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INTERNATIONAL PACIFIC HALIBUT COMMISSION

**ESTABLISHED BY A CONVENTION BETWEEN
CANADA AND THE UNITED STATES OF AMERICA**

**ANNUAL REPORT
1980**

COMMISSIONERS

NEILS M. EVENS

DONALD McLEOD

WILLIAM S. GILBERT

ROBERT W. SCHONING

MICHAEL HUNTER

PETER C. WALLIN

DIRECTOR

DONALD A. McCAUGHRAN

SEATTLE, WASHINGTON

1981

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.

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 commissioners meet 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. Citizens of each nation are required to observe the regulations that are adopted.

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: Indicative of international cooperation in research by the Halibut Commission: the Canadian and United States flags flying from the Canadian trawler, M/V HOPE BAY, during a juvenile halibut tagging project off Alaska.

INTERNATIONAL PACIFIC HALIBUT COMMISSION
P.O. BOX 5009, UNIVERSITY STATION
SEATTLE, WASHINGTON 98105, U.S.A.

International Pacific Halibut Commission

ANNUAL REPORT 1980

Contents

Activities of the Commission	4
Director's Report	7
Regulations for 1980	8
Regulatory Proposals	8
Regulatory Areas	9
Catch Limits and Lengths of Seasons	10
Other Regulations	11
The Fishery	12
Commercial Fishery	12
Catch by Regulatory Area	12
Number of Vessels	14
Landings by Port	14
Value of the 1980 Catch	14
Sport Fishery	16
Incidental Catch of Halibut	17
Restrictions	18
Population Assessment	20
Abundance of Adult Halibut	20
Abundance of Young Halibut	21
Equilibrium Yield	21
Scientific Investigations	22
Cooperative Research	22
Population Dynamics Study	22
Juvenile Halibut Survey	24
Adult Halibut Survey	27
Tagging Studies	28
Migration Studies	30
Submarine Observation of Setline Gear	34
Catch of Halibut by Crab Pots	34
Domestic Trawler Observer Program	36
Research Fishing in Western Area 3	36
Catch Sampling	37
Glossary	39
Appendices	41
I. Catch, CPUE, and Effort 1980	42
II. Annual Landings, Ex-Vessel Price, and Value, 1929-1980	44
Publications	45
Calendar Year 1980	45
Commission Publications, 1930-1980	46

Activities of the Commission

The Commission held its fifty-sixth Annual Meeting in Seattle, Washington, on January 22-24, 1980. Mr. Robert W. Schoning presided as Chairman, with Mr. Michael Hunter, Vice Chairman. The Commission staff reviewed the 1979 halibut fishery, summarized the results of scientific investigations, and presented regulatory proposals for the 1980 halibut fishery. The Conference Board, representing vessel owners and fishermen, presented and discussed its regulatory proposals with the Commission. The Commission consulted with the Advisory Group, consisting of representatives of vessel owners, fishermen, and processors, before adopting the regulations for the 1980 halibut fishery, which 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 1980, and adopted the budget for fiscal year 1982-1983. Mr. Hunter was elected Chairman for 1980, and Mr. Schoning was elected Vice Chairman. At the close of the meeting, a news release was issued explaining the Commission's recommendations for regulations during the 1980 halibut fishing season and expressing continuing concern over the low abundance of halibut and the high incidental catch of halibut in other fisheries. The release also urged that the two governments increase efforts to solve the incidental catch problem.

In letters to the governments, the Commission urged further studies to minimize halibut mortality while permitting optimum production of other ground-fish. The letters emphasized that incidental catches must be reduced if the setline fishery is to survive as an economic activity. The Commission recommended that the United States National Marine Fisheries Service (NMFS) and IPHC cooperatively conduct a winter survey of juvenile halibut in the southeastern Bering Sea, where large numbers of halibut have been observed in the catches of the foreign trawl fisheries. The information provided by this survey will be a useful guide in determining methods to minimize the incidental catch of halibut.

On June 19, the Commission held a telephone conference meeting. They agreed to close U.S. Area 2 on May 30; to close Area 3 on July 19; to open Area 4 ten days after the final closure in Area 3; and to conduct an experimental fishery in western Area 3 to provide population assessment information. On July 31, the Commission announced that the experimental fishery was abandoned due to public opposition to the plan and that two vessels would be chartered to gather the required information instead.

An interim meeting of the Commission was held in Seattle, Washington, on September 30, primarily to review preliminary results of the 1980 halibut fishing season and research conducted by the staff. During the meeting, the Makah Indian Tribal Council presented proposals to permit the tribe to exercise its treaty rights. The Commission discussed the management aspects of the tribe's proposals and agreed to transmit them to the Canadian and United States governments, who have authority in this matter. At the close of the meeting, letters were sent to the governments again stressing the urgent need for government action to minimize the incidental catch of halibut by other fisheries. The letters suggested that the required use of pelagic trawls, coupled with increased observer data, could significantly reduce the catch of prohibited species with substantial benefits to domestic fishermen, processors, and the economy. The letters also advised the governments of the proposals from the Makah Tribal Council and included a copy of the brief.

Due to a shortfall in the Canadian Area 2 catch after the final scheduled fishing period in September, the commissioners agreed on October 17 to permit an additional nine-day fishing period from October 27 to November 5.

A list of reports published by the Commission staff during 1980 is appended to this annual report. In addition, several documents were prepared at the request of the governments.

Expenditures during the 1979-1980 fiscal year (April through March) were \$999,265 (U.S.). The Commission expenses were shared equally by both governments as required by the Halibut Convention.



CLIFFORD R. LEVELTON
Canadian Commissioner, 1974-1979

Director's Report

The staff of the Halibut Commission is optimistic about the immediate future of the Pacific halibut resource. The stocks appear to be increasing at the present time and should continue to grow if exploitation rates can be controlled. To place the present stock conditions in perspective, it is worthwhile to review briefly the history of the fishery.

Fishing for Pacific halibut began in the late 1800's. Annual catches increased to over 68 million pounds by 1915 and then began to decline, and by 1918 had dropped to about 40 million pounds. Under the management of the newly formed International Fisheries Commission (now IPHC), Pacific halibut stocks grew throughout the 1930's and reached a fishable stock of about 500 million pounds in the early 1940's. The stock remained in excellent condition into the 1950's, sustaining a yield of 60 to 70 million pounds annually. In the late 1950's, the foreign trawl fleet increased its effort in the Bering Sea and Gulf of Alaska, and the incidental catch of halibut by foreign trawlers rose from 1 to 2 million pounds annually to more than 17 million pounds by 1965. The increase in incidental catch raised the total fishing mortality above the equilibrium level, causing the stocks to decline. The Commission, seeking to drop the total catch below equilibrium yield, responded by reducing the setline quotas gradually over the years from 56 million pounds in 1960 to a low of 20 million pounds in 1978. This action, combined with a small reduction in the foreign incidental catch due to time area closures and reduced effort, has resulted in a recent increase in the stock to over 300 million pounds. The staff estimates that the present annual growth of the stock is approximately 8 million pounds of fishable size halibut.

The increase in fishable stock was first apparent in Area 3 in 1979. The Area 2 stock relies on migrants from Area 3; therefore, a lag of several years is expected before a significant increase in the size of the Area 2 stock will occur. At the present Area 3 stock size, it is estimated that approximately 10 to 11 million pounds of halibut migrate from Area 3 into Area 2 each year. The migration would be larger except for the incidental halibut catch by trawlers, which predominantly catch migrating size fish.

The incidental catch at the present time represents an annual loss in yield to the domestic fishery of approximately 25 million pounds. This loss is the net loss when growth, natural mortality, and loss of reproduction are accounted for. The Halibut Commission staff and the North Pacific Fishery Management Council have been working on a program to reduce the incidental catches of halibut, particularly by the foreign fleets. The Council's Groundfish Plan Development Team has recently proposed a series of alternative measures which will further reduce the incidental catch of halibut and yet allow for the orderly development of a domestic groundfish industry. This action has the potential of reducing the incidental catch by the foreign trawl fleets and will guarantee the future of Pacific halibut as a viable fisheries resource.

Regulations for 1980

REGULATORY PROPOSALS

Regulatory proposals for the 1980 halibut fishery were solicited from all segments of the fishing industry and from government agencies involved with the halibut fishery. A summary of the various proposals, including those of the Commission scientific staff, were distributed to the Commission and all interested groups prior to the annual meeting.

The staff recommended dividing Area 2 into three sub-areas. Area 2A would include all waters off the coasts of Washington, Oregon, and California with a proposed catch limit of 0.2 million pounds; Area 2B would include all waters off British Columbia with a proposed catch limit of 5.4 million pounds; and Area 2C would include all waters off southeastern Alaska with a proposed catch limit of 3.4 million pounds. The staff also recommended moving the western boundary of Area 3 to 170°W longitude and proposed a catch limit of 10 million pounds for the slightly smaller Area 3. The staff further recommended that all of the Bering Sea and all Pacific waters west of 170°W longitude be designated Area 4 with a proposed catch limit of 1 million pounds.

The staff proposed a sequence of fishing periods for Areas 2 and 3 as follows: May 20 to June 3, June 17 to July 1, July 15 to July 29, and August 12 to August 26. The dates were selected to provide fishing periods of adequate lengths that coincided with favorable tides, and avoided landings on weekends and holidays. All other regulations, such as nursery areas, size limits, gear restrictions, opening and closing hours, and sport fishing regulations would remain the same as in 1979.

The Makah Indian Tribe 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 the adoption of a regulation designed to prevent halibut gear from being set prior to the opening time of a halibut fishing period.

The Conference Board, consisting of members of fishermen and vessel owners groups, met during the first two days of the annual meeting. They recommended no subdivision of Area 2 and a 9.0 million pound catch limit for the total regulatory Area 2. Because the 60/40 division of the Area 2 catch between Canadian and United States waters, agreed upon in Juneau in February 1979, had not been achieved during the 1979 fishing season, they further recommended that the 1980 catch limits be adjusted so that the combined 1979 and 1980 catches would reflect the 60/40 split. The Conference Board also recommended catch limits in Areas 3 and 4 of 11.0 million and 1.0 million pounds, respectively, assuming the Commission staff boundary proposal for these areas was adopted. Fishing periods recommended by the majority of the Conference Board were as follows: May 1 to May 18 and July 1 to July 17 for Area 3 and for the United States portion of Area 2; July 1 to

July 17, August 3 to August 20, September 7 to September 23, and October 9 until attainment of the catch limit for the Canadian portion of Area 2; and in Area 4, June 1 to June 20, with a second opening to be set 20 days after attaining the Area 3 catch limit and remaining open until the Area 4 catch limit was reached. The Conference Board proposed that other regulations such as the nursery area, size limits, gear restrictions, opening and closing hours, and sport fishery regulations remain the same as in 1979. Further, in light of the North Pacific Fishery Management Council's action to allow domestic trawling in certain Bering Sea areas when foreign trawling is prohibited, the Conference Board requested that the Commission conduct a winter trawl survey to obtain additional information on the concentrations of juvenile halibut in these areas.

All regulatory proposals were discussed with the Advisory Group. Members of the Advisory Group in 1980 were Robert Alverson, Brian Kelly, and Tom Gordon (Seattle, Washington); Steinar Antonsen, Dick Marino, and Ray Potter (Vancouver, British Columbia); Sid Dickens (Prince Rupert, British Columbia); Sigurd Mathisen and Tom Thompson (Petersburg, Alaska); Albert Davis (Kake, Alaska); Marvin Bellamy (Homer, Alaska); and Don Kuiper (Kodiak, Alaska).

The regulations recommended by the Commission were approved by the United States Secretary of State on April 21, 1980 and the Governor General of Canada by Order in Council on May 1, 1980, and became officially effective on the latter date. On June 19, 1980, the Commission recommended amending the regulations to allow the fishing season in Area 4 to begin 10 days after the last closure of Area 3 instead of the 20 days initially approved. This change was approved by the United States Secretary of State on July 16, 1980 and by the Governor General of Canada by Order in Council on January 13, 1981.

When it became apparent that the catch limit from the Canadian portion of Area 2 would not be reached by the end of the fourth and final scheduled fishing period, the Commission conferred on October 17, 1980 and recommended a fifth fishing period for the Canadian portion of Area 2 from October 27 to November 5. The additional fishing period was approved by both governments; confirmation was received by letter from the United States Secretary of State on October 30, 1980 and the Canadian Minister of Fisheries and Oceans on November 11, 1980.

REGULATORY AREAS

Regulatory areas in 1980 are shown in Figure 1. Area 2 remained unchanged from 1979, but the western boundary of Area 3 was moved eastward from 173°W longitude to 170°W longitude. The waters south of the western Aleutian Islands, formerly called Area 3C, and the two areas in the Bering Sea, formerly called Area 4-East and Area 4-West, were all combined and renamed Area 4. The nursery area in the eastern Bering Sea remained unchanged and was closed to halibut fishing again in 1980. Following is a description of the regulatory areas for the halibut fishery in 1980.

Area 2 - South and east of Cape Spencer, Alaska.

Area 3 - Cape Spencer, Alaska to 170°W longitude, excluding the Bering Sea.

Area 4 - Bering Sea, and the Gulf of Alaska west of 170°W longitude.

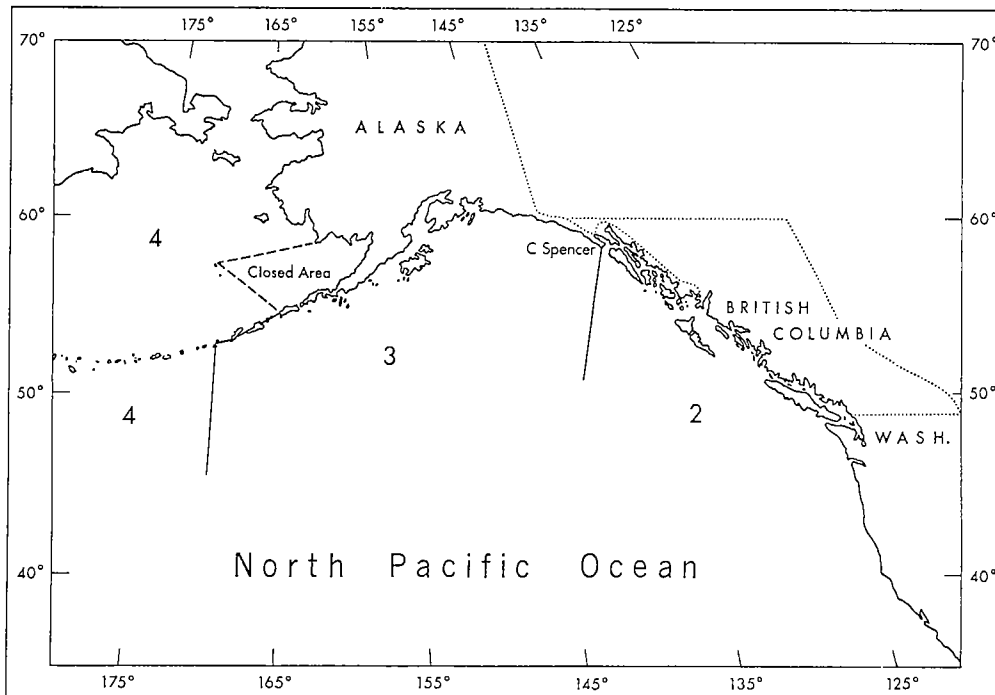


Figure 1. Regulatory areas for the Pacific halibut fishery, 1980.

CATCH LIMITS AND LENGTHS OF SEASONS

The 1980 catch limit in Area 2 was 9.3 million pounds, 300,000 pounds more than the catch limit in 1979. As in 1979, the proportion of the Area 2 catch limit to be taken from Canadian and United States territorial waters was specified. The 1980 catch limit in Canadian waters was 6.1 million pounds, an increase of 700,000 pounds from 1979, and the 1980 catch limit in United States waters was 3.2 million pounds, a decrease of 400,000 pounds. These changes were made to achieve the 60/40 division of catch between Canadian and United States waters for the combined 1979-1980 fishing seasons. In Area 3, the catch limit was 10.0 million pounds, 1.0 million pounds less than in 1979. A catch limit of 1.0 million pounds was specified for Area 4, whereas in past years, most of the area had been regulated by specified fishing seasons only.

Opening and closing dates and lengths of fishing periods for 1979 and 1980 are given in Table 1. Fishing seasons in all areas in 1980 and in Areas 2 and 3 in 1979 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 further fishing periods were not opened. In Canadian Area 2, an additional 9-day fishing period was permitted due to a shortfall in the catch after the final scheduled period. 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, 1979-1980.

Area	1979			1980		
	Opening Date	Closing Date	Fishing Days	Opening Date	Closing Date	Fishing Days
2 - U.S. waters	May 25 June 26	June 10 July 3	16 7	May 20	May 30	10
2 - Canadian waters	May 25 June 26 July 28	June 10 July 12 Aug. 5	16 16 8	May 20 July 15 Aug. 12 Sept. 9 Oct. 27	June 3 July 29 Aug. 26 Sept. 23 Nov. 5	14 14 14 9
3	May 25 June 26	June 10 July 12	16 16	May 19 July 15	June 4 July 19	16 4
3C*	Apr. 10	Nov. 15	218			
4-East*	Apr. 10 July 24	Apr. 30 Aug. 11	19 17	Apr. 10 July 29	Apr. 30 Aug. 23	19 25
4-West*	Apr. 10	Nov. 15	218			

*In 1980 these three areas were combined and renamed Area 4.

OTHER REGULATIONS

A new regulation was adopted prior to the 1980 fishing season that prohibits any person or vessel engaged in longline fishing during the 72 hours immediately preceding the opening of any halibut fishing period from catching, retaining, or possessing halibut during the ensuing halibut fishing period.

All other regulations pertaining to minimum size limits, licensing, gear restrictions, and to the sport fishery remained unchanged.

The Fishery

COMMERCIAL FISHERY

A compilation of historical statistics published in 1977 as Technical Report Number 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 on landings also are given by port and country. Appendix tables in this Annual Report and the Annual Reports for 1977 and 1979 are in the same format and update those statistics to 1980.

Catch by Regulatory Area

The total commercial catch in 1980 was 21.9 million pounds, 0.6 million pounds less than the 1979 catch of 22.5 million pounds. Canadian vessels took 35% of the catch and United States vessels took 65%. The Canadian portion of the catch was nearly one million pounds higher than in 1979 due to a greater portion of the Area 2 catch limit being allotted to Canadian waters and to a larger Canadian catch in Area 3.

Catch by country and regulatory area for 1976 through 1980 is shown in Table 2. The catches for Area 2 are further separated into waters over which Canada and the United States each claim exclusive fisheries jurisdiction. However, halibut caught by Canadian vessels in disputed waters in Dixon Entrance are considered as having been caught in Canadian waters, and halibut caught by United States vessels in the same area are considered as having been caught in United States waters. This anomaly in the division of the catch is necessary because of an unresolved question of boundary location between the two countries in this region.

The Area 2 catch was 8.9 million pounds, 0.4 million pounds lower than the 9.3 million pound total area catch limit. However, the catch from the United States portion of the area was 60,000 pounds greater than the 3.2 million pound catch limit. The catch from the Canadian portion of the area was 450,000 pounds below the 6.1 million pound catch limit. This was despite the fact that the regulations were amended to add a fifth fishing period to provide Canadian fishermen with the opportunity to reach the catch limit. Many Canadian vessel owners opted not to fish during the additional fishing period, and very severe weather conditions restricted the effectiveness for those that did.

In Area 3, the catch during the regular season was 12.0 million pounds, exceeding the catch limit for the area by 2.0 million pounds. Canadian fishermen took just under 2.0 million pounds of the total, exceeding their allocation from United States waters by 750,000 pounds, and United States fishermen took 10.3 million pounds. An additional 271,000 pounds were landed by IPHC research vessels, with most of the catch taken between Kodiak Island and Unimak Pass in the western portion of Area 3. The catch limit was exceeded partly because fishing was better than anticipated during the short second fishing period. Additional factors were much larger fleet size than had been projected and a very high CPUE resulting from a reconcentration of stocks following a closed period of nearly six weeks.

Catches were highest in the Yakutat region (Appendix I, Table 2), as fishermen were attracted to that area due to good catches in 1979. However, CPUE dropped slightly from the previous year. The Kodiak region showed a decrease in both catch and effort from 1979 but CPUE increased sharply in 1980, reaching the highest level on the coast. The catch from Area 3 waters west of Kodiak Island was small and was taken by a few small vessels fishing out of ports within the region, and by IPHC research vessels.

Table 2. Catch by country and regulatory area, 1976-1980 (in thousands of pounds).

Regulatory Area	1976	1977	1978	1979	1980
Area 2					
Canadian waters					
U.S.	474	254	243	-	-
Canada	<u>6,807</u>	<u>5,174</u>	<u>4,364</u>	<u>4,857</u>	<u>5,650</u>
Total	7,281	5,428	4,607	4,857	5,650
United States waters					
U.S.	5,174	2,859	3,503	4,412	3,260
Canada	<u>593</u>	<u>533</u>	<u>910</u>	<u>164</u>	<u>-</u>
Total	5,767	3,392	4,413	4,576	3,260
Area 2 - all waters					
U.S.	5,648	3,113	3,746	4,412	3,260
Canada	<u>7,400</u>	<u>5,707</u>	<u>5,274</u>	<u>5,021</u>	<u>5,650</u>
Total	13,048	8,820	9,020	9,433	8,910
Area 3					
U.S.	9,430	9,446	9,013	10,504	10,291
Canada	<u>4,534</u>	<u>2,921</u>	<u>3,297</u>	<u>1,638</u>	<u>1,952</u>
Total	13,964	12,367	12,310	12,142	12,243
Area 4					
U.S.	461	542	624	952	713
Canada	<u>62</u>	<u>139</u>	<u>34</u>	<u>-</u>	<u>-</u>
Total	523	681	658	952	713
All Areas					
U.S.	15,539	13,101	13,383	15,868	14,264
Canada	<u>11,996</u>	<u>8,767</u>	<u>8,605</u>	<u>6,659</u>	<u>7,602</u>
Total	27,535	21,868	21,988	22,527	21,866

In Area 4, the catch was 713,000 pounds, as compared to 1,369,000 pounds from the comparable area in 1979. This was the first year that the area had been managed by a catch limit, and difficulties in determining the number of vessels in the area and their projected catches resulted in closing the area without reaching the 1.0 million pounds allotted. Six vessels landed 158,000 pounds during the 19-day spring fishery; the remaining 555,000 pounds was taken during the 24-day summer season.

Number of Vessels

Table 3 shows the number of vessels, the number of trips, and the catch by vessel category in 1980. Vessels five net tons or larger fishing with setline gear must have a license issued by IPHC. Setline vessels less than five net tons, or vessels of any size not using setline gear, do not require an IPHC license.

The number of Canadian vessels landing halibut in 1980 was almost identical with that in 1979, reflecting the stabilization of fleet size under the halibut license limitation program in effect in British Columbia. Conversely, the number of United States vessels licensed by IPHC that landed halibut in 1980 increased 28% from the previous year. The greater number of vessels and a gradual improvement of the halibut population were largely responsible for the continued trend toward shorter fishing seasons in United States waters. The number of unlicensed United States setliners that landed halibut was similar to 1979, but the number of trollers landing halibut declined nearly 58%. The reduced troll landings reflect the short 10-day fishing period in Area 2, where most of the troll fleet operates.

Landings by Port

Landings from 1979 to 1980 declined in northern ports and were much higher in southern ports, as many of the larger vessels brought their catches south where ex-vessel prices were higher. The long closed period between the first and second fishing periods also contributed to the increased landings in southern ports because vessels had ample time to run to these ports, which are more distant from the fishing grounds.

Prince Rupert was the leading halibut port for the second year in a row, but landings were 19% lower than in 1979. Vancouver was the number two port with landings nearly double those of 1979. For the first time since 1969, Seattle was the leading United States port, followed by Petersburg and Kodiak.

Value of the 1980 Catch

Table 4 shows the average ex-vessel price (U.S. dollars) paid each fishing period for halibut in the major ports.

The total ex-vessel value of the 1980 catch was \$22 million (U.S.). The fishermen received an average price of \$0.99 (U.S.) per pound. This is substantially lower than the record value set in 1979, when the catch was worth \$48 million at an

Table 3. Number of vessels, number of trips, and catch by licensed and unlicensed vessels in Areas 2 and 3, 1980.

Vessel Category	Canada			United States			Total		
	No. of Vessels	No. of Trips	Catch 000's Pounds	No. of Vessels	No. of Trips	Catch 000's Pounds	No. of Vessels	No. of Trips	Catch 000's Pounds
AREA 2									
Unlicensed									
Trollers	5	6	1	339	448	37	344	454	38
Setliners	7	9	12	564	1,283	646	571	1,292	658
Other**	-	-	3	-	-	2	-	-	5
Total	12	15	16	903	1,731	685	915	1,746	701
Licensed									
5-19 tons***	294	975	3,498	271	493	1,004	565	1,468	4,502
20-39 tons	33	82	1,051	60	81	549	93	163	1,600
40-59 tons	5	17	156	5	5	49	10	22	205
60+ tons	1	5	65	-	-	-	1	5	65
Total	333	1,079	4,770	336	579	1,602	669	1,658	6,372
All Vessels	345	1,094	4,786	1,239	2,310	2,287	1,584	3,404	7,073
AREA 3*									
Unlicensed									
Trollers	-	-	-	54	78	23	54	78	23
Setliners	-	-	-	769	1,677	1,306	769	1,677	1,306
Total	-	-	-	823	1,755	1,329	823	1,755	1,329
Licensed									
5-19 tons***	3	12	259	386	864	2,741	389	876	3,000
20-39 tons	10	28	869	162	323	4,203	172	351	5,072
40-59 tons	7	18	746	41	96	3,061	48	114	3,807
60+ tons	6	14	942	10	19	643	16	33	1,585
Total	26	72	2,816	599	1,302	10,648	625	1,374	13,464
All Vessels	26	72	2,816	1,422	3,057	11,977	1,448	3,129	14,793
Grand Total	371	1,166	7,602	2,661	5,367	14,264	3,032	6,533	21,866

*Vessels that fished in both Areas 2 and 3, and those that fished in Area 4 are included in the Area 3 figures.

**Deliveries of unknown origin.

***Includes small vessels of unknown tonnage.

average price of \$2.13 per pound. The calculated average price (U.S. dollars) paid during the season was \$1.13 for landings in Washington and Oregon, \$1.16 in southern British Columbia, \$0.99 in northern British Columbia and \$0.90 in southeastern and central Alaska.

The Canadian catch totalled 7.6 million pounds with a landed value of \$8.2 million (U.S.). Of this, 1.9 million pounds, with a landed value of \$2.0 million (U.S.), was taken in waters off Alaska. The U.S. catches amounted to 14.3 million pounds with a landed value of \$13.6 million.

Halibut prices increased after the spring Bering Sea landings and remained stable throughout the season in Alaskan ports, whereas the prices generally increased during the fishing season for landings in southern ports.

Table 4. Average ex-vessel prices paid for halibut by port and fishing period, 1980 (U.S. dollars).

Port	Fishing Period							
	Bering Sea Spring	May- June	July	Aug.	Bering Sea Fall	Sept.	Oct.- Nov.	Season Average
Seattle	-	1.12	1.15	1.37	1.30	1.15	-	1.14
Bellingham	-	1.10	1.16	-	1.22	-	-	1.11
Ketchikan	-	0.90	-	-	-	-	-	0.90
Petersburg	-	0.90	-	-	-	-	-	0.90
Kodiak	0.80	0.90	0.90	-	0.90	0.92	-	0.89
Unalaska	0.60	0.81	0.94	-	0.85	-	-	0.85
Vancouver	-	1.01	1.15	1.29	-	1.28	1.30	1.17
Prince Rupert	-	0.93	1.01	1.10	-	1.23	1.28	1.01
Coastwide Average	0.78	0.94	1.01	1.22	0.95	1.19	1.30	0.99

SPORT FISHERY

Estimates of the 1980 catches by Alaska, British Columbia, and Washington sport fishermen are provided by the respective state or provincial agencies and are shown in Table 5. The 1980 catch from Washington is not yet available from the Washington Department of Fisheries but has been estimated using data from the previous four years. No data are available from Oregon.

The coastwide catch of halibut by sport fishermen increased 23% from 1979 due to a sharp increase in the catch by Alaskan fishermen. In particular, the catch in the Kenai region was up substantially. The catch by Washington and British Columbia sport fishermen showed a modest decline.

The catch by the charter-boat fishery in Kachemak Bay, Alaska, was monitored again in 1980. One company provided daily records of number and total weight of

all halibut caught. Based on this information, estimates were made of the average weight and number of fish caught by other companies. The estimated charter-boat catch from Kachemak Bay in 1980 was similar to 1979, about 17,500 fish (200,000 pounds).

Table 5. Pounds of halibut caught by sport fishermen, 1976-1980.

Area	1976	1977	1978	1979	1980
Alaska					
Southeastern	57,895	109,624	115,244	246,278	281,955
Prince William Sound	N/A	23,440	17,538	31,786	37,594
Kenai	60,150	285,169	257,466	314,726	428,947
Kodiak	N/A	18,684	32,350	56,635	65,789
Total	144,361	436,917	422,598	649,425	814,285
British Columbia					
British Columbia	16,342	17,237	8,505	17,863	10,808
Washington	15,158	16,786	9,756	19,774	16,917
TOTAL	175,861	470,940	440,859	687,062	842,010

N/A = Detailed catch not available for areas, but catch is included in total for Alaska.

INCIDENTAL CATCH OF HALIBUT

Halibut are caught in many fisheries other than the commercial setline and troll or sport fisheries. Although regulations require that incidentally-caught halibut be returned to the sea, many of the released fish die from injuries received during capture. Nearly all halibut caught in foreign trawls and domestic crab pots, and about half of those caught by domestic trawls and foreign setlines, do not survive. In recent years, the incidental catch has nearly equalled the commercial catch and, therefore, the impact of incidental catches on the halibut resource is significant.

Estimates of the incidental catch are not precise and may change as additional information becomes available. Incidental catches by foreign trawls, foreign setlines, and domestic trawls are estimated from data collected by observers who sample the catch at sea. Incidental catches by domestic shrimp trawls and crab pots are based on data collected during research cruises. During 1980, IPHC conducted cooperative studies with other agencies to improve estimates of the incidental catch of halibut, particularly in the domestic groundfish fishery off British Columbia and in the U.S. king and Tanner crab fisheries. The results of these studies are discussed in later sections.

In 1979, the most recent year for which data are available, the estimated total incidental catch was 16.8 million pounds, greater than in any year since 1974. This increase over recent years occurred in the foreign trawl and domestic crab pot fisheries and was largest in Area 3. The total catch in 1979 approaches the high levels observed in the 1960's and early 1970's, thereby reversing a declining trend in incidental catches. The incidental catch by regulatory area and fishery is presented in Table 6.

Table 6. Estimated incidental catch of halibut by regulatory area and fishery, 1979 (in millions of pounds).

Fishery	Area			Total
	2	3	4	
Foreign Trawl	0.5	3.4	4.5	8.4
Foreign Setline	Trace	0.3	0.2	0.5
Domestic Fish Trawl	3.7	0.1	Trace	3.8
Domestic Shrimp Trawl	Trace	0.1	Trace	0.1
Domestic Crab Pot	0.2	3.0	0.8	4.0
Total	4.4	6.9	5.5	16.8

Restrictions

In addition to prohibiting the retention of halibut by foreign fisheries and by domestic trawl and pot fishermen, several other restrictions have been placed on the groundfish fisheries to reduce the incidental catch of halibut. These restrictions have been developed through the North Pacific Fishery Management Council.

In the Bering Sea, 1980 restrictions were:

1. Foreign trawling prohibited in the Bristol Bay Pot Sanctuary (Figure 2). Domestic trawling allowed on an experimental basis, to be closely monitored by observers.
2. Foreign trawling prohibited from December 1 to May 31 in the Winter Halibut Savings Area (Figure 2). Domestic trawling allowed on an experimental basis, to be closely monitored by observers.
3. Foreign longlining prohibited from December 1 to May 31 seaward of the 500 m isobath in the Winter Halibut Savings Area. Domestic longlining permitted in the Winter Halibut Savings Area until the groundfish catch exceeds 2,000 m.t.

The 1980 restrictions in the Gulf of Alaska were:

1. Foreign trawling prohibited on "Yakutat" and "W" grounds (140°W-147°W longitude) from November 1 to February 15.
2. Foreign trawling prohibited between 147°W and 157°W longitude from February 16 to May 31.
3. Foreign fishing with bottom trawls prohibited from December 1 to May 31 in the entire Gulf of Alaska. Domestic fishing with bottom trawls is allowed from December 1 to May 31 but the total incidental catch in each area cannot exceed 1 percent of the groundfish catch.

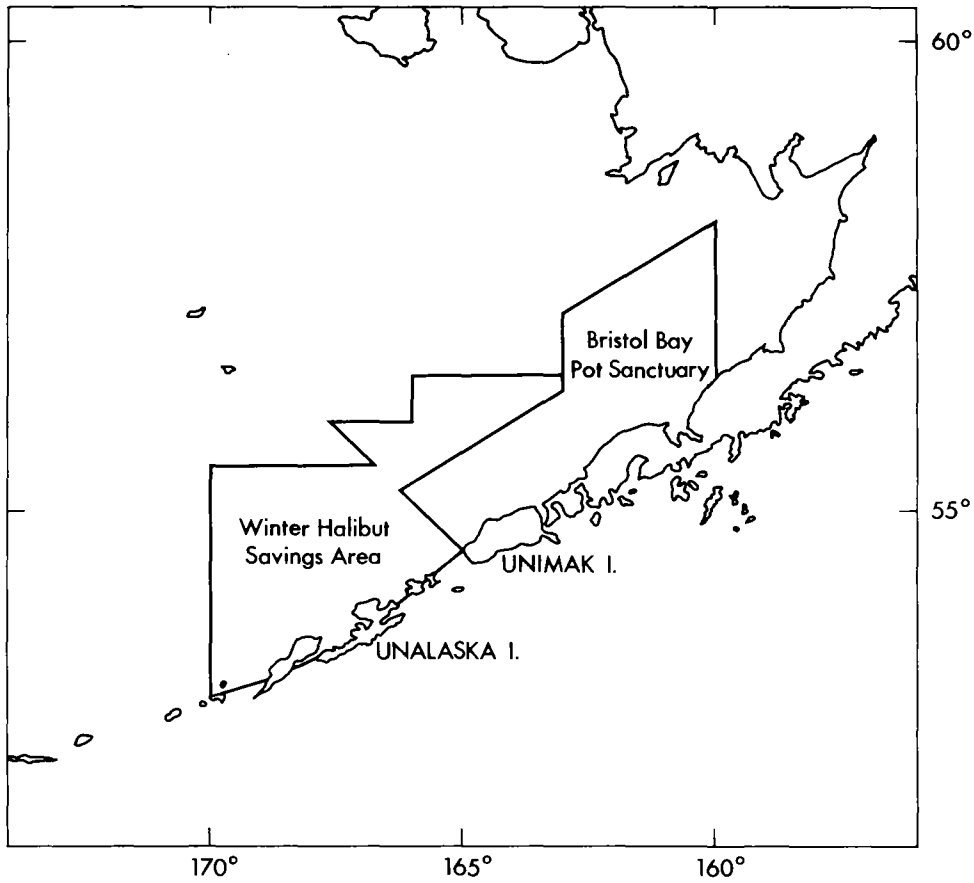


Figure 2. Bristol Bay pot sanctuary and winter halibut savings area in the Bering Sea.

Population Assessment

Assessment of halibut stocks in 1980 was based on a variety of techniques and relied on several sources of data. CPUE, catch, and age composition data from the setline fishery were used, as well as results from IPHC surveys and estimates of incidental catches from other fisheries. More detailed results from these analyses are presented in other sections of this report. The IPHC staff is continually attempting to upgrade the assessment of stocks by using new methods as they are developed. The new techniques improve our understanding of the halibut resource, although they still depend on accurate data and knowledge of the fish and the fishery. Estimates of stock condition vary somewhat depending on the technique and source of data being used. Although opinions may vary on the interpretation or validity of a particular analysis, there is little disagreement on the general condition and management needs of the resource.

ABUNDANCE OF ADULT HALIBUT

Adult halibut are at least 8 years old. Most are over the legal size limit and approaching sexual maturity. Thus, the abundance of adults indicates the present condition of the resource available to the setline fishery.

In Area 2, the estimates of biomass (total weight of halibut in the population) averaged about 100 million pounds in 1980, well below the 200 million pound peak level of the 1950's. CPUE in the commercial fishery increased in the late 1970's, but the increase appears to be due to a higher availability of fish, not necessarily greater abundance. The cause of the higher availability is not understood, but may be related to environmental conditions. IPHC's adult halibut survey in Hecate Strait indicated a slight increase in abundance in 1980, but overall the trend has been relatively level since the surveys began in 1976. In general, the abundance of adults has been relatively stable in Area 2 since the early 1970's.

In Area 3, the estimates of biomass in 1980 averaged about 250 million pounds and were generally higher than estimates for the early and mid-1970's (about 200 million pounds), but well below the peak level of the 1950's and 1960's (350-450 million pounds). CPUE of the commercial fishery increased sharply in 1979 and 1980. However, one analysis suggests that most of the increase was due to higher availability of fish rather than higher abundance. Conversely, availability may have been below normal during the mid-1970's, making stock abundance appear lower than it was. IPHC's adult halibut survey indicates a modest increase in abundance since the mid-1970's. Overall, the evidence suggests that adult abundance has increased since the early 1970's in Area 3.

Catch and CPUE data from the commercial fishery continue to indicate a low abundance of adult halibut in Area 4.

ABUNDANCE OF YOUNG HALIBUT

Young halibut are defined as less than 8 years old and most are below legal size. This includes juvenile halibut, which are generally defined as less than 65 cm. The abundance of young is important because it indicates potential abundance of adults.

The estimated number of young halibut from statistical analyses of age composition data has been relatively stable in recent years, but data from IPHC's juvenile surveys and from the commercial fishery indicate that juvenile abundance has increased. The survey data show that the catch of juveniles in the Gulf of Alaska was the highest in any year since the survey began in 1963, and well above the low recorded in 1976. Catches in the Bering Sea were the highest since 1966. In the commercial fishery, the CPUE of fish less than 10 years of age has increased in both Areas 2 and 3 since the mid-1970's.

EQUILIBRIUM YIELD

Equilibrium yield is the catch that can be taken in a given year without changing stock size. Stocks usually produce a harvestable surplus as a result of young fish entering the fishery and the growth of older fish already available to the fishery. Under adverse conditions, the equilibrium yield will decline and could even be zero. This might happen, for example, if incidental catches in other fisheries or poor environmental conditions sharply reduced survival.

Equilibrium yield is difficult to predict because it depends on many factors which are constantly changing. In our best judgment, equilibrium yield is about 10 million pounds in Area 2, 20 million pounds in Area 3, and between 1 and 2 million pounds in the Bering Sea. The equilibrium yields are calculated directly from estimates of biomass. For example, stocks in Area 3 are increasing at a rate of about 8 million pounds a year at a time when the setline catch has been about 12 million pounds. The 8 million pound increase added to the present 12 million pound harvest means that 20 million pounds could be taken in Area 3 without reducing stocks. However, a 20 million pound harvest in Area 3 would not allow for any further increase in stocks, which is contrary to IPHC's management objective. Also, negative factors, such as poor survival of young or incidental catches by other fisheries, are not constant and could unexpectedly reduce the equilibrium yield available to the fishery.

Scientific Investigations

COOPERATIVE RESEARCH

The year 1980 was marked by a number of cooperative research projects between IPHC and other agencies. Some were specifically designed to answer particular questions while others attempted to make more efficient use of existing projects and to reduce or share costs. Some of these projects are discussed more fully elsewhere in this report and several are featured pictorially in the centerfold section.

United States scientists from the Northwest and Alaska Fisheries Center (NWAFC) of the National Marine Fisheries Service at Seattle, Washington, participated in IPHC's annual juvenile halibut survey to enumerate and collect biological information on other species. IPHC has regularly collected similar data on king crab and other groundfish, but in 1980 the sampled area was expanded as part of the NWAFC Continental Shelf Survey and the other species were sampled more intensively.

IPHC and the Alaska Department of Fish and Game conducted a study of incidental catch of halibut in crab pots under auspices of the North Pacific Fishery Management Council off Yakutat in August.

IPHC joined with Canadian scientists of the Pacific Biological Station at Nanaimo, British Columbia to collect information on incidental halibut catches by Canadian trawlers during July and August.

Canadian and U.S. personnel tagged blackcod during IPHC winter spawning ground studies off British Columbia and southeast Alaska, respectively. Canadian personnel also tagged dogfish during the IPHC adult halibut survey in Hecate Strait in June.

IPHC delivered live halibut from research cruises for display and study at the Seattle Aquarium and the Pacific Biological Station. Unfortunately, all the halibut introduced into the Seattle Aquarium died of fungal infections and an unfavorable temperature regime. The fish at the Nanaimo laboratory are flourishing and are being used for tagging and growth studies.

POPULATION DYNAMICS STUDY

Many factors, such as natural mortality, fishing mortality, and recruitment affect the size of the halibut population and the equilibrium yield that can be taken by the commercial fishery. Recruitment itself depends on the number of young produced, losses from natural mortality, and incidental catches. A mathematical model was developed for halibut which attempts to describe the complex relationships which govern the population in Areas 2 and 3. The model may be used to forecast trends in the size of the future population and equilibrium yields under various conditions.

The model requires estimates of the factors affecting the population and these estimates have been inferred from data accumulated since 1935. A key factor in the model is early life survival, the proportion of fish that survive from the egg stage to become 3-year-olds. Estimates of early life survival are shown in Figure 3 for the period 1935-1977 for each regulatory area. For example, the figure shows that on the average two to three fish survived to age three for every 100,000 eggs spawned in the period 1935 to 1944 in Area 2. Early life survival for Area 2 apparently dropped sharply in the mid-1940's and then stabilized at a lower level. In Area 3, early life survival showed a moderate decline in the mid-1940's, followed thereafter by oscillations around a relatively low level. No explanation for the decline is currently available, although it may be related to environmental conditions, changes in migration, or incidental catches.

For use in forecasting trends in the population, a set of population parameters for 1980 is estimated from population assessment studies of Areas 2 and 3. These population parameters include fishing mortality, incidental catch mortality, natural mortality, population size and weight, fecundity, and age at maturity. A projection for each regulatory area is made for the 1980's with this set of parameters. In Area 2, the population will likely remain constant or decline slightly, and the equilibrium yield that can be taken by the setline fishery will be about 10 million pounds. The forecast for Area 3 indicates that population size and equilibrium yield will continue to increase at a rate of about two to three percent each year.

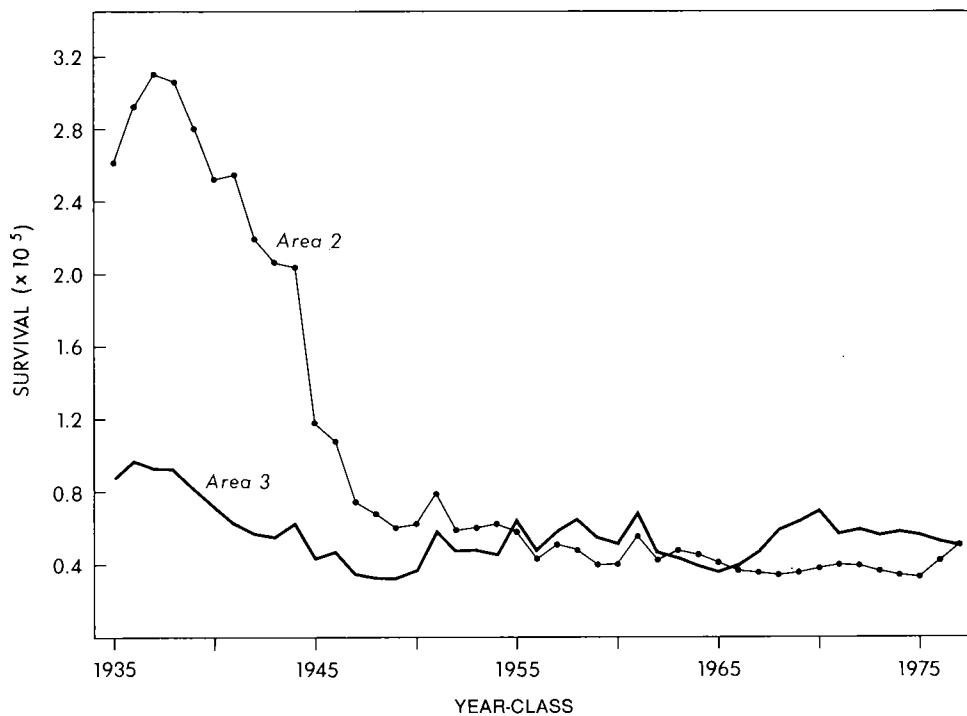


Figure 3. Estimates of early life survival (number of age 3 survivors per 100,000 eggs spawned) for Areas 2 and 3, 1935-1977.

It is important to note that neither the population model nor the parameter estimates account for migration, which is mainly from Area 3 to Area 2. The net effect of incorporating migration is that estimates of population size and yield would be somewhat higher than predicted in Area 2, but lower in Area 3.

Variation in early life survival has a big effect on equilibrium yield. Although there has been no consistent change in early life survival since 1950 in either Area 2 or 3, there are still year-to-year fluctuations. For each estimate of early life survival, it is possible to calculate an equilibrium exploitation rate, which is the percentage of the stock that can be removed by the commercial fishery without changing stock size. Estimated annual migration from Area 3 to Area 2 of 5.5% is incorporated into the calculations. The equilibrium exploitation rate since 1950 has ranged from 8 to 21% for Area 2 and from zero to 16% for Area 3. At current levels of biomass, this means that the equilibrium yield may range from 8 to 20 million pounds in Area 2 and zero to 32 million pounds in Area 3 because of variability in early life survival. The best estimate of equilibrium yield is 10 million pounds in Area 2 and 20 million pounds in Area 3, based upon the most recent estimates of early life survival. The best estimate for Area 2 is near the lower end of the range because recent estimates of early life survival in Area 2 have been relatively low (Figure 3). The Area 3 best estimate is in the upper part of the range because recent estimates of early life survival have been relatively high. These results indicate that catch limits should be kept well below the best estimates of equilibrium yield, because variability in early life survival and other important factors can have an important effect on the ability of the halibut population to sustain consistent exploitation from the commercial fishery.

JUVENILE HALIBUT SURVEY

A trawl survey is conducted annually to assess changes in abundance of juvenile halibut populations 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.

The trawler M/V PACIFIC HARVESTER, out of Vancouver, British Columbia was chartered for 85 days in 1980 to assess abundance of juvenile halibut and to do cooperative research with the National Marine Fisheries Service (NMFS) on other groundfish species. A total of 217 hauls were made on predetermined stations during the halibut assessment phase: 153 thirty-minute hauls at offshore locations using a 90-mm mesh codend net, and 64 fifteen-minute hauls at inshore locations with a 32-mm mesh net. Additional fishing was conducted as part of a special study on transboundary migrations, and with NMFS in cooperative research studies. Length, sex, and age data were collected on halibut in all hauls. Also, all king crab caught were counted, sex composition was recorded, and the carapace length of all male crab was measured.

The relative abundance of juvenile halibut (number per 1-hour haul) in the Bering Sea and the Gulf of Alaska is given in Table 7 and is shown in Figure 4. The Bering Sea assessment index is based on the catch at 34 stations fished each year. The mean CPUE had been increasing steadily since the early 1970's, but declined in 1978-1979. In 1980, the CPUE showed a three-fold increase over that observed in 1979 and was higher than in any year since 1966. Three-year-olds (1977 year-class) showed a near record CPUE of 14.6, nearly 52% of the catch. The 1978 year-class also appears to be relatively strong.

Table 7. The number of juvenile halibut caught per hour trawled in the Bering Sea and the Gulf of Alaska, IPHC surveys, 1963-1980. Parentheses indicate meager data.

Year	Bering Sea		Gulf of Alaska	
	2 to 6-year olds	3-year-olds	2 to 6-year-olds	3-year-olds
1963	(45.9)	3.4	(46.5)	(15.2)
1964	No survey		(44.1)	(20.8)
1965	(26.3)	2.6	(38.8)	(12.9)
1966	31.0	17.2	(39.7)	(13.8)
1967	16.6	4.3	(40.4)	(35.7)
1968	12.5	6.4	(41.0)	(7.0)
1969	12.8	4.1	(35.1)	(17.6)
1970	12.1	8.8	(42.1)	(12.1)
1971	14.2	2.6	31.8	17.2
1972	3.1	2.0	28.6	9.2
1973	6.6	3.7	31.0	11.1
1974	6.1	1.2	29.6	12.9
1975	11.8	3.2	19.2	3.8
1976	12.9	6.5	18.6	5.8
1977	18.9	5.4	25.1	4.6
1978	14.6	5.1	34.1	6.1
1979	9.4	0.3	29.6	9.3
1980	28.1	14.6	55.3	15.6

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. In 1980, the average CPUE was 55.3 juveniles, the highest recorded for the area. CPUE in the Cape Chiniak and Cape St. Elias index areas has shown a steady increase during the past five years, but the increase is even more pronounced west of Kodiak. As in the Bering Sea, the current increase in the Gulf was due primarily to 2- and 3-year-olds, but 4-year-olds also contributed heavily. These year-classes should have a significant impact on the setline fishery in four to six years.

Samples are also taken annually at shallow inshore stations using a 32-mm mesh trawl to obtain information on juvenile halibut younger than three years. Data from these stations are too variable to provide a reliable index of abundance, but give an early indication of year-class strength and are useful in determining age and growth.

In 1980, 54 hauls were made at inshore stations in the Gulf of Alaska (at Unimak Bight, Trinity Island, Alitak Bay, Kayak Island, and Shelikof Bay in southeastern Alaska) and 10 hauls were made in the southeastern Bering Sea. Results were comparable to those observed in 1979. Catches of juveniles with the small net in the Gulf of Alaska totalled 1,287, compared to 1,545 in 1979 and 4,422 in 1978. Similarly, in the Bering Sea, the total catch was 264 juveniles; slightly more than the 177 caught in 1979, but significantly below the 1978 catch of 543.

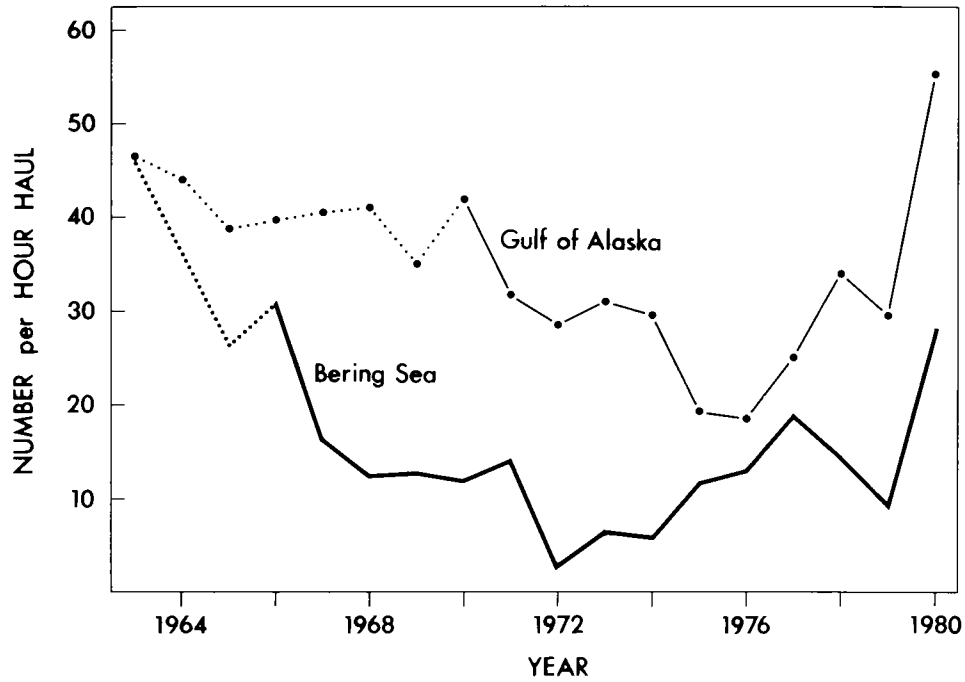


Figure 4. Catch per unit effort of juvenile halibut in the Gulf of Alaska and the Bering Sea, 1963-1980.

ADULT HALIBUT SURVEY

Since 1976, IPHC has acquired population assessment information independent of the commercial fishery through its own setline survey. The survey entails fishing a predetermined pattern of stations in Hecate Strait-Queen Charlotte Sound in Area 2 and on the Portlock-Albatross grounds in Area 3. Objectives of the survey include collection of CPUE, sex, size, and age data which are used to supplement commercial fishery data. In addition, all halibut without serious injuries are tagged, resulting in a systematic dispersal of tagged fish in each survey area. The 1980 surveys were conducted with the Vancouver-based M/V ELLING K in Area 2 and the Seattle-based M/V SEYMOUR in Area 3.

In previous years, the survey in each area consisted of fishing approximately 104 stations during August and September. The 1980 surveys, however, were modified to provide additional information on seasonal movements of halibut over the fishing grounds. Only half of the stations were fished, but each station was fished twice: first in June and then again in August. Coverage of each area was comparable to that in previous years.

In Area 2, the overall CPUE was 31.5 pounds per skate, a 41% increase over the 1978 survey of this area and the highest since the surveys began in 1976. Catches were generally higher over the entire survey area. The increase in catch was observed for all sizes of fish but was particularly noticeable in fish of legal size (greater than 81 cm), which increased from 0.6 fish per skate in 1978 to 1.0 in 1980. Female halibut, comprising 57% of the catch, averaged 29.1 pounds and 10.2 years of age; males averaged 15.9 pounds and 10.7 years of age.

In Area 3, the overall CPUE was 98.9 pounds per skate, a 71% increase over the 1979 survey and, as in Area 2, the highest since the surveys began in 1976. Although the catch of sublegal fish showed little change from previous years, the catch of legal-sized fish increased significantly and was the major reason for the tremendous increase in CPUE. Halibut were also more evenly distributed across the survey area, in contrast to earlier surveys, when fish had been more concentrated in the eastern portion (Portlock Bank) of the survey area. Females comprised 68% of the halibut catch and averaged 40.5 pounds and 10.7 years of age. Males averaged 17.6 pounds and 9.7 years of age.

During the 1980 survey of Area 2, CPUE decreased from 36.5 pounds per skate in June to 26.7 pounds per skate in August. The decrease was observed at all depths and was primarily caused by a decline in the catch of males, from 0.78 to 0.42 fish per skate. The decline in the catch of females was not as large.

In contrast to Area 2, the CPUE in the Area 3 surveys increased from 94.1 pounds per skate in June to 103.6 pounds per skate in August. The reason for this increase is not entirely clear. Very little change in the sex composition of the catch occurred from June to August, although small halibut were slightly more prevalent in the August survey.

Species other than halibut affect the results of the survey because they compete for baited hooks. In Area 2, halibut comprised only 10% of the catch. Chief competitors were spiny dogfish (*Squalus acanthias*), blackcod (*Anoplopoma fimbria*), skates (*Raja spp.*) and starfish. Halibut represented 34% of the total catch on the Area 3 surveys. Starfish, cottids, and Pacific cod (*Gadus macrocephalus*) were also caught in significant numbers.

The 1980 surveys caught 2,990 halibut, of which 1,316 were tagged and released. Recoveries of these tags will provide estimates of mortality and growth, as well as information on migration.

TAGGING STUDIES

The number of tagged fish released during 1980 was 36,299, which is almost three times as many as in any previous year (Table 8). The majority of these tags, 27,218, were released during the summer from the trawler M/V HOPE BAY. Most of these tags were placed on fish below 80 cm in length and the recoveries will yield information on transboundary movements and how young halibut are recruited to the adult population. During the charter of the trawler M/V PACIFIC HARVESTER for the juvenile halibut survey, 5,402 fish were tagged; most of these were young fish. While fishing on adult spawning concentrations between Cape Ommaney and Cape Spencer in northern southeastern Alaska during January and February, 1,540 tagged fish were released from the setliner M/V SEYMOUR. The summer adult halibut surveys by the setliners M/V SEYMOUR and M/V ELLING K resulted in the tagging of 891 fish near the east end of Kodiak Island and 425 fish in Hectate Strait, respectively. In the fall, setliners M/V REPUBLIC and M/V EVENING STAR were chartered to assess population conditions in the western Gulf of Alaska and 253 and 366 fish were tagged, respectively. The setliner M/V PROUD CANADIAN was chartered in November and December for spawning stock studies on the British Columbia coast. Due to extremely poor weather very little fishing was done and only 19 fish were tagged. From the crab vessel M/V ANTARES, 185 halibut were tagged in August. These fish were caught in crab pots and the recoveries will provide data on survival of halibut released from this gear.

In 1980, 283 halibut tags were returned including 13 caught prior to 1980. These tags were released between 1964 and 1980. Eight premium tags were received and the finders were awarded \$100.00 each in addition to the basic \$5.00 reward.

Table 8. Number of halibut tagged in 1980 by region of release.

Region	Vessel	Months	Number Released
Charlotte	ELLING K	June-July	251
	ELLING K	August	174
	PROUD CANADIAN	November	19
Southeastern	SEYMOUR	January-February	1,317
	PACIFIC HARVESTER	August	2
Yakutat	SEYMOUR	February	223
	HOPE BAY	July-August	12,470
	PACIFIC HARVESTER	July-August	696
	ANTARES	August	185
Kodiak	SEYMOUR	June	449
	HOPE BAY	June-July	8,862
	PACIFIC HARVESTER	July	3,303
	SEYMOUR	August	442
Chirikof	PACIFIC HARVESTER	June	624
	HOPE BAY	June-July	5,886
	EVENING STAR	September	144
	REPUBLIC	September	78
Shumagin	PACIFIC HARVESTER	June	419
	REPUBLIC	September-October	175
	EVENING STAR	October	222
Bering Sea	PACIFIC HARVESTER	June	358
TOTAL			36,299

As reported in the 1979 Annual Report, the Commission tagged 1,002 halibut in southeastern Alaska off Cape Bartolome and Cape Addington in January and February, 1979. Summer recoveries of these fish indicated a movement from winter spawning grounds to summer feeding grounds. There were 51 recoveries with location information from these tags during the 1979 and 1980 seasons (Figure 5). Of these, 40 were taken in Canadian waters. Some were taken on the outer coast, but most had moved to shallower, inside grounds. The recoveries were widely distributed over the British Columbia coast from Dixon Entrance to as far south as Cape Cook, off the northwest coast of Vancouver Island. At least 30% of the releases must have moved to the British Columbia coast to have produced the number of tagged fish reported.

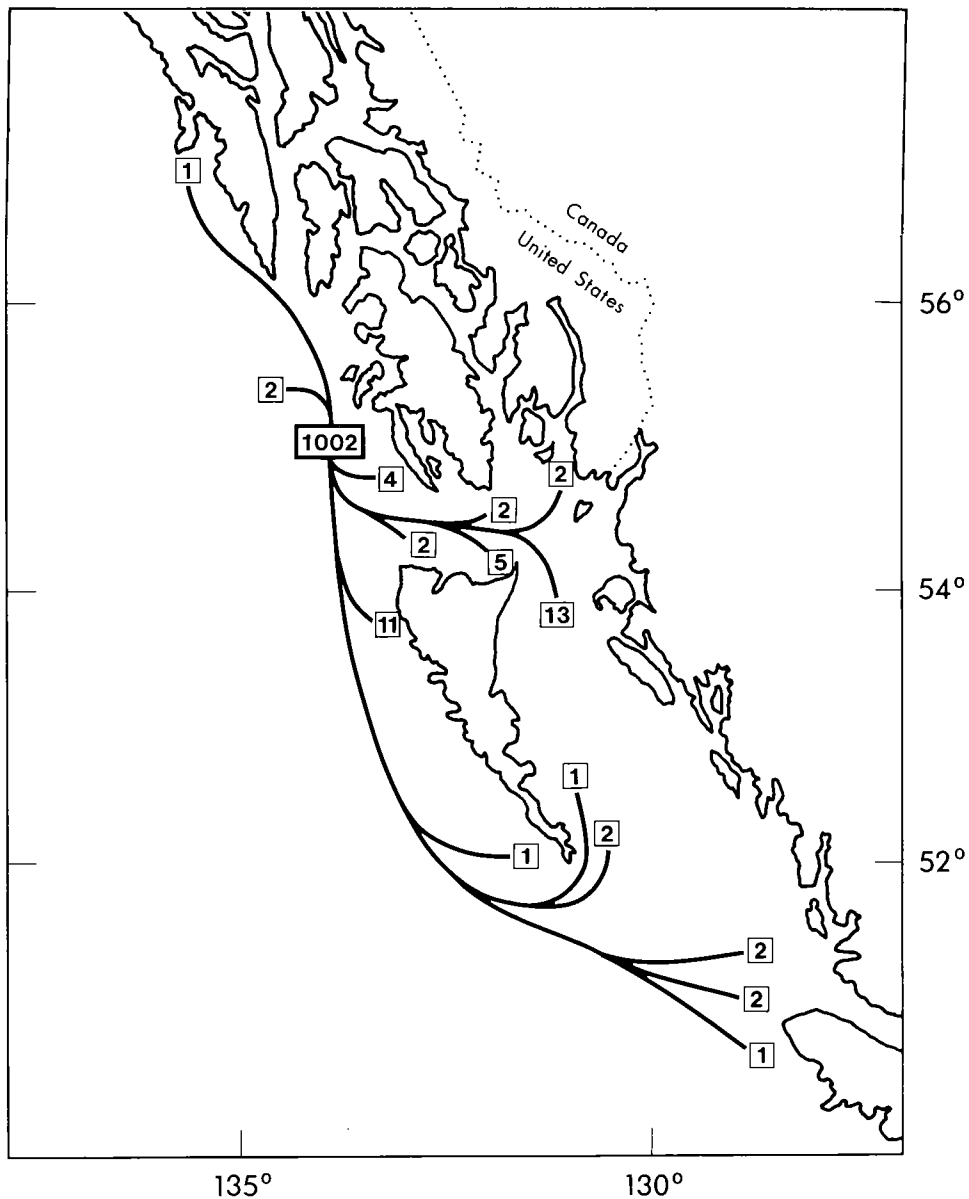


Figure 5. Distribution of 51 summer recoveries in 1979 and 1980 from 1,002 releases off Cape Bartolome and Cape Addington in January-February, 1979.

The Commission tagged 1,511 halibut in outside waters of southeastern Alaska between Cape Ommaney and Cape Spencer in January and February 1980, further north than the previous year. Of 27 recoveries, four (15%) were taken in Canadian waters. This indicates that the spawning halibut concentration off the northern portion of southeastern Alaska contains a smaller portion of fish which summer in Canadian waters than does the concentration off the southern portion of southeastern Alaska.

MIGRATION STUDIES

Tagging experiments can provide direct information on the migratory behavior of the halibut. Previous IPHC studies have focused on development of a qualitative understanding of migration; transboundary movement of halibut is documented, but estimates were not made of the proportion of the halibut population involved in such movements. The primary purpose of the current study is to quantify estimates of annual halibut migration.

Releases and recoveries of halibut tagged during 1950 through 1979 are the primary data used for estimation of migration. Analysis of the number of tagged fish caught per unit of setline fishing effort (CPUE) provided the basic information needed to estimate migration. Because migration rates may vary with the size of the fish, estimates were made for several size groups.

Average migration rates of halibut greater than 65 cm at release are given in Table 9. Those estimates are based on analysis of 77,520 releases and 8,386 recoveries; they indicate that approximately 5.5% of halibut in Regulatory Area 3 migrate to waters off southeastern Alaska and British Columbia each summer. Migration estimates have not been completed for halibut originating in the Bering Sea.

The chance of migration is highest for small halibut and generally decreases with increasing fish size (Figure 6). For example, over 20% of the fish averaging 40 cm migrated from eastern Area 3 to Area 2, compared to less than 5% of those fish averaging 148 cm.

Biological and oceanographic factors probably affect timing and extent of migration, and migration rates from various tagging experiments vary considerably from these long term averages. Nonetheless, a principal conclusion can be drawn from this study; halibut exhibit strong migratory tendencies, especially at sublegal size, and therefore, management decisions about catch limits in one regulatory area can affect potential yield of another area. The IPHC staff is currently in the process of developing estimates of area-specific yield that account for interception of migrating halibut.

Table 9. Estimated percent of halibut over 65 cm that move from one area to another each year.

Area of Origin	Destination Area				
	Washington	British Columbia	Southeastern Alaska	Eastern Area 3	Western Area 3
Washington	99.5	0.2	0.3	0.0	0.0
British Columbia	3.3	96.0	0.5	0.1	0.0
Southeastern Alaska	0.0	1.9	97.9	0.2	0.0
Eastern Area 3	2.3*	2.4	3.3	91.3	0.0
Western Area 3	4.9*	2.7	2.8	4.9	84.7

*Unreliable estimates because of small sample size (one recaptured halibut).

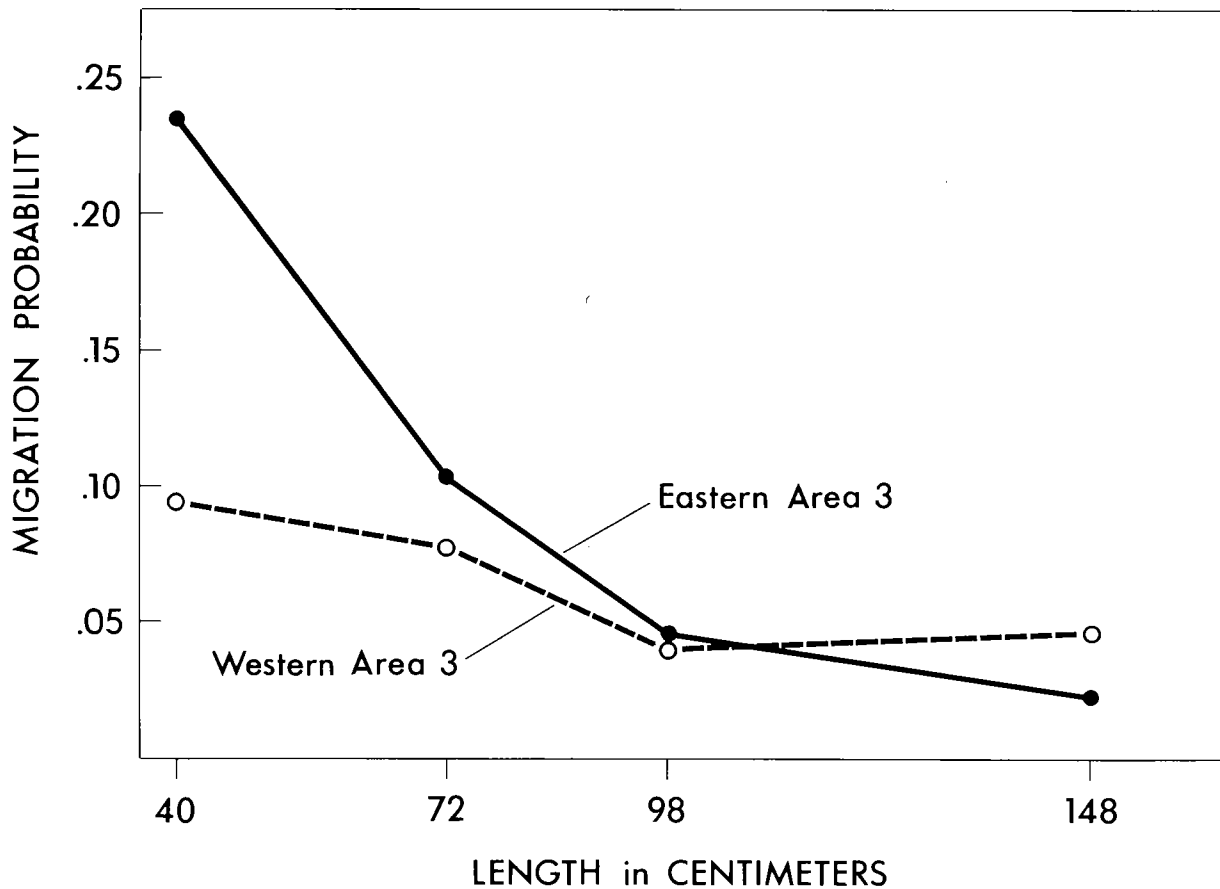
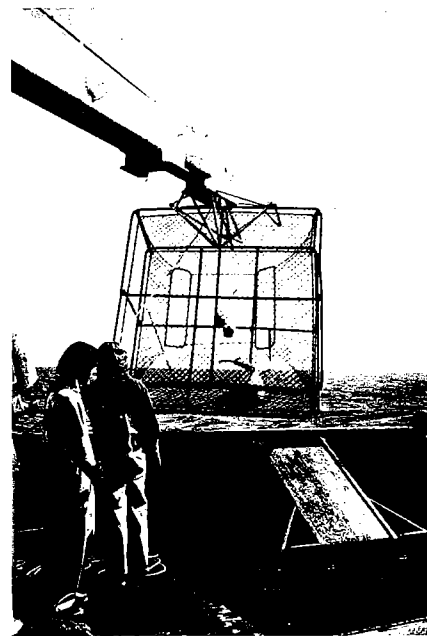
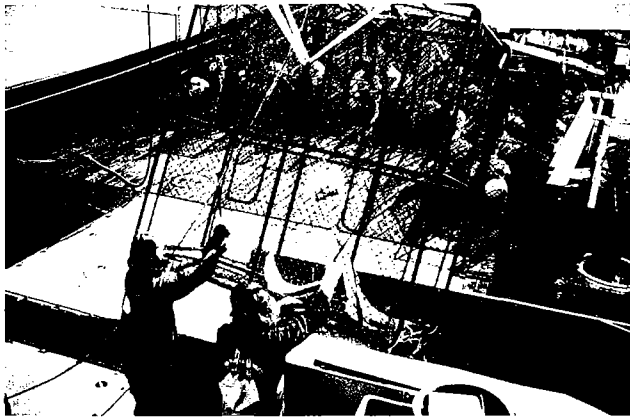
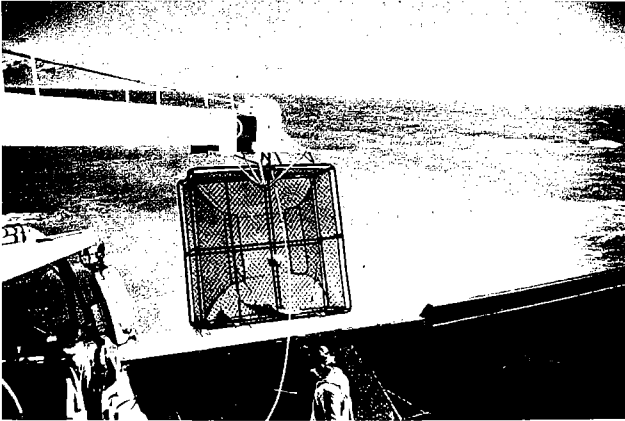


Figure 6. Relationship between size and migration of halibut from Area 3 to Area 2. Lengths indicated are mid-points of release size groups: less than 65cm, 65-79 cm, 80-119cm, and 120+ cm.

**INTER
COOPERATIVE**

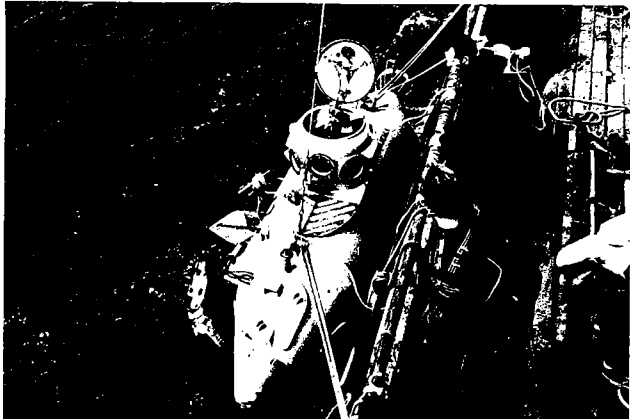


Joint ADF&G/NPFMC/IPHC study of incidental halibut catches by crab pots-Yakutat



*IPHC/NMFS
Juvenile halibut and
other ground fish
trawl survey
Gulf of Alaska*

**AGENCY
RESEARCH**



Joint NMFS/IPHC Submarine observation of setline gear-Sitka Sound



SUBMARINE OBSERVATION OF SETLINE GEAR

In July of 1980, a member of the IPHC staff participated with United States scientists in a series of dives to observe halibut setline gear using the NMFS chartered submersible NEKTON GAMMA. The study was conducted in the vicinity of Biorka Island, near the southern entrance to Sitka Sound in southeastern Alaska. The M/V CRUSADER, a 32-foot halibut boat rigged with snap-on gear, was chartered by IPHC to set and haul the setline gear needed for the observations.

The objectives of the study were to determine the practicality of using submersibles for observations under varying bottom conditions, to observe the incidence of halibut on the gear, and to observe predation on bait. Twelve dives (two non-effective) were made on four setline gear sets at depths ranging from 30 to 100 meters (100 to 330 feet). The gear had hooks baited alternately with herring, salmon, and blackcod and was set over many different types of bottom including sand, gravel and small boulders, rocky areas with large boulders, and areas with large cliffs and abrupt changes in depth. Initial observations commenced within one hour of the gear being set, with additional dives approximately 5 and 10 hours later, and in one case 19 hours later after an overnight soak. Visual observations were made as the submersible cruised along the longline gear, and data were voice-recorded on a tape recorder.

Halibut were observed in all areas except where the gear had been set among very large boulders and over cliffs, where many hooks were suspended in mid-water. The greatest halibut incidence occurred in areas of moderate size rocks and boulders, with fewer halibut observed on flat, sandy bottom.

Two dives were made in which the gear was observed twice during the same dive. In one case, the number of halibut hooked increased from three to seven over a 2-hour period. In a second case, 10 halibut were observed 5½ hours after the gear had been set and by the second observation, 2 hours later, three additional halibut had been hooked.

In general, the number of halibut hooked increased substantially between observations made at 1 and 5 hours after setting. However, few additional fish were caught between 5 and 10 hours; in very limited observations, only six additional fish that had not been previously noted were observed on the gear after a 10-hour soak, but five fish had escaped, effectively negating the increase.

Most of the bait loss was from predation by brittle stars, small sea urchins, and to a lesser extent, large starfish. Some bait was also lost to sea anemones if the gear was set over them. Baits set on grounds infested with brittle stars or sea urchins were almost universally covered by these predators within an hour, and were probably ineffective for catching fish beyond that time. By the second observation, at 5 hours, these hooks were generally stripped of all bait. Brittle stars and sea urchins were primarily restricted to sand and gravel bottom, and were not common in areas of rock and large boulders. Less predation on bait occurred in these latter areas, although the incidence of bait loss still increased with time. Baits not in contact with the bottom were retained for long periods, but were ineffective in attracting halibut.

CATCH OF HALIBUT BY CRAB POTS

Since the inception of the crab fisheries in the 1950's, IPHC has known that halibut are caught incidentally in crab pots. Early investigations suggested that the loss of halibut in pots was relatively minor. During the 1965-1966 Kodiak king crab

season, vessel captains were interviewed regarding the number of halibut observed in pots; the interviews represented slightly more than 2,000 vessel-days of fishing. The interview program, conducted in cooperation with the Alaska Department of Fish and Game (ADF&G), suggested that halibut and crab usually occurred at different depths and that the incidence of halibut was low. IPHC concluded that the catch of halibut by crab pots was relatively small and not a significant factor in the management of the halibut resource.

Since then, IPHC has frequently received reports of high incidental halibut catches in the king (*Paralithodes spp.*) and Tanner (*Chionoecetes spp.*) crab fisheries. These reports indicated that the catch of halibut in crab pots was higher than previously believed and that the interview program underestimated the incidental catch. Data on the incidence of halibut were collected on ADF&G crab research surveys during the 1970's and resulting estimates indicated an incidental halibut catch in the king crab fishery of 1.5 to 3.0 million pounds, as reported in previous IPHC annual reports.

During 1980, additional incidence data from the crab research surveys were obtained and analyzed. This analysis suggests that incidental halibut catches by the king and Tanner crab fisheries in 1979 were about 3.5 million pounds in the northeast Pacific and 0.6 million pounds in the Bering Sea. The incidental catch in 1980 probably is similar to that in 1979, but is not yet available.

Nearly all halibut caught in crab pots die. Crab pots are usually soaked from 24 to 72 hours and sandfleas prey heavily on halibut in the pots. Additionally, crab catches of up to 100 per pot cause injuries to halibut and probably reduce viability. Also, fishermen reportedly use incidentally-caught halibut for bait in their pots and as food for the crews of the crab vessels.

Crab fishermen have indicated that halibut incidence varies with pot type. Yakutat Tanner crab fishermen reported large incidental catches during the 1979-1980 season and that the incidental catch was much higher in side-entry (rectangular) pots than in top-entry (pyramid or conical) pots. Local fishermen from Yakutat requested that ADF&G prohibit the use of side-entry pots to reduce the halibut catches and asked IPHC to support them. However, data were not available to document these reports or to quantify the effect of pot type on the catch of halibut. As a result, IPHC and ADF&G cooperated in a study to test the effect of pot type on halibut catches. This study was funded by the North Pacific Fishery Management Council.

The study, conducted off Yakutat in August, 1980, involved two separate experiments. First, the catch of halibut by top-entry and side-entry pots was compared. Results showed that top-entry pots had substantially lower catch rates of halibut than side-entry pots. Second, "Tanner boards", which constrict the size of the tunnel opening, were placed in half of the side-entry pots and their effect on the catch of halibut tested. The "Tanner boards" reduced the catch rate of halibut by 63% in side-entry pots, and almost eliminated the catch of halibut over 90 cm in length. Catch rates of Tanner crab were also compared but catches were too variable and generally not large enough to provide meaningful results.

Results of research conducted during 1980 indicate that pot type and tunnel size affect the catch of halibut by crab pots, and that the incidental catch by the crab fishery is substantial. However, an observer program is needed to establish rates of incidence in the commercial fishery and to confirm the results of the IPHC-ADF&G crab pot study.

DOMESTIC TRAWLER OBSERVER PROGRAM

During the 1960's, IPHC placed observers aboard Canadian and American trawlers off British Columbia to monitor the incidence of halibut in their catches. Since then, IPHC has applied these incidence rates to groundfish landings to estimate incidental catches because data for more recent years are limited.

In 1978 and 1979, the Canadian Department of Fisheries and Oceans (Resource Services Branch) placed observers aboard Canadian trawlers and obtained data indicating that the incidence of halibut was lower than that observed in the 1960's. As a result, in 1980 IPHC and the Resource Services Branch joined in an effort to obtain additional data. Six IPHC observers collected data from 15 trips involving about 350 trawl hauls. This effort occurred primarily in northern Hecate Strait during July and August. The results indicate that the incidence was significantly higher in 1980 than was observed in the same area and season during 1978 and 1979. The incidence in 1980 was similar to that observed in the 1960's, suggesting that the present method of estimating incidental catch is still valid. However, the observer data for 1980 may not be representative of the entire fleet because sampling was limited in area and time. A far more extensive program is required to obtain reliable estimates for the entire coast throughout the year. The estimated incidental catch of halibut taken annually by trawlers in Canadian waters is approximately 3 million pounds.

RESEARCH FISHING IN WESTERN AREA 3

During 1980, as in 1979, halibut fishing was exceptionally good in the eastern Gulf of Alaska. Consequently, nearly all of the Area 3 catch came from grounds east of Kodiak Island, and CPUE and age composition information were lacking for more westerly grounds.

The Commission chartered two setline vessels, the M/V EVENING STAR and the M/V REPUBLIC, to conduct test fishing in offshore waters west of Kodiak Island to gather the lacking information. Each vessel made one trip in the Chirikof region and one trip in the Shumagin region. Their total catch was 244,000 pounds, and their combined CPUE was 131 pounds in the Chirikof region and 97 pounds in the Shumagin region, much higher than the commercial setline CPUE in recent years. Additionally, 619 halibut were tagged and released in the two regions to obtain information on mortality, migration, and growth rates.

The data collected during these operations provided the only available information on size, age, and sex composition in those regions for 1980 and are summarized in Table 11 in the discussion on Catch Sampling. In general, CPUE data collected during the test fishing operations showed that commercial concentrations of adult halibut occurred in western Area 3 at levels comparable to grounds in the rest of Area 3. The size, age, and sex composition of the catch gave no evidence that the halibut stocks in western Area 3 were in poorer condition than those to the east.

CATCH SAMPLING

Commercial halibut landings are routinely sampled to obtain data on their age and size composition. Since 1935, the sampling program has been conducted continuously at Seattle, Washington. Development of modern processing and transportation facilities in Alaska, and changing patterns of fishing led to the subsequent expansion of the sampling program to Canadian and Alaskan ports. During the 1980 fishing season, samples were collected from landings at the following ports: Seattle, Bellingham, Vancouver, Prince Rupert, Petersburg, Sitka, Pelican, Seward, and Kodiak.

An attempt is made to sample one-third of the vessels landing over 5,000 pounds and one-ninth of those landing between 1,000 and 5,000 pounds. Following a random choice of the first cargo sling used to unload the halibut, every second sling for landings of 1,000 to 5,000 pounds and every sixth sling for landings over 5,000 pounds are sampled to obtain size and age information. The left or white side otolith is removed from each fish in the selected slings. The weight of the otolith is used to estimate the length of the individual fish. A sub-sample of 700 otoliths is then selected for aging for each month and region of the coast. This system was a modification of the one previously used and resulted in a decrease in the number of otoliths collected but an increase in the number of age determinations from 350 to 700.

In 1980, 267 setline vessel landings were sampled. Over 23,000 otoliths were collected for length estimation of which 10,300 were used for age determinations. In addition, nearly 5,100 halibut otoliths collected during 1980 IPHC research cruises were aged.

Catches from most major fishing regions were represented in 1980. The samples amounted to 3.6% of the catch by weight. The percentage of sampling varied with region as shown in Table 10.

Table 10. Commercial catch and percent sampled for size and age composition by region during 1980.

Region Fished	Catch* (000's pounds)	Percent Sampled
Columbia	6	0.0
Vancouver	310	0.6
Outside Charlotte	827	4.0
Inside Charlotte	4,271	3.9
Outside SE Alaska	985	3.8
Inside SE Alaska	2,460	1.4
Yakutat	6,074	3.4
Kodiak	5,865	3.0
Chirikof	18	0.0
Shumagin	15	0.0
Aleutian	287	21.7
Bering Sea	426	10.5

* Does not include research catches.

Commercial landings from the Columbia, Chirikof, and Shumagin regions were very limited and no samples were obtained from these regions. It was, therefore, necessary to obtain size and age information from the Chirikof and Shumagin regions by charter vessels after the close of the regular fishing season. Landings from the Aleutian and Bering sea regions were also relatively small, but the timing of these seasons, prior to and after the general open season, allowed greater sampling opportunity and therefore a greater proportion of these landings was sampled.

Age composition of halibut in the 1980 setline landings and the mean age since 1976 are summarized by region in Table 11. The mean age of halibut landed from the Canadian portion of Area 2 increased in 1980, while in the United States portion of Area 2 off southeastern Alaska, average age decreased. In Area 3 the Yakutat and Kodiak regions showed an increase in mean age. Limited data from the charter vessels fishing in the Chirikof and Shumagin regions after the season closed also indicate an increase in average age. Average age in the Aleutian region of Area 4 was the same as 1979, while 4D-West had an increase in average age.

Table 11. Age composition in 1980 and mean age by region, 1976-1980.

Region	Percent by Age (1980)				Mean Age byYear				
	<9	9-11	12-14	>14	1976	1977	1978	1979	1980
Area 2									
Columbia	-	-	-	-	-	-	-	-	-
Vancouver	25.9	44.4	20.4	9.3	12.3	-	12.4	-	10.4
Charlotte (Inside)	26.4	43.3	18.6	11.7	9.9	10.4	10.1	10.3	10.6
Charlotte (Outside)	10.2	37.3	28.8	23.7	11.6	11.4	11.1	11.2	12.2
S.E. Alaska (Inside)	27.2	44.6	20.5	7.7	11.5	11.5	10.6	11.1	10.5
S.E. Alaska (Outside)	11.6	37.5	29.8	21.1	12.6	12.0	11.2	11.4	11.1
Area 3									
Yakutat	9.9	40.9	32.2	17.0	12.2	12.3	11.5	11.1	11.9
Kodiak	16.6	43.7	29.0	10.7	11.0	11.2	10.8	10.7	11.2
Chirikof*	19.5	49.1	23.0	8.4	10.4	10.6	10.3	9.6	10.7
Shumagin*	23.5	52.0	17.0	7.5	11.0	11.3	10.7	-	10.4
Area 4									
Aleutian	3.0	30.6	28.9	37.5	17.8	13.7	15.8	13.7	13.7
Bering Sea - 4A	-	-	-	-	11.7	13.0	-	-	-
Bering Sea - 4B	-	-	-	-	13.0	13.2	13.5	15.3	-
Bering Sea - 4C	-	-	-	-	-	12.4	-	12.4	-
Bering Sea - 4D-West	1.5	19.8	23.0	55.7	-	15.1	15.1	15.0	15.4
Bering Sea - 4D-East	-	-	-	-	-	-	13.5	13.6	-

*Data from IPHC research vessels.

Glossary

This section presents a brief description of some of the methods and scientific terminology used in this report.

Availability-The fraction of a fish population living in a region susceptible to fishing during a given fishing season.

Biomass-The weight of a fish stock.

Catch-per-unit-effort (CPUE)-The catch of fish in numbers or in weight taken by a defined unit of fishing effort (see following definition of "Fishing effort"). CPUE is interpreted as an indicator of density, presuming selectivity of a unit of gear and the availability of halibut do not change over area or time.

Setline CPUE, the average catch per standard skate (see "Fishing effort" for definition of a standard skate), is used as an indicator of adult halibut abundance. Setline CPUE from the commercial fishery is estimated from catch and effort data recorded in the fishermen's log books. IPHC regulations require the captains of all licensed setline vessels to maintain log records showing statistical area fished each day, amount of gear fished, and estimated catch. All records are used in assigning the location of the catch, but only fixed-hook setline gear is used for computing CPUE and fishing effort.

CPUE indices are also calculated from research surveys. Setline CPUE from standardized population assessment surveys provide another indicator of adult abundance. Trawl CPUE, the number of juvenile halibut per hour trawled, provides an indicator of juvenile abundance.

Cohort analysis-A cohort, or year-class, is a group of fish spawned in the same year. Cohort analysis is a method of population estimation based on relationships between the catch, death from natural causes, and population size during the life span of a cohort. Necessary data for cohort analysis are the estimates of catch by age obtained from catch sampling. Though cohort analysis is not subject to assumptions of constant selectivity and availability, as is CPUE (see Catch-per-unit-effort), it has other limitations (see IPHC Scientific Report Number 65).

Equilibrium yield-The total catch of fish that can be taken from one year to the next without changing the biomass of fish in a stock. If the catch is held below the equilibrium yield, a subsequent increase in biomass should occur; a catch exceeding the equilibrium should result in a reduction of total population.

Fecundity-The number of eggs produced by a female.

Fishing effort-The total amount of fishing gear used for a specified period of time. The basic unit of setline effort is a standard skate, defined as a 1,800 foot (550 meter) groundline with 100 hooks attached at 18-foot (5.5 meter) intervals. Correction factors have been developed for non-standard skates.

Incidental catch-The total catch of halibut by fisheries other than the commercial or sport fishery. The majority of the incidental catch is made up of young fish under the minimum size limit for the commercial fishery.

Landing-The number or weight of fish brought into port for sale from the commercial fishery.

Maturity-The stage at which fish are able to produce sex products.

Appendix I.

TABLE 1. CATCH, CPUE AND EFFORT BY STATISTICAL AREA AND COUNTRY, 1980.

1980	CANADA			UNITED STATES			TOTAL			LOGS %
	STAT. AREA	CATCH 000 LBS	CPUE LBS	EFFORT 00 SKS	CATCH 000 LBS	CPUE LBS	EFFORT 00 SKS	CATCH 000 LBS	CPUE LBS	
00-03	-	-	-	6	37.3*	2	6	37.3	2	-
04	-	-	-	6	37.3*	2	6	37.3	2	-
05	-	-	-	10	37.3*	3	10	37.3	3	-
06	72	37.2*	19	-	-	-	72	37.2	19	-
07	87	37.2*	23	-	-	-	87	37.2	23	-
08	135	37.2	36	-	-	-	135	37.2	36	13
09 -0	131	64.2	20	-	-	-	131	64.2	20	11
09 -I	459	67.2	68	-	-	-	459	67.2	68	16
10 -0	16	60.8*	3	-	-	-	16	60.8	3	-
10 -I	955	82.0	116	-	-	-	955	82.0	116	42
11 -0	66	34.6	19	-	-	-	66	34.6	19	9
11 -I	1127	65.0	173	-	-	-	1127	65.0	173	37
12 -0	127	61.6	21	-	-	-	127	61.6	21	9
12 -I	579	66.8	87	-	-	-	579	66.8	87	27
13 -0	491	66.3	74	-	-	-	491	66.3	74	25
13 -I	1162	63.2	184	-	-	-	1162	63.2	184	21
14 -0	23	101.8*	2	114	101.6	11	137	105.4	13	61
14 -I	220	53.8	41	183	53.8*	34	403	53.7	75	32
15 -0	-	-	-	198	85.9	23	198	85.9	23	38
15 -I	-	-	-	282	92.5	30	282	92.5	30	11
16 -0	-	-	-	292	142.8	20	292	142.8	20	17
16 -I	-	-	-	570	63.6	90	570	63.6	90	33
17 -0	-	-	-	319	91.6	35	319	91.6	35	14
17 -I	-	-	-	161	79.3	20	161	79.3	20	31
18S-0	-	-	-	73	129.2	6	73	129.2	6	37
18S-I	-	-	-	1046	101.8	103	1046	101.8	103	10
18W	6	35.1	2	643	57.5	112	649	56.9	114	26
19	258	102.6	25	913	85.7	106	1171	89.4	131	32
20	560	108.6	52	922	91.2	101	1482	96.9	153	59
21	209	233.5	9	394	110.5	36	603	134.0	45	53
22	175	106.1	16	747	109.1	68	922	109.8	84	59
23	158	151.1	10	1091	145.7	75	1249	146.9	85	39
24	121	294.4	4	1213	116.4	104	1334	123.5	108	49
25	380	190.2	20	1796	131.2	137	2176	138.6	157	68
26	-	-	-	1547	163.7	95	1547	163.7	95	43
27	-	-	-	481	260.6	18	481	260.6	18	14
28	85	240.8	4	267	197.8	14	352	195.6	18	31
29	-	-	-	88	137.1	6	88	137.1	6	88
30	-	-	-	41	106.5	4	41	106.5	4	90
31	-	-	-	28	164.7	2	28	164.7	2	79
32	-	-	-	79	118.4	7	79	118.4	7	77
33	-	-	-	17	52.0	3	17	52.0	3	65
34	-	-	-	24	90.2	3	24	90.2	3	100
35	-	-	-	-	-	-	-	-	-	-
36	-	-	-	-	-	-	-	-	-	-
37	-	-	-	-	-	-	-	-	-	-
38	-	-	-	-	-	-	-	-	-	-
39	-	-	-	4	66.7	1	4	66.7	1	100
40	-	-	-	-	-	-	-	-	-	-
41	-	-	-	18	60.8	3	18	60.8	3	100
42+	-	-	-	265	68.2	39	265	68.2	39	87
4A	-	-	-	38	59.8*	6	38	59.8	6	-
4B	-	-	-	164	44.3	37	164	44.3	37	9
4C	-	-	-	94	42.8	22	94	42.8	22	27
4DE	-	-	-	1	11.4	1	1	11.4	1	73
4DW	-	-	-	129	73.1	18	129	73.1	18	83
4E	-	-	-	-	-	-	-	-	-	-

* NO LOG DATA, CPUE INTERPOLATED.

TABLE 2. CATCH, CPUE AND EFFORT BY REGION AND COUNTRY, 1980.

1980 REGION	CANADA			UNITED STATES			TOTAL			LOGS %
	CATCH 000 LBS	CPUE LBS	EFFORT 00 SKS	CATCH 000 LBS	CPUE LBS	EFFORT 00 SKS	CATCH 000 LBS	CPUE LBS	EFFORT 00 SKS	
COLUMBIA	-	-	-	6	37.3*	2	6	37.3	2	-
VANCOUVER	294	37.2	79	16	37.2*	4	310	37.3	83	6
CHARLOTTE	5113	68.4	747	-	-	-	5113	68.4	747	28
CHAR-O	831	63.4	131	-	-	-	831	63.4	131	18
CHAR-I	4282	69.5	616	-	-	-	4282	69.5	616	30
SE ALASKA	243	56.5	43	3238	82.0	395	3481	79.5	438	22
SE AK-O	23	102.2*	2	996	102.2	97	1019	102.9	99	28
SE AK-I	220	53.8	41	2242	75.3	298	2462	72.6	339	20
YAKUTAT	1366	116.9	117	4710	98.2	480	6076	101.8	597	46
KODIAK	586	216.4	27	5304	137.2	387	5890	142.3	414	51
CHIRIKOF	-	-	-	157	130.6	12	157	130.6	12	87
SHUMAGIN	-	-	-	120	96.7	12	120	96.7	12	84
ALEUTIAN	-	-	-	287	67.6	42	287	67.6	42	88
BERING SEA	-	-	-	426	50.8	84	426	50.8	84	35
TOTAL	7602	75.0	1013	14264	100.6	1418	21866	89.9	2431	49

* NO LOG DATA, CPUE INTERPOLATED.

TABLE 3. CATCH, CPUE AND EFFORT BY REGULATORY AREA, 1980.

YEAR	AREA 2				AREA 3				AREA 4			
	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 %
1980	8910	70.2	1270	25	12243	118.3	1035	49	713	56.6	126	56

TABLE 4. CATCH IN THOUSANDS OF POUNDS BY REGULATORY AREA AND COUNTRY, 1980.

YEAR	AREA 2			AREA 3			AREA 4			ALL AREAS			
	CAN.	U.S.	TOTAL	CAN.	U.S.	TOTAL	CAN.	U.S.	TOTAL	CAN.	U.S.	TOTAL	
1980	5650	3260	8910	1952	10291	12243			713	713	7602	14264	21866

TABLE 5. LANDINGS IN THOUSANDS OF POUNDS BY PORT AND COUNTRY, 1980.

PORT	1980		
	CAN.	U.S.	TOTAL
CAL AND ORE	-	132	132
SEATTLE	393	1808	2201
BELLINGHAM	980	766	1746
MISC WASH	-	74	74
VANCOUVER	2637	-	2637
MISC SD BC	632	-	632
NAMU	89	-	89
PR RUPERT	2699	-	2699
MISC NO BC	135	-	135
KETCHIKAN	-	131	131
WRANGELL	-	355	355
PETERSBURG	-	2083	2083
JUNEAU	-	726	726
SITKA	-	1347	1347
PELICAN	1	960	961
MISC SE AK	-	1076	1076
KODIAK	36	1736	1772
P WILLIAMS	-	-	-
SEWARD	-	1443	1443
MISC CEN AK	-	1627	1627

Appendix II. Annual landings, ex-vessel price, and value (U.S. dollars), 1929-1980.

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				
1952	62,262	.19	11,830				
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				

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