INTERNATIONAL PACIFIC HALIBUT COMMISSION

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

ANNUAL REPORT
1975

SEATTLE, WASHINGTON
1976

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 Conventions of 1930 and 1937 extended the Commission's authority and the 1953 Treaty specified that the halibut stocks be developed and maintained at levels that permit the maximum sustained yield.

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 the regulatory proposals made by the scientific staff and the Conference Board, representing vessel owners and fishermen. The regulatory alternatives are discussed with the Advisory Group composed of fishermen, vessel owners, and processors. The regulatory measures 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, Scientific Reports, and Technical Reports. Until 1969, only one series was published. The numbering of the original series has been continued with the Scientific Reports.

INTERNATIONAL PACIFIC HALIBUT COMMISSION

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ANNUAL REPORT 1975

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Dedication

EDWARD WEBER ALLEN
1884-1976

This annual report is dedicated to Edward W. Allen whose tenure on the Halibut Commission was the longest of any Commissioner. He was appointed by President Hoover in 1932 and held office until 1955. Mr. Allen also was appointed as a Commissioner to the International Pacific Salmon Fisheries Commission by President Roosevelt (1937-1951) and to the International North Pacific Fisheries Commission by President Eisenhower (1954-1974).

Mr. Allen was an advisor to the United States delegation at several United Nations meetings on international fishery problems and was a member of the three-man MacArthur Fisheries Mission to Japan in 1949. He authored four books and published about 70 articles and poems on a wide range of topics that usually emphasized his interest in fisheries and the sea. Mr. Allen was recognized as an expert in marine law and remained active in his multiple professions until his late 80's. He died on March 15, 1976, just 2 months before his 92nd birthday.

Activities of the Commission

The Fifty-First Annual Meeting of the Commission was held in Vancouver, British Columbia, January 21-24, 1975. Mr. Clifford R. Levelton presided as Chairman, and Mr. Robert W. Schoning was Vice Chairman. The Commission staff reported on the condition of the halibut stocks, reviewed the results of scientific investigations, and recommended regulations for the halibut fishery in 1975. The Conference Board, the International Trawlers Association, and representatives of the halibut industry also submitted recommendations for the regulations. All proposals were reviewed by the Commission with its Advisory Group before the regulations for the 1975 halibut season were adopted and sent to the Canadian and United States Governments for approval. The Commission considered administrative and fiscal matters, approved research plans for 1975, and adopted the budget for fiscal year 1977-1978. Mr. Schoning was elected Chairman and Mr. Levelton was elected Vice Chairman for 1975.

Officials of Canada, U.S., U.S.S.R., and IPHC met in Washington, D.C. in February to discuss measures that could be taken to protect the halibut resource. No decisive action was taken, but the parties agreed to meet again in July. No agreement was reached at this trilateral meeting, but at subsequent U.S.-U.S.S.R. bilateral negotiations, the U.S.S.R. agreed to trawl closures similar to those accepted by Japan.

The Commission met in Vancouver, British Columbia, on September 26 to consider staff and industry proposals for the Bering Sea fishery for 1976. The Commission recommended no change in the regulations and urged a continuation of the Japanese and Soviet trawl closures to reduce the incidental catch of halibut. The Commission also recommended more federal research on methods to reduce the incidental halibut catch and that the joint tagging studies with the U.S.S.R. be continued. Regulations proposed by IPHC for the eastern Bering Sea fishery also were proposed by the International North Pacific Fisheries Commission (INPFC). Japan agreed to continue the trawl closures established in 1975, with the understanding that in 1976 fishing experiments would be conducted in the closed areas to test the effectiveness of new off-bottom gear designed by the Japanese.

The Commission's publications during 1975 are listed at the end of this report. In addition, several documents were prepared for the INPFC annual meeting at the request of the Canadian and United States National Sections.

Expenditures during the 1974-1975 fiscal year (April-March) were $643,000. In compliance with the Convention, expenses of the Commission were shared equally by both governments.

Director's Report

The long-term decline of the halibut stocks in the Gulf of Alaska appears to have been halted in 1975. The reduction of the catch limit, the increase of the minimum size, and the reduction of the incidental catch all helped to stop the decline. Although the apparent stabilization of the resource is encouraging, a relatively small increase in mortality or reduction in recruitment could reduce stock abundance. Until there is a substantial and consecutive annual increase in abundance, continued restraint on the North American fishery is essential.

Further reduction of the incidental catch of halibut by foreign trawlers is needed to assure continued improvement of the halibut resource. Japan did agree to greater restrictions in both the Bering Sea and the Gulf of Alaska in 1975, and the U.S.S.R. has agreed to similar limitations for 1976 (see page 24). These actions will reduce the incidental catch, but the anticipated benefits will not be fully realized for several years. The Commission had requested more-stringent restrictions on the foreign fleets in the Gulf of Alaska. A 200-mile fisheries jurisdiction could provide the federal governments with the authority needed to establish and enforce such restrictions (legislation enacted in U.S., effective March 1, 1977). Extended jurisdiction also may increase the need for effective means of reducing the incidental catch of halibut by multi-species trawl fisheries. IPHC has urged the national governments to undertake such studies and, at last year's meeting of INPFC, supported a proposal by Japan that an experiment be conducted to test the effects of off-bottom versus on-bottom trawls. Canada, Japan, and the U.S. developed such a program under the auspices of INPFC, and it is scheduled to be in operation early in 1976.

With a 200-mile fishing limit in the offing, the national governments are reviewing jurisdictional policies, and there is added impetus for reconsideration of the Halibut Convention and its Enabling Acts. The terms of the existing Convention may be inconsistent with the extended jurisdiction management principles advocated by the federal fishery agencies in the two countries. For example, the Convention specifies maximum sustained yield (MSY) as a management goal and does not allow for limiting entry into the fishery. Both governments consider MSY inadequate as a management objective and foster principles to reduce overcapitalization in fisheries. Similarly, there may be inconsistencies in the Convention regarding licensing provisions, the method of establishing regulations, and the penalties for violations as compared with extended jurisdiction legislation. Further, the administrative and staffing policies of international commissions should be reviewed and specific guidelines provided. These factors and the significant changes in high seas fisheries during the past decade warrant the full review and reevaluation of the Convention and Enabling Acts.

The Fishery

REGULATIONS FOR 1975

Regulatory proposals for 1975 were submitted by fishermen, vessel owners, processors, government agencies, and the Commission's scientific staff. Prior to the annual meeting, a summary of all proposals was distributed to all interested groups. The staff recommended catch limits of 13 and 12 million pounds for Areas 2 and 3 respectively, the same as in 1974; that Areas 2 and 3 open no earlier than May 15 and close no later than September 15; and that the size limit, sport fishery regulations, and gear restrictions remain the same as last year. The staff proposed that all setline vessels 5 net tons or larger be licensed annually to provide current information on the vessels and gear types that produce most of the catch. The staff also explained the need for revisions of the Convention and the Enabling Acts and recommended that review of the legislation be undertaken in 1975. The Conference Board concurred with the concept of such a review.

The Conference Board proposed the same catch limits for Areas 2 and 3 as were proposed by the Commission staff, but favored an opening date of May 1 in Areas 2 and 3 and a mandatory closing date of October 15. The Conference Board also proposed the licensing of all vessels that land halibut and restricting halibut fishing to vessels using hook and line gear. The Board recommended additional restrictions on Japanese trawlers and that the Commission conduct further research to determine time-area closures that would protect concentrations of halibut from destructive types of gear. The Board also requested that the Commission meetings, at which regulatory decisions are made, be open to all Conference Board delegates. The Board also urged changes in state and federal legislation: that crab traps be constructed with escape mechanisms and that management of sea lions in Alaska be transferred from the federal government to the State of Alaska.

All regulatory alternatives were discussed with the Advisory Group consisting of representatives of fishermen, vessel owners, and industry. This body was established in 1974. Members of the Advisory Group were James Ferguson, Harold Lokken, David Roy, and Elmer Smehaug (Seattle, Wa.); Norman Christensen, George Dodman, and George Hewison (Vancouver, B.C.); Sid Dickens (Prince Rupert, B.C.); Albert Davis (Kake, Ak.); and Chris Christensen and Tommy Thompson (Petersburg, Ak.).

Regulatory proposals for the Bering Sea fishery were considered at the Commission's September 1974 meeting. The staff proposed that Areas 4A, 4B, 4C, and 4D East open on April 1 and close on April 19 and that the same areas reopen on September 15 and close on September 30. The staff proposal provided for Area 4D West to open on April 1 and close on November 15, while Area 4E, a nursery area, would remain closed to halibut fishing at all times. These proposed regulations were the same as those adopted for the 1974 fishery. In addition, the staff proposed that time-area closures of foreign trawl fisheries in the eastern Bering Sea be more restrictive to further reduce the incidental halibut catch. Halibut fishermen

concurred with the proposal for foreign trawl closures, but preferred a longer setline fishing season to allow fishing in Areas 4A, 4B, and 4C during the summer months.

The regulations recommended by the Commission are described in the following sections and were approved by the United States Secretary of State on April 16 and by the Governor General of Canada on April 24. Because the regulations were not in force on April 1, the spring fishery in the Bering Sea opened under provisions of the 1974 regulations which were the same as those for 1975. As in previous years, the approval of the regulations also implemented the conservation measures adopted by the International North Pacific Fisheries Commission.

Regulatory Areas

The regulatory areas in 1975 were the same as in 1974 and are depicted in Figure 1:

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

Area 3 — North and west of Area 2, excluding the Bering Sea.

Area 4 — The Bering Sea:
4A, 4B, 4C, and 4D East: East of 175° W except Area 4E.
4D West: West of 175° W.
4E: The southeastern flats.

Catch Limits and Length of Seasons

The 1975 catch limits of 13 million pounds in Area 2 and 12 million pounds in Area 3 were the same as 1974. Area 4 was managed by limiting the length of the fishing seasons without assigning catch limits. Area 4E was designated as a halibut nursery area and has been closed to all halibut fishing since 1967. The opening and closing dates and the length of the fishing seasons for 1974 and 1975 are given in

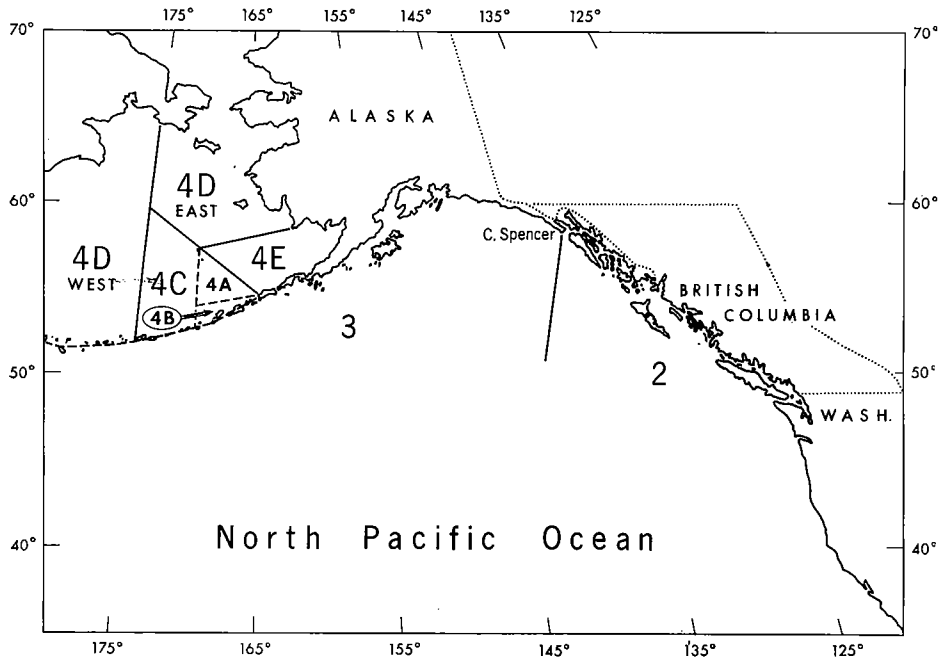


Figure 1. Regulatory areas for the Pacific halibut fishery, 1975.

Table 1. The number of fishing days in 1975 conformed to the 4-month season proposed by the staff. The fishing seasons began at 1500 hours in Areas 2 and 3 and 1800 hours in Area 4 and closed at 0600 hours in all areas, all times being Pacific Standard Time.

Table 1. Opening and closing dates by areas, 1974-1975.

Area	1974			1975		
	Opening	Closing	Fishing Days	Opening	Closing	Fishing Days
2	May 17	Sept. 15	121	May 1	Sept. 6	128
3	May 17	Sept. 15	121	May 1	Sept. 6	128
4A, B, C, D East	Apr. 1	Apr. 19	17	Apr. 1	Apr. 19	17
	Sept. 15	Sept. 30	14	Sept. 15	Sept. 30	14
4D West	Apr. 1	Nov. 15	227	Apr. 1	Nov. 15	227

Other Regulations

The minimum size limit in the commercial fishery was 32 inches with head-on or 24 inches with head-off (Figure 2). The 1974 regulations prohibited the possession of undersized halibut or portions thereof. This wording conflicted with Canadian law and was revised in 1975 as follows:

Section 6. Size Limits

No person, firm or corporation shall take any halibut that with head on is less than 32 inches as measured in a straight line, passing over the pectoral fin, from the tip of the lower jaw with mouth closed, to the extreme end of the middle of the tail, or with head off is less than 24 inches as measured from the base of the pectoral fin, at its most anterior point, to the extreme end of the middle of the tail.

Other regulations, such as licensing, gear restrictions, and the sport fishery were the same as in 1974. The more important of these regulations are as follows:

Section 7. Licensing of Vessels

(a) All vessels of any tonnage which shall fish for halibut in any manner or hold halibut in possession in any area, or which shall transport halibut otherwise than as a common carrier documented by the Government of Canada or of the United States for the carriage of freight, must be licensed by the

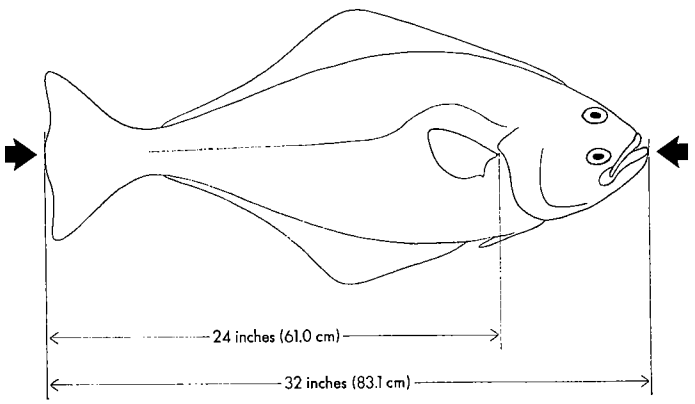


Figure 2. Minimum commercial size.

Commission, provided that vessels of less than five net tons or vessels which use hook and line gear other than setlines need not be licensed.

(h) The captain or operator of any vessel holding a license under these regulations shall keep an accurate log of all fishing operations including date, locality, amount of gear used and amount of halibut taken daily in each such locality. This log record shall be retained for a period of two years and shall be open to inspection by authorized representatives of the Commission.

Section 9. Fishing Gear

(a) Halibut are permitted to be taken only with hook and line gear. The retention or possession of halibut taken with any other gear, such as nets or pots, is prohibited.

(b) The retention or possession of halibut is prohibited when any commercial fishing gear other than hook and line gear or nets used solely for the capture of bait are on board.

Section 12. Sport Fishing for Halibut

(a) Sport fishing is permitted from March 1 to October 31 in all convention waters. The daily catch limit by any person is two (2) halibut of any size, caught with a hook attached to a handline or rod, or by spear. After two halibut have been taken by any person, those halibut shall be landed before that person takes more halibut on any succeeding day.

(b) It is illegal for any person to possess sport-caught halibut aboard a vessel when other fish or shellfish aboard said vessel are destined for commercial use (sale, trade or barter).

FLEET LAY-UP PROGRAM

During the early 1950's, competition among halibut fishermen was so keen that the catch limit was taken in less than 2 months and the processors had difficulty handling the volume of the catch. The situation was chaotic and fishermen had no rest periods between trips. In 1956, a group of Canadian and United States halibut fishermen re-instituted a program of between trip lay-ups to extend the fishing season, establish rest periods for the fishermen, attain a more orderly delivery of the catch, and aid in the conservation of the resource*. This voluntary program is now supported by 18 organizations (unions and vessel owner associations) whose representatives meet annually to establish the lay-up rules. The rules apply to four types of operation and govern the fishing activity. "Halibut vessels" have three or more men and land their fare at ports or plants and observe an 8-day lay-up between trips. "Camp boats" have one or two men and usually make daily landings at fishing camps or to packer vessels. The camp boats take an 8-day lay-up between 12-day fishing periods. "Alaskan boats" have one, two, or three men and fish in Alaskan territorial waters. They have the option of fishing under camp boat rules or taking one-half day lay-up for each day fished. "Salmon trollers" participate in the lay-up if their catch of halibut exceeds 3,000 pounds per trip. Vessels and crew members cannot engage in other fisheries during their lay-up, and running time to ports of landing does not count toward lay-up. Each participating vessel has a crew delegate who is responsible for reporting arrivals and departures from port.

Support for the lay-up program is strong among the full-time fishermen, but part-time and non-union fishermen do not always comply with the rules. IPHC has been asked to incorporate the lay-up program in its regulations to insure compliance. Although IPHC supports the concept of the lay-up program, it does not have the authority, under existing legislation, to regulate departures of individual vessels. If

* The lay-up program was first introduced in the 1930's but was discontinued during World War II.

the lay-up program should end, IPHC could divide the fishing season to distribute fishing effort on early and late stocks, but this would not be as effective as the fleet's program.

STATISTICS OF THE FISHERY

Catch by Regulatory Area

The 1975 catch of 27.6 million pounds was 6.3 million more than in 1974 and is compared by country and regulatory area with catches in 1971 to 1974 in Table 2. The 1975 catch exceeded the 25 million pound catch limit in Areas 2 and 3 by 8%. In part, this excess was caused by the strike in the Canadian industry that complicated the setting of closing dates by altering the fleet size and disrupting landing patterns near the end of the fishing season, but errors in IPHC's records also contributed to the overrun. The excess catch was undesirable because of the poor stock condition. However, the 1974 catch was nearly 4 million pounds less than the quota and the total catch for 1974 and 1975 was below the combined catch limit for the two years. Canadian fishermen landed 41% of the 1975 catch, 6% more than in 1974, but still below their 47% average during the past decade. The Canadian catch would have been greater except for the aforementioned labor dispute in British Columbia.

Table 2. Catch of halibut in thousands of pounds net weight (eviscerated, heads-off) by regulatory areas, 1971-1975.

Regulatory Area	1971	1972	1973	1974	1975
Area 2					
Canada	10,189	10,517	7,364	4,973	7,369
United States	6,584	5,766	5,565	5,771	6,461
Total	16,773	16,283	12,929	10,744	13,830
Area 3					
Canada	14,578	11,757	6,990	2,227	3,819
United States	14,437	14,112	11,536	7,898	9,442
Total	29,015	25,869	18,526	10,125	13,261
Bering Sea					
Canada	729	247	96	168	169
United States	137	485	189	269	356
Total	866	732	285	437	525
All Areas					
Canada	25,496	22,521	14,450	7,368	11,357
United States	21,158	20,363	17,290	13,938	16,259
Total	46,654	42,884	31,740	21,306	27,616

In Area 2, the catch was 13.8 million pounds, 3.1 million pounds greater than in 1974. Catches increased throughout the area, but the greatest increase occurred in northern British Columbia. The Canadian catch in Area 2 was 7.4 million pounds and the U.S. catch was 6.4 million pounds. The catch in Area 3 was 13.2 million pounds, 3.2 million pounds greater than in 1974 and 1.3 million pounds over the catch limit. The U.S. catch in this area was 9.4 million pounds and the Canadian catch was 3.8 million pounds. In Area 4 (Bering Sea), the total catch was 525,000 pounds. Four United States and one Canadian vessel caught 212,000

pounds during the spring fishery, and five United States and three Canadian vessels caught 313,000 pounds during the summer and fall. This was the largest catch from the Bering Sea since 1972 when 732,000 pounds were taken.

The landed value of the 1975 catch was over $24 million compared with $15 million in 1974. Fishermen received record high prices with a coast-wide average of 89 cents per pound. Prices for medium and large halibut were near 75 cents per pound during May, but increased to over one dollar per pound for both categories by September.

Landings by Ports

Landings increased in all major ports in 1975 (Table 3). Halibut are landed at 20 major ports and many small ports and buying camps. However, 73% of the catch was landed at six major ports: Prince Rupert and Vancouver in Canada, and

Table 3. Halibut landings in thousands of pounds by port, 1974-1975.

Region or Port	1974			1975		
	Canada	U.S.	Total	Canada	U.S.	Total
CALIFORNIA AND OREGON	—	68	68	—	57	57
WASHINGTON						
Seattle	—	432	432	38	559	597
Bellingham	80	241	321	400	196	596
Neah Bay	—	231	231	—	247	247
Other	—	116	116	—	108	108
BRITISH COLUMBIA						
Prince Rupert	4,390	154	4,544	5,089	115	5,204
Vancouver	1,447	—	1,447	1,882	—	1,882
Vancouver Island	180	—	180	434	—	434
Namu	163	—	163	259	—	259
Other	180	—	180	247	—	247
SOUTHEASTERN ALASKA						
Petersburg	—	3,047	3,047	129	3,042	3,171
Pelican	143	878	1,021	583	1,039	1,622
Juneau	—	769	769	—	873	873
Sitka	—	463	463	—	598	598
Metlakatla	—	372	372	128	458	586
Wrangell	—	397	397	—	441	441
Ketchikan	—	465	465	112	305	417
Hoonah	—	171	171	—	257	257
Craig	—	168	168	—	202	202
Other	—	58	58	—	185	185
CENTRAL ALASKA						
Kodiak	541	3,201	3,742	1,231	2,978	4,209
Seward	244	1,686	1,930	825	3,111	3,936
Homer	—	431	431	—	414	414
Yakutat	—	155	155	—	128	128
Other	—	435	435	—	946	946
Total	7,368	13,938	21,306	11,357	16,259	27,616

Kodiak, Seward, Petersburg, and Pelican in the United States. Prince Rupert continued as the leading halibut port with landings of 5.2 million pounds, followed by Kodiak, Seward, and Petersburg. The greatest increase occurred in Seward where 3.9 million pounds were landed, more than twice the 1974 landings. Landings in Pelican increased from 1.0 to 1.6 million pounds.

Number of Vessels

Vessels 5 net tons and larger that fish with setline gear are required to have an IPHC license. Vessels less than 5 net tons and vessels that catch halibut with troll gear are not required to have an IPHC license. Until recently, the Commission's annual reports presented information only on "regular vessels", licensed vessels that caught at least 10,000 pounds. These data were maintained from the early years of the fishery, when almost all of the catch was landed by licensed vessels (over 5 net tons). In recent years, the influx of smaller, unlicensed vessels into the fishery has been substantial and their catch has accounted for an increasing percentage of the total catch. We are attempting to present a more complete description of the fishery and are comparing several categories of licensed and unlicensed vessels. To be consistent with statistics in other fisheries, the licensed vessels are divided by tonnage class. The listing of the licensed vessels includes vessels that previously would not have been included as "regular vessels". Table 4 shows the number of licensed and unlicensed vessels by area in 1975. The catch per trip by vessel category and area is discussed in the biostatistics section of this report.

Table 4. Number of licensed and unlicensed vessels by area and nationality, 1975.

Vessel Category	Number of Vessels						
	Area 2		Area 3*		Total		Grand Total
	Canada	U.S.	Canada	U.S.	Canada	U.S.	
Unlicensed Vessels							
Trollers	1,017	1,398	0	20	1,017	1,418	2,435
Setliners	161	418	2	284	163	702	865
Total	1,178	1,816	2	304	1,180	2,120	3,300
Licensed Vessels							
5-19 Tons**	133	113	3	92	136	205	341
20-39 Tons	21	35	11	49	32	84	116
40-59 Tons	4	2	5	10	9	12	21
60+ Tons	3	0	13	3	16	3	19
Total	161	150	32	154	193	304	497
Grand Total	1,339	1,966	34	458	1,373	2,424	3,797

* Includes vessels that fished in both areas.

** Includes small vessels of unknown tonnage.

Sport Fishery

A preliminary report from the Washington Department of Fisheries indicates that sport fishermen caught about 1,000 halibut, less than half of the catch in 1974. The weight of the halibut ranged from 6 to 80 pounds and averaged 27 pounds.

Most of these fish were caught in the Strait of Juan de Fuca between mid-May and mid-August.

The State of Alaska used data from a creel census and other observations to estimate a catch of 6,909 halibut by sport fishermen in 1975. Most of the catch (4,409) was taken in southeastern Alaska. Estimates in 1973 and 1974 were 5,000 fish.

CONDITION OF THE RESOURCE

During the past several years, the outlook for the halibut stock has been dismal. Today, the condition of the stock remains critical, but the long-term prospects have improved. Whereas all of the indicators had been negative in recent years, a few positive signs now are in evidence. Stock assessment studies indicate that the decline has been halted and that stocks may have stabilized. The lowered catch limit has reduced the mortality of adult halibut, and the time-area closures for the foreign trawl fleet have improved the survival of juvenile halibut. At the present low level of abundance, however, far greater improvements are needed before recovery is certain.

Abundance

Catch per unit effort (CPUE) increased, although slightly, for the first time in nearly 10 years (Figure 3). In Area 2, CPUE increased from 62 to 63 pounds per

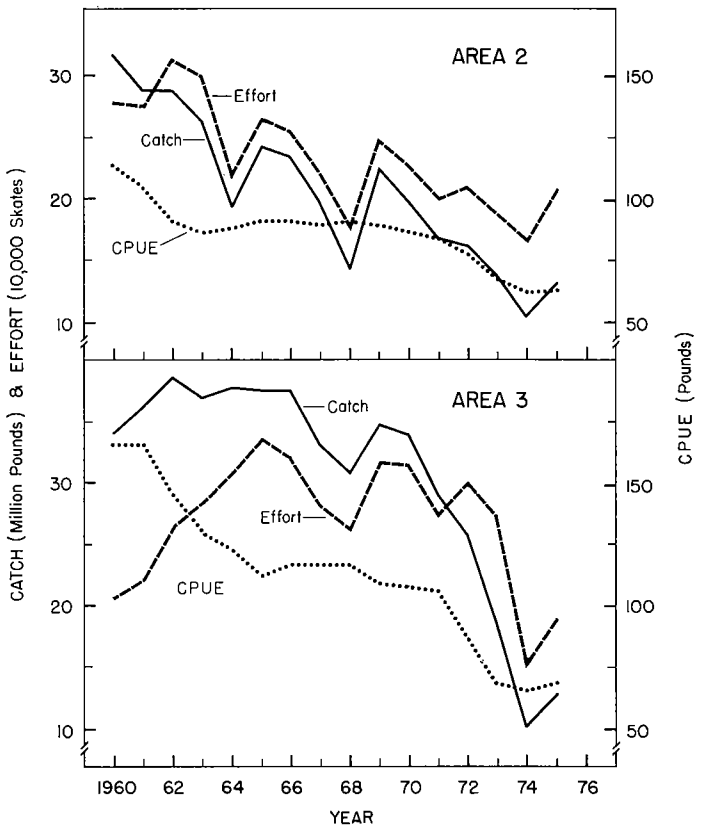


Figure 3. Setline catch, effort, and CPUE in Areas 2 and 3.

skate, and in Area 3, from 64 to 68 pounds per skate. (In 1960, CPUE in both areas exceeded 100 pounds per skate.) The overall increase in CPUE in 1975 was only 3% but, viewed with the relatively small decline in 1974, indicates that the stocks may have stabilized. The slightly higher CPUE is viewed with caution because the opening date was earlier than in 1974, and the increased CPUE may reflect a change in availability rather than an increase in abundance. Also, participation by Canadian vessels was greater in 1975 and they had a higher CPUE than U.S. vessels.

Fishing Effort

Although several factors have contributed to the apparent stabilization of the stocks, the primary factor was the curtailment of the setline fishery. Recruitment of juvenile fish to the setline fishery has continued to decline, and a major reduction in the setline catch was necessary to reduce fishing effort, i.e., mortality, and to stabilize stock abundance. This was accomplished by reducing the catch limit from 50 million pounds in 1970 to 25 million pounds in 1974. The mortality of young fish also was reduced by increasing the minimum size limit in 1973.

Fishing effort has been reduced substantially since the 1960's. In Area 2, fishing effort declined from 290,000 skates to 210,000 skates in 1975. In Area 3, effort increased from 245,000 skates in the early 1960's to 291,000 skates in the early 1970's and then dropped sharply in 1974 to 158,000 skates. In 1975, Area 3 effort increased to 192,000 skates, but is still relatively low. A continuation of the present level of fishing effort should result in an increase of CPUE, if recruitment does not decline further.

Age Composition

The age composition of halibut in the 1975 landings and mean ages since 1972 are summarized by region in Table 5. The mean age of halibut in the setline catch increased in most regions in 1973 as a result of the increased minimum size.

Table 5. Age composition of halibut in 1975 and mean age by region, 1972-1975.

Region	Age (1975)				Year			
	<9	9-11	12-14	>14	1972	1973	1974	1975
	Percent				Mean Age			
Willapa Bay and South	—	—	—	—	10.6	—	—	—
Washington-Vancouver Is.	5	33	32	30	9.7	13.5	—	13.6
Hecate Strait	20	43	25	12	8.6	9.9	10.8	11.0
West Coast Queen Charlottes	14	46	28	12	10.6	13.6	12.1	11.4
Inside S.E. Alaska	17	40	27	16	10.3	11.4	11.6	11.5
Outside S.E. Alaska	9	34	35	22	11.3	12.9	12.7	12.5
Cape Spencer-St. Elias	8	38	38	16	12.3	12.3	12.3	12.1
Portlock-Albatross Banks	18	42	31	9	10.8	11.5	11.6	11.1
Chirikof-Semedi Islands	20	42	29	9	9.9	10.5	11.1	10.9
Shumagin Is.-Davidson Bank	14	43	31	12	11.1	11.5	12.1	11.4
Aleutian Islands	—	—	—	—	—	—	16.7	—
Bering Sea - 4A	—	—	—	—	11.0	—	—	—
Bering Sea - 4B	11	23	29	37	11.2	10.8	11.3	13.6
Bering Sea - 4C	—	—	—	—	—	—	—	—
Bering Sea - 4D West	4	22	34	40	13.8	—	—	14.6

Since 1973, mean age has not changed significantly, except in Hecate Strait where mean age continued to increase in 1974 and 1975, possibly as a delayed effect of the larger minimum size. Landings from Hecate Strait historically have contained high proportions of young fish, and the increased minimum size forced many fishermen to change fishing grounds.

A change in age composition typically indicates a change in mortality or recruitment, but also may reflect sampling variability or a change in gear selectivity, distribution of fish, or fishing effort. Because age composition is affected by several factors that have not been quantified, further study is needed to evaluate the observed changes.

Recruitment

The high catch limits during the 1950's and early 1960's adversely affected the stocks, and CPUE continued to decline throughout the 1960's even though setline catch and effort had been reduced. Reduced recruitment appears to be primarily responsible for the present low stock size, although a change in natural mortality

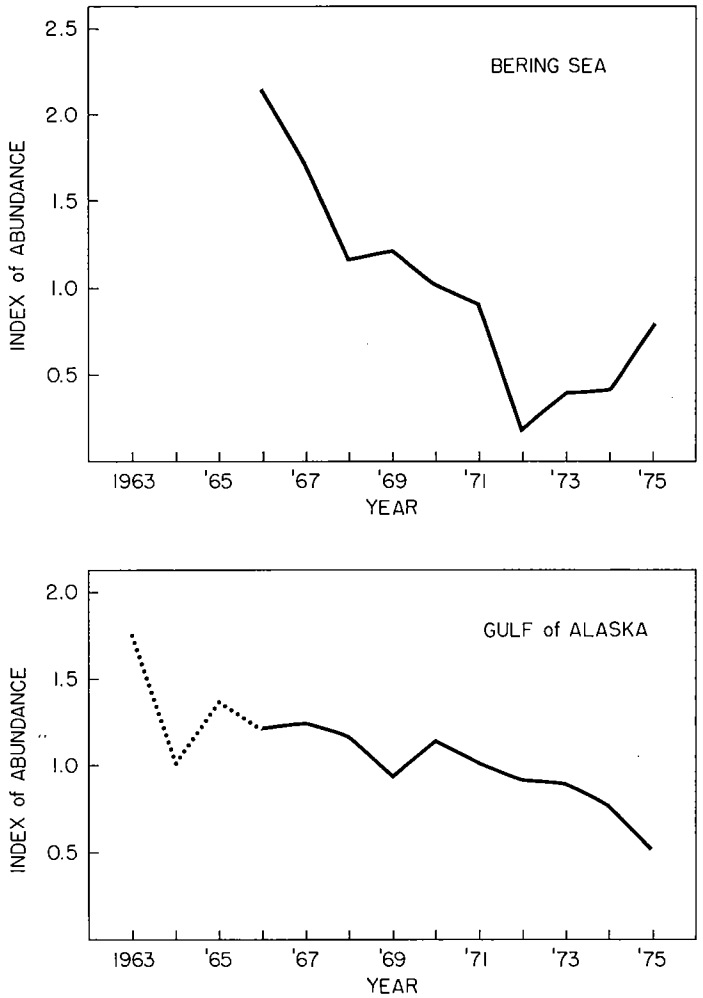


Figure 4. Relative abundance of juvenile halibut in the Bering Sea and the Gulf of Alaska (limited data before 1966).

or growth cannot be discounted. Evidence of the decline in recruitment is supported by IPHC surveys of juvenile halibut in the Bering Sea and the northeast Pacific that show a declining abundance since the mid-1960's (Figure 4). The index of abundance is discussed in the section on juvenile halibut studies.

The cause of the reduced recruitment is not understood fully and environmental factors as well as the trawl and setline fisheries may have contributed to the decline. Foreign and domestic trawling increased markedly during the 1960's and early 1970's and several million juvenile halibut were taken as an incidental catch. Recent closures to trawling have reduced the mortality, and the abundance of juveniles increased in the Bering Sea in 1975, just one year after Japan agreed to prohibit trawling in areas where the incidental catch of juvenile halibut was high. In the Gulf of Alaska, where trawl closures have been more recent, the abundance of juveniles continued to decline and, in 1975, was the lowest since surveys began. A further reduction in the incidental catch is expected in the Bering Sea and the Gulf in 1976, when the U.S.S.R. will institute trawl closures for the first time. This step will further improve the survival of juveniles and, hence, recruitment to the setline fishery. Although beneficial, trawl closures alone will not restore recruitment to former high levels because the abundance of 2-year-old halibut, that are not caught by trawls, also declined; an indication that recruitment was affected by adverse environmental conditions or reduced spawning success. An increase in the abundance of the spawning stock is expected from the restrictions on the setline fishery, but changes in environmental conditions cannot be predicted.

Environmental Factors

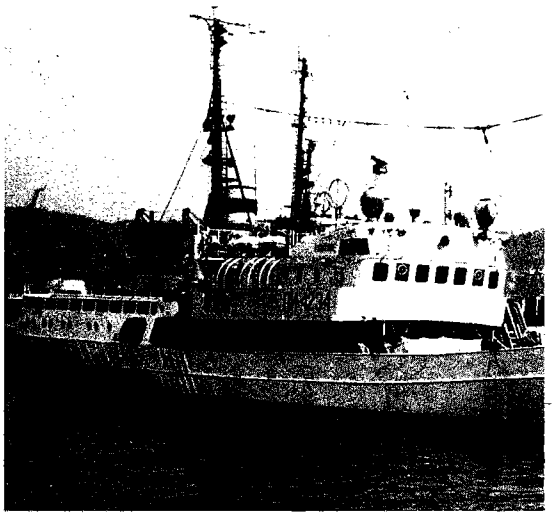
The emphasis of IPHC's research has been directed toward the effects of fishing, however, the role of environmental factors has been of concern. The Commission's early oceanographic studies provided information on currents and temperatures that helped determine the drift of eggs and larvae and the distribution of halibut. Although investigators agree that environmental factors can influence stock abundance, the relative importance of these factors in explaining trends in abundance often is debated. Several scientists have suggested that environmental conditions were critical, whereas others concluded that the effects of fishing transcend any long-term effects due to the environment.

In part, this lack of agreement stems from the inadequacy of data on oceanographic conditions and an incomplete understanding of the factors that control halibut stocks. The importance of environmental factors, however, cannot be dismissed lightly as some of the changes, such as recruitment, that have been observed in halibut stocks cannot be explained by fishing alone. Year class strength has fluctuated significantly, yet the catch of "chicken halibut" (under 10 pounds) has declined steadily since 1930. One of the basic problems in assessing the effect of the environment on year class strength was that estimates of CPUE were based on weight and not numbers of fish. This difference was important because the growth rate of halibut increased continuously from the 1930's to the 1950's, perhaps due, in part, to environmental conditions. The rate of growth influences the age at which young halibut enter the fishery and their duration in the chicken category. Studies on the growth of juvenile halibut in the Bering Sea (1973 Annual Report) suggests that low temperatures have a deleterious effect on survival and growth. Although natural factors are known to have affected stock abundance in past years, until more is known about their impact, the cause of some changes remains in doubt.

U.S.S.R.–

Cooperative

Setting Longline Gear



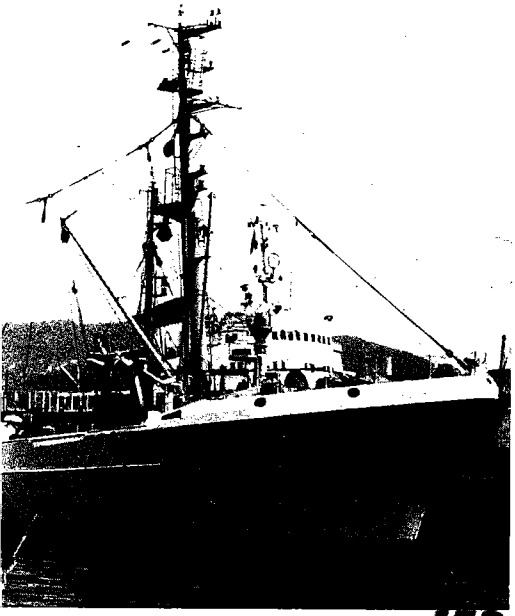
Soviet Research V
Nakhodka Har

Dumping a Trawl Catch of Pollock

-IPHC

Research

Attaching Baited Hooks to Groundline



essel RAKITNIY
bor, U.S.S.R.

Releasing a Tagged Halibut

Scientific Investigations

U.S.S.R. - IPHC COOPERATIVE RESEARCH

In June 1974, representatives of Canada, U.S., U.S.S.R., and IPHC met in Halifax, Nova Scotia to discuss the impact of increased trawling by Soviet vessels on the halibut resource. During these discussions, the delegations agreed that more research was needed to learn how Soviet fishing affected the halibut resource and how halibut could be protected and still allow profitable fishing for the other species. The delegations also agreed that a joint tagging operation in the Bering Sea would expand knowledge on the migration of halibut within the Bering Sea and between the Bering Sea and the North Pacific Ocean. Plans for a joint tagging study during the summer of 1975 were developed at subsequent bilateral meetings (U.S.-U.S.S.R.), and IPHC agreed to participate for Canada and the U.S. IPHC was to provide tags, longline gear, and technical advice on tagging and setline fishing. Soviet authorities would supply the vessel, trawl gear, and crew. Dr. N. S. Fadeev from the Pacific Research Institute of Fisheries and Oceanography (TINRO) was in charge of the Soviet operations. Arrangements for the exchange of personnel and gear were coordinated in Washington, D.C. by Mr. Larry Snead of the U.S. National Marine Fisheries Service and Mr. Iouri A. Znamenskiy of the Soviet Embassy.

The Soviet research vessel *Rakitniy,* under the command of Captain Yuri Djadev, was provided for the study during June and July. The *Rakitniy* is a new 60-meter class, all electric side-trawler that was outfitted with sophisticated fish-finding equipment and carried a complement of 30, including 4 scientists. The vessel was on charter to TINRO and Mr. Yuri Demidenko was chief scientist on the cruise. Two Commission employees assisted in the project: Captain Arthur L. Hansen, of Delta, B.C., supervised the fishing operation and Mr. William H. Hardman, IPHC biologist, directed the tagging and catch sampling.

The scientists and fishermen were able to adapt the vessel for setline fishing even though they experienced minor technical difficulties. In particular, the longline gurdy, which was designed for tuna gear, was cumbersome, the deck layout made setting and hauling difficult, and the high rail created problems in landing large halibut. Ultimately, a satisfactory modification was developed by winding the groundline on a drum and using snap-on hooks. Although awkward, the operation provided the desired capability of fishing with both trawl and setline gear, thereby assuring that the catch would contain both small and large halibut.

During the 5,600-mile cruise from Nakhodka, U.S.S.R., over 500 halibut were caught by trawl and setline gear, chiefly between Cape Olyutorski and Cape Navarin, northeast of the Kamchatka Peninsula (Figure 5). Of these, 323 fish were tagged with serially numbered tags bearing English, Japanese, and Russian identification so that fishermen from the different countries can return the tags to their respective research agencies. No large concentrations of halibut were encountered during the exploratory fishing, but up to four halibut per skate were caught along the 300

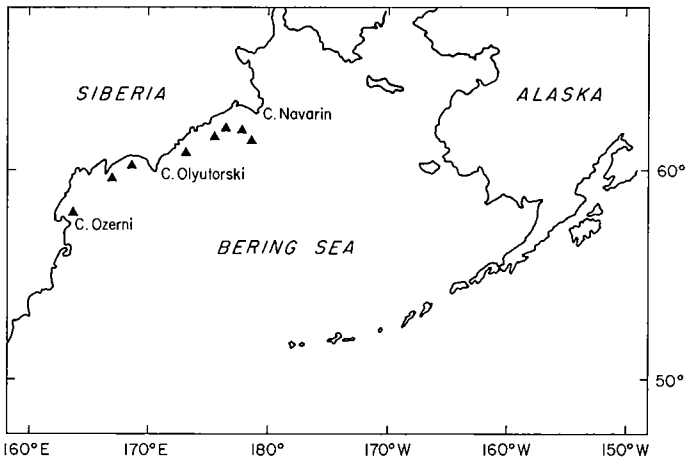


Figure 5. Major fishing locations during joint U.S.S.R.-IPHC halibut tagging cruise in the western Bering Sea.

meter contour between Cape Navarin and Cape Olyutorski. The same year classes which have been dominant in North American catches in the Gulf of Alaska and the southeastern Bering Sea (e.g., the 1961, 1955, and 1954 year classes) were prominent in the catch from the western Bering Sea. Trawl-caught halibut ranged from 39 to 157 cm long with a mean of 79 cm, and setline-caught halibut ranged from 37 to 179 cm long with a mean of 102 cm.

The average weights of halibut at each age taken during the *Rakitniy* cruise were much larger than those taken during IPHC fishing off Cape Navarin in 1967 and much smaller than were taken by the IPHC charter vessel *Seymour* in the eastern Bering Sea in July 1975 (Figure 6). The comparatively smaller average size at each age of the western Bering Sea halibut is consistent with earlier observations by IPHC and Soviet scientists.

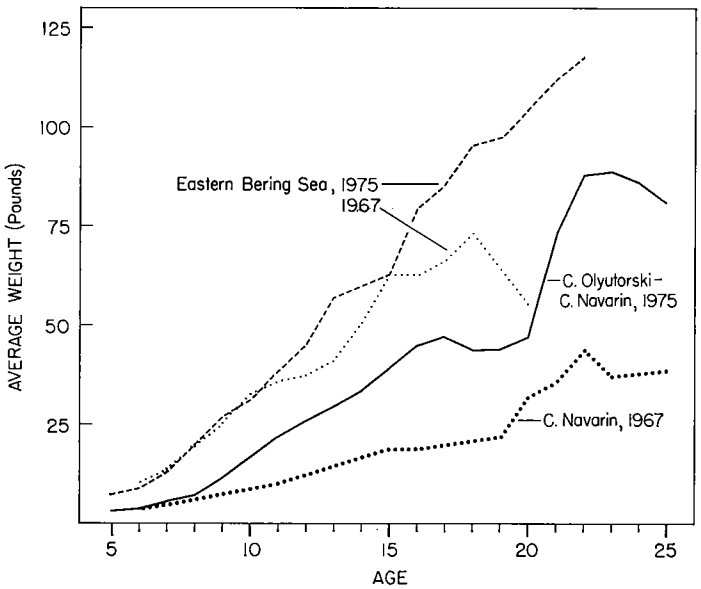


Figure 6. Average weight by age of female halibut, eastern and western Bering Sea.

The Soviets plan to continue the tagging project in the western Bering Sea during the next two years, and IPHC will conduct a similar program in the eastern Bering Sea. Information gained from this cooperative research will provide a better assessment of the halibut resource and will be helpful in management of the fishery in the Bering Sea.

ABUNDANCE OF HALIBUT BEFORE 1930

A recent IPHC analysis of fishing effort showed that stock abundance in the 1960's had been overestimated. The bias arose because fishermen had increased the spacing between hooks from 13-foot intervals to 18-, 21-, and 26-foot intervals, and the change was not assessed correctly in terms of effective fishing effort. A similar change occurred between 1915 and 1930 when dories were replaced by longline vessels and fishermen increased the hook-spacing from 9-foot to 13-foot intervals. This change prompted a reevaluation of early effort data.

Traditionally, a distinction has been made between gear fished from dories (dory gear) and that fished from larger vessels (longline gear). The longline vessels carried more gear, used heavier lines, and generally used larger hooks, but the major differences between the two types of gear were the spacing between hooks and the length of the skate (i.e., the number of 50-fathom lines per skate). Dory gear was rigged predominantly with hooks at 9-foot intervals, and the number of lines per skate varied from 6 to 10. Longline gear, which was introduced in 1915, was rigged with hooks at 13-foot intervals and seldom used more than 6 lines per skate. The 9-foot gear had space for 200 hooks on a standard 1,800-foot skate, whereas the 13-foot gear had space for 138 hooks. Wider hook-spacing, 18 to 26 feet, was not common until after 1955.

The authors of the 1930 studies concluded that the skates should be adjusted to a standard length and that no correction for hook-spacing was necessary. However, reexamination of the early log records showed that, for a standard length, the catch per skate of dory gear was greater than that of longline gear. This difference between dory and longline gear agreed with results of hook-spacing experiments in the 1970's that showed that the catch per skate decreased and the catch per hook increased with wider hook-spacing. (In 1973, the standard unit of effort was changed to 100 hooks of 18-foot gear.)

The change from dory to longline gear also was accompanied by a change in the "soak", the time between setting and retrieval of the gear. Dory fishermen usually set 2 to 6 skates and retrieved them twice during the daylight hours. Soak-time per skate averaged about 4 hours. Longline fishermen fished as many as 50 skates, and the time between setting and retrieval averaged between 8 to 12 hours. Whereas the early studies concluded that the difference in soak-time was unimportant, recent studies showed that catch per skate increased with the length of soak. Thus, when longlines replaced dory gear, two very significant changes occurred: the number of hooks per standard skate was reduced and the soak-time was at least doubled. The increased soak-time partially compensated for the reduced number of hooks, but contrary to earlier conclusions, adjustments were needed to correctly standardize fishing effort.

In addition to corrections for the differences in hook-spacing and soak-time, adjustments also were made for differences in seasonal availability. The correction for gear and for seasonal availability had the same effect, i.e., both increased the

estimate of total effort and decreased the estimate of CPUE. The revised estimates did not alter the original conclusion of a stock decline, but did provide a more accurate estimate of the abundance of the stock in the early years of the halibut fishery and showed that the decline prior to 1930 was not as precipitous as originally portrayed (Figure 7).

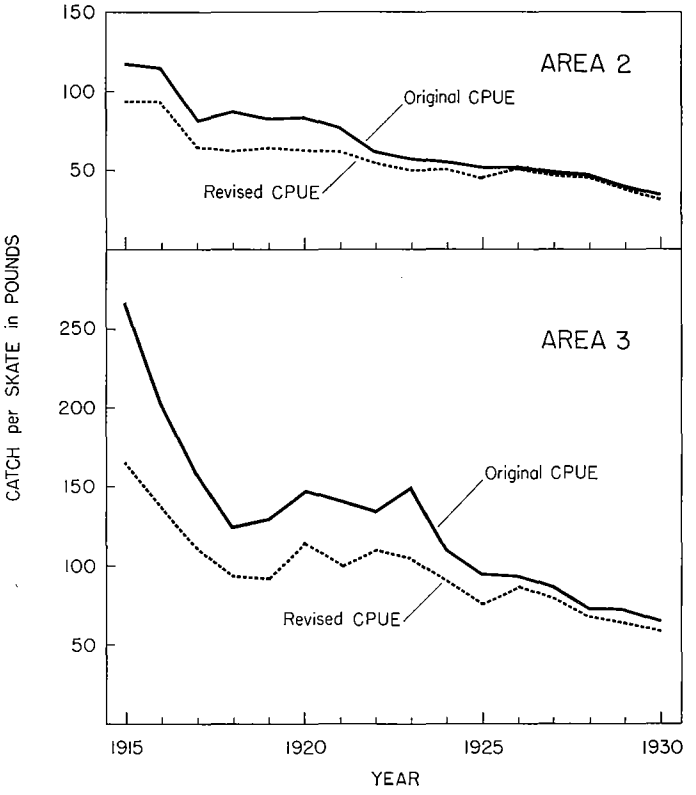


Figure 7. Comparison of the original CPUE with the revised estimates, Areas 2 and 3.

The revised estimates of CPUE support the contention that the stock decline before 1930 was mainly fishery induced; however, the role of natural factors cannot be summarily rejected. Until there is a better understanding of the population parameters, such as growth and recruitment, and the interrelations of the stocks are determined, one cannot properly credit fluctuations in abundance to either fishery induced changes or to environmental effects.

INCIDENTAL CATCH OF HALIBUT

Large quantities of halibut are caught incidentally by foreign and domestic trawlers fishing for other species of groundfish. This incidental catch has reduced the yield available to the North American setline fishery, and a lack of information on the magnitude of the incidental catch has hampered IPHC's assessment of stock condition. Even now, the incidental catch is not reported directly, but rather is estimated by IPHC from data obtained by sampling the groundfish catch at sea. As data become available, IPHC continues to update and refine estimates of the incidental catch. The most recent estimates indicate that the incidental catch in the

eastern Bering Sea peaked in 1971 at about 15,000,000 pounds (round weight) and has declined since then. Estimates for the 1975 catch still are preliminary, but the catch was probably less than 10,000 000 pounds. In the Gulf of Alaska (including British Columbia), the incidental catch by foreign and domestic trawlers has averaged about 10,000,000 pounds since 1970 and probably was about the same in 1975.

Trawl Closures

As discussed in the 1973 and 1974 Annual Reports, Japan agreed to prohibit trawling in the Bering Sea and the Gulf of Alaska in areas and at times when the incidental catch of halibut was relatively high. The time-area closures were initiated in 1974 and extended in 1975. Further negotiations by Canada, Japan, and the United States were held in 1975, and Japan agreed to continue the closures in 1976. Reduced Japanese fishing effort and the trawl closures lowered the incidental catch by at least 5,000,000 pounds between 1971 and 1975. A greater reduction is anticipated in 1976 when the U.S.S.R. will institute closures for the first time. The Soviet closures were the result of negotiations between Canada, the United States, and the U.S.S.R. and were implemented in bilateral agreements between the U.S. and the U.S.S.R. The closures are similar to those agreed to by Japan. The closed areas in the Bering Sea and the Gulf of Alaska are depicted in Figure 8. The immediate result of these closures should be a reduced mortality of juvenile halibut but, in time, the abundance of adult halibut also will increase. The abundance of juveniles already has increased in the Bering Sea; as yet, no increase has been detected in the Gulf. Trawl closures in the Gulf, although beneficial, offer less protection to halibut than closures in the Bering Sea because halibut are more widely distributed in the Gulf.

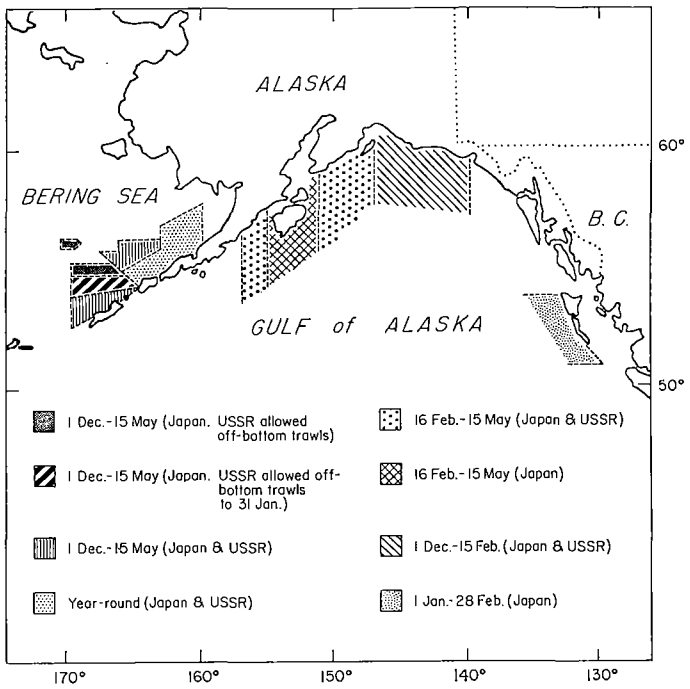


Figure 8. Foreign trawl closures pertaining to halibut in the Bering Sea and the Gulf of Alaska.

Trawl Observer Programs

Observer programs to collect data on the incidental catch of halibut by Japanese trawlers were conducted in the Gulf of Alaska between 1963 and 1969 and were initiated in the Bering Sea in 1972 and continued through 1975. These programs were coordinated by the U.S. National Marine Fisheries Service under the auspices of the International North Pacific Fisheries Commission. IPHC has participated in the programs since their inception. Data from the programs were used to assess the effect of trawling on halibut stocks and, along with data from IPHC and the Fisheries Agency of Japan, were the basis for determining the areas and times that should be closed to trawling to protect halibut. Data collected in 1975 support the conclusions reached from analysis of earlier data. In the Bering Sea, the incidence of halibut was highest in Areas A, B, and E (Figure 1) during the winter and spring. Observers also were aboard four Japanese trawlers in the Gulf of Alaska, and these were the first observations in the Gulf since 1969. The incidence, expressed as the number of halibut per metric ton of groundfish, was similar to that observed during the 1960's and varied with season and target species. As in the Bering Sea, the incidence of halibut is highest during the winter and averaged over 2.0 halibut per metric ton during November-December. Area differences are not pronounced in the Gulf, but the incidence was substantially higher when the target species were flatfish rather than Pacific ocean perch *(Sebastes alutus)*.

Although U.S.S.R. trawlers have fished in the Bering Sea and the Gulf of Alaska since the late 1950's, the observer program was not established until 1974. As a result of negotiations between Canada, the United States, and the U.S.S.R., U.S. observers were placed aboard five U.S.S.R. trawlers between November 1974 and March 1975. Two of the trawlers were in the Bering Sea and three were in the Gulf of Alaska. Each observer trip was scheduled for 14 days, but actual sampling time varied from 5 to 13 days. The incidence of halibut in the catch ranged from about 3.1 fish per metric ton during January in the Kodiak area to 0.05 fish per metric ton during March in the Bering Sea. Average weights of halibut ranged from 2.1 to 16.0 kg. Target species for Soviet trawlers were Atka mackerel *(Pleurogrammus monopterygius)* in the Gulf and walleye pollock (*Theragra chalcogramma*) in the Bering Sea. Although data are too limited to provilde accurate estimates of the incidental catch, the observations suggest that the incidence of halibut in the U.S.S.R. catch in the Bering Sea may be less than in the Japanese catch. For example, the incidence on one U.S.S.R. trawler during March (Area A, Figure 1) was 0.05 halibut per metric ton, substantially less than the incidence (3.36 halibut per metric ton) observed in the Japanese catch in the same area and month during 1974. The U.S.S.R. trawler was fishing for pollock with the net slightly off bottom, which probably explains the low incidence. The incidence on the other U.S.S.R. trawler in the Bering Sea (February, Area C) also was low, but this was a research vessel and the results may not be comparable with commercial vessels.

Total Catch of Halibut

Before 1955, North American setliners took nearly all of the halibut caught in the North Pacific and the Bering Sea. North American trawlers did catch halibut incidentally, but they were required to release them under IPHC regulations. Since the late 1950's, the catch by Japanese setliners and by Japanese and Soviet trawlers operating in the North Pacific Ocean and the Bering Sea has increased markedly. These fisheries usually target on other species and halibut are an incidental catch.

INPFC regulations prohibit retention of trawl-caught halibut in most of the Bering Sea east of 175° W longitude and prohibit retention of all halibut, regardless of method of capture, in the northeast Pacific. However, even the halibut that are not retained represent a loss of biomass because most are dead when released or die later from injuries received during capture.

In earlier annual reports, IPHC has estimated the halibut catch by foreign vessels, but these estimates had not been combined previously with the North American setline catch to show the total catch of Pacific halibut. The results show striking changes (Figure 9). The incidental catch by the North American shrimp and crab fisheries was not included in the comparison. The estimates do not imply that all of the halibut were retained; however, they provide the best available information on the total poundage caught by these fisheries. The comparison shows that the combined catch (round weight) increased from about 60 million pounds in 1955 to nearly 100 million pounds in 1962 and then declined to less than 40 million pounds in 1975. The share of this catch taken by the North American setline fishery has declined from nearly 100% in 1955 to about 60% in 1975.

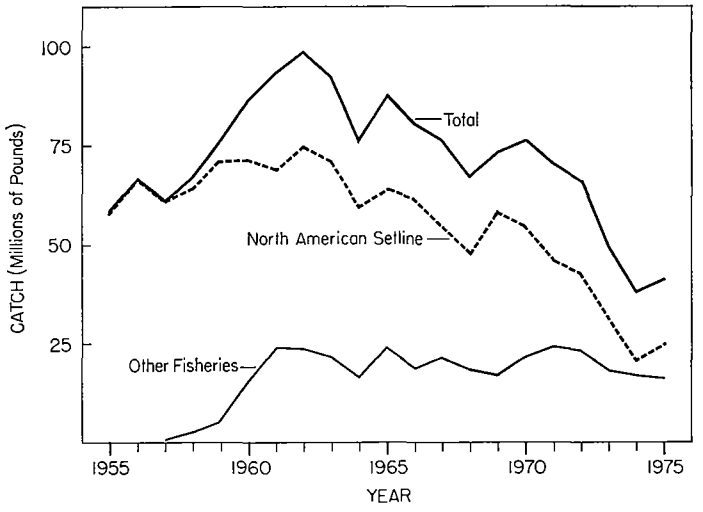


Figure 9. Total catch of halibut (round weight) in the North Pacific Ocean and the Bering Sea, 1955-1975 (see explanation in text).

JUVENILE HALIBUT STUDIES

A Seattle-based trawler, *M/V Tordenskjold,* was chartered from May 19 to August 16, 1975 to study the distribution and abundance of juvenile halibut in the eastern Bering Sea and the Gulf of Alaska. Juvenile halibut are defined as fish less than 65 cm (fork length) and most are less than 7 years old. The survey is conducted annually and an attempt is made to maintain comparability in the fishing gear, timing, and location of fishing. However, the number of stations and the locations have not always been the same. Fewer stations were fished during the early 1960's when the surveys began and extra stations occasionally were added. Fishing locations in recent years have been more consistent, but even now, stations are occasionally missed because of weather and ice. Variations in the survey have been less in the Bering Sea than in the Gulf where sampling locations are more widely distributed. To standardize the results from all surveys, an annual index of abundance was developed based on relative changes in the catch at each station from the long-term average (Figure 4). The trends are indicative of long-term declines, but further study of the method of calculation is needed to improve the precision of these estimates and to assess annual changes.

In the southeastern Bering Sea, the CPUE (number per hour trawled) in 1975 was 11.9, nearly double the 1974 figure of 6.2, but still below the 1966-1974 average of 14.6 per hour. The CPUE increased for all ages in 1975, but the greatest increase was among the 4-, 5-, and 6-year-olds. Although several factors could have contributed to the increase, recent restrictions on trawl fishing in the Bering Sea reduced the mortality during the December-May period when the juveniles are concentrated along the edge of the continental slope and are particularly vulnerable to trawling.

Environmental conditions in the Bering Sea are especially severe and are important factors in the distribution and abundance of juveniles. Again in 1975, low temperatures and drift ice were encountered at stations near the head of Bristol Bay. Charts provided by the U.S. Navy Fleet Weather Facility showed that the ice cover in March was less extensive than in the previous 4 years, but persistent northerly winds retarded seasonal warming and forced the ice edge further south for a longer period than usual. Bottom temperatures at the stations fished in early June averaged 0.9° C and were the lowest since the survey began:

Average bottom temperatures (°C) in June in the southeastern Bering Sea.

1966	1967	1968	1969	1970	1971	1972	1973	1974	1975
3.0	3.6	—	4.5	1.9	1.3	1.1	3.1	1.1	0.9

In the Gulf of Alaska, the survey is conducted at six widely separated locations: Unimak Island, Trinity Islands, Chirikof Island, Cape Chiniak, Cape St. Elias, and Shelikof Bay. The CPUE of juveniles continued to decline in the Gulf of Alaska in 1975, and most of this decline occurred among fish of age 3 and younger. As in the Bering Sea surveys, 5- and 6-year-olds at Unimak Island were more abundant in 1975 than in 1974, but this pattern was not as apparent at the other locations.

In 1975, the National Marine Fisheries Service (NMFS) initiated a trawl survey of the groundfish resources in the eastern Bering Sea to establish a base line

for assessing the effects of offshore petroleum exploration. The survey was conducted from August to October and provided valuable information on the distribution of halibut (Figure 10). Data during the autumn have not been available since 1969, and the extent of the NMFS survey was far greater than others at this time of the year. The halibut caught at stations in Bristol Bay were primarily juveniles and were comparable in size to those collected by IPHC in June. Halibut caught at the northern and western stations generally were larger than those taken in Bristol Bay.

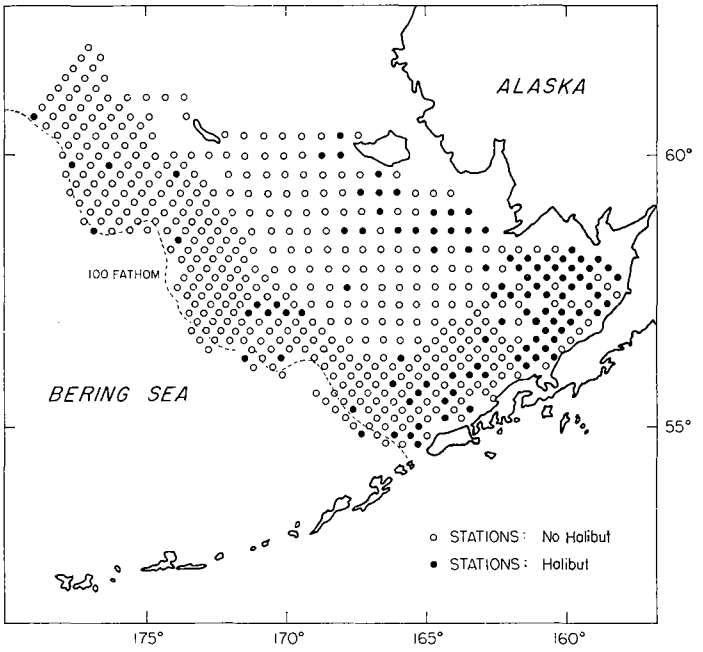


Figure 10. Distribution of halibut in NMFS trawl survey, August-October 1975.

TAGGING

In 1975, 233 tags were returned to IPHC, five of which were recovered by fishermen in 1974. In addition, one tag was recovered that had been released by the Fisheries Agency of Japan. The 228 recaptures in 1975 were substantially more than the 190 in 1974 and the increase occurred in both regulatory areas: from 169 to 199 in Area 2 and from 21 to 29 in Area 3. An increase in fishing effort accounts for some, but not all, of the greater number of recoveries. The rise in effort was particularly sharp in Hecate Strait and Cape Spencer-St. Elias, areas where a relatively large number of halibut have been tagged in recent years. Other factors, such as the earlier opening in 1975, also could have affected the number of recoveries and further study is required to interpret the increase. Twelve premium tags worth $100.00 each were returned in 1975. This is the largest number of premium tags received in one year since the premium tag program was started in 1966.

Between 1961 and 1971, over 10,000 juvenile halibut (less than 65 cm) were tagged in the Bering Sea. To date, 104 tags have been returned, of which 101 were from the Bering Sea, including 74 by the Japanese trawl fleet, 26 by Commission

research trawlers, and 1 by a U.S. king crab vessel. Three tags were recovered outside the Bering Sea by the North American setline fleet; one each from Shelikof Strait, Yakutat, and Icy Strait. A low recovery rate by the North American setline fleet was expected because tagged juveniles are exposed to several years of natural mortality and incidental capture by trawl fisheries before reaching a size large enough to be harvested by the setline fleet.

During the 1975 juvenile halibut survey, 1,956 small halibut were tagged in the vicinity of Cape Fairweather. This experiment will provide information on the recruitment of young fish to the commercial stock. An additional 323 tagged halibut were released from the Soviet research trawler *Rakitniy* during the cooperative U.S.S.R.-IPHC research cruise in the western Bering Sea. This experiment will provide information on the relationship of these fish with those elsewhere in the Bering Sea and in the Gulf of Alaska.

BIOSTATISTICS

Catch Sampling

During the 1975 fishing season, port samplers were stationed at Seattle, Vancouver, Prince Rupert, Petersburg, Sitka, Seward, and Kodiak. Landings were sampled to obtain data on age and size composition, and catch and effort data were recorded from the vessel log books. Port samplers also obtained details of halibut purchases by fish processors, relayed the data to IPHC headquarters, and informed the fishermen about the status of landings in the regulatory areas.

Port samplers systematically sample every third landing over 5,000 pounds and every tenth landing between 1,000 and 5,000 pounds. The samples consist of otoliths from all fish in systematically selected slings, every second or third sling, depending on the size of the catch. The otoliths are measured and an otolith length-fish length relationship is used to estimate the length of each fish in the sample. The length samples are then combined by month and section of the coast. Subsamples of otoliths are randomly selected from the monthly samples to determine the age structure for each coastal section.

Catches from 517 commercial landings were sampled in 1975. Over 47,000 otoliths were used for length and age determination. Of these, nearly 3,600 were from landings by trollers. IPHC also measured 6,600 halibut and collected 1,200 otoliths on its chartered vessels, *Tordenskjold* and *Seymour*. In addition, observers on Japanese and Soviet vessels measured 900 halibut.

Catch and Effort Statistics

Daily catch and effort data are collected from fishermen's log books to calculate CPUE which is summarized by fleet, month, and area. Landings are obtained from fish processors and other fishery agencies and are summarized by ports. These two data sets then are merged, and catch, effort, and CPUE are tabulated for each statistical area by month. Only data from vessels using conventional (fixed-hook) longline gear are used to calculate CPUE. The standard measure of effort is 100 hooks of 18-foot gear. Historically, fixed-hook gear accounted for most of the catch, but in recent years, the number of vessels using snap-on, troll, and jig (handline) gear has increased, but data from these vessels has not been used to calculate CPUE because their units of effort are too variable and cannot be readily standardized. Also, many of the boats not using fixed-hook gear are below 5 net tons and are not required to have an IPHC license or to maintain log books. In 1975, CPUE

was based on data representing 42% of the total landed catch (30% in Area 2 and 52% in Area 3). Although the log data are adequate to estimate CPUE, they can be improved by increasing the collection of logs from vessels using fixed-hook gear and by developing a method of standardizing snap-on gear.

The catch by vessel category shows that licensed vessels produced 78% of the total catch (Table 6). In Area 2, their share was 67% and in Areas 3 and 4 was 89%. Most of the Area 2 catch by unlicensed vessels was taken by setliners (74%), and the remainder was taken by trollers (26%). Nearly all of the Area 3 catch by unlicensed vessels was taken by setliners. For the entire coast, trollers accounted for 64% of the vessels that landed halibut but only 4% of the total catch. Most of the troll-caught halibut are taken in Area 2, largely as an incidental catch.

Table 6 also shows that large vessels have a higher catch per trip than small vessels which generally fish less gear per day and make shorter trips.

Table 6. Comparison of catch per trip by licensed and unlicensed vessels, 1975.

Vessel Category	Number of Vessels	Number of Trips	Catch in Thousands of Pounds	
			Total	Per Trip
Unlicensed Vessels				
Trollers	2,435	7,664	1,071	0.1
Setliners	865	3,705	4,576	1.2
Other*	—	—	311	—
Licensed Vessels				
5-19 Tons**	341	1,648	6,179	3.7
20-39 Tons	116	510	9,285	18.2
40-59 Tons	21	78	2,965	38.0
60+ Tons	19	60	3,229	53.8
Total	3,797	13,665	27,616	

* Includes miscellaneous vessels such as handliners and deliveries of unknown origin.

** Includes small vessels of unknown tonnage.

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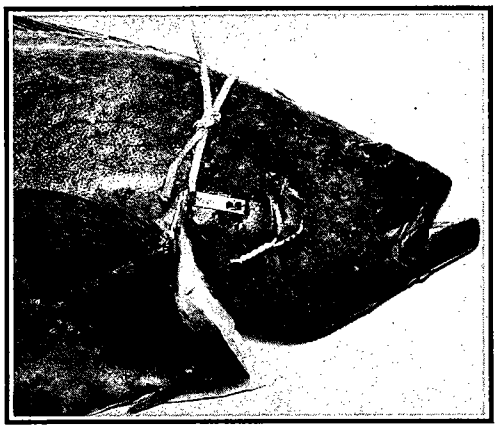
TAGGED HALIBUT

The INTERNATIONAL PACIFIC HALIBUT COMMISSION tags halibut with plastic tags and metal strap tags attached to the cheek on the dark side of the fish. Some fish have two tags. Retain all tagged halibut regardless of size or gear used.



REWARD

$2.00 WILL BE PAID FOR THE RETURN OF THE TAGS AND RECOVERY INFORMATION FROM EACH FISH. $100.00 WILL BE PAID FOR SPECIAL PRESELECTED TAGS.

WHEN YOU CATCH A TAGGED HALIBUT:

1. Record Tag Numbers, Date, Location and Depth in your log book.
2. Leave Tags on the fish.
3. Mark the fish with a gangion.

WHEN YOU LAND A TAGGED HALIBUT:

1. Report fish to a Commission Representative or Government Officer

   or

2. Forward tags to address below and enclose recovery information (see above), your name, address, boat name, gear, overall length of fish and, if possible, earstones from the fish.

FINDER WILL BE ADVISED OF MIGRATION AND GROWTH OF THE FISH.

International Pacific Halibut Commission
P.O. Box 5009
University Station
Seattle, Washington 98105

Tag Reward Poster.