INTERNATIONAL PACIFIC HALIBUT COMMISSION

Annual Report
1995

Established by a Convention between
Canada and the United States of America

Produced jointly by the IPHC staff
and
Krys Holmes, Winterholm Press
1996

On the Cover: (Left to right) - Port sampler, Linda Gibbs takes an otolith: The sign which is posted on all IPHC charters to make us more recognizable: Bringing halibut aboard during an IPHC survey charter on the F/V Lualda.

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 the joint management of a marine resource. The Commission's authority was expanded by several subsequent conventions, the most recent being signed in 1953 and amended by the protocol of 1979.

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

The Commission meets annually to review all regulatory proposals, including those made by the scientific staff, the Conference Board (which represents vessel owners and fishermen), and the processors. The measures recommended by the Commission are submitted to the two governments for approval. Upon approval the regulations are enforced by the appropriate agencies of both governments.

The International Pacific Halibut Commission publishes three serial publications: Annual Reports (U.S. ISSN 0074-7238), Scientific Reports-formerly known as Reports- (U.S. ISSN 0074-7246) and Technical Reports (U.S. ISSN 0579-3920). Until 1969, only the Report series was published; the numbers of that series have been continued with the Scientific Reports.

Unless otherwise indicated, all weights in this report are dressed weight (eviscerated, head-off). Round (live) weight may be calculated by dividing the dressed weight by 0.75.

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http:\www.iphc.washington.edu

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ROCKING THE CRADLE OF THE DEEP

There are more fishes in the sea than any other vertebrates on earth -- more than thirty thousand species -- ranging in size from the minuscule Philippine goby, which grows to one third of an inch, to the oceanic sunfish, which has weighed in at just under 5,000 pounds. Within this plethora of piscine bounty, the Pacific halibut (*Hippoglossus stenolepis*) is perhaps one of the most treasured. On the West Coast of North America, the Pacific halibut resource has supported a commercial fishery for more than a hundred years.

Here on the eastern wash of the great Pacific, between Monterey Bay in central California and St. Lawrence Island in the Bering Sea, Pacific halibut live their mysterious lives and haunt the bottoms of the world while we, on the top side of the great meniscus of the sea, hunt and harvest them, study their habits and habitats, and do our best to keep their communities healthy. The meeting ground between halibut and human is the International Pacific Halibut Commission, a six-member board that gathers each year to set catch limits, write fishing regulations, oversee biological research and design programs and policies to protect the resource and further the fisheries.

In January 1995 the Commission held its 71st annual meeting in Victoria, British Columbia, chaired by Dr. Richard Beamish of Canada. The Commissioners, IPHC staff and throngs of harvesters, processors, biologists and fishery managers worked through a number of issues that are challenging the halibut community in these interesting years. Bycatch conflicts between gear groups, between fisheries and even between the two countries, continue to ignite problems on the grounds and in management forums. The new Alaska individual fishing program settled into place this year, joining the Canadian IVQ program with extended seasons and presenting a few challenges of its own including the reduction of waste, quieting the chaos of derby openings, and garnering higher prices for both fishermen and processors.

Coastwide, the halibut population continues its rhythmic decline, though a new method of estimating overall biomass hints that the resource may

be slightly more abundant than we previously assumed. The combined fisheries landed 43.8 million pounds of halibut in 1995, the lowest harvest in 11 years. Though the resource may decline, our dependence on it does not, and the ever-entwining use conflicts, economic pressures and subtleties of science lead us further down the fascinating path of good stewardship.

SLICING THE PISCINE PIE

The first order of business each year is to set harvest limits for each regulatory area. The catch limit in each area is then divided up among the various fisheries and user groups -- commercial, recreational, ceremonial and personal. This year, U.S. and Canadian Commissioners disagreed about how the resource in Area 2 should be compensated for bycatch removals, and as a result they went home without agreeing upon catch limits for Areas 2A, 2B and 2C. The two individual governments unilaterally set their own Area 2 limits, the U.S. for waters off the U.S. West Coast and Southeast Alaska, and Canada for waters off British Columbia. The catch limits were as recommended by the staff biologists:

	Poundage
Area 2A	520,000
Area 2B	9,520,000
Area 2C	9,000,000

The Commission approved catch limits for the remaining areas as follows:

	Poundage
Area 3A	20,000,000
Area 3B	3,700,000
Area 4A	1,950,000
Area 4B	2,310,000
Area 4C	770,000
Area 4D	770,000
Area 4E	120,000

The Commission also writes the halibut harvester's calendar, and in Area 2A this meant commercial fishing was restricted to four 10-hour fishing periods on July 5, July 18, August 1, and August 15. The Commission also made room for the important Treaty Indian fisheries of Area 2A. From British Columbia north to the Bering Sea, the commercial season began on March 15 and ended on November 15.

GOVERNING THE GROUNDS

The Commission approved the following regulations, some of them new and some carryovers from previous years:

1) The Area 2A catch sharing plan, which divides use of the available halibut among commercial, recreational and Treaty Indian fisheries, will continue to be implemented under National Marine Fisheries Service (NMFS) regulation.

2) This year the Pacific Fishery Management Council (PFMC) recommended a pair of new licensing procedures for Area 2A specifying that a vessel may be licensed for only one of three fisheries: commercial, sport charter, or incidental salmon troll. They also required that all commercial license applications be postmarked by April 30 in order for a license to be issued. The Commission adopted both of these recommendations.

3) The Commission modified vessel clearance requirements for Area 4C and 4D so that when a commercial halibut vessel leaves either area, it must clear at either St. George or St. Paul Island. Clearance may be made by VHF radio provided that visual identification of the vessel can be confirmed from shore. The same procedural requirements will apply to vessels fishing in Area 4B that clear in and out of Nazan Bay.

4) Another new regulation required that all commercially harvested halibut be dressed, with gills and viscera removed, prior to being offloaded from the catcher vessel.

5) Automated hook strippers, also known as crucifiers, were legalized aboard commercial vessels in all waters provided that all non-retained halibut are released using one of the careful release methods. Crucifiers previously were banned for halibut vessels but allowed in the sablefish fishery; this change brings regulations for both fisheries under the same umbrella. Under the new fishing quota program, many vessels harvest both species on the same trip and the slower pace of the fisheries does allow fishermen to release non-retained halibut more carefully.

6) The Commission abolished Area 4D-N, a sub-area created in 1993 to allow exploratory fishing around St. Lawrence Island in the Bering Sea.

7) A new ruling allows salmon trollers to retain limited amounts of incidentally caught halibut in Area 2A.

THE DOLLAR DANCE

For the two nations on either side of the Halibut Convention, budgets are slimming down while the need for solid research just grows more ardent.

Each of the two countries contributed $800,000 to fund the Commission this year. Adding a variety of other funds, the total IPHC budget came to $2,550,000.

The additional funds come from a variety of sources. There were $82,000 in allocative funds left over from fiscal year 1994; a surplus of fish funds brought that total to $442,000. The IPHC also earned $258,000 on research surveys. The Commission received $125,000 from the NMFS Alaska Region and $30,000 from the Halibut Advisory Board for sampling purposes. The remainder was composed of other carryover items.

This year, the U.S. contributed 62 percent of the total IPHC budget, including outside research funds, and Canada 38 percent. At this year's annual meeting, the commissioners created a Finance and Administration committee to address the budgetary challenges we will face in the coming years, and to re-evaluate the role the Commission is obligated to play in upholding the treaty between the U.S. and Canada.

Some of the research projects that were funded this year were:

1. Studying alternative stock assessment methods ($7,000)
2. Data collection aboard NMFS trawl surveys ($15,000)
3. Habitat evaluation ($30,000)
4. Sport fish tagging project ($3,000)
5. Canadian sport fish statistics project (Canadian $5,000)

HOT TOPICS FOR 1995:

1) Bycatch problems suggest many solutions; few seem immediately implementable.

2) Should some areas be compensated for bycatch losses that occur in other areas?

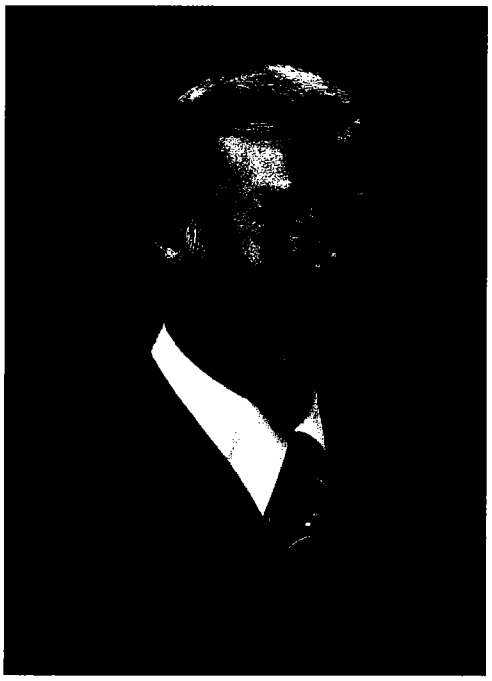
3) The controversial IFQ program began off Alaska this year.

BATTLE OF THE BYCATCH BULGE

In May of this year, the Commission held a special session to specifically address bycatch problems. While Canadian reduction of bycatch is clearly underway, the U.S. is having problems making any significant progress in reducing its bycatch. The two countries invited the public to participate and discussed progress thus far as well as plans for the future; see the section entitled, "Untangling the web of wonder: Bycatch problems continue".

DIRECTOR'S REPORT

The commercial fishery for the Pacific halibut fishery began 108 years ago. The stock at the present time is yielding a catch higher than the average during the history of the fishery. At a time when so many fish stocks have collapsed, why does the halibut fishery continue? This is not easy to answer because there are many aspects to maintaining a successful fishery. We do know however that to manage any fishery successfully, four requirements are necessary: (1) All removals of fish from the stock must be accounted for; (2) Good science must produce a measure of abundance that is directly proportional to actual stock abundance; (3) A sound management strategy that imposes on the fishery an exploitation rate that produces high yields with low risk of overfishing; and (4) Political and social pressure to increase catches beyond those justified by good science must be disregarded.

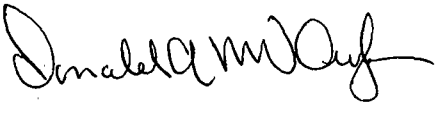


Over the history of the halibut fishery these four requirements have been maintained to varying degrees . During the early 1960s the Commission did not have a good measure of the bycatch of halibut by foreign fleets and this contributed to the decline in the stock to the low of the mid 1970s. During the first 40 years of the commission's existence the science of stock assessment was not well developed , but as new techniques were invented they were adopted and modified by the Commission staff to meet the needs of halibut.management. At the present time the staff uses the most modern population dynamics methods available to arrive at catch limits. We are in the process of making further improvements to the method by incorporating more biological information, such as changes in growth and selectivity and the results of our stock assessment surveys. The present science is "state of the art."

The staff is exploring the consequences of various harvesting strategies in order to determine the optimum exploitation rate. The fundamental strategy has been to maintain the breeding stock near but always above the level that produces the maximum number of recruits. Keeping the spawning stock at high levels makes full use of favorable environmental conditions which occur periodically. This strategy produced the record stock sizes and harvest levels during the 1980s.

Avoiding political interference with the conservation of the stocks has been relatively easy because of the international nature of the fishery. That is not to say however, that various user groups have not tried to influence Commission decisions and that individual commissioners have not tried to bring their political agenda to bear. In my tenure, however, the commission decisions have been primarily based on the conservation recommendations of the staff.. It is most important therefore, for the staff to provide the best possible conservation recommendations..

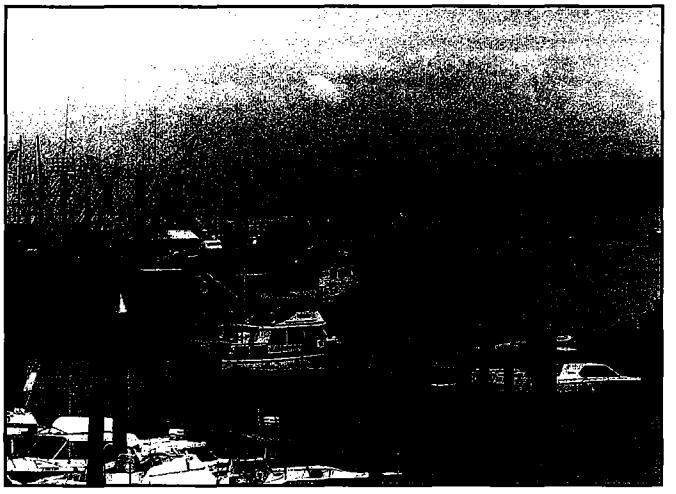
Fisheries managers the world over view Pacific halibut management as a long term experiment in resource conservation. The commission has so far demonstrated that a fish stock can be harvested in a sustainable manner, and providing that the conditions which contributed to the historical success of this fishery are maintained ,there is every reason to believe that Pacific halibut stocks will be sustained for another 108 years.



Donald A. McCaughran
Director

FAITH ALONG THE FATHOMLINE: THE 1995 COMMERCIAL FISHERY

The continental shelf spreads like an open palm on the armrest of North America. Its wrinkled regions hold treasures incalculable, fed by the minerals and nutrients delivered on upwelling currents from the ocean floor. Between the Monterey Canyon and the deepwater tendons of St. Lawrence Island, untold billions of marine creatures live out their cycle of survival and surrender. Of the billions of pounds of biota in the sea, perhaps the Pacific halibut is among the most treasured. Halibut take years to mature and, as everyone knows, can grow to behemoth proportions. Even one individual fish can make a terrific contribution to the resource, to a vessel's earnings, and to a family's freezer.



The commercial halibut fishery of the North Pacific is more than a century old, born on the decks of sailing ships that deployed two-man dories into the pitching sea to fish by handlines. Then came the wooden schooners of the 1920s, the duchesses of deepwater fishing. But all the boats that fish for halibut -- the small multi-purpose boats that also serve as salmon trollers or tourist carriers; the cherried-out schooners that cruise the Bering Sea -- are variations on a theme begun centuries ago when Pacific Coast Natives first launched their handmade barques through the foam in search of dinner from the deep.

CARTOGRAPHY OF THE INCALCULABLE

The IPHC maps out the region of the Pacific halibut in ten regulatory areas (see Figure 1). Each area is allocated its own halibut catch and, in many cases, is assigned its own fishing season and regulations. The ten regulatory areas have remained the same for a number of years, with one exception: Area 4D-N, created a few years ago to encourage experimental fisheries in the northern portion of Area 4D, was discontinued in 1995 and Area 4D was managed as a whole again.

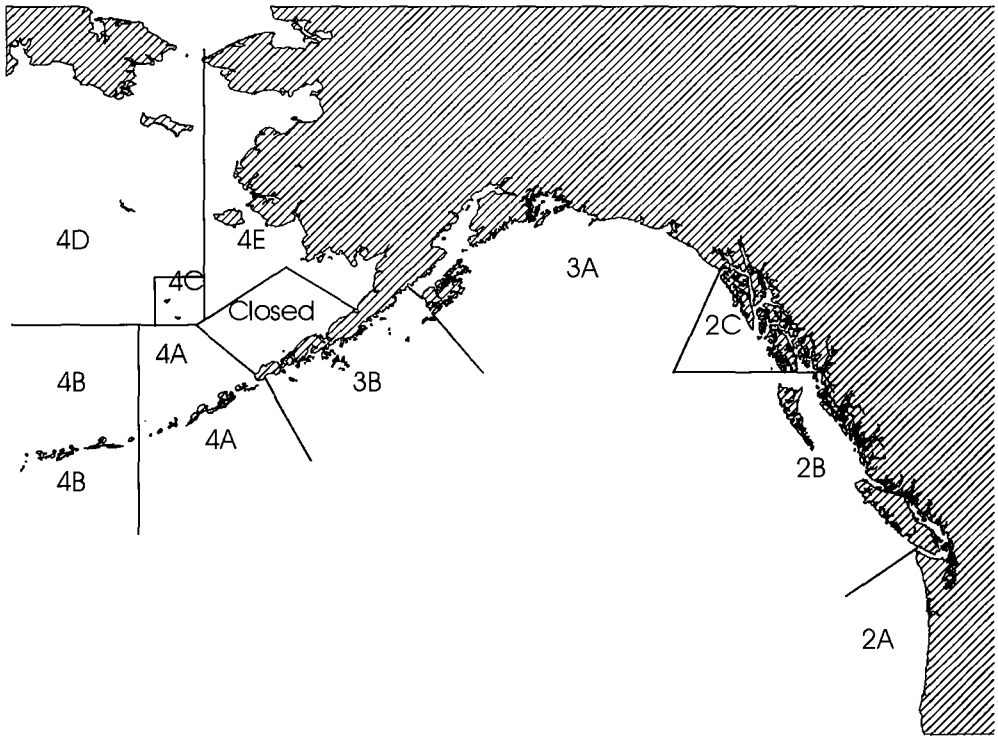


Figure 1. IPHC regulatory areas in 1995.

The Southeastern flats of the Bering Sea region excluding Bristol Bay remained closed in 1995 to all halibut fishing, as it has for several years. The regulatory areas for the 1995 halibut fishery are:

Area 2A -	all waters off the coast of the states of California, Oregon, and Washington.
Area 2B -	all waters off the coast of British Columbia.
Area 2C -	all waters off the coast of Alaska, south and east of Cape Spencer.
Area 3A -	all waters between Cape Spencer and Cape Trinity, Kodiak Island.
Area 3B -	all waters between Cape Trinity and a line extending southeast from Cape Lutke, Unimak Island.
Area 4A -	all waters west of Area 3B and the Bering Sea closed area that are south of 56°20'N and east of 172°00'W.
Area 4B -	all waters in the Gulf of Alaska and the Bering Sea west of Area 4A and south of 56°20'N.
Area 4C -	all waters in the Bering Sea north of Area 4A and the closed area that are east of longitude 171°00'W., south of latitude 58°00'N., and west of longitude 168°00'W.
Area 4D -	all waters in the Bering Sea north of Areas 4A and 4B, north and west of Area 4C, and west of longitude 168°00'W.
Area 4E -	all waters in the Bering Sea north and east of the closed area, east of Areas 4C and 4D, and south of 65°34'N.

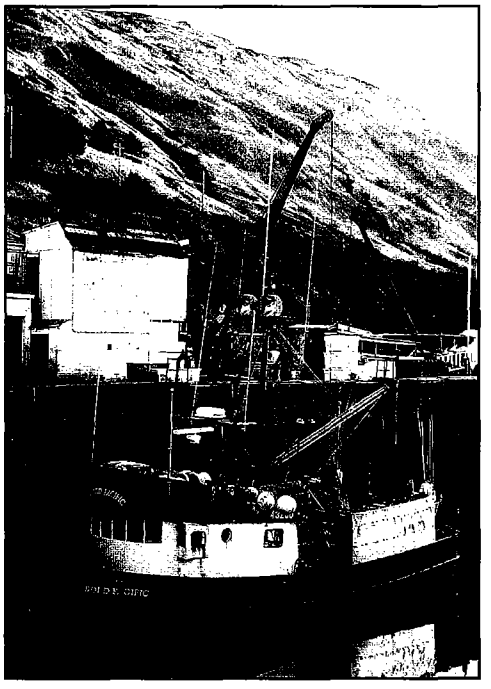
DINING AT THE HALIBUT CAFE

In 1995, harvesters landed 43,882,000 pounds of Pacific halibut, the smallest harvest of the past five years.

In 1995, harvesters landed approximately 43,882,000 pounds of Pacific halibut from the waters of the northeastern Pacific. This year's harvest was the smallest in several years; indeed, not since 1984 has the commercial halibut catch been below 45 million pounds coastwide. Generally, the decrease in poundage is a manifestation of several things including a diminishing halibut biomass and the presence of smaller individuals emerging in the younger year-classes.

Appendix I-Table 1 shows commercial halibut catches by regulatory area over the past five years, 1991 through 1995. Only in Area 4E, where harvests were smallest, was there any increase in poundage caught this year.

A summary of the 1995 catch and seasons by regulatory area appear in Appendix I-Table 2. The IPHC research catch usually is included in the commercial catch, but this year the research catch has been separated to allow a clean comparison between the catch and catch limits in the quota fisheries. However, use the total catch figure to draw comparisons between years. (Appendix I-Tables 3 and 4 offer various breakdowns of catch by port and vessel class).



AREA 2A

Area 2A is managed under a catch sharing plan to provide for a complex community of users. The total allowable take in the area was set at 520,000 pounds, with 230,880 pounds of that assigned to the sport fishery. The treaty Indian fisheries off the Pacific coast harvested 11,000 pounds of halibut for subsistence and ceremonial use. The total commercial catch limit of 289,120 pounds included 171,000 pounds of commercial halibut from the treaty Indian fisheries, 91,052 pounds allocated to the directed commercial fishery, and 16,068 pounds allotted for incidental catch by salmon trollers.

The IPHC issued 125 licenses to the troll fleet for incidental catches of halibut during the May and June salmon troll fishery, and harvests were allowed only in the area south of Westport, Washington. Regulations allowed only one halibut per twenty chinook harvested, but the twenty salmon had to

be on board before one halibut could be kept. Though the PFMC set the limit at 16,068 pounds, trollers caught only 2,000 pounds; the remaining 14,068 pounds were rolled into the directed commercial fishery when chinook trolling ended in June.

This year the directed commercial fishery was restricted to waters south of Point Chehalis, Washington (46°53'18" N latitude). Openings were scheduled in a series of seven 10-hour fishing periods, each with fishing period limits (see Appendix II-Table 1). Though 352 vessels received licenses for this fishery, far fewer showed up on the grounds. Conflicts with sablefish openings, meetings between fishermen and processors to sort out salmon prices, and bad weather in at least one case, kept some of the grounds nearly empty during a few of the fishing periods. A few additional openings were added after August 15, and when the fishery closed September 26, the allowable catch of 105,000 pounds had been taken.

THE TREATY INDIAN FISHERIES

This year, the 176,000 treaty Indian catch within Area 2A exceeded their allotment by 5,000 pounds. Their halibut season consisted of three unrestricted longline fisheries: March 16 for 24 hours, March 24 for 48 hours, March 29 for 24 hours; and one restricted fishery with a 3,000 pound trip limit on April 21 to 24. The treaty catch also included halibut harvested incidentally by sablefish and salmon troll vessels. The incidental sablefish fishery had a 500 pound limit; some tribes reduced this limit in May to five halibut per delivery. The treaty Indian fishery closed for the year on June 12.

THE ANNETTE ISLAND RESERVE FISHERY

Up in Area 2C, the Metlakatla Indian Community conducts a small commercial halibut fishery within the Annette Island Reserve in Southeast Alaska. This year their small fleet of 24 vessels fished thirteen 48-hour fishing periods between May 26 and October 8 (Appendix II-Table 2). They harvested 51,849 pounds, which is included in the Area 2C catch.

As in the Canadian program, the IFQ system allotted qualifying quota holders a predetermined share of the total catch in each regulatory area. The IPHC set the catch limits by regulatory area, and opened the harvesting season in the entire region between March 15 and November 15.

One advantage of the quota program is that it allows halibut landings to be spread out through more than half of the year. In 1994, Areas 2C and 3A were open for three days; in 1995 there were 245 fishing days. The U.S. fishery got off to a slower start compared to the Canadian IVQ fishery. In the Alaskan fishery only 7 percent of the catch was landed in the first month and a half (Appendix I-Table 5). In those early weeks of the season, harvesters stayed away from halibut because of winter weather, and also because sablefish prices were much higher than halibut prices. Most of those vessels that held quota shares for both halibut and sablefish targeted sablefish early in the year. September was the busiest halibut month in Alaska; in comparison, Canada's highest landings came in April, though March was busier on a daily basis.

In 1994, Areas 2C and 3A were open for three days; in 1995 there were 245 fishing days.

More Pacific halibut is landed in Kodiak, Alaska than anywhere else on earth. In 1995, 18 percent of the U.S./Canadian catch combined was landed on this emerald island in the Gulf of Alaska. Homer is the second leading port with 8 percent of the catch landed there in 1995. These two ports have been the leading halibut processing centers since 1986, and they remained so under the IFQ program. In this first year of the IFQ fishery, offloads to tenders were only allowed if they became registered buyers, which meant they had to be able to transmit landing weight information to NMFS within six hours of a catcher vessel's delivery. This requirement had an effect on the landing patterns. Also, a preliminary analysis shows a change in some vessel's fishing locations, and it appears that vessels are fishing closer to regulatory area boundaries. King Cove for example, where, historically, tenders congregate and vessels fished outside of, processed less fish this year than before the IFQ program.

POSTCARDS FROM THE CONTINENTAL SHELF: THE 1995 SPORT FISHERY

The sea is the primordial soup kitchen, the place, as Rachel Carson wrote, of our dim ancestral beginnings. *In the recurrent rhythms of tides and surf and in the varied life of the tide lines there is the obvious attraction of movement and change and beauty,* begins Carson's At the Sea's Edge. *There is also, I am convinced, a deeper fascination born of inner meaning and significance.*

Every year thousands of anglers let their deeper fascination drive them to the sea to engage in that rich conversation between worlds that we call sport fishing. To the angler, flat-bottomed halibut are neither as flashy nor as acrobatic as salmon, but they still count as a trophy fish. A couple hundred pounds of halibut seeking return to its seafloor home is more of an endurance test than a spectacle, and there is some doubt about the wisdom of bringing aboard a shipmate that could break your femur with one swipe of its caudal peduncle. But fresh halibut meat tastes as sweet as it comes, and there is some charm to the cockeyed creature, if only in its ability to change its mottled skin tone to match its surroundings: its skin can become a kind of postcard from the seabottom.

The coastwide sport fishery harvest for 1994, estimated at 7,382,000 pounds, is the second highest on record, slightly below the peak of 8,051,000 pounds in 1993.

Sport fishermen landed a record catch of these piscine postcards in 1993-8,051,000 pounds. The recreational catch dipped only slightly in 1994, to 7,382,000 pounds, the second highest catch on record. Appendix III-Table 1 shows the estimated sport harvests in each regulatory area from 1990 to 1994. The 1995 figures are available only for Area 2A (Appendix III-Table 2). A commitment to inseason quota management requires herculean efforts to collect and process data. Data from creel census and postal surveys are not available until the following year, and take time to analyze. In Canada, the mechanisms for collecting sport harvest data are limited, catch estimates derive from historical data.

The rules of the road for sport harvests of halibut in British Columbia and Alaska remained the same in 1995 as they were the previous year. In all areas, an IPHC license was required for sport charter boats that intended to pursue halibut.

SWELLING CATCHES, SHRINKING FISH IN 2A

The region along the U.S. Pacific coast is the only halibut area in which anglers' unbounded enthusiasm meets a catch limit. The catch sharing plan in Area 2A divides the total allowable catch among sport, Treaty Indian and commercial landings; the sport catch is distributed among several sub-areas where seasons are managed by catch limits.

This year, the Commission added a new sub-area in the Columbia River region, bounded in the north by Leadbetter Point in Washington, and in the south by Cape Falcon on the coast of Oregon. The Oregon coast fishery was split into two components; the central coast (Cape Falcon to the Siuslaw River) and the southern coast (Siuslaw River to the California border). The Washington south coast sub-area southwest of the Queets River was closed to fishing to extend the season elsewhere.

Anglers caught about 5,300 pounds more than their limit of 230,880 pounds. Most of the overharvest occurred in the Washington inside waters fishery (Puget Sound and Strait of Juan de Fuca), where anglers enjoyed unusually good early-season fishing and brought the catch about 4,000 pounds above the limit. Halibut are getting smaller here; the average weight dropped from 23.0 pounds in 1993 to 20.4 pounds in 1995. The second area where overharvests took managers by surprise was in the all-depth fishery along the Oregon coast, which was only open August 3 and 4, and where daily catch rates broke all records both days.

The Washington north coast fishery closed about 2,000 pounds short of the 71,410-pound quota. Here the average weight of halibut is shrinking considerably having gone from 23.1 pounds in 1994 to 17.3 pounds in 1995. The Washington south coast fishery, centered principally out of Westport, was only about 400 pounds over quota. The average weight of halibut here fell to 18.9 pounds, from 21.7 pounds in 1994. In the newly created Columbia River area the charter fleet harvested only about 30 percent of its quota and the fish averaged 24.6 pounds.

The Washington north coast fishery closed about 2,000 pounds short of the 71,410-pound quota. Here the average weight of halibut is shrinking considerably - from 23.1 pounds in 1994 to 17.3 pounds in 1995.

The early season opening along the Oregon central coast bounced nearly 13 percent over the quota. Boats in the restricted 30-fathom fishery also caught more than their limit, illustrating the difficulty of predicting precisely when the quota will be taken. The Oregon south coast early season fishery landed about 10 percent less than its quota, and only 12 pounds were taken in the restricted 30-fathom fishery. The overharvests in the Oregon central coast fishery were deducted from the August Oregon coast limit, reducing that opening to only two days. Even so, the record high daily landings there popped the catch over the limit. In this area, average fish weights ranged from 19.4 pounds in the August Oregon coast fishery to 21.3 pounds in the Oregon south coast early season fishery; these weights are comparable to average weights from previous years.

A RICH CATCH IN BRITISH COLUMBIA

More and more Canadian sport fishermen are catching the halibut fever. While we think actual effort on the grounds maybe intensifying, budget problems in the management agency continue to hamper our ability to assess the take. The Department of Fisheries and Oceans has been unable to find funds for expanding, or in some cases even maintaining, the creel surveys by which they assess sport catch. In the meantime, we estimate sport catches using average catch data logged by the DFO Tidal Diary Program that was in place from 1987 through 1992. We then multiply the average weight from creel surveys to the DFO's catch information to estimate total sport catch. For northern British Columbia we use the average halibut weight from the Ketchikan area; average weights from the Neah Bay sampling program, conducted by the Washington Department of Fish & Wildlife, provide estimates for southern British Columbia.

Canada's sport catch is beefed up by U.S. fishermen who slip across the invisible border to catch halibut off Swiftsure Bank. This year U.S. fishermen caught 7,582 halibut in Canadian waters and landed them in Neah Bay, British Columbia. At an average of 17.3 pounds apiece, that makes about 131,238 pounds; over 25 percent more than U.S. fishermen caught here in 1994.

If estimates are correct, U.S. fishermen caught 131,238 pounds of Canadian halibut in 1995, a 25 percent increase from 1994.

NO DISAPPOINTMENTS AT HALIBUT HEADQUARTERS

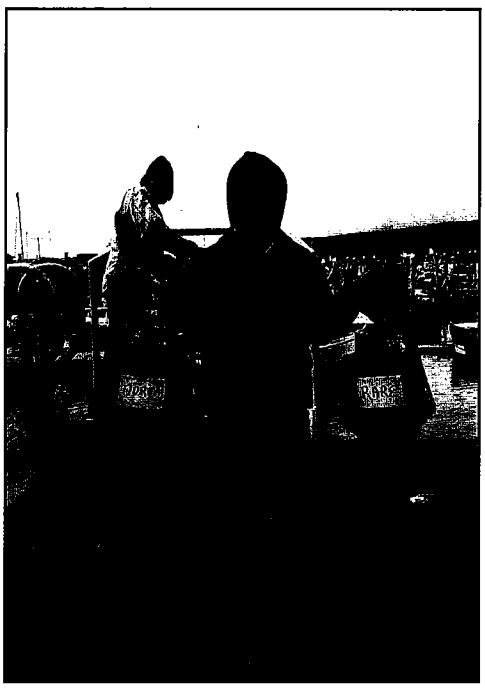
Sport anglers in Southeast Alaska landed a record catch of 88,740 halibut in 1994, nearly 10 percent more fish than in 1993, even though fewer fishermen went out than in previous years. The average weight of halibut here ranged from 34.4 pounds around Sitka to 15.3 pounds around Juneau. Creel surveys reveal that Juneau and Sitka anglers these days have to travel further from normal fishing grounds to find the high halibut catch rates they are accustomed to. Discouraged by the time and distance it now takes to reach the more productive grounds, far fewer fishermen pursued halibut than did between 1989 and 1993.

The average weight of Southeast halibut ranged from 34.4 pounds around Sitka to 15.3 pounds around Juneau.

For sport fishermen, the Gulf of Alaska and Prince William Sound are halibut headquarters. From late May to early September, these waters in the crook of Alaska's arm give forth thousands of game fish to the bobbing charter boats that swarm from their slips as often as weather allows. From the flat, rushing tides of Cook Inlet out to the Gulf's more challenging chop, these waters of the northern Gulf where the Aleutian Trench dives off the continental shelf toward Kamchatka are the most productive Pacific halibut grounds in the world.

Recreational harvests here have bounced up an ascending slope for the past 15 years, leaping up one year and then holding steady for a couple of years before leaping again. At the same time the average weight of fish generally has been dropping. The 1993 sport harvest was 35 percent higher than in 1992, and the average weight ranged between 15 and 25 pounds. In 1994, the sport harvests dropped about 15 percent to 4,487,000 pounds in all of Area 3. This decline may reflect further drop in the average fish size, rather than any decrease in fishing effort.

The mean weight of halibut in the central Cook Inlet area (which includes the popular and productive Deep Creek fishing grounds) was 13.3 pounds in 1994, sharply lower than our estimates in 1992 and 1993. ADF&G also did not have the funding to conduct its usual sampling in the central Cook Inlet area for those two years, so we estimated average weight using information from adjacent areas. During that period the 1988 and 1987 year classes (ages 6 and 7) were probably just beginning to appear in the fishery and had the Deep Creek area been sampled, a smoother decline in average weight may have appeared. This year, those strong year-classes of fairly small fish dominated catches from the central Inlet. At the same time, the mean weight for halibut in the lower Cook Inlet dropped from 25 to 21 pounds-also, most likely, the result of an influx of younger fish. These changes in the average weight of halibut in the central and lower Cook Inlet made a big difference in catch estimates, because these areas accounted for 72 percent of the number of fish harvested in 1994.



Changes in the average weight of halibut in the central and lower Cook Inlet make a big difference in catch estimates, because 72 percent of the area's sport catch are harvested here.

Make of it what you will: according to Alaska Department of Fish and Game studies, private anglers caught smaller halibut in 1994 than charter-boat anglers did. But for Area 3A in general, excluding the Cook Inlet, the average weight of halibut hovered about the same as in 1993, ranging from 20 to 25 pounds.

Out in the Bering Sea and Aleutian Islands, where people are few and far between, good data to support harvest estimates has been hard to come by. Historically, we have based all our estimates on a postal survey which contacts few anglers in that area. Catch, size and weight information was provided by the U.S. Navy, which operated a recreational camp on Adak Island for many years. Now that the Navy has ended that program our data is even more lean, so the erratic pattern of our harvest estimates, probably are not telling the whole story. The 1994 catch data showed that the average weight of halibut was 20.3 pounds.

According to an Alaska Department of Fish and Game study, private anglers caught smaller halibut in 1994 than charter-boat anglers did.

PLYING THE PRODIGAL SEA: WASTE AND PERSONAL USE

WASTE IN THE COMMERCIAL FISHERY

"To say that holiness is a fish is a statement of the abundance of grace," wrote Annie Dillard. "It is the equivalent of affirming in a purely materialistic culture that money does indeed grow on trees." Fish grow free, out of the bounty of nature, and become at times a prodigal fortune lavished on a world in which extravagance is a survival mechanism. Nature allocates its means constantly — only a small fraction of eggs of any species are born to survive to reproductive age.

It is a fact of living that human beings do not use everything we take. In the halibut fisheries, waste is caused by lost or abandoned gear or by mortalities of sublegal halibut that are thrown back over the side. While we can work to reduce the amount of waste in the halibut fisheries, we must estimate the waste that does occur and add it to our account of the total removals from the halibut population.

Delinquent gear decreases

Each year we try to assess the amount of delinquent gear that is lost or abandoned on the halibut grounds and estimate how much fish was killed and not retrieved by these lost skates. We conduct logbook interviews and mail out fishing logs to gather the basic information. Even though gear types vary considerably as to length of skates, hook size, and hook spacing, the data must be standardized to be effectively collated, so some extrapolation must be done to come up with an accurate waste estimate. Wastage is calculated by skate ratio: the ratio of effective skates lost to effective skates hauled. The calculation is done using fixed hook gear in Alaska and snap gear in Areas 2B and 2A. (The Area 2A catch includes the treaty and non-treaty commercial catch.)

Waste from derelict gear dropped in 1995 to 20 percent of its 1994 levels, lower than it has been in years. Nearly 1.3 million pounds of halibut

were wasted in 1994, and most of it occurred in the Gulf of Alaska. Coastwide, waste estimates dropped to only 257,000 pounds in 1995, thanks to significant decreases in the Gulf region and in Southeast Alaska. This encouraging news may reflect improved fishing practices during the IFQ fishery that began in 1995. In fact, this year the effective skate ratio drew very close to that of Canada, which has been under a quota program for several years.

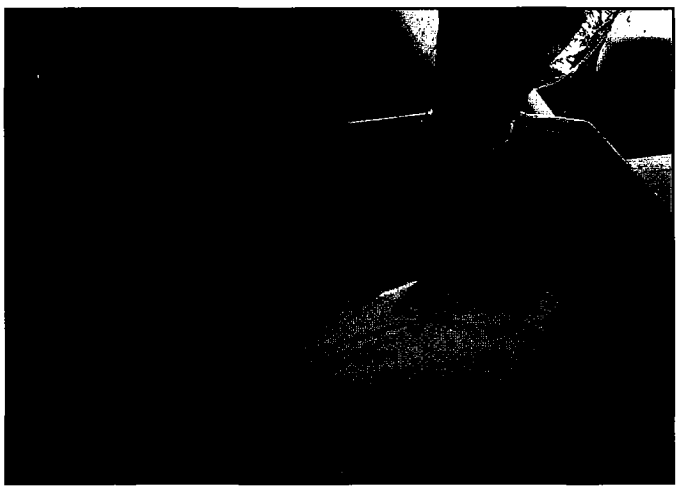
Waste from derelict gear dropped in 1995 to 20 percent of its 1994 levels, and in 1995 was lower than it has been in years

The new complexion of the halibut and sablefish fisheries has made it somewhat more difficult for researchers to chart halibut waste in Alaska. This year for the first time harvesters could conduct mixed halibut and sablefish trips, and they could also land halibut while they were targeting sablefish. As a result it was harder to gather accurate data about effective skates in each separate fishery. For example, in Area 3A, there were 38 percent fewer effective skates available for use in the calculation this year than last, because of shifts in fishing operations. More halibut was caught on sablefish gear, which is non-standard halibut gear, diminishing the amount of halibut-only data we could find.

Discarding the diminutive

Halibut longliners can only retain fish that are longer than 32 inches and must return the smaller, sublegal halibut to the sea. Though halibut are resilient creatures, a certain portion of them inevitably die from the trauma of being caught, dragged aboard and released again, especially if they are not handled tenderly. Each year the IPHC staff estimates the amount of sublegal halibut that are killed in the commercial fisheries, and these removals are considered part of the total annual harvest.

Far fewer young halibut were killed in the commercial fisheries this year--roughly half the number in the two previous years. We estimate that 746,000 pounds of sublegal halibut were lost to discard mortalities coastwide-down from 1,357,000 pounds in 1994--and decreases appeared in every regulatory area. For Area 2A, the estimated sublegal mortality was 3,000 pounds; 169,000 pounds for Area 2B; 75,000 pounds for Area 2C; 411,000 pounds for Area 3A, 50,000 pounds for Area 3B; and 38,000 pounds for all of Area 4.



An estimated 746,000 pounds of sublegal halibut were lost to discard mortalities coastwide-down from 1,357,000 pounds in 1994.

Biologists estimate mortality rates for sublegal halibut using the catch ratio of sublegal to legal-sized fish seen in biological survey data. Discard mortalities are determined to a great extent by the speed of the fishery and the amount of time taken to handle sublegals carefully. We estimate that 16 percent of the sublegal halibut that are brought aboard a commercial vessel die, and so this mortality rate was applied to all halibut harvests in all areas. This is the rate applied to the Canadian IVQ fishery since 1991.

In the past couple of years we have estimated the sublegal discard mortality rate to be 25 percent in the U.S. fisheries because they were conducted at a much more hectic pace than the quota fisheries. We borrowed the 25 percent rate from bycatch mortalities seen in the Gulf of Alaska sablefish fishery in 1992 and 1993. This year, however, we were able to drop our mortality estimates to the 16 percent level because of the slower pace of the quota fisheries off Alaska.

TENDERING THE TAKE-HOME PAY: PERSONAL USE

One of the more nebulous areas of halibut harvest, and perhaps the most difficult to count, is halibut taken for personal use. We count as personal use the fish that are harvested by a variety of people in a variety of circumstances, but that don't fall under either the commercial, sport, bycatch or waste categories. Personal use harvests include the sanctioned food fish taken in Canada, and illegally retained bycatch in other fisheries. We used to define halibut taken home by crew members in the commercial halibut fisheries as personal use, but in 1995 we began to count those fish in the commercial take.

It is difficult to assess personal use harvests with complete accuracy, but good stewardship demands that an estimate be included in our measure of the total halibut take each year. In the waters off Washington, Oregon, and California, personal use fish in the halibut fisheries must be recorded on fish tickets. Previously, personal use data from the fish tickets, although documented, was not included in the assessment of the total commercial catch. In 1995, however, all personal use fish data has been included in the total commercial take. Participants in the treaty Indian fishery harvested 11,000 pounds of personal use catch in 1995; this harvest is included in the catch sharing plan.

In the Canadian IVQ fishery, all take-home fish is monitored and weighed by port monitors at the time of delivery and is therefore included as part of the vessel's quota. The primary source of unreported personal use in British Columbia is the Indian food fish. Participants in this fishery take an estimated 300,000 pounds, according to the Department of Fisheries and Oceans.

Personal use fish is hardest to estimate in Alaska. In the past, take-home fish from the commercial fishery were not weighed or included in the commercial catch, but when the IFQ program began it provided a mechanism to monitor take-home fish more accurately. This year, take-home fish are included in the vessel's total retained weight, and are counted against the

vessel's quota. As a result, the fish that fall under the personal use category for 1995 include only the non-commercial and non-sport halibut. This take is estimated to be about 228,000 pounds: none in Area 2C; 97,000 pounds in Area 3A; 37,000 pounds in Area 3B; and 94,000 pounds in Area 4.

THE SEA OF TEEMING SWEETNESS: ASSESSING THE HALIBUT BIOMASS

"Mankind cannot tether time nor tide," wrote Robert Burns. Neither can we tether the fishes in the sea or any of the ocean's frothy richness, which makes stock assessment a delicate and exacting chore. When we estimate the Pacific halibut biomass we focus not only on the current size and age of the population, but also on trends within individual year classes and in the population as a whole.

Coastwide, halibut stocks still are declining, but the decline may not be as steep as previously thought.

Pacific halibut stocks continued their coastwide decline in 1995 (see Figure 2). We are watching several strong year classes pass out of the fishery, followed by weaker year classes that proffer poorer recruitment of small fish into the fishery.

The halibut stocks are changing, and so are fishing operations, and as a result we are revising some of the assumptions we use to formulate the annual stock assessments. We continue to use commercial catch-per-unit-of-effort data, as recorded from IPHC logbooks, which each commercial vessel is

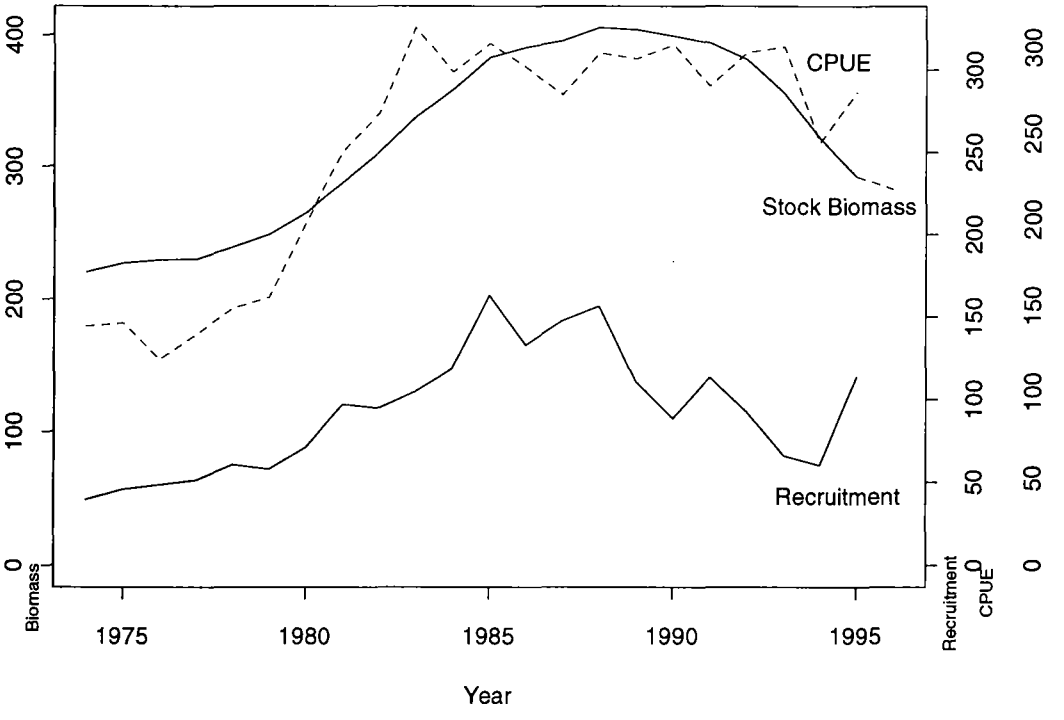


Figure 2. Coastwide stock biomass (million of pounds), recruitment (millions of pounds), and CPUE (pounds per skate) for the years 1974 through 1995.

required to keep. This year the assessment model was modified to incorporate growth of the fish as well as harvest mortality and recruitment. It also takes into account changes in gear selectivity as fishing operations evolve. The procedure now uses catch at age, length at age, and weight at age data from both commercial and IPHC survey landings, and these data were re-estimated this year for all areas and all years. Adding the new information has allowed us to interpret some shifts in the stocks that potentially may bias assessments, and we suspect a few other aspects of the procedure could be improved even further.

Three factors go into calculating the trends in fish stocks: the age composition of the catches fish size at age and catch-per-unit-of-effort (CPUE) data. This year, we looked at all three factors using size/age-based estimates and using the traditional CAGEAN method of cohort analysis. The size/age-based estimates better represent the changing trends in the stocks, but we are not yet certain enough of the reliability of our assumptions to base absolute harvest limits on those estimates alone.

The result of all this new information is that we now believe the absolute level of abundance of halibut may be higher than previously estimated. This good news comes with a warning: These estimates are more sensitive to assumptions made in the procedures, and coastwide, halibut stocks still are declining. But the decline may not be as steep as previously thought.

HALIBUT ARE EASIER TO CATCH

CPUE trends, which help measure the abundance of halibut by how hard it is to catch one, rose 12 percent coastwide.

More good news: CPUE trends, which help measure the abundance of halibut by how hard it is to catch one, rose 12 percent coastwide. CPUE is measured by comparing the number of effective skates fished to the amount of fish harvested. CPUE averaged 244.2 pounds per skate in 1994 in all areas -- the lowest since the early 1980s when the stock was thought to first begun rebuilding -- but bounced back to 282.7 pounds per skate in 1995. Moving northward up the coast, CPUE increased 23 percent in 2A, 5 percent in 2B, 25 percent in Area 2C, 13 percent in Area 3A, 11 percent in Area 3B, and 23 percent in Area 4.

The increase is not specific to the commercial fisheries alone. Even on the IPHC systematic surveys, we have seen CPUE rise in recent years, showing a 40 percent increase in Area 2B (from 119 pounds per skate in 1993 to 167 pounds per skate in 1995), and an 18 percent increase in Area 3A (from 313 pounds per skate in 1994 to 370 pounds per skate in 1995). Survey CPUE in Area 2B has more than doubled since the mid-1980s, averaging 57 pounds per skate in 1985-1986 compared with the 143 pounds per skate seen in the two most recent surveys. In Area 3A, on the other hand, survey CPUE dropped during that same time period, averaging 439 pounds per skate over the years 1984-1986 and only 332 pounds per skate during 1993-1995. By comparing trends in the survey and commercial CPUE indexes for Areas 2B and 3A, we are assessing the existence of possible bias in the latter.

COMING OF AGE IN THE BATHYSPHERE

Pacific halibut have undergone a rapid reduction in body growth in recent years. Fish of a particular age are now about 50% lighter than they were 20 years ago. Catch sampling statistics show that the average weight of twelve-year-old halibut caught coastwide in the commercial fisheries has declined nearly 40%. More recently however, average weight-at-age of twelve-year-olds increased from 23.4 to 26.0 pounds in Area 2A, from 23.5 to 25.5 pounds in Area 2B, from 27.2 to 40.3 pounds in Area 2C, and from 25.0 to 25.5 pounds in Area 3A between 1994 and 1995. At the same time, weight-at-age dropped from 31.4 to 25.6 pounds in Area 3B, and from 34.2 to 28.4 pounds in Area 4.

The directional trend in weight-at-age appears to be trailing off especially among young age cohorts.

In many ways, statistics given on an age-specific basis are more variable than stock-wide statistics; nevertheless, it does appear clear that weight-at-age may be leveling off somewhat in the coastwide stocks.

All this information tells us that the exploitable biomass of Pacific halibut continues its downward trend in all areas except Gulf of Alaska. There, in Areas 3A and 3B, young halibut are recruiting into the fishery at encouraging levels --strong enough, even, to be considered the beginning of an upturn. There are signs that recruitment might be improving slightly in other areas as well. Recruitment estimates are extremely variable in the most recent years, when strong cohorts (newly recruited fish of the same year class) have appeared only once or twice in the fishery. This year, the newly recruited fish were generally smaller than in most years, too, which means they make up a smaller than average percentage of the harvest, making accurate projections even more difficult. Their smaller size also means they may contribute less volume to the overall exploitable biomass than, say, the larger year classes that recruited into the fishery in the mid-1980s. Nevertheless, the increase in recruitment, such as it is, is a positive sign for the fishery.

READING BETWEEN THE WATERLINES

Last year's assessment sent two conflicting messages from Area 2B. While overall biomass estimates for the area declined, CPUE improved in the

commercial fishery. Did implementation of Canada's IVQ system somehow make halibut more easily harvestable? Certainly the movement and fishing operations of the fleet changed significantly under the IFQ program, but those dynamics were not enough to explain away the increase in CPUE. Surveys this year resulted in higher catch rates. The 1993-1994 catch-at-age data from these waters suggest that the year classes of fish that were then 11-15 years old may be stronger than we once thought. Perhaps these halibut recruited later than normal into the fishery. Perhaps they were simply recruited later than normal because of slow growth. Or perhaps fishing activities happened to target on small fish during that period. At this point, hypotheses are all we have to explain these conflicts in the data for Area 2B. Some of these possibilities will be explored in 1996.

The harvesting strategy will be reevaluated — in the interests of conserving a declining resource.

The waters of Area 4, in the Bering Sea and western Aleutian Island region, have their own story to tell. Both assessment procedures showed an increase in exploitable biomass here. A significant upturn in the Area 4 CPUE index accounts for about half the overall increase; the rest is accountable to updates in the age -- composition data that went into the size-age estimates. Each year we conduct retrospective analyses of biomass estimates for each area, applying updated information to existing models in hopes of coming up with more accurate assessments. Our estimates of Area 4 vary more from year to year than any other area -- partly due to lack of survey information, and partly because there was less fishing activity here in the 1970s and early 1980s from which to glean baseline information.

In 1996, we plan to develop the size/age-based assessment model to make it usable as a basis for biomass estimates. We hope to include a model of the change in growth rate, CPUE rates from scientific surveys, and data reflecting bycatch removals as a source of legal-sized halibut mortality. It is expected that these modifications will result in biomass estimates that are generally higher than current calculations. However, even if biomass estimates are higher, the stocks themselves are still diminishing. We will re-evaluate the harvest rate now set at 30 percent of exploitable biomass together with the size limit -- in the interests of conserving a declining resource.

UNTANGLING THE WEB OF WONDER: BYCATCH PROBLEMS CONTINUE

Bycatch mortalities decreased 6 percent coastwide, from 15.7 million pounds in 1994 to 14.9 million pounds in 1995.

The good news is that halibut bycatch mortalities decreased slightly in 1995. The not-so-good news is that the decrease is not by much; it lies well within the historic fluctuations in bycatch mortalities over the past five years. Coast-wide estimates of bycatch mortality decreased 6 percent, from 15.7 million pounds in 1994 to 14.9 million pounds in 1995. Bycatch mortalities in U.S. waters totalled 13.4 million pounds, slightly lower than last year. In Canada, mortalities actually increased slightly to 1.5 million pounds, despite a bycatch mortality reduction program in place there. Overall, efforts to reduce bycatch mortalities have yielded minimal results since 1991.

Bycatch mortality estimates come from logs kept by observers aboard groundfish vessels fishing off Alaska. Canada recently initiated an observer program that provides updated bycatch and mortality rates for some Area 2B fishing spots. The fisheries off Washington and Oregon do not yet require observers, so we estimate mortalities using bycatch rates generated by research surveys in 1987.

IN CANADA: WILL BYCATCH QUOTAS WORK?

The Canadians pledged in 1992 to reduce their halibut bycatch by 50 percent in five years. Their goal is no more than 1.3 million pounds in 1996 and 1.0 million pounds in 1997. The biggest decrease in bycatch has come in Canada's cod fisheries, but low cod stocks could be more responsible than any bycatch reduction tools. Canada's aggressive pursuit of bycatch reduction includes a set of new industry-funded programs that begin in 1996 for the groundfish trawl fleet. They will include 100 percent observer coverage, tow time restrictions, gear restrictions, and individual bycatch caps for the trawl fleet, including the Queen Charlotte area. For 1996, the plan would reduce bycatch mortality limits for Hecate Strait to 500,000 pounds, from 580,000 pounds in 1995. It would also add a trawl bycatch mortality limit of 380,000 pounds for the west coast of Vancouver Island. According to Canadian officials, the fleet there has thrown strong support behind the bycatch reduction program, and harvesters and managers alike are optimistic they will achieve their goals.

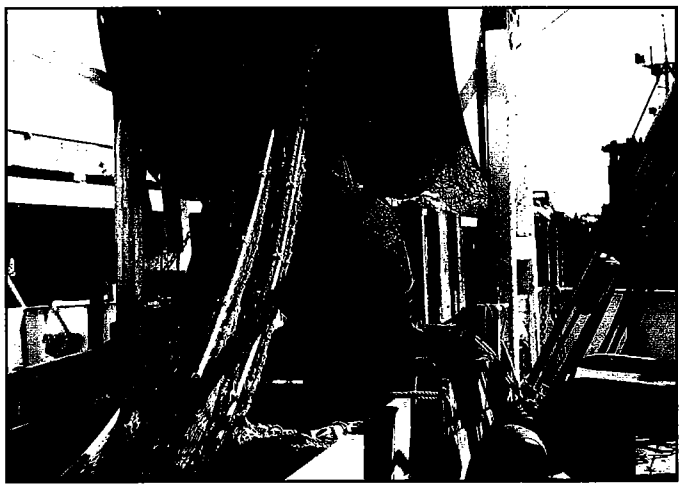
From the Canadian perspective, the bycatch issue has been one of frustration and disappointment. The industry has made a significant commitment, only to watch progress on the U.S. side become bogged down by the scope and complexities of the issue. Canadian harvesters have seen their own halibut quotas reduced as a result of high bycatch in U.S. waters. Canadian Commissioners have asked for compensation to their fleet for the losses they suffer from activities outside their control. The Commission has not been able to agree on this issue, and did not approve further compensations to Canada this year. Debate on that issue continues, and the staff is investigating a number of options.

Meanwhile, Canada has implemented an individual bycatch allocation plan, which gives individual vessel operators an incentive to reduce their bycatch. This program will slide into place in 1996, and is of great interest to harvesters and managers on both sides of the border.

IN ALASKA: THE GORDIAN KNOT TIGHTENS

Canada has implemented an individual bycatch allocation plan, which gives individual vessel operators an incentive to reduce their bycatch.

In the U.S., the halibut bycatch problem is perhaps no more serious (bycatch as a percentage of target catch is lower than in many other parts of the world) but because of the sheer tonnage of fish harvested, bycatch problems loom far larger in scale and the ramifications in other groundfish fisheries are collossal. The IPHC's Halibut Bycatch Working Group so far has only been able to come up with a few resolutions that nibbled at the greater problem. The large-scale programs that are in place -- observer coverage, bycatch caps, a post-season Vessel Incentive Program -- create pressure to reduce overall bycatch but have not helped the fleet change their fishing practices. The kind of management changes that would give groundfish harvesters both the incentive and the opportunity to reduce their halibut bycatch on their own do not lie within the Commission's domain.



Groundfish harvesters fish under bycatch limits in the waters off Alaska. Under this program each groundfish fishery is closed when its bycatch cap is reached, but since there is no incentive driving operations of an individual vessel, the program is not as effective as it might be. Bycatch caps successfully limit the overall amount of halibut taken as bycatch, but do not necessarily reduce the bycatch rate among the fleet. The North Pacific Fishery Management Council probably will not consider cutting the bycatch caps any further without the addition of an effective incentive program

One variation of bycatch quotas would allocate bycatch mortality to pools of fishermen, rather than to specific fisheries; this idea might be the most manageable.

The NPFMC now is looking at three different ideas for reducing bycatch mortality limits: individual bycatch quotas; a vessel incentive program; and careful release. The concept of a bycatch quota program presents certain legal and technical problems, and certainly is not supported by all segments of the industry. The NPFMC is scheduled to prepare an analysis of individual bycatch quota alternatives in 1996. One variation of the program would allocate bycatch mortality to pools of fishermen, rather than to specific fisheries, and this idea might be among the most manageable.

In 1991, NMFS implemented a vessel incentive program to penalize groundfish fishermen who caught halibut and other bycatch at higher than standard rates. The first two cases prosecuted under this program took four years to come to trial. In the first case, an Administrative Law Judge imposed a $50,000 fine on a vessel for exceeding the incentive program's bycatch rate standard while fishing for flatfish in the Bering Sea-Aleutian Islands. The owner and fishmaster appealed portions of the decision, and the decision on the appeal is pending. In the second case, the vessel owner and NMFS settled for a penalty of $35,000 for exceeding the halibut rate standard in September 1991. Two other cases from 1991 have been heard by an administrative law judge but still await decisions.

A concerted careful release program also has yielded small results. In 1993, the NPFMC and the IPHC together implemented a program requiring all groundfish longliners to use prescribed methods of careful release for discarding their halibut bycatch. For the first two years, mortality rates stayed at the same level as they were before the requirement, around 18 to 20 percent.

In 1995, a cooperative effort was begun to look more closely at a specific fishery -- in this case, the Bering Sea Pacific cod longline fishery, which was previously given a mortality rate of 12.5% to track mortalities on a weekly basis throughout the season. The North Pacific Council asked the IPHC and NMFS to monitor the rate in-season and report back to the Council in June 1995, so that any necessary retroactive adjustments in the rate could be made. Observers aboard the longliners forwarded their data on bycatch levels and viability of the fish as they were returned to the sea, sending their reports to the IPHC weekly throughout the season. Upon return to NMFS for debriefing, the observers were interviewed by IPHC personnel and their data immediately scrutinized. Many vessel captains also sent their data to a consultant, who collated the weekly bycatch information and reported directly back to the fleet so that vessels that were having big bycatch problems could change their fishing practices. At the end of the season, analysis by IPHC showed an average discard mortality rate of 11.5 percent in this fishery; dramatically below the 18-20% rate of earlier years.

This year, we proposed to the NPFMC a program requiring on-deck sorting of halibut bycatch aboard factory trawlers and catcher vessels that dump to stern tanks for sorting below decks. Support for on-deck sorting springs from many corners, because improved bycatch survival would mean groundfish harvesters could fish longer under current bycatch mortality limits. However, there is opposition for four reasons: 1) it would mean more work, and perhaps increased safety problems, for the groundfish observers; 2) data from deck-sorted catches would not fit with current observer databases, nor with the sampling protocol of the Vessel Incentive Program; 3) a deck-sorting program might reduce the quality of bycatch estimates; and 4) it would be difficult to confirm that vessels are actually adhering to the deck-sorting requirements when observers are not actually monitoring a haul. The NPFMC is scheduled to take final action on the proposal in January, 1996. Though the deck-sorting program shows great potential, the IPHC Commissioners recommended to the NPFMC that on-deck sorting not be approved unless it is part of another program that addresses the problems identified.

On a positive note, the sablefish harvesters off Alaska, who now fish under an IFQ system, have successfully reduced halibut bycatch mortalities in their fishery.

SHOW OF HANDS OFF THE U.S. WEST COAST

There is no bycatch reduction program in place along the U.S. West Coast. One of the problems managers face there is a lack of reliable bycatch estimates. In 1995, the Pacific Fishery Management Council accepted a procedure developed by the University of Washington and the Oregon Department of Fish and Wildlife (ODFW) that uses catch-per-unit-of-effort for halibut and total effort in groundfish and shrimp trawls to estimate bycatch. The final estimate, using 1987 catch figures, showed bycatch levels on the U.S. West Coast at about 910,000 in 1995, equivalent to 455,000 pounds of halibut mortality. The ODFW now is producing an updated estimate using 1992 effort data.

Meanwhile, the Oregon Trawl Commission is working with ODFW to implement a voluntary observer program for the trawl fisheries off Oregon and Washington for 1996, focusing on the deepwater complex first. There are also some halibut avoidance experiments going on using shrimp panels to reduce bycatch and these show some promise. While the Pacific Fishery Management Council gathers its information, it hopes to persuade the fleet to voluntarily avoid hotspots.

THE WISDOM OF AVOIDANCE

The impact of bycatch harvests can be reduced in two ways: by reducing bycatch levels altogether, and by reducing mortalities of the halibut that are caught and returned to the sea. The U.S. longline fleet has been able to reduce bycatch mortalities under the IFQ system. Trawlers are having a tougher time because the nature of trawl operations makes it difficult to handle halibut individually in a careful manner. The best tack for trawlers seems to be avoiding bycatch species altogether. Some experiments with separator panels, conducted at the Fishery Industrial Technology Center in Kodiak, reveals that Pacific cod trawlers may be able to reduce their incidental halibut catches substantially without missing out on too much cod.

This year we tagged nearly 5,000 trawl-caught halibut near Kodiak Island in a cooperative study with the University of Washington, hoping to learn more

about the life and times of a halibut caught as bycatch in trawl gear. We returned most of the tagged halibut to the ocean, keeping a small number of them in sea-bottom cages to monitor their well-being over the following few days (See The Silent Song of Fishes: Tagging Studies in this report).

In 1993 and 1994, we also tagged about 13,000 halibut caught as longline bycatch, and the information we glean from the return of their tags will enhance our understanding of discard mortalities as well. We encourage all fishermen to watch for and return tags to us, because the more tags we receive, the more accurate our results will be.

Even if a tagged fish is sublegal, it is still permissible to keep the fish for personal use -- returning the tag to IPHC -- no matter what gear it was harvested on. Sublegal fish cannot be sold.

BALANCE IN THE BOUNTY: COMPENSATING FOR BYCATCH LOSSES

Action and reaction are met in every aspect of nature, Emerson wrote, and he called nature's dualism the Law of Compensation: where something is taken, something must be given back. Since the early 1980s, the IPHC has compensated the halibut resource for the effects of bycatch mortalities by reducing the overall catch limit. Our procedures for figuring out the effects of bycatch mortality have improved over the years, and two more modifications to the procedure are now being considered for 1997. First, legal-sized halibut bycatch would be treated the same as commercial catches, and would be included in the stock assessment model by which we estimate exploitable biomass. The quantity of legal-sized halibut bycatch mortality would be subtracted from the catch limit in the area in which the bycatch occurred.

The second possible change involves our method of compensating the resource for the lost reproductive capacity of halibut taken as bycatch. Compensation would be figured for sublegal-sized halibut only (we previously compensated for all bycatch halibut), and the consequent reductions in catch limits would be distributed geographically according to the young halibut migration pattern, rather than being pooled over all areas. This new way of computing the amount and distribution of compensation would affect the estimate of exploitable biomass, and also would change catch limits in some areas, but exactly by how much we cannot yet determine.

Under a new proposal, stock compensation would be figured for sublegal-sized halibut bycatch only.

The problem of incidental harvests of halibut has been one of the most divisive issues yet to confront the North Pacific seafood industry. Yet, it is the divisive issues that tend to bring people together: The Commission convened several special meetings on bycatch issues this year, and continues to dedicate significant resources to helping solve the bycatch problem in the North Pacific. Even though we favor reducing halibut bycatch caps by 10 percent per year, we recognize that further reductions probably will not happen if they result in continued decreases in the target groundfish catches. The IPHC staff strongly supports in-season individual incentive programs -- individual bycatch quotas, for example -- as a way to reduce bycatch while maintaining groundfish harvest. Programs that focus on post-season consequences, such as the Vessel

Incentive Program do not appear to be very effective. Developing a sound incentive program will not be easy; in the meantime, our approach is to emphasize bycatch reductions in much smaller steps through time-area management and reduction of mortalities.

Bycatch issues, no doubt, will continue to confound fishery managers for years to come. In the meantime, the Commissioners, staff members and industry participants who met to discuss and debate these issues this year did agree that both countries are making some progress -- albeit slow, especially on the U.S. side -- and the commitment is strong to press forward to find answers to our deeply engaging problems.

THE PORTABLE AND COMPENDIOUS OCEAN: SCIENTIFIC INVESTIGATIONS

"Never lose a holy curiosity," Einstein urged. Is it holy curiosity that electrifies the ganglia of marine biologists, that titillates the fingertips of statisticians, that inspires us to chase fish from the seabottom to the microscope? Scientific curiosity has provided the bedrock of knowledge on which we base our interactions with the sea. Since 1924 the IPHC has conducted scientific investigations of the North Pacific in our thirst for knowledge about the Pacific halibut, its private life and the influences on its benthic habitat.

CRUISING THE CASCADIA BASIN: AREA 2A SURVEY

This year we conducted the first setline survey of Area 2A north to Vancouver Island since 1989.

When G. K. Chesterton heard the term "dull as ditchwater" he scoffed: "Is ditchwater dull? Naturalists with microscopes have told me that it teems with quiet fun." The North Pacific is actually a little large to take a microscope to, so we take a setline survey -- this year we conducted the first one in Area 2A since 1989.

From surveys we learn about the relative abundance, size, age and sex composition of halibut stocks, and the species composition of the catch found in each region. We use this information to increase our knowledge of the growth and distribution of halibut, the relative abundance of other species, the sexual maturity of all the stocks, and the rate of bait attacks on gear.

In 1994 we began designing a stratified random pattern survey for Area 2A and the southern part of 2B, and on July 10, 1995 we began a series of seven survey trips aboard the *F/V Risky Business* , a 55-foot longliner homeported in Kodiak, Alaska. We departed Newport, Oregon on July 10 and started fishing July 11 in southern Oregon waters. The vessel carried an IPHC representative and researchers from the Makah Tribal Fisheries Office, Northwest Indian Fisheries Commission, Oregon Department of Fish and Wildlife, the U.S. Coast Guard, and Washington Department of Fish and Wildlife.

The vessel fished waters between 30 and 200 fathoms at survey stations that were distributed so that 75 percent were in areas we knew from

logbooks and sport fishing ground data to be fishing grounds, and 25 percent from areas not known as fishing grounds in particular. As the vessel moved northward during a streak of good weather, delivering its catch at different ports along the way, it fished 117 of the 120 planned survey stations in 43 days.

A typical work day consisted of setting the first of three stations at 6:00 or 7:00 a.m. and hauling gear five hours later. The crew fished tub gear, each tub consisting of 900 feet of groundline with large circle hooks spaced every 18 feet, baited with thawed chum salmon. Two tubs made up one 1800-foot skate. A string of five skates was fished at each station.

Each set was counted and each halibut's size, sex and maturity stage was noted; also, the white-side otolith was taken from every third fish for age determination back on shore. Sequential, hook by hook, catch information was collected for every set. Other species and species groups were recorded. Legal-sized halibut were retained for sale to offset the costs of the charter.

The survey yielded a total catch of 1,348 legal and 817 sub-legal halibut, with the best catches coming off the west coast of Vancouver Island. As expected, the commercial grounds produced the highest catches. Non-commercial grounds yielded catch rates not significantly different from commercial grounds off Vancouver Island and the southern portion of Area 2A, but produced only 15 percent of the amount of fish found in commercial grounds in northern Area 2A, between the U.S.-Canada border and Willipa Bay, Washington.

Our survey's CPUE in northern 2A, even on the commercial hotspots, was well below 100-150 pounds per skate that the commercial fishery attained in 1993 and 1994.

Catch per unit of effort for the commercial grounds was well below 100-150 pounds per skate that the commercial fishery attained in 1993 and 1994. The researchers looked at CPUE and depth on the commercial stations, but found little correlation. One unusually shallow station, averaging 37 fathoms, produced the top CPUE in Oregon waters, but the next three highest CPUEs came from depths of 116 to 147 fathoms. The top five commercial grounds stations in the northern portion of Area 2A averaged in depth between 64 and 155 fathoms.

The largest females occurred off Vancouver Island. In fish smaller than 95 centimeters, females dominated the catch in Area 2A waters, while males and females were about equal in number in Area 2B. Most males were less than 115 centimeters long, with a few larger than that in Area 2B.

This survey of Area 2 is the most ambitious examination of the halibut resource in its southern habitat so far. We will continue to analyze the data from the survey throughout 1996 to learn more about the biomass distribution, and age/size composition of the stock. Our survey results will be compared with those of the 1995 NMFS Pacific Groundfish Trawl Survey to study variations between trawl and setline surveys.

Our survey off B.C. found CPUE levels 59 percent higher than they were in 1993, close to the commercial fishery CPUE.

ABOARD THE KRISTIANA: AREA 2B SURVEY

Moving northward, our survey work included a setline grid survey of Area 2B, off British Columbia. Here, the survey vessel fished 120 grid stations between July and September, and found CPUE levels 48 percent higher than they were in the last survey, in 1993.

We conducted our Area 2B survey aboard U.S. F/V *Kristiana*, fishing 120 stations with a five-skate string of conventional longline gear (1800 foot lines with 18 foot spacing and #3 circle hooks baited with chum salmon) with an average soak time of five to 12 hours. The charter began in July in Ketchikan and ended on September 17th in Seattle. As usual, we counted the catch and recorded size, sex and sexual maturity of each fish, taking otoliths from two-thirds of the fish. Hook-by-hook catch information was collected on

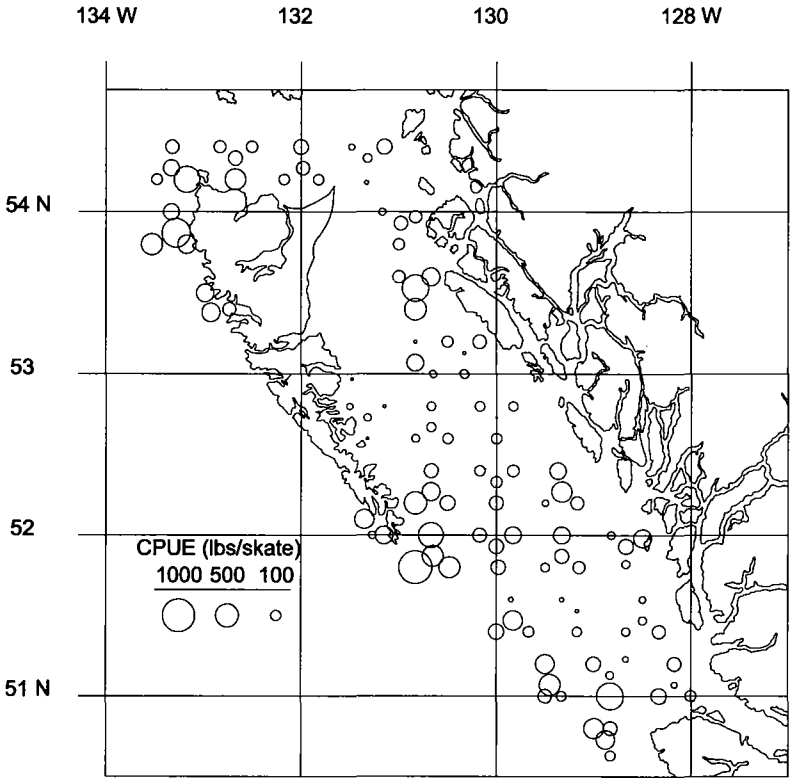
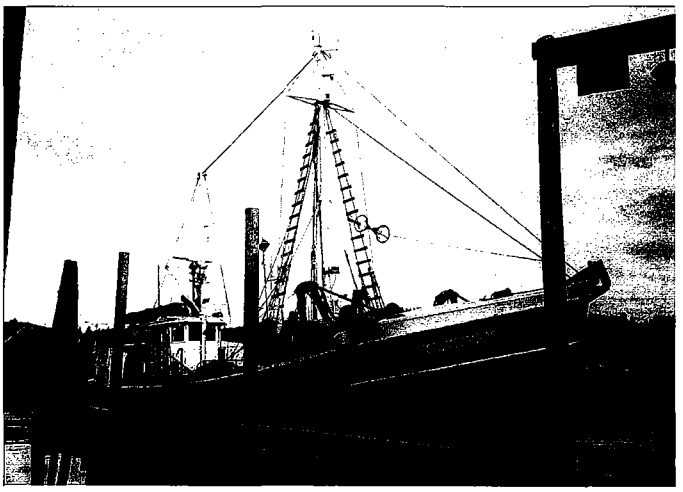


Figure 3. Station CPUEs for the 1995 Area 2B grid survey.

every set, including the sequence of catch by hook and estimates of average weight of other species caught.

CPUE rates among survey activities usually fall significantly below the rates seen in the commercial fishery. In 1995 the two rates were closer together than they were in the past five survey years. The average CPUE achieved over the survey was 176.2 pounds, compared to 195 pounds seen in the commercial fishery. The average CPUE in the 1993 setline survey for this area was only 119.3 pounds. Much of the difference in growth between the two CPUEs can be attributed to additional stations added to the survey trips for 1995, and changing fishing patterns in the commercial fishery. This year, the highest average CPUE appeared in statistical area 130, where nine stations yielded an average of 346.2 pounds per skate. Figure 3 maps out the CPUE levels as we experienced them on this survey, with circles drawn to indicate the magnitude of CPUE at each fishing location.



The next survey for this area is scheduled for 1996.

IN THE WIDENING GYRE: AREA 3 SURVEY

The Gulf of Alaska can stir up some mighty weather and fling it all the way across the Continental Divide. It can also brew up a fine kettle of fish, and we hove aboard the *F/V Kilkenny* on June 19 out of Kodiak harbor for a series of seven fishing trips that would land 209,718 pounds of halibut continuing the annual setline surveys of the Kodiak Island area started in 1993.

The *Kilkenny* fished 1500-foot conventional longline gear, also with 18 foot spacing and #3 circle hooks baited with frozen chum salmon. Our survey of the Gulf east and northeast of Kodiak Island yielded an average of 373.7 pounds per skate, harvested over 119 stations. This is a 16 percent increase in mean CPUE over 1994 rates. In actual fish, this is only about 51 pounds per skate-not a statistically significant increase.

Average CPUE rates aboard this survey were not as far from commercial rates as they were in Area 2B. Our areawide average CPUE was 370.89 pounds per skate on the survey, compared to 374 pounds per skate in the commercial fishery. Both CPUE levels, survey and commercial, increased this year. In 1994, CPUE rates aboard the survey were 311.87 pounds and commercial rates were 335.80 pounds. The highest CPUE rates the survey

achieved this year, 416 pounds per skate, were in statistical area 280. Figure 4 shows where our survey stations were, and the relative CPUE rates.

The charter ended on August 17th after 37 fishing days. We hope to

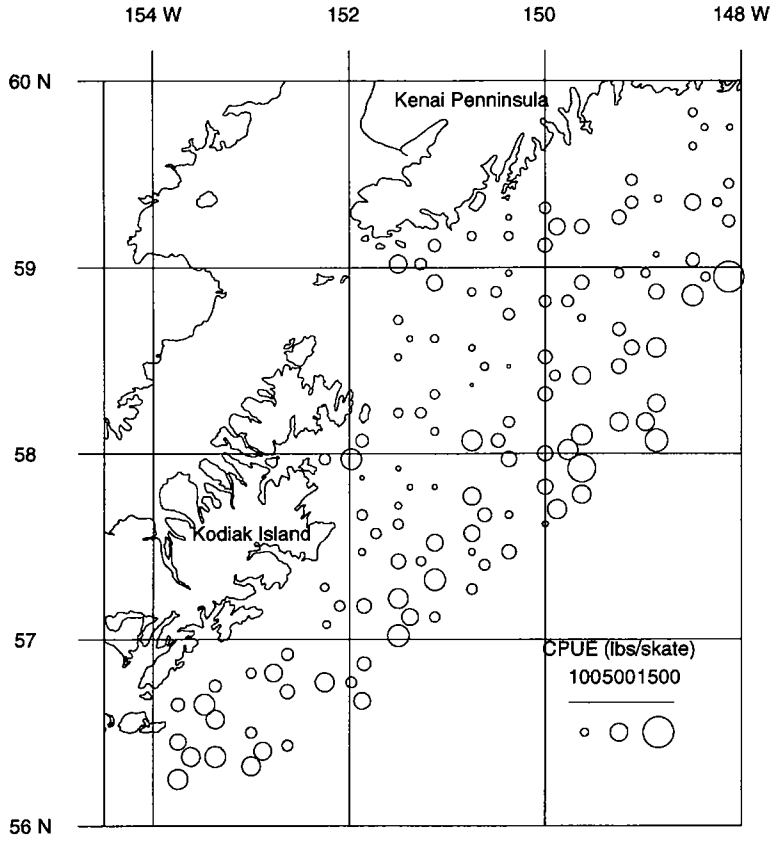


Figure 4. Station CPUEs for the 1995 Area 3A grid survey

continue the Kodiak area survey every year from now on, adding stations to include the area from Cape Spencer, on the eastern edge of Area 3A, to Cape Lazaref on the western edge of Area 3B. We expect the 1996 survey to be pretty similar to this one.

The Bering Sea halibut biomass is about twice as big as it was in the 1980s, but there has not been a strong year class since 1987.

SHAKEDOWN ON THE EASTERN SHELF

The National Marine Fisheries conducted their annual systematic trawl survey. The survey covers a standard area of the eastern Bering Sea shelf north to about 61°N. This area is a major nursery ground for juvenile halibut in summer, when the survey is carried out. (Every third year the northern shelf and the slope are added to the survey area.)

The eastern Bering Sea shelf was blessed with a strong 1987 year-class that has boosted the halibut biomass in recent years. Presently the halibut biomass estimated by the trawl survey is about twice as big as it was in the 1980s, and has held steady since 1993 and 1994 surveys. But there is no guarantee these high levels will remain; there has not been a strong year class since 1987.

This year, as in every year since 1981, NMFS used an Eastern flatfish trawl (without roller gear) with a 25 m headrope and a 34 m footrope. They fished at stations along a 20 nautical mile grid in depths from 30 to 200 fathoms. Everything that is caught in the sweep of the trawl is recorded, and the catch is extrapolated over the total survey area to estimate the overall abundance of each species. This method may produce estimates that are biased high or low, but over a long period should provide a good index of relative abundance in the survey area during the summer, when both juvenile and adult halibut are mostly within the depth range covered by the survey. In winter halibut move into deeper water, so a series of winter surveys might show quite different trends.

NMFS estimates that the total halibut biomass increased slowly from about 50,000 mt in 1980 to about 100,000 mt in 1992. In 1993 the estimate jumped to 160,000 mt -- a greater leap than simple variability in the sampling would explain -- and remained at about the same level in 1994 and again in 1995. Biomass is the measure of the total mass of halibut in the area, so it is determined both by numbers of fish and by the size of the fish. Biologists believe that the baby-boomers of 1987 comprised about half of this year's increase in biomass, and a surge in the presence of larger fish (over 75 cm) boosted the biomass the rest of the way. This sudden appearance of larger fish in 1993 should not be misinterpreted: since large halibut do not migrate into the Bering Sea, the increase NMFS saw in the survey probably means the larger halibut were more available to be captured by the survey, not that they were truly more abundant in the region.

The number of juvenile and adult halibut had declined by the 1995 survey, but biomass held steady because of an increase in average size.

The biomass levels seem to be hanging steady, though the population itself is changing. In 1994 the increase in biomass created by the growth of the 1987 year class was counterbalanced by a decrease in the abundance of larger fish (which nevertheless remain well above earlier levels of abundance.) The number of juvenile and adult halibut had declined by the 1995 survey, but biomass held steady because of an increase in their average size.

In some years it is possible to detect the appearance of an above-average year class of two-year-olds as a distinct mode at about 20 cm in the survey length frequency. In particular, the strong 1977 year-class was a standout at age two in 1979, and sustained the overall level of juvenile abundance for the next two or three years. The 1987 year-class roared onto the scene in 1989, and in 1990 appeared as an enormous spike in the charts, head and shoulders above the spike that the 1977 year-class made in 1980. In the following years, through 1994, these youngsters of the Bering Sea have appeared stronger in every year than the 1977 year-class did at the same ages. This year class now has passed through the juvenile stage and is contributing to the fishery. No year-class since 1987 has been so abundant.

EACH ONE OF US A UNIVERSE: STUDIES OF PARASITES THAT INHABIT HALIBUT

Every living thing feeds off other life, all of us taking root in some sort of wonder and snacking on the richness thereof. We can learn a lot from the

parasites that live in Pacific halibut. For several years we have funded a graduate student at the University of Alberta to examine the patterns of parasitism in Pacific halibut to see what those patterns may teach us about the movement and habits of halibut.

Altogether, we took samples from 20 localities from northern California to St. Matthew Island in the Bering Sea and examined 547 fish (115 recruits, 100 juveniles, and 332 subadults/adults). When we look at parasitism in halibut we are exploring in five different directions. We want to know the nature and extent of parasitism in halibut throughout its geographic range; the relationship between local and regional parasite patterns; whether parasites can help differentiate separate halibut stocks; whether there are any differences in parasitism based on size class, age, or maturity; and whether there are any potential effects of parasites on the fish themselves or the marketability of the fish.

We examine the patterns of parasitism in Pacific halibut to see what we can learn about the movement and habits of halibut.

Hey, who's your little buddy?

We found a plethora of different kinds of parasites in our sampling of halibut. A closer look at the creatures themselves revealed that 14 of the species were only present as juveniles. Halibut are most likely deadends for most of these parasites because most of the halibut in the size range we examined are not heavily preyed upon. The parasite fauna of Pacific halibut is fairly consistent oceanwide. Though work on halibut in the western Pacific is limited, the same parasites seem to infect halibut there as they do here in the eastern Pacific. The halibut has almost every parasite species its closes relative, the arrowtooth founder, has. The halibut also shares many parasites with other Pacific flatfish.

Many of the parasites we found live throughout the range of Pacific halibut, though there do appear to be three distinct zoogeographic zones.

Many of the parasites we found live throughout the North American range of Pacific halibut, though there do appear to be three distinct zoogeographic zones in which different species appear in varying abundances. Some species are present primarily from California to the Queen Charlotte Islands, some species are more common in the Gulf of Alaska, and some species prefer the grounds north of Nagai Island into the Bering Sea. There are also species that are present virtually everywhere but have latitudinal gradients of prevalence from south to north, or vice versa, making boundaries between the three zones less clear. Presumably, fish migration blurs the boundaries somewhat, but the three geographic zones these parasites have defined for us indicate that larger fish generally do not move long distances.

Different parasites inhabit halibut of different size classes.

We looked in particular at the parasites in 245 fish from 15 individual (or closely adjacent) hauls to see whether parasite communities are distinctive to specific localities or brouder regions. We found that the parasite mix present in halibut is determined, at least to some extent, by the specific locality the fish inhabits: but we also found that the number of less common parasite species is determined by the number of parasite species in the geographic zone the fish inhabits. In other words, the region a fish lives in determines how many parasite species it might play host to.

As halibut grow, their diet changes to a more diverse invertebrate and fish menu, and this may be why some parasites disappear and others become

more populous in older fish. Fish in the intermediate size class appear to have more gastrointestinal species than larger fish, even those in the same general locality, a shift that tells of a halibut's tendency to narrow its menu choices to a mostly fish-based diet as it ages.

There are no significant differences in parasites between male and female halibut, nor have we found much difference between the sub-adult and adult classes. Size, rather than maturity, seems to be responsible for differences in parasitism: simply put, bigger, faster-growing fish hold more worms. We also are studying the overall health of halibut using liver weights as an index of body condition in relation to worm number.

We hope to complete the parasite project, and be able to share some new knowledge about parasites and their effects on Pacific halibut and the consumers who love to eat them, by the summer of 1996.

THE SILENT SONG OF FISHES: TAGGING STUDIES TELL US SO MUCH

Fishes dance to the swing time of the tidal orchestra but they never sing. The only way we have to hear their story is to get to know them personally and this we do, as best we can, with tagging studies.

Sport harvesters are a crucial part of the tagging activities that expand our knowledge base of Pacific halibut.

This year we caught, tagged and released 4,904 halibut as part of two different projects. Every year the Homer Derby Association tags a chorus line of halibut for its Homer Halibut Derby -- this year they tagged 52 in the Cook Inlet. This small tagging project, in conjunction with other sport tagging programs, engages sport harvesters in the crucial task of expanding our knowledge base of Pacific halibut.

The testament of the trawl

The rate of halibut deaths from harvest as bycatch in the trawl fisheries is estimated according to a number of factors. But what really happens to the halibut caught that way? We decided to take a look, and in the spring of 1995, using $30,000 in IPHC research funds, $20,000 from the U of W School of Fisheries, and proceeds from the 500 mt of groundfish we would harvest, we launched a research cruise, along with researchers from the University of

For this project we trawled the bottom, tagged the halibut that came up in the net, and put a few of them in underwater cages to observe in person their short-term survival rates.

Washington's Fisheries Research Institute (FRI). We boarded the *F/V Forum Star* in Kodiak, Alaska on April 20 and during the next four weeks we trawled the bottom, tagged the halibut that came up in the net, and put a few of them in underwater cages to observe in person their short-term survival rates. We designed this project to update some old research conducted in the bottom trawl fishery off Canada in the early 1970s, and to supplement a caging research project that FRI conducted from 1992 through 1994.

During this cruise we hoped to tag approximately 10,000 halibut, but from 40 tows in 15 days we were able to tag only 4,852 fish that were hauled up in the trawl gear. In addition to the size and condition of the fish, we also recorded the length of time the fish spent on deck between haul and release, and even the weather conditions on deck. Halibut ranged in size from 20 cm to 164 cm in total length and the mean length was 62.5 cm. The condition of the halibut at their release varied dramatically, and was strongly determined by the variables we are exploring: fish size, catch size, tow duration, and time on deck. Most halibut were in excellent condition for the first 20 minutes on deck, but began failing soon after the 20-minute mark. More than half of the halibut were dead after 40 minutes. Halibut were able to remain in excellent condition longer when the tow size was relatively small or when the deck was awash with seawater. Larger halibut held up in better condition longer than small halibut. Predictably, halibut were in worse condition in the 3-hour tows than those caught in the 1-hour tows. As the recovered tags find their way back to us over the next few years, they will add to our knowledge of the mortality of trawl-caught fish.

Most halibut were in excellent condition for the first 20 minutes on deck, but began failing soon after the 20-minute mark.

We retained 1,500 of the halibut (24 fish per haul) for observation in underwater cages. As each haul came aboard, we measured and tagged 24 halibut and distributed them among five cages. After ten minutes on deck the first cage was lowered overboard, followed by another cage at 20 minutes, one at 30, one at 40 and one at 60 minutes on deck. The caging experiment involved 504 halibut distributed among 84 cages. (One cage was lost and never recovered.) All the caged fish came from 20 tows (ten one-hour tows and ten three-hour tows) and for most of those the relative humidity on deck was 85 percent or higher; only two tows were brought aboard in fine, clear weather when humidity was lower. The cages were left to soak for four to five days and were then retrieved, and the fish measured and evaluated and finally released.

We also dropped eight baited pots alongside our experimental cages as controls to help determine whether confinement within the cages caused mortality. The pots were remodeled slightly, with a tunnel replacing one of the side doors, and were baited with herring. The tunnel entrance was geared with a weighted curtain of netting that would drop after 24 hours' soak time, triggered by a Galvanic Trigger Release device. After five days, one of the pots had caught three halibut, all of them alive and in excellent condition. Five of the eight pots contained 40 Pacific cod that appeared to be in lively condition with normal color and no visible damage. One contained a single arrowtooth flounder that was dead and decomposed. Two pots came up empty.

Meanwhile, the trawler had harvested 466 mt of groundfish, 63 percent of which was arrowtooth flounder. The rest of the catch was primarily shallow-water flatfish-rock sole, yellowfin sole and starry flounder. Pacific cod was

only 8 percent of the catch, pollock less than 1 percent, and the ubiquitous skates made their appearance, as usual. Individual tows yielded catches between 1.1 mt and almost 34 mt, though most of the tows were less than 20 mt in size.

Though we didn't quite tag as many halibut as we had wished, we still collected a large enough sampling to produce a meaningful analysis from three or four years' worth of tag recoveries. We were able, however, to work with halibut of all sizes caught at various tow speeds and durations, in various catch sizes, and this breadth of variables will enrich our data immeasurably.

Reading off the sheet music

Since 1993 more than 18,000 halibut have found themselves hauled to the surface, tagged and released, most of them in the Kodiak area. Each year we receive more and more tags, along with information about when and where each fish was caught, and each one expands our understanding of halibut behavior. This year we received 465 tags, 266 of them recovered in Kodiak. This is a vast increase over the 276 tags returned to us in 1994.

Most of the tags are recovered in the same area in which they were released. We have seen some halibut range north and south from their area of release, however, and most of the wanderlust we have seen comes from fish released in the Bering Sea who migrate southward to be harvested in other areas. The tag recoveries this year showed that eight Bering Sea fish headed east since their release; one was recovered in the Shumagin Islands, one off Kodiak Island, another off Yakutat. Four were recovered in Area 2B (two in the north half and one off Vancouver Island) and one fish traveled as far as Neah Bay, Washington.

By far the largest number of releases and recoveries occurred in Area 3A.

By far the largest number of releases and recoveries occurred in Area 3A. The majority of these recovered fish were the most recently tagged and many were recovered not far from their release site. But at least a few Area 3A fish wandered, too: eleven headed west; ten to adjacent Area 3B and one was recovered in the Bering Sea. Six fish traveled south (four into Area 2B and two to Area 2C). One of the Area 2B recoveries occurred off the northern part of Vancouver Island and was at large for only a year.

As the recovered tags find their way back to us over the next few years, they will add to our knowledge of the mortality of trawl-caught fish.

Tag recoveries are highest in the older experiments where fish have been available for capture the longest. Nearly half the tagged fish released in the Canadian Sitka Spot experiment of 1988 have now been recovered. We have recovered 28 percent of the tags from the 1989 Central Oregon study, and three percent of the tags from more recent longline mortality experiments in 1993 and 1994. We have the NMFS observer program to thank for many of our tag recoveries. With more observers aboard the trawl and longline fleets off Alaska who are trained to recognize and collect tags, we have recovered more IPHC tags than ever in the past few years. We received close to 100 tags from observers in 1995.

Sport fishermen play their part

Tagging halibut helps us track the movements of fish over an extended period of time, and anything that increases our understanding of halibut seems to garner strong support from charter boat operators. We learned in 1994 that sport charter operators are willing and able to tag the fish brought aboard their boats in the catch and release fishery, and their participation significantly increases the pool of tagged halibut throughout the region. Charter operators now contribute significantly to our bank of knowledge.

Charter skippers have become partners in halibut research because of their willingness to help with this tagging program.

Since 1993 we have distributed 5,200 tags to 100 charter operators. The basic tagging kit consists of tags, an applicator needle, and a log form to record release information about the fish. When a halibut is brought aboard, the operator presents a tagging certificate and pin (depicting an angler landing a halibut and words proclaiming "I Tagged a Halibut" and "Pacific Halibut Tag and Release.") to the client who landed the fish. Skippers are also offered an optional tagging pennant to fly from their vessel on days they tag halibut. Later on, when the fish is landed and its tag returned to the IPHC, we forward the recapture data to the charter operators, who in turn informs the client what we have learned about his or her tagged fish.

The program started out with two types of tags for different-sized fish. The larger tag, with a stainless steel head, was designed for use on halibut too large to bring on board, and was applied over the side of the vessel. But fish processing companies objected to this type of tag, citing liability concerns in case one of the metal heads was inadvertently left in the flesh. This year we discontinued them, and all halibut were tagged with devices that have smaller, plastic barbed heads. Tags were to be inserted in the nape or just behind the head of the fish, a spot that neither harms the fish nor downgrades it at the processing plant. We discouraged tagging halibut under ten pounds because fish that small sometimes die from the damage.

The tags cost operators 60¢ each, including certificate and pin. The applicator needle costs $3.00 and pennants $15.00-all charges designed to partially offset costs of the program to the IPHC. The needles are durable and will last indefinitely if not lost or abused. We suggested mounting the needles into a broom handle, which made a good tagging pole. We provided mounting instructions with each order. Skippers can also order commercial tagging poles from outdoor recreation catalogs if they want to.

Since the program began in 1993, we have received sport tag release information from 33 participants. Our first tag recovery was from a group released in the 1993 pilot program near Hippa Island in northern British Columbia, and was recovered by a commercial longline vessel. Sixty-nine tags have been recovered from the sport tagging venture, and as expected, most of the recoveries occurred in Area 2C, often near where they were released.

Three of the fish, however, had road fever and were recaptured far from their release sites. The first was a 36-inch halibut released in July 1994 near Hein Bank in Puget Sound and recovered by a Canadian longliner out by Cape St. James in November 1994. Two other halibut that were released near Sitka in the summer of 1994 were harvested by longline vessels near Yakutat in March 1995. A fourth fish, released near Sitka in September 1994, was captured by Canadian longliners in western Queen Charlotte Sound in late April 1995.

Twenty charter operators notified us that they received tagging kits from us in 1994 but did not release any tagged fish, but the fate of over 2,000 tags remains unknown. Three operators released tags in more than one regulatory area in 1994.

A core group of charter operators has enthusiastically embraced the sport tagging program, and we are thankful for their support. However, the troubling issue remains that nearly 40 percent of the tags we have sent out remain unaccounted for. We hope to do what we can to encourage the crucial cooperation of charter operators, whose efforts will help make the sport tagging project a success.

THESE PARALLEL LIVES

No matter how much research we do, no matter how many studies we conduct or policies we recommend, we do not have complete dominion over these creatures we call our own, the Pacific halibut or any other species who live their lives along the longitude of their own instinctual reckoning. The flatbottomed halibut live parallel to the seabottom, and we stand as vertical as light rays, and the most we can do is extend our understanding but not our claim. Fishing is not viviculture. We can draw lines in the sea but we can never own what lives there. Pacific halibut and other fish live in the gaps between our experience and our curiosity can never be fully owned.

"You can lure them, net them, troll for them, club them, clutch them, chase them up an inlet, stun them, catch them in a wooden wheel that runs all night -- and you still might starve," Annie Dillard wrote. "They are there, they are certainly there, free, food, and wholly fleeting. You can see them if you want to; catch them if you can."

APPENDICES

The tables in Appendix I provide catch information for the 1995 commercial and tribal fisheries. The areas specified are the IPHC regulatory areas, depicted in Figure 1 of this report. Appendix II shows the fishing period limits used during the 1995 west coast seasons, and Appendix III shows the current sport fishing statistics.

All of the weights used are dressed (eviscerated), head off. Round weight can be calculated by multiplying the dressed weight by a factor of 1.33.

APPENDIX I

Table 1. Commercial catch of Pacific halibut by regulatory area (thousands of pounds) for 1991 through 1995.

Table 2. Fishing periods, number of fishing days, catch limit, commercial, research and total catch (thousands of pounds) by regulatory area for the 1995 Pacific halibut commercial fishery.

Table 3. Number of vessels and catch (thousands of pounds) of Pacific halibut by vessel length class in the 1995 commercial fishery. Information shown for Area 2A does not include the treaty Indian commercial fishery.

Table 4. Commercial landings in 1995 of Pacific halibut for port and country (thousands of pounds).

Table 5. Total pounds (thousands) of 1995 commercial landings, including research, of Pacific halibut for Alaska and British Columbia by regulatory area and month.

Table 6. Commercial halibut fishery catch (thousands of pounds) in 1995 by country, statistical area, and regulatory area.

APPENDIX II

Table 1. The fishing period limits used in the directed commercial fishery in Area 2A.

Table 2. Metlakatla community fishing periods, number of vessels, and catch in 1995.

APPENDIX III

Table 1. Catch by sport fishers (thousands of pounds) by area, 1990-1994.

Table 2. 1995 catch allocations and estimates by subarea (pounds, net weight) within regulatory Area 2A.

APPENDIX I

Table 1. Commercial catch of Pacific halibut by regulatory area (thousands of pounds) for 1991 through 1995.

REGULATORY AREA	1991	1992	1993	1994	1995
2A	355	437	504	370	297
2B	7,168	7,626	10,628	9,911	9,625
2C	8,687	9,819	11,290	10,379	7,761
3A	22,858	26,782	22,738	24,844	18,342
3B	11,934	8,620	7,855	3,860	3,122
4A	2,255	2,699	2,561	1,803	1,617
4B	1,513	2,417	1,962	2,017	1,680
4C	678	793	831	715	668
4D	1,437	727	836[1]	711[1]	643
4E	104	72	64	120	127
Total	**56,989**	**59,892**	**59,269**	**54,730**	**43,882**

[1] Includes < 1,000 pounds in 1993 and 18 ,000 pounds in 1994 from Subarea 4D-N

APPENDIX I

Table 2. Fishing periods, number of fishing days, catch limit, commercial, research and total catch (thousands of pounds) by regulatory area for the 1995 Pacific halibut commercial fishery.

AREA	FISHING PERIOD	NO. OF DAYS	CATCH LIMIT	COMMERCIAL CATCH	RESEARCH CATCH	TOTAL CATCH
2A- treaty Indian	3/05 - 6/12	7 days directed, also incidental fisheries	171	176		176
2A-incidenatal	5/01 - 7/2	63	16[1]	2	-	2
2A directed	7/05[2] 7/18[2] 8/01[2] 8/15[2] 8/29[2] 9/12[2] 9/26[2]	10 hrs 10 hrs 10 hrs 10 hrs 10 hrs 10 hrs 10 hrs	91 (105)[1]	14 25 6 28 21 6 6 105	14	119
2B	3/15 - 11/15	245	9,520[3]	9,512	113	9,625
2C[4]	3/15 - 11/15	245	9,000	7,766	-	7,761
3A	3/15 - 11/15	245	20,000	18,132	200	18,342
3B	3/15 - 11/15	245	3,700	3,117	10	3,122
4A	3/15 - 11/15	245	1,950	1,617	-	1,617
4B	3/15 - 11/15	245	2,310	1,680	-	1,680
4C	3/15 - 11/15	245	770	668	-	668
4D	3/15 - 11/15	245	770	643	-	643
4E	3/15 - 11/15	245	120	127	-	127
TOTAL			**48,418**	**43,545**	**337**	**43,882**

1 14,000 pounds carried over to directed commercial catch limit.

2 Fishing period limits by vessel class.

3 An additional 131,000 pounds available as carryover from 1994.

4 Includes 52,000 pounds taken by Metlakatla Indians during additional fishing within reservation waters.

APPENDIX I

Table 3. Number of vessels and catch (thousands of pounds) of Pacific halibut by vessel length class in the 1995 commercial fishery. Information shown for Area 2A does not include the treaty Indian commercial fishery.

Overall Vessel Length	Area 2A		Area 2B	
	No. of Vessels	Catch (000's lbs.)	No. of Vessels	Catch (000's lbs.)
Unk. Length	7	<1	16	398
<26 ft.	17	8	1	17
26 to 30 ft.	7	1	2	29
31 to 35 ft.	8	1	26	477
36 to 40 ft.	27	32	66	1,378
41 to 45 ft.	22	25	84	2,537
46 to 50 ft.	16	21	33	1,253
51 to 55 ft.	7	15	30	1,548
56+ ft.	4	17	38	1,988
Total	115	121	296	9,625

Overall Vessel Length	Area 2C		Area 3A	
	No. of Vessels	Catch (000's lbs.)	No. of Vessels	Catch (000's lbs.)
Unk. Length	38	41	17	191
<26 ft.	127	204	55	67
26 to 30 ft.	69	174	41	73
31 to 35 ft.	131	543	146	725
36 to 40 ft.	223	1,223	169	1,051
41 to 45 ft.	165	1,309	186	1,777
46 to 50 ft.	150	1,561	149	1,702
51 to 55 ft.	63	772	58	1,346
56+ ft.	190	1,934	336	11,410
Total	1,156	7,761	1,157	18,342

Overall Vessel Length	Area 3B		Area 4	
	No. of Vessels	Catch (000's lbs.)	No. of Vessels	Catch (000's lbs.)
Unk. Length	7	44	23	207
<26 ft.	1	2	103	295
26 to 30 ft.	0	0	26	336
31 to 35 ft.	22	61	30	281
36 to 40 ft.	25	73	1	15
41 to 45 ft.	40	176	4	50
46 to 50 ft.	33	175	11	104
51 to 55 ft.	18	89	5	144
56+ ft.	171	2,502	103	3,303
Total	317	3,122	306	4,735

APPENDIX I

Table 4. Commercial landings in 1995 of Pacific halibut for port and country (thousands of pounds).

Ports	Canada	United States	Total
California & Oregon		414	414
Seattle	8	1,062	1,070
Bellingham	84	1,308	1,392
Misc. Washington		370	370
Vancouver	2,083		2,083
Port Hardy	2,801		2,801
Misc. Southern B.C.	811		811
Prince Rupert	3,672	527	4,199
Misc. Northern B.C.	166		166
Ketchikan, Craig, & Metlakatla		887	887
Wrangell		446	446
Petersburg, Kake		2,718	2,718
Juneau		466	466
Sitka		2,807	2,807
Hoonah, Excursion, & Pelican		1,974	1,974
Misc. Southeast Alaska		340	340
Cordova		829	829
Seward		2,770	2,770
Homer		3,303	3,303
Kenai		251	251
Kodiak		7,720	7,720
Chignik, King Cove, & Sand Point		994	994
Misc. Central Alaska		903	903
Akutan & Dutch Harbor		3,153	3,153
Misc. Bering Sea		1,015	1,015
Total	**9,625**	**34,257**	**43,882**

APPENDIX I

Table 5. Total pounds (thousands) of 1995 commercial landings, including research, of Pacific halibut for Alaska and British Columbia by regulatory area and month.

AREA	MARCH	APRIL	MAY	JUNE	JULY	AUG.	SEPT.	OCT.	NOV.	TOTAL
Area 2C	220	604	1,265	1,559	459	1,036	1,448	892	278	7,761
Area 3A	269	1,239	2,385	2,884	1,485	2,280	3,468	2,743	1,589	18,342
Area 3B	0	80	382	312	441	461	794	429	223	3,122
Area 4A	0	<1	151	302	367	304	321	108	64	1,617
Area 4B	0	0	125	267	466	300	217	193	112	1,680
Area 4C	0	0	0	279	223	120	46	0	0	668
Area 4D	0	0	0	195	258	92	14	49	35	643
Area 4E	0	0	10	91	26	0	0	0	0	127
Alaskan Total	489	1,923	4,318	5,889	3,725	4,593	6,308	4,414	2,301	33,960
Area 2B	1,225	1,388	1,189	1,037	1,222	1,233	882	789	660	9,625

APPENDIX I

Table 6. Commercial halibut fishery catch (thousands of pounds) in 1995 by country, statistical area, and regulatory area.

Country	Statistical Area	Catch	Regulatory Area	Catch
United States	00-03	114	2A	297
	04	11		
	05	172		
Canada	06	118	2B	9,625
	07	55		
	08	606		
	09-O	368		
	09-I	429		
	10-O	734		
	10-I	1,554		
	11-O	233		
	11-I	1,222		
	12-O	179		
	12-I	238		
	13-O	852		
	13-I	3,037		
United States	14-O	37	2C	7,761
	14-I	521		
	15-O	256		
	15-I	1,037		
	16-O	1,093		
	16-I	1,758		
	17-O	1,057		
	17-I	430		
	18S-O	663		
	18S-I	909		
	18W	1,461	3A	18,342
	19	563		
	20	619		
	21	618		
	22	430		
	23	691		
	24	1,869		
	25	2,147		
	26	3,058		
	27	3,314		
	28	3,572		
	29	1,345	3B	3,122
	30	375		
	31	286		
	32	518		
	33	359		
	34	239		
	35	305	4	4,735
	36	386		
	37	32		
	38	85		
	39	0		
	40	102		
	41	98		
	42+	486		
	Bering Sea	3,241		

APPENDIX II

Table 1. The fishing period limits used in the directed commercial fishery in Area 2A.

VESSEL LTR	CLASS FT.	FISHING PERIOD 7/5	7/18	8/1	8/15	8/29	9/12	9/26
A	0 - 25	200	200	200	335	200	200	200
B	26-30	200	210	210	420	210	200	200
C	31-35	200	335	335	670	335	200	250
D	36-40	465	925	925	1,850	925	465	695
E	42-45	500	995	995	1,990	995	500	750
F	46-50	595	1,190	1,190	2,385	1,190	595	895
G	51 - 55	665	1,330	1,330	2,660	1,330	665	1,000
H	56 +	1,000	2,000	2,000	4,000	2,000	1,000	1,500

Table 2. Metlakatla community fishing periods, number of vessels, and catch in 1995.

FISHING DATES	NUMBER OF VESSELS	CATCH
May 26 - 28	5	4,683
June 3 - 5	9	5,185
June 10 - 12	8	5,132
June 16 -18	9	8,020
June 23 -25	9	4,034
June 30 - July 2	6	1,380
July 14 - 16	6	4,721
July 28 - 30	6	3,801
Aug 11 - 13	6	4,632
Aug 25 - 27	10	7,127
Sept 8 - 10	2	654
Sept 22 - 24	4	1,423
Oct 6 - 8	5	1,057

APPENDIX III

Table 1. Catch by sport fishers (thousands of pounds) by area, 1990-1994.

Area	1990	1991	1992	1993	1994
2A	197	158	250	246	186
2B	762	584	579	657	657
2C	1,330	1,654	1,668	1,811	2,001
3	3,638	4,236	3,899	5,265	4,487
4	40	74	40	72	51
Total	**5,967**	**6,706**	**6,436**	**8,051**	**7,382**

Table 2. 1995 catch allocations and estimates by subarea (pounds, net weight) within regulatory Area 2A.

Sub Area	Allocation	Catch Estimate
WA Inside Waters	71,410	69,374
WA North Coast	34,653	38,500
WA South Coast	15,222	15,610
Columbia River	4,617	1,426
OR Central Coast (all depths)	67,706	76,177
OR Central Coast (<30 fathoms)	3,314	4,953
OR South Coast (all depths)	5,999	5,526
OR South Coast (<30 fathoms)	1,500	12
OR Coast	23,674	21,835
California	2,785	2,785
Total	**230,880**	**236,198**

[1]After accounting for underages and overages in previous openings from Cape Falcon to the California border, 15,525 pounds remained to be harvested.

PUBLICATIONS 1995

The IPHC publishes three serial publications - Annual Reports, Scientific Reports, and Technical Reports - and also prepares and distributes regulation pamphlets and information bulletins. Items produced during 1995 by the Commission and staff are shown below. A list of all Commission publications is shown on the following pages. Commission materials are available upon request free of charge.

CALENDAR YEAR 1995

Clark, William G. and Ana M. Parma. 1995. Re-evaluation of the 32-inch commercial size limit. International Pacific Halibut Commission Technical Report No. 33. 34 p.

Gilroy, Heather L, Joan E. Forsberg, and William G. Clark. 1995. Changes in commercial catch sampling and age determination procedures for Pacific halibut 1982 to 1993. International Pacific Halibut Commission Technical Report No. 32. 44 p.

Hilborn, Ray, John Skalski, Alejandro Anganuzzi, and Annette Hoffman. School of Fisheries, University of Washington. 1995. Movements of Juvenile Halibut in IPHC Regulatory Areas 2 and 3. International Pacific Halibut Commission Technical Report No. 31. 44 p.

International Pacific Halibut Commission. 1995. Annual Report, 1994. 55 p.

_____. 1995. Pacific halibut fishery regulations 1995. 13 p.

McCaughran, Donald A. 1995. Flatfish management in the eastern Pacific Ocean with special reference to Pacific halibut. Pages 3-15 [IN] Proceedings of the International Symposium on North Pacific Flatfish. Alaska Sea Grant Program Report No. 95-04, University of Alaska Fairbanks.

Sadorus, Lauri L. and Gilbert St-Pierre. 1995. IPHC research and management of Pacific halibut in the Pribilof Islands through 1994. International Pacific Halibut Commission Technical Report No. 34. 35 p.

Trumble, Robert J., Gregg H. Williams, and Steven E. Hughes. 1995. Methods to improve survival of Pacific halibut bycatch discarded from a factory trawler. Pages 591-610 [IN] Proceedings of the International Symposium on North Pacific Flatfish. Alaska Sea Grant College Program Report No. 95-04, University of Alaska Fairbanks.

Williams, Gregg H. and Thomas K. Wilderbuer. 1995. Discard mortality rates of Pacific halibut bycatch: Fishery differences and trends during 1990-1993. Pages 611-622 [IN] Proceedings of the International Symposium on North Pacific flatfish. Alaska Sea Grant College Program Report No. 95-04, University of Alaska Fairbanks.

Walters, C. and A. M. Parma. 1995. Fixed exploitation rate strategies for coping with effects of climate change. Can. J. Fish. Aquat. Sci. (In press).

COMMISSION PUBLICATIONS 1930-1995

REPORTS

1. Report of the International Fisheries Commission appointed under the Northern Pacific Halibut Treaty. John Pease Babcock, William A. Found, Miller Freeman, and Henry O' Malley. 31 p. (1931).[Out of print]
2. Life history of the Pacific halibut. Marking experiments. William F. Thompson and William C. Herrington. 137 p. (1930).
3. Determination of the chlorinity of ocean waters. Thomas G. Thompson and Richard Van Cleve. 14 p. (1930).
4. Hydrographic sections and calculated currents in the Gulf of Alaska, 1927 and 1928. George F. McEwen, Thomas G. Thompson, and Richard Van Cleve. 36 p. (1930).
5. History of the Pacific halibut fishery. William F. Thompson and Norman L. Freeman. 61 p. (1930).
6. Biological statistics of the Pacific halibut fishery. Changes in the yield of a standardized unit of gear. William F. Thompson, Harry A. Dunlop, and F. Heward Bell. 108 p. (1930). [Out of print]
7. Investigations of the International Fisheries Commission to December 1930, and their bearing on the regulation of the Pacific halibut fishery. John Pease Babcock, William A. Found, Miller Freeman, and Henry O'Malley. 29 p. (1930). [Out of print]
8. Biological statistics of the Pacific halibut fishery, Effects of changes in intensity upon total yield and yield per unit of gear. William F. Thompson and F. Heward Bell. 49 p. (1934). [Out of print]
9. Life history of the Pacific halibut - Distribution and early life history. William F. Thompson and Richard Van Cleve. 184 p. (1936). [Out of print]
10. Hydrographic sections and calculated currents in the Gulf of Alaska. 1929. Thomas G. Thompson, George F. McEwen, and Richard Van Cleve. 32 p. (1936).
11. Variations in the meristic characters of flounder from the northeastern Pacific. Lawrence D. Townsend. 24 p. (1936).
12. Theory of the effect of fishing on the stock of halibut. William F. Thompson. 22 p. (1937).
13. Regulation and investigation of the Pacific halibut fishery in 1947 (Annual Report). IFC. 30 p. (1948).
14. Regulation and investigation of the Pacific halibut fishery in 1948 (Annual Report). IFC. 30 p. (1949).
15. Regulation and investigation of the Pacific halibut fishery in 1949 (Annual Report). IFC. 24 p. (1951).
16. Regulation and investigation of the Pacific halibut fishery in 1950 (Annual Report). IFC. 16 p. (1951).
17. Pacific Coast halibut landings 1888 to 1950 and catch according to areas of origin. F. Heward Bell, Henry A. Dunlop, and Norman L. Freeman. 47 p. (1952).
18. Regulation and investigation of the Pacific halibut fishery in 1951 (Annual Report). Edward W. Allen, George R. Clark, Milton C. James, and George W. Nickerson. 29 p. (1952).

19. The production of halibut eggs on the Cape St. James spawning bank off the coast of British Columbia 1935-1946. Richard Van Cleve and Allyn H. Seymour. 44 p. (1953).
20. Regulation and investigation of the Pacific halibut fishery in 1952 (Annual Report). Edward W. Allen, George R. Clark, Milton C. James, George W. Nickerson, and Seton H. Thompson. 29 p. (1953).
21. Regulation and investigation of the Pacific halibut fishery in 1953 (Annual report). IPHC. 22 p. (1954).
22. Regulation and investigation of the Pacific halibut fishery in 1954 (Annual Report). IPHC. 32 p. (1955).
23. The incidental capture of halibut by various types of fishing gear. F. Heward Bell. 48 p. (1955).
24. Regulation and investigation of the Pacific halibut fishery in 1955 (Annual Report). IPHC 15 p. (1956).
25. Regulation and investigation of the Pacific halibut fishery in 1956 (Annual Report). IPHC. 27 p. (1957).
26. Regulation and investigation of the Pacific halibut fishery in 1957 (Annual report). IPHC. 16 p. (1958).
27. Regulation and investigation of the Pacific halibut fishery in 1958 (Annual Report). IPHC. 21 p. (1959).
28. Utilization of Pacific halibut stocks: Yield per recruitment. IPHC Staff. 52 p. (1960).
29. Regulation and investigation of the Pacific halibut fishery in 1959 (Annual Report). IPHC. 17 p. (1960).
30. Regulation and investigation of the Pacific halibut fishery in 1960 (Annual Report). IPHC. 24 p. (1961).
31. Utilization of Pacific halibut stocks: Estimation of maximum sustainable yield, 1960. Douglas G. Chapman, Richard J. Myhre, and G. Morris Soutward, 35 p. (1962).
32. Regulation and investigation of the Pacific halibut fishery in 1961 (Annual Report). IPHC. 23 p. (1962).
33. Regulation and investigation of the Pacific halibut fishery in 1962 (Annual Report). IPHC. 27 p. (1963).
34. Regulation and investigation of the Pacific halibut fishery in 1963 (Annual Report). IPHC. 24 p. (1964).
35. Investigation, utilization and regulation of the halibut in southeastern Bering Sea. Henry A. Dunlop, F. Heward Bell, Richard J. Myhre, William H. Hardman, and G. Morris Soutward. 72 p. (1964).
36. Catch records of a trawl survey conducted by the International Pacific Halibut Commission between Unimak Pass and Cape Spencer, Alaska from May 1961 to April 1963. IPHC. 524 p. (1964).
37. Sampling the commercial catch and use of calculated lengths in stock composition studies of Pacific halibut. William H. Hardman and G. Morris Southward, 32 p. (1965).
38. Regulation and investigation of the Pacific halibut fishery in 1964 (Annual Report). IPHC 18 p. (1965).
39. Utilization of Pacific halibut stocks: Study of Bertalanffy's growth equation. G. Morris Southward and Douglas G. Chapman. 33 p. (1965).
40. Regulation and investigation of the Pacific halibut fishery in 1965 (Annual Report). IPHC. 23 p. (1966).
41. Loss of tags from Pacific halibut as determined by double-tag experiments. Richard J. Myhre. 31 p. (1966).
42. Mortality estimates from tagging experiments on Pacific halibut. Richard J. Myhre. 43 p. (1967).
43. Growth of Pacific halibut. G. Morris Southward. 40 p. (1967).
44. Regulation and investigation of the Pacific halibut fishery in 1966 (Annual Report). IPHC 24 p. (1967).
45. The halibut fishery, Shumagin Islands westward not including Bering Sea. F. Heward Bell. 34 p. (1967).
46. Regulation and investigation of the Pacific halibut fishery in 1967 (Annual Report). IPHC. 23 p. (1968).
47. A simulation of management strategies in the Pacific halibut fishery. G. Morris Southward. 70 p. (1968).

48. The halibut fishery south of Willapa Bay, Washington. F. Heward Bell and E.A. Best. 36 p. (1968).
49. Regulation and investigation of the Pacific halibut fishery in 1968 (Annual report). IPHC. 19 p. (1969).
50. Agreements, conventions and treaties between Canada and the United States of America with respect to the Pacific halibut fishery. F. Heward Bell. 102 p. (1969). [Out of print]
51. Gear selection and Pacific halibut. Richard J. Myhre. 35 p. (1969).
52. Viability of tagged Pacific halibut. Gordon J. Peltonen. 25 p. (1969).

SCIENTIFIC REPORTS

53. Effects of domestic trawling on the halibut stocks of British Columbia. Stephen H. Hoag. 18 p. (1971).
54. A reassessment of effort in the halibut fishery. Bernard E. Skud. 11 p. (1972).
55. Minimum size and optimum age of entry for Pacific halibut. Richard J. Myhre. 15 p. (1974).
56. Revised estimates of halibut abundance and the Thompson-Burkenroad debate. Bernard Einar Skud. 36 p. (1975).
57. Survival of halibut released after capture by trawls. Stephen H. Hoag. 18 p. (1975).
58. Sampling of landings of halibut for age composition. G. Morris Southward. 31 p. (1976).
59. Jurisdictional and administrative limitations affecting management of the halibut fishery. Bernard Einar Skud. 24 p. (1976).
60. The incidental catch of halibut by foreign trawlers. Stephen H. Hoag and Robert R. French. 24 p. (1976).
61. The effect of trawling on the setline fishery for halibut. Stephen H. Hoag. 20 p. (1976).
62. Distribution and abundance of juvenile halibut in the southeastern Bering Sea. E.A. Best. 23 p. (1977). Drift, migration, and intermingling of Pacific halibut stocks. Bernard Einar Skud. 42 p. (1977).
63. Drift, migration, and intermingling of Pacific halibut stocks. Bernard Einar Skud. 42 p. (1977).
64. Factors affecting longline catch and effort: I. General review. Bernard E. Skud; II. Hookspacing. John M. Hamley and Bernard E. Skud; III. Bait loss and competition. Bernard E. Skud. 66 p. (1978). [Out of print]
65. Abundance and fishing mortality of Pacific halibut, cohort analysis, 1935-1976. Stephen H. Hoag and Ronald J. McNaughton, 45 p. (1978).
66. Relation of fecundity to long-term changes in growth, abundance and recruitment. Cyreis C. Schmitt and Bernard E. Skud. 31 p. (1978).
67. The Pacific halibut resource and fishery in regulatory Area 2; I. Management and biology. Stephen H. Hoag, Richard J. Myhre, Gilbert St-Pierre, and Donald A. McCaughran. II. Estimates of biomass, surplus production, and reproductive value. Richard B. Deriso and Terrance J. Quinn, II. 89 p. (1983).
68. Sampling Pacific halibut (*Hippoglossus stenolepis*) landings for age composition: History, evaluation, and estimation. Terrance J. Quinn, II, E.A. Best, Lia Bijsterveld, and Ian R. McGregor. 56 p. (1983).
69. Comparison of efficiency of snap gear to fixed-hook setline gear for catching Pacific halibut. Richard J. Myhre and Terrance J. Quinn, II. 37 p. (1984).
70. Spawning locations and season for Pacific halibut. Gilbert St-Pierre. 46 p. (1984).
71. Recent changes in halibut CPUE: Studies on area differences in setline catchability. Stephen H. Hoag, Richard B. Deriso, and Gilbert St-Pierre. 44 p. (1984).
72. Methods of population assessment of Pacific halibut. Terrance J. Quinn, II, Richard B. Deriso, and Stephen H. Hoag. 52 p. (1985).
73. Recent studies of Pacific halibut postlarvae in the Gulf of Alaska and eastern Bering Sea. Gilbert St-Pierre. 31 p. (1989).
74. Evaluation of Pacific halibut management for Regulatory Area 2A, I. Review of the Pacific halibut fishery in Area 2A, II. Critique of the Area 2A stock assessment. Robert J. Trumble, Gilbert St-Pierre, Ian R. McGregor and William G. Clark. 44 p. (1991).
75. Estimation of halibut body size from otolith size. William G. Clark. 31 p. (1992).
76. Mark recapture methods for Pacific halibut assessment: a feasibility study conducted off the central coast of Oregon. Patrick J. Sullivan, Tracee O. Geernaert, Gilbert St-Pierre, and Steven

M. Kaimmer. 35 p. (1993).
77. Further studies of area differences in setline catchability of Pacific halibut. Steven M. Kaimmer and Gilbert St-Pierre. 59 p. (1993).
78. Pacific halibut bycatch in the groundfish fisheries: Effects on and management implications for the halibut fishery. Patrick J. Sullivan, Robert J. Trumble, and Sara A. Adlerstein. 28 p. (1994).

TECHNICAL REPORTS

1. Recruitment investigations: Trawl catch records Bering Sea, 1967. E.A. Best. 23 p. (1969).
2. Recruitment investigations: Trawl catch records Gulf of Alaska, 1967. E.A. Best. 32 p. (1969).
3. Recruitment investigations: Trawl catch records Eastern Bering Sea, 1968 and 1969. E.A. Best. 24 p. (1969).
4. Relationship of halibut stocks in Bering Sea as indicated by age and size composition. William H. Hardman. 11 p. (1969).
5. Recruitment investigations: Trawl catch records Gulf of Alaska, 1968 and 1969. E.A. Best. 48 p. (1969).
6. The Pacific halibut. F. Heward Bell and Gilbert St-Pierre. 24 p. (1970). [Out of print]
7. Recruitment investigations: Trawl catch records Eastern Bering Sea, 1963, 1965,and 1966. E.A. Best. 52 p. (1970).
8. The size, age and sex composition of North American setline catches of halibut (*Hippoglossus stenolepis*) in Bering Sea, 1964-1970. William H. Hardman. 31 p. (1970).
9. Laboratory observations on early development of the Pacific halibut. C.R. Forrester and D.G. Alderdice. 13 p. (1973).
10. Otolith length and fish length of Pacific halibut. G. Morris Southward and William H. Hardman. 10 p. (1973).
11. Juvenile halibut in the eastern Bering Sea: Trawl surveys, 1970-1972. E.A. Best. 32 p. (1974).
12. Juvenile halibut in the Gulf of Alaska: Trawl surveys, 1970-1972. E.A. Best. 63 p. (1974).
13. The sport fishery for halibut: Development, recognition and regulation. Bernard Einar Skud. 19 p. (1975).
14. The Pacific halibut fishery: Catch, effort, and CPUE, 1929-1975. Richard J. Myhre, Gordon J. Peltonen, Gilbert St-Pierre, Bernard E. Skud, and Raymond E. Walden, 94 p. (1977).
15. Regulations of the Pacific halibut fishery, 1924-1976. Bernard E. Skud. 47 p. (1977).
16. The Pacific halibut: Biology, fishery, and management. International Pacific Halibut Commission. 56 p. (1978). [Out of print]
17. Size, age, and frequency of male and female halibut: Setline research catches, 1925-1977. Stephen H. Hoag, Cyreis C. Schmitt, and William H. Hardman. 112 p. (1979).
18. Halibut assessment data: Setline surveys in the north Pacific Ocean, 1963-1966 and 1976-1979. Stephen H. Hoag, Gregg H. Williams, Richard J. Myhre, and Ian R. McGregor. 42 p. (1980).
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INFORMATION BULLETINS

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ANNUAL REPORTS

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Annual Report 1977. 39 p. (1978).
Annual Report 1978. 40 p. (1979).[Out of print]
Annual Report 1979. 43 p. (1980).
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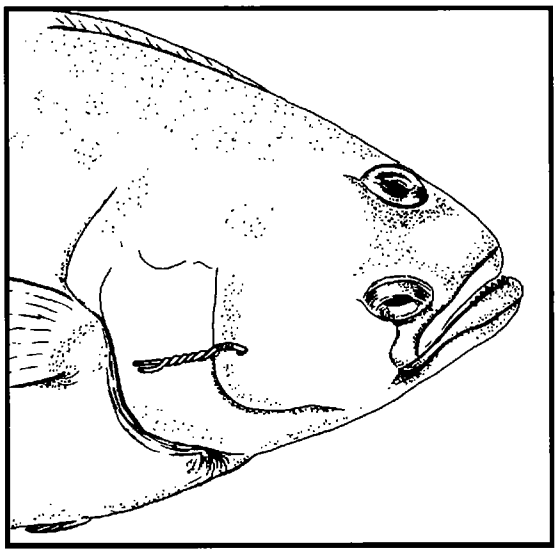
Annual Report 1981. 48 p. (1982).
Annual Report 1982. 56 p. (1983).[Out of print]
Annual Report 1983. 59 p. (1984).
Annual Report 1984. 63 p. (1985).[Out of print]
Annual Report 1985. 59 p. (1986).
Annual Report 1986. 73 p. (1987).[Out of print]
Annual Report 1987. 51 p. (1988).
Annual Report 1988. 62 p. (1989).[Out of print]
Annual Report 1989. 39 p. (1990).
Annual Report 1990. 52 p. (1991).
Annual Report 1991. 57 p. (1992).[Out of print]
Annual Report 1992. 57 p. (1993).
Annual Report 1993. 57 p. (1994).
Annual Report 1994. 55 p. (1995).

TAGGED HALIBUT

The INTERNATIONAL PACIFIC HALIBUT COMMISSION attaches plastic-coated wire tags to the cheek on the dark side of the halibut, as in the diagram below. Fishermen should retain all tagged halibut, regardless of gear type used, time of year caught, or size of the halibut.



REWARD

$5.00 or a baseball cap with tag reward logo will be paid for the return of each tag.

The IPHC also pays a reward for the return of Halibut Sport Tags:

1. A plastic-tipped dart tag inserted into the back just below the dorsal fin.
2. A metal-tipped tag inserted into the flesh behind the head.

WHEN YOU CATCH A TAGGED HALIBUT:

1. Record tag numbers, date, location and depth .
2. Leave the tag on the fish until landed.
3. If possible, mark the fish with a gangion or flagging tape around the tail.

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, fish length, and, if possible, the ear bones. Tags should be completely removed from the fish. Plastic-tipped and metal-tipped tags may need to be cut out of the fish.

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

International Pacific Halibut Commission
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Seattle, WA 98145-2009
Phone: (206) 634-1838