard errors shown in parentheses. WC = west coast of Washington, Oregon, and California.

^a Average revenue-share percentages calculated as the mean of vessel observations, not as the ratio of group revenue totals.

Table 7.—Fleet characteristics of domestic trawl vessels landing more than 1,000 lb of sablefish from west coast areas, 1985.

Fleet characteristics	Total	Average			
	All vessels	All vessels	Top 20% vessels	Bottom 20% vessels	Vessels with Alaska landings
Number of vessels	278	278	56	56	11
WC sablefish landings (t)	7,145	26 (33)	82 (31)	1 (0.4)	8 (10)
WC sablefish revenue (\$1,000s)	3,470	12 (16)	40 (15)	0.5 (0.2)	5 (7)
Total WC revenue (\$1,000s)	50,078	180 (214)	279 (113)	133 (119)	386 (920)
Percentage of WC vessel revenue from sablefish ^a	—	7% (8)	16% (10)	1% (2)	7% (10)
Alaskan revenue (\$1,000s)	2,000	—	—	—	182
Total WC and Alaskan revenue (\$1,000s)	52,078	—	—	—	568
Percentage of vessel revenue from WC sablefish ^a	—	7%	—	—	5%
Length (ft)	—	58	60	53	79
Year constructed	—	1962	1969	1962	1965

Sources: Pacific Fishery Information Network (PacFIN) research database, NMFS Southwest Fisheries Center, P.O. Box 271, La Jolla, CA 92038 (August 1987), and the Alaska Research Database, NMFS Northwest and Alaska Fisheries Center, 7600 Sand Point Way N.E., Seattle, WA 98115 (March 1988).

Notes: The top- and bottom-20% groupings reflect the ranking of all vessels in this gear group on the basis of their amount of west coast sablefish landings. Selected standard errors shown in parentheses. WC = west coast of Washington, Oregon, and California.

^a Average revenue-share percentages calculated as the mean of vessel observations, not as the ratio of group revenue totals.

Table 8.--Fleet characteristics of domestic trawl vessels landing more than 1,000 lb of sablefish from west coast areas, 1984.

Fleet characteristics	Total	Average			
	All vessels	All vessels	Top 20% vessels	Bottom 20% vessels	Vessels with Alaska landings
Number of vessels	286	286	58	58	17
WC sablefish landings (t)	8,464	30 (37)	93 (38)	1 (0.5)	16 (20)
WC sablefish revenue (\$1,000s)	3,073	11 (13)	33 (13)	0.4 (0.2)	7 (10)
Total WC revenue (\$1,000s)	50,413	176 (501)	348 (856)	87 (70)	791 (1,974)
Percentage of WC vessel revenue from sablefish ^a	--	7% (7)	15% (8)	1% (3)	7% (9)
Alaskan revenue (\$1,000s)	6,100	--	--	--	359
Total WC and Alaskan revenue (\$1,000s)	56,513	--	--	--	1,150
Percentage of vessel revenue from WC sablefish ^a	--	7%	--	--	5%
Length (ft)	--	59	64	56	84
Year constructed	--	1963	1969	1962	1965

Sources: Pacific Fishery Information Network (PacFIN) research database, NMFS Southwest Fisheries Center, P.O. Box 271, La Jolla, CA 92038 (August 1987), and the Alaska Research Database, NMFS Northwest and Alaska Fisheries Center, 7600 Sand Point Way N.E., Seattle, WA 98115 (March 1988).

Notes: The top- and bottom-20% groupings reflect the ranking of all vessels in this gear group on the basis of their amount of west coast sablefish landings. Selected standard errors shown in parentheses. WC = west coast of Washington, Oregon, and California.
^a Average revenue-share percentages calculated as the mean of vessel observations, not as the ratio of group revenue totals.

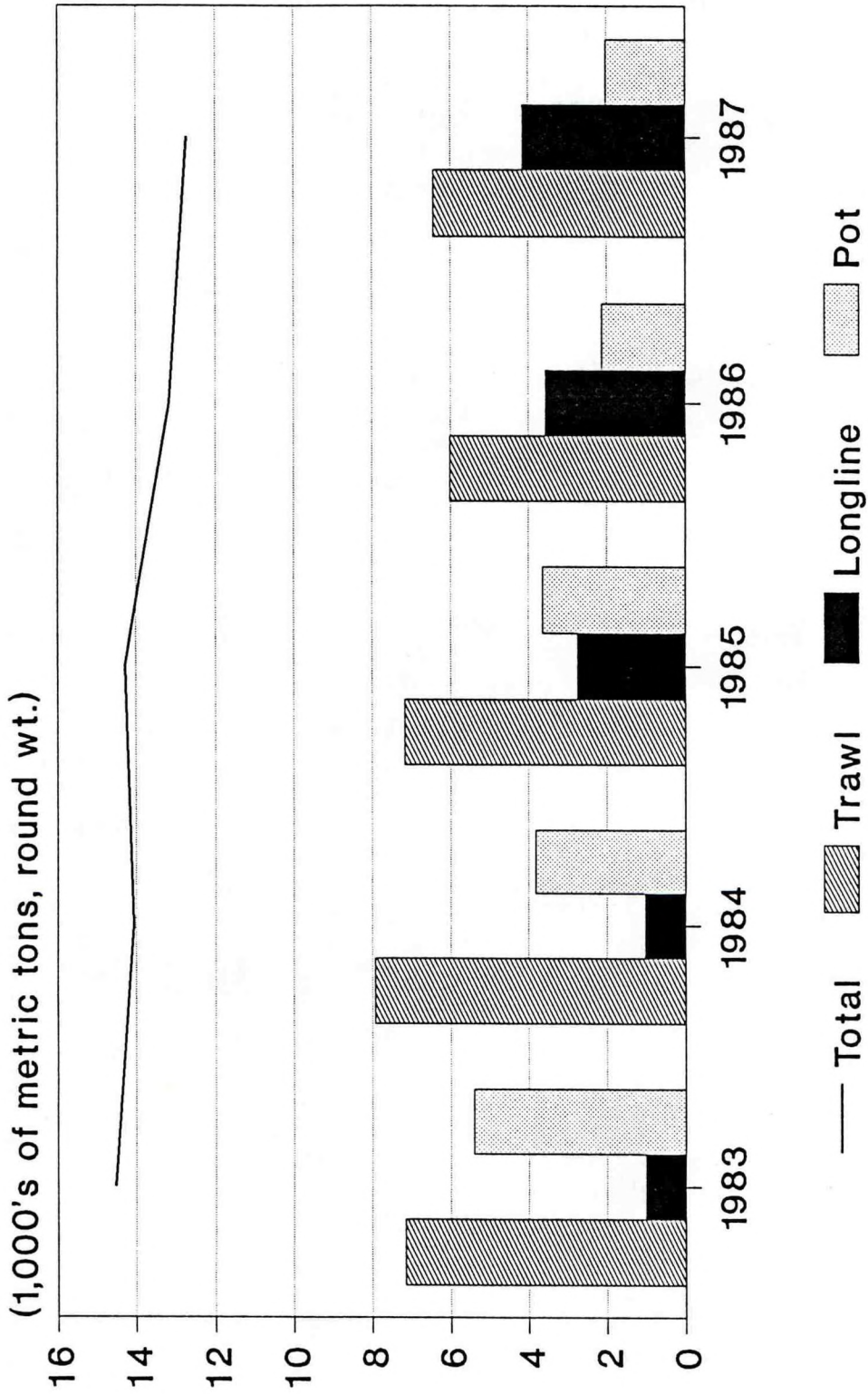


Figure 1.—West coast sablefish landings by gear, 1983-87.

Source: Pacific Marine Fisheries Commission, Pacific Fishery Information Network (PacFIN) management database, 7600 Sand Point Way, Seattle WA 98115 (report no. 112, 18 May 1988).

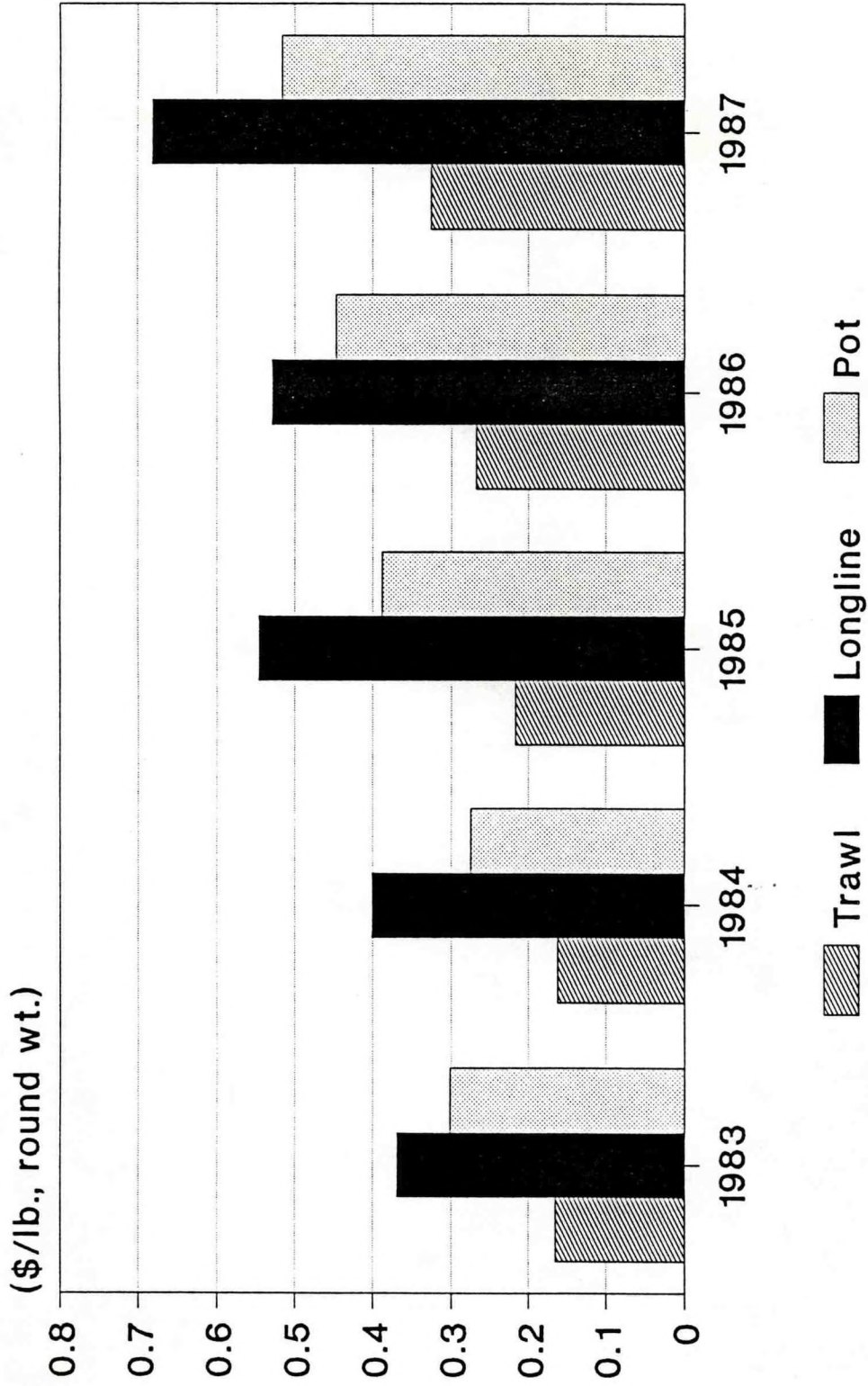


Figure 2.—West coast sablefish ex-vessel price by gear type, 1983-87.

Source: Pacific Marine Fisheries Commission, Pacific Fishery Information Network (PacFIN) management database, 7600 Sand Point Way, Seattle WA 98115 (report no. 112, 18 May 1988).

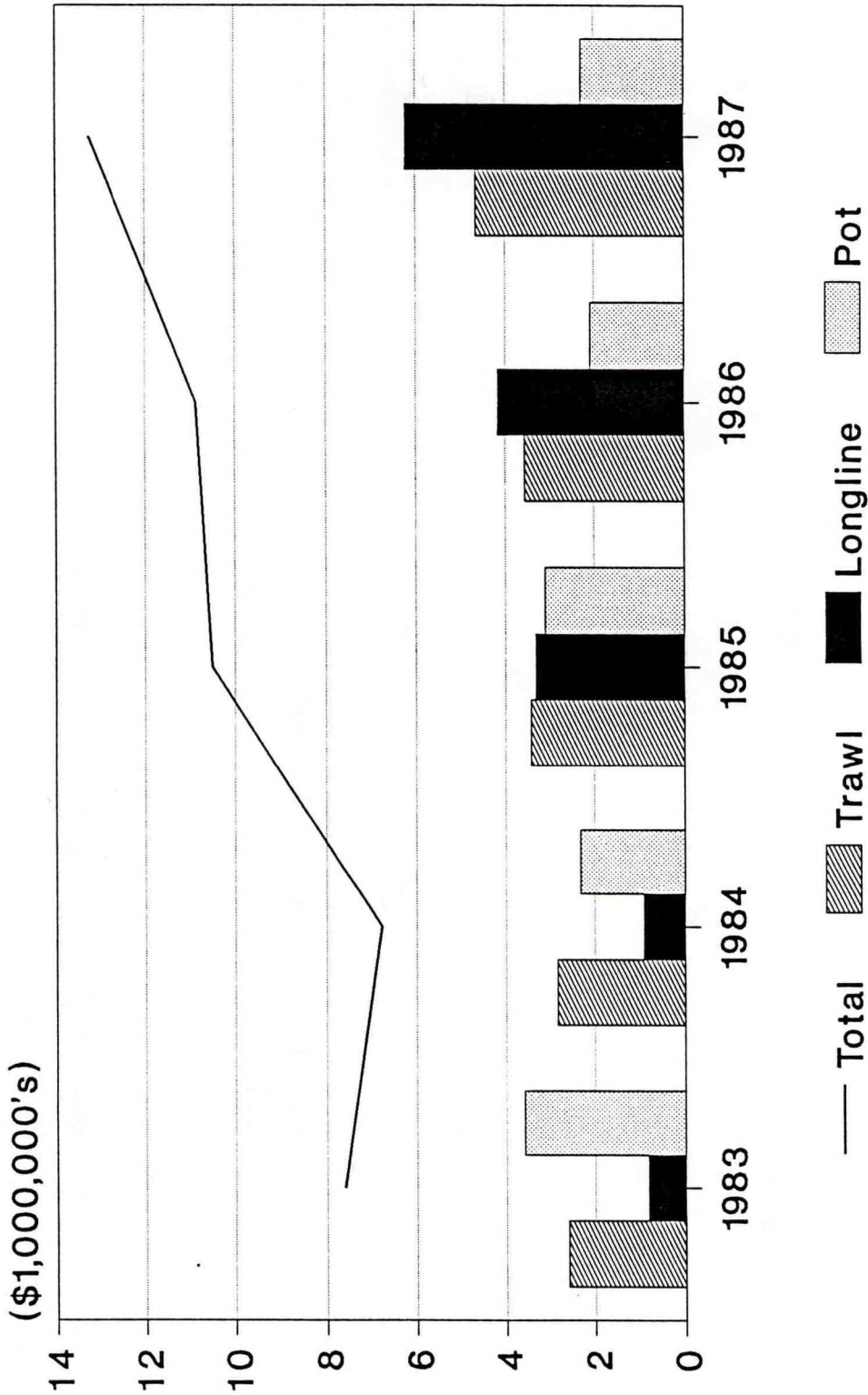


Figure 3.--West coast sablefish ex-vessel revenue by gear type, 1983-87

Source: Pacific Marine Fisheries Commission, Pacific Fishery Information Network (PacFIN) management database, 7600 Sand Point Way, Seattle WA 98115 (report no. 112, 18 May 1988).

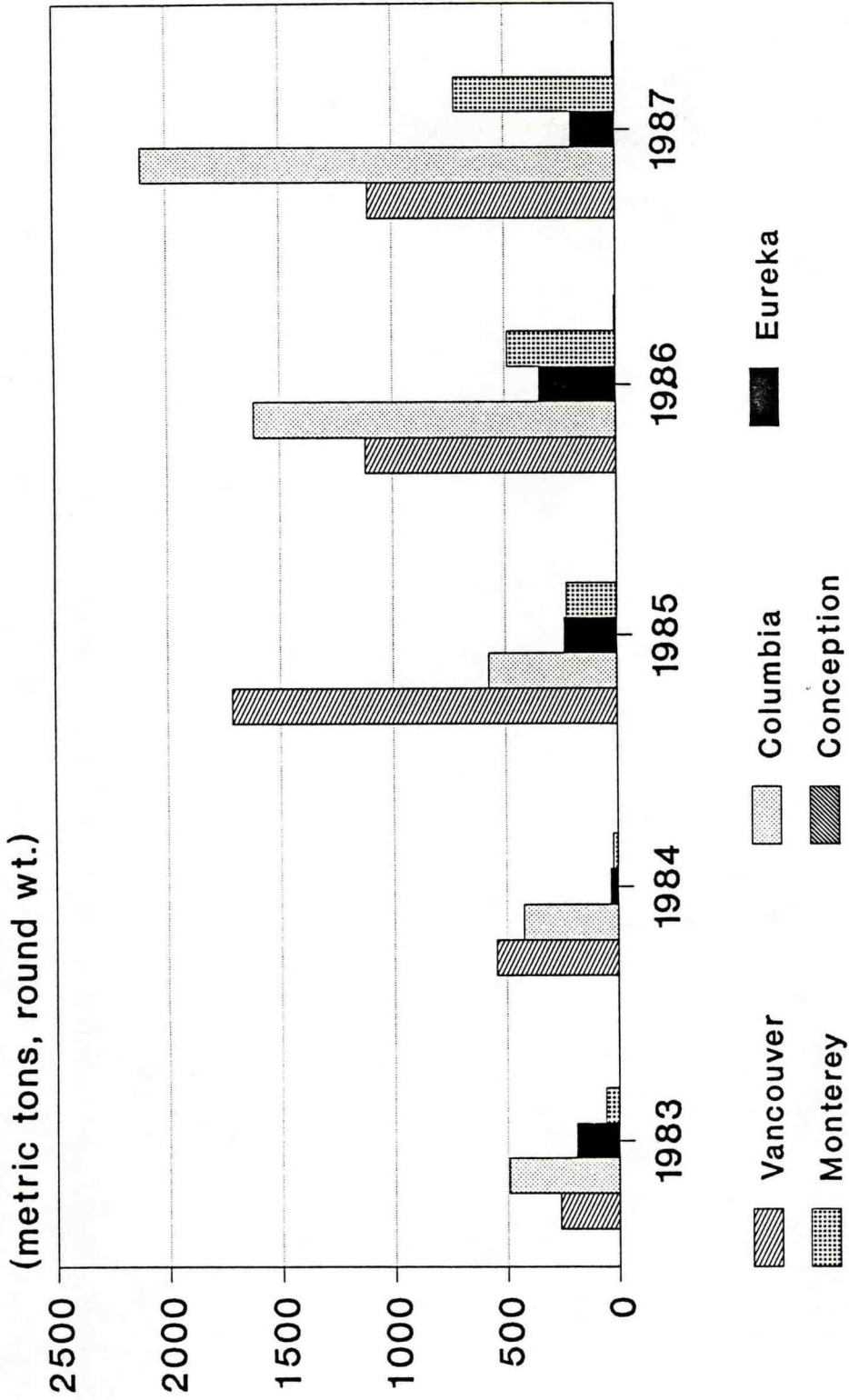


Figure 4.--West coast sablefish longline landings by area, 1983-87.

Source: Pacific Marine Fisheries Commission, Pacific Fishery Information Network (PacFIN) management database, 7600 Sand Point Way, Seattle WA 98115 (report no. 112, 18 May 1988).

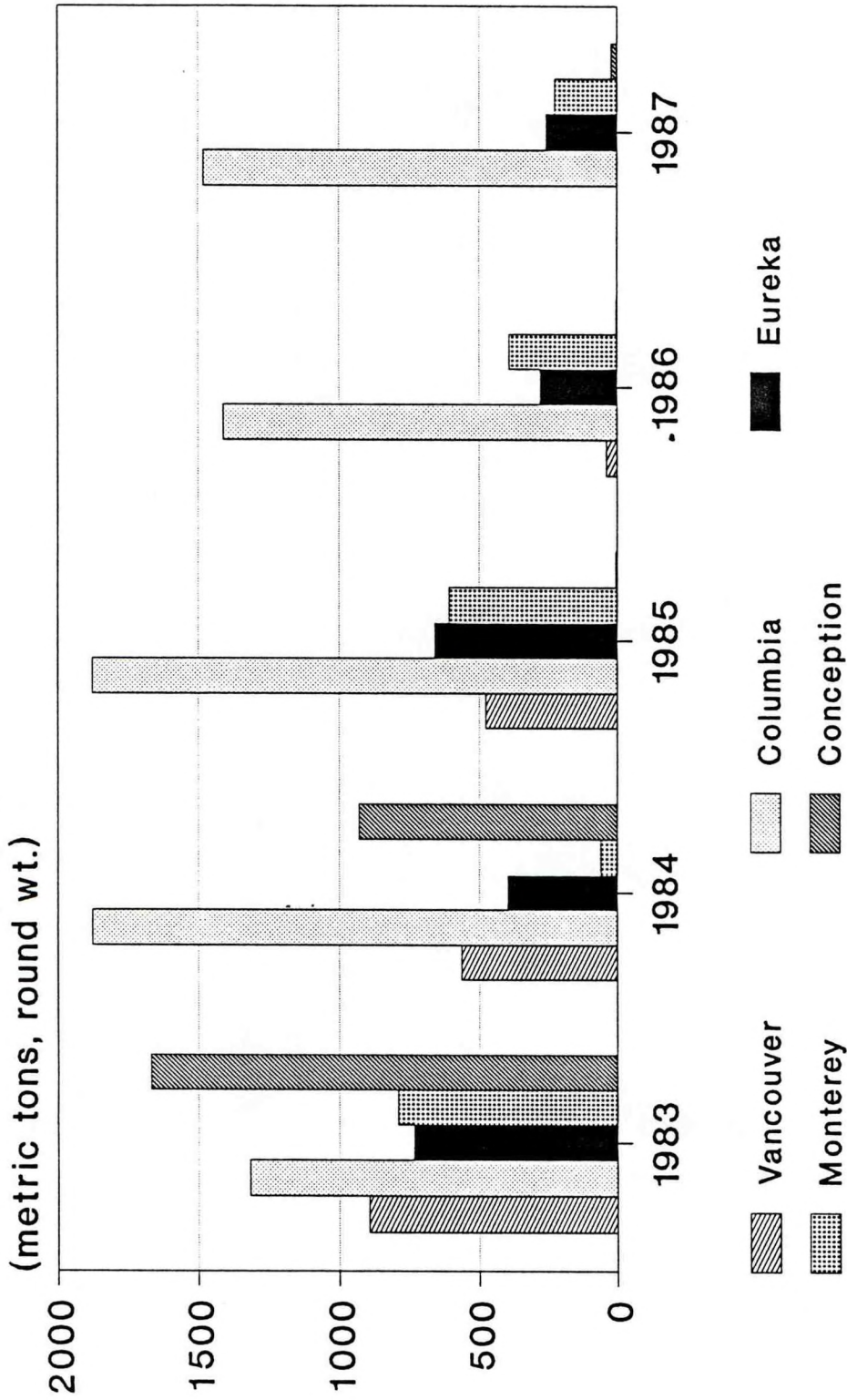


Figure 5.--West coast sablefish pot landings by area, 1983-87.

Source: Pacific Marine Fisheries Commission, Pacific Fishery Information Network (PacFIN) management database, 7600 Sand Point Way, Seattle WA 98115 (report no. 112, 18 May 1988).

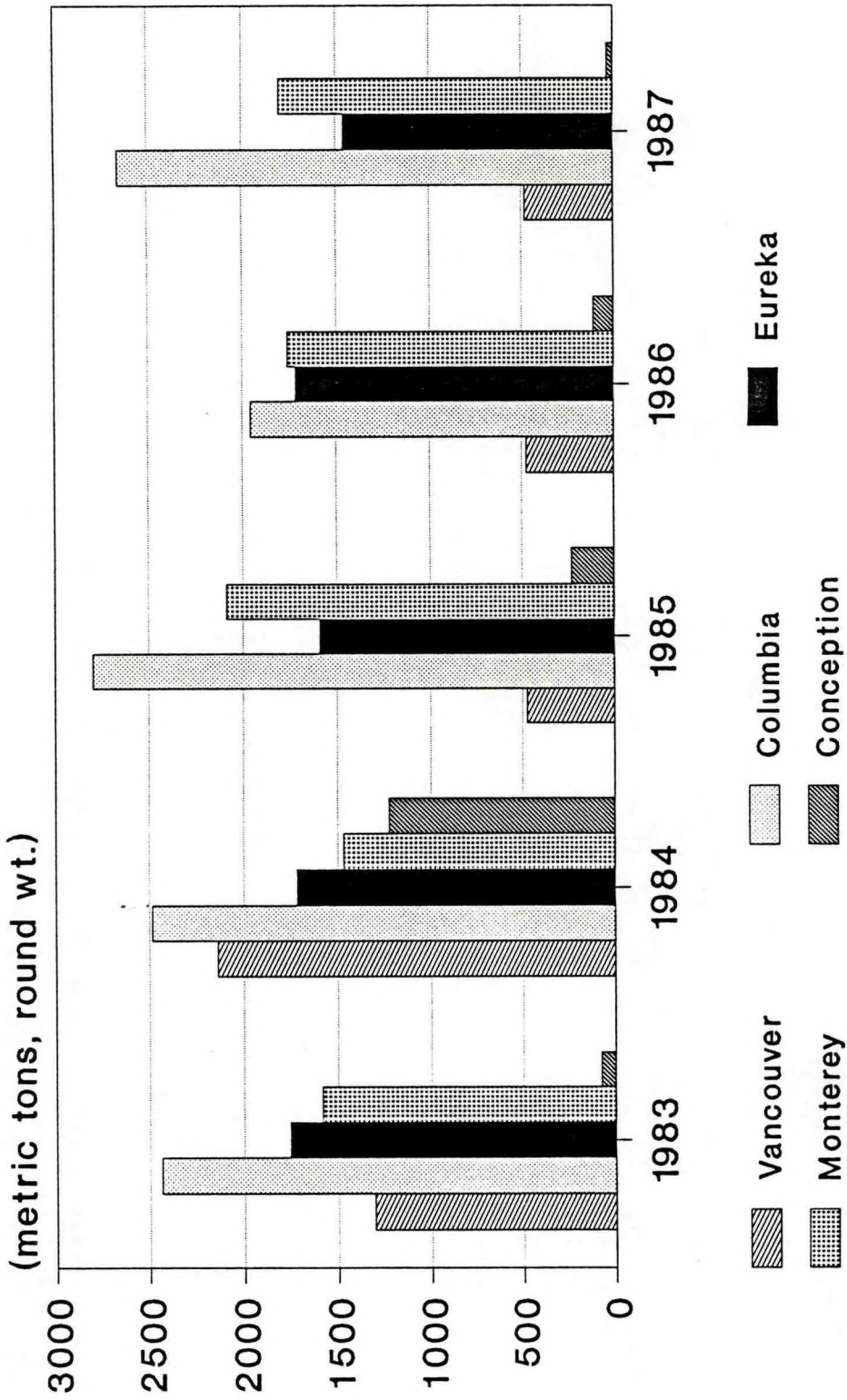


Figure 6.--West coast sablefish trawl landings by area, 1983-87.

Source: Pacific Marine Fisheries Commission, Pacific Fishery Information Network (PacFIN) management database, 7600 Sand Point Way, Seattle WA 98115 (report no. 112, 18 May 1988).

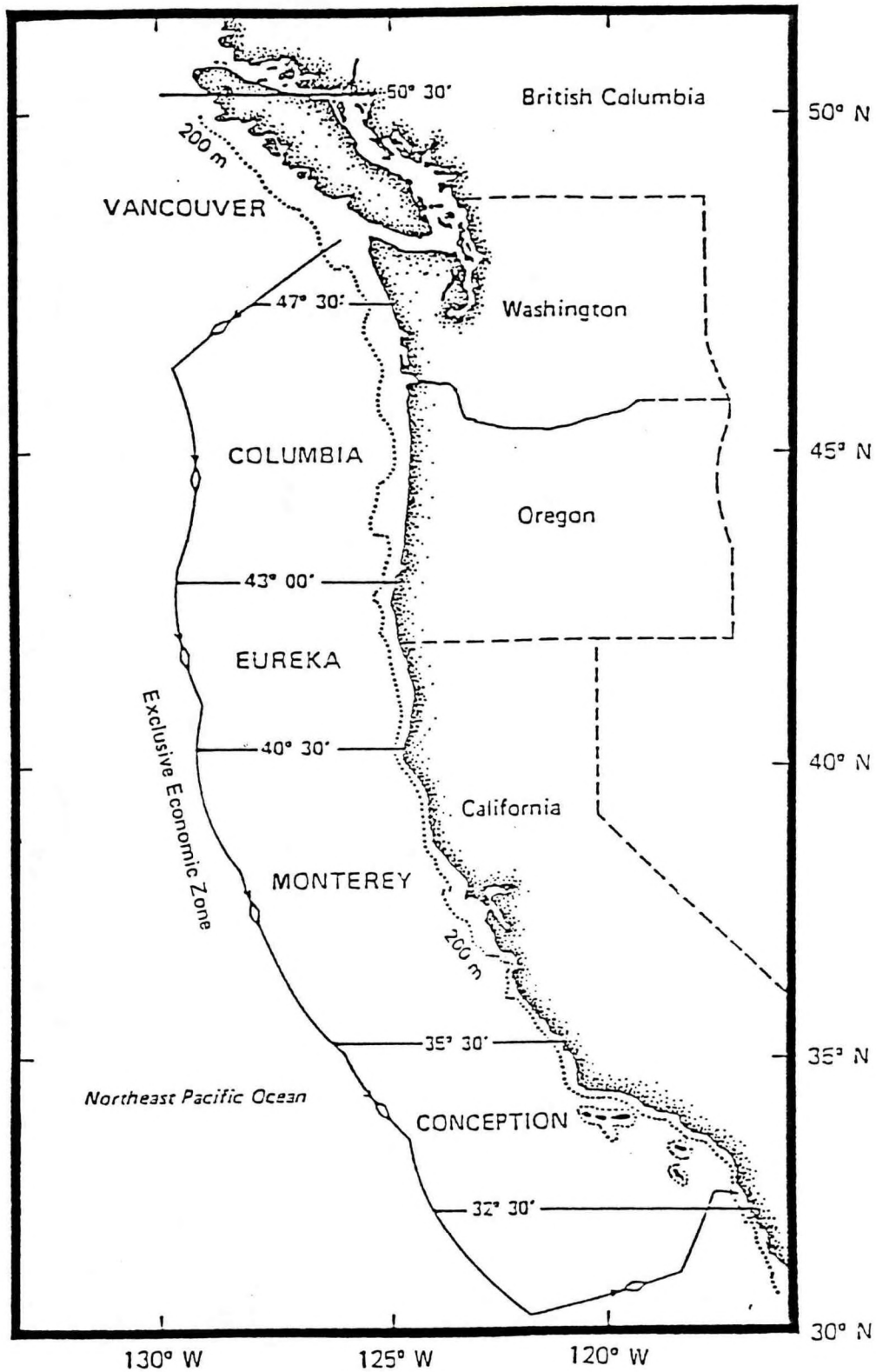


Figure 7.—International North Pacific Fisheries Commission statistical areas for fisheries located off the west coast of the United States.

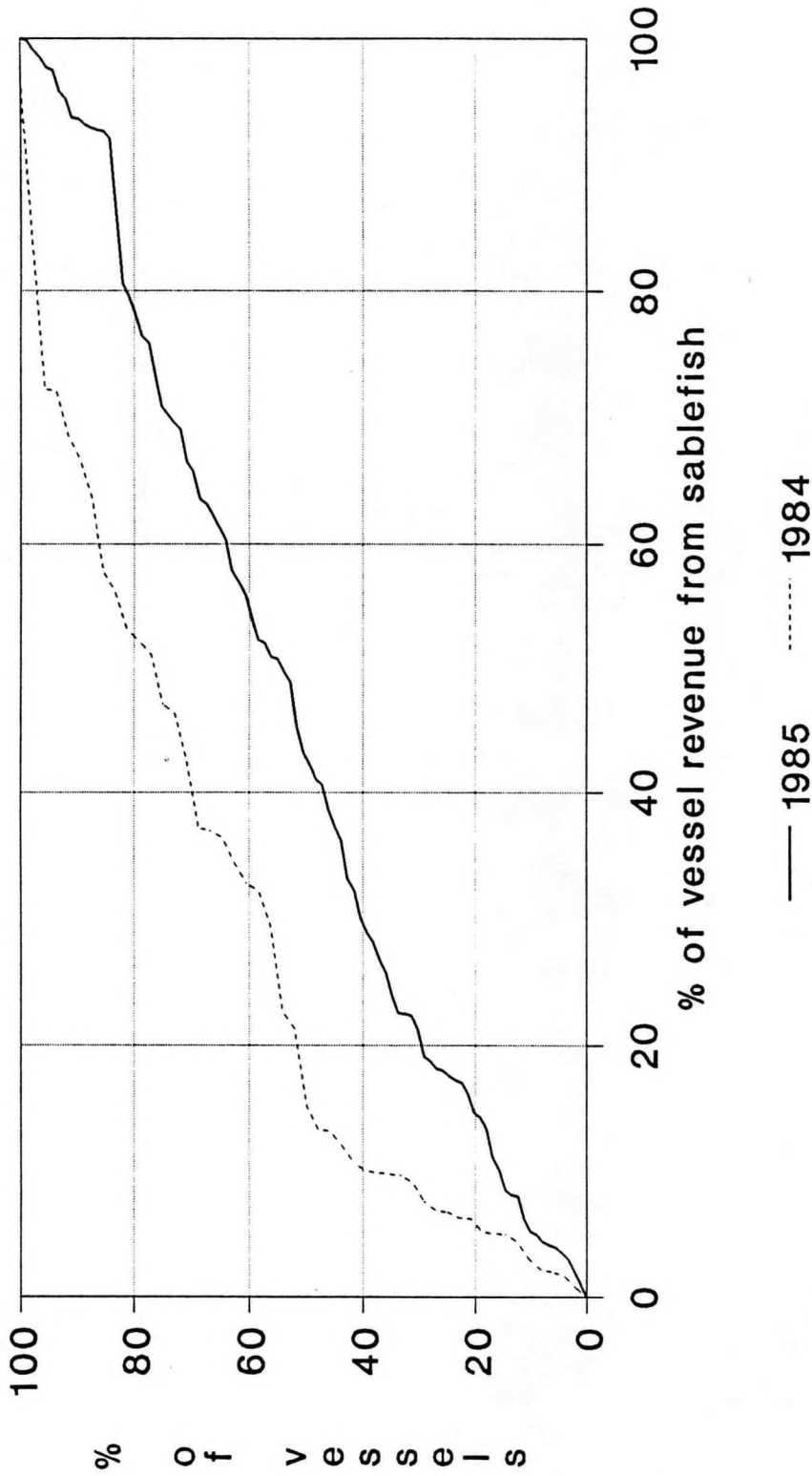


Figure 8.--Percentage of west coast revenue derived from sablefish: all longline vessels landing more than 1000 lb of west coast sablefish, 1984-85.

Source: Pacific Fishery Information Network (PacFIN) research database, NMFS Southwest Fisheries Center, P.O. Box 271, LaJolla CA 92038 (August 1987).

Note: The curves indicate the percentage of vessels that received up to the corresponding percentage of their west coast revenue from sablefish. For example, 40% of the 1985 longline vessels received 29% or less of their west coast revenue from sablefish. The farther right the curve, the greater the dependence on sablefish.

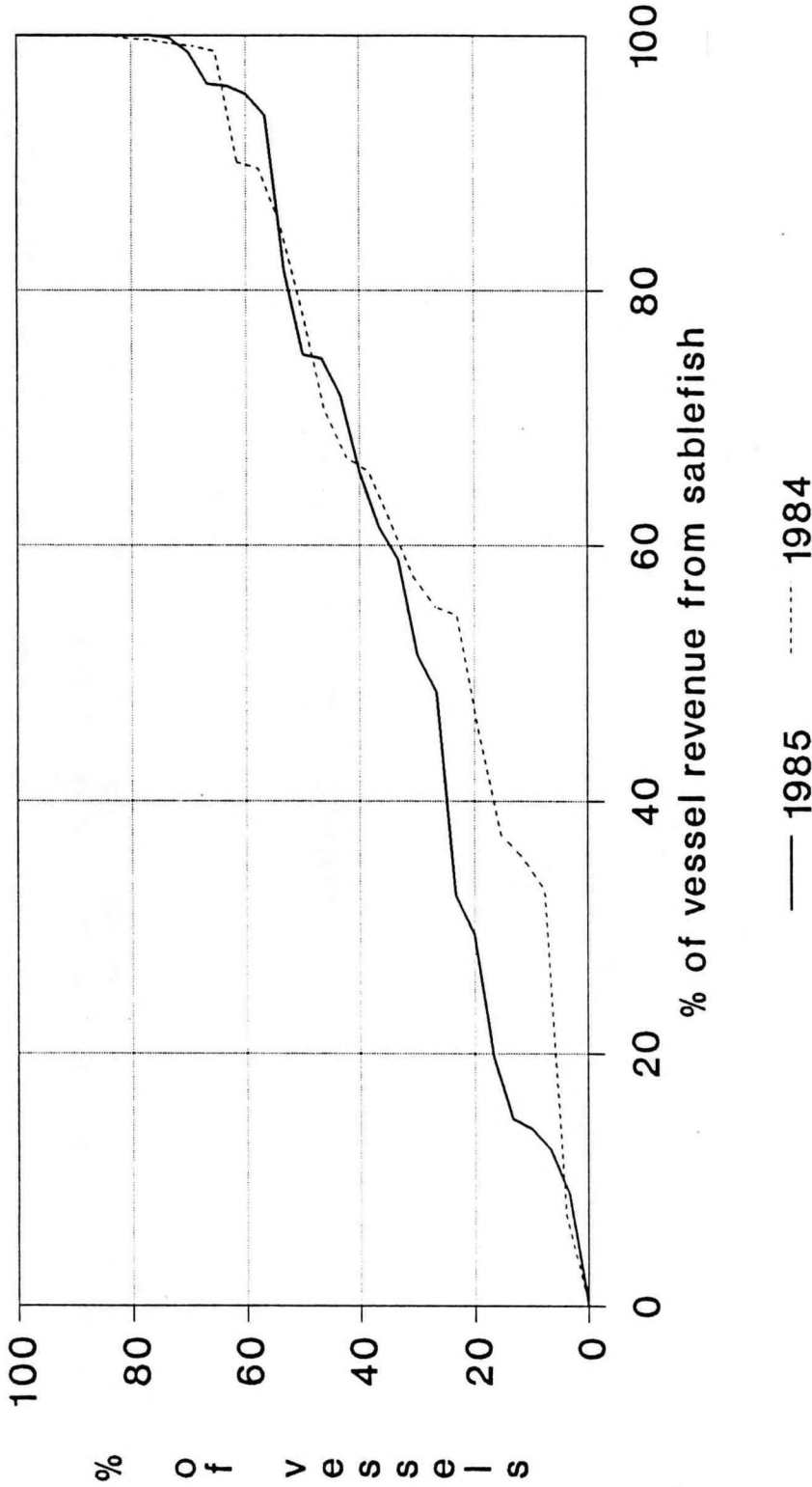


Figure 9. ---Percentage of west coast revenue derived from sablefish: all pot vessels landing more than 1000 lb of west coast sablefish, 1984-85.

Source: Pacific Fishery Information Network (PacFIN) research database, NMFS Southwest Fisheries Center, P.O. Box 271, LaJolla CA 92038 (August 1987).

Note: The curves indicate the percentage of vessels that received up to the corresponding percentage of their west coast revenue from sablefish. For example, 40% of the 1985 pot vessels received 66% or less of their west coast revenue from sablefish. The farther right the curve, the greater the dependence on sablefish.

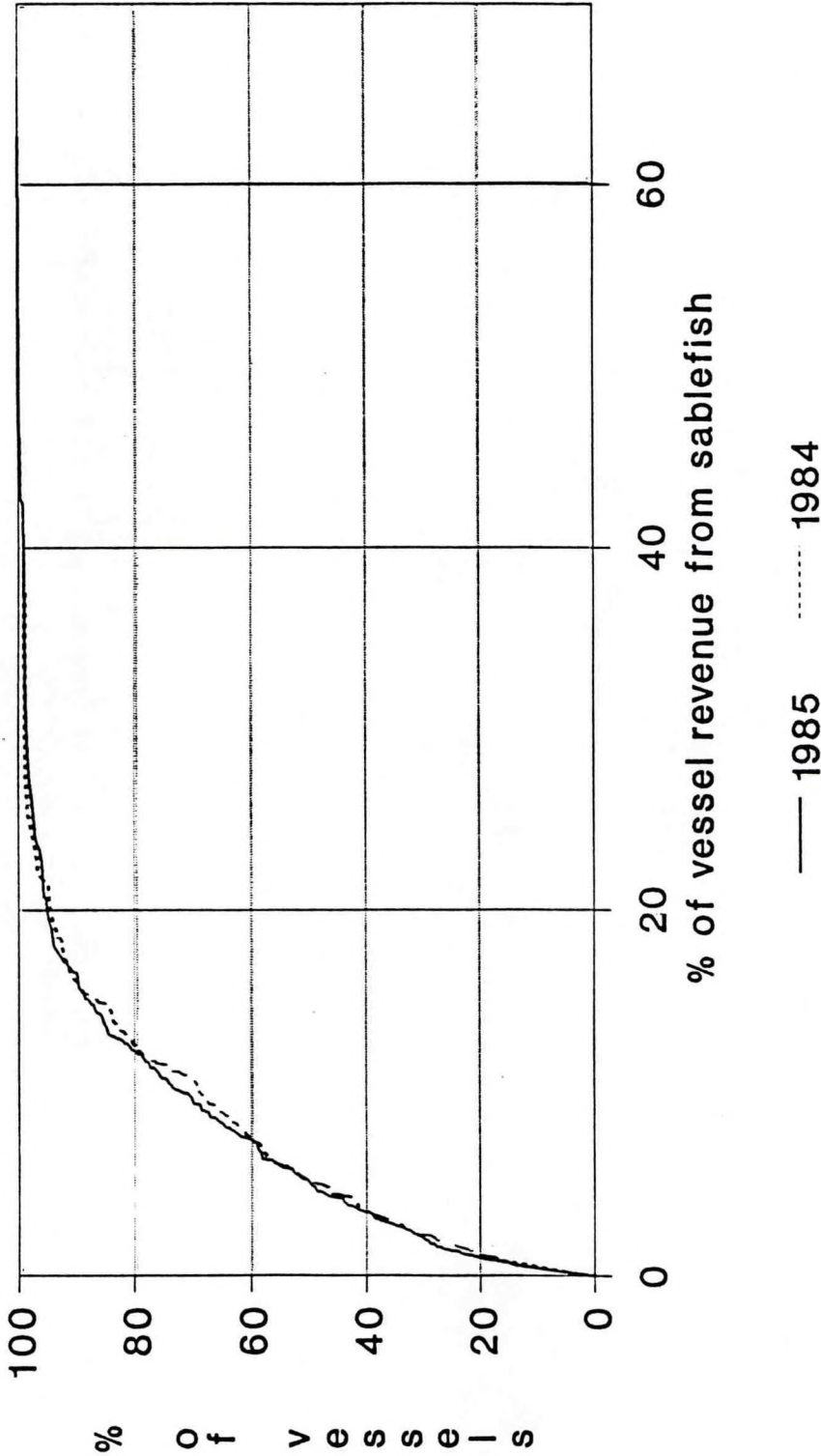


Figure 10. ---Percentage of west coast revenue derived from sablefish: all trawl vessels landing more than 1000 lb of west coast sablefish, 1984-85.

Source: Pacific Fishery Information Network (PacFIN) research database, NMFS Southwest Fisheries Center, P.O. Box 271, La Jolla, CA 92038 (August 1987).

Note: The curves indicate the percentage of vessels that received up to the corresponding percentage of their west coast revenue from sablefish. For example, 40% of the 1985 trawl vessels received 4% or less of their west coast revenue from sablefish. The farther right the curve, the greater the dependence on sablefish.

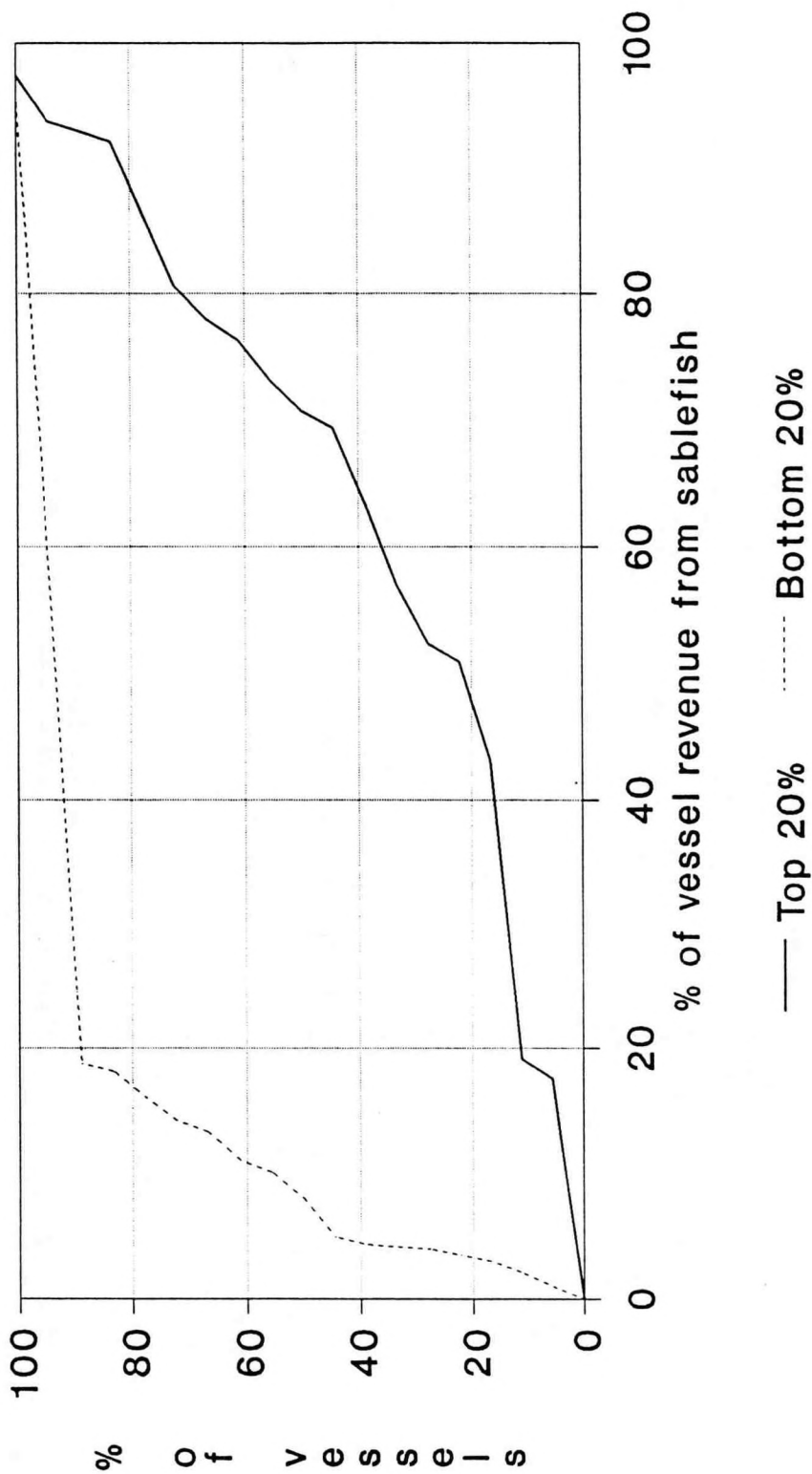


Figure 11.---Percentage of west coast revenue derived from sablefish: top and bottom 20%-groups of longline vessels, as determined by the amount of west coast sablefish landed, 1985.

Source: Pacific Fishery Information Network (PacFIN) research database, NMFS Southwest Fisheries Center, P.O. Box 271, La Jolla, CA 92038 (August 1987).

Note: The curves indicate the percentage of vessels that received up to the corresponding percentage of their west coast revenue from sablefish. For example, 40% of the top group of longliners received 29% or less of their west coast revenue from sablefish. The farther right the curve, the greater the dependence on sablefish.

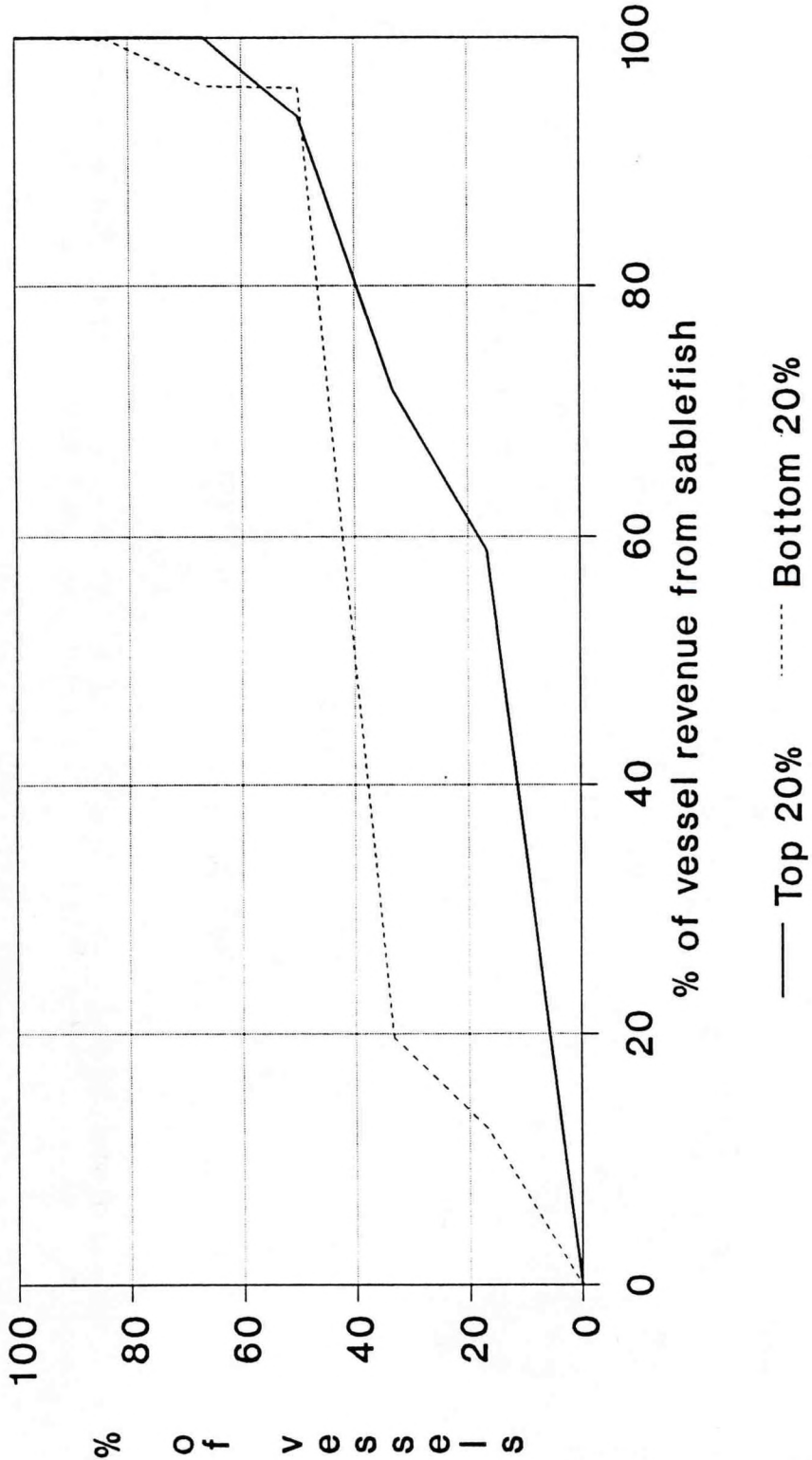


Figure 12.--Percentage of west coast revenue derived from sablefish: top and bottom 20%-groups of pot vessels, as determined by the amount of west coast sablefish landed, 1985.

Source: Pacific Fishery Information Network (PacFIN) research database, NMFS Southwest Fisheries Center, P.O. Box 271, LaJolla CA 92038 (August 1987).

Note: The curves indicate the percentage of vessels that received up to the corresponding percentage of their west coast revenue from sablefish. For example, 40% of the top group of pot vessels received 80% or less of their west coast revenue from sablefish. The farther right the curve, the greater the dependence on sablefish.

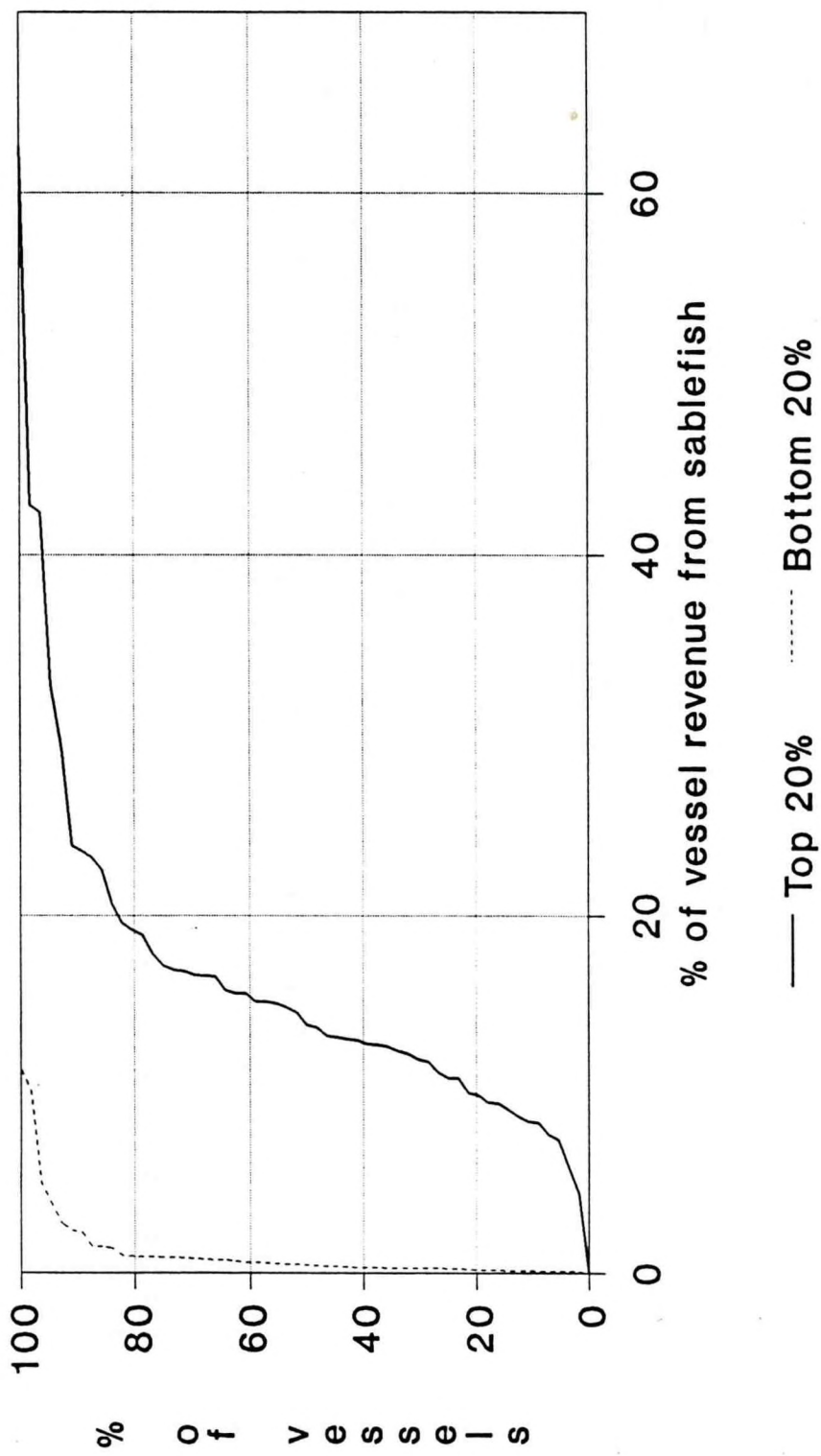


Figure 13.—Percentage of west coast revenue derived from sablefish: top and bottom 20%-groups of trawl vessels, as determined by the amount of west coast sablefish landed, 1985.

Source: Pacific Fishery Information Network (PacFIN) research database, NMFS Southwest Fisheries Center, P.O. Box 271, LaJolla CA 92038 (August 1987).

Note: The curves indicate the percentage of vessels that received up to the corresponding percentage of their west coast revenue from sablefish. For example, 40% of the top group of trawlers received 13% or less of their west coast revenue from sablefish. The farther right the curve, the greater the dependence on sablefish.

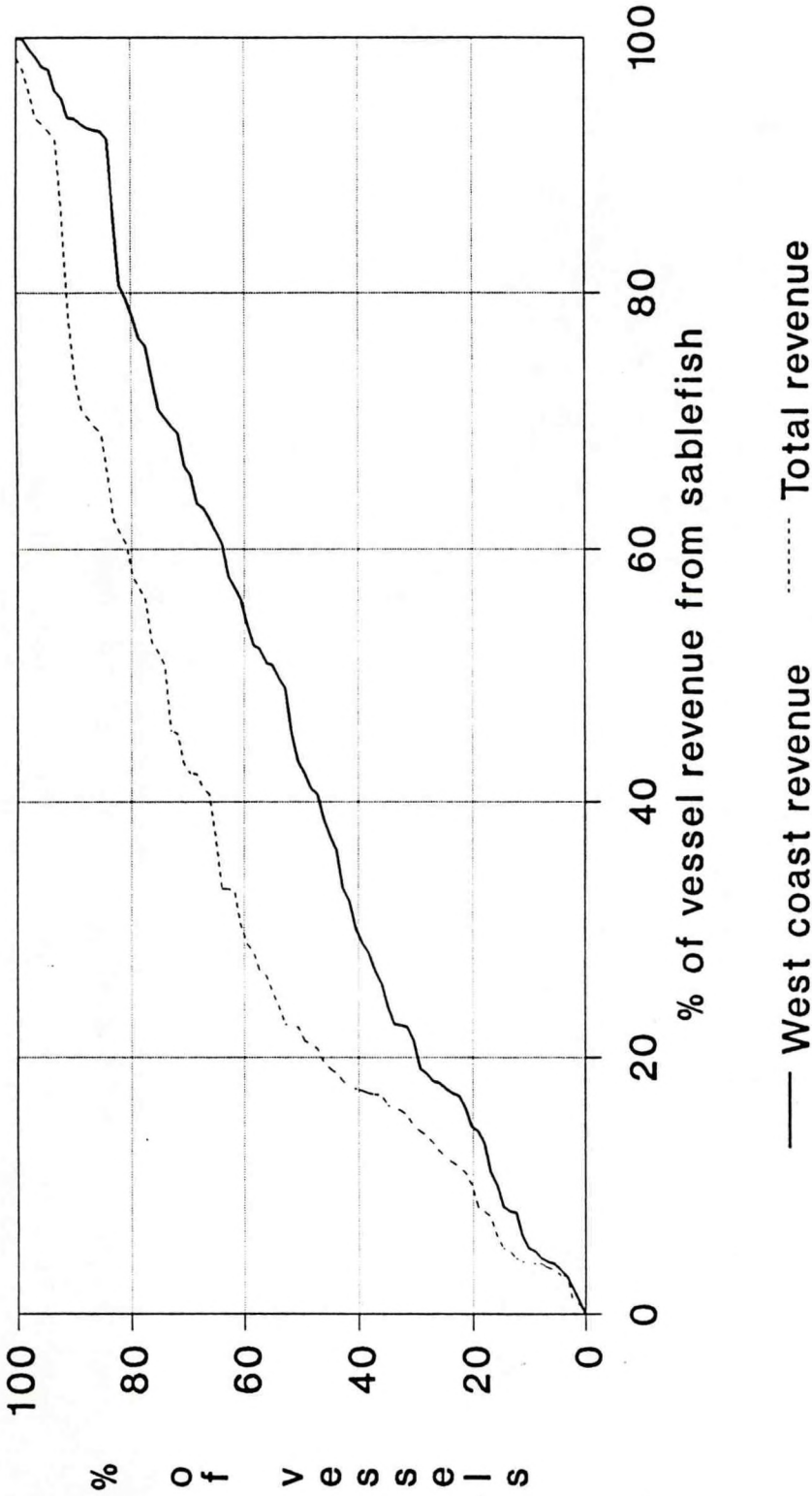


Figure 14.--Percentage of west coast and total (west coast and Alaska) vessel revenue derived from sablefish: all longline vessels landing more than 1,000 lb of west coast sablefish, 1985.

Source: Data from the NMFS Southwest Center, Pacific Fishery Information Network (PacFIN) research database, August 1987, and from the NMFS Northwest and Alaska Fisheries Center, Alaska research database, March 1988.

Note: The curves indicate the percentage of vessels that received up to the corresponding percentage of their revenue from sablefish. For example, the percentage of vessels which were less than 20% dependent on west coast sablefish was 30% with respect to their west coast revenue alone, but 48% with the addition of Alaskan revenue.

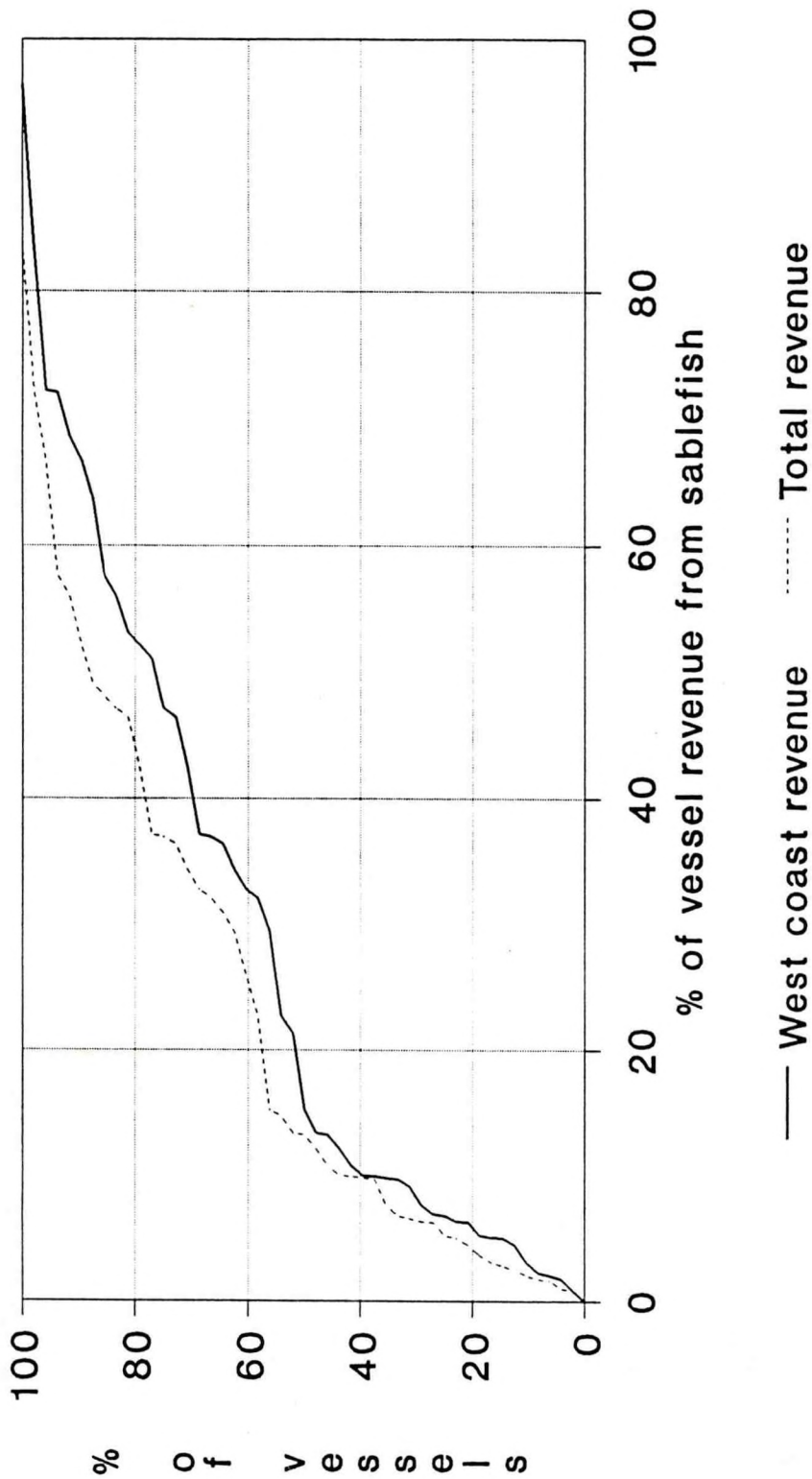


Figure 15.--Percentage of west coast and total (west coast and Alaska) vessel revenue derived from sablefish: all longline vessels landing more than 1,000 lb of west coast sablefish, 1984.

Source: Data from the NMFS Southwest Center, Pacific Fishery Information Network (PacFIN) research database, August 1987, and from the NMFS Northwest and Alaska Fisheries Center, Alaska research database, March 1988.

Note: The curves indicate the percentage of vessels that received up to the corresponding percentage of their revenue from sablefish. For example, the percentage of vessels which were less than 20% dependent on west coast sablefish was 50% with respect to their west coast revenue alone, but 58% with the addition of Alaskan revenue.

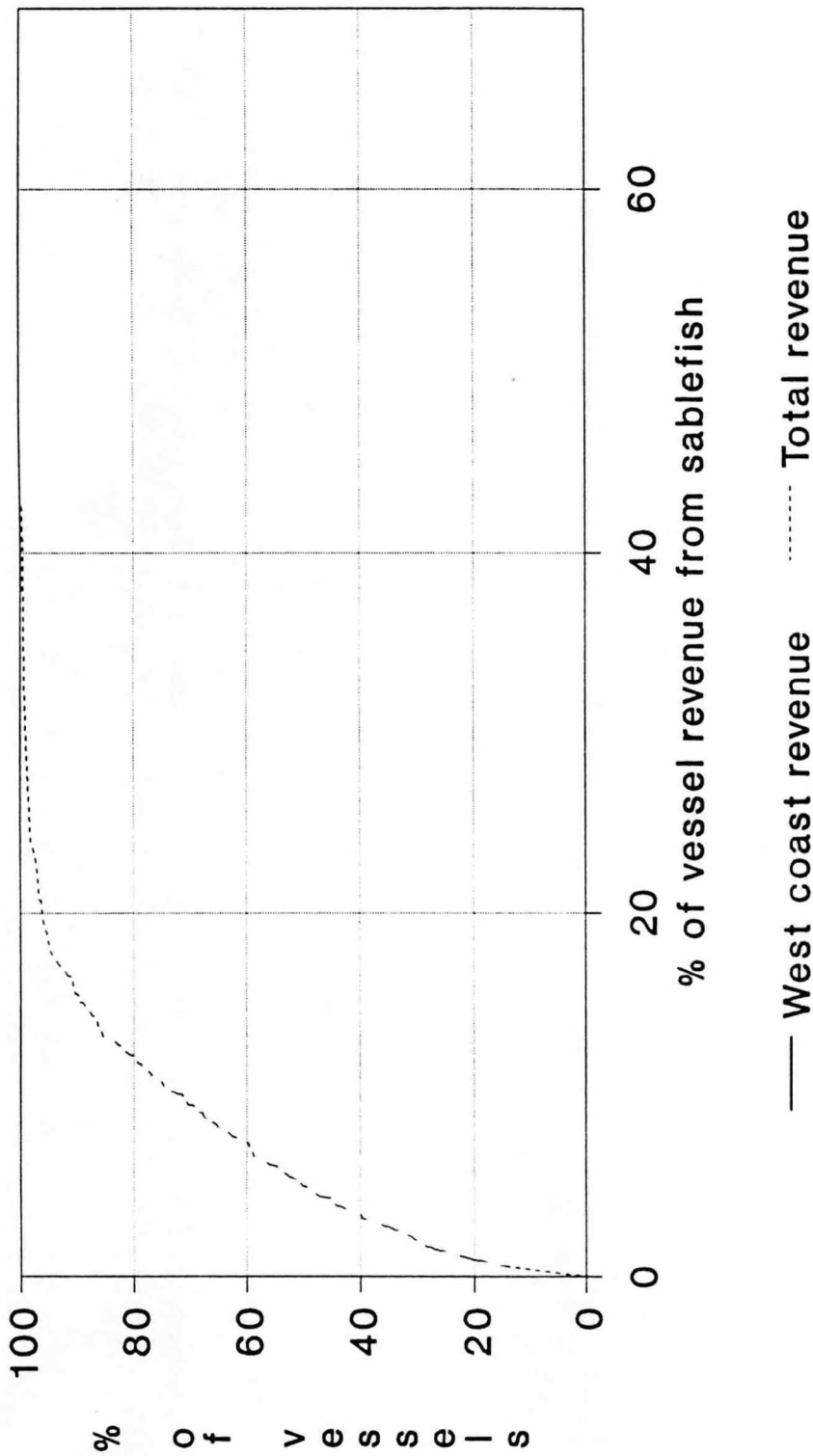


Figure 16. ---Percentage of west coast and total (west coast and Alaska) vessel revenue derived from sablefish: all trawl vessels landing more than 1,000 lb of west coast sablefish, 1985.

Source: Data from the NMFS Southwest Center, Pacific Fishery Information Network (PacFIN) research database, August 1987, and from the NMFS Northwest and Alaska Fisheries Center, Alaska research database, March 1988.

Note: The curves indicate the percentage of vessels that received up to the corresponding percentage of their revenue from sablefish. For example, the percentage of vessels which were less than 10% dependent on west coast sablefish was 71.2% with respect to their west coast revenue alone, but 71.9% with the addition of Alaskan revenue.

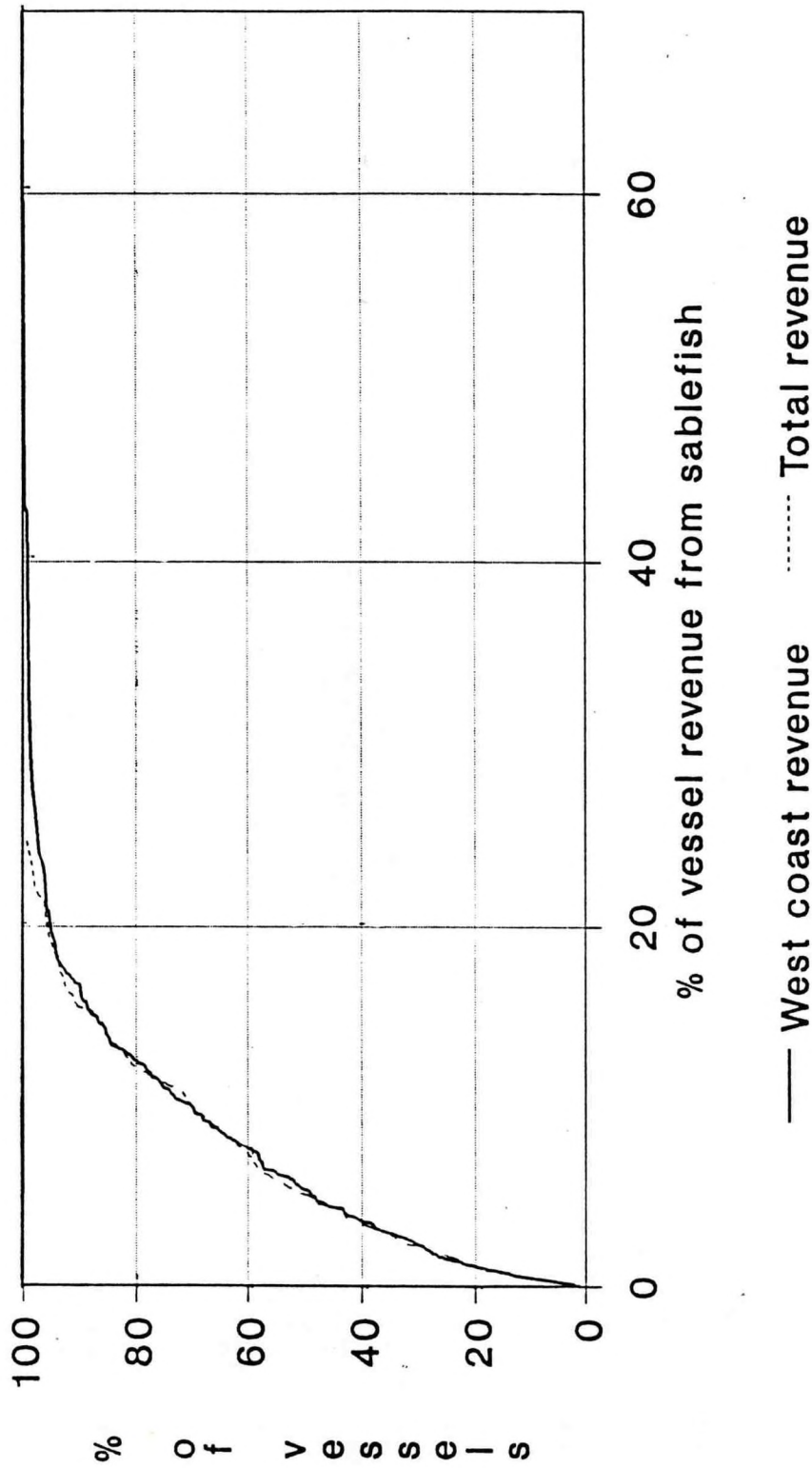


Figure 17.--Percentage of west coast and total (west coast and Alaska) vessel revenue derived from sablefish: all trawl vessels landing more than 1,000 lb of west coast sablefish, 1984.

Source: Data from the NMFS Southwest Center, Pacific Fishery Information Network (PacFIN) research database, August 1987, and from the NMFS Northwest and Alaska Fisheries Center, Alaska research database, March 1988.

Note: The curves indicate the percentage of vessels that received up to the corresponding percentage of their revenue from sablefish. For example, the percentage of vessels which were less than 10% dependent on west coast sablefish was 69.2% with respect to their west coast revenue alone, but 70.3% with the addition of Alaskan revenue.

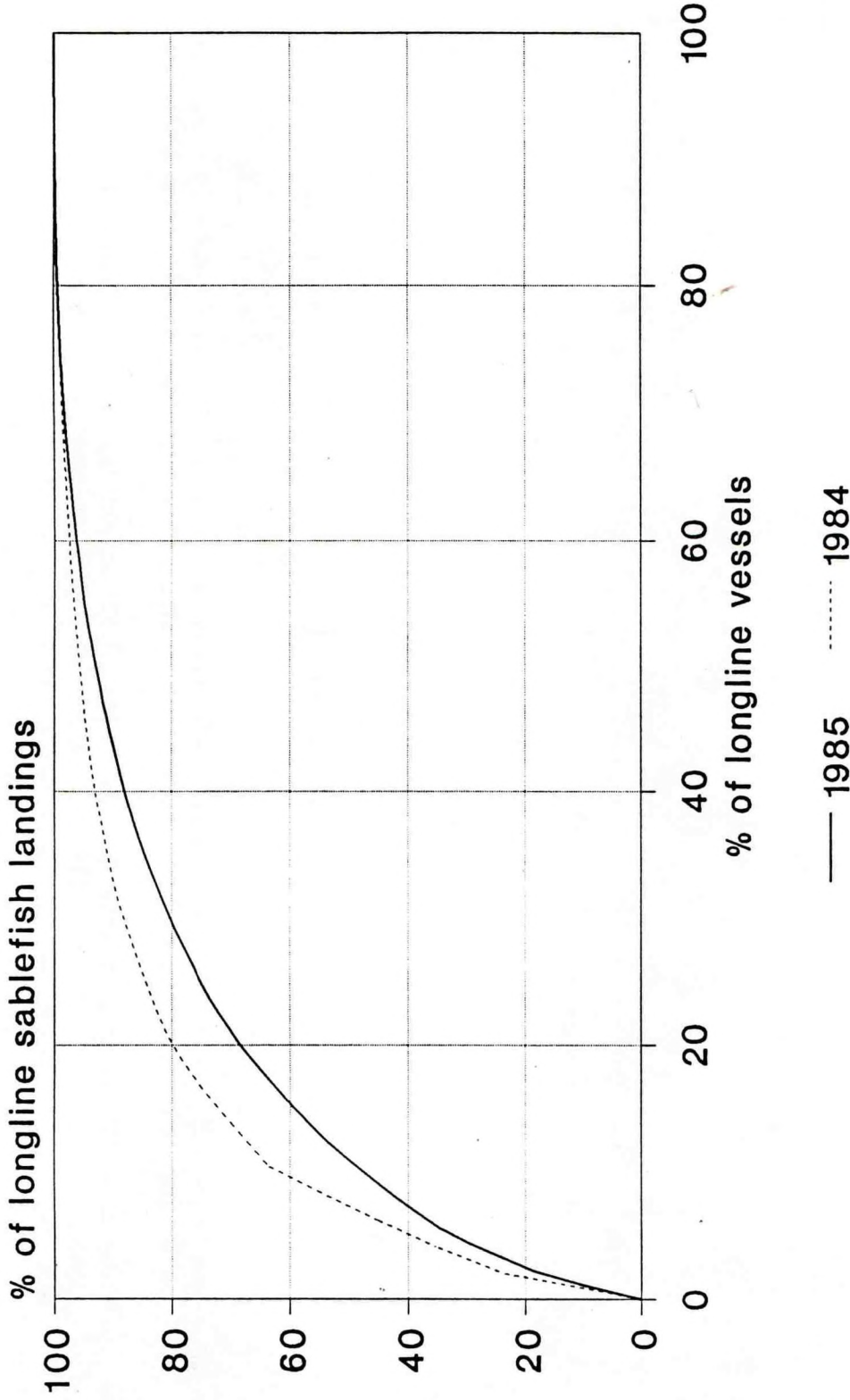


Figure 18.—Concentration of west coast sablefish harvest within the longline gear group, 1984-85.

Source: Pacific Fishery Information Network (PacFIN) research database, NMFS Southwest Fisheries Center, P.O. Box 271, LaJolla CA 92038 (August 1987).

Note: The curves indicate the percentage of west coast gear-group landings that were made by the top "x" percent of vessels. For example, the top 40% of 1985 longline vessels accounted for 88% of the west coast's longline sablefish landings. The farther the curve is bowed from the diagonal, the greater the degree of harvest concentration.

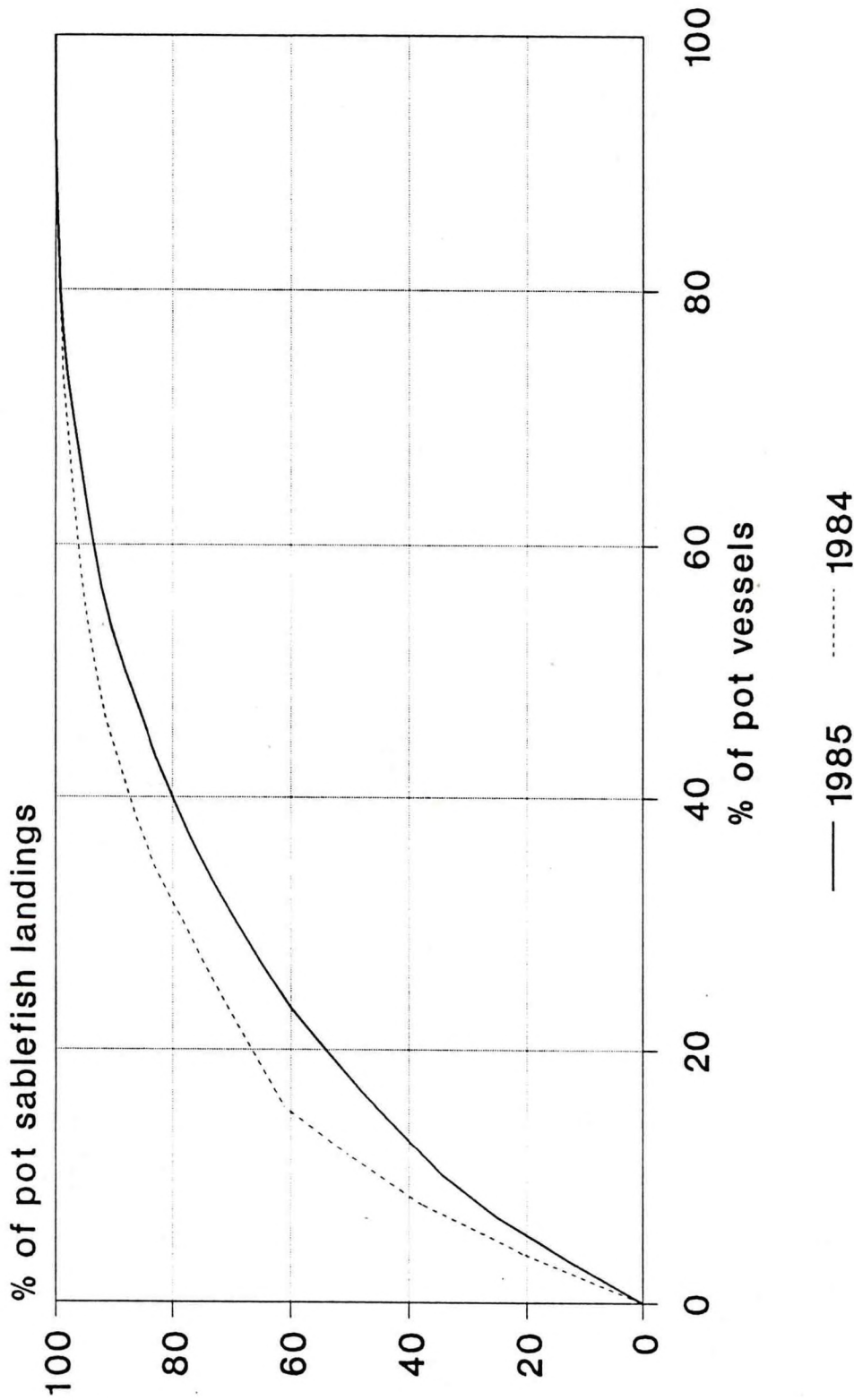


Figure 19.--Concentration of west coast sablefish harvest within the pot gear group, 1984-85.

Source: Pacific Fishery Information Network (PacFIN) research database, NMFS Southwest Fisheries Center, P.O. Box 271, LaJolla CA 92038 (August 1987).

Note: The curves indicate the percentage of west coast gear-group landings that were made by the top "x" percent of vessels. For example, the top 40% of 1985 longline vessels accounted for 80% of the west coast's longline sablefish landings. The farther the curve is bowed from the diagonal, the greater the degree of harvest concentration.

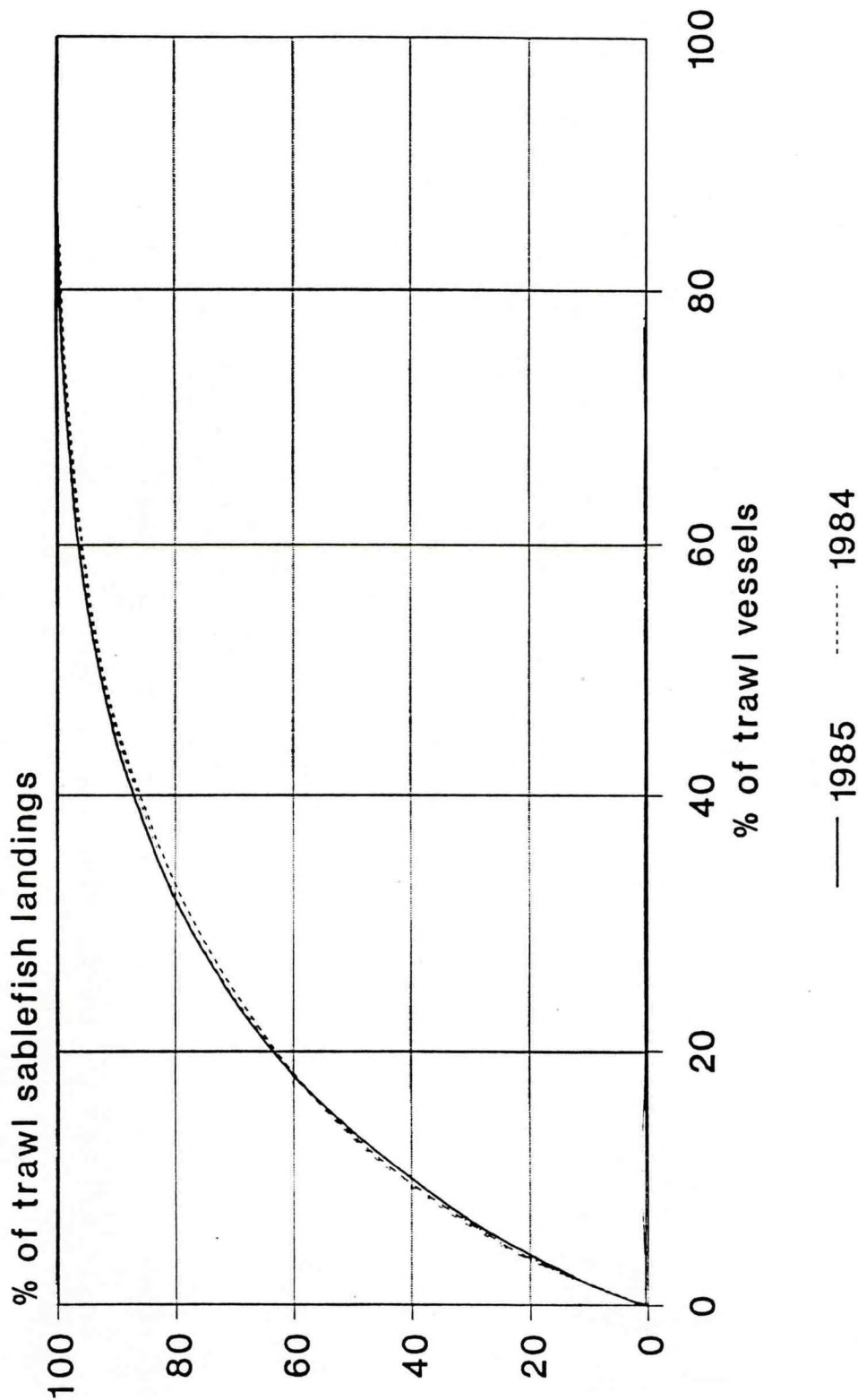


Figure 20.—Concentration of west coast sablefish harvest within the trawl gear group, 1984-85.

Source: Pacific Fishery Information Network (PacFIN) research database, NMFS Southwest Fisheries Center, P.O. Box 271, La Jolla, CA 92038 (August 1987).

Note: The curves indicate the percentage of west coast gear-group landings that were made by the top "x" percent of vessels. For example, the top 40% of 1985 longline vessels accounted for 87% of the west coast's longline sablefish landings. The farther the curve is bowed from the diagonal, the greater the degree of harvest concentration.