INTERNATIONAL PACIFIC HALIBUT COMMISSION

Established by a Convention Between

Canada and the United States of America

ANNUAL REPORT
1982

SEATTLE, WASHINGTON

1983

Preface

The International Pacific Halibut Commission (IPHC) was established in 1923 by a Convention between Canada and the United States for the preservation of the halibut *(Hippoglossus stenolepis)* fishery of the North Pacific Ocean and the Bering Sea. The Convention was the first international agreement providing for joint management of a marine resource. The Commission's authority was expanded by several subsequent conventions, the most recent being signed in 1953 and amended by the protocol of 1979.

Three commissioners are appointed by the Governor General of Canada and three by the President of the United States. The commissioners appoint the director who supervises the scientific and administrative staff. The scientific staff collects and analyzes statistical and biological data needed to manage the halibut fishery. The headquarters and laboratory are located on the campus of the University of Washington in Seattle, Washington. Each country provides one-half of the Commission's annual appropriation.

The Commission meets annually to review all regulatory proposals, including those made by the scientific staff and the Conference Board which represents vessel owners and fishermen. Regulatory alternatives are discussed with the Advisory Group composed of fishermen, vessel owners, and processors. The measures recommended by the commissioners are submitted to the two governments for approval. Upon approval of the regulatory proposals by the two governments, the Commission published regulations which are enforced by appropriate agencies of both governments.

The International Pacific Halibut Commission has three publications: Annual Reports (U.S. ISSN 0074-7238), Scientific Reports (U.S. ISSN 0074-7246), and Technical Reports (U.S. ISSN 0579-3920). Until 1969, only one series was published. The numbering of the original series has been continued with the Scientific Reports.

Unless otherwise indicated, all weights in this report are dressed weight (eviscerated, head-off).

Cover: Retrieving a dory after a day of fishing with longline gear. Dory fishing was prohibited in 1935 because fish taken were generally smaller than those caught by regular gear. Because dory fishing was hazardous, most of the fleet at that time favored the prohibition. Other scenes of the good old days of dory fishing are featured in the center pictorial section of this report.

INTERNATIONAL PACIFIC HALIBUT COMMISSION
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International Pacific Halibut Commission

ANNUAL REPORT 1982

Contents

Activities of the Commission

The 58th Annual Meeting of the Commission was held in Seattle, Washington on February 2-4, 1982, with Mr. Robert W. Schoning presiding as Chairman and Mr. Michael Hunter as Vice Chairman. The Commission staff presented a review of the 1981 Pacific halibut fishery, summarized the results of scientific investigations, and presented regulatory proposals for the 1982 fishery. The Conference Board, representing vessel owners and fishermen, presented and discussed its regulatory proposals with the Commission. The Commission reviewed all proposals with the Advisory Group, consisting of fishermen, vessel owners, and processors before adopting regulations for the 1982 halibut fishery. The regulations were then sent to the Canadian and United States governments for approval.

In other sessions, the Commission considered administrative and fiscal matters, approved research plans for 1982, and adopted the budget for fiscal year 1984-1985. Mr. Hunter was elected Chairman for 1982 and Mr. Schoning was elected Vice Chairman. A news release was issued at the close of the meeting summarizing the regulations being submitted to the governments for approval and expressing concern that the incidental catch of halibut was increasing in fisheries targeting on other species.

Letters sent to the governments drew attention to the continuing high level of incidental catch of halibut, and urged the governments to support efforts to reduce incidental halibut catches. The Commission commended the scientific staff for the quality of its research and expressed gratitude to agencies in both countries that cooperated with the Commission's work. The letters cited improved stock conditions for halibut in northern Area 2 and Area 3, and a lack of stock improvement in southern Area 2, and explained that the scientific staff would seek an explanation of this phenomenon. Finally, the letters explained that, after reviewing a study by the scientific staff on the biological basis for the 60%-40% division of the Area 2 catch between Canadian and United States waters, the Commission decided that there is no basis upon which to recommend a different catch division at this time.

A list of reports published by the Commission staff during 1982 is appended to this Annual Report. Several documents were also prepared at the request of the governments.

Expenditures during the 1981-1982 fiscal year (April through March) were $1,517,100 (U.S.). The Commission expenses were shared equally by both governments as required by the Halibut Convention.

Neils M. Evens
United States Commissioner
1972-1982

Robert W. Schoning
United States Commissioner
1972-1982

Peter C. Wallin
Canadian Commissioner
1977-1982

Director's Report

IPHC estimates that the biomass of Pacific halibut is increasing at approximately eight million pounds per year; however, the stocks are not improving uniformly over the entire range. The stocks north of central Sumner Strait in southeastern Alaska have been increasing since 1976, whereas the stocks to the south have remained at a low but stable level. The 1982 catch-per-unit-effort (CPUE) off British Columbia (Area 2B) was 60 pounds per skate, whereas the CPUE off southeastern Alaska (Area 2C) was 172 pounds per skate.

Catch-per-unit-effort is often used as a measure of stock density, hence, it is logical to question whether the difference in CPUE is due to actual differences in stock density or to other factors affecting the catchability of halibut. In 1982, the season lengths in Areas 2B and 2C were 61 days and 5 days, respectively. Had Area 2C had 61 days of fishing, the average CPUE would probably have been much lower than 170 pounds per skate. Consequently, comparing CPUE between the two regions will require an adjustment for the "short season effect" in Area 2C. Dogfish competing for bait in Area 2B is also cited as a possible factor reducing CPUE. These factors, while not thoroughly investigated at the present time, may well show that the density of the stocks in the two regions is more similar than the CPUE indicates.

Although the absolute stock abundances are not accurately known, it is clear that the Area 2C stock is at a higher density than that in Area 2B. The reason must in some way be related to migration rates, since much of Area 2B recruitment derives from the Gulf of Alaska and even from the Bering Sea.

Several hypotheses have been proposed to explain the reduction in migration: (1) interception of halibut destined for British Columbia by foreign and domestic trawl fisheries in the United States Fisheries Conservation Zone; (2) oceanographic conditions off British Columbia slowing down immigration; and (3) a reduced adult female population in British Columbia, perhaps producing fewer potential recruits to migrate back to their areas of origin after their westward drift as developing eggs and larvae.

The Commission is concerned by this abnormal condition, particularly in view of the 60%-40% harvest ratio between Areas 2B and 2C as specified in the protocol of 1979. The staff is devoting much of its research activities toward an explanation of the problem and will advise the Commission of its findings later this year. The staff believes the situation is temporary and will reverse itself. It was only five years ago that we were concerned with the depressed stocks in Area 2C, but have since witnessed a dramatic turnaround. The Commission will review the results of the staff's summer research and will take the appropriate action in assigning future harvesting levels in Area 2.

Regulations for 1982

REGULATORY PROPOSALS

The Commission received regulatory proposals for the 1982 halibut fishery from fishermen, vessel owners, processors, government agencies, the Makah Indian Tribe, and the Commission's scientific staff. A summary of all proposals and their source was distributed to all interested groups prior to the annual meeting.

The staff recommended no change in regulatory area boundaries for 1982, and a total catch limit of 27 million pounds. The catch limit would be apportioned with 9 million pounds to Area 2, 14 million pounds in Area 3A, 3 million pounds in Area 3B, and 1 million pounds in Area 4. The staff proposed a sequence of fishing periods as follows: Areas 2A and 2B to open on May 8 with 13-day open periods and 15- and 19-day closed periods. Area 2C to open on May 13 with 6-day open periods and 22-day closed periods. Areas 3A and 3B to open on May 12 with 9-day open periods and 19-day closed periods, except that after Area 3A closes there would be a sequence of 14-day open periods and 14-day closed periods. This schedule of fishing periods was selected to provide openings of adequate length, to coincide with favorable tides, and to avoid landings on weekends and holidays. The staff proposed that all other regulations, such as the nursery areas, size limits, gear restrictions, opening and closing hours, clearances in and out of Area 4, and sport fishing regulations would remain the same as in 1981.

The Makah Indian Tribe again requested changes in the regulations that would exempt tribal members from complying with some current Pacific halibut fishery regulations. The National Marine Fisheries Service in Juneau proposed that any licensed vessel that fishes in Area 2C or 3A must obtain a fish hold and vessel inspection within 24 hours prior to fishing. This proposal was designed to increase the effectiveness of enforcement in Alaska. The Tanadgusix Corporation of St. Paul, Alaska, proposed that Area 4 be divided into north and south sectors, with the division line at 55°45'N latitude, and that each sector have a separate catch quota. The purpose of the regulation was to obtain a more equitable distribution of catch and effort within Area 4.

The Conference Board met during the first two days of the annual meeting. They proposed that the Pacific boundary of Area 4 be moved to the eastern side of IPHC statistical area 350 to stimulate fishing on a section of the coast which had not been adequately fished when it was the western extremity of Area 3. The Conference Board proposed that all other regulatory areas remain the same as in 1981.

Quotas recommended by the Conference Board were: Area 2A, 0.2 million pounds; Area 2B, 5.4 million pounds; Area 2C, 3.4 million pounds; Area 3A, 14 million pounds; Area 3B, 3 million pounds; and Area 4, 2 million pounds. The Board proposed that Areas 2A and 2C open on May 13, with open periods of 13 days and 6 days, respectively. For Area 2B, the Board recommended an opening on any suitable date, approximately May 27, with open periods no longer than 13 days. For Areas 3A and 3B, the Board recommended 13-day openings beginning on May 13 and June 11, which would result in a 21-day closure between the open periods. The Board also recommended reopening Area 3B in August if any quota remained. The Board requested openings in Area 4 from May 13-20, from June 11-30, with the area to remain open after July 9 until the quota was

taken. The Board pointed out that the staff proposal for Area 4 would not accommodate the economic problems of the Pribilof and Nelson Island fishermen, nor be economically feasible for larger vessels fishing in the area. Finally, the Conference Board opposed an incidental catch allowance for trollers during the closed season, and any retention of halibut by trawlers.

All regulatory proposals were discussed with the Advisory Group. Members of the Advisory Group in 1982 were Ira Koker, Newport, Oregon; Robert Alverson, Bill Kelliher, Pete Knutsen, Mark Lundsten, Bruce Mitchell, and Mark Sandvik, Seattle, Washington; Dick Marino, Vancouver, B.C.; Reg Paine, Victoria, B.C.; Sid Dickens, Rick Dunn, and Raymond Krause, Prince Rupert, B.C.; Albert Davis, Kake, Alaska; Greg Baker and Tom Thompson, Sitka, Alaska; Sigurd Mathisen, Dennis Rogers, and Tom Stewart, Petersburg, Alaska; Marvin Bellamy, Homer, Alaska; David Ausman and Don Baker, Kodiak, Alaska.

The regulations recommended by the Commission were approved by the United States Secretary of State on April 13, 1982, and by the Governor General of Canada by Order in Council on May 12, 1982, and became officially effective on the latter date.

REGULATORY AREAS

Regulatory areas for the 1982 halibut fishery are shown in Figure 1. Boundary lines for the regulatory areas are the same as in 1981, except that the boundary for Area 4 on the Pacific side was moved to Cape Lutke on Unimak Island. The nursery area in the eastern Bering Sea was the same as in 1981 and was closed to all halibut fishing. Following is a description of the regulatory areas for the halibut fishery in 1982:

Area 2A — All waters off the coast of California, Oregon, and Washington.
Area 2B — All waters off the coast of British Columbia.
Area 2C — All waters off the coast of Alaska, south and east of Cape Spencer, Alaska.
Area 3A — Cape Spencer, Alaska to Cape Trinity, Kodiak Island, Alaska.
Area 3B — Cape Trinity to a line southeast from Cape Lutke, Unimak Island.
Area 4 — The Gulf of Alaska west of Area 3B, and the Bering Sea.

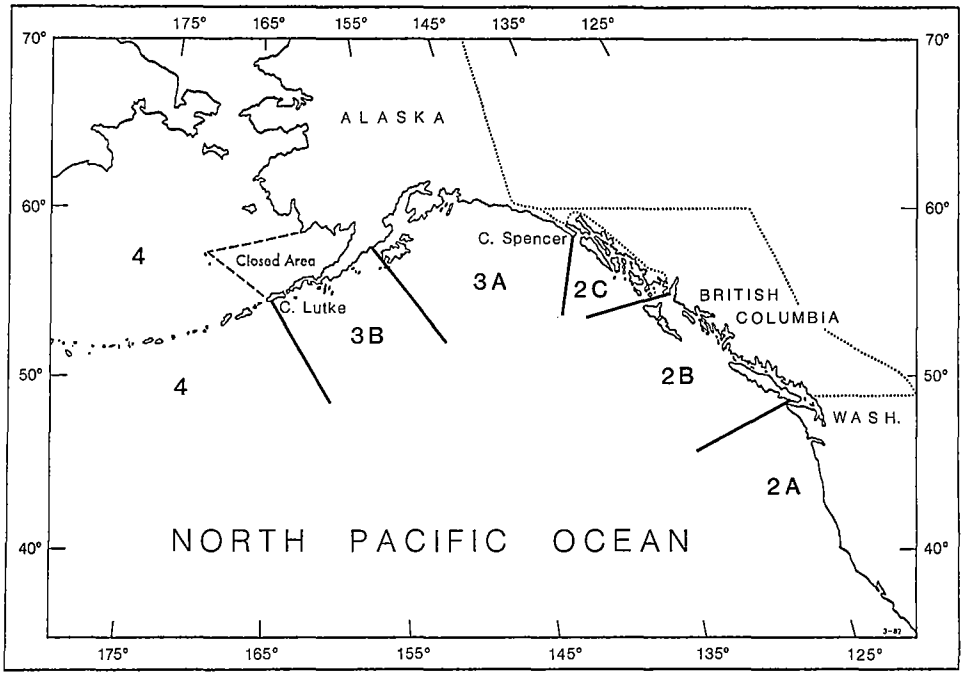


Figure 1. Regulatory Areas, 1982.

CATCH LIMITS AND LENGTHS OF SEASONS

The 1982 catch limit in Area 2 was 9 million pounds, the same as in 1981. The limits for the subareas were 200,000 pounds in Area 2A, 5.4 million pounds in Area 2B, and 3.4 million pounds in Area 2C.

In Area 3, the catch limit was 17 million pounds, 4 million pounds more than in 1981. Of this, 14 million pounds was allocated to Area 3A and 3 million pounds to Area 3B.

In Area 4, the catch limit was 1.5 million pounds, 500,000 pounds more than in 1981.

Opening and closing dates and lengths of the fishing periods for 1981 and 1982 are given in Table 1. Fishing seasons in all areas in 1982 consisted of a series of fishing periods, each of specified length. When the catch limit for each area was reached, the area was closed and subsequent fishing periods were voided. The fishing periods in all areas began at 1500 hours and ended at 0600 hours, Pacific Standard Time.

Table 1. Opening and closing dates by area, 1981-1982.

	1981			1982		
Area	Opening Date	Closing Date	Fishing Days	Opening Date	Closing Date	Fishing Days
2A	June 7	June 21	14	May 12	May 24	12
	July 7	July 21	14	June 9	June 21	12
	Aug. 6	Aug. 20	14	July 7	July 19	12
	Sept. 5	Sept. 19	14	Aug. 9	Aug. 22	13
2B	May 7	May 22	15	May 12	May 24	12
	June 7	June 22	15	June 9	June 21	12
	July 7	July 22	15	July 7	July 19	12
	Aug. 6	Aug. 19	13	Aug. 9	Aug. 22	13
				Sept. 4	Sept. 16	12
2C	June 7	June 14	7	May 12	May 17	5
3A	June 7	June 20	13	May 11	May 19	8
				June 9	June 12	3
3B	June 7	June 20	13	May 11	May 19	8
	Aug. 25	Aug. 28	3	June 9	June 12	3
				Aug. 20	Aug. 27	7
4	June 7	June 22	15	May 11	May 19	8
	July 10	Aug. 6	27	June 9	June 28	19

OTHER REGULATIONS

All other regulations pertaining to minimum size limits, licensing, gear restrictions, and the sport fishery remained unchanged. The regulation requiring that vessels participating in the Area 4 fishery clear with U.S. Customs or fishery officers at Dutch Harbor, Alaska, prior to any fishing in Area 4 and again upon leaving Area 4 applied again in 1982. This regulation did not apply to fishermen resident in Area 4 and who unloaded all of their catches at ports within the area.

The Fishery

COMMERCIAL FISHERY

A compilation of historical statistics published in 1977 as Technical Report No. 14, "The Pacific Halibut Fishery: Catch, Effort, and CPUE, 1929-1975" summarizes catch and effort data by statistical area, region, regulatory area, and country. Data are also given by port and country. Appendix tables in this annual report and the annual reports from 1977, 1979, 1980, and 1981 are in the same format and update those statistics through 1982.

Catch by Regulatory Area

The total commercial catch in 1982 was 29.0 million pounds, 3.3 million pounds more than the 1981 catch of 25.7 million pounds. Canadian vessels took 19% of the catch, down slightly from a 22% share in 1981, and United States vessels took 81%. Most of the increase in catch in 1982 resulted from increased catch limits in Regulatory Areas 3 and 4, both of which are wholly within United States territorial waters.

Catch by country and regulatory area for 1978 through 1982 is shown in Table 2. The catches for all years are shown by regulatory area as defined in the 1982 Pacific Halibut Fishery Regulations to facilitate comparison of similar geographic areas. Previous annual reports of the Commission should be consulted for actual regulatory area boundaries in effect in any specific year. As in previous years, Canadian and United States catches in Dixon Entrance are reported as being caught in Regulatory Areas 2B and 2C, respectively, due to the continuing unresolved boundary dispute between the two countries in this region.

The catch in Area 2A, the waters off California, Oregon, and Washington, was 211,000 pounds, slightly above the 200,000 pound catch limit. Most of the catch from this area, which encompasses the southernmost geographical limits for Pacific halibut, was taken by small local setliners and trollers. Only a few thousand pounds were landed by larger setline vessels, usually as an incidental catch in the sablefish fishery.

The catch in Area 2B, the waters off British Columbia, slightly exceeded the 5.4 million pound catch limit set for 1982. The number of Canadian vessels landing halibut declined 15% from 1981, but a somewhat improved CPUE, particularly on the grounds on the outside of the Queen Charlotte Islands, resulted in an overall catch and length of season similar to last year.

The catch in Area 2C, the waters off southeastern Alaska, was 3.5 million pounds, slightly over the 3.4 million pound catch limit, and 0.5 million pounds less than was taken in 1981. For the first time in several years the number of vessels fishing in Area 2C declined, but CPUE continued to increase and allowed the smaller fleet to attain the catch limit in a shorter period.

The catch in Area 3A, which includes all Alaskan waters between Cape Spencer and the west end of Kodiak Island, was 13.5 million pounds, 0.5 million pounds less than the catch limit and 0.7 million pounds less than was taken in 1981. Failure to reach the catch

Table 2. Catch by country and regulatory area*, 1978-1982 (in thousands of pounds).

Regulatory Area	1978	1979	1980	1981	1982
Area 2A					
U.S.	94	46	22	202	211
Canada	3	—	—	—	—
Total	97	46	22	202	211
Area 2B					
U.S.	243	—	—	—	—
Canada	4,364	4,857	5,650	5,654	5,538
Total	4,607	4,857	5,650	5,654	5,538
Area 2C					
U.S.	3,409	4,366	3,238	4,010	3,500
Canada	907	164	—	—	—
Total	4,316	4,530	3,238	4,010	3,500
Area 3A					
U.S.	7,488	9,714	10,014	14,225	13,530
Canada	2,807	1,621	1,952	—	—
Total	10,295	11,335	11,966	14,225	13,530
Area 3B					
U.S.	943	369	277	451	4,800
Canada	377	17	—	—	—
Total	1,320	386	277	451	4,800
Area 4					
U.S.	1,206	1,373	713	1,190	1,429
Canada	147	—	—	—	—
Total	1,353	1,373	713	1,190	1,429
ALL AREAS					
U.S.	13,383	15,868	14,264	20,078	23,470
Canada	8,605	6,659	7,602	5,654	5,538
Total	21,988	22,527	21,866	25,732	29,008

*Regulatory Areas defined in 1982 Pacific Halibut Fishery Regulations.

limit was due to a severe storm in the Gulf of Alaska that coincided with the short 3-day final fishing period and sharply reduced fishing success. The catch during the initial 8-day fishing period was nearly 10.2 million pounds and 3.3 million pounds was caught during the final period. CPUE continued to improve from last year, particularly in the Kodiak region (see Appendix I, Table 2) with the 1982 value of 191 pounds per skate being the highest ever recorded for this region.

In Area 3B, waters between Kodiak Island and Unimak Pass, 4.8 million pounds were caught, of which 4.2 million pounds were taken during the 7-day season in late August. This catch substantially exceeded the 3.0 million pound catch limit. While some of this overage was due to excellent fishing, the main cause was the difficulty IPHC had in determining the number of vessels intending to fish in the area during the final fishing period. Many vessels were reluctant to commit themselves to the fishery without knowing the exact number of fishing days, and IPHC couldn't determine the appropriate number of fishing days without knowing the expected fleet size. Only poor weather during the early part of this last period prevented an even larger overage. The CPUE of 213 pounds per skate in the Chirikof region was the highest of any region on the coast, and is attributed to the light fishing pressure and small catch during the previous three years.

The catch in Area 4, which includes the Bering Sea and all Pacific waters west of Unimak Island, was over 1.4 million pounds, slightly below the 1.5 million pound catch limit. All but 13,000 pounds was caught during the second fishing period with few vessels entering the area until after the halibut fishing season was closed in Area 3A.

The boundary of Area 4 was moved east in 1982 to Cape Lutke, near Unimak Pass, from its previous location at 170 degrees W. This 350-mile long fishing area on the Pacific Ocean side of the Fox Islands was open to fishing at the same time as grounds in the Bering Sea and the western Aleutian Islands. Over 1.0 million pounds, or nearly 71% of the total Area 4 catch was taken from this newly added Pacific area. Fishing grounds west of 170 degrees W. along the Aleutian Islands, which had produced over one million pounds of halibut as recently as 1978 and 1979, were relatively unfished.

Number of Vessels

Table 3 shows the number of vessels, the number of trips, and the catch by vessel category in 1982. Vessels five net tons or larger that fish with setline gear are required to be licensed by the Commission. Smaller vessels, or those not using setline gear, such as trollers and handliners, do not need a Commission license.

The number of Canadian vessels participating in the 1982 halibut fishery was down 10% from 1981. Only 323 vessels reported halibut landings, although Fisheries and Oceans, Canada, had authorized approximately 422 "L", or halibut longline fishing permits. In 1981, 360 Canadian vessels reported halibut landings.

The number of licensed and unlicensed United States setline vessels continued to increase moderately in Area 3, but decreased slightly in Area 2. These changes were due in part to a shift in vessels from Area 2 to Area 3 because of the continued shortening of the Area 2 fishing season. The number of trollers landing halibut declined sharply from 1981 due to conflicting fishing dates for the halibut and troll salmon seasons.

Table 3. Number of vessels, number of trips, and catch by licensed and unlicensed vessels in Areas 2 and 3, 1982.

Vessel Category	Canada			United States			Total		
	No. of Vsls.	No. of Trips	Catch 000's Lbs.	No. of Vsls.	No. of Trips	Catch 000's Lbs.	No. of Vsls.	No. of Trips	Catch 000's Lbs.
AREA 2									
Unlicensed									
Trollers	12	14	1	156	218	17	168	232	18
Setliners	8	11	11	578	1,090	743	586	1,101	754
Other**	—	—	—	—	—	17	—	—	17
Total	20	25	12	734	1,308	777	754	1,333	789
Licensed									
5-19 tons***	259	940	3,984	300	526	1,172	559	1,466	5,156
20-39 tons	35	107	1,235	55	78	494	90	185	1,729
40-59 tons	5	12	182	6	6	107	11	18	289
60+ tons	2	7	125	1	3	6	3	10	131
Total	301	1,066	5,526	362	613	1,779	663	1,679	7,305
All Vessels	321	1,091	5,538	1,096	1,921	2,556	1,417	3,012	8,094
AREA 3*									
Unlicensed									
Trollers	—	—	—	5	5	1	5	5	1
Setliners	—	—	—	995	2,275	1,384	995	2,275	1,384
Other**	—	—	—	—	—	—	—	—	—
Total	—	—	—	1,000	2,280	1,385	1,000	2,280	1,385
Licensed									
5-19 tons***	—	—	—	472	1,078	4,136	472	1,078	4,136
20-39 tons	—	—	—	222	510	7,514	222	510	7,514
40-59 tons	—	—	—	56	158	5,373	56	158	5,373
60+ tons	—	—	—	34	78	2,506	34	78	2,506
Total	—	—	—	784	1,824	19,529	784	1,824	19,529
All Vessels	—	—	—	1,784	4,104	20,914	1,784	4,104	20,914
Grand Total	321	1,091	5,538	2,880	6,025	23,470	3,201	7,116	29,008

*Includes vessels that fished in both Areas 2 and 3, and those that fished in Area 4.
**Deliveries of unknown origin.
***Includes small vessels of unknown tonnage.

Landings by Port

The leading halibut port on the Pacific Coast was Kodiak, Alaska, with landings of 6.25 million pounds. This reflects increased catches from Areas 3B and 4 to the west of Kodiak, with many vessels delivering to central Alaska ports rather than risking deterioration of fish on the long run to southern ports. Other central Alaska ports also benefited by their proximity to the western grounds with Seward becoming the second leading Pacific coast halibut port. Landings in central Alaska as a whole increased from 9 million pounds in 1981 to 13.5 million pounds in 1982. Landings in southeastern Alaska ports declined except in Sitka which ranked third in landings with a total of 2.6 million pounds.

Canadian vessels delivered over 1.5 million pounds, or nearly 27% of the British Columbian production, to Washington ports in 1982 compared to only 9% in 1981. This appeared to be due to very low ex-vessel prices offered in British Columbia, particularly during the early fishing periods, and possibly to the relative values of the Canadian and United States dollar.

VALUE OF THE 1982 CATCH

The calculated ex-vessel value of the 1982 catch was $31.6 million (U.S.) compared to $26 million for 1981 (Table 4). The fishermen received an average price of $1.09 (U.S.) per pound, an overall increase of $0.07 per pound over the price received in 1981. The 1982 landings ranked fourth in value and fifth in price per pound paid compared to the record value set in 1979 of $48.0 million at an average price of $2.13 per pound.

The Canadian catch totalled 5.5 million pounds with a landed value in 1982 of $5.8 million (U.S.) for an average price of $1.10 per pound, compared to 5.7 million pounds with a value of $6.2 million for an average price of $1.09 in 1981. The minimal change in price for 1982 over 1981 reflects the drop in value of the Canadian dollar, which reached its lowest value compared to the U.S. dollar in mid-June and July. The Canadian catch included 1.5 million pounds landed in Washington State ports with a landed value of $1.9 million at an average price of $1.27 per pound. This represents a three-fold increase in poundage landed by Canadian vessels in Washington ports in 1982. The 1982 U.S. catch totalled 23.5 million pounds with a landed value of $25.4 million compared to 20.1 million pounds with a landed value of $20.0 million in 1981.

Table 4. Landings, prices, and value by region of the coast.

Region	Landings (000's lbs)	Price (per pound)	Value (millions of US $)
Washington-Oregon	4,491	1.265	5.7
Southeastern Alaska	7,023	1.054	7.4
Central Alaska	13,481	1.060	14.3
N. British Columbia	2,179	0.979	2.1
S. British Columbia	1,845	1.117	2.1
Total	29,019	1.088	31.6

Prices in Alaska were stable from May through July but increased about 5% for the last opening in August. The trend in Alaska of paying higher prices for large fish continued in 1982. The 10-40 pound trade category received the lowest price with the highest price going to fish 60 pounds and over (Table 5). Washington State buyers also paid a higher price for large fish but buyers in British Columbia did not. As in the past, fish destined for the fresh market, especially those from the first landings in each period, received a higher price in British Columbia and Washington State.

Since 1981, some enterprising fishermen have obtained a higher price by selling directly to the public. This activity increased in 1982 and IPHC estimates that about 550,000 pounds or 2% of the fish landed were sold in this fashion with a price varying from $1.25 to $2.50 per pound (U.S.).

Table 5. Prices (U.S. $) by trade categories by region of the coast.

	Trade Categories			
Region	(10-40 lbs)	(40-60 lbs)	(60+ lbs)	(#2)
Washington-Oregon	1.21	1.22	1.36	1.20
Southeastern Alaska	0.90	1.00	1.21	0.85
Central Alaska	0.90	1.00	1.20	0.95
N. British Columbia	0.98	0.98	0.99	0.91
S. British Columbia	1.11	1.11	1.17	1.04
Average	0.98	1.04	1.21	1.02

SPORT FISHERY

The Commission relies on state and provincial agencies for estimates of the annual sport fishery harvest. Estimates from the respective agencies are shown in Table 6.

Sport fishing for halibut received much attention in 1982. Newspapers, magazines, and trade shows throughout the Pacific Northwest featured the halibut as a prime game fish. Halibut to 50 pounds are not uncommon with trophy fish ranging from 100 to 300 pounds. Sport fishing effort on halibut is expected to increase in the future. The very rapid increase in the sport harvest of halibut presents increasing difficulties in the development of timely and meaningful statistics relative to the sport harvest, and is of increasing concern to IPHC.

Alaska continues to dominate the fishery with over 95% of the sport harvest taken there. All areas in Alaska reported increased landings in 1982. The majority of the catch is landed in southeastern Alaska and the Kenai Peninsula, but the Kodiak share of the catch has increased steadily. Data on sport harvests from British Columbia and Washington are unavailable at this time and are estimated from previous years. Harvest estimates are expected to be higher in 1982 in Washington due to increased angling effort for bottom fish.

Table 6. Catch by sport fishermen (thousands of pounds).

Area	1978	1979	1980	1981	1982
Alaska:					
Southeastern	115	246	467	411	698
Prince William Sound	18	32	59	47	51
Kenai	257	315	404	517	520
Kodiak	32	57	69	129	188
Total	422	650	999	1,104	1,457
British Columbia	9	18	11	12*	13*
Washington	10	19	22	20	28*
Total	441	687	1,032	1,136	1,498

*Estimated

INCIDENTAL CATCH OF HALIBUT

Halibut are caught incidentally in fisheries other than the commercial and sport fisheries for halibut. Although regulations require that incidentally-caught halibut be returned to the sea, many of the released fish die from injuries received during capture and, hence, represent a loss in yield from the halibut resource.

Information on the magnitude of the incidental catch is lacking or meager for some fisheries, making it difficult to precisely assess the effect of incidental catches on the resource and the fishery. Although IPHC estimates the incidental catch annually, these estimates change periodically as new data become available, and some estimates have been adjusted for potential survival or growth. These apparent differences have led to some confusion on the estimates of incidental catch and their reliability. Estimates of incidental catch are presented in this section and a discussion of the resultant mortality and its effect on yield will be discussed in a later section.

Most of the incidental halibut catch occurs in the domestic and foreign groundfish fisheries off British Columbia and Alaska and the domestic crab and shrimp fisheries off Alaska. IPHC has conducted several studies to estimate incidental catch over the years, but does not have the resources to monitor these fisheries on an annual basis. Rather, IPHC relies largely on information collected by other agencies.

The most reliable information on incidental catch is from observer programs where scientists sample the catch at sea. Unfortunately, these programs are expensive and require cooperation from the fishing industry. Presently, only the foreign and joint-venture fisheries in the Gulf of Alaska and the Bering Sea are being extensively monitored by observers.

When sufficient observer information is available, the incidental catch is estimated by extrapolating the observed rates of incidence to the total groundfish catch or effort. For example, if observers report that 1% of the groundfish catch in an area was halibut, then the entire groundfish catch for that area is assumed to be 1% halibut. Unfortunately, information is often lacking for an area or even for a period of years. In these cases, the halibut catch is estimated from observed data in adjacent areas or years. Often, data from several years or areas are pooled because data are too meager to use separately.

Since observer data are essentially lacking in the crab and shrimp fisheries, estimates are made using rates of incidence from research surveys. These rates are extrapolated to the total catch and effort for the fishery. Such estimates are of questionable accuracy but do provide an indication of the general magnitude of the incidental catch. In addition, an attempt is made to confirm the general magnitude of the estimates through interviews of people associated with the fishery.

The estimated incidental catch of halibut by regulatory area and fishery in 1981 is shown in Table 7. The incidental catch, 16.1 million pounds, declined 22% from the revised 1980 estimate of 20.7 million pounds. This substantial reduction represents a return to the relatively low levels of the late 1970's and suggests that the high catch in 1980 was not the beginning of an upward trend in catches. Area 4 showed the largest decline, although catches in all areas decreased.

The foreign trawl catch, 6.3 million pounds, showed the greatest reduction, 41% less than the 1980 incidental catch of 10.5 million pounds. The domestic trawl catch off British Columbia fell 13%, from 2.7 million pounds in 1980 to 2.4 million pounds in 1981. The foreign setline fishery was the only fishery that showed a significant increase in incidental catch, from 2.0 million pounds in 1980 to 2.4 million pounds in 1981.

Table 7. Estimated incidental catch and mortality of halibut by fishery and regulatory area, 1981 (millions of pounds).

	Foreign		Domestic					
			Fish Trawl			Shrimp Trawl	Crab Pot	Total
	Setline	Trawl	US J.V.	U.S.	Can			
				CATCH				
Area 2	0	0.2	0	Trace	2.4	Trace	0.2	2.8
Area 3	2.2	1.8	Trace	0.1	0	0.1	2.8	7.0
Area 4	0.2	4.3	0.4	0.2	0	Trace	1.2	6.3
Total	2.4	6.3	0.4	0.3	2.4	0.1	4.2	16.1
				MORTALITY				
Area 2	0	0.2	0	Trace	1.2	Trace	0.2	1.6
Area 3	1.1	1.8	Trace	Trace	0	0.1	2.8	5.8
Area 4	0.1	4.3	0.4	0.1	0	Trace	1.2	6.1
Total	1.2	6.3	0.4	0.1	1.2	0.1	4.2	13.5

ESTIMATES OF BIOMASS AND ANNUAL SURPLUS PRODUCTION

Estimates of halibut biomass and surplus production are used by the staff to recommend catch limits. The first step is to determine the biomass of the total halibut population in the northeast Pacific Ocean. Two different methods are used, one using catch-age data and the other using catch-per-unit-effort (CPUE) data. Analysis of catch-age data is a combination of cohort analysis for historical estimates of population abundance and an updating procedure for recent years. Analysis of CPUE data involves the use of a population model to relate CPUE as an index of biomass to survival, growth, catchability, and recruitment. Biomass estimates, along with the amount of commercial setline catch, are used to estimate annual surplus production (ASP), which is the excess over what is required to replenish the population each year. If other conditions in the population and the fishery remain constant, the population increases when catch is held below ASP, and vice versa.

Both methods produce the same long-term estimates of ASP available to the commercial setline fishery. Catch was below ASP from 1930-1960 when the population was rebuilding (Figure 2). Catch greatly exceeded ASP during the population decline in the 1960's. As a result, ASP decreased from 65 million pounds in 1960 to 30 million

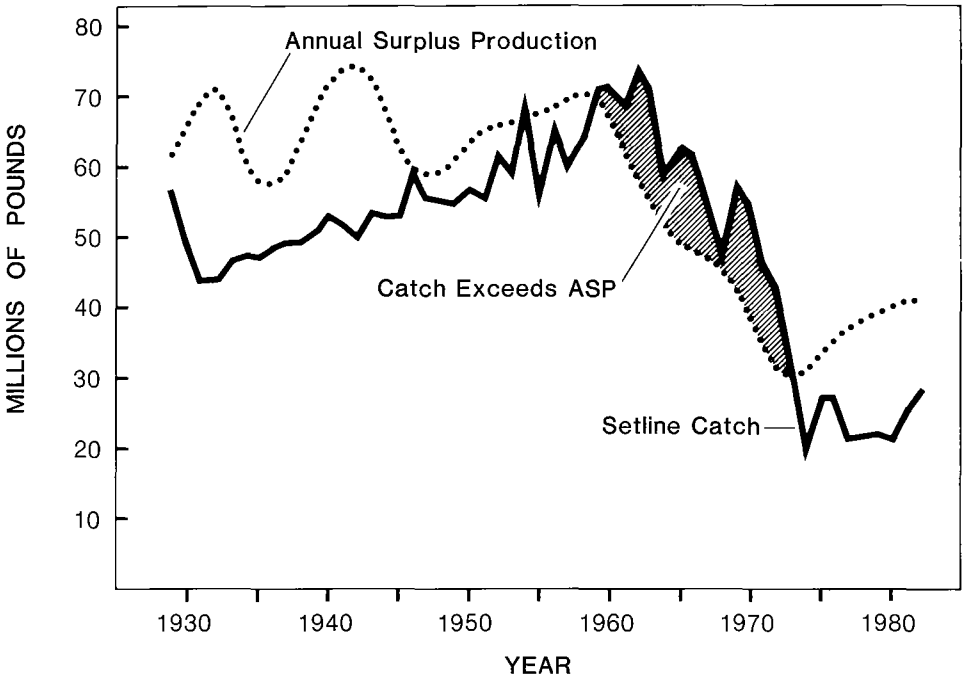


Figure 2. Halibut setline catch and annual surplus production, 1929-1982.

pounds in 1973. The decline in surplus production available for setlines can be explained in large part by the incidental catch losses since the late 1950's. Since 1973, catch has been below ASP and the population has increased. Current surplus production available to the setline fishery is about 40 million pounds, up from 36 million pounds last year. If incidental catch losses had not occurred, current surplus production would be about 60 million pounds, although this estimate is based on limited data on incidental catch and certain assumptions about productivity.

The second step in the path toward recommended catch limits is to partition estimates of total biomass and surplus production into regulatory areas. CPUE is an index of fish density in an area and must be multiplied by the amount of habitat occupied to estimate biomass. Estimated habitat or bottom area for halibut, expressed as a percentage of the total habitat available, is 1% for Area 2A, 24% for Area 2B, 20% for Area 2C , 35% for Area 3A, 14% for Area 3B, and 6% for Area 4. The percentage of biomass in each area is estimated annually by multiplying CPUE data by these habitat values. Percentage biomass estimates for 1970 and 1982 are compared with habitat by regulatory area in Figure 3. Data are meager in Areas 2A and 4 for this breakdown and should be used with caution. Percentage biomass in 1970 was similar to habitat for each subarea. In the last five years, percentage biomass has decreased in Area 2B and increased in Areas 2C, 3A, and 3B. Reasons for the Area 2 shift are hypothesized in another section.

Percentage biomass is multiplied by total biomass and surplus production to get biomass and surplus production by regulatory area. These results are shown in Figure 4.

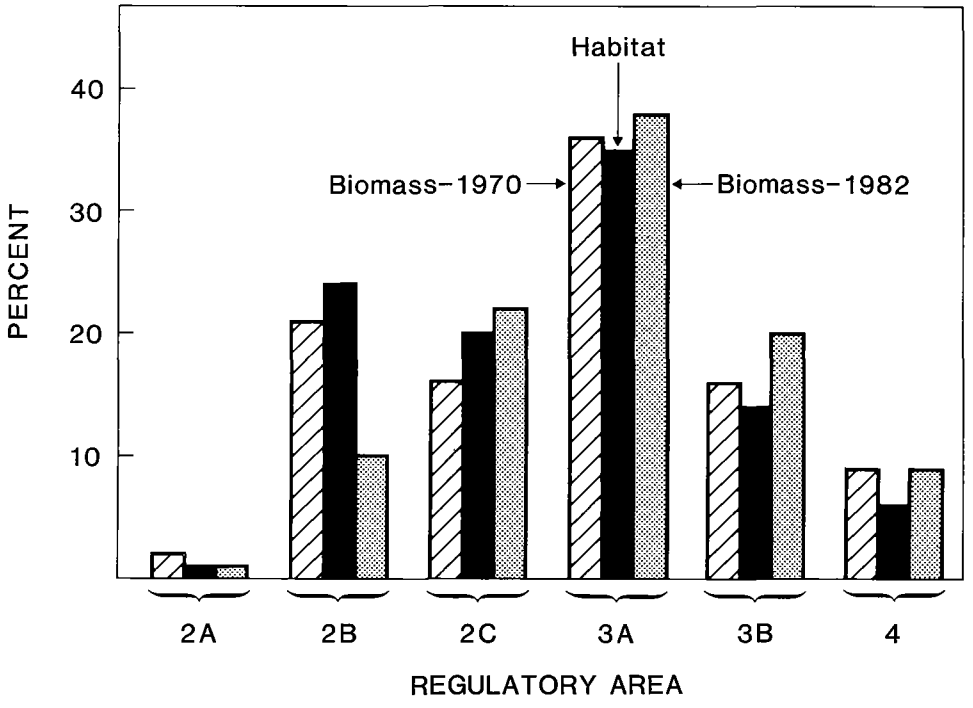


Figure 3. Estimated halibut habitat and relative biomass in 1970 and 1982 by regulatory area.

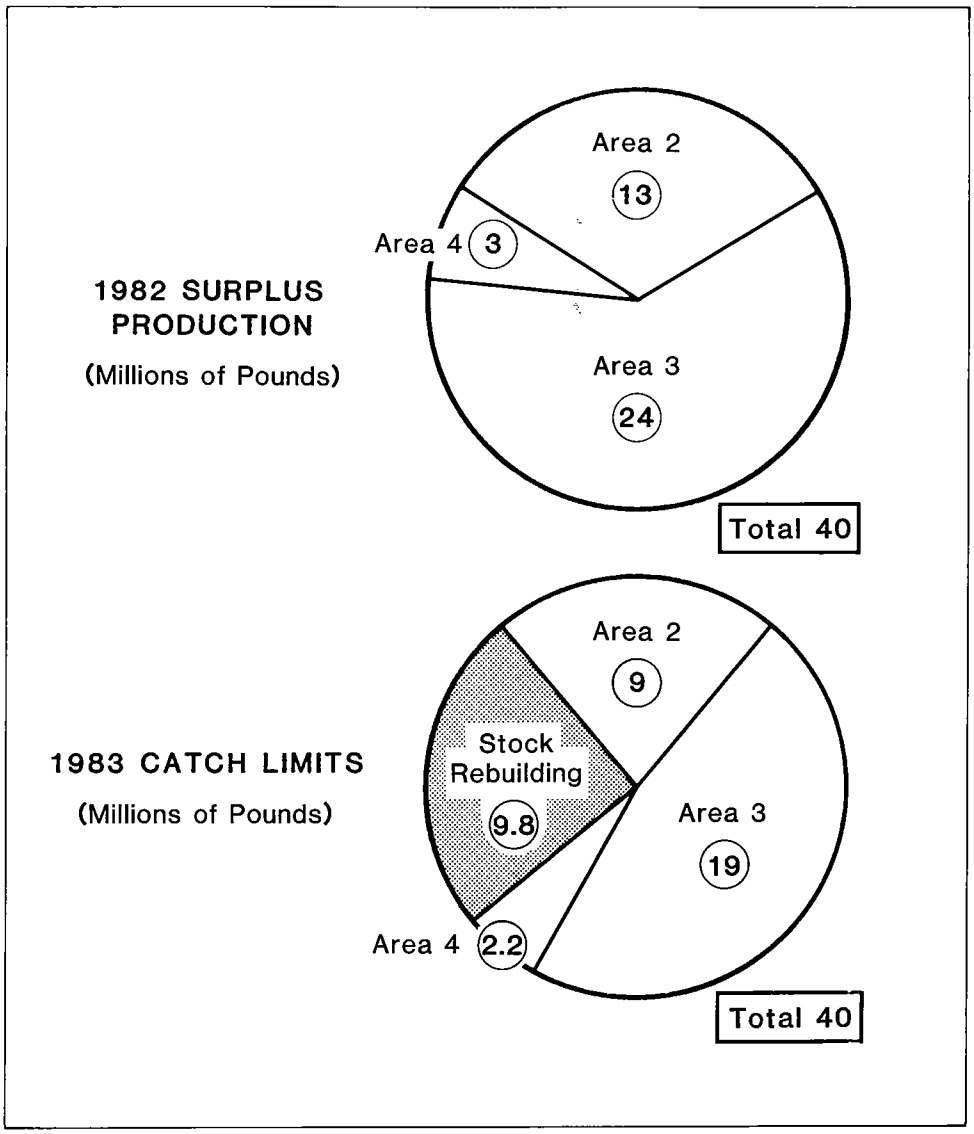


Figure 4. 1982 setline surplus production and 1983 recommended catch limits by regulatory area.

Since 1974, when biomass was at its lowest point in at least 35 years, biomass has increased 26% in Area 2 and 91% in Area 3. An estimated increase of 57% in Area 4 is based on limited data. The best estimates of surplus production are 13 million pounds in Area 2, 24 million pounds in Area 3, and 3 million pounds in Area 4 (Figure 4). The IPHC staff has recommended that catch limits be near 75% of surplus production to provide for population rebuilding, as in previous years. Recommended catch limits for 1983 are 9 million pounds in Area 2, 19 million pounds in Area 3, and 2.2 million pounds in Area 4,

with 9.8 million pounds set aside for stock rebuilding. The proposed catch limit in Area 2 was set slightly below 75% of surplus production because subareas 2A and 2B have shown no improvement. The catch limit in Area 3A is slightly larger than 75% because the population appears to be growing rapidly. The catch limit in Area 4 is 75% of the ASP.

These analyses are not the only information used in examining the condition of population components in regulatory areas. In 1982, IPHC carried out adult halibut setline surveys in Areas 2B, 2C, 3A, and 3B. The surveys confirm our quantitative analyses. The populations in Areas 2C, 3A, and 3B have apparently increased since 1976, but the population in Area 2B has not increased. IPHC also conducts a juvenile trawl survey in the Bering Sea and Gulf of Alaska with the purpose of forecasting future abundance. Juvenile CPUE in the Bering Sea in 1982 was the highest recorded since 1963. Juvenile CPUE in the Gulf dropped in 1982 but is well above the low levels of the mid-1970's.

In summary, halibut biomass continues to grow in most of its range and juvenile production appears to be stable. However, the poor condition of the Area 2B population component is a major cause for concern.

AREA 2B HALIBUT ABUNDANCE

Estimates of CPUE for the setline fisheries in southeast Alaska and British Columbia for years 1929-1982 are shown in Figure 5. An important feature in this graph is the close agreement of CPUE between these areas prior to 1981. Halibut abundance increased in both areas between 1930 and 1950, but declined through most of the 1960's and 1970's. In the last two years, CPUE has increased substantially in Area 2C, while the trend has been essentially flat in Area 2B. In Figure 6 catch per skate in Area 2B is matched with the CPUE value in Area 2C from the same year. Points lying along the diagonal line indicate equal CPUE in both areas. Most of the data lie close to this diagonal line before 1981 but data in 1981 and 1982 depart significantly from the historical relationship.

A closer inspection of the geographical distribution of CPUE within Area 2 shows that catch per skate differs in 1981-1982 from the average distribution of the 1970's. Low CPUE's extend north from Area 2B (statistical divisions 060-130, Appendix I, Table 1) into Area 2C through statistical division 140, which extends midway up Prince of Wales Island. Thus, low CPUE's are not just a problem in British Columbia, but also affect the southern part of southeast Alaska. The distribution of CPUE in outside waters shows a

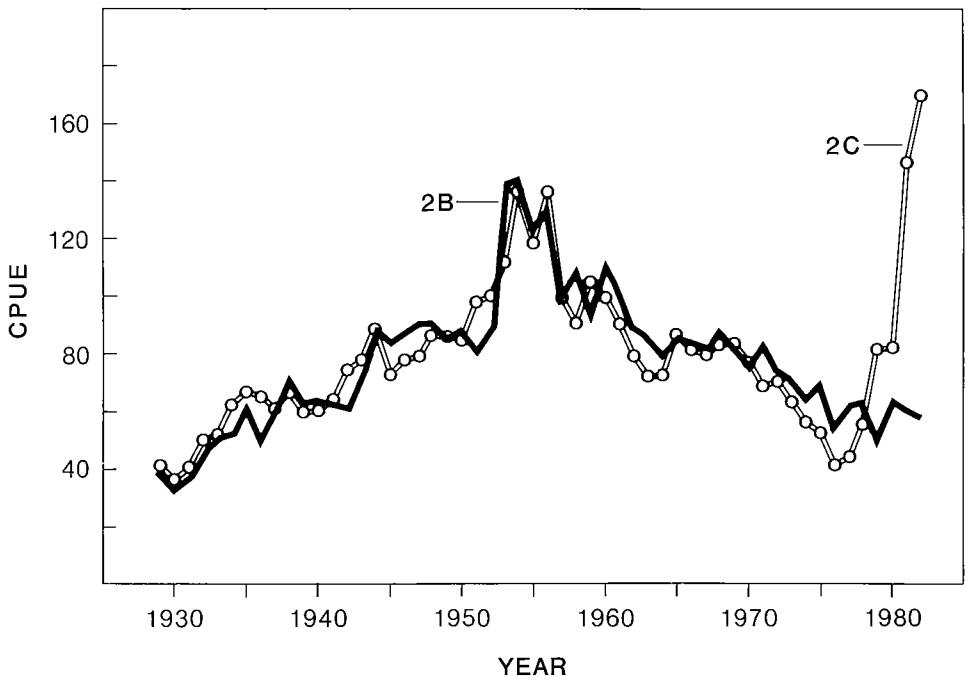


Figure 5. Setline CPUE (lbs/skate) by year for Areas 2B, 2C.

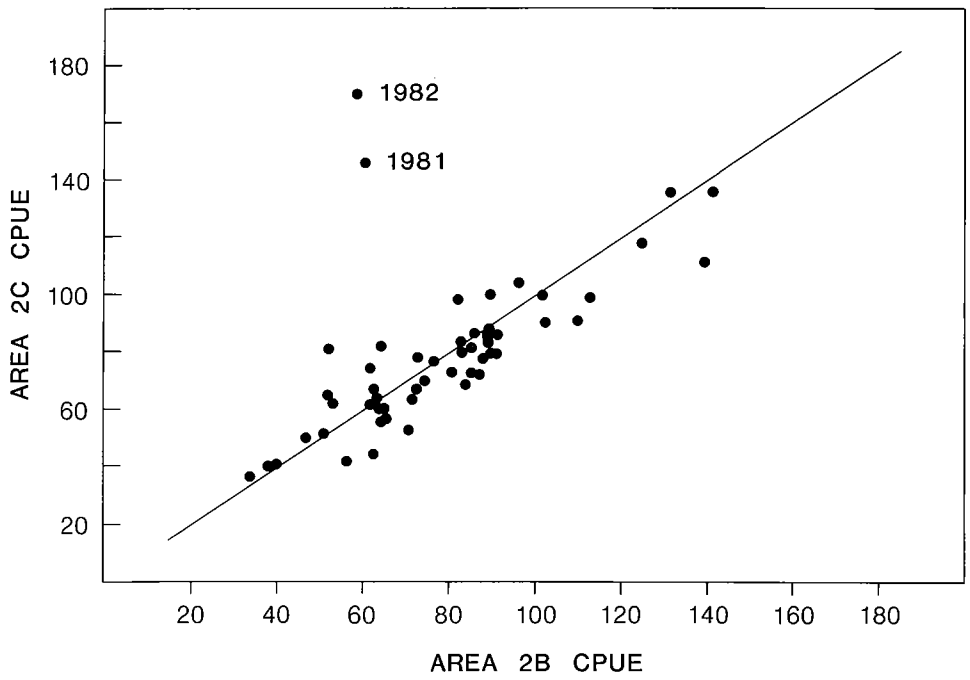


Figure 6. Setline CPUE (lbs/skate) for Area 2C compared to Area 2B.

similar result with unusually low values north through statistical division 140, then higher values in the rest of Area 2C. The high CPUE's in Area 2C are consistent, however, with above average CPUE in regulatory Area 3A (Yakutat, Kodiak), based on the historical relation between these areas.

IPHC annually conducts a setline stock assessment survey in Hecate Strait in Area 2B to obtain abundance and distribution information from a standardized grid of fishing locations. These surveys have been made each year since 1977 (except 1979) and were also made in 1965 and 1966. A comparison of CPUE from the 1977-1982 surveys with those from 1965-1966 confirms the recent lower CPUE values of the commercial fleet. Recruitment trends in Area 2B were calculated by looking at survey CPUE by size group between 1965-1966 data and 1977-1982. The 50% reduction in survey CPUE of halibut less than 65 cm in length is consistent with the 37% reduction in the CPUE for fish less than 81 cm in length (minimum-size change in 1973) and the 39% percent reduction in CPUE for all sizes of halibut.

Reduced recruitment of halibut into Area 2B is one cause of the recent low commercial CPUE. Low abundance of juvenile halibut may likely be due to reduced transboundary movement. Tagging data also suggest lower migration of adult halibut into British Columbia waters in recent years, but their migration rates are thought to be relatively small (around 5% per year) and thus not as important. Juvenile migration is quite important, however, and is the driving force behind changes in abundance of the stock as a whole.

A combination of factors is probably responsible for recent low recruitment estimates of juvenile halibut in Area 2B. Two factors thought to be important influences on transboundary recruitment are (1) interception of juvenile halibut by incidental fisheries in the Gulf of Alaska and the Bering Sea and (2) unfavorable environmental conditions of the last few years. Preliminary results from juvenile tagging operations in 1980 and 1981 show that young halibut migrate into Area 2B from regions with incidental fisheries. Environmental conditions have also been unfavorable in recent years, with an apparent warming trend detected since 1977 (except the 1978-1979 winter). In addition, sea levels in the southeast Gulf of Alaska have been high since 1976 from an anomalous strengthening of the California countercurrent — a northward drift of warmer water. As a possible result of the environmental factors, the extent of southerly migration of halibut may have been interrupted further north than usual.

Other hypotheses were examined and found to be less likely to account for the low CPUE values in Area 2B. One of these is the possibility that the CPUE indices are not accurate because of bait competition from dogfish. A special study was conducted to examine this in 1982 off Masset and on the Horseshoe grounds in Hecate Strait. Findings of the study suggest that dogfish interference is only a problem at locations where extremely large concentrations are found (more than 15 dogfish per skate). Halibut trends in the setline assessment survey were not altered, however, when high dogfish catch stations were excluded from analysis. Other factors tested but found to have contradicting evidence include (1) low CPUE in Area 2B is due to a general deterioration of fish habitat there and (2) low CPUE indicates overexploitation.

Research efforts will continue toward understanding this resource problem by the development and analysis of better oceanographic data and by obtaining better biological data on halibut and other species. The occurrence of low CPUE in the southern part of Area 2C shows this problem is not confined to Area 2B. Cautious management of the halibut resource in regulatory Area 2 is indicated until the problem of low CPUE is better understood.

MORTALITY OF INCIDENTALLY-CAUGHT HALIBUT

As discussed in an earlier section, the total incidental catch of halibut was estimated at 16.1 million pounds in 1981. This catch was presumably released and some of the fish probably survived. The survival of released halibut varies considerably with type of operation. On foreign trawl vessels where catches are large, the halibut often cannot be released immediately and survival is very low. Similarly, halibut caught in crab pots suffer a high rate of mortality because of predation by sand fleas and because halibut reportedly are often used as crab bait. On the other hand, tagging studies indicate a potential survival of about 50% for halibut released from domestic trawlers and from setline vessels which sort their catch immediately.

To adjust the incidental catch estimates to reflect mortality, IPHC assumes a survival rate of 50% for Canadian and U.S. trawlers and for domestic and foreign setliners. Survival was assumed to be zero in all other fisheries. Applying these values to the 1981 catch estimates results in a total incidental catch mortality of 13.5 million pounds. A breakdown of the incidental catch and mortality by fishery is shown in Table 7. The highest incidental mortality was estimated for foreign trawls (6.3 million pounds),

followed by U.S. crab pots (4.2 million pounds). Canadian trawls accounted for an estimated loss of 1.2 million pounds.

The highest incidental mortality occurred in Area 4 (6.1 million pounds) followed closely by Area 3 (5.8 million pounds). A total of 1.6 million pounds was estimated for all of Area 2: 0.4 million in Area 2C and 1.2 million in Area 2B. A small but unestimated mortality also occurs in Area 2A.

Trends in Incidental Mortality

The incidental catch mortality declined from 18.3 million pounds in 1980 to 13.5 million pounds in 1981. The decline was largely due to a 40% reduction in the foreign trawl catch in terms of weight. In terms of numbers of fish, the incidental catch declined only 6%. The difference was due to a decline in the size of fish caught in the Bering Sea. The reason for the smaller average weight is not clear, but is probably due to a change in factors such as the fishing grounds, target species, or the distribution of small halibut. In the Gulf of Alaska, the foreign trawl catch declined by 43% in terms of both weight and numbers of fish. Only the foreign setline catch showed a noticeable increase in 1981. The total groundfish harvest by foreign and joint-venture fishermen in the Bering Sea and the Gulf of Alaska was slightly higher in 1981, so that lower incidental catch observed in 1981 was apparently not due to reduced fishing activity. Rather, the 1981 results illustrate that groundfish can be effectively harvested with lower rates of incidental catch, a principle

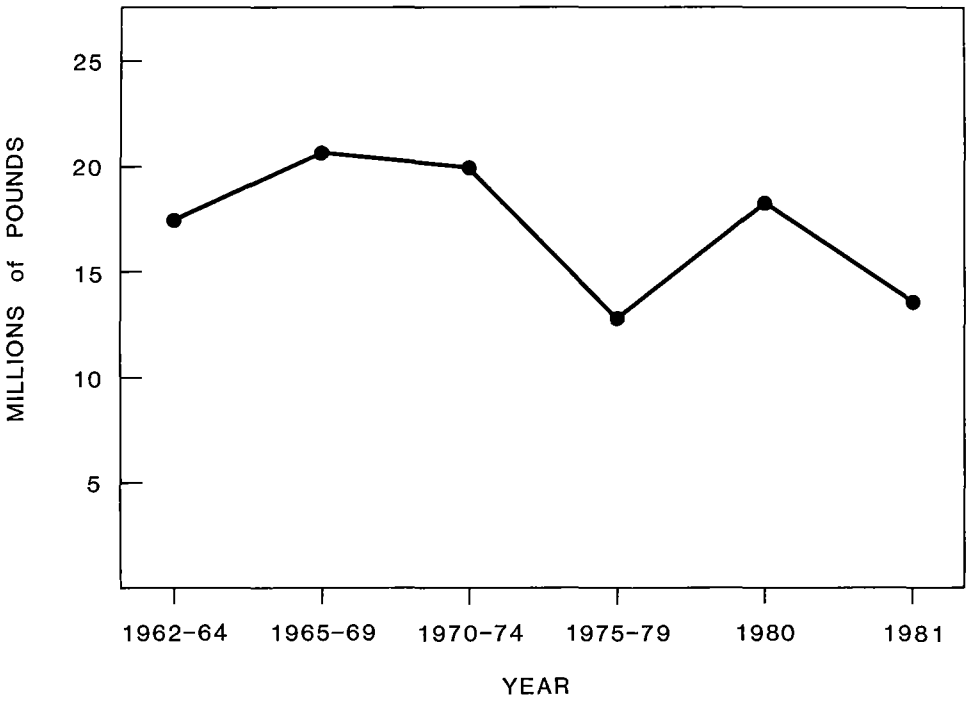


Figure 7. Trends in incidental mortality by groups of years.

that IPHC has tried to promote for a number of years. The recent joint-venture fishery in Shelikof Strait, near Kodiak, Alaska, in 1982, was particularly encouraging in that large catches of pollock were made by mid-water trawls with essentially no incidental catch of halibut.

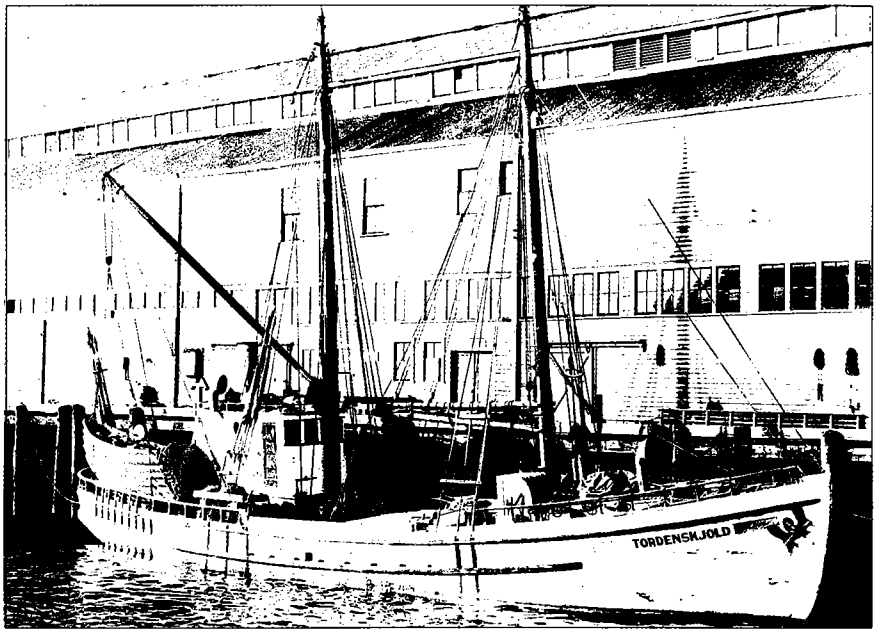
Figure 7 shows that the long term trend of incidental mortality increased to about 20.5 million pounds during the 1965-1969 period. Incidental mortality remained high during 1970-1974, then dropped sharply to an average of 12.7 million pounds during 1975-1979. This decline coincides with restrictions on foreign ground fisheries to reduce fishing effort and avoid times and areas where halibut abundance was high. An increase did occur in 1980, but as previously mentioned, the 1981 estimate declined and is similar to the 1975-1979 average.

Effect of Incidental Mortality

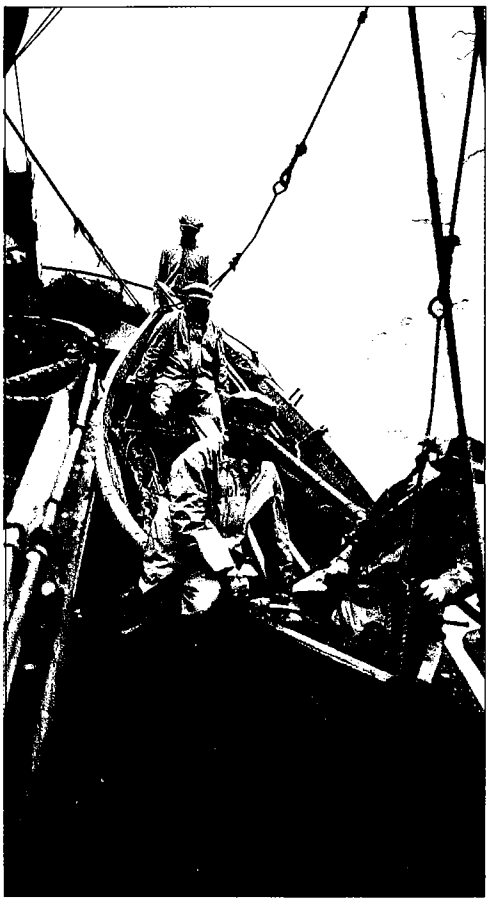
Mortality from incidental catches reduces the yield available to the halibut fishery and can lead to reduced abundance if the combined removals from incidental catches and the directed fishery exceed the annual surplus production. This apparently occurred during the 1960's and early 1970's when stocks were declining. The total loss to the directed fishery may exceed the estimated mortality because the incidental catch tends to consist of smaller and younger fish which have a high rate of growth. In addition, the reproductive value of these fish must be accounted for.

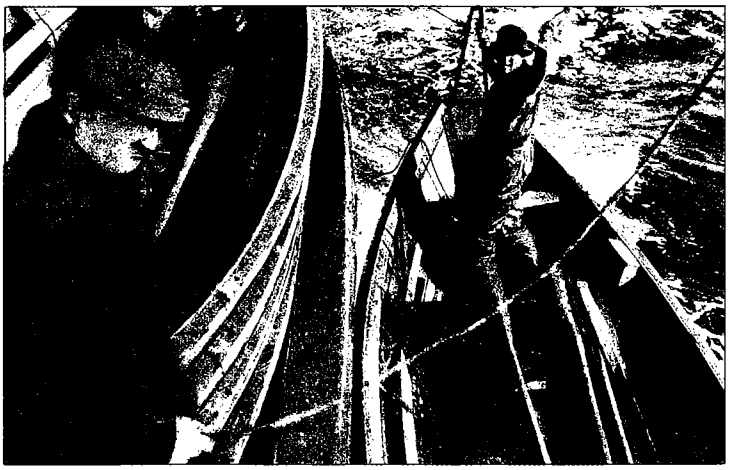
A recent estimate suggests that the loss to the setline fishery might be 1.58 times the actual incidental mortality. If this estimate is accurate, the loss to the setline fishery from incidental catches during the 1960's and early 1970's would have been between 25 and 30 million pounds annually. The loss from incidental catches in 1981 would be about 21 million pounds (13.5 x 1.58). However, the above estimates must be considered preliminary. Further analysis is needed to account for differences in the size, age, and sex composition of the incidental catch among areas and fisheries. The IPHC staff plans to review the effect of incidental mortality more thoroughly during the coming year. Even if the estimate of 1.58 is somewhat too high, it is still apparent that incidental catches have had a significant impact on the yield available to the halibut fishery.

THE GOOD OLD DAYS OF DORY FISHING



Schooner in port with dories on board.

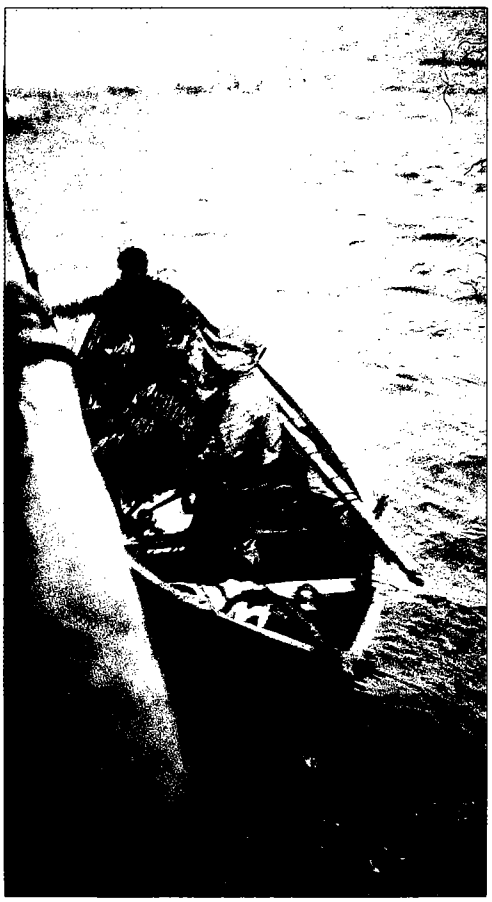

Preparing to launch.


Launching the dory.


Looking for the gear.

Dory under sail.

Hauling gear.



Returning with the catch
and the gear.

Picking up.

JUVENILE HALIBUT SURVEY

A trawl survey is conducted annually to assess changes in abundance of juvenile halibut in the southeastern Bering Sea and the Gulf of Alaska. Juvenile halibut are defined as fish less than 65 cm long and most are under eight years of age. Thirty-four index stations are fished each year at offshore locations in the Bering Sea and 110 in the Gulf of Alaska using a standard 900 mm mesh codend net. Five inshore stations in the Bering Sea, 22 in the Gulf of Alaska, and five off southeastern Alaska are fished using a smaller 32 mm mesh net to obtain information on younger juveniles. Each index region is fished at nearly the same time each year beginning in late May-early June in the Bering Sea.

The trawler NORE-DICK, out of Seattle, Washington, was chartered for 87 days in 1982 beginning in mid-May for the assessment survey, and to continue cooperative research with the National Marine Fisheries Service (NMFS) on other groundfish species begun in 1980. A total of 308 hauls were made, including 35 hauls to extend the NMFS studies beyond the usual IPHC grid, and 80 hauls to compare trawl catches with setline catches and for tagging in the Masset-Hecate Strait region of British Columbia. Lengths of halibut were recorded in all hauls, and sex and age data were collected from subsamples of the halibut catches in each region by gear type. Also, the number and sex of all king crab caught were recorded, and the carapace lengths of a sample of male crab were measured. All hauls were subsampled to estimate the number and weight of other species in the catches.

The relative abundance of juvenile halibut (number per one-hour haul with the 90 mm gear and the number per 15-minute haul with the 32 mm gear) is given with the average length at each age for each index region in 1982 (Appendix III, Table 1). The CPUE for the Bering Sea index area and the average CPUE for the Gulf of Alaska are shown in Figure 8 for all years since sampling began.

The mean CPUE from the Bering Sea index stations has been increasing from a low level in the early 1970's, except for a marked decline in 1979. In 1982, the CPUE was 33.1 juveniles per one-hour haul, the highest recorded in the region since sampling began in the 1960's. Each year, as part of the sampling scheme, additional fishing is progressively extended to stations beyond the limits of the index area depending on the continuing availability of juveniles. The low CPUE in 1979 was attributed partly to the weakness of the 1976 year-class and to a wide dispersion of the juvenile population, making them less available in the index area. In 1980 and 1981, juveniles were highly available both within and outside the index area. However, in 1982, despite their greater apparent abundance, halibut did not appear to be so widely dispersed.

Ocean bottom water temperature in the southeastern Bering Sea in early June in recent years had been above average compared to the early 1970's, when ice conditions prevailed in the sampling area and catches were low. However, the mean bottom temperature in late May-early June, 1982 was only 1.4°C, compared to 4.1°C for comparable seasons in the 1978-1981 period. The low temperature may have contributed to the reduced dispersion of juveniles in 1982. Stations nearer Unimak Pass in the Bering Sea averaged several degrees warmer than those further east in Bristol Bay where temperatures of 0 degrees C were not uncommon.

The total adjusted catch with the 32 mm net in the Bering Sea in 1982 was 293 juveniles, considerably fewer than the 376 taken in 1981. Although these catches are

larger than in the previous few years (266 in 1980, and 177 in 1979), they remain much smaller than the large catch of 541 observed in 1978. Three, 4- and 5-year-olds were the dominant age groups in the catches at offshore stations with the 90 mm mesh; catches at inshore locations with the 32 mm mesh were primarily of 3- and 4-year-olds. The 1980 year-class (2-year-olds) was below average in Bering Sea catches by both nets.

The Gulf of Alaska assessment index is based on 110 offshore stations in four locations: 25 off Unimak Island, 23 near Chirikof Island, 26 off Cape Chiniak, and 36 near Cape St. Elias. The average CPUE in the Gulf of Alaska had been increasing steadily during the past five years but took a drastic turn downward in 1982. In 1982, the mean CPUE was 35.7 juveniles per one-hour haul, considerably lower than the record high of 56.0 in 1981 and barely on an upward trend from the lows of the mid-1970's (Figure 8).

Temperature observations in the Gulf of Alaska were taken later in the year as the charter progressed, and bottom temperatures were much warmer throughout the Gulf than in the Bering Sea (1.4 degrees C), averaging 3.8 degrees C in the Unimak index region, 5.5 degrees C at Chirikof, 5.9 degrees C at Chiniak, and 5.7 degrees C at St. Elias. The weighted mean bottom temperature in the Gulf of Alaska was 5.2 degrees C. The mean temperature was 7.3 degrees C in Shelikof Bay in southeast Alaska by the time the charter vessel reached there in mid-July. The small catch of halibut in that region may be attributed to the high temperature.

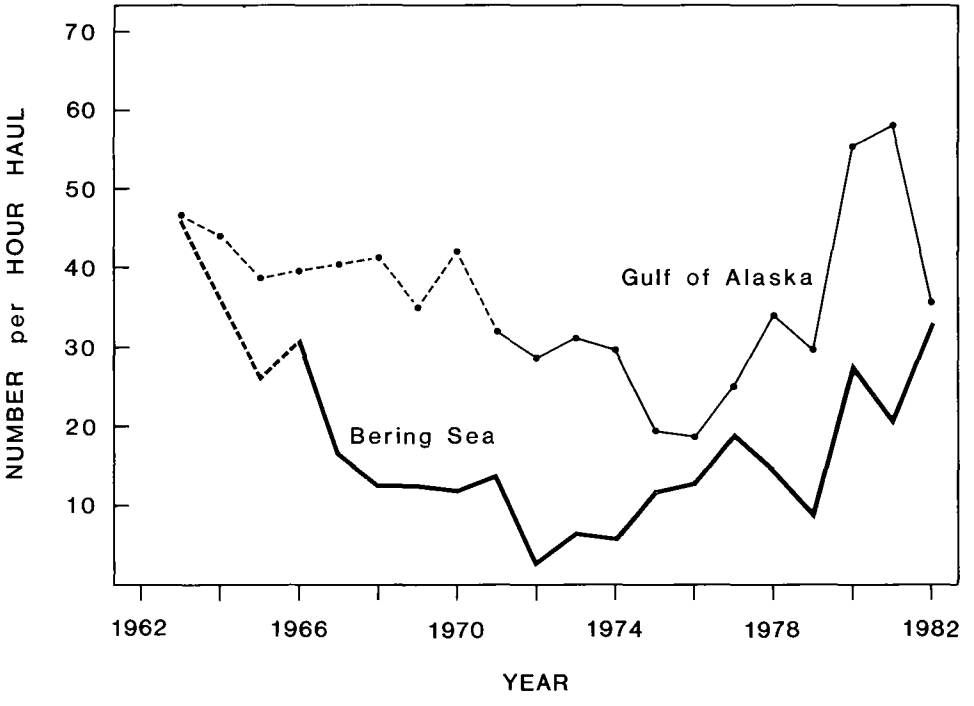


Figure 8. Catch per unit effort of juvenile halibut in the Gulf of Alaska and the Bering Sea, 1963-1982.

The standardized catch with the 32 mm net in the Gulf of Alaska was 2,575 juveniles in 1982, much higher than in the previous few years: 1,422 in 1981, 1,357 in 1980, and 1,545 in 1979. However, as in the Bering Sea, these catches all remain smaller than the catch of 4,442 juveniles in 1978.

In the Gulf of Alaska, as in the Bering Sea, the catches with the 90 mm gear were primarily of 3-, 4-, and 5-year-olds. The 1980 year-class (2-year-olds), weak in the Bering Sea, also appeared below average in the Gulf of Alaska except in catches with the 32 mm mesh at Alitak Bay and Trinity Islands stations and with the 90 mm net at Chirikof Island. Surprisingly, in the latter index region this group constituted 57% of the halibut catch.

ADULT HALIBUT SURVEY

Since 1976, IPHC has acquired population assessment information on adult halibut independent of the commercial fishery through its own setline surveys. Objectives of the surveys include collection of CPUE, sex, size, and age data. In addition, all halibut without serious injuries are tagged. The surveys entail fishing a predetermined grid of stations and in past years have taken place in the Charlotte (British Columbia) region in Area 2 and the Kodiak region in Area 3. In 1982, additional surveys were conducted in the southeastern Alaska region of Area 2 and the Shumagin Island-Davidson Bank region of Area 3. Vessels chartered for the 1982 surveys were the PROUD CANADIAN out of Prince Rupert, B.C. for the Charlotte region survey; the KRISTINE, Seattle, for the southeastern Alaska survey; and the THOR, Seattle, for the Kodiak and Shumagin surveys.

CPUE on the Charlotte survey was 26 pounds per skate, not significantly different from the 1981 CPUE of 22 pounds. The trend in CPUE since 1976 has been very stable and has averaged 24 pounds per skate. The catch of spiny dogfish, *Squalus acanthias,* which has accounted for nearly 64% of the total number of fish caught on the 1981 survey of this area, was down to about 44% in 1982, with no significant increase in halibut CPUE, indicating that dogfish may not be affecting the setline catch of halibut as much as believed. Female halibut comprised 58% of the catch, averaging 29 pounds and 10.2 years of age. Males averaged 14 pounds and 10.3 years of age. The average bottom temperature was 6.5 degrees C.

The survey of the southeastern Alaska region covered both the inside and outside waters. The survey of the inside waters resulted in a CPUE of 94 pounds per skate. CPUE ranged from 167 pounds per skate in the northern portion of the region (Icy Strait-Chatham Strait) to a low of 45 pounds per skate in the southern portion (Lower Clarence Strait-Revillagigedo Channel). Bottom temperature readings indicated no large difference between north and south: the overall average was 6.6 degrees C, not significantly different from the Charlotte survey. Females comprised 61% of the catch and averaged 38 pounds and 10.8 years of age. Males averaged 19 pounds and 11.0 years of age.

CPUE on the survey of the outside waters of southeastern Alaska was 164 pounds per skate and ranged from 241 pounds per skate to 83 pounds per skate, north to south. Only a few bottom temperature readings were taken, but the temperature in Dixon Entrance averaged 5.9 degrees C. Females comprised 55% of the catch and averaged 50 pounds and 12.4 years of age. Males averaged 20 pounds and 11.5 years of age.

CPUE on the Kodiak survey was 167 pounds per skate, the same as in 1981. Overall average weight and the percentage of females in the catch also showed no change from 1981, indicating no change in the population in this region. Females comprised 64% of the catch, averaging 46 pounds and 10.6 years of age. Males averaged 19 pounds and 10.0 years of age. The average bottom temperature was 5.6 degrees C.

The survey of the Shumagin region resulted in a CPUE of 152 pounds per skate, slightly higher than was obtained by the commercial fleet. Highest catch rates were made in the Shumagin Bank-Sanak Bank area. Females averaged 44 pounds and 10.0 years of age; males averaged 13 pounds and 9.0 years of age. Females comprised 74% of the catch, relatively high in comparison to other areas, but not atypical for this region. The mean bottom temperature was 4.6 degrees C.

Species other than halibut affect the results of the surveys because they compete for baited hooks. On the Charlotte survey halibut comprised only 9% of the catch. Chief competitors were spiny dogfish, skates (*Raja* spp.), blackcod (*Anaplopoma fimbria*), and rockfish (*Sebastes* spp.). On the southeastern Alaska survey, halibut accounted for 36% of the catch. Rockfish, blackcod, and dogfish were also caught in significant numbers. Halibut represented 57% of the catch on the Kodiak survey, with starfish and Pacific cod (*Gadus macrocephalus*) making up a large portion of the remainder. The catch on the Shumagin survey had halibut comprising 33% of the catch, with Pacific cod, starfish, and cottids (*Cottidae* spp.) making up the remainder.

The 1982 surveys caught 7,626 halibut, of which 4,016 were tagged and released. Recoveries of these tags will provide estimates of mortality and growth, as well as information on migration. The remaining 3,610 fish were used to estimate the size, sex, and age composition of the catches in the four survey areas.

TAGGING STUDIES

Tagging activity in 1982 was concentrated on adult fish rather than on juveniles as in the past two years. Consequently, the number of fish tagged dropped from 30,997 in 1982 to 11,671 in 1981. Tagged halibut were released from eight vessels engaged in various research activities. The investigations of spawning stocks, begun in late 1981, was continued during January and February with the vessels QUEST and STAR WARS II. The QUEST fished on grounds near Chirikof Island and the Shumagin Islands and encountered heavy catches. The STAR WARS II fished one trip in January off the south end of the Queen Charlotte Islands and, unlike the QUEST charter, had poor fishing. The setliners THOR, KRISTINE, and PROUD CANADIAN, using conventional setline gear, were chartered for summer adult halibut surveys fishing predetermined stations in the Gulf of Alaska, southeastern Alaska, and British Columbia, respectively. Two snap gear setliners, the VALOROUS and DAILY, fished some of the stations in parallel with the conventional setliners THOR and KRISTINE, respectively, to compare gear effectiveness. The trawler NORE-DICK was chartered for the annual juvenile halibut survey and released tagged fish from the Bering Sea to Cape St. Elias as well as a few off southeastern Alaska. The tag releases by all vessels are summarized in Table 8.

Upon completion of the juvenile survey, the trawler NORE-DICK fished in coordination with setliner PROUD CANADIAN off British Columbia where both vessels released tagged fish.

Table 8. Tag releases by month, vessel, and gear in 1982.

Month	Vessel	Gear	No. Tagged
January-February	QUEST	Setline	1,802
January	STAR WARS II	Setline	137
July-September	THOR	Setline	2,535
July	VALOROUS	Setline	746
July-August	KRISTINE	Setline	1,112
July-August	DAILY	Setline	702
July-September	PROUD CANADIAN	Setline	949
May-July	NORE-DICK	Trawl	3,688
Total			11,671

Tag recoveries totalled 424 in 1982, including nine recaptured in earlier years but not reported until this year. A tag released in 1965 and at liberty 17 years was recaptured this year. Few tagged halibut have been recovered so many years after release. This individual was released near Nunivak Island in the Bering Sea and was recovered in Caamano Sound on the British Columbia coast. It had grown from 77 cm to 172 cm and had increased in weight from about 10 pounds to 120 pounds. Seven premium tags were received and the finders were awarded $100.00 each in addition to the basic $5.00 reward.

During the summers of 1980 and 1981 the Commission released 53,754 tagged trawl-caught halibut under 65 cm in length west of Cape Spencer. Through 1982 there have been 173 total recoveries of which 39 were taken off the British Columbia coast and south to as far as northern California. Few of these fish had yet reached the minimum legal size so the chances of recovering them with setline were not great. Most of the recoveries in Alaska were reported by shrimp trawlers, and sport fishermen. Of the 39 recoveries caught south of Alaska, 22 were taken by bottom trawlers, eight by salmon trollers, four by sport fishermen, one by unknown gear, and only four by setliners.

Table 9 summarizes the releases by several broad geographic areas and the respective recoveries south of Alaska. Significantly more of those fish released near the east end of Kodiak Island moved south of Alaska than those released in other areas.

Table 9. Tag releases in 1980 and 1981 by geographic area, and number and percent recovery south of Alaska.

Area	1980+1981 Releases	1981+1982 Recoveries South of Alaska	% Recovery
Bering Sea	3,479	—	—
Unimak Island	2,078	—	—
West end of Kodiak Isl.	13,927	7	.050
East end of Kodiak Isl.	17,575	26	.148
Cape St. Elias	16,695	6	.036
Total	53,754	39	.072

CATCH SAMPLING

During the 1982 fishing season, 318 landings were sampled at selected ports from Seattle, Washington, to Kodiak, Alaska. The season timing and price structure made running south to deliver the catch at Seattle or Bellingham a profitable venture for many vessels. Consequently, the southern ports received a greater proportion of the landings than they have for several years. This pattern of delivery complicated the sampling somewhat as the fish processing plants are separated by much greater distances in most of the southern ports than at the smaller northern ports.

Sampling crews collected over 23,000 otoliths which were used to determine the size of halibut in the landings. Over 9,000 of these otoliths were aged for composition studies. The sub-samples for aging were 600 otoliths from each region each fishing period. The sampling rate for the season was 2.9%. A summary of the sampling by region is presented in Table 10. The lightly fished regions of Columbia and Aleutians were not sampled, although all other regions were well represented.

Catch, CPUE, and average weight at each age of halibut in the setline landings for 1982 are summarized by region in Appendix III, Table 2. The average length and age of the fish in the landings and number of halibut measured and aged are also reported.

The 1972 year-class, which made an important early contribution in Area 2, has continued to be above average in abundance. In Area 3, the 1970 year-class has continued to increase in relative abundance as 12-year-olds, shifting the Area 3 modal age of landings from 10-year-olds (1977 to 1980) to 11-year-olds (1981), and 12-year-olds (1982).

Table 10. Commercial catch and percent sampled for size and age composition by region during 1982.

Region	Catch* (000's pounds)	Percent Sampled
Columbia	76	0.0
Vancouver	399	1.1
Charlotte-Outside	659	4.0
Charlotte-Inside	4,313	4.2
S.E. Alaska-Outside	1,191	1.6
S.E. Alaska-Inside	2,294	1.7
Yakutat	3,786	2.4
Kodiak	9,721	2.4
Chirikof	3,464	3.8
Shumagin	2,408	3.5
Aleutian	0	0.0
Bering Sea	407	4.3
Total	28,718	2.9

*Does not include research catches.

Several management solutions have been proposed and implemented in recent years to reduce these losses. Time and area closures are effective in redistributing trawl effort. Incidental catch of halibut varies according to the season and, often, the target species. By directing this effort away from known concentrations of halibut, some savings can be realized. Another method of reducing incidental catch losses is through modification of trawl gear.

Cooperative research in studying this problem was conducted in the Bering Sea by the Japan Marine Fishery Resource Research Center (JAMARC) and IPHC during July and August of 1982. The cruise plan for the project was developed by JAMARC and supported by the Committee on Biology and Research at the 28th Annual Meeting of the International North Pacific Fisheries Commission. JAMARC chartered a small 50-meter Japanese stern trawler and provided all trawl gear for the study. One member of the IPHC staff participated in the research effort.

The objective of the study was to test trawl nets modified to reduce the incidental catch of halibut, while not adversely affecting the catch rate of the target species, walleye pollock *(Theragra chalcogramma).* Four trawl designs were used for comparison; a standard bottom trawl with roller gear, a mid-water trawl, and two modified bottom trawls. The modified trawls differed basically at their footropes. One net (hanging rope type) had roller gear attached to the footrope by one meter lengths of rope and chain. The other had no roller gear but 1.5 meter dropper chains spaced at 0.5 meter intervals along the footrope. Floats were attached to the footrope to compensate for the chain weight.

Three sites south of the Pribilof Islands on the Misty Moon ground and two sites northwest of Cape Sarichef were selected on which to compare the trawls. Each area was hydro-acoustically surveyed for concentrations of pollock and assumed to be suitable habitat for halibut. The experimental areas were approximately two miles wide by five and a half miles long. Depth ranged between 120 to 240 meters.

Results of the study showed that the modified nets reduced the halibut catch rate (halibut/hr) by nearly 80% when compared to the standard bottom trawl. This was most apparent in the Misty Moon area where halibut were more abundant. The mid-water net had the lowest halibut catch rate but a corresponding decrease in total catch as well. Total catch was not as low for the mid-water net in the Cape Sarichef area. Target species catch rates were lower for all nets when compared to the standard bottom trawl. However, the hanging rope type net averaged only 13% less than the standard bottom trawl with a substantial reduction in the halibut catch rate.

Distance between the footrope and the sea bottom likely increases the halibut's chance of avoiding capture. The mean weight of individual halibut caught increased as the distance between the footrope of the net and the sea bottom increased. Smaller halibut swimming closer to the sea bottom possibly escape under the footrope whereas larger halibut occasionally swim off the bottom and are still subject to capture.

Net modifications can reduce the incidental catch of halibut but may also have a slight adverse effect on the catch of the target species. To minimize these effects a combination of time-area closures, gear restrictions, and net modifications may be the best compromise to lower incidental catch rates.

SUBMARINE OBSERVATIONS

Again in 1982, IPHC participated with the National Marine Fisheries Service in a series of dives using the submersible NEKTON GAMMA for the purpose of observing the retention and loss of various types of bait on longline gear, and to determine how many hooked halibut are actually brought to the surface. The TIFFY, a 42-foot snap gear vessel was chartered to set the gear to be observed.

Baits used were herring, octopus, salmon, and grey cod. Generally, herring and salmon baits disappeared so quickly that reliable estimates of bait loss were not possible, with 80-90% of these baits disappearing within the first hour of soak. Grey cod and octopus baits disappeared at a rate of about 30% per hour.

Comparison of the catch rates for hooks baited with octopus with the corresponding percentage of empty hooks still retaining octopus baits indicates a positive correlation between catch rate and bait retention. This suggests that predation by fish was not the major cause of the high bait losses observed. Poor baiting technique, and losses to predators such as crabs, starfish, anemones, and snails were undoubtedly the primary cause of bait loss.

Estimated rates of escape of hooked halibut varied from 5% to 50% between sets. The overall loss of hooked halibut was 19%.

AGE VALIDATION USING OXYTETRACYCLINE

During the 1982 field season, an age validation study was initiated by injecting tagged halibut with oxytetracycline hydrochloride (OTC) which has been widely used to make a "time mark" in the new bone of animals. When viewed under ultra-violet light this mark fluoresces as a ring within the otolith. Upon recapture, age rings outside the OTC mark can be verified as true annuli by comparing them with the time at large.

A total of 570 fish were injected during tagging operations in Areas 2B and 3B (Table 11). An intraperitoneal injection at a dosage of 50 mg/kg of body weight was used. Halibut 75 cm and under were injected in Area 2B, whereas in Area 3B halibut between 45 and 200 cm were selected for injection. The proportion of tagged fish injected was nearly the same for each area (Area 3B, 61.5%; Area 2B, 61.7%).

The otolith from one injected fish has been recovered to date. Only eight days had elapsed between release and recapture but the "OTC mark" was already conspicuous.

Table 11. Summary of Oxytetracycline-injected halibut in Areas 2B and 3B.

	Number Injected			Average Weight	% of Total Tagged
	≤81 cm	≥82 cm	Total		
Area 3B	186	273	459	27.4	61.5
Area 2B	111	0	111	5.8	61.7
Total	297	273	570	23.2	61.6

GENETIC RELATIONSHIP OF HALIBUT

An examination of the genetic relationships between Atlantic halibut, *(Hippoglossus hippoglossus)*, and Pacific halibut, *(H. stenolepis)*, suggests that they are at an early stage of subspecific divergence. Biochemical genetic variation shown by starch-gel electrophoresis in samples of Pacific halibut from the Gulf of Alaska, Bering Sea, and off Japan was compared to a sample of Atlantic halibut off Iceland.

Pleuronectids are thought to have evolved in the Pacific Ocean basin about 70 million years ago because of the greater present-day species diversity of this group in the Pacific Ocean. Migration of cold-adapted flatfishes into the Atlantic Ocean was not possible until the Bering Seaway was formed about 7 million years ago. It is uncertain whether halibut ancestral to Atlantic halibut migrated into the Atlantic at that time or at a much later date. The current geographic distributions of Atlantic and Pacific halibut do not overlap and the genetic differences between them suggest that separation occurred about 2 to 3 million years ago.

A similar examination of the genetic relationships among populations of Pacific halibut shows that halibut in the North Pacific Ocean and Bering Sea are interrelated. Samples of juvenile halibut from the Gulf of Alaska, Bering Sea, and off Japan were tested for biochemical genetic variation using starch-gel electrophoresis. No significant differences were detected between juveniles from the Gulf of Alaska and Bering Sea, an indication that the populations in these areas are genetically homogeneous. This result is consistent with the migration pattern of Pacific halibut and the concept of stock intermingling. A comparison of the Japanese sample to a pooled sample of Gulf of Alaska and Bering Sea juveniles showed that they are also very closely related.

HALIBUT HEAD WEIGHT

In the early days of the halibut fishery, eviscerated fish were sometimes landed with the heads on. Weights from fish in this condition are called gross weights. Since fishermen are paid on the basis of eviscerated, head-off weight, also known as dressed or net weight, fish dealers in Seattle customarily deducted 14% for the head weight. An additional 2% was deducted for the ice and slime. The Seattle Fishing Vessel Owners Association and the Deep Sea Fishermen's Union believed that 14% was too high and in 1936 they contracted with Mr. Ralph Silliman, a student at the University of Washington School of Fisheries, to determine the actual percentage of the gross weight represented by the head when cut according to standard industry procedures. After examining over 2,500 halibut, the average head weight was found to be 9.9% of the gross weight. On the basis of this study, the Vessel Owners Association, the Fishermen's Union, and the Seattle Fish Exchange agreed that 12% would be deducted from the head-on weight to correct for the weight of the head. Beginning in 1971, the Seattle Fish Exchange started deducting 10% for the head weight, according to Mr. Robert Alverson, manager of the Seattle Fishing Vessel Owners Association.

During 1982, the dressed weights of halibut landed by six vessels in Prince Rupert were compared with the weight of all heads from those trips. The gross weight for all fish in the sample was 49,200 pounds, and the head weight was found to be 8.2% of the gross weight. In addition, the gross weight and the head weights for 213 halibut landed by Commission research vessels were obtained. Most heads were severed with a guillotine operated by fish company employees, and the head weight from this sample was 7.5% of the gross weight.

From the above it is concluded that according to current industry heading practice the head weight for halibut is about 8% of the gross weight.

Appendices

The tables in Appendix I provide statistics for 1982 and are a supplement to Technical Report No. 14, "The Pacific Halibut Fishery: Catch, Effort and CPUE, 1929-1975." Appendix tables in the 1977 Annual Report updated these statistics for 1976 and 1977, the 1979 Annual Report updated these statistics for 1978 and 1979, and the 1980 and 1981 Annual Reports updated them for 1980 and 1981, respectively. A detailed explanation of the tables, the methods of compilation, and definitions of the statistical subdivisions are included in Technical Report No. 14 which is available on request. The poundage in these tables is dressed weight (head-off, eviscerated). Copies of the tables in metric units and round (live) weight are available on request.

The tables in Appendix II and Appendix III provide data on ex-vessel price of halibut and on abundance and average size at each age by regions of sampling, respectively.

Appendix I.

Table 1. Catch, CPUE, and effort by statistical area and country, 1982.
Table 2. Catch, CPUE, and effort by region and country, 1982.
Table 3. Catch, CPUE, and effort by regulatory area, 1982.
Table 4. Catch in thousands of pounds by regulatory area and country, 1982.
Table 5. Landings in thousands of pounds by port and country, 1982.

Appendix II.

Annual landings, ex-vessel price, and value (U.S. dollars), 1929-1982.

Appendix III.

Table 1. Juvenile halibut CPUE and average length by age by sampling index area, 1982.
Table 2. Catch in numbers, CPUE in number per 10,000 skates, and average weight in pounds (dressed, head-off) at age by regions, 1982.

APPENDIX I.

TABLE 1. CATCH, CPUE AND EFFORT BY STATISTICAL AREA AND COUNTRY, 1982.

1982	CANADA			UNITED STATES			TOTAL			
STAT. AREA	CATCH 000 LBS	CPUE LBS	EFFORT 00 SKS	CATCH 000 LBS	CPUE LBS	EFFORT 00 SKS	CATCH 000 LBS	CPUE LBS	EFFORT 00 SKS	LOGS %
00-03	-	-	-	76	36.8	21	76	36.8	21	-
04	-	-	-	18	17.1	11	18	17.1	11	6
05	-	-	-	117	44.7	26	117	44.7	26	19
06	137	22.6*	61	-	-	-	137	22.6	61	-
07	104	25.0	42	-	-	-	104	25.0	42	1
08	68	19.6	35	-	-	-	68	19.6	35	1
09 -0	70	56.1	12	-	-	-	70	56.1	12	34
09 -I	443	50.9	87	-	-	-	443	50.9	87	9
10 -0	15	75.8*	2	-	-	-	15	75.8	2	-
10 -I	919	69.0	133	-	-	-	919	69.0	133	15
11 -0	69	73.7	9	-	-	-	69	73.7	9	43
11 -I	1020	59.7	171	-	-	-	1020	59.7	171	35
12 -0	111	74.5	15	-	-	-	111	74.5	15	26
12 -I	439	96.0	46	-	-	-	439	96.0	46	35
13 -0	452	80.2	56	-	-	-	452	80.2	56	19
13 -I	1691	64.8	261	-	-	-	1691	64.8	261	22
14 -0	-	-	-	117	148.7*	8	117	148.7	8	-
14 -I	-	-	-	208	192.6*	11	208	192.6	11	-
15 -0	-	-	-	190	108.8	17	190	108.8	17	11
15 -I	-	-	-	219	276.2	8	219	276.2	8	28
16 -0	-	-	-	281	171.4	16	281	171.4	16	9
16 -I	-	-	-	845	182.3	46	845	182.3	46	22
17 -0	-	-	-	428	163.1	26	428	163.1	26	4
17 -I	-	-	-	116	101.6	11	116	101.6	11	17
18S-0	-	-	-	171	143.2	12	171	143.2	12	18
18S-I	-	-	-	925	212.2	44	925	212.2	44	13
18W	-	-	-	554	78.8	70	554	78.8	70	13
19	-	-	-	691	131.8	52	691	131.8	52	19
20	-	-	-	747	119.3	63	747	119.3	63	21
21	-	-	-	482	125.9	38	482	125.9	38	16
22	-	-	-	683	153.3	45	683	153.3	45	33
23	-	-	-	703	91.2	77	703	91.2	77	20
24	-	-	-	1240	110.5	112	1240	110.5	112	21
25	-	-	-	3308	191.2	173	3308	191.2	173	55
26	-	-	-	2216	190.1	117	2216	190.1	117	32
27	-	-	-	1684	246.2	68	1684	246.2	68	17
28	-	-	-	1222	267.7	46	1222	267.7	46	37
29	-	-	-	2052	252.0	81	2052	252.0	81	29
30	-	-	-	873	198.8	44	873	198.8	44	65
31	-	-	-	495	138.3	36	495	138.3	36	18
32	-	-	-	1161	195.0	60	1161	195.0	60	36
33	-	-	-	201	224.1	9	201	224.1	9	34
34	-	-	-	18	135.3*	1	18	135.3	1	-
35	-	-	-	336	111.7	30	336	111.7	30	58
36	-	-	-	412	94.8	43	412	94.8	43	60
37	-	-	-	124	66.9	19	124	66.9	19	62
38	-	-	-	142	94.5	15	142	94.5	15	82
39	-	-	-	-	-	-	-	-	-	-
40	-	-	-	-	-	-	-	-	-	-
41	-	-	-	-	-	-	-	-	-	-
42+	-	-	-	-	-	-	-	-	-	-
4A	-	-	-	15	76.5	2	15	76.5	2	-
4B	-	-	-	150	47.8	31	150	47.8	31	11
4C	-	-	-	237	76.2	31	237	76.2	31	43
4DE	-	-	-	7	14.3	5	7	14.3	5	-
4DW	-	-	-	6	43.8	1	6	43.8	1	72
4E	-	-	-	-	-	-	-	-	-	-

* NO LOG DATA, CPUE INTERPOLATED.

APPENDIX I. (continued)

TABLE 2. CATCH, CPUE AND EFFORT BY REGION AND COUNTRY, 1982.

1982	CANADA			UNITED STATES			TOTAL			
REGION	CATCH 000 LBS	CPUE LBS	EFFORT 00 SKS	CATCH 000 LBS	CPUE LBS	EFFORT 00 SKS	CATCH 000 LBS	CPUE LBS	EFFORT 00 SKS	LOGS %
COLUMBIA	-	-	-	76	42.8	18	76	42.8	18	-
VANCOUVER	309	21.1	146	135	42.8	32	444	24.9	178	5
CHARLOTTE	5229	66.8	783	-	-	-	5229	66.8	783	23
CHAR-O	717	73.6	97	-	-	-	717	73.6	97	23
CHAR-I	4512	65.8	686	-	-	-	4512	65.8	686	23
SE ALASKA	-	-	-	3500	172.4	203	3500	172.4	203	14
SE AK-O	-	-	-	1187	142.4	83	1187	142.4	83	8
SE AK-I	-	-	-	2313	193.1	120	2313	193.1	120	17
YAKUTAT	-	-	-	3860	117.0	330	3860	117.0	330	21
KODIAK	-	-	-	9670	191.4	505	9670	191.4	505	37
CHIRIKOF	-	-	-	3420	213.5	160	3420	213.5	160	36
SHUMAGIN	-	-	-	2394	121.9	196	2394	121.9	196	47
ALEUTIAN	-	-	-	-	-	-	-	-	-	-
BERING SEA	-	-	-	415	58.7	71	415	58.7	71	-
TOTAL	5538	59.6	929	23470	154.9	1515	29008	118.7	2444	35

* NO LOG DATA, CPUE INTERPOLATED.

TABLE 3. CATCH, CPUE AND EFFORT BY REGULATORY AREA, 1982.

	AREA 2				AREA 3				AREA 4			
YEAR	CATCH 000 LBS	CPUE LBS	EFFORT 00 SKS	LOGS %	CATCH 000 LBS	CPUE LBS	EFFORT 00 SKS	LOGS %	CATCH 000 LBS	CPUE LBS	EFFORT 00 SKS	LOGS %
1982	9249	78.2	1182	19	19344	162.4	1191	35	415	58.5	71	30

TABLE 4. CATCH IN THOUSANDS OF POUNDS BY REGULATORY AREA AND COUNTRY, 1982.

	AREA 2			AREA 3			AREA 4			ALL AREAS		
YEAR	CAN.	U.S.	TOTAL	CAN.	U.S.	TOTAL	CAN.	U.S.	TOTAL	CAN.	U.S.	TOTAL
1982	5538	3711	9249		19344	19344		415	415	5538	23470	29008

TABLE 5. LANDINGS IN THOUSANDS OF POUNDS BY PORT AND COUNTRY, 1982.

	1982		
PORT	CAN.	U.S.	TOTAL
CAL AND ORE	-	183	183
SEATTLE	635	1408	2043
BELLINGHAM	701	1115	1816
MISC WASH	189	260	449
VANCOUVER	1408	-	1408
MISC SO BC	403	-	403
NAMU	23	-	23
PR RUPERT	1932	-	1932
MISC NO BC	247	-	247
KETCHIKAN	-	219	219
WRANGELL	-	192	192
PETERSBURG	-	1465	1465
JUNEAU	-	654	654
SITKA	-	2589	2589
PELICAN	-	599	599
MISC SE AK	-	1305	1305
KODIAK	-	6246	6246
P WILLIAMS	-	-	-
SEWARD	-	3234	3234
MISC CEN AK	-	4001	4001

APPENDIX II. Annual landings, ex-vessel price, and value (U.S. dollars), 1929-1982.

Year	Catch (000's pounds)	Price (dollars/ pound)	Value (000's dollars)	Year	Catch (000's pounds)	Price (dollars/ pound)	Value (000's dollars)
1929	56,928	.12	6,831				
1930	49,492	.10	4,949	1960	71,605	.16	11,457
1931	44,220	.07	3,095	1961	69,274	.21	14,548
1932	44,454	.04	1,778	1962	74,862	.30	22,459
1933	46,795	.06	2,808	1963	71,237	.21	14,960
1934	47,546	.06	2,853	1964	59,784	.23	13,750
1935	47,343	.07	3,314	1965	63,176	.32	20,216
1936	48,923	.08	3,914	1966	62,016	.34	21,085
1937	49,539	.08	3,963	1967	55,222	.23	12,701
1938	49,553	.07	3,469	1968	48,594	.23	11,177
1939	50,903	.07	3,563	1969	58,275	.38	22,144
1940	53,381	.09	4,804	1970	54,938	.37	20,327
1941	52,231	.10	5,223	1971	46,654	.32	14,929
1942	50,388	.15	7,558	1972	42,884	.64	27,446
1943	53,699	.19	10,203	1973	31,740	.74	23,488
1944	53,435	.15	8,015	1974	21,306	.70	14,914
1945	53,395	.15	8,009	1975	27,616	.89	24,578
1946	60,266	.17	10,245	1976	27,535	1.26	34,694
1947	55,700	.17	9,469	1977	21,868	1.31	28,647
1948	55,564	.17	9,446	1978	21,988	1.70	37,380
1949	55,025	.17	9,354	1979	22,532	2.13	48,080
1950	57,234	.23	13,164	1980	21,866	.99	21,647
1951	56,045	.17	9,528	1981	25,732	1.02	26,247
1952	62,262	.19	11,830	1982	29,019	1.09	31,573
1953	59,837	.15	8,976				
1954	70,583	.17	11,999				
1955	57,521	.14	8,053				
1956	66,588	.22	14,649				
1957	60,854	.17	10,345				
1958	64,508	.21	13,547				
1959	71,204	.19	13,529				

APPENDIX III. Table 1. Juvenile halibut CPUE and average length ($\bar{\ell}$) by age by sampling index area, 1982.

A. Using 32-mm mesh for 15-minute tow

		AGE										
AREA		0	1	2	3	4	5	6	7	8	9	Total
Shelikof	CPUE	—	3.80	0	0.40	0.70	1.70	1.60	—	—	—	8.20
Bay	$\bar{\ell}$	—	17.5	—	46.0	41.7	48.5	50.9	—	—	—	33.8
Kayak	CPUE	—	23.58	1.72	18.86	9.16	1.68	2.49	—	—	—	57.50
Island	$\bar{\ell}$	—	14.6	21.8	31.2	38.3	52.0	48.7	—	—	—	26.6
Trinity	CPUE	—	2.20	16.92	5.68	0.60	0.30	0.10	—	—	—	25.80
Islands	$\bar{\ell}$	—	13.5	22.5	28.8	50.8	56.3	61.0	—	—	—	24.3
Alitak	CPUE	—	25.56	63.49	15.32	2.64	0.33	—	—	—	—	107.33
Bay	$\bar{\ell}$	—	11.2	20.7	32.6	41.8	53.3	—	—	—	—	20.8
Unimak	CPUE	—	4.86	9.29	6.69	3.99	2.74	0.10	0.10	0.10	—	27.87
Bight	$\bar{\ell}$	—	10.4	23.4	32.1	38.3	49.7	58.0	58.0	62.0	—	28.3
Bering	CPUE	—	0.17	1.72	15.78	8.08	2.92	0.50	0.17	—	—	29.33
Sea	$\bar{\ell}$	—	8.0	24.3	32.7	35.6	45.3	47.3	65.0	—	—	34.6

B. Using 90-mm mesh for 60-minute tow

Cape St.	CPUE	—	0.11	0.06	4.72	4.78	9.70	5.06	1.24	0.50	—	26.17
Elias	$\bar{\ell}$	—	15.5	25.0	36.6	39.8	49.7	55.3	59.4	63.6	—	47.1
Cape	CPUE	—	—	0.98	10.86	4.57	3.62	1.37	—	—	—	21.40
Chiniak	$\bar{\ell}$	—	—	27.2	32.9	40.1	48.4	58.8	—	—	—	38.5
Chirikof	CPUE	—	—	39.36	11.88	8.05	7.16	2.64	0.36	—	—	69.45
Island	$\bar{\ell}$	—	—	24.3	36.6	41.5	49.2	58.5	64.0	—	—	32.4
Unimak	CPUE	—	—	2.89	2.14	4.13	16.08	4.63	2.38	1.58	0.37	34.22
Island	$\bar{\ell}$	—	—	25.5	33.4	42.8	46.8	50.7	55.1	58.4	61.0	46.4
Bering	CPUE	—	—	0.18	6.29	8.71	17.06	0.29	0.53	—	—	33.06
Sea	$\bar{\ell}$	—	—	24.8	35.3	45.3	50.6	60.7	57.8	—	—	46.4

APPENDIX III. (continued)

TABLE 2. CATCH IN NUMBERS, CPUE IN NUMBER PER 10,000 SKATES, AND AVERAGE WEIGHT IN POUNDS (DRESSED, HEAD-OFF) AT AGE BY REGIONS, 1982.

	COLUMBIA			VANCOUVER			CHARLOTTE OUTSIDE		
AGE	CATCH	CPUE	AVE WT	CATCH	CPUE	AVE WT	CATCH	CPUE	AVE WT
1	0	0	0.0	0	0	0.0	0	0	0.0
2	0	0	0.0	0	0	0.0	0	0	0.0
3	0	0	0.0	0	0	0.0	0	0	0.0
4	0	0	0.0	0	0	0.0	0	0	0.0
5	5	28	3.6	25	14	3.6	29	30	3.6
6	83	468	11.6	425	238	11.5	606	622	11.2
7	296	1669	11.6	1588	891	11.5	2450	2515	11.4
8	394	2221	12.9	2230	1251	12.9	3559	3653	13.2
9	552	3112	16.4	3124	1753	16.4	5181	5318	16.4
10	557	3140	21.0	3158	1772	20.9	5243	5381	20.9
11	320	1804	25.1	1869	1049	25.1	3131	3214	25.3
12	326	1838	35.1	1879	1054	34.8	2982	3061	34.7
13	194	1094	38.1	1198	672	38.4	2035	2089	38.9
14	139	784	41.4	811	455	41.1	1212	1244	41.0
15	63	355	43.4	399	224	44.0	661	678	43.9
16	62	349	45.5	372	209	45.9	557	572	46.9
17	43	242	44.2	258	145	43.9	384	394	42.8
18	28	158	61.8	190	107	60.2	306	314	62.3
19	33	186	71.3	187	105	73.7	261	268	74.1
20	7	39	65.3	37	21	71.5	62	64	66.3
21+	18	101	78.7	112	63	79.9	174	179	82.6
TOT	3118	17576	24.4	17863	10021	24.8	28831	29592	24.8
	AV LEN 102.0, AV AGE 10.4			AV LEN 102.3, AV AGE 10.5			AV LEN 102.5, AV AGE 10.5		
	#OTO'S 855, #AGED 854			#OTO'S 1044, #AGED 1042			#OTO'S 1044, #AGED 1042		

	CHARLOTTE INSIDE			SE ALASKA OUTSIDE			SE ALASKA INSIDE		
AGE	CATCH	CPUE	AVE WT	CATCH	CPUE	AVE WT	CATCH	CPUE	AVE WT
1	0	0	0.0	0	0	0.0	0	0	0.0
2	0	0	0.0	0	0	0.0	0	0	0.0
3	0	0	0.0	0	0	0.0	0	0	0.0
4	0	0	0.0	0	0	0.0	0	0	0.0
5	1004	146	9.1	0	0	0.0	0	0	0.0
6	4756	692	10.0	121	145	8.6	461	385	10.6
7	15443	2248	11.8	904	1085	12.5	2978	2486	12.2
8	26365	3837	15.8	1809	2170	15.5	5474	4569	13.2
9	32385	4714	18.0	4461	5352	20.3	11935	9962	19.5
10	27422	3991	22.9	5366	6438	23.8	14357	11984	23.0
11	19365	2819	28.2	5607	6727	34.1	11555	9645	27.3
12	14882	2166	33.8	3678	4413	34.9	8127	6784	35.0
13	9700	1412	38.6	3738	4485	43.4	4756	3970	44.6
14	6318	920	44.0	2110	2531	53.6	2468	2060	45.3
15	4088	595	47.8	1145	1374	46.8	1999	1669	51.5
16	3124	455	62.2	1326	1591	67.1	2075	1732	70.7
17	1969	287	66.8	663	795	65.0	1036	865	72.5
18	1839	268	66.1	362	434	76.1	1370	1144	84.0
19	969	141	94.8	603	723	80.7	927	774	76.4
20	628	91	84.4	181	217	103.9	356	297	91.2
21+	1568	228	95.4	302	362	127.5	1129	942	138.1
TOT	171827	25010	26.2	32375	38842	36.2	71001	59266	32.3
	AV LEN 102.5, AV AGE 10.3			AV LEN 113.7, AV AGE 11.6			AV LEN 109.1, AV AGE 11.2		
	#OTO'S 6803, #AGED 2939			#OTO'S 537, #AGED 537			#OTO'S 1211, #AGED 596		

APPENDIX III. Table 2. (continued)

TABLE 2. CATCH IN NUMBERS, CPUE IN NUMBER PER 10,000 SKATES, AND AVERAGE WEIGHT IN POUNDS (DRESSED, HEAD-OFF) AT AGE BY REGIONS, 1982.

	YAKUTAT			KODIAK			CHIRIKOF		
AGE	CATCH	CPUE	AVE WT	CATCH	CPUE	AVE WT	CATCH	CPUE	AVE WT
1	0	0	0.0	0	0	0.0	0	0	0.0
2	0	0	0.0	0	0	0.0	0	0	0.0
3	0	0	0.0	0	0	0.0	0	0	0.0
4	0	0	0.0	0	0	0.0	0	0	0.0
5	0	0	0.0	0	0	0.0	0	0	0.0
6	691	209	9.4	1010	200	10.8	1304	814	13.6
7	2878	872	12.0	5583	1105	15.7	3676	2295	13.4
8	5803	1759	15.3	10267	2032	19.5	8258	5156	20.0
9	11914	3611	18.8	22535	4461	23.6	18873	11785	28.3
10	15328	4646	21.9	26357	5217	29.0	17910	11183	32.9
11	14937	4528	28.4	28759	5692	37.9	11420	7131	40.8
12	19679	5965	34.5	32964	6525	44.8	11351	7088	52.8
13	14979	4540	40.5	24836	4916	56.0	4427	2764	57.2
14	9881	2995	45.1	21142	4185	66.5	3540	2210	65.3
15	6482	1965	46.6	10192	2017	73.6	2020	1261	69.8
16	3523	1068	52.4	6048	1197	70.7	819	511	83.9
17	3904	1183	54.0	6822	1350	86.4	576	360	93.5
18	1427	433	75.0	2100	416	99.9	689	430	96.4
19	995	302	68.3	2416	478	117.0	174	109	116.2
20	359	109	73.1	1415	280	110.8	238	149	71.0
21+	1201	364	101.7	1540	305	148.3	810	506	106.9
TOT	113982	34550	33.9	203988	40377	47.1	86086	53753	39.1
	AV LEN 111.9, AV AGE 12.0			AV LEN 123.7, AV AGE 11.9			AV LEN 117.3, AV AGE 10.6		
	#OTO'S 2711, #AGED 1046			#OTO'S 4963, #AGED 1198			#OTO'S 3401, #AGED 775		

	SHUMAGIN(3B)			ALEUTIANS			BERING SEA		
AGE	CATCH	CPUE	AVE WT	CATCH	CPUE	AVE WT	CATCH	CPUE	AVE WT
1	0	0	0.0	0	0	0.0	0	0	0.0
2	0	0	0.0	0	0	0.0	0	0	0.0
3	0	0	0.0	0	0	0.0	0	0	0.0
4	0	0	0.0	0	0	0.0	0	0	0.0
5	0	0	0.0	0	0	0.0	0	0	0.0
6	27	14	5.2	0	0	0.0	0	0	0.0
7	1830	932	14.7	0	0	0.0	1300	1839	11.1
8	5488	2795	19.7	0	0	0.0	2049	2898	18.0
9	15427	7856	24.6	0	0	0.0	3660	5177	25.2
10	13729	6991	31.1	0	0	0.0	2859	4044	32.6
11	8724	4442	38.1	0	0	0.0	1041	1472	37.4
12	7854	3999	43.8	0	0	0.0	818	1157	50.9
13	5549	2826	48.5	0	0	0.0	369	522	64.3
14	2115	1077	53.3	0	0	0.0	253	358	71.5
15	2064	1051	57.1	0	0	0.0	220	311	70.3
16	824	420	71.4	0	0	0.0	91	129	70.7
17	663	338	85.4	0	0	0.0	61	86	52.2
18	289	147	80.3	0	0	0.0	30	42	61.0
19	220	112	99.7	0	0	0.0	59	83	97.8
20	90	46	115.3	0	0	0.0	58	82	78.7
21+	324	165	124.6	0	0	0.0	145	205	124.6
TOT	65218	33210	35.7	0	0	0.0	13041	18446	31.8
	AV LEN 114.3, AV AGE 10.7			AV LEN 0.0, AV AGE 0.0			AV LEN 109.4, AV AGE 9.9		
	#OTO'S 2375, #AGED 804			#OTO'S 0, #AGED 0			#OTO'S 2817, #AGED 1231		

APPENDIX III. Table 2. (continued)

TABLE 2. CATCH IN NUMBERS, CPUE IN NUMBER PER 10,000 SKATES, AND AVERAGE WEIGHT IN POUNDS (DRESSED, HEAD-OFF) AT AGE BY REGIONS, 1982.

	AREA 2A			AREA 2B			AREA 2C		
AGE	CATCH	CPUE	AVE WT	CATCH	CPUE	AVE WT	CATCH	CPUE	AVE WT
1	0	0	0.0	0	0	0.0	0	0	0.0
2	0	0	0.0	0	0	0.0	0	0	0.0
3	0	0	0.0	0	0	0.0	0	0	0.0
4	0	0	0.0	0	0	0.0	0	0	0.0
5	14	26	3.6	1005	108	9.0	0	0	0.0
6	230	428	11.6	5212	560	10.1	586	289	10.2
7	819	1527	11.6	18429	1979	11.7	3916	1928	12.3
8	1090	2033	12.9	31366	3368	15.3	7346	3616	13.8
9	1528	2848	16.4	40385	4337	17.6	16541	8142	19.7
10	1542	2874	21.0	35435	3805	22.5	19897	9794	23.2
11	886	1651	25.1	25124	2698	27.9	17314	8522	29.5
12	902	1682	35.1	18910	2031	33.9	11908	5862	34.9
13	537	1001	38.1	13047	1401	38.7	8569	4218	44.1
14	385	717	41.4	7263	780	43.0	4619	2273	49.1
15	174	325	43.4	5142	552	48.1	3173	1562	49.8
16	172	320	45.5	3863	415	61.6	3431	1689	69.3
17	119	222	44.2	2324	250	62.2	1714	844	69.6
18	77	144	61.8	2281	245	65.7	1746	860	82.4
19	91	170	71.3	1278	137	87.6	1544	760	78.1
20	19	36	65.3	650	70	83.7	541	266	95.5
21+	50	93	78.7	1790	192	98.4	1442	710	135.9
TOT	8630	16088	24.4	213505	22928	26.0	104291	51334	33.6
	AV LEN 102.0, AV AGE 10.4			AV LEN 102.6, AV AGE 10.3			AV LEN 110.8, AV AGE 11.3		
	#OTO'S 855, #AGED 854			#OTO'S 7847, #AGED 3981			#OTO'S 1748, #AGED 1133		

	AREA 2 TOTAL			AREA 3A			AREA 3B		
AGE	CATCH	CPUE	AVE WT	CATCH	CPUE	AVE WT	CATCH	CPUE	AVE WT
1	0	0	0.0	0	0	0.0	0	0	0.0
2	0	0	0.0	0	0	0.0	0	0	0.0
3	0	0	0.0	0	0	0.0	0	0	0.0
4	0	0	0.0	0	0	0.0	0	0	0.0
5	1082	91	8.7	0	0	0.0	0	0	0.0
6	6303	533	10.3	1701	204	10.2	1331	373	13.4
7	23684	2001	11.8	8461	1013	14.4	5506	1544	13.9
8	40052	3384	14.9	16070	1924	17.9	13745	3855	19.9
9	58384	4933	18.2	34449	4125	22.0	34300	9621	26.6
10	56464	4770	22.8	41686	4992	26.4	31639	8874	32.1
11	43423	3669	28.6	43695	5232	34.7	20143	5650	39.6
12	31353	2649	34.4	52644	6304	40.9	19205	5387	49.1
13	21427	1810	40.6	39815	4768	50.2	9976	2798	52.4
14	11858	1002	45.3	31023	3715	59.7	5655	1586	60.8
15	8241	696	49.2	16675	1997	63.1	4084	1145	63.4
16	7422	627	65.5	9571	1146	64.0	1643	461	77.7
17	4013	339	65.9	10727	1285	74.6	1240	348	89.1
18	3913	331	73.3	3528	422	89.8	979	275	91.6
19	2979	252	80.5	3411	408	102.8	394	111	107.0
20	1171	99	89.4	1774	212	103.2	328	92	83.1
21+	3246	274	116.2	2741	328	127.9	1134	318	111.9
TOT	325015	27460	28.3	317970	38075	42.4	151304	42438	37.6
	AV LEN 105.1, AV AGE 10.6			AV LEN 119.5, AV AGE 11.9			AV LEN 116.0, AV AGE 10.6		
	#OTO'S 9595, #AGED 5114			#OTO'S 7674, #AGED 2244			#OTO'S 5776, #AGED 1579		

APPENDIX III. Table 2. (continued)

TABLE 2. CATCH IN NUMBERS, CPUE IN NUMBER PER 10,000 SKATES, AND AVERAGE WEIGHT IN POUNDS (DRESSED, HEAD-OFF) AT AGE BY REGIONS, 1982.

	AREA 3 TOTAL			AREA 4 TOTAL			ALL AREAS		
AGE	CATCH	CPUE	AVE WT	CATCH	CPUE	AVE WT	CATCH	CPUE	AVE WT
1	0	0	0.0	0	0	0.0	0	0	0.0
2	0	0	0.0	0	0	0.0	0	0	0.0
3	0	0	0.0	0	0	0.0	0	0	0.0
4	0	0	0.0	0	0	0.0	0	0	0.0
5	0	0	0.0	0	0	0.0	1082	44	8.7
6	3033	255	11.6	0	0	0.0	9335	382	10.8
7	13967	1172	14.2	1300	1839	11.1	38979	1594	12.7
8	29815	2502	18.8	2049	2898	18.0	71944	2941	16.6
9	68749	5769	24.3	3660	5177	25.2	130810	5348	21.6
10	73325	6153	28.9	2859	4044	32.6	132651	5423	26.4
11	63839	5357	36.3	1041	1472	37.4	108282	4427	33.2
12	71848	6029	43.1	818	1157	50.9	103997	4252	40.6
13	49791	4178	50.6	369	522	64.3	71565	2926	47.7
14	36678	3078	59.8	253	358	71.5	48784	1994	56.4
15	20758	1742	63.2	220	311	70.3	29213	1194	59.3
16	11215	941	66.0	91	129	70.7	18725	766	65.8
17	11967	1004	76.1	61	86	52.2	16039	656	73.5
18	4506	378	90.2	30	42	61.0	8448	345	82.3
19	3805	319	103.3	59	83	97.8	6843	280	93.3
20	2102	176	100.0	58	82	78.7	3332	136	95.9
21+	3877	325	123.2	145	205	124.6	7270	297	120.1
TOT	469274	39381	40.8	13041	18446	31.8	807330	33007	35.6
	AV LEN 118.7, AV AGE 11.5			AV LEN 109.4, AV AGE 9.9			AV LEN 113.2, AV AGE 11.1		
	#OTO'S 13450, #AGED 3823			#OTO'S 2817, #AGED 1231			#OTO'S 23487, #AGED 9364		

Publications

CALENDAR YEAR 1982

Alton, M.S. and R.B. Deriso. 1982. Pollock. [IN] J. Balsiger (editor), Condition of groundfish resources of the Gulf of Alaska in 1982. Unpubl. rep., Northwest and Alaska Fisheries Center, Natl. Mar. Fish. Serv., NOAA, 2725 Montlake Blvd. E., Seattle, WA 98112. (Document submitted to the International North Pacific Fisheries Commission in October 1982.)

Best, E.A. and William H. Hardman. 1982. Juvenile Halibut Surveys, 1972-1980. International Pacific Halibut Commission, Technical Report No. 20:38 p.

Brannian, Linda K., Ole A. Mathisen, and D.A. McCaughran. 1982. Variance estimates of sockeye salmon predictions with reference to the Egegik River system of Bristol Bay, Alaska. Contract No. 82-0769, Alaska Department of Fish and Game. Publications of Fisheries Research Institute, FRI-UW-8210, University of Washington.

Deriso, R.B. 1982. Relationship of fishing mortality to natural mortality and growth at the level of maximum sustainable yield. Can. J. Fish. Aquat. Sci. 39(7): 1054-1058.

International Pacific Halibut Commission. 1982. Pacific Halibut Fishery Regulations.

_____. 1982. Annual Report 1981.

Myhre, Richard J. 1982. Pacific Halibut Fishery in 1981. [IN] Pacific Marine Fisheries Commission, 34th Annual Report, pp. 33-34.

Quinn, T.J., II, S.H. Hoag, and G.M. Southward. 1982. A comparison of two methods of combining catch-per-unit-effort data from geographic regions. Can. J. Fish. Aquat. Sci., 39(6): 837-846.

Wespestad, Vidar C., Stephen H. Hoag, and Renold Narita. 1982. I. Reducing the incidental catch of prohibited species in the Bering Sea groundfish fishery through gear restrictions. International Pacific Halibut Commission, Technical Report No. 19: 14 p.

Williams, Gregg H., Donald A. McCaughran, Stephen H. Hoag, and Timothy M. Koeneman. 1982. II. A comparison of Pacific halibut and Tanner crab catches in (1) side-entry and top-entry crab pots and (2) side-entry crab pots with and without Tanner boards. International Pacific Halibut Commission, Technical Report No. 19: 21 p.

Commission Publications — 1930-1982

Reports

1.* Report of the International Fisheries Commission appointed under the Northern Pacific Halibut Treaty. John Pease Babcock, William A. Found, Miller Freeman and Henry O'Malley. 31 p. (1931).
2. Life history of the Pacific halibut (1) Marking experiments. William F. Thompson and William C. Herrington. 137 p. (1930).
3. Determination of the chlorinity of ocean waters. Thomas G. Thompson and Richard Van Cleve. 14 p. (1930).
4. Hydrographic sections and calculated currents in the Gulf of Alaska, 1927 and 1928. George F. McEwen, Thomas G. Thompson, and Richard Van Cleve, 36 p. (1930).
5.* History of the Pacific halibut fishery. William F. Thompson and Norman L. Freeman. 61 p. (1930).
6.* Biological statistics of the Pacific halibut fishery (1) Changes in the yield of a standardized unit of gear. William F. Thompson, Harry A. Dunlop, and F. Heward Bell. 108 p. (1931).
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Reports

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Annual Report 1980, 49 p. (1981).
Annual Report 1981, 48 p. (1982).

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