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Summary of U.S. Observer Sampling of Joint Venture Fisheries in the Northeast Pacific Ocean and Eastern Bering Sea, 1990

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Michael Guttormsen, Renold Narita,
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U.S. DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
National Marine Fisheries Service
Alaska Fisheries Science Center

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ABSTRACT

This report summarizes the 1990 joint venture groundfish activities in the eastern Bering Sea and Aleutian Islands region and off the Washington-Oregon-California coast. Data contained herein provide estimates of the joint venture groundfish catches. Estimates of the rockfish and flatfish catches are tabulated by species group and also by species. Estimates are derived from catches and average weights of Pacific salmon (Oncorhynchus spp.), Pacific halibut (Hippoglossus stenolepis), snow (Tanner) crab (Chionoecetes spp.), and king crab (Lithodes and Paralithodes spp.). Incidental catch estimates are also made for Pacific herring (Clupea pallasi).

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INTRODUCTION

The year 1990 was the 14th year of observer coverage of foreign fishing vessels as mandated by the Magnuson Fishery Conservation and Management Act (MFCMA) of 1976. Foreign vessels engaging in independent fishing operations or acting as processors of groundfish caught by U.S. fisherman (joint venture) were required to have a U.S. fisheries observer aboard. The observers' objectives were to 1) collect data used to estimate the commercial catches, 2) determine the incidental catches of marine mammals and species whose retention is prohibited by U.S. regulations, 3) provide information needed to assess the biological status of the various stocks of fish, and 4) report possible violations of U.S. fishing regulations.

This report summarizes the 1990 observer sampling data collected aboard foreign vessels operating within the U.S. 200-mile Exclusive Economic Zone (EEZ) of the northeast Pacific Ocean and eastern Bering Sea. A description of vessel types and a listing of vessel-class abbreviations used in this paper's tables are presented in Table 1. Observers obtained information on the location, duration, average depth, and catch weight of each trawl haul made while they were on board. They sampled several hauls each day to determine species composition by weight, the incidence of species whose retention was prohibited, incidental take of marine mammals, and the age and length composition of designated species. In addition, observers reported possible violations of U.S. regulations and described fishing strategies and sampling methods used.

After the inception of the MFCMA in 1976, foreign fishing fleets continued to dominate groundfish fisheries in U.S waters as they had since the 1960s. But, in 1986, joint venture fisheries had become the dominant fishery, and in 1989, U.S. domestic fisheries had grown to preeminence, having completely eliminated foreign fishing and nearly having displaced joint venture fisheries. In 1990, no groundfish resources were allotted for foreign fishing, and joint venture fisheries received groundfish allocations in only two major regions: the Bering Sea-Aleutian Islands region and the Washington-Oregon-California coast.

OBSERVER SAMPLING PROCEDURES

The sampling procedures used by observers in 1990 have been described by Nelson et al. (1981) and French et al. (1981). While on the vessel, observers determined the species composition of the catch by taking representative basket samples of various delivered hauls. Individuals of each species in the samples were then counted and weighed. If the catch delivered to a joint venture processing ship was composed of a high percentage of one species, the observer often determined the composition of the entire haul by separating, counting, and weighing all nontarget species. The weight of the target species catch was calculated by subtracting the weight of the other species from the total haul weight. The numbers of the target species were obtained by dividing the total weight of the species catch by the average weight per fish, determined from a sample of the catch. For those species for which additional biological information was desired, length frequencies were taken

Table 1.--Definition of domestic gear types and foreign vessel classes used by the U.S. observer program in the Bering Sea and Aleutian Islands and North Pacific groundfish fisheries in 1990.

Vessel class	Abbreviation	Definition
Mothership - Freezer joint venture	FJV	Mothership fleets, producing primarily venture frozen products, where the catcher boat fleet is composed of U.S. trawlers and the mothership is of foreign registry. Fish caught are defined as U.S. landings.
Mothership - Surimi joint venture	SJV	Mothership fleets, producing primarily surimi products, where the catcher boat fleet is composed of U.S. trawlers and the mothership is of foreign registry. Fish caught are defined as U.S. landings.

from random samples, and otoliths or scales were taken from subsamples stratified by length and sex. Observers monitored the catch being emptied from fish holding bins via conveyor belts and watched the emptying of nets. They also recorded the incidental catch by number and weight of four species groups that cannot be retained due to U.S. regulations. These designated "prohibited species" are Pacific salmon (Oncorhynchus spp.), Pacific halibut (Hippoglossus stenolepis), snow (Tanner) crabs (Chionoecetes spp.), and king crabs (Paralithodes and Lithodes spp.). The weight of the fifth prohibited species (Pacific herring, Clupea pallasi) was determined through species composition sampling. Observers also collected data on the sightings and incidental catch of marine mammals, the design and dimensions of fishing gear, and methods of fish processing. Some observers conducted additional special studies.

METHODS OF CALCULATION

Estimates of U.S. Joint Venture Groundfish Catches

Estimates of joint venture catches were based on observer and vessel reported data using the method previously described by Nelson et al. (1981). In this technique, the average daily catch rates of each species by vessel class (obtained by observers on the vessels sampled) for a particular statistical reporting area were applied to the total number of vessel days on the grounds in that area. Refer to the first figure in each section for the boundaries and designations of the statistical reporting areas of each region. Data on fleet vessel days on the grounds were obtained from the foreign vessel check-in and check-out summaries, which are required by U.S. regulations and are verified by U.S. Coast Guard surveillance flights and ship patrols. In order to provide a "best estimate" of the catch, the U.S. catch estimates were used when observer coverage of a week-area-vessel class element was at least 20% and when the U.S. estimate of the catch differed by more than 10% from the vessel-reported catch for that element. When those elements did not meet either of the above criteria, catches reported by foreign processors were used.

Estimates of Joint Venture Incidental Catches and Average Weights of Pacific Salmon, Pacific Halibut, Snow (Tanner) Crabs, and King Crabs

Observer data provided the following catch estimates for each of the four prohibited species: 1) the mean incidence or the average number of individuals caught per metric ton (t) of groundfish catch; 2) the total number of individuals caught; 3) the total weight of the catch. The average number per metric ton and the total number of individuals caught were estimated by multiplying the average weekly incidence rates for each nation, statistical reporting area, and vessel class by the estimated weekly groundfish catches for those same nations, areas, and vessel classes. The total catch weight was calculated by multiplying the estimated numbers of fish or crab caught each month by the average weight per individual in kilograms, this being determined from observer samples.

Estimates of Rockfish and Flatfish Catch by Species

The joint venture catches of individual rockfish and flatfish species were estimated by applying the mean annual species percentages by weight, computed from species composition data collected by U.S. observers, to the total rockfish and flatfish catch. In the Bering Sea, no rockfish were reported taken and because specific catch allocations were set for yellowfin sole (Pleuronectes asper), rock sole (P. bilineatus), and Greenland turbot (Reinhardtius hippoglossoides) in this area, actual catch estimates have already been made for these species. Specific allocations were also set for Pacific ocean perch (Sebastes alutus) in the Washington-Oregon-California region. It should be noted that even though all observers were trained in species identification and instructed in the use of fish identification keys, errors in the identification of some species could have been made, and any errors would affect the individual species estimates.

SUMMARY OF OBSERVER SAMPLING FOR THE BERING SEA AND ALEUTIAN ISLANDS REGION

Area of Sampling

The area sampled by observers in the eastern Bering Sea lies within the zones defined by the North Pacific Fishery Management Council's (NPFMC) Bering Sea groundfish Fishery Management Plan (FMP), Amendment 12A (Fig. 1). Zones 1, 2, and 3 are designated in the FMP protecting crab and Pacific halibut stocks. These three zones are further divided into areas: Zone 1 = Areas 511, 512, and 516; Zone 2 = Areas 513, 517, and 521; and Zone 3 = Areas 514, 515, 522, 530, and 540. Additionally, Area 517 is also designated as Zone 2H.

Catch Allocations

For 1990, the domestic annual harvest (DAH), which consists of domestic annual processing (DAP--the total amount of groundfish expected to be caught in fully U.S. groundfish fisheries) and joint venture processing (JVP--the total amount of groundfish allotted to be caught in joint venture groundfish operations), was again expected to account for the entire 2 million t allowed to be taken in the Bering Sea and Aleutian Islands region, resulting in no allocation for foreign fishing. The joint venture allotment was 252,382 t, while the domestic fisheries received an initial allocation of 1,495,320 t, and a reserve of 252,298 t was set aside.

For the second consecutive year, increases of allotments given to fully U.S. domestic operations resulted in greatly reduced allocations for the joint venture fishery and limited it to targeting on only yellowfin sole, rock sole, and the "other flounders" category (primarily flathead sole (Hippoglossoides elassodon) and Alaska plaice (Pleuronectes quadrituberculatus)). Joint venture allotments for 1990 were less than the 1989 amounts by 90% for Pacific cod (Gadus macrocephalus), 53% for rock sole, 26% for "other" flounders, and 5% for yellowfin sole; and, for the first time in the history of the joint venture fishery, walleye pollock (Theragra chalcogramma) was not an allowable target species, resulting in an allocation 93% less than in 1989. As recently as 1988, the joint venture fishery was allocated over 1 million t of walleye pollock.

Observer Coverage of Fishing Fleets

Foreign vessels spent 2,482 days in joint venture fishing operations (Table 2), representing a 68% decrease in effort from that in 1989. Joint ventures were conducted between U.S. vessels and processing vessels from the U.S.S.R., Japan, Poland, the Republic of Korea (R.O.K.), the People's Republic of China (P.R.O.C.), and Iceland. Observers spent 1,642 days sampling aboard the 67 foreign processing vessels, providing a level of observer coverage of 83.3%, a decrease of 11.1% coverage over the 94.4% coverage level obtained in 1989 (Guttormsen et al. 1990).

Estimates of U.S. Joint Venture Groundfish Catches

Due to attainment of bycatch quotas (discussed later in the Restrictions section of this report), U.S. fishing vessels delivered only 53% (or 133,438 t of groundfish) to foreign processing vessels in 1990 (Table 3). Yellowfin sole was the major species or species group taken, comprising 52.2% (or 69,677 t) of the joint venture catch. Walleye pollock, taken only as bycatch, comprised the second largest amount of catch (16.8% or 22,397 t). Other species taken in substantial amounts were "other" flatfishes (14.0% or 18,748 t), rock sole (7.9% or 10,492 t), and Pacific cod (6.5% or 8,078 t).

Estimated foreign and joint venture catches are summarized by species from 1977 through 1990 in Table 4. The 1990 joint venture groundfish catch represented the lowest total since 1982. The combined foreign and joint venture catch was the lowest since the inception of the MFCMA, less by 400,000 t than in 1989, and less by over 1 million t than the next lowest total, which was taken in 1979.

The distribution of the joint venture groundfish catch is presented by area in Figure 2. Areas in Zone 2 contributed 62% (Area 513--41% and Area 517--21%); areas in Zone 1 added 36% (Area 511--11% and Area 516--25%); and areas in Zone 3 accounted for 3% (Area 514--3% and Area 515--0.000004%).

Restrictions

In 1987, Amendment 10 to the NPFMC's Bering Sea groundfish FMP was enacted to control the incidental catches of red king crab (Paralithodes camtschaticus) and Chionoecetes bairdi during yellowfin sole and other flatfish fisheries and to protect the stocks of these two crab species from further decline. When this amendment expired at the end of 1988, emergency regulations were imposed to control the bycatch of these species in foreign, joint venture, and domestic fisheries until the implementation of Amendment 12A in August 1989. Restrictions retained from Amendment 10 by Amendment 12A are 1) the prohibition of foreign and joint venture trawling in Area 512, between long. 160° and 162°W and south of lat. 58°N; 2) the reservation of the southern portion of this area for a controlled domestic trawl fishery for Pacific cod; and 3) the designation of zones that can be closed to a fishery whenever its particular bycatch limits are attained (Fig. 1). Amendment 12A also established limits on the bycatch of Pacific halibut, creating primary and secondary bycatch quotas. Pacific halibut catches are cumulated over the entire Bering Sea region, and the attainment of the primary quota closes Zones 1 and 2H, while attainment of the secondary quota closes the entire Bering Sea and Aleutian Islands region.

For 1990, the joint venture yellowfin sole-flatfish fishery received bycatch limits of 50,000 red king crab in Zone 1, 400,000 C. bairdi in Zone 1, and 1,000,000 C. bairdi in Zone 2; for Pacific halibut, the fishery received a primary quota of 660 t and a secondary quota of 800 t. All joint venture fishery closures in 1990 occurred as a result of attainment of these bycatch quotas (Fig. 3). The first closure occurred on 25 January. However, due to a last-minute rise in bycatch rates along with the arrival en masse of the

Korean joint venture fleet, by the scheduled closure date an estimated 164,600 red king crab had been taken. The next closure occurred on 27 February with the attainment of the primary Pacific halibut bycatch quota, closing Zone 2H to joint venture fishing. Then, with the joint venture fishery approaching its secondary Pacific halibut bycatch quota at a daily rate of 30 t, the Bering Sea was closed on 5 March, with an estimated Pacific halibut bycatch of 776.3 t. But, at the request of the joint venture fishing industry, operations resumed on 24 June in the Bering Sea, with a remaining halibut bycatch limit of 23.7 t and with fishing limited to Togiak Bay in Area 514 (where bycatch rates of halibut have been low in past years). Higher-than-expected halibut bycatch rates, however, closed the fishery within 7 days with a final secondary bycatch estimate of 798.5 t, and on 1 July the Bering Sea was closed to joint venture fishing for the remainder of 1990.

Incidence and Incidental Catch of Prohibited Species

Pacific Salmon

Incidence rates and average weights of Pacific salmon taken in catches sampled by observers are presented in Table 5. Incidental salmon catch is primarily associated with walleye pollock fisheries; thus in 1990, salmon catch rates were extremely low, with rates ranging between 0 and 0.005 salmon/t of groundfish.

The incidence rates of Pacific salmon in joint venture groundfish catches are plotted by quarter in 1/2 degree latitude and 1 degree longitude statistical areas in Figure 4. During the first quarter, joint venture fishing was located in the southeastern Bering Sea (Areas 511, 513, 516, and 517), and in the second and third quarters fishing was limited to a few days in the vicinity of Togiak Bay. For all quarters, salmon incidence rates were low, ranging from 0 to less than 0.1 salmon/t of groundfish. In 1990, the joint venture fishery targeted flatfish by using demersal trawl gear only, which catches low numbers of salmon. No joint venture fishing occurred during the fourth quarter.

The estimated joint venture incidental catch of Pacific salmon by nation and area is presented in Table 6. The salmon taken in Area 513 accounted for 70.4% (by number) of the total joint venture incidental catch. The catch of 152 salmon in 1990 was the lowest (foreign and joint venture combined) since the implementation of the MFCMA in 1977 (Table 7).

The incidental catch of Pacific salmon by zone and joint venture fishery in 1990 is shown in Table 8. The salmon catch in Zone 2 accounted for 84% of the incidental catch of salmon in the joint venture fishery.

Table 9 presents the biological data for the incidentally caught Pacific salmon. Chinook salmon (Oncorhynchus tshawytscha) accounted for 96.7% of the salmon catch, and their size averaged 71.6 cm and 4.84 kg per fish. Coho (O. kisutch; 2.0%) and chum salmon (O. keta; 1.3%) made up the remainder of the incidental catch.

Pacific Halibut

The incidence rates and average weights of Pacific halibut in joint venture catches are presented by nation, area, and month in Table 10. The highest annual incidence rates occurred in Areas 513 and 517 (mostly between 4 and 8 halibut/t), and in all areas bycatch rates generally exceeded 1 halibut/t. In contrast, annual bycatch rates in 1989 rarely exceeded 1 halibut/t.

The incidence of Pacific halibut in groundfish catches are plotted in Figure 5 by quarter and blocks of 1/2 degree latitude by 1 degree longitude. During the first quarter, joint venture fishing took place in the southeastern Bering Sea (Areas 511, 513, 516, and 517) and incidental catch rates were generally between 5 and 10 halibut/t. Two blocks with an incidental catch rate greater than 10 halibut/t were located along lat. 56°N at long. 163°W and 167°W. Incidental catch rates less than 5 halibut/t occurred on the central shelf and also east of the Pribilof Islands. The second and third quarter rates ranged from greater than 1 to greater than 10 halibut/t for the 7 days of fishing that occurred in the Togiak Bay region of Area 514.

Over half of the incidental catch of halibut occurred in Area 513 (Table 11) and was taken by the U.S.-Japan, U.S.-R.O.K., and U.S.-U.S.S.R. joint venture fisheries. The estimated incidental halibut catch in the 1990 joint venture fishery by number (592,034 fish) represented a slight increase over the amount taken during 1989. However, the amount by weight (799 t) in terms of combined foreign and joint venture totals was the lowest since the inception of the MFCMA (Table 12), indicating that the average size of halibut taken by the fishery was smaller than in 1989.

In the last 3 years (1988-90), the average weight and length of halibut has been less than in previous years--1.35 kg and 44.1 cm in 1990, 1.9 kg and 46.2 cm in 1989 (Guttormsen et al. 1990), and 1.7 kg and 49.4 cm in 1988 (Berger and Weikart 1989), as compared with 2.8 kg and 56.2 cm in 1987 (Berger and Weikart 1988), 2.9 kg and 57.9 cm in 1986 (Berger et al. 1988), and 2.5 kg and 56.6 cm in 1985 (Berger et al. 1987).

Table 13 presents the incidental catch of Pacific halibut by zone and joint venture fishery for 1990. Most of the incidental catch of halibut occurred in Zone 2 (82% by number and 92% by weight).

Snow (Tanner) Crabs

The incidence and average weights of snow (Tanner) crabs observed in the joint venture fisheries in 1990 are summarized in Table 14 by nation, month, and area. The highest annual incidence rates were observed in Areas 513 and 517 (between 12 and 64 crabs/t for all nations, but mostly 30-40 crabs/t). Except for Area 514, the incidental catch rates for snow (Tanner) crabs in the 1990 joint venture fishery greatly exceeded those of the 1989 fishery for every area and nation. As mentioned earlier, fishing occurred in all areas during in the first quarter of 1990 except for Area 514. In 1989, most of the high incidence rates were also seen in the first quarter, except in Areas 514

and 521, which had minimal or no fishing in the first quarter, and Area 513, which had high rates throughout the year.

The incidence rates of snow (Tanner) crabs in joint venture groundfish catches are given by 1/2 degree latitude and 1 degree longitude statistical areas by quarter in Figure 6. In the first quarter, when joint venture fishing occurred on the continental shelf in the southeastern Bering Sea, 14 of the 24 statistical blocks showed incidence rates greater than or equal to 25 crabs/t. The remaining blocks had rates between 1 and 10 crabs/t and were located either west of the Pribilof Islands in Area 521 or in Areas 511 and 516 in the midshelf area. No snow (Tanner) crabs were caught just north of Unalaska Island in Area 515. For the brief fishery in Togiak Bay that overlapped the second and third quarter, no snow (Tanner) crabs were caught except in one block (lat. 58°N and long. 159°W) where the rate was less than 1 crab/t.

By number, the largest catches of snow (Tanner) crabs occurred in the U.S.-Japan, U.S.-R.O.K., and U.S.-U.S.S.R. joint venture fisheries in Area 513 and the U.S.-U.S.S.R. joint venture fishery in Area 517, with all four fisheries each accounting for over 500,000 crabs (Table 15). The estimated incidental catch of 3.2 million snow (Tanner) crabs in the 1990 joint venture groundfish fishery was 16% lower than that of 1989. However, by weight, the amount taken in 1990 was 41% higher than in 1989 and was the highest ever taken by the joint venture fishery (Table 16) (see below for annual catch weight comparison).

Table 17 presents the incidental catch of snow (Tanner) crabs by species, zone, and joint venture fishery for 1990. Chionoecetes bairdi accounted for 99.6% (251,087 crab) and 28.4% (827,466 crab) of the Zone 1 and Zone 2 snow (Tanner) crab catches, respectively. Two C. bairdi were reported taken in Zone 3.

Table 18 gives the species composition, sex composition, average weight, and average carapace width of the snow (Tanner) crab taken in the 1990 joint venture fishery. Over all zones, C. bairdi accounted for 34% of the snow (Tanner) crab catch by number compared to 28% in 1989. The snow (Tanner) crabs caught in 1990 were larger in size and weight than those caught in 1989. C. bairdi caught in 1990 were 82% heavier and 28% wider than those caught in 1989; C. opilio caught in 1990 were 50% heavier and 21% wider than those caught in 1989.

King Crabs

The incidence and average weights of king crabs (Lithodes and Paralithodes spp.) observed in the 1990 joint venture fishery are summarized by nation, month, and area in Table 19. Incidence rates of king crab were highest in Zone 1. The highest rate (8.189 king crabs/t of groundfish) occurred in the U.S.-R.O.K. fishery in Area 516. The U.S.-Japan fishery in Area 511 was the only fishery that had a rate of under 1.0 crab/t of groundfish. Outside of Zone 1, no rate exceeded 1.0 king crab/t of groundfish.

The observed incidence rates of king crab in catches made by joint venture vessels by quarter and 1/2 degree latitude by 1 degree longitude areas are plotted in Figure 7. During the first quarter, all rates exceeded 1 crab/t on the mid-continental shelf. In two blocks, rates exceeded 25 crab/t (lat. 56°N, long. 163°W and lat. 57°30'N, long. 162°W). Elsewhere, rates were generally less than 1 crab/t, except for one block west of the Pribilof Islands (lat. 57°N, long. 169°W). During the second and third quarter, king crab incidence rates were low in the Togiak Bay area, ranging from 0 to less than 1 crab/t.

The 1990 joint venture fisheries incidentally caught 167,733 king crabs (Table 20). Areas 511 and 516 accounted for 98.2% of the king crab catch by numbers. As mentioned in the Restrictions Section, the 50,000 red king crab bycatch quota was exceeded by almost 115,000 crab due to increased fishing pressure and a much higher bycatch rate in the last week of the fishery. Even so, the catch was lower than that in 1989 and was the third lowest by number and weight since the inception of the MFCMA (Table 21).

Red king crab accounted for 99.9% of the Zone 1 king crab catch. Outside of Zone 1, 88.2% of the observed king crab were red king crab (Table 22).

Data on the species composition, sex composition, average weight, and average carapace width of the king crab taken in the joint venture fishery are presented in Table 23. Red king crab accounted for 99.75% of the king crab catch, had an average weight of 1.51 kg, and an average width of 128 cm. Blue king crab (P. platypus) made up the remainder of the catch.

Pacific Herring

Pacific herring (Clupea pallasi) continued to be designated a prohibited species in 1990. The foreign and joint venture catches and percentages of Pacific herring in the total groundfish catches since 1977 are presented in Table 24. The rate of the incidental catch in 1990 was the lowest in the joint venture fishery since 1982. In 1990, the joint venture incidental catch of Pacific herring was 127 t (Table 3).

Joint Venture Flatfish Catch by Species

In the 1990 joint venture groundfish catch, observers identified 13 species of flatfish (Table 25). The total flatfish catch was 99,578 t (Table 26) and made up 75% of the total groundfish catch. The primary flatfish species, yellowfin sole, accounted for 52% of the total groundfish catch (69,677 t), making it the most important target species in the joint venture fishery in the eastern Bering Sea. Other species of flatfish caught in significant amounts were Alaska plaice (15,928 t), rock sole (10,493 t), and flathead sole (2,219 t) (Table 26).

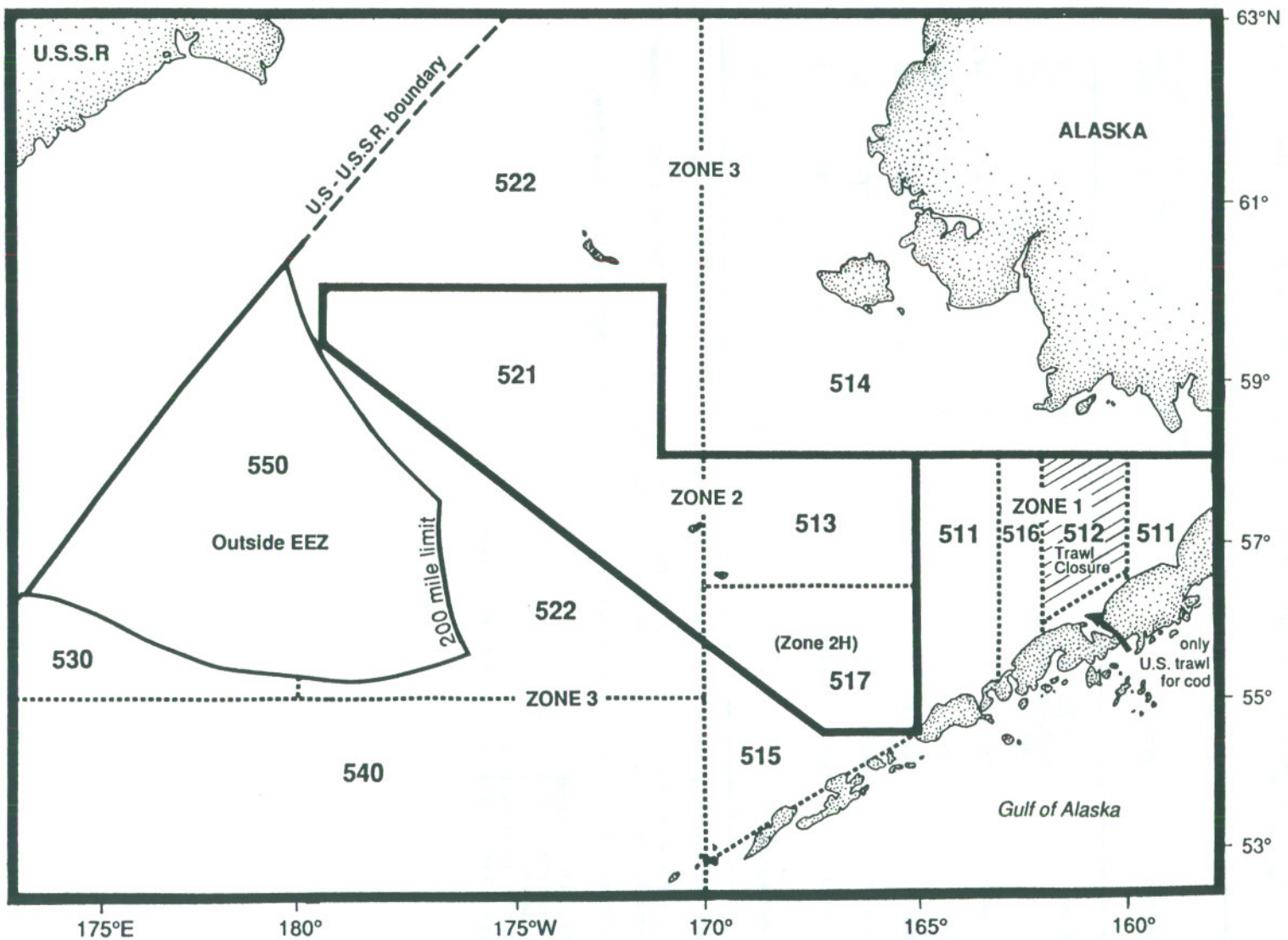


Figure 1.--Bering Sea zones by which the restrictions on the incidental catch of king and snow (Tanner) crabs and Pacific halibut apply.

Table 2.--Annual summary of observer effort, joint venture effort, and observer coverage (100 x observer days/joint venture vessel days) by nation and vessel class in the Bering Sea and Aleutian Islands region, 1990.

Nationality	Vessel	No. of observers	No. of ships observed[a]	No. of ships in fishery[a]	No. of observer days	No. of vessel days	Percent coverage
U.S.-Japan	Yell/Flat FJV		13	13	295	473	63.4
	Yell/Flat SJV		2	2	53	59	89.8
	Total	17	15	15	348	532	64.8
U.S.-Poland	Yell/Flat FJV	2	2	2	40	42	95.2
U.S.-ROK	Yell/Flat FJV	24	19	21	350	567	61.7
U.S.-PROC	Yell/Flat FJV	6	6	6	123	205	60.0
U.S.-U.S.S.R.	Yell/Flat FJV	23	22	22	773	1,128	68.5
U.S.-Iceland	Yell/Flat FJV	2	1	1	8	8	100.0
Joint venture total[b]		72[c]	65	67	1,642	2,482	83.3

[a] Vessels that participated in more than one fishery are only counted once in the totals.

[b] In the joint venture fisheries, only the foreign processing vessels are indicated for the number of ships and vessel days--the U.S. catcher boats are not included.

[c] This column does not add up because several observers sampled on more than one vessel type.

ROK = Republic of Korea.
PROC = People's Republic of China.
FJV = Freezer joint venture.
SJV = Surimi joint venture.
Yell/Flat = Targeting on yellowfin sole/flatfish.

Table 3.--Estimated groundfish landings taken (in metric tons) in joint venture operations[a] in the Bering Sea and Aleutian Islands region in 1990.

Species	Metric tons	Percent
Yellowfin sole	69,677	52.2
Rock sole	10,492	7.9
Arrowtooth flounder[b]	660	0.5
Greenland turbot	1	<0.1
Other flatfishes	18,748	14.0
Walleye pollock	22,397	16.8
Pacific cod	8,078	6.5
Sablefish[c]	<1	<0.1
Pacific herring[d]	127	0.1
Other fish	3,258	2.4
Total	133,438	

[a] In 1990, joint venture fisheries were conducted between U.S. catcher boats and processing vessels from Japan, the Republic of Korea, Poland, the U.S.S.R., and the People's Republic of China.

[b] Arrowtooth includes arrowtooth flounder (Atheresthes stomias) and Kamchatka flounder (A. evermanni).

[c] Anoplopoma fimbria

[d] Non-U.S. groundfish vessels were not allowed to retain Pacific herring in 1990.

Table 4.--Estimated catches of groundfish (1,000 metric tons) taken by the foreign and joint venture fisheries in the Bering Sea and Aleutian Islands region, 1977-90[a].

Fisheries and species group	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990
Foreign directed catches														
Walleye pollock	978.4	979.4	944.0	1,006.1	986.9	959.3	891.5	933.0	820.3	352.3	3.6	NF	NF	NF
Pacific cod	35.9	47.4	41.4	37.3	39.1	28.2	41.5	58.5	57.2	39.3	54.7	NF	NF	NF
Sablefish	4.6	2.0	2.2	2.4	3.0	3.8	3.2	1.9	0.3	0.1	<0.1	NF	NF	NF
Atka mackerel	NA	24.2	23.3	20.2	18.1	7.4	1.2	0.1	<0.1	<0.1	<0.1	NF	NF	NF
All rockfish	10.8	7.5	7.2	8.5	7.3	4.9	2.0	0.9	0.1	<0.1	<0.1	NF	NF	NF
Yellowfin sole	0.3[b]	110.3	101.1	77.8	81.3	76.0	85.9	126.8	100.7	57.2	1.8	NF	NF	NF
Turbots and other flatfish	136.4[b]	125.5	90.0	88.5	91.9	79.3	80.3	59.3	46.9	20.8	5.7	NF	NF	NF
Pacific herring	19.3	8.4	7.5	0.8	0.3	1.9	1.4	1.3	1.5	0.3	<0.1	NF	NF	NF
Other fish	94.7	71.8	64.7	47.0	39.4	22.3	14.3	7.5	6.3	4.0	2.7	NF	NF	NF
Squid	8.4	9.4	7.0	6.4	5.9	5.0	4.0	3.1	1.6	0.8	0.1	NF	NF	NF
Snails	0.4	2.2	0.5	0.1	0.2	0.2	0.3	0.2	0.1	0.5	0.9	NF	0.1	NF
Total	1,289.1	1,388.3	1,288.9	1,295.1	1,273.4	1,188.4	1,125.5	1,192.7	1,035.0	475.9	69.6	NF	0.1	NF
Joint venture catches														
Walleye pollock	NF	NF	NF	10.7	42.1	54.6	149.0	237.0	377.5	835.1	1,044.5	826.4	287.8	22.4
Pacific cod	NF	NF	NF	8.5	9.2	13.6	14.4	30.8	41.3	63.9	58.2	109.9	44.6	8.1
Sablefish	NF	NF	NF	<0.1	0.2	0.1	0.1	0.3	0.1	0.4	0.1	<0.1	<0.1	<0.1
Atka mackerel	NF	NF	NF	0.3	1.6	12.5	10.5	35.9	37.9	32.0	30.1	19.6	0.1	0.0
All rockfish	NF	NF	NF	0.1	<0.1	<0.1	0.1	0.6	0.5	0.5	0.9	2.1	0.1	0.0
Yellowfin sole	NF	NF	NF	9.6	16.0	17.4	22.5	32.8	126.4	151.4	179.6	213.3	151.5	69.7
Turbots and other flatfish	NF	NF	NF	2.8	6.0	9.2	11.8	17.4	46.3	65.5	36.0	117.7	42.2	18.7
Pacific herring	NF	NF	NF	0.0	0.0	<0.1	1.1	1.8	3.1	3.8	0.5	0.4	2.5	0.1
Other fish	NF	NF	NF	0.7	3.4	1.1	1.6	2.6	6.3	7.6	6.1	11.8	4.8	3.3
Squid	NF	NF	NF	0.0	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.2	0.1	0.0
Snails	NF	NF	NF	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total	NF	NF	NF	32.6	78.5	108.6	211.2	359.3	639.4	1,160.2	1,355.9	1,301.4	533.6	133.4

[a] Statistics for 1978 from Berger et al. (1986). Statistics for 1977 and 1979-89 from Guttormsen et al. (1990).

[b] Japan reported yellowfin sole combined with other flounders.

NF = No fishing.

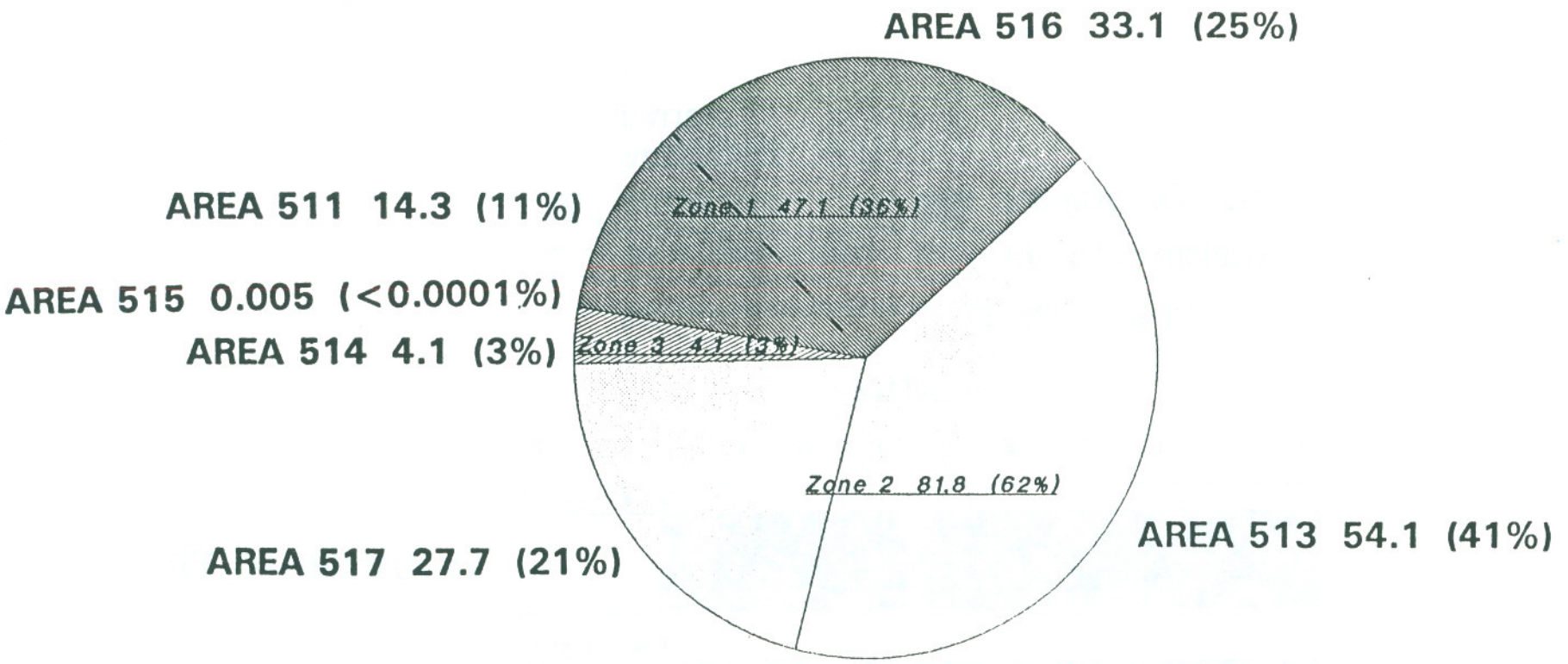


Figure 2.--Total joint venture groundfish catch in thousands of metric tons (% of total catch) in the Bering Sea and Aleutian Islands region by zones and management subareas, 1990. No catch was taken in Areas 521, 522, 530, or 540.

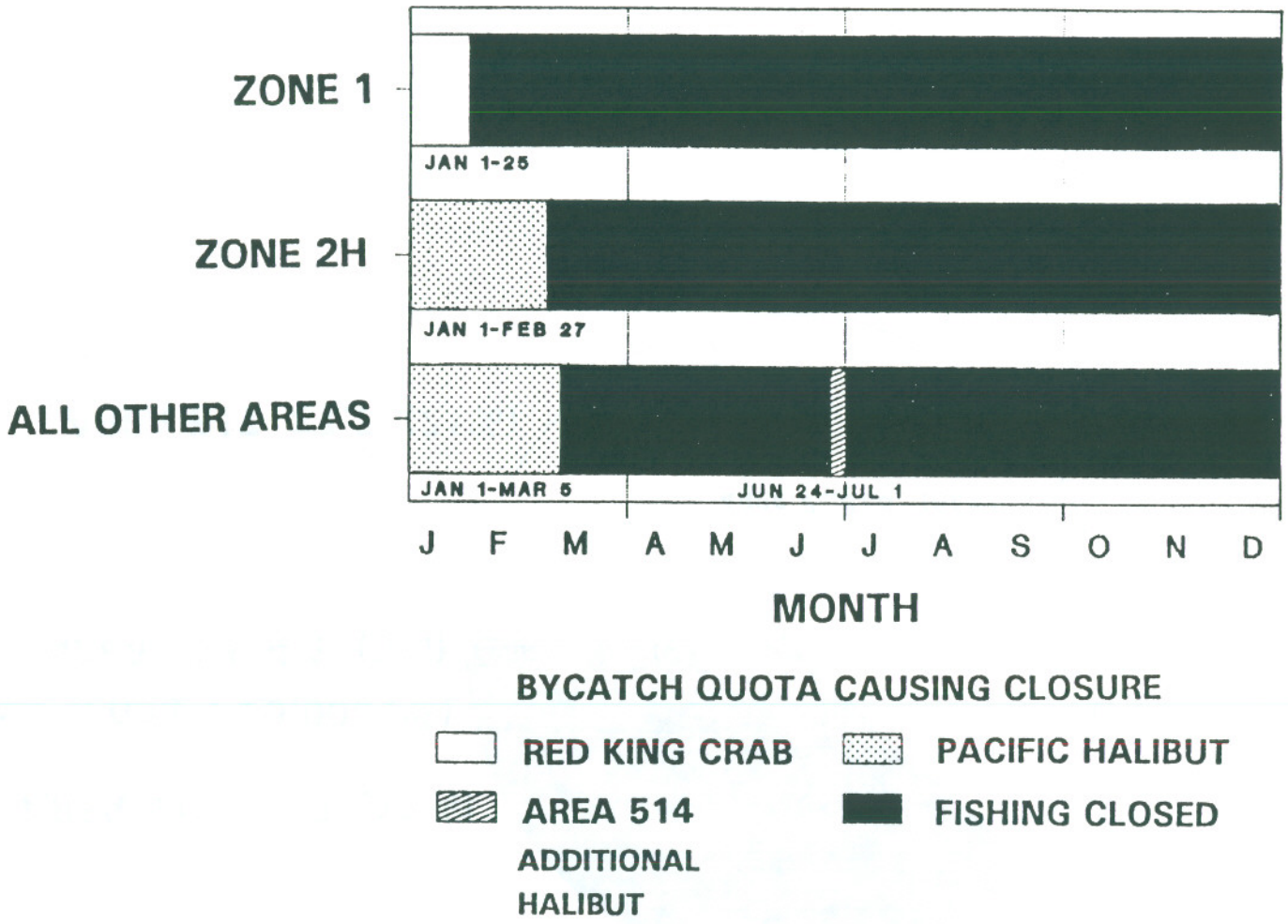


Figure 3.--Joint venture openings and closures based on bycatch quotas in the Bering Sea and Aleutian Islands region, 1990.

Table 5.--Incidence rate (number per metric ton of catch) and average weight (kg) of Pacific salmon taken in joint venture catches in the Bering Sea and Aleutians Islands region, 1990. (Dashes indicate area not fished.)

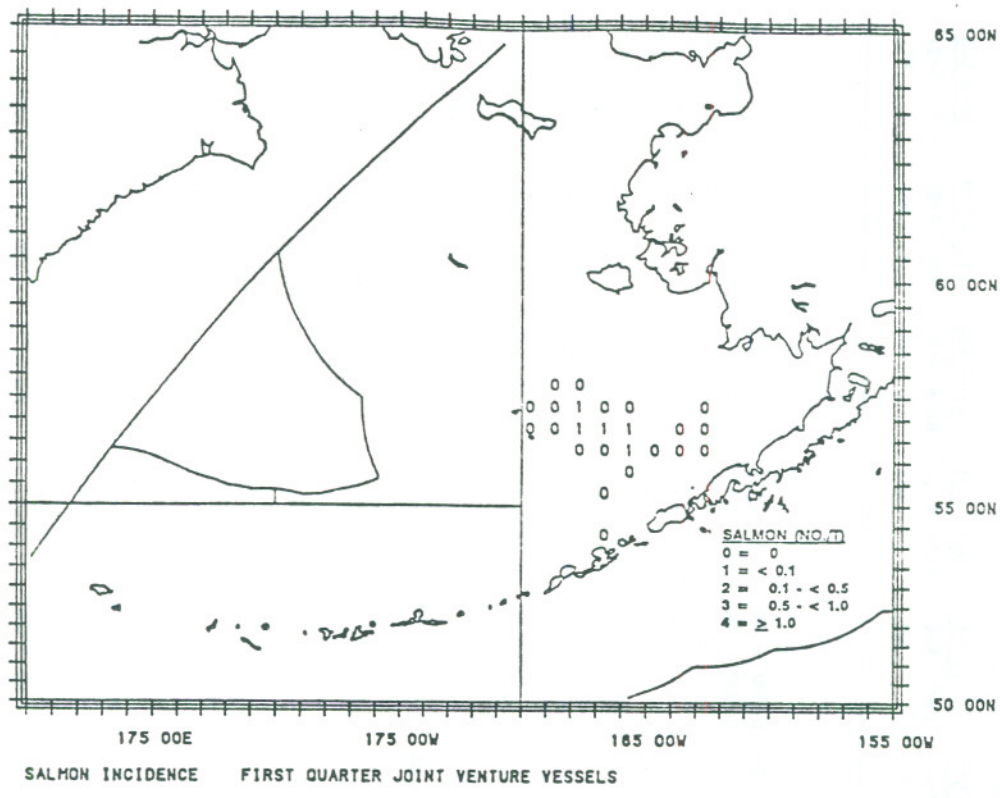
	Area 511		Area 512		Area 513		Area 514		Area 515		Area 516		Area 517		Area 521		Area 522		Area 530		Area 540	
	Rate	Avg. wt.	Rate	Avg. wt.	Rate	Avg. wt.	Rate	Avg. wt.	Rate	Avg. wt.	Rate	Avg. wt.	Rate	Avg. wt.	Rate	Avg. wt.	Rate	Avg. wt.	Rate	Avg. wt.	Rate	Avg. wt.
U.S.-Japan Joint Venture Mothership																						
Jan.	0.000	0.00	--	--	0.003	2.20	--	--	--	--	0.000	0.00	0.000	0.00	--	--	--	--	--	--	--	--
Feb.	--	--	--	--	0.003	4.31	--	--	--	--	--	--	0.005	5.05	--	--	--	--	--	--	--	--
Mar.	--	--	--	--	0.000	0.00	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Apr.	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
May	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
June	--	--	--	--	--	--	0.004	3.40	--	--	--	--	--	--	--	--	--	--	--	--	--	--
July	--	--	--	--	--	--	0.000	0.00	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Aug.	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Sep.	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Oct.	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Nov.	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Dec.	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Year	0.000	0.00	--	--	0.002	3.86	0.004	3.40	--	--	0.000	0.00	0.004	5.05	--	--	--	--	--	--	--	--
U.S.-Republic of Korea Joint Venture Mothership																						
Jan.	0.000	0.00	--	--	0.001	3.00	--	--	--	--	0.003	8.20	0.000	0.00	--	--	--	--	--	--	--	--
Feb.	--	--	--	--	0.005	4.47	--	--	--	--	--	--	0.005	3.51	--	--	--	--	--	--	--	--
Mar.	--	--	--	--	0.000	0.00	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Apr.	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
May	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
June	--	--	--	--	--	--	0.004	2.48	--	--	--	--	--	--	--	--	--	--	--	--	--	--
July	--	--	--	--	--	--	0.000	0.00	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Aug.	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Sep.	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Oct.	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Nov.	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Dec.	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Year	0.000	0.00	--	--	0.004	4.43	0.003	2.48	--	--	0.003	8.20	0.004	3.51	--	--	--	--	--	--	--	--

Table 5.--Continued.

	Area 511		Area 512		Area 513		Area 514		Area 515		Area 516		Area 517		Area 521		Area 522		Area 530		Area 540	
	Rate	Avg. wt.	Rate	Avg. wt.	Rate	Avg. wt.	Rate	Avg. wt.	Rate	Avg. wt.	Rate	Avg. wt.	Rate	Avg. wt.	Rate	Avg. wt.	Rate	Avg. wt.	Rate	Avg. wt.	Rate	Avg. wt.
U.S.-Poland Joint Venture Mothership																						
Jan.	0.000	0.00	--	--	0.000	0.00	--	--	--	--	0.000	0.00	0.000	0.00	--	--	--	--	--	--	--	--
Feb.	--	--	--	--	0.000	0.00	--	-	--	--	--	--	0.010	4.00	--	--	--	--	--	--	--	--
Mar.	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Apr.	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
May	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
June	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
July	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Aug.	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Sep.	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Oct.	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Nov.	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Dec.	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Year	0.000	0.00	--	--	0.000	0.00	--	--	--	--	0.000	0.00	0.009	4.00	--	--	--	--	--	--	--	--
U.S.-People's Republic of China Joint Venture Mothership																						
Jan.	0.000	0.00	--	--	0.000	0.00	--	--	--	--	0.000	0.00	0.000	0.00	--	--	--	--	--	--	--	--
Feb.	--	--	--	--	0.000	0.00	--	--	--	--	--	--	0.000	0.00	--	--	--	--	--	--	--	--
Mar.	--	--	--	--	0.000	0.00	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Apr.	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
May	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
June	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
July	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Aug.	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Sep.	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Oct.	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Nov.	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Dec.	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Year	0.000	0.00	--	--	0.000	0.00	--	--	--	--	0.000	0.00	0.000	0.00	--	--	--	--	--	--	--	--

Table 5.--Continued.

	Area 511		Area 512		Area 513		Area 514		Area 515		Area 516		Area 517		Area 521		Area 522		Area 530		Area 540	
	Rate	Avg. wt.	Rate	Avg. wt.	Rate	Avg. wt.	Rate	Avg. wt.	Rate	Avg. wt.	Rate	Avg. wt.	Rate	Avg. wt.	Rate	Avg. wt.	Rate	Avg. wt.	Rate	Avg. wt.	Rate	Avg. wt.
U.S.-U.S.S.R. Joint Venture Mothership																						
Jan.	0.000	0.00	--	--	0.000	0.00	--	--	--	--	0.000	0.00	0.000	0.00	--	--	--	--	--	--	--	--
Feb.	--	--	--	--	0.000	0.00	--	--	--	--	--	--	0.000	0.00	--	--	--	--	--	--	--	--
Mar.	--	--	--	--	0.000	0.00	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Apr.	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
May	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
June	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
July	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Aug.	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Sep.	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Oct.	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Nov.	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Dec.	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Year	0.000	0.00	--	--	0.000	0.00	--	--	--	--	0.000	0.00	0.000	0.00	--	--	--	--	--	--	--	--
U.S.-Iceland Joint Venture Mothership																						
Jan.	--	--	--	--	--	--	--	--	0.000	0.00	--	--	--	--	--	--	--	--	--	--	--	--
Feb.	--	--	--	--	0.000	0.00	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Mar.	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Apr.	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
May	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
June	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
July	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Aug.	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Sep.	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Oct.	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Nov.	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Dec.	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Year	--	--	--	--	0.000	0.00	--	--	0.000	0.00	--	--	--	--	--	--	--	--	--	--	--	--



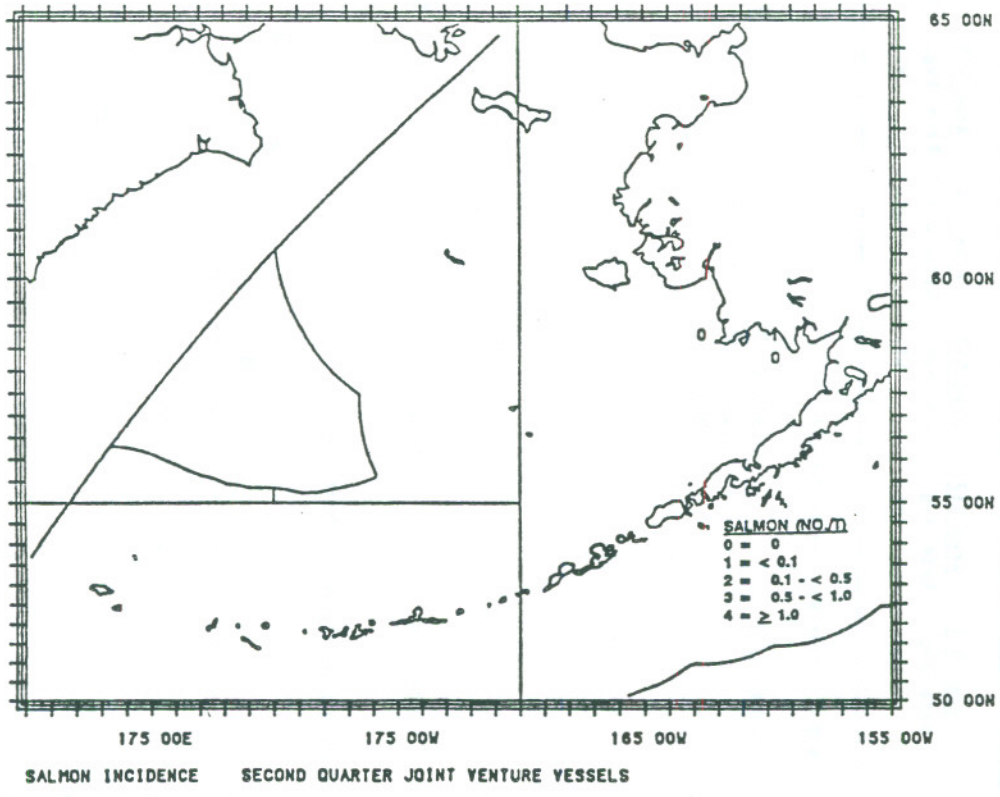
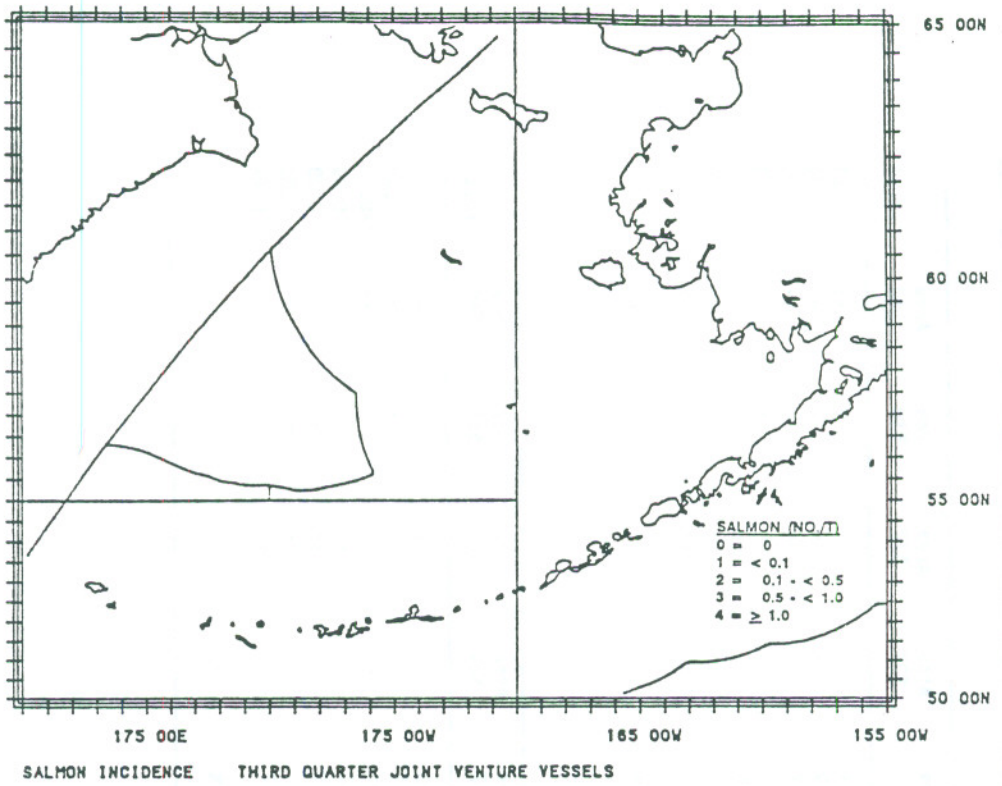


Figure 4.--Average incidence (no./t) of Pacific salmon in joint venture fisheries by quarter and 1/2° latitude by 1° longitude areas, 1990.



SALMON INCIDENCE THIRD QUARTER JOINT VENTURE VESSELS

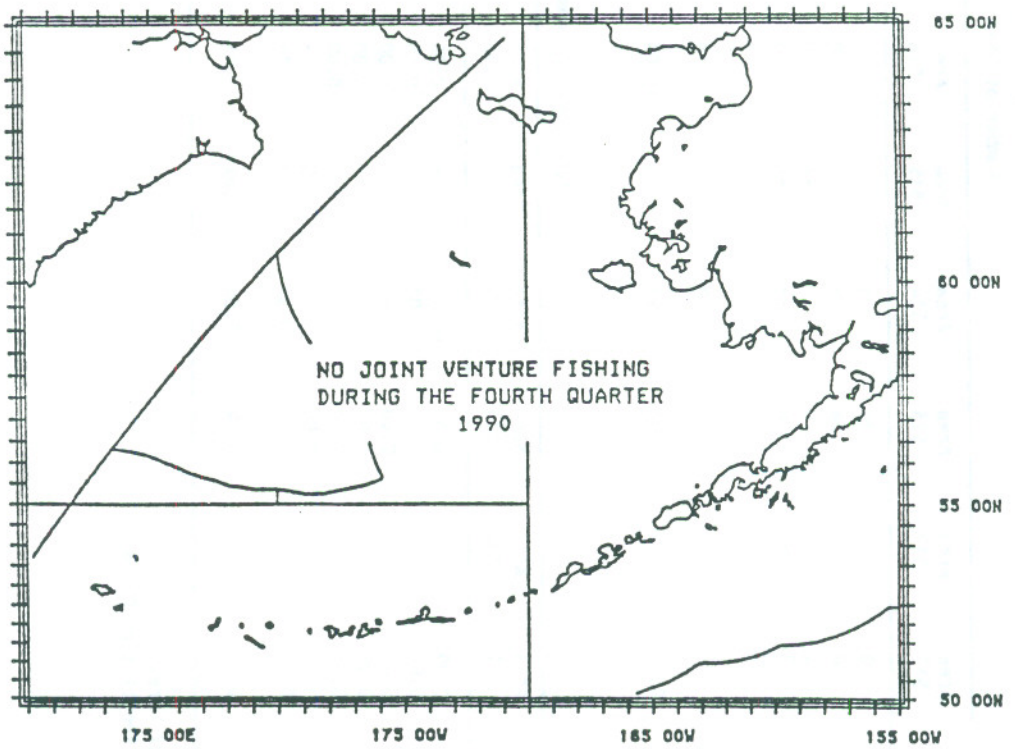


Figure 4.--Continued.

Table 6.--Estimated incidental catch of Pacific salmon (in numbers and metric tons) by joint venture nation in the Bering Sea and Aleutian Islands region, 1990. (Dashes indicate areas not fished.)

	Number of fish											
	Area 511	Area 512	Area 513	Area 514	Area 515	Area 516	Area 517	Area 521	Area 522	Area 530	Area 540	Total
U.S.-Japan	0	--	39	1	--	0	11	--	--	--	--	51
U.S.-ROK	0	--	68	5	--	18	9	--	--	--	--	100
U.S.-Poland	0	--	0	--	--	0	1	--	--	--	--	1
U.S.-PROC	0	--	0	--	--	0	0	--	--	--	--	0
U.S.-U.S.S.R.	0	--	0	--	--	0	0	--	--	--	--	0
U.S.-Iceland	--	--	0	--	0	--	--	--	--	--	--	0
Total	0	--	107	6	0	18	21	--	--	--	--	152
Percent by area	0.0%	--	70.4%	3.9%	0.0%	11.8%	13.8%	--	--	--	--	

	Weight (metric tons)											
	Area 511	Area 512	Area 513	Area 514	Area 515	Area 516	Area 517	Area 521	Area 522	Area 530	Area 540	Total
U.S.-Japan	0.00	--	0.15	<0.01	--	0.00	0.06	--	--	--	--	0.21
U.S.-ROK	0.00	--	0.30	0.01	--	0.15	0.03	--	--	--	--	0.49
U.S.-Poland	0.00	--	0.00	--	--	0.00	<0.01	--	--	--	--	<0.01
U.S.-PROC	0.00	--	0.00	--	--	0.00	0.00	--	--	--	--	0.00
U.S.-U.S.S.R.	0.00	--	0.00	--	--	0.00	0.00	--	--	--	--	0.00
U.S.-Iceland	--	--	0.00	--	0.00	--	--	--	--	--	--	0.00
Total	0.00	--	0.45	0.02	0.00	0.15	0.09	--	--	--	--	0.71
Percent by area	0.0%	--	63.4%	2.8%	0.0%	21.1%	12.7%	--	--	--	--	

ROK = Republic of Korea.
PROC = People's Republic of China.

Table 7.--Estimated incidental catches (numbers and metric tons (t)) of Pacific salmon in foreign and joint venture groundfish fisheries in the Bering Sea and Aleutian Islands region, 1977-90*.

Year	Foreign		Joint venture		Total	
	No.	t	No.	t	No.	t
1977	47,840	198	NF	NF	47,840	198
1978	44,548	137	NF	NF	44,548	137
1979	107,706	340	NF	NF	107,706	340
1980	120,104	381	1,898	7	122,002	388
1981	42,337	137	854	3	43,191	140
1982	21,241	85	2,382	8	23,623	92
1983	18,173	66	24,493	54	42,666	120
1984	16,516	51	67,622	160	84,138	211
1985	10,003	33	10,420	30	20,423	63
1986	1,643	5	19,340	66	20,983	71
1987	3,386	13	10,848	41	14,234	54
1988	NF	NF	9,380	35	9,380	35
1989	NF	NF	14,153	45	14,153	45
1990	NF	NF	152	1	152	1

* Estimated catches for years 1977-89 from Guttormsen et al. (1990).

NF = No fishing.

Table 8.--Groundfish catch (in metric tons) and numbers of Pacific salmon in the joint venture groundfish fishery by species and zone, 1990.

Zone	Groundfish catch (t)	Chinook salmon	Other salmon
1	47,482.5	18	0
2	1,841.0	127	1
3	4,112.9	2	4

Table 9.--Biological data on the incidental catches of Pacific salmon in the joint venture groundfish fishery in the Bering Sea and Aleutian Islands region, 1990.

Species	Percent by species	Sex	Sex composition	Average weight (kg)	Average length (cm)
Chinook	96.71	Male	65.26	4.17	67.1
		Female	34.74	6.19	80.1
		Unsexed		2.70	66.0
		Combined		4.84	71.6
Chum	1.31	Female	100.00	2.96	60.0
Coho	1.98	Male	32.78	5.42	75.0
		Female	67.22	2.47	61.5
		Combined		3.44	65.9

Table 10.--Incidence rate (number per metric ton of catch) and average weight (kg) of Pacific halibut taken in joint venture catches in the Bering Sea and Aleutians Islands region, 1990. (Dashes indicate area not fished.)

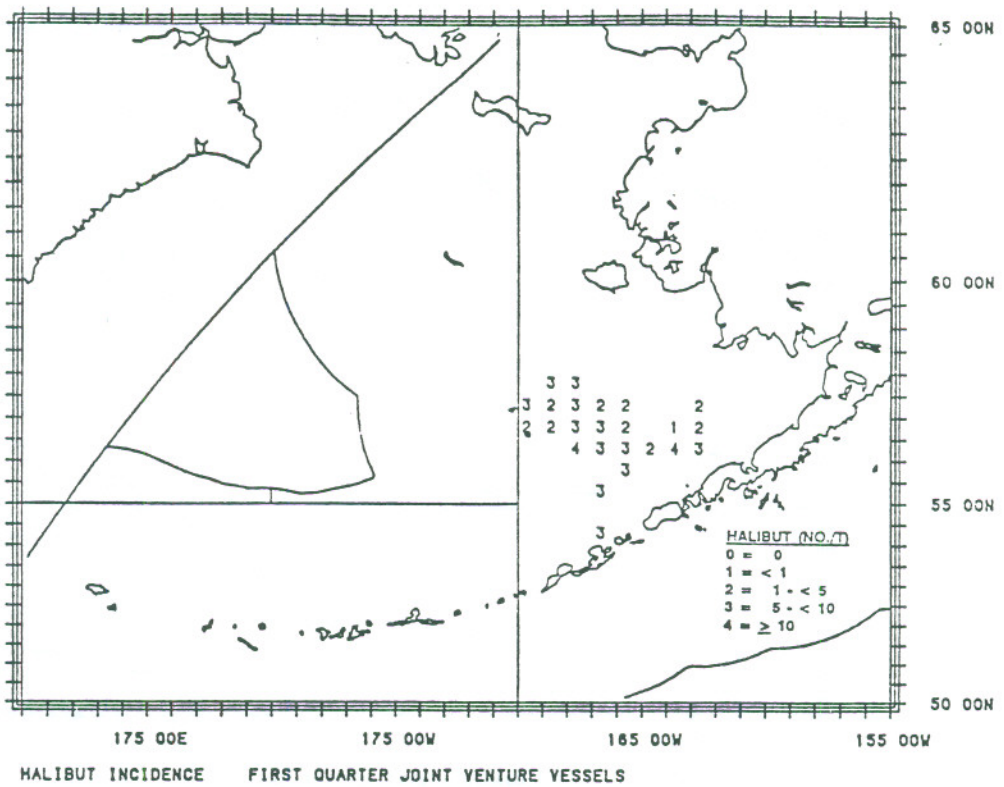
	Area 511		Area 512		Area 513		Area 514		Area 515		Area 516		Area 517		Area 521		Area 522		Area 530		Area 540	
	Rate	Avg. wt.	Rate	Avg. wt.	Rate	Avg. wt.	Rate	Avg. wt.	Rate	Avg. wt.	Rate	Avg. wt.	Rate	Avg. wt.	Rate	Avg. wt.	Rate	Avg. wt.	Rate	Avg. wt.	Rate	Avg. wt.
U.S.-Japan Joint Venture Mothership																						
Jan.	0.427	1.32	--	--	2.958	1.51	--	--	--	--	1.522	0.41	8.240	0.99	--	--	--	--	--	--	--	--
Feb.	--	--	--	--	7.019	1.45	--	--	--	--	--	--	7.613	1.75	--	--	--	--	--	--	--	--
Mar.	--	--	--	--	3.588	0.85	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Apr.	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
May	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
June	--	--	--	--	--	--	2.984	1.26	--	--	--	--	--	--	--	--	--	--	--	--	--	--
July	--	--	--	--	--	--	8.598	1.14	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Aug.	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Sep.	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Oct.	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Nov.	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Dec.	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Year	0.427	1.32	--	--	6.047	1.44	3.314	1.24	--	--	1.522	0.41	7.774	1.55	--	--	--	--	--	--	--	--
U.S.-Republic of Korea Joint Venture Mothership																						
Jan.	0.516	1.22	--	--	2.046	1.73	--	--	--	--	0.866	1.20	1.482	0.84	--	--	--	--	--	--	--	--
Feb.	--	--	--	--	6.039	1.09	--	--	--	--	--	--	3.696	1.80	--	--	--	--	--	--	--	--
Mar.	--	--	--	--	8.070	0.42	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Apr.	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
May	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
June	--	--	--	--	--	--	5.746	0.95	--	--	--	--	--	--	--	--	--	--	--	--	--	--
July	--	--	--	--	--	--	4.649	1.29	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Aug.	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Sep.	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Oct.	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Nov.	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Dec.	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Year	0.516	1.22	--	--	5.564	1.09	5.715	0.96	--	--	0.866	1.20	3.212	1.70	--	--	--	--	--	--	--	--

Table 10.--Continued.

	Area 511		Area 512		Area 513		Area 514		Area 515		Area 516		Area 517		Area 521		Area 522		Area 530		Area 540	
	Rate	Avg. wt.	Rate	Avg. wt.	Rate	Avg. wt.	Rate	Avg. wt.	Rate	Avg. wt.	Rate	Avg. wt.	Rate	Avg. wt.	Rate	Avg. wt.	Rate	Avg. wt.	Rate	Avg. wt.	Rate	Avg. wt.
U.S.-Poland Joint Venture Mothership																						
Jan.	1.748	0.46	--	--	0.610	3.91	--	--	--	--	2.076	0.57	1.947	1.48	--	--	--	--	--	--	--	--
Feb.	--	--	--	--	4.054	0.35	--	--	--	--	--	--	4.978	1.83	--	--	--	--	--	--	--	--
Mar.	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Apr.	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
May	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
June	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
July	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Aug.	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Sep.	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Oct.	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Nov.	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Dec.	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Year	1.748	0.46	--	--	0.786	2.97	--	--	--	--	2.076	0.57	4.472	1.81	--	--	--	--	--	--	--	--
U.S.-People's Republic of China Joint Venture Mothership																						
Jan.	0.196	0.31	--	--	2.893	1.46	--	--	--	--	0.514	0.60	5.881	2.06	--	--	--	--	--	--	--	--
Feb.	--	--	--	--	5.244	1.57	--	--	--	--	--	--	4.034	2.36	--	--	--	--	--	--	--	--
Mar.	--	--	--	--	3.456	0.65	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Apr.	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
May	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
June	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
July	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Aug.	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Sep.	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Oct.	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Nov.	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Dec.	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Year	0.196	0.31	--	--	4.326	1.42	--	--	--	--	0.514	0.60	4.174	2.33	--	--	--	--	--	--	--	--

Table 10.--Continued.

	Area 511		Area 512		Area 513		Area 514		Area 515		Area 516		Area 517		Area 521		Area 522		Area 530		Area 540	
	Rate	Avg. wt.	Rate	Avg. wt.	Rate	Avg. wt.	Rate	Avg. wt.	Rate	Avg. wt.	Rate	Avg. wt.	Rate	Avg. wt.	Rate	Avg. wt.	Rate	Avg. wt.	Rate	Avg. wt.	Rate	Avg. wt.
U.S.-U.S.S.R. Joint Venture Mothership																						
Jan.	2.850	0.50	--	--	4.753	1.18	--	--	--	--	2.297	0.42	5.115	1.34	--	--	--	--	--	--	--	--
Feb.	--	--	--	--	5.481	1.28	--	--	--	--	--	--	7.183	2.06	--	--	--	--	--	--	--	--
Mar.	--	--	--	--	4.317	0.61	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Apr.	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
May	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
June	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
July	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Aug.	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Sep.	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Oct.	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Nov.	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Dec.	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Year	2.850	0.50	--	--	5.234	1.22	--	--	--	--	2.297	0.42	6.997	2.02	--	--	--	--	--	--	--	--
U.S.-Iceland Joint Venture Mothership																						
Jan.	--	--	--	--	--	--	--	--	8.197	1.07	--	--	--	--	--	--	--	--	--	--	--	--
Feb.	--	--	--	--	7.824	1.45	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Mar.	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Apr.	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
May	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
June	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
July	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Aug.	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Sep.	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Oct.	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Nov.	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Dec.	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Year	--	--	--	--	7.824	1.45	--	--	8.197	1.07	--	--	--	--	--	--	--	--	--	--	--	--



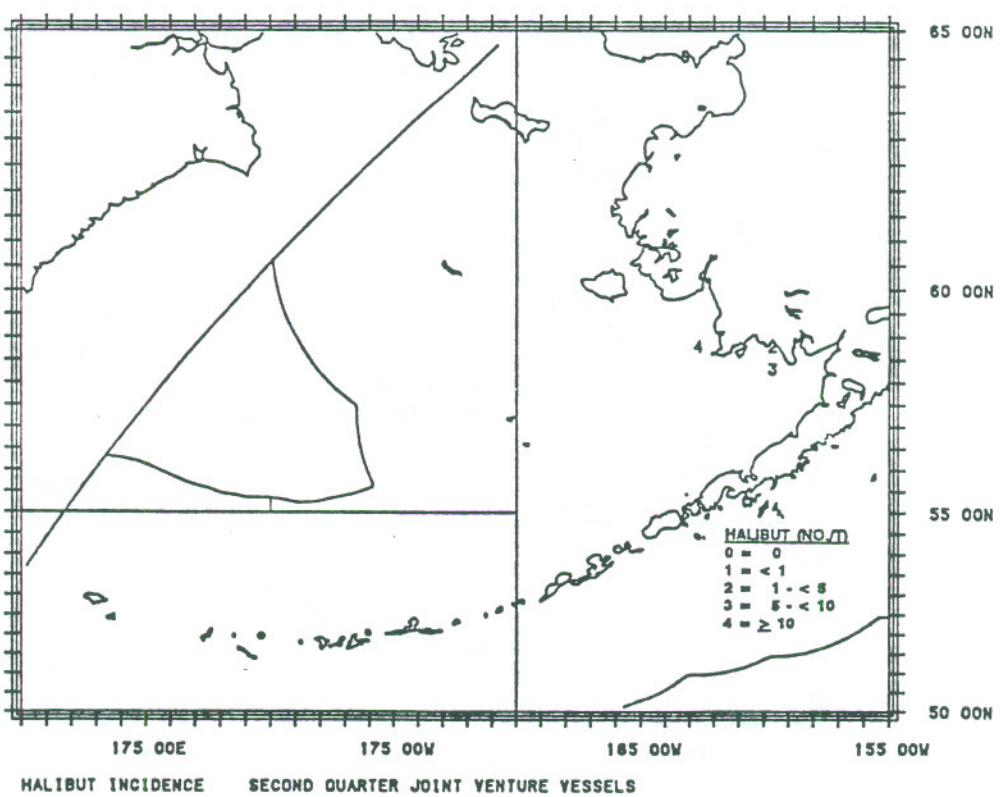
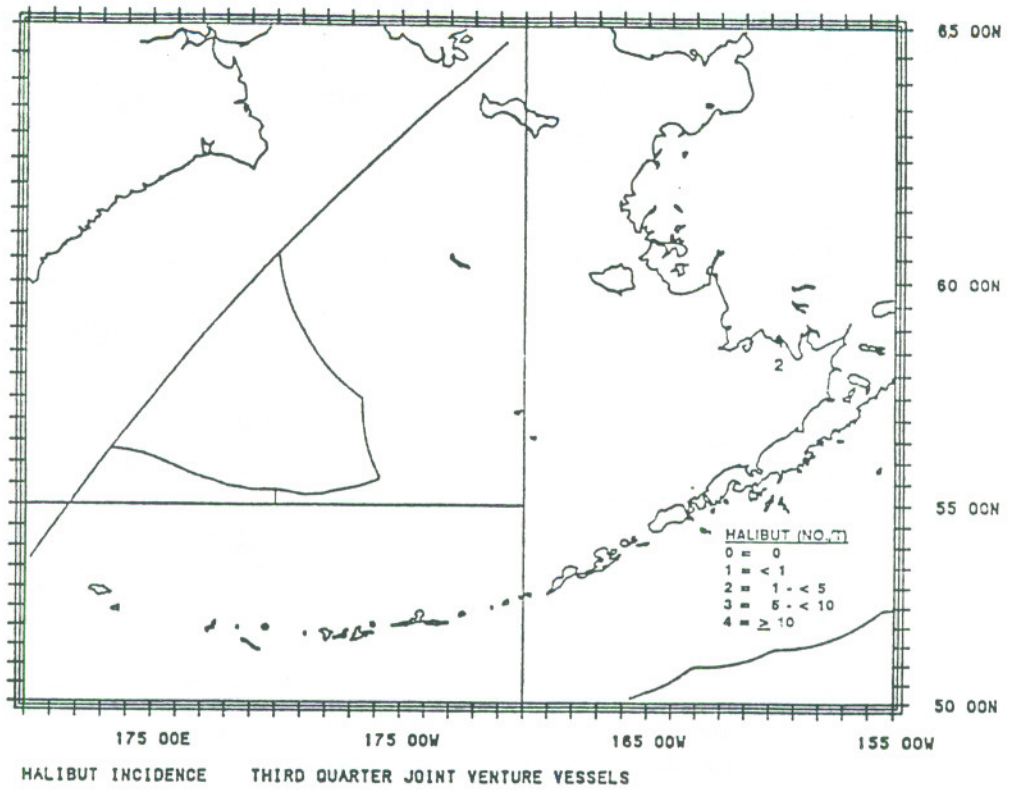


Figure 5.--Average incidence (no./t) of Pacific halibut in joint venture fisheries by quarter and 1/2° latitude by 1° longitude areas, 1990.



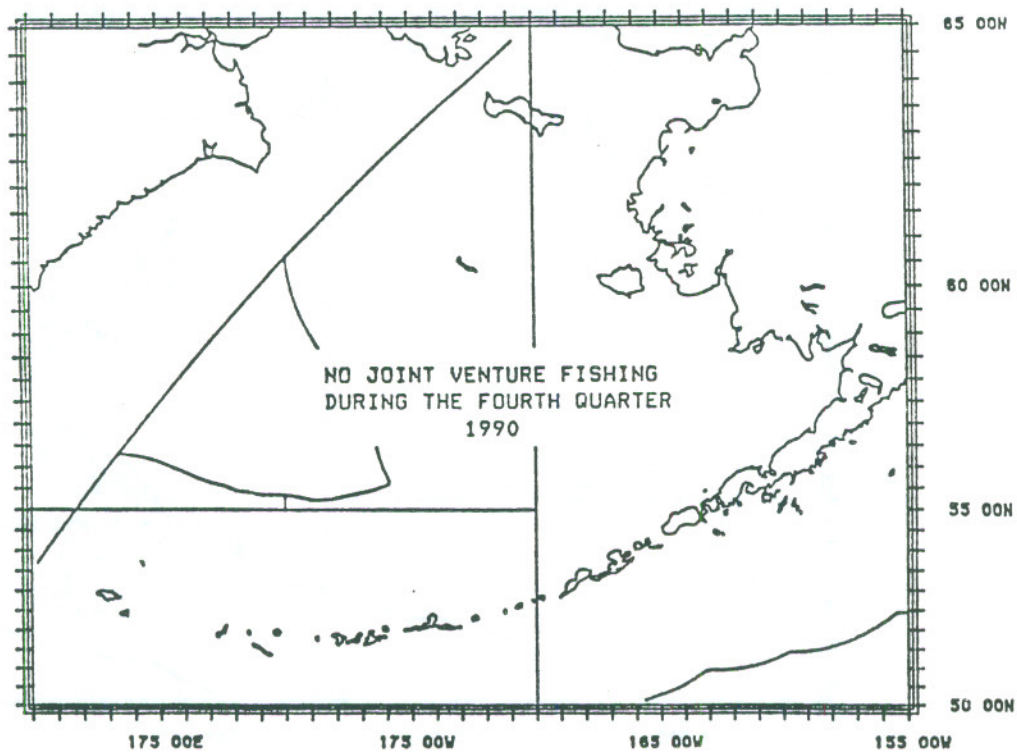


Figure 5.--Continued.

Table 11.--Estimated incidental catch of Pacific halibut (in numbers and metric tons) by joint venture nation in the Bering Sea and Aleutian Islands region, 1990. (Dashes indicate areas not fished.)

	Number of fish											
	Area 511	Area 512	Area 513	Area 514	Area 515	Area 516	Area 517	Area 521	Area 522	Area 530	Area 540	Total
U.S.-Japan	1,156	--	95,853	1,694	--	9,293	34,579	--	--	--	--	142,575
U.S.-ROK	1,751	--	93,508	20,230	--	3,663	6,834	--	--	--	--	125,986
U.S.-Poland	836	--	108	--	--	1,188	494	--	--	--	--	2,626
U.S.-PROC	280	--	11,962	--	--	328	10,001	--	--	--	--	22,571
U.S.-U.S.S.R.	20,369	--	103,776	--	--	45,508	128,438	--	--	--	--	298,091
U.S.-Iceland	--	--	137	--	48	--	--	--	--	--	--	185
Total	24,392	--	305,344	21,924	48	59,980	180,346	--	--	--	--	592,034
Percent by area	4.1%	--	51.6%	3.7%	<0.1%	10.1%	30.5%	--	--	--	--	

	Weight (metric tons)											
	Area 511	Area 512	Area 513	Area 514	Area 515	Area 516	Area 517	Area 521	Area 522	Area 530	Area 540	Total
U.S.-Japan	1.4	--	147.7	2.1	--	3.5	51.6	--	--	--	--	206.3
U.S.-ROK	2.4	--	109.5	20.3	--	3.5	11.3	--	--	--	--	147.0
U.S.-Poland	0.4	--	0.3	--	--	0.7	1.2	--	--	--	--	2.6
U.S.-PROC	0.1	--	18.3	--	--	0.3	23.4	--	--	--	--	42.1
U.S.-U.S.S.R.	10.1	--	113.5	--	--	19.7	257.1	--	--	--	--	400.4
U.S.-Iceland	--	--	0.2	--	0.1	--	--	--	--	--	--	0.3
Total	14.4	--	389.5	22.4	0.1	27.7	344.6	--	--	--	--	798.7
Percent by area	1.8%	--	48.8%	2.8%	<0.1%	3.5%	43.1%	--	--	--	--	

ROK = Republic of Korea.
PROC = People's Republic of China.

Table 12.--Estimated incidental catches (numbers and metric tons (t)) of Pacific halibut in foreign and joint venture groundfish fisheries in the Bering Sea and Aleutian Islands region, 1977-90*.

Year	Foreign		Joint venture		Total	
	No.	t	No.	t	No.	t
1977	344,973	1,453	NF	NF	344,973	1,453
1978	599,852	2,853	NF	NF	599,852	2,853
1979	583,811	2,863	NF	NF	583,811	2,863
1980	959,566	4,311	204,948	286	1,164,514	4,597
1981	988,731	2,704	103,616	232	1,092,347	2,936
1982	423,340	1,609	412,115	563	835,455	2,172
1983	515,587	1,872	274,080	438	789,667	2,310
1984	518,327	2,128	254,273	617	772,600	2,745
1985	485,311	1,789	447,370	1,026	932,681	2,815
1986	296,372	1,192	593,597	1,711	889,969	2,903
1987	273,197	1,077	545,065	1,485	818,262	2,562
1988	NF	NF	1,590,685	2,579	1,590,685	2,579
1989	NF	NF	525,673	874	525,673	874
1990	NF	NF	592,034	799	592,034	799

* Estimated catches for years 1977-89 from Guttormsen et al. (1990).

NF = No fishing.

Table 13.--Groundfish catch (in metric tons) and numbers and weight (metric tons) of Pacific halibut in the joint venture groundfish fishery by zone, 1990.

Zone	Groundfish catch (t)	Pacific Halibut	
		Numbers	Weight (t)
1	47,482.6	84,372	42.1
2	81,841.0	485,690	734.1
3	4,112.9	21,972	22.5

Table 14.--Incidence rate (number per metric ton of catch) and average weight (kg) of snow (Tanner) crabs taken in joint venture catches in the Bering Sea and Aleutians Islands region, 1990. (Dashes indicate area not fished.)

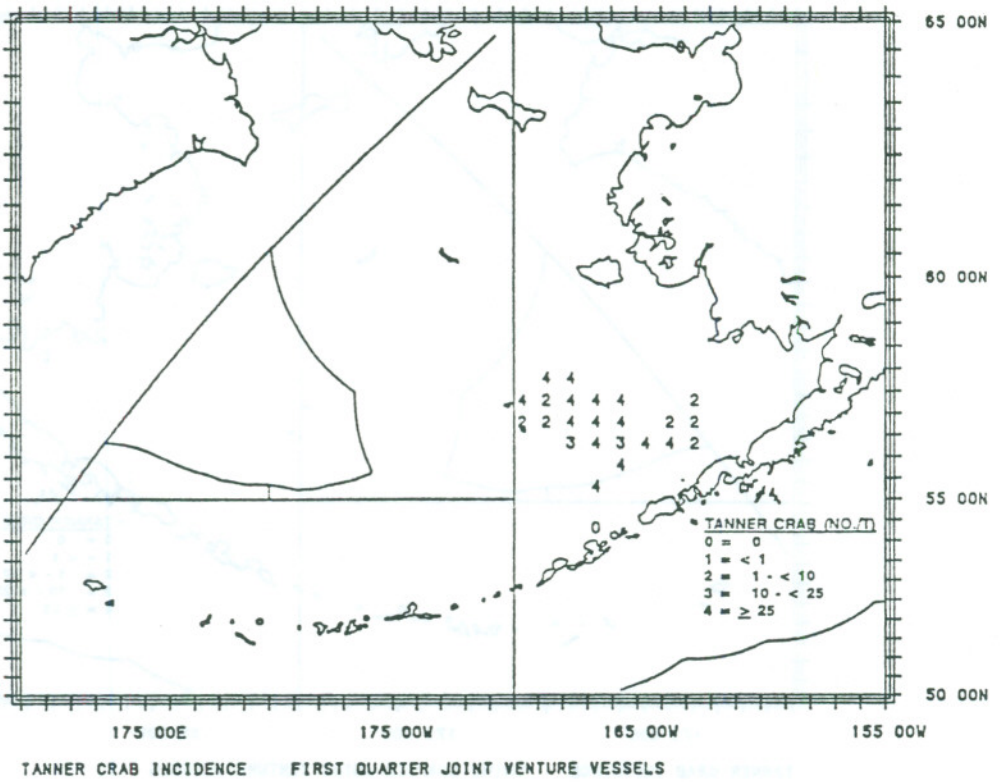
	Area 511		Area 512		Area 513		Area 514		Area 515		Area 516		Area 517		Area 521		Area 522		Area 530		Area 540	
	Rate	Avg. wt.	Rate	Avg. wt.	Rate	Avg. wt.	Rate	Avg. wt.	Rate	Avg. wt.	Rate	Avg. wt.	Rate	Avg. wt.	Rate	Avg. wt.	Rate	Avg. wt.	Rate	Avg. wt.	Rate	Avg. wt.
U.S.-Japan Joint Venture Mothership																						
Jan.	2.851	0.48	--	--	41.873	0.26	--	--	--	--	2.408	0.62	35.847	0.30	--	--	--	--	--	--	--	--
Feb.	--	--	--	--	33.654	0.30	--	--	--	--	--	--	25.978	0.37	--	--	--	--	--	--	--	--
Mar.	--	--	--	--	11.786	0.36	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Apr.	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
May	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
June	--	--	--	--	--	--	0.000	0.00	--	--	--	--	--	--	--	--	--	--	--	--	--	--
July	--	--	--	--	--	--	0.000	0.00	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Aug.	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Sep.	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Oct.	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Nov.	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Dec.	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Year	2.851	0.48	--	--	34.148	0.29	0.000	0.00	--	--	2.408	0.62	28.501	0.34	--	--	--	--	--	--	--	--
U.S.-Republic of Korea Joint Venture Mothership																						
Jan.	8.315	0.53	--	--	30.499	0.26	--	--	--	--	5.728	0.56	18.445	0.26	--	--	--	--	--	--	--	--
Feb.	--	--	--	--	37.883	0.25	--	--	--	--	--	--	11.291	0.31	--	--	--	--	--	--	--	--
Mar.	--	--	--	--	9.100	0.37	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Apr.	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
May	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
June	--	--	--	--	--	--	0.001	0.75	--	--	--	--	--	--	--	--	--	--	--	--	--	--
July	--	--	--	--	--	--	0.000	0.00	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Aug.	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Sep.	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Oct.	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Nov.	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Dec.	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Year	8.315	0.53	--	--	36.035	0.25	0.001	0.75	--	--	5.728	0.56	12.855	0.30	--	--	--	--	--	--	--	--

Table 14.--Continued.

	Area 511		Area 512		Area 513		Area 514		Area 515		Area 516		Area 517		Area 521		Area 522		Area 530		Area 540	
	Rate	Avg. wt.	Rate	Avg. wt.	Rate	Avg. wt.	Rate	Avg. wt.	Rate	Avg. wt.	Rate	Avg. wt.	Rate	Avg. wt.	Rate	Avg. wt.	Rate	Avg. wt.	Rate	Avg. wt.	Rate	Avg. wt.
U.S.-Poland Joint Venture Mothership																						
Jan.	6.798	0.74	--	--	41.717	0.27	--	--	--	--	1.672	0.90	1.895	0.51	--	--	--	--	--	--	--	--
Feb.	--	--	--	--	50.809	0.28	--	--	--	--	--	--	21.778	0.32	--	--	--	--	--	--	--	--
Mar.	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Apr.	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
May	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
June	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
July	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Aug.	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Sep.	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Oct.	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Nov.	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Dec.	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Year	6.798	0.74	--	--	42.182	0.27	--	--	--	--	1.672	0.90	18.459	0.33	--	--	--	--	--	--	--	--
U.S.-People's Republic of China Joint Venture Mothership																						
Jan.	21.738	0.51	--	--	87.526	0.27	--	--	--	--	3.134	0.49	35.498	0.39	--	--	--	--	--	--	--	--
Feb.	--	--	--	--	65.630	0.27	--	--	--	--	--	--	54.000	0.33	--	--	--	--	--	--	--	--
Mar.	--	--	--	--	23.314	0.34	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Apr.	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
May	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
June	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
July	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Aug.	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Sep.	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Oct.	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Nov.	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Dec.	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Year	21.738	0.51	--	--	63.922	0.28	--	--	--	--	3.134	0.49	52.599	0.34	--	--	--	--	--	--	--	--

Table 14.--Continued.

	Area 511		Area 512		Area 513		Area 514		Area 515		Area 516		Area 517		Area 521		Area 522		Area 530		Area 540	
	Rate	Avg. wt.	Rate	Avg. wt.	Rate	Avg. wt.	Rate	Avg. wt.	Rate	Avg. wt.	Rate	Avg. wt.	Rate	Avg. wt.	Rate	Avg. wt.	Rate	Avg. wt.	Rate	Avg. wt.	Rate	Avg. wt.
U.S.-U.S.S.R. Joint Venture Mothership																						
Jan.	8.663	0.49	--	--	73.239	0.25	--	--	--	--	3.299	0.51	25.391	0.29	--	--	--	--	--	--	--	--
Feb.	--	--	--	--	27.344	0.29	--	--	--	--	--	--	33.905	0.28	--	--	--	--	--	--	--	--
Mar.	--	--	--	--	5.920	0.34	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Apr.	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
May	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
June	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
July	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Aug.	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Sep.	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Oct.	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Nov.	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Dec.	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Year	8.663	0.49	--	--	36.443	0.27	--	--	--	--	3.299	0.51	33.136	0.28	--	--	--	--	--	--	--	--
U.S.-Iceland Joint Venture Mothership																						
Jan.	--	--	--	--	--	--	--	--	0.000	0.00	--	--	--	--	--	--	--	--	--	--	--	--
Feb.	--	--	--	--	34.209	0.26	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Mar.	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Apr.	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
May	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
June	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
July	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Aug.	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Sep.	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Oct.	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Nov.	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Dec.	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Year	--	--	--	--	34.209	0.26	--	--	0.000	0.00	--	--	--	--	--	--	--	--	--	--	--	--



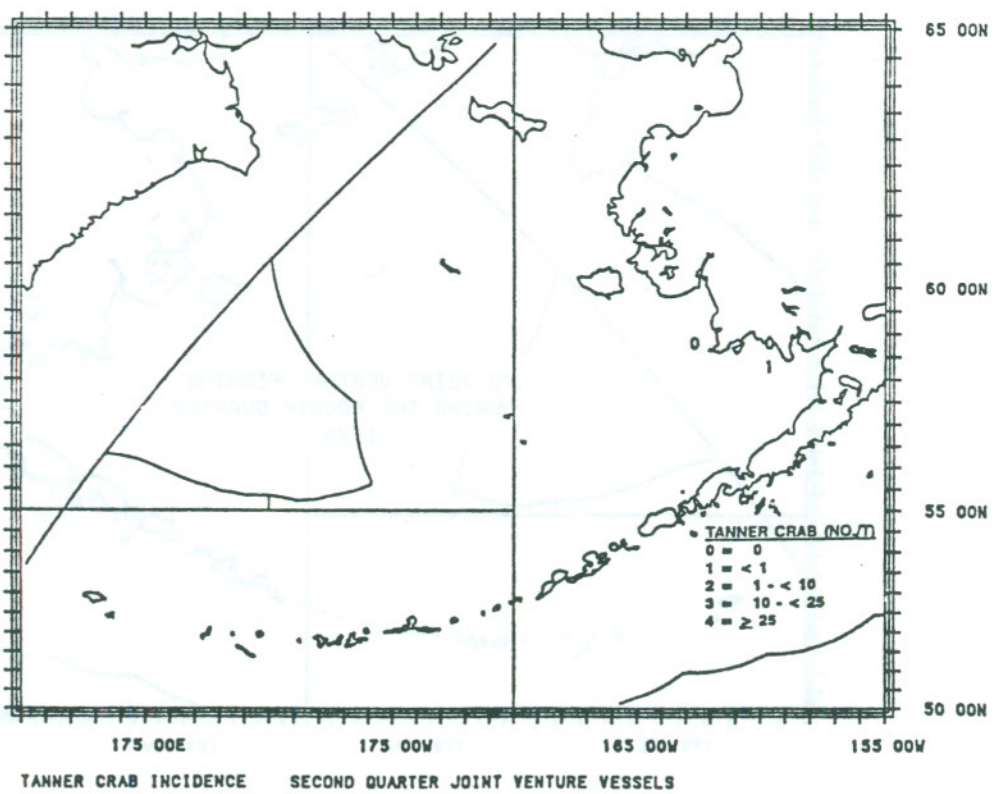
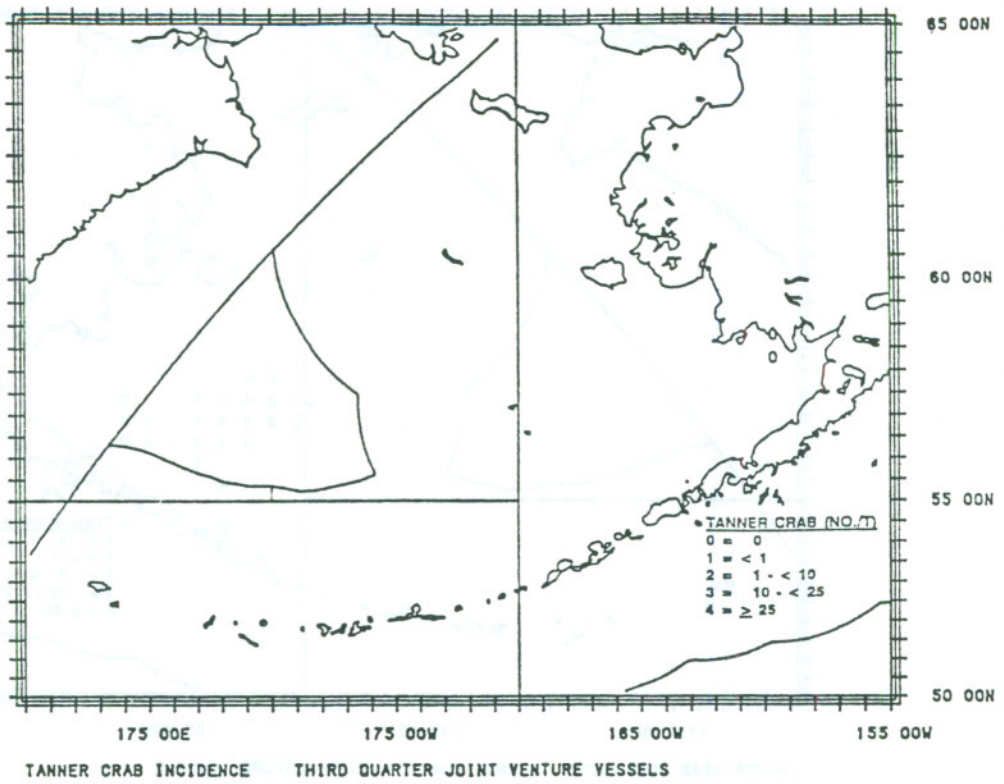


Figure 6.--Average incidence (no./t) of Tanner crab in joint venture fisheries by quarter and 1/2° latitude by 1° longitude areas, 1990.



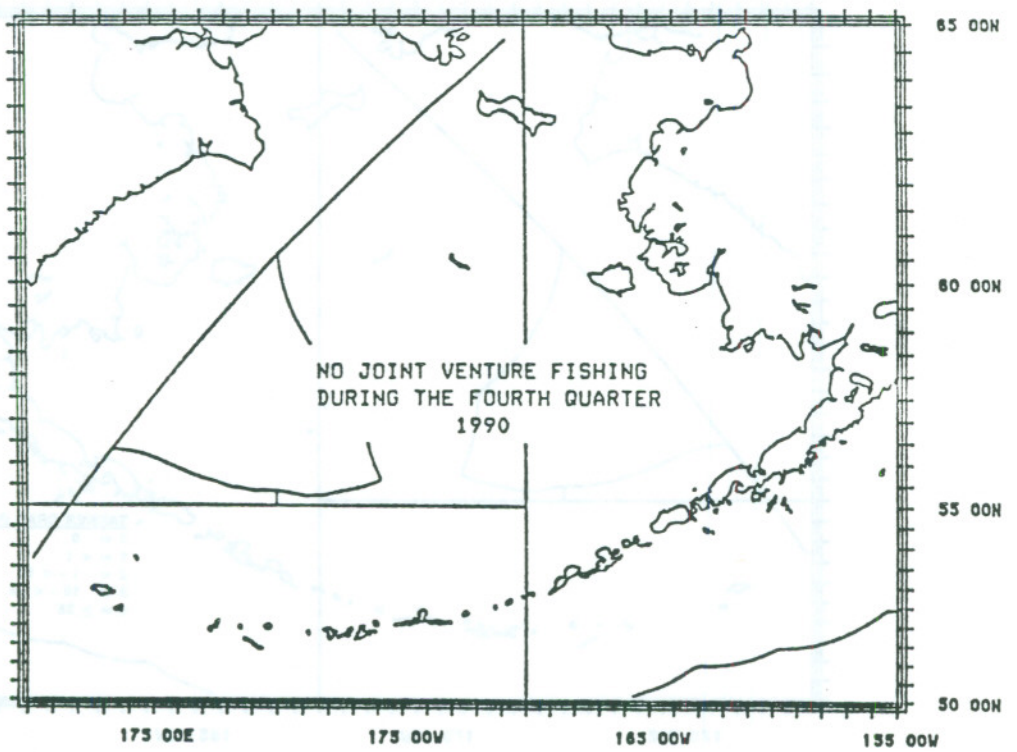


Figure 6.--Continued.

Table 15.--Estimated incidental catch of snow (Tanner) crabs (in numbers and metric tons) by joint venture nation in the Bering Sea and Aleutian Islands region, 1990. (Dashes indicate areas not fished.)

	Number of crab											
	Area 511	Area 512	Area 513	Area 514	Area 515	Area 516	Area 517	Area 521	Area 522	Area 530	Area 540	Total
U.S.-Japan	9,778	--	604,228	0	--	17,427	123,676	--	--	--	--	755,109
U.S.-ROK	25,337	--	581,418	2	--	33,115	29,106	--	--	--	--	668,978
U.S.-Poland	2,400	--	5,910	--	--	1,825	2,038	--	--	--	--	12,173
U.S.-PROC	28,707	--	191,826	--	--	1,993	111,175	--	--	--	--	333,701
U.S.-U.S.S.R.	52,645	--	667,302	--	--	78,786	596,087	--	--	--	--	1,394,820
U.S.-Iceland	--	--	599	--	0	--	--	--	--	--	--	599
Total	118,867	--	2,051,283	2	0	133,146	862,082	--	--	--	--	3,165,380
Percent by area	3.8%	--	64.8%	<0.1%	0.0%	4.2%	27.2%	--	--	--	--	

	Weight (metric tons)											
	Area 511	Area 512	Area 513	Area 514	Area 515	Area 516	Area 517	Area 521	Area 522	Area 530	Area 540	Total
U.S.-Japan	4.69	--	175.23	0.00	--	10.80	42.05	--	--	--	--	232.77
U.S.-ROK	13.43	--	145.35	<0.01	--	18.54	8.73	--	--	--	--	186.05
U.S.-Poland	1.78	--	1.60	--	--	1.64	0.67	--	--	--	--	5.69
U.S.-PROC	14.64	--	53.71	--	--	0.98	37.80	--	--	--	--	107.13
U.S.-U.S.S.R.	25.80	--	180.17	--	--	40.18	166.90	--	--	--	--	413.05
U.S.-Iceland	--	--	--	--	0.00	--	--	--	--	--	--	0.00
Total	60.34	--	556.06	<0.01	0.00	72.14	256.15	--	--	--	--	944.70
Percent by area	6.4%	--	58.9%	<0.1%	0.0%	7.6%	27.1%	--	--	--	--	

ROK = Republic of Korea.
PROC = People's Republic of China.

Table 16.--Estimated incidental catches (numbers and metric tons (t)) of snow (Tanner) crabs in foreign and joint venture groundfish fisheries in the Bering Sea and Aleutian Islands region, 1977-90*.

Year	Foreign		Joint venture		Total	
	Millions of crab	t	Millions of crab	t	Millions of crab	t
1977	17.6	3,728	NF	NF	17.6	3,728
1978	17.3	4,267	NF	NF	17.3	4,267
1979	18.0	3,654	NF	NF	18.0	3,654
1980	11.1	2,058	0.3	56	11.4	2,114
1981	5.6	1,196	0.7	276	6.3	1,472
1982	2.3	425	0.1	24	2.4	448
1983	2.5	501	0.5	171	3.0	672
1984	2.6	527	0.4	119	3.0	646
1985	1.8	263	0.9	134	2.7	397
1986	1.7	280	5.5	370	7.2	650
1987	0.3	101	7.1	537	7.4	638
1988	NF	NF	3.1	464	3.1	464
1989	NF	NF	3.8	672	3.8	672
1990	NF	NF	3.2	945	3.2	945

* Estimated catches for years 1977-89 from Guttormsen et al. (1990).

NF = no fishing.

Table 17.--Groundfish catch (in metric tons) and numbers of snow (Tanner) crabs in the joint venture groundfish fishery by species and zone, 1990.

Zone	Groundfish catch (t)	*Chionoecetes bairdi* no.	*Chionoecetes opilio* no.
1	47,482.5	251,087	926
2	81,841.0	827,467	2,085,900
3	4,112.9	0	0

Table 18.--Biological data on the incidental catches of snow (Tanner) crabs in the joint venture groundfish fishery in the Bering Sea and Aleutian Islands region, 1990.

Species	Percent by species	Sex	Sex composition	Average weight (kg)	Average width (mm)
Chionoecetes opilio	65.93	Male	83.45	0.27	87.3
		Female	16.55	0.12	66.3
		Unsexed		0.25	91.9
		Combined		0.24	83.9
Chionoecetes bairdi	34.07	Male	64.54	0.50	114.8
		Female	35.46	0.21	81.8
		Unsexed		0.43	108.8
		Combined		0.40	103.1

Table 19.--Incidence rate (number per metric ton of catch) and average weight (kg) of king crabs taken in joint venture catches in the Bering Sea and Aleutians Islands region, 1990. (Dashes indicate area not fished.)

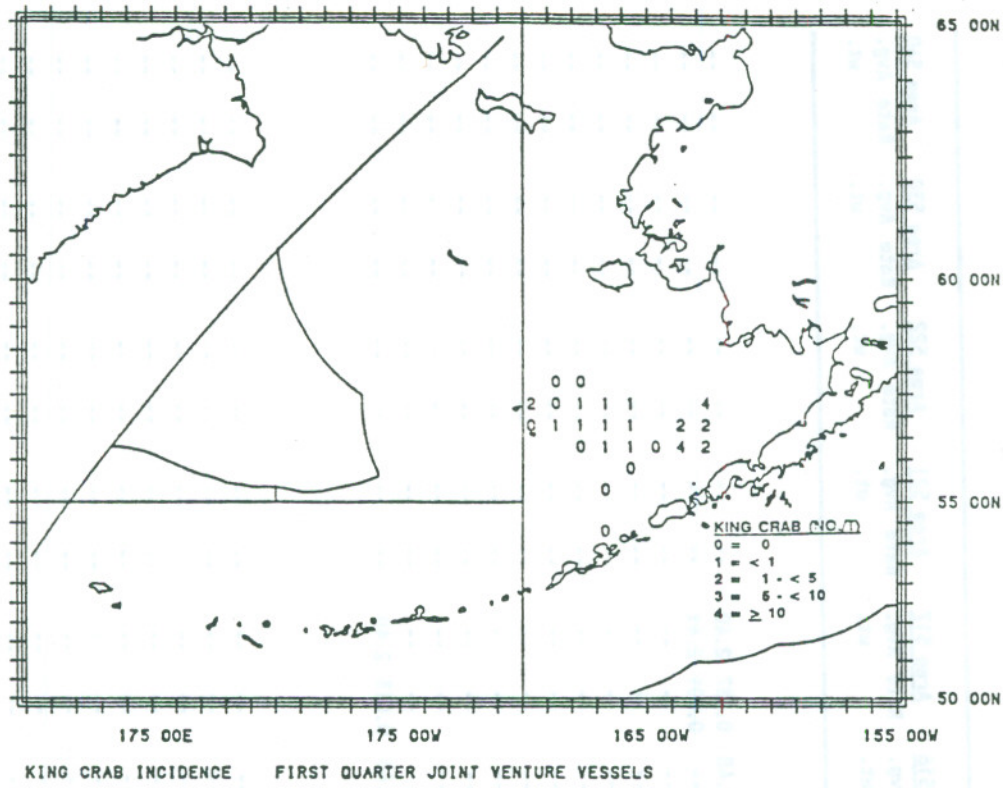
	Area 511		Area 512		Area 513		Area 514		Area 515		Area 516		Area 517		Area 521		Area 522		Area 530		Area 540	
	Rate	Avg. wt.	Rate	Avg. wt.	Rate	Avg. wt.	Rate	Avg. wt.	Rate	Avg. wt.	Rate	Avg. wt.	Rate	Avg. wt.	Rate	Avg. wt.	Rate	Avg. wt.	Rate	Avg. wt.	Rate	Avg. wt.
U.S.-Japan Joint Venture Mothership																						
Jan.	0.860	1.70	--	--	0.091	1.53	--	--	--	--	4.704	1.48	0.024	1.84	--	--	--	--	--	--	--	--
Feb.	--	--	--	--	0.029	1.84	--	--	--	--	--	--	0.002	1.45	--	--	--	--	--	--	--	--
Mar.	--	--	--	--	0.014	2.62	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Apr.	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
May	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
June	--	--	--	--	--	--	0.000	0.00	--	--	--	--	--	--	--	--	--	--	--	--	--	--
July	--	--	--	--	--	--	0.000	0.00	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Aug.	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Sep.	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Oct.	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Nov.	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Dec.	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Year	0.860	1.70	--	--	0.040	1.72	0.000	0.00	--	--	4.704	1.48	0.008	1.76	--	--	--	--	--	--	--	--
U.S.-Republic of Korea Joint Venture Mothership																						
Jan.	1.896	1.57	--	--	0.199	1.75	--	--	--	--	8.189	1.58	0.153	1.90	--	--	--	--	--	--	--	--
Feb.	--	--	--	--	0.012	1.75	--	--	--	--	--	--	0.001	1.10	--	--	--	--	--	--	--	--
Mar.	--	--	--	--	0.015	2.65	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Apr.	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
May	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
June	--	--	--	--	--	--	0.017	2.02	--	--	--	--	--	--	--	--	--	--	--	--	--	--
July	--	--	--	--	--	--	0.036	1.20	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Aug.	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Sep.	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Oct.	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Nov.	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Dec.	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Year	1.896	1.57	--	--	0.037	1.76	0.018	1.98	--	--	8.189	1.58	0.035	1.87	--	--	--	--	--	--	--	--

Table 19.--Continued.

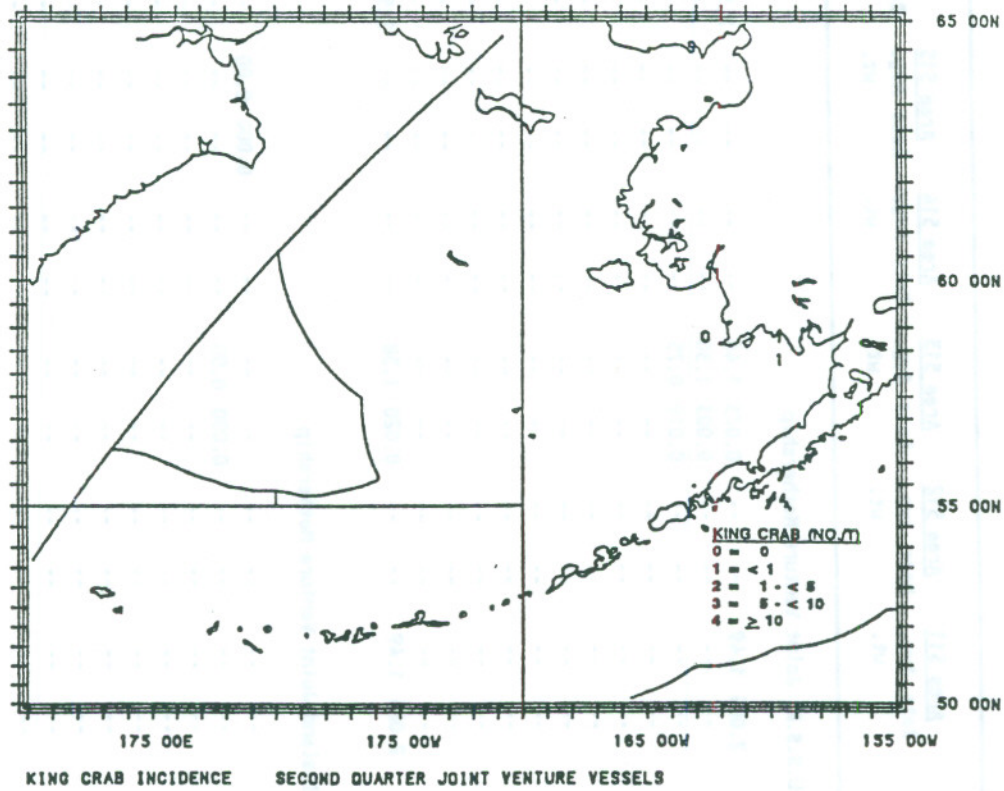
	Area 511		Area 512		Area 513		Area 514		Area 515		Area 516		Area 517		Area 521		Area 522		Area 530		Area 540	
	Rate	Avg. wt.	Rate	Avg. wt.	Rate	Avg. wt.	Rate	Avg. wt.	Rate	Avg. wt.	Rate	Avg. wt.	Rate	Avg. wt.	Rate	Avg. wt.	Rate	Avg. wt.	Rate	Avg. wt.	Rate	Avg. wt.
U.S.-Poland Joint Venture Mothership																						
Jan.	2.918	1.77	--	--	0.093	1.35	--	--	--	--	2.771	2.03	0.000	0.00	--	--	--	--	--	--	--	--
Feb.	--	--	--	--	0.135	1.40	--	--	--	--	--	--	0.000	0.00	--	--	--	--	--	--	--	--
Mar.	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Apr.	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
May	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
June	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
July	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Aug.	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Sep.	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Oct.	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Nov.	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Dec.	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Year	2.918	1.77	--	--	0.095	1.35	--	--	--	--	2.771	2.03	0.000	0.00	--	--	--	--	--	--	--	--
U.S.-People's Republic of China Joint Venture Mothership																						
Jan.	1.697	0.93	--	--	0.787	1.67	--	--	--	--	3.807	1.43	0.028	1.00	--	--	--	--	--	--	--	--
Feb.	--	--	--	--	0.119	1.72	--	--	--	--	--	--	0.008	0.64	--	--	--	--	--	--	--	--
Mar.	--	--	--	--	0.000	0.00	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Apr.	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
May	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
June	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
July	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Aug.	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Sep.	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Oct.	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Nov.	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Dec.	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Year	1.679	0.93	--	--	0.271	1.68	--	--	--	--	3.807	1.43	0.010	0.71	--	--	--	--	--	--	--	--

Table 19.--Continued.

	Area 511		Area 512		Area 513		Area 514		Area 515		Area 516		Area 517		Area 521		Area 522		Area 530		Area 540	
	Rate	Avg. wt.	Rate	Avg. wt.	Rate	Avg. wt.	Rate	Avg. wt.	Rate	Avg. wt.	Rate	Avg. wt.	Rate	Avg. wt.	Rate	Avg. wt.	Rate	Avg. wt.	Rate	Avg. wt.	Rate	Avg. wt.
U.S.-U.S.S.R. Joint Venture Mothership																						
Jan.	2.085	1.49	--	--	0.073	1.44	--	--	--	--	2.536	1.48	0.137	2.40	--	--	--	--	--	--	--	--
Feb.	--	--	--	--	0.003	1.30	--	--	--	--	--	--	0.001	2.41	--	--	--	--	--	--	--	--
Mar.	--	--	--	--	0.019	0.75	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Apr.	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
May	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
June	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
July	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Aug.	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Sep.	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Oct.	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Nov.	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Dec.	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Year	2.085	1.49	--	--	0.020	1.38	--	--	--	--	2.536	1.48	0.013	2.40	--	--	--	--	--	--	--	--
U.S.-Iceland Joint Venture Mothership																						
Jan.	--	--	--	--	--	--	--	--	0.000	0.00	--	--	--	--	--	--	--	--	--	--	--	--
Feb.	--	--	--	--	0.000	0.00	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Mar.	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Apr.	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
May	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
June	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
July	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Aug.	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Sep.	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Oct.	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Nov.	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Dec.	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Year	--	--	--	--	0.000	0.00	--	--	0.000	0.00	--	--	--	--	--	--	--	--	--	--	--	--

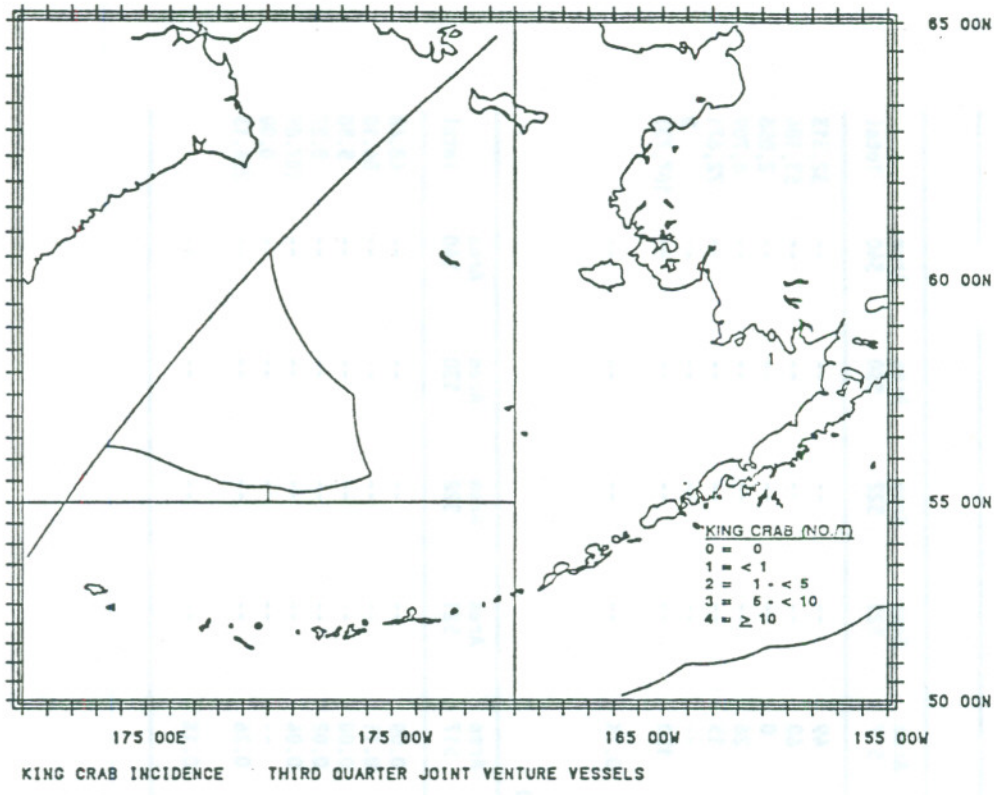


KING CRAB INCIDENCE FIRST QUARTER JOINT VENTURE VESSELS



KING CRAB INCIDENCE SECOND QUARTER JOINT VENTURE VESSELS

Figure 7.--Average incidence (no./t) of king crab in joint venture fisheries by quarter and 1/2° latitude by 1° longitude areas, 1990.



KING CRAB INCIDENCE THIRD QUARTER JOINT VENTURE VESSELS

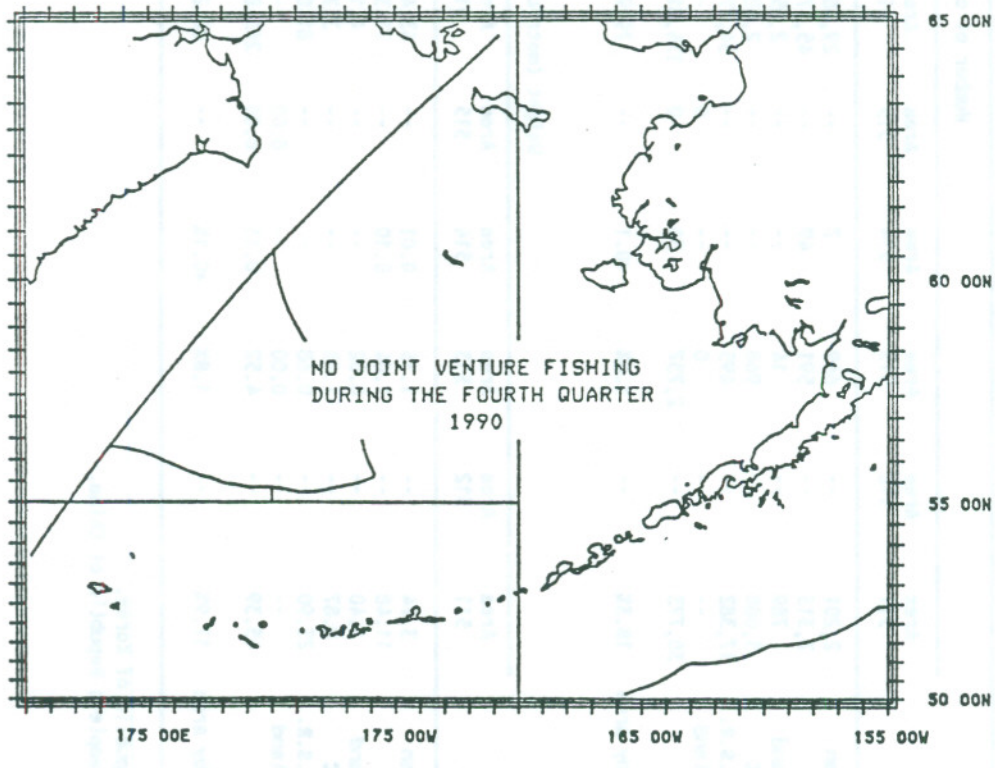


Figure 7.--Continued.

Table 20.--Estimated incidental catch of king crabs (in numbers and metric tons) by joint venture nation in the Bering Sea and Aleutian Islands region, 1990. (Dashes indicate areas not fished.)

	Number of crab											
	Area 511	Area 512	Area 513	Area 514	Area 515	Area 516	Area 517	Area 521	Area 522	Area 530	Area 540	Total
U.S.-Japan	2,201	--	669	7	--	29,387	49	--	--	--	--	32,313
U.S.-ROK	7,313	--	591	49	--	45,171	60	--	--	--	--	53,184
U.S.-Poland	789	--	14	--	--	2,053	0	--	--	--	--	2,856
U.S.-PROC	3,088	--	968	--	--	2,627	26	--	--	--	--	6,709
U.S.-U.S.S.R.	17,382	--	495	--	--	54,779	15	--	--	--	--	72,671
U.S.-Iceland	--	--	0	--	0	--	--	--	--	--	--	0
Total	30,773	--	2,737	56	0	134,017	150	--	--	--	--	167,733
Percent by area	18.3%	--	1.6%	<0.1	--	79.9%	0.1%	--	--	--	--	

	Weight (metric tons)											
	Area 511	Area 512	Area 513	Area 514	Area 515	Area 516	Area 517	Area 521	Area 522	Area 530	Area 540	Total
U.S.-Japan	3.74	--	1.15	0.01	--	43.49	0.09	--	--	--	--	48.48
U.S.-ROK	11.48	--	1.04	0.10	--	71.37	0.11	--	--	--	--	84.10
U.S.-Poland	1.40	--	0.02	--	--	4.17	0.00	--	--	--	--	5.58
U.S.-PROC	2.87	--	1.63	--	--	3.76	0.02	--	--	--	--	8.27
U.S.-U.S.S.R.	25.90	--	0.68	--	--	81.07	0.04	--	--	--	--	107.69
U.S.-Iceland	--	--	0.00	--	0.00	--	--	--	--	--	--	0.00
Total	45.39	--	4.52	0.11	0.00	203.86	0.26	--	--	--	--	254.13
Percent by area	17.9%	--	1.8%	<0.1%	--	80.2%	0.1%	--	--	--	--	

ROK = Republic of Korea.
PROC = People's Republic of China.

Table 21.--Estimated incidental catches (numbers and metric tons (t)) of king crabs in foreign and joint venture groundfish fisheries in the Bering Sea and Aleutian Islands region, 1977-90*.

Year	Foreign		Joint Venture		Total	
	No.	t	No.	t	No.	t
1977	599,623	641	NF	NF	599,623	641
1978	1,277,931	1,097	NF	NF	1,277,931	1,097
1979	1,007,796	1,008	NF	NF	1,007,796	1,008
1980	858,129	781	289,542	241	1,147,671	1,022
1981	733,026	666	1,084,126	642	1,817,152	1,308
1982	380,004	343	193,915	90	573,919	433
1983	404,013	353	630,144	337	1,034,157	690
1984	292,223	309	398,865	283	691,088	592
1985	219,783	191	1,005,290	678	1,225,073	869
1986	14,631	19	260,435	332	275,066	351
1987	7,403	9	139,983	169	147,386	178
1988	NF	NF	88,033	119	88,033	119
1989	NF	NF	207,703	315	207,703	315
1990	NF	NF	167,733	254	167,733	254

* Estimated catches for years 1977-89 from Guttormsen et al. (1990).

NF = No fishing.

Table 22.--Groundfish catch (in metric tons) and numbers of king crabs in the joint venture groundfish fishery by species and zone, 1990.

Zone	Groundfish catch (t)	Red king crab no.	Blue king crab* no.	Other king crab no.
1	47,482.5	164,587	203	0
2	81,841.0	2,669	218	0
3	4,112.9	53	3	0

* Paralithodes platypus.

Table 23.--Biological data on the incidental catches of king crabs in the joint venture groundfish fishery in the Bering Sea and Aleutian Islands region, 1990.

Species	Percent by species	Sex	Sex composition	Average weight (kg)	Average length (mm)
Red king crab	99.75	Male	82.90	1.62	132.0
		Female	17.10	0.99	109.1
		Unsexed		0.69	101.9
		Combined		1.51	128.0
Blue king crab	0.25	Male	85.43	1.51	130.7
		Female	14.57	0.70	100.9
		Combined		1.40	126.4

Table 24.--Pacific herring catch statistics (1,000 metric tons) in the Bering Sea and Aleutian Islands foreign and joint venture groundfish fishery, 1977-90*.

	Pacific herring joint venture catch (1,000 t)	% of total joint venture catch (1,000 t)	Pacific herring foreign catch	% of total foreign catch
1977	NF	NF	19.3	1.50
1978	NF	NF	8.4	0.61
1979	NF	NF	7.5	0.58
1980	0.0	0.00	0.8	0.06
1981	0.0	0.00	0.3	0.02
1982	<0.1	--	1.9	0.16
1983	1.1	0.52	1.4	0.12
1984	1.8	0.50	1.3	0.11
1985	3.1	0.48	1.5	0.14
1986	3.8	0.33	0.3	0.06
1987	0.5	0.04	<0.1	<0.01
1988	0.4	0.03	NF	NF
1989	2.5	0.47	NF	NF
1990	0.1	0.10	NF	NF

* Estimated catches for the years 1977-89 from Guttormsen et al. (1990).

NF = No fishing.

Table 25.--Common and scientific names of flatfish identified in the 1990 joint venture catches in the Bering Sea and Aleutian Islands region.

Common name	Scientific name
Alaska plaice	Pleuronectes quadrituberculatus
Arrowtooth flounder	Atheresthes stomias
Bering flounder	Hippoglossoides robustus
Butter sole	Pleuronectes isolepis
Dover sole	Microstomus pacificus
Flathead sole	Hippoglossoides elassodon
Greenland turbot	Reinhardtius hippoglossoides
Kamchatka flounder	Atheresthes evermanni
Longhead dab	Pleuronectes proboscideus
Rex sole	Errex zachirus
Rock sole	Pleuronectes bilineatus
Starry flounder	Platichthys stellatus
Yellowfin sole	Pleuronectes asper

Table 26.--Estimated joint venture catch (in metric tons and percentages) of flatfish by species in the Bering Sea and Aleutian Islands region during 1990.

Common name	Metric tons	Percent by species
Alaska plaice	15,928.05	16.00
Arrowtooth flounder	644.04	0.65
Bering flounder	133.45	0.13
Butter sole	0.97	<0.01
Flatfish, unidentified	0.15	<0.01
Flathead sole	2,218.86	2.23
Greenland turbot	0.91	<0.01
Kamchatka flounder	16.11	0.02
Longhead dab	16.27	0.02
Rex sole	3.29	<0.01
Rock sole	10,492.29	10.54
Starry flounder	446.64	0.45
Yellowfin sole	69,676.91	69.97
Total	99,577.94	

SUMMARY OF OBSERVER SAMPLING OFF THE COASTS OF WASHINGTON, OREGON, AND CALIFORNIA

Catch Allocations

The joint venture fishery for Pacific whiting (Merluccius productus) received a quota of 171,000 t in 1990. For the second year in a row, the foreign fishery did not receive an allocation and did not fish.

In the Pacific whiting joint venture fishery, quotas are only set for Pacific whiting. Other species are allowed to be taken as bycatch and limits for these species are established as a percentage of the Pacific whiting quota (Table 27). The percentage limitations apply to each 5,000 t of Pacific whiting received from U.S. vessels. If the retention limit of a species is reached prior to the receipt of 5,000 t of Pacific whiting, additional catches of that species are required to be discarded until 5,000 t of Pacific whiting are received. The retention limits allow U.S. fishery managers to monitor the bycatch of important commercial groundfish species taken in the Pacific whiting joint venture fishery.

Observer Coverage of Fishing Fleets

The period of 1990 joint venture fishing for Pacific whiting off the Washington-Oregon-California coast (Fig. 8) was divided into two seasons (Fig. 9). The first season began on 3 April and continued until 20 June when the initial allocation was attained. The fishery reopened on 2 August when it received a reapportionment of Pacific whiting from the domestic fishery. The second season ceased on 27 October when the Pacific whiting quota was attained. Participating in joint venture fishing operations with U.S. fishermen were processing vessels from Poland, Japan, and the U.S.S.R. In the joint venture fishery, observers sampled a total of 1,882 days out of the 1,960 days foreign processors spent on the fishing grounds, providing a level of coverage of 96.0% (Table 28). The level of coverage in the joint venture fishery for 1989 was 96.7%.

Estimates of U.S. Joint Venture Catches

In 1990, the Pacific whiting joint venture fishery landed 172,069 t of groundfish, and Pacific whiting comprised 170,972 t (99.4%) of the total catch (Table 29). The catch of Pacific whiting taken by the joint venture fishery in 1990 was 16% less than the catch taken in 1989 but still represented the second highest total taken by the combined foreign and joint venture fisheries since the inception of the MFCMA in 1976 (Table 30). Of the bycatch taken in 1990, the majority was made up of rockfish (excluding Pacific ocean perch) and jack mackerel (Trachurus symmetricus).

Figure 10 illustrates how the groundfish catch in the 1990 Pacific whiting joint venture fishery was distributed by International North Pacific Fisheries Commission Statistical (INPFC) area. The catches in the Columbia and Eureka

INPFC areas accounted for 59% and 36%, respectively, of the total catch. The catches in the Vancouver and Monterey INPFC areas accounted for 4% and 1%, respectively.

Incidence and Incidental Catch of Prohibited Species

Pacific Salmon and Steelhead

The incidence rates and average weights of salmon taken in the Pacific whiting joint venture fishery in 1990 are shown in Table 31 by joint venture nation, INPFC statistical area, and month. As in 1989, the early closure of the joint venture fishery resulted in low rates of salmon incidence (the highest catch of salmon generally occurs in July and August). The highest salmon incidence rate (0.23 salmon/t of catch) occurred in June during U.S.-Japan fishing in the Eureka INPFC area. The U.S.-Poland joint venture operation occurred in August (during the second opening) but had an incidence rate of only 0.002 salmon/t of groundfish in both the Vancouver and Columbia INPFC areas.

Figure 11 provides a summary by 1/2 degree latitude and 1 degree longitude blocks of the incidence of salmon in the Pacific whiting joint venture fishery for 1990. Only two blocks exceeded 0.07 salmon/t: lat. 47°30'N by long. 124°W (0.195 salmon/t) off the north Washington coast; and lat. 40°30' by long. 124°W (0.221 salmon/t) off of Cape Mendocino on the northern California coast.

The estimated incidental catch of salmon in the Pacific whiting joint venture fishery by joint venture nation, INPFC area, and month is shown in Table 32. The highest catches were taken in the Eureka INPFC area by the U.S.-Japan fishery during May (1,546 fish) and June (4,212 fish). By area, 64.4% of the salmon catch occurred in the Eureka INPFC area, 31.6% in the Columbia INPFC area, 3.5% in the Vancouver INPFC area, and 0.5% in the Monterey INPFC area. The total catch of salmon in 1990 was 9,308 fish, or 20.8 t (Table 32). The catch by number represented an increase of 1.1% from the catch taken in 1988, though by weight the catch in 1990 was 17.3% less than the catch taken in 1989 (Table 33). No steelhead (O. mykiss) were reported in 1990.

The biological data for the incidentally caught Pacific salmon are presented in Table 34. Chinook salmon accounted for 98.2% of the salmon and had an average weight of 2.23 kg and an average length of 55.3 cm.

Pacific Halibut

As in previous years, the annual incidence of Pacific halibut was extremely low in the Pacific whiting joint venture fishery (Table 35), ranging from 0.000 fish/t to 0.002 fish/t. All incidental catch occurred in the Columbia INPFC area, and similar to past years, most of the halibut catch occurred during May and June (Table 36). The catch of 75 halibut in 1990 was 31.8% less than the catch taken in 1989 (Table 37).

Joint Venture Rockfish Catch by Species

The 26 species of rockfish identified by observers in the Pacific whiting joint venture fishery in 1990 are listed in Table 38. The rockfish catch was predominantly yellowtail rockfish (Sebastes flavidus, 118 t) and widow rockfish (S. entomelas, 102 t) (Table 39). Other species made up only 47 t of the catch (Table 39). The catch of yellowtail rockfish occurred primarily in the Vancouver and Columbia INPFC areas, where it was the predominant rockfish species taken, accounting for 55% and 49%, respectively, of the rockfish catches in those two areas. Widow rockfish was the primary species taken in the Eureka INPFC area, accounting for 60% of the rockfish catches in that area. A significant amount of widow rockfish was also caught in the Vancouver INPFC area (43%) and the Columbia INPFC area (33%).

In 1990, 268 t of rockfish were taken by the joint venture fishery. (This total includes catches of both retained and discarded rockfish.) The Columbia INPFC area yielded 60% of the rockfish catch. The catch of rockfish in the Vancouver INPFC area, where 4% of the groundfish catch was taken, accounted for 27% of the total rockfish catch. Conversely, only 10% of the rockfish catch occurred in the Eureka INPFC area, where 36% of the groundfish catch was taken. The Monterey INPFC area accounted for 1% of the groundfish catch and nearly 3% of the rockfish catch.

Joint Venture Flatfish Catch by Species

Eight species of flatfish were identified by observers in the Pacific whiting joint venture fishery in 1990 (Table 40). The incidental catch of 25.5 t was only 31% of the 81 t caught in 1989. Pacific sanddab (Citharichthys sordidus) was the predominant species taken, accounting for 99.87% (by weight) of the flatfish identified in 1990 (Table 41). The Columbia INPFC area accounted for 100% of the flatfish catch.

Table 27.--Percentage limitations of bycatch species for the Pacific whiting joint venture fishery off the coasts of Washington, Oregon, and California for 1990.

Species	Percentage of Pacific whiting quota
Flounders	0.100%
Jack mackerel	3.000%
Pacific ocean perch	0.062%
Rockfishes (excluding Pacific ocean perch)	0.738%
Sablefish	0.173%
Other species	0.500%

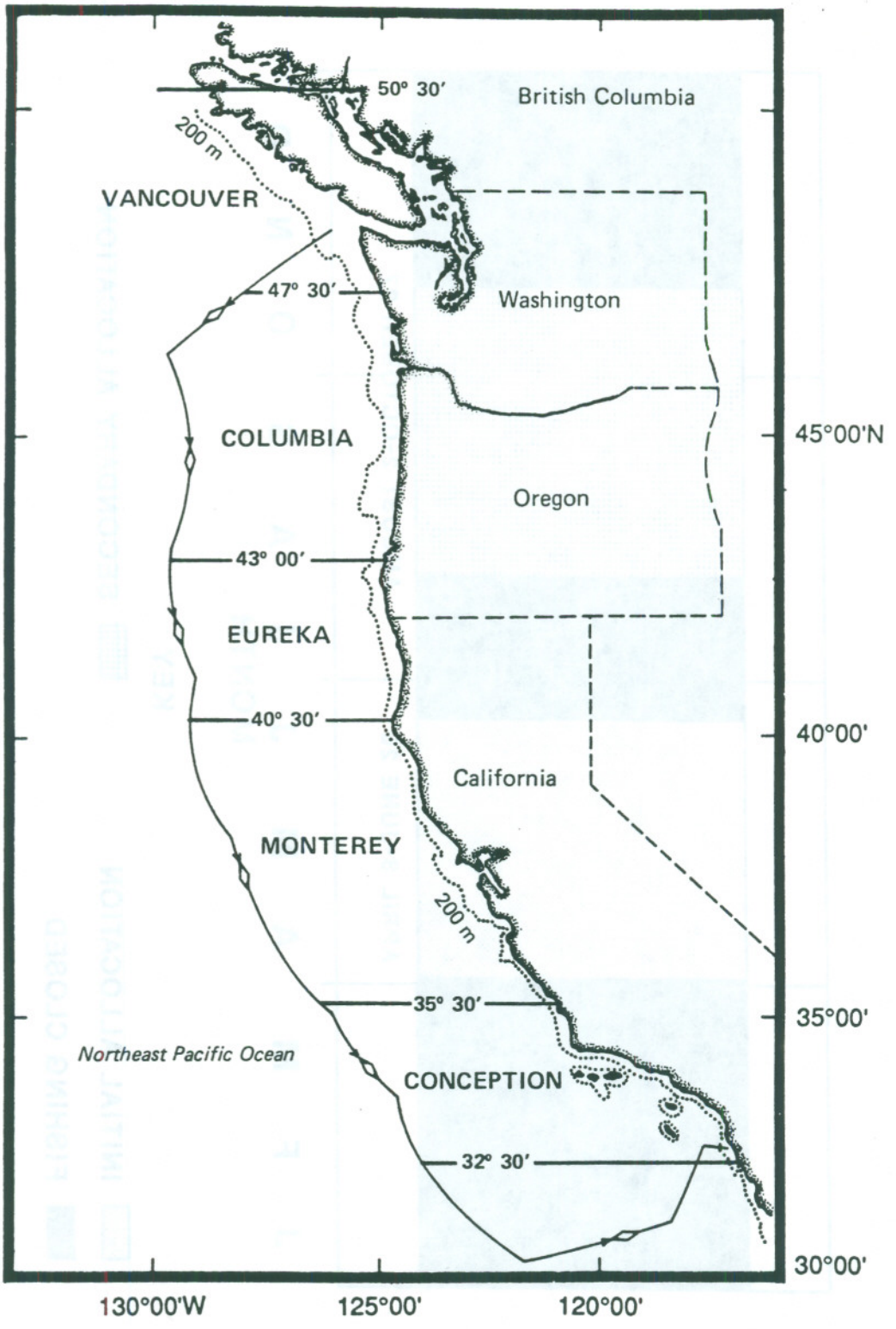


Figure 8.--International North Pacific Fisheries Commission statistical areas off the coasts of Washington, Oregon, and California.

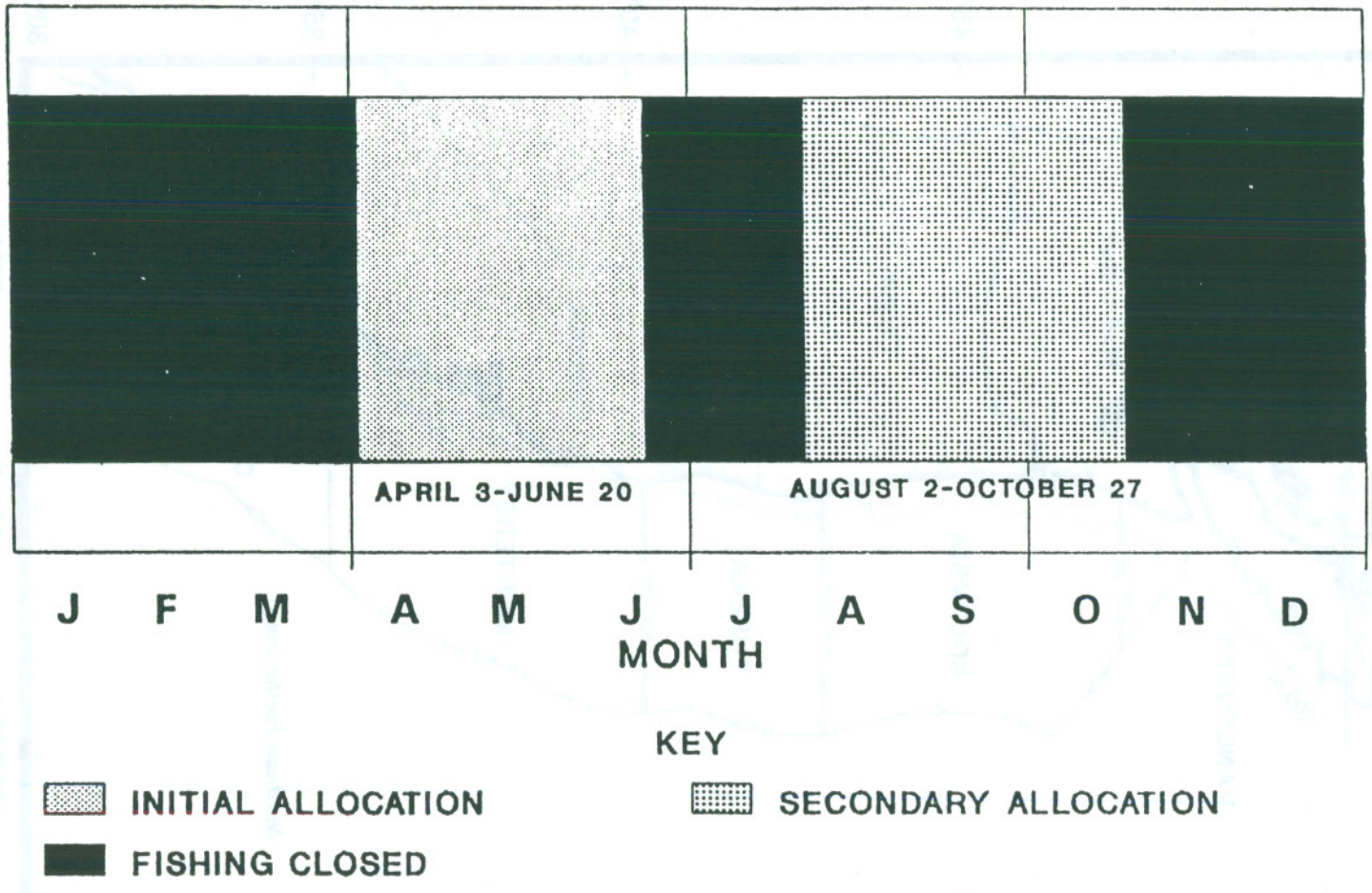


Figure 9.--Joint venture openings and closures along the Washington-Oregon-California coast, 1990.

Table 28.--Annual summary of observer effort, vessel effort, and observer coverage (100 x observer days/vessel days) by nation and vessel class in the Pacific whiting joint venture fishery off the coasts of Washington, Oregon, and California, 1990.

Nation	Vessel class	No. of observers	No. of ships observed*	No. of ships in fishery	No. of observer days	No. of vessel days	Percent coverage
U.S.-Poland	FJV	16	13	13	570	597	95.5
U.S.-Japan	SJV	3	2	2	99	105	94.3
U.S.-U.S.S.R.	FJV	21	19	19	1,213	1,258	96.4
Total		36	34	34	1,882	1,960	96.0

* For the joint venture fishery, only the foreign processing vessels are indicated for the number of ships and vessel days. U.S. catcher boats are not included.

FJV = Freezer joint venture.
SJV = Surimi joint venture.

Table 29.--Estimated catches of groundfish taken (in metric tons (t)) by joint venture vessels operating in the Pacific whiting fishery off the coasts of Washington, Oregon, and California, 1990.

Species group	Retained (t)*	Discarded (t)	Total (t)	% of Pacific whiting catch
Pacific whiting	170,972.4		170,972.4	
Jack mackerel	80.4	107.1	187.5	0.1%
Rockfish (excluding Pacific ocean perch)	267.4	407.0	674.4	0.4%
Pacific ocean perch	0.5	1.8	2.3	<0.1%
Sablefish	8.1	8.1	16.2	<0.1%
Flounders	25.5	66.5	92.0	<0.1%
Other fish	10.8	113.1	123.9	0.1%
Total	171,365.1	703.6	172,068.8	

* See text for description of regulations pertaining to retention and discarding of joint venture catch.

Table 30.--Estimated catch in metric tons (t) of Pacific whiting by foreign and joint venture fisheries off the coasts of Washington, Oregon, and California, 1977-90*.

Year	Foreign (t)	Joint venture (t)	Total (t)
1977	127,013	NF	127,013
1978	96,827	856	97,683
1979	114,910	8,834	123,744
1980	44,023	27,537	71,560
1981	70,365	43,557	113,922
1982	7,089	67,465	74,554
1983	NF	72,100	72,100
1984	14,772	78,889	93,661
1985	49,853	31,692	81,545
1986	69,861	81,640	151,501
1987	49,656	105,997	155,653
1988	18,041	135,781	153,822
1989	NF	203,578	203,578
1990	NF	170,972	170,972

* Estimates for years 1977-89 are from Guttormsen et al. (1990).

NF = No fishing.

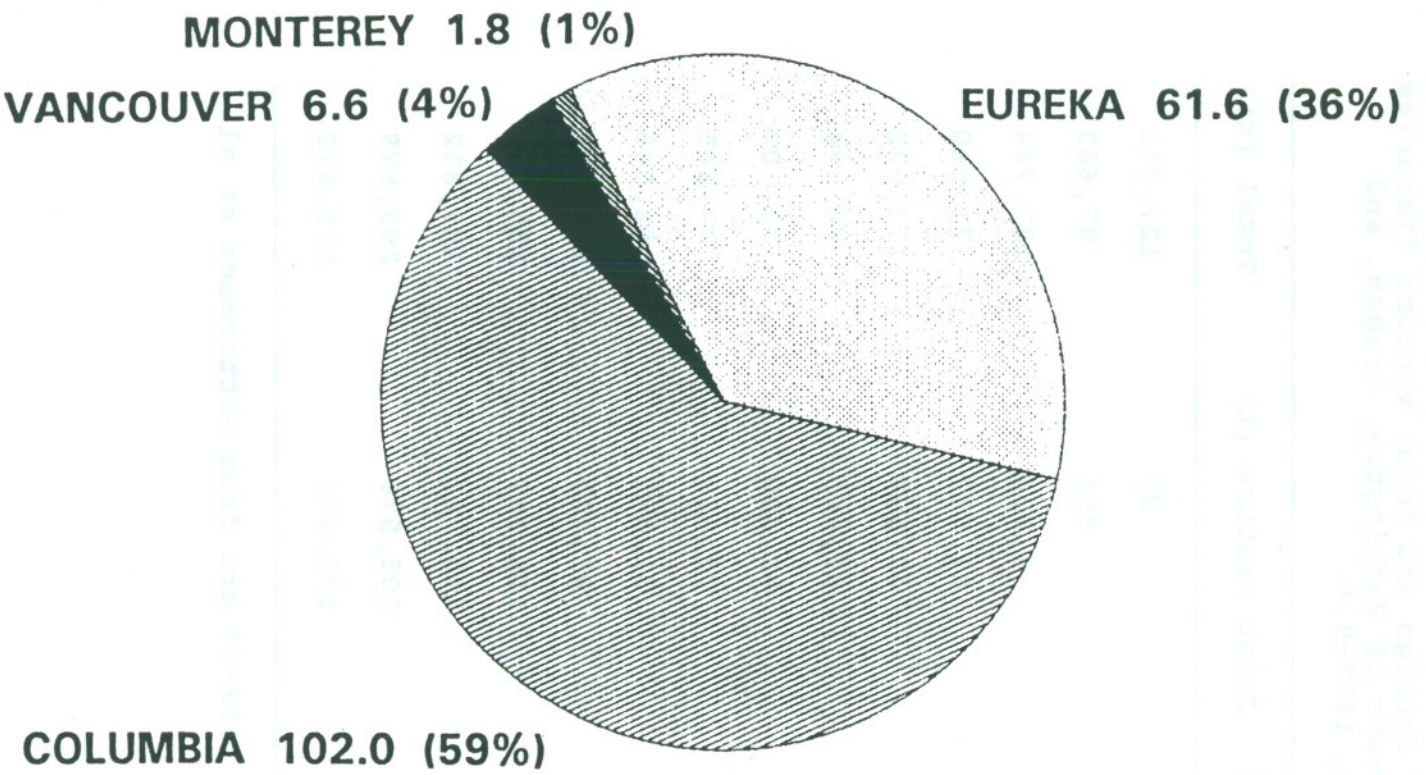


Figure 10.--Total joint venture groundfish catch in thousands of metric tons (% of total catch) along the Washington-Oregon-California coast by International North Pacific Fisheries Commission statistical area, 1990. No catch was taken in the Conception area.

Table 31.--Incidence rates (number per metric ton of catch) and average weights (kg) of Pacific salmon by International North Pacific Fisheries Commission statistical area, nation, and month in the Pacific whiting joint venture fishery off the coasts of Washington, Oregon, and California, 1990. (Dashes indicate areas not fished.)

	Vancouver		Columbia		Eureka		Monterey	
	Rate	Average weight	Rate	Average weight	Rate	Average weight	Rate	Average weight
U.S.-U.S.S.R. Joint Venture Mothership								
Jan.	--	--	--	--	--	--	--	--
Feb.	--	--	--	--	--	--	--	--
March	--	--	--	--	--	--	--	--
April	--	--	0.019	2.78	0.022	2.81	0.022	2.45
May	0.089	1.89	0.033	2.60	0.045	2.37	--	--
June	--	--	0.034	2.37	0.000	0.00	--	--
July	--	--	--	--	--	--	--	--
Sep.	--	--	--	--	--	--	--	--
Oct.	--	--	--	--	--	--	--	--
Nov.	--	--	--	--	--	--	--	--
Dec.	--	--	--	--	--	--	--	--
Annual	0.089	1.89	0.031	2.55	0.025	2.71	0.022	2.45
U.S.-Poland Joint Venture Mothership								
Jan.	--	--	--	--	--	--	--	--
Feb.	--	--	--	--	--	--	--	--
March	--	--	--	--	--	--	--	--
April	--	--	0.009	2.26	0.028	2.05	--	--
May	0.008	4.40	0.043	2.57	--	--	--	--
June	--	--	0.041	2.20	--	--	--	--
July	--	--	--	--	--	--	--	--
Aug.	0.002	10.00	0.002	3.96	--	--	--	--
Sep.	--	--	0.015	2.91	--	--	--	--
Oct.	--	--	0.000	0.00	--	--	--	--
Nov.	--	--	--	--	--	--	--	--
Dec.	--	--	--	--	--	--	--	--
Annual	0.006	5.33	0.029	2.44	0.028	2.05	--	--
U.S.-Japan Joint Venture Mothership								
Jan.	--	--	--	--	--	--	--	--
Feb.	--	--	--	--	--	--	--	--
March	--	--	--	--	--	--	--	--
April	--	--	0.000	0.00	0.025	3.34	--	--
May	0.006	3.23	0.004	2.40	0.041	2.99	--	--
June	--	--	--	--	0.230	1.74	--	--
July	--	--	--	--	--	--	--	--
Aug.	--	--	--	--	--	--	--	--
Sep.	--	--	--	--	--	--	--	--
Oct.	--	--	--	--	--	--	--	--
Nov.	--	--	--	--	--	--	--	--
Dec.	--	--	--	--	--	--	--	--
Annual	0.006	3.23	0.003	2.40	0.104	2.07	--	--

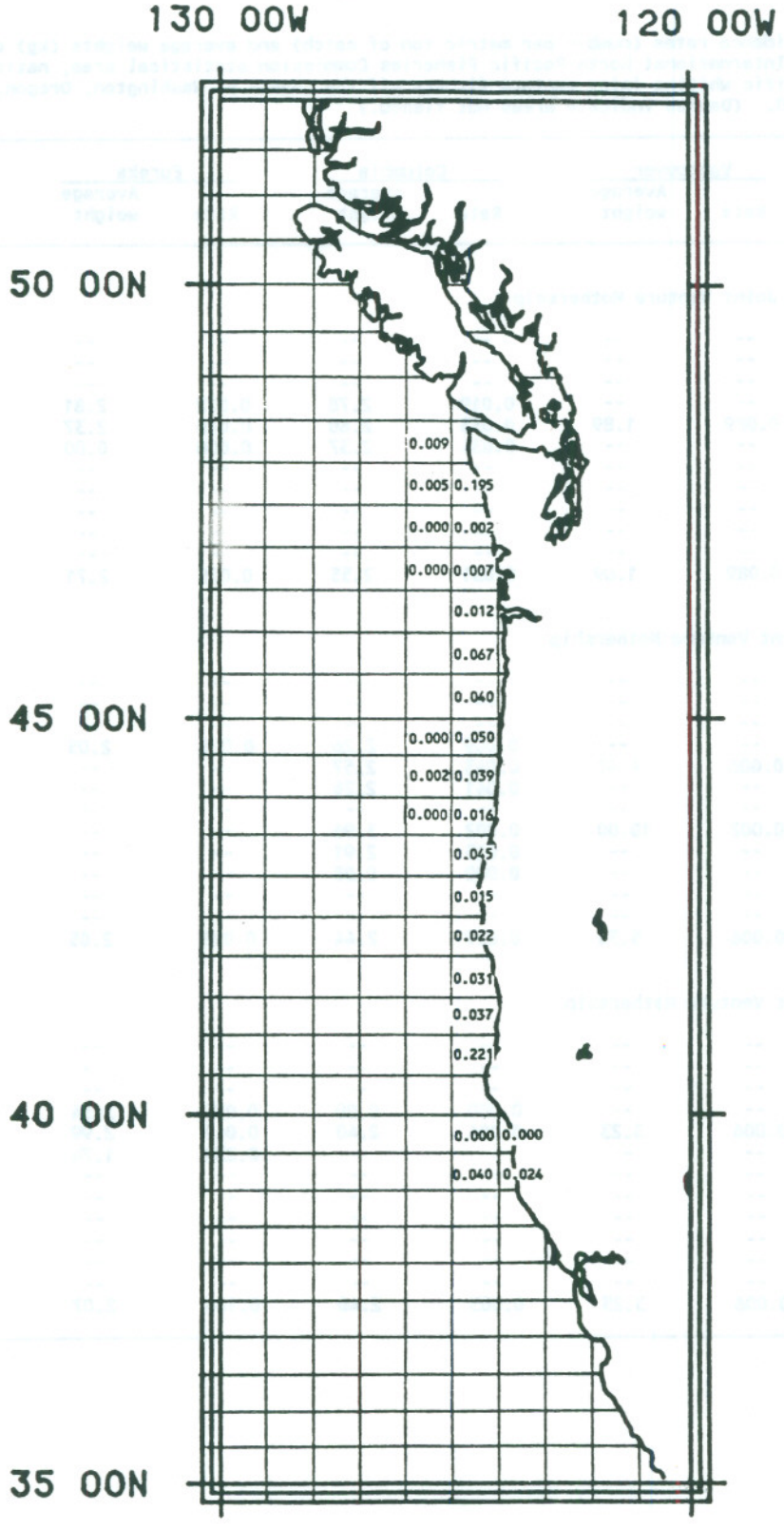


Figure 11.--Average incidence of Pacific salmon (number of fish/metric ton of groundfish) in the Pacific whiting joint venture off the coasts of Washington, Oregon, and California, 1990.

Table 32.--Estimated incidental catch of Pacific salmon (numbers and metric tons) by International North Pacific Fisheries Commission statistical area and month in the Pacific whiting joint venture fishery off the coasts of Washington, Oregon, and California, 1990. (Dashes indicate areas not fished.)

Month	Vancouver		Columbia		Eureka		Monterey		All areas	
	No.	t	No.	t	No.	t	No.	t	No.	t
Joint venture fishery--U.S.-Japan										
April	--	--	0	0.0	9	<0.1	--	--	9	<0.1
May	6	0.1	8	<0.1	1,546	4.6	--	--	1,560	4.7
June	--	--	--	--	4,212	7.3	--	--	4,212	7.3
Total	6	0.1	8	<0.1	5,758	11.9	--	--	5,781	12.0
Joint venture fishery--U.S.-Poland										
April	--	--	5	<0.1	10	<0.1	--	--	15	<0.1
May	16	0.1	390	1.0	--	--	--	--	406	1.1
June	--	--	460	1.0	--	--	--	--	460	1.0
Aug.	1	<0.1	13	0.1	--	--	--	--	14	0.1
Sep.	--	--	77	0.2	--	--	--	--	77	0.2
Oct.	--	--	0	0.0	--	--	--	--	0	0.0
Total	17	0.1	945	2.3	10	<0.1	--	--	972	2.4
Joint venture fishery--U.S.-U.S.S.R.										
April	--	--	200	0.6	171	0.5	42	0.1	413	1.2
May	303	0.6	1,192	3.1	47	0.1	--	--	1,542	3.8
June	--	--	600	1.4	0	0.0	--	--	600	1.4
Total	303	0.6	1,992	5.1	218	0.6	42	0.1	2,555	6.4
All fisheries--Total										
April	--	--	205	0.6	190	0.5	42	0.1	437	1.2
May	325	0.8	1,590	4.1	1,593	4.7	--	--	3,508	9.6
June	--	--	1,060	2.4	4,212	7.3	--	--	5,272	9.7
Aug.	1	<0.1	13	0.1	--	--	--	--	14	0.1
Sep.	--	--	77	0.2	--	--	--	--	77	0.2
Oct.	--	--	0	0.0	--	--	--	--	0	0.0
Total	326	0.8	2,945	7.4	5,995	12.5	42	0.1	9,308	20.8

Table 33.--Estimated incidental catches (numbers and metric tons (t)) of Pacific salmon in foreign and joint venture Pacific whiting fisheries off the coasts of Washington, Oregon, and California, 1977-90*.

Year	Foreign		Joint Venture		Total	
	No.	t	No.	t	No.	t
1977	14,627	49.1	NF	NF	14,627	49.1
1978	5,905	19.1	19	<0.1	5,924	19.1
1979	7,043	29.8	1,623	4.1	8,666	33.9
1980	4,831	17.1	3,602	8.6	8,433	25.7
1981	5,052	17.7	6,422	13.6	11,474	31.3
1982	104	0.8	11,694	33.1	11,798	33.9
1983	NF	NF	5,143	10.8	5,143	10.8
1984	63	0.3	10,192	18.5	10,255	18.8
1985	713	3.8	1,575	4.0	2,288	7.8
1986	11,739	26.0	32,051	47.7	43,790	73.7
1987	4,649	14.7	8,636	19.6	13,285	34.3
1988	2,185	7.1	13,983	29.0	16,168	36.1
1989	NF	NF	9,199	24.9	9,199	24.9
1990	NF	NF	9,308	20.8	9,308	20.8

* Estimated catches for years 1977-89 from Guttormsen et al. (1990).

NF = No fishing.

Table 34.--Biological data on the incidental catches of Pacific salmon in the Pacific whiting joint venture fishery off the coasts of Washington, Oregon, and California, 1990.

Species	Percent by species	Sex	Sex composition	Average weight (kg)	Average length (cm)
Chinook	98.21	Male	48.78	2.11	54.2
		Female	51.22	2.34	56.4
		Unsexed		2.40	53.1
		Combined		2.23	55.3
Chum	1.43	Male	30.66	2.24	54.5
		Female	69.34	1.70	50.2
		Combined		1.86	51.5
Coho	0.36	Male	65.46	6.30	76.1
		Female	34.54	3.39	63.1
		Combined		5.30	71.6

Table 35.--Incidence rates (number per metric ton of catch) and average weights (kg) of Pacific halibut by International North Pacific Fisheries Commission statistical area, nation, and month in the Pacific whiting joint venture fishery off the coasts of Washington, Oregon, and California, 1990. (Dashes indicate areas not fished.)

	Vancouver		Columbia		Eureka		Monterey	
	Rate	Average weight	Rate	Average weight	Rate	Average weight	Rate	Average weight
U.S.-U.S.S.R. Joint Venture Mothership								
Jan.	--	--	--	--	--	--	--	--
Feb.	--	--	--	--	--	--	--	--
March	--	--	--	--	--	--	--	--
April	--	--	0.000	13.05	0.000	0.00	0.000	0.00
May	0.000	0.00	0.002	7.90	0.000	0.00	--	--
June	--	--	0.001	6.51	0.000	0.00	--	--
July	--	--	--	--	--	--	--	--
Sep.	--	--	--	--	--	--	--	--
Oct.	--	--	--	--	--	--	--	--
Nov.	--	--	--	--	--	--	--	--
Dec.	--	--	--	--	--	--	--	--
Annual	0.000	0.00	0.001	8.09	0.000	0.00	0.000	0.00
U.S.-Poland Joint Venture Mothership								
Jan.	--	--	--	--	--	--	--	--
Feb.	--	--	--	--	--	--	--	--
March	--	--	--	--	--	--	--	--
April	--	--	0.000	0.00	0.000	0.00	--	--
May	0.000	0.00	0.000	6.90	--	--	--	--
June	--	--	0.000	7.02	--	--	--	--
July	--	--	--	--	--	--	--	--
Aug.	0.000	0.00	0.000	0.00	--	--	--	--
Sep.	--	--	0.000	0.00	--	--	--	--
Oct.	--	--	0.000	0.00	--	--	--	--
Nov.	--	--	--	--	--	--	--	--
Dec.	--	--	--	--	--	--	--	--
Annual	0.000	0.00	0.000	6.98	0.000	0.00	--	--
U.S.-Japan Joint Venture Mothership								
Jan.	--	--	--	--	--	--	--	--
Feb.	--	--	--	--	--	--	--	--
March	--	--	--	--	--	--	--	--
April	--	--	0.000	0.00	0.000	0.00	--	--
May	0.000	0.00	0.000	0.00	0.000	0.00	--	--
June	--	--	--	--	0.000	0.00	--	--
July	--	--	--	--	--	--	--	--
Aug.	--	--	--	--	--	--	--	--
Sep.	--	--	--	--	--	--	--	--
Oct.	--	--	--	--	--	--	--	--
Nov.	--	--	--	--	--	--	--	--
Dec.	--	--	--	--	--	--	--	--
Annual	0.000	0.00	0.000	0.00	0.000	0.00	--	--

Table 36.--Estimated incidental catch of Pacific halibut (numbers and metric tons) by International North Pacific Fisheries Commission statistical area and month in the Pacific whiting joint venture fishery off the coasts of Washington, Oregon, and California, 1990. (Dashes indicate areas not fished.)

Month	Vancouver		Columbia		Eureka		Monterey		All areas	
	No.	t	No.	t	No.	t	No.	t	No.	t
Joint venture fishery--U.S.-Japan										
April	--	--	0	0.0	0	0.0	--	--	0	0.0
May	0	0.0	0	0.0	0	0.0	--	--	0	0.0
June	--	--	--	--	0	0.0	--	--	0	0.0
Total	0	0.0	0	0.0	0	0.0	--	--	0	0.0
Joint venture fishery--U.S.-Poland										
April	--	--	0	0.0	0	0.0	--	--	0	0.0
May	0	0.0	2	<0.1	--	--	--	--	2	<0.1
June	--	--	5	<0.1	--	--	--	--	5	<0.1
Aug.	0	0.0	0	0.0	--	--	--	--	0	0.0
Sep.	--	--	0	0.0	--	--	--	--	0	0.0
Oct.	--	--	0	0.0	--	--	--	--	0	0.0
Total	0	0.0	7	0.1	0	0.0	--	--	7	0.1
Joint venture fishery--U.S.-U.S.S.R.										
April	--	--	5	0.1	0	0.0	0	0.0	5	0.1
May	0	0.0	56	0.5	0	0.0	--	--	56	0.5
June	--	--	7	<0.1	0	0.0	--	--	7	<0.1
Total	0	0.0	68	0.6	0	0.0	0	0.0	68	0.6
All fisheries--Total										
April	--	--	5	0.1	0	0.0	0	0.0	5	0.1
May	0	0.0	58	0.5	0	0.0	--	--	58	0.5
June	--	--	12	0.1	0	0.0	--	--	12	0.1
Aug.	0	0.0	0	0.0	--	--	--	--	0	0.0
Sep.	--	--	0	0.0	--	--	--	--	0	0.0
Oct.	--	--	0	0.0	--	--	--	--	0	0.0
Total	0	0.0	75	0.7	0	0.0	0	0.0	75	0.7

Table 37.--Estimated incidental catches (numbers and metric tons (t)) of Pacific halibut in foreign and joint venture Pacific whiting fisheries off the coasts of Washington, Oregon, and California, 1977-90*.

Year	Foreign		Joint Venture		Total	
	No.	t	No.	t	No.	t
1977	86	1.6	NF	NF	86	1.6
1978	240	1.4	0	0.0	240	1.4
1979	40	0.5	0	0.0	40	0.5
1980	135	0.9	0	0.0	135	0.9
1981	22	0.1	0	0.0	22	0.1
1982	1	<0.1	43	0.2	44	0.2
1983	NF	NF	46	0.5	46	0.5
1984	0	0.0	26	0.2	26	0.2
1985	4	0.1	31	0.2	35	0.3
1986	20	0.1	96	0.6	116	0.7
1987	20	0.2	49	0.4	69	0.6
1988	11	0.1	131	0.8	142	0.9
1989	NF	NF	110	1.0	110	1.0
1990	NF	NF	75	0.7	75	0.7

*Estimated catches for years 1977-89 from Guttormsen et al. (1990).

NF = No fishing.

Table 38.--Common and scientific names of rockfish identified in the 1990 Pacific whiting joint venture fishery off the coasts of Washington, Oregon, and California.

Common name[a]	Scientific name
Bocaccio	*Sebastes paucispinis*
Canary rockfish	*Sebastes pinniger*
Chilipepper	*Sebastes goodei*
Darkblotched rockfish	*Sebastes crameri*
Pacific ocean perch	*Sebastes alutus*
Redstripe rockfish	*Sebastes proriger*
Sharpchin rockfish	*Sebastes zacentrus*
Shortbelly rockfish	*Sebastes jordani*
Splitnose rockfish	*Sebastes diploproa*
Vermilion rockfish	*Sebastes miniatus*
Widow rockfish	*Sebastes entomelas*
Yellowtail rockfish	*Sebastes flavidus*
Other rockfish[b]	
Bank rockfish	*Sebastes rufus*
Black rockfish	*Sebastes melanops*
Blue rockfish	*Sebastes mystinus*
Greenstriped rockfish	*Sebastes elongatus*
Pygmy rockfish	*Sebastes wilsoni*
Redbanded rockfish	*Sebastes babcocki*
Rosethorn rockfish	*Sebastes helvomaculatus*
Rosy rockfish	*Sebastes rosaceus*
Rougheye rockfish	*Sebastes aleutianus*
Shortraker rockfish	*Sebastes borealis*
Shortspine thornyhead	*Sebastolobus alascanus*
Silvergray rockfish	*Sebastes brevispinis*
Stripetail rockfish	*Sebastes saxicola*
Yellowmouth rockfish	*Sebastes reedi*

[a] With all rockfish, the possibility of misidentification exists, and the listing of species not previously reported from the Washington-Oregon-California region should be noted with caution.

[b] The 14 species listed under "Other rockfish" each made up less than 0.10% of the rockfish catch by joint venture operations.

Table 39.--Estimated catch in metric tons (t) of rockfish by International North Pacific Fisheries Commission statistical area and species in the Pacific whiting joint venture fishery off the coasts of Washington, Oregon, and California in 1990.

Common name	Vancouver		Columbia		Eureka		Monterey		Total	
	t	%	t	%	t	%	t	%	t	%
Bocaccio	0.00	0.00	0.15	0.09	0.12	0.42	0.03	0.33	0.29	0.11
Canary rockfish	0.46	0.64	1.07	0.67	0.04	0.15	0.00	0.00	1.57	0.59
Chilipepper	<0.01	0.01	11.71	7.28	0.06	0.20	7.40	95.29	19.17	7.15
Darkblotched rockfish	0.38	0.53	2.00	1.25	2.91	10.39	0.00	0.00	5.29	1.98
Pacific ocean perch	0.03	0.05	0.00	0.00	0.51	1.82	0.00	0.00	0.54	0.20
Redstripe rockfish	0.01	0.01	2.44	1.52	0.00	0.00	0.00	0.00	2.45	0.91
Sharpchin rockfish	0.00	0.00	0.27	0.17	0.00	0.00	0.02	0.26	0.29	0.11
Shortbelly rockfish	0.00	0.00	8.97	5.58	7.04	25.16	<0.00	0.01	16.02	5.98
Splitnose rockfish	0.00	0.00	0.33	0.21	0.21	0.75	0.06	0.76	0.60	0.22
Vermillion rockfish	0.38	0.53	0.00	0.00	0.03	0.11	0.00	0.00	0.41	0.15
Widow rockfish	30.91	43.35	54.22	33.71	16.91	60.41	0.11	1.37	102.15	38.12
Yellowtail rockfish	39.12	54.87	79.19	49.23	0.14	0.50	<0.01	0.04	118.45	44.21
Other rockfish*	0.00	0.00	0.52	0.29	0.02	0.08	0.15	1.94	0.68	0.26
Total	71.29		160.87		27.99		7.76		267.91	
Percent by area	26.61%		60.05%		10.45%		2.90%			

* Species included in this category are listed in Table 38.

Table 40.--Common and scientific names of flatfish identified in the 1990 Pacific whiting joint venture fishery off the coasts of Washington, Oregon, and California.

Common name	Scientific name
Arrowtooth flounder	Atheresthes stomias
Dover sole	Microstomus pacificus
English sole	Pleuronectes vetulus
Flathead sole	Hippoglossoides elassodon
Pacific sanddab	Citharichthys sordidus
Petrale sole	Eopsetta jordani
Rex sole	Errex zachirus
Slender sole	Eopsetta exilis

Table 41.--Estimated catch in metric tons (t) of flatfish by International North Pacific Fisheries Commission statistical area and species in the Pacific whiting joint venture fishery off the coasts of Washington, Oregon, and California in 1990.

Common name	Vancouver		Columbia		Eureka		Monterey		Total	
	t	%	t	%	t	%	t	%	t	%
Arrowtooth flounder	0.00	0.00	0.02	0.09	0.00	0.00	0.00	0.00	0.02	0.09
Dover sole	0.00	0.00	<0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.01
English sole	0.00	0.00	<0.01	<0.01	0.00	0.00	0.00	0.00	<0.00	<0.00
Flathead sole	0.00	0.00	<0.01	<0.01	0.00	0.00	0.00	0.00	<0.00	<0.00
Pacific sanddab	0.00	0.00	25.47	99.87	0.00	0.00	0.00	0.00	25.47	99.87
Petrale sole	0.00	0.00	<0.01	<0.01	0.00	0.00	0.00	0.00	<0.00	<0.00
Rex sole	0.00	0.00	0.01	0.03	0.00	0.00	0.00	0.00	0.00	0.00
Slender sole	0.00	0.00	<0.01	<0.01	0.00	0.00	0.00	0.00	<0.00	<0.00
Total	0.00		25.50		0.00		0.00		25.50	
Percent by area	0.00%		100.00%		0.00%		0.00%			

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