INTERNATIONAL PACIFIC HALIBUT COMMISSION

Annual Report
1996

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

Produced jointly by the IPHC staff
and
Krys Holmes, Winterholm Press
1997

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, as required by the Halibut Convention. 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 and industry; specifically the Conference Board and the Processor Advisory Group. 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.

The IPHC can now be visited on the Internet. Our Homepage address is:

http:\www.iphc.washington.edu

The following abbreviations are used throughout this report:

IPHC	International Pacific Halibut Commission
NMFS	National Marine Fisheries Service (United States)
DFO	Department of Fisheries and Oceans (Canada)
NPFMC	North Pacific Fishery Management Council
PFMC	Pacific Fishery Management Council
ADF&G	Alaska Department of Fish and Game
WDFW	Washington Department of Fish and Wildlife
ODFW	Oregon Department of Fish and Wildlife
IFQ	Individual Fishing Quota
IVQ	Individual Vessel Quota

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ACTIVITIES OF THE COMMISSION 1996

Our planet teems with 331 million cubic miles of ocean swarming with billions of living creatures and 32,000 different kinds of fishes. The undulating universe of the sea hides among its benthic secrets mountain ranges longer than the Andes, peaks higher than Mount Everest, and gorges deeper than the Grand Canyon. Nine-tenths of the ocean is deeper than 200 meters, and most of that is profound abyss from which bottom water may take two thousand years to circulate to the surface. On the broad shoulder of the North American continent, the mysteries we seek take on a familiar form. Where water eats light and bends sound, live the Pacific halibut, *Hippoglossus stenolepis*.

The sea, as Robert Browning would say, is "all a wonder and wild desire," and those who live by it or make their living harvesting its mysteries know this better than most. As time goes by, we strive to increase our wonder while managing our wild desire, which is, after all, what good stewardship of the earth's natural resources means.

Toward that end, the International Pacific Halibut Commission gathered for its seventy-second annual meeting in Bellevue, Washington in January 1996. Two issues in particular dominated the table at this meeting: dramatic shifts in stock assessment data, which show that the coastwide Pacific halibut stocks are significantly larger than previously estimated; and the continuing struggle to decrease halibut bycatch among other fisheries of the North Pacific.

Throughout the year, IPHC stock assessment biologists continued to study and recalculate data resulting from new stock assessment models that provide a clearer, more accurate interpretation of stock trends. The new information indicates that, though downward trends continue in halibut stocks coastwide (we believe this is due to recruitment decline that is perhaps influenced by environmental conditions), the overall biomass of Pacific halibut apparently is significantly larger than we previously thought. In fact, the new information indicates that halibut stocks may be twice as large as previously estimated.

The emerging information about stock assessments did not affect 1996 harvest limits, which were established in January. Near the end of the

year, IPHC Commissioners and biologists announced to the public and the seafood industry that the 1997 harvest limits would reflect the new stock estimates. The Commission decided to increase harvest limits by about 36 percent in 1997 in hopes of giving the industry the benefit of the new information without creating widespread instability in the marketplace.

As everyone but the fish themselves know by now, bycatch of non-target species remains one of the most entangled issues in the North Pacific fisheries today. In 1996, the Canadian government implemented an Individual Bycatch Quota (IBQ) program for trawlers, which helped reduce their halibut bycatch significantly. Coastwide, mortalities of both legal sized and sub-legal sized halibut bycatch have diminished from 20.3 million pounds in 1992 to 13.4 million pounds in 1996. The IPHC and the industry together are wrestling with the obstacles that seem to impede further progress toward decreasing halibut bycatch.

A few other concerns were raised during the public testimony session of the IPHC Annual Meeting, including curiosity about the cause of "chalky" halibut. The Commission asked the staff to gather as much information as possible on "chalky" fish and the matter would be considered further in 1997. The possibility of compensating Canada for halibut bycatch that occurs in the U.S. and the implementation of a system, whereby U.S.-caught fish that is landed in Canadian ports are market-tagged as product of the U.S., were also discussed.

Hot topics for 1996:

1) New data shows the Pacific halibut resource coastwide may be much larger than previously thought, though populations are still on a downward slide.

2) Bycatch remains the top concern of resource managers and harvesters.

GOVERNING OURSELVES IN THE GRANDEUR

The Commission holds three primary responsibilities in its stewardship of the Pacific halibut resource: setting harvest limits and other regulations governing use of the resource, monitoring stock abundance, and conducting scientific investigations into the biology, habits, habitat and the world of the Pacific halibut. The Commission monitors all uses of Pacific halibut, including commercial take, sport harvests, bycatch mortality, personal use and halibut lost as waste. In 1996, the total Pacific halibut harvest for all uses topped 70 million pounds, a volume comparable to the total take in 1995, and close to the average of the last thirty-five years.

The Commission continues to diligently work toward decreasing halibut bycatch and waste, while managing commercial, sport and personal

uses as wisely and judiciously as possible. For the 1996 harvesting year, the Commission adopted a string of regulations, most of them applying to the commercial fisheries. Some of the more significant regulations adopted were as follows:

1) The Area 2A catch sharing plan, as proposed by the Pacific Fishery Management Council (PFMC), was renewed. It divides use of the available halibut among commercial, recreational and treaty Indian fisheries off the coasts of Washington, Oregon and California.

2) Fishing season was set from March 15 through November 15 for Areas 2B, 2C, 3A, 3B, 4, and the Area 2A treaty Indian fishery. The Area 2A non-treaty Indian fishery was scheduled for six 10-hour fishing periods on July 10 and 24, August 14 and 28, and September 11 and 25.

3) The deadline for IPHC license applications in the Area 2A directed commercial fishery was set for April 30, and for the 2A incidental commercial fishery was April 1, as requested by the PFMC.

4) Vessels fishing in Area 4A and landing their total annual halibut catch within that area are exempt from clearance requirements. (This exemption already was in place for Areas 4B, 4C, 4D and 4E.)

5) Non-local vessel clearances required prior to fishing in Areas 4C and 4D are to be obtained at St. Paul or St. George Islands. Post-fishing clearances for these areas are allowed at St. Paul, St. George, Dutch Harbor or Akutan. Clearances obtained at St. Paul or St. George are allowed via VHF radio, provided visual identification of the vessel could be confirmed from shore.

6) Fishing in multiple sub-areas of Area 4 is allowed when an observer is aboard, provided the fish were separated and identifiable by area. Pre- and post-fishing clearance requirements apply.

7) Fishing is allowed in multiple areas within the Gulf of Alaska (Areas 2C, 3A and 3B) when an observer is aboard, provided fish are separated and identifiable by area.

8) Vessels on which a National Marine Fisheries Service (NMFS) logbook was used were not required to also keep a separate IPHC logbook.

9) The overage/underage plan for the U.S. Individual Fishing Quota (IFQ) fishery was approved, allowing quota harvesters to transfer to the next year small amounts of halibut that run either slightly over or slightly under the harvester’s quota.

10) Freezer longline vessels are allowed to “cheek” retained halibut at sea.

11) IPHC regulations were amended to prohibit fletching or filleting at sea.

12) In Canada, the possession limit for sport fishing was set at three fish, with a two-fish daily bag limit.

13) Northwest Food Strategies was authorized to process up to 50,000 pounds of halibut caught as bycatch, but only from those trawl vessels deemed by NMFS unfit to safely sort at sea and that therefore deliver their entire catch shoreside.

MONEY MATTERS AND FISCAL FARRAGOES

The two nations joined by the Halibut Convention are equally committed to the health and abundance of Pacific halibut, and so, by treaty, they equally contribute 50 percent of the Commission's basic annual budget, which, this year, was $800,000 per country. Combined with a variety of other funds, the Commission's total budget for the fiscal year of 1995-96 was $2,774,869.

During the fiscal year 1996-1997, the IPHC had $335,000 worth of new or continuing research projects on its plate including population assessment and bycatch statistics, fisheries oceanography research, data collection from surveys, halibut life history and DNA studies, and a sport tagging program. At the same time, other kinds of research projects and ongoing analyses continued throughout the year that did not require additional project funding. These projects included recalculating commercial age/size compositions, comparing trawl survey results and other measures of halibut abundance, looking into historical changes in halibut growth, analysis of various survey data, evaluating different management programs, and research into halibut habitat.

DIRECTOR'S REPORT

This is my last Director's Report, I retire January 31, 1998. My replacement is Dr. Bruce Leaman, a scientist currently employed by the Canadian Department of Fisheries and Oceans at the Nanaimo Pacific Biological Station. Dr. Leaman has been the scientific advisor to the Canadian half of the Commission for a number of years. I am sure Bruce will continue the Commission's long history of excellent science and management.

I leave the Commission a better place than I found it, not that it was in bad shape, but that science and technology has improved greatly during my tenure. My main contribution has been to put together an excellent staff. This staff is as good as any fisheries management staff anywhere. The Commission's stock assessment work is "state of the art." I expect that excellence to continue.

During my tenure we have not overfished the stocks and have been fortunate that good environmental conditions prevailed and the stocks have remained in excellent shape. I view the management of Pacific halibut as a long term experiment in fisheries management. We have definitely proved that it is possible to sustainably harvest Pacific halibut. Halibut management might well be used as a model for many other species. Perhaps there would be fewer overfished stocks if it were.

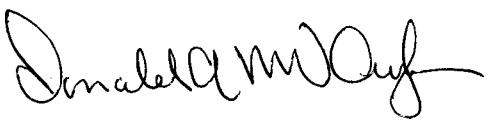
It is my hope that the present IPHC organization does not change. The way the Commission is structured is largely responsible for the success it has enjoyed. The Commission is noted for its long term directors that have shared a strong conservation ethic. There have been many competent commissioners who have done a good job of oversight and of developing the final industry regulations. The Commission was set up like a corporation where the director is the CEO and the Commission is the board of directors. This model has worked extremely well and should not be changed if the Commission is to maintain its record of excellence. Bureaucratic interference and interference with the Commission's meager budget is always a major concern of Commission directors. The Commission has been blessed, however, with a minimum of outside political interference.

The budget of the Commission is less than 2% of the ex-vessel value of the annual catch, which is extremely low by any standard. Salmon management costs many times the ex-vessel value of the resource and no one seems concerned. In contrast to other fisheries, halibut management is inexpensive but the rewards of good stewardship have been large indeed. In the long term "common sense" always seems to prevail, which gives me confidence that this noble experiment in resource management will continue to be adequately funded.

The most notable improvements to the fishery have been the implementation of the IFQ systems in both countries and the control of bycatch. In the U.S., bycatch is still higher than necessary to conduct its groundfish fisheries; there is still 8 million pounds of unnecessary wastage. The consumer is deprived of that halibut and halibut fishermen do not get profit from the catch. I am hopeful that the bycatch issue will finally get resolved.

I will miss my staff and the many scientists and administrators I deal with. I will miss my many friends in the fishing industry. I will miss the many discussions and arguments over conservation issues, and I certainly will miss being involved in the grand experiment.

Good luck.



Donald A. McCaughran
Director

HELIX, GALAXY, FISH: THE FISHERY IN REVIEW

BOUNDARIES OF THE BENTHIC WONDER

The first step, always, is to divide: earth from firmament, cell from cell, one halibut regulatory area from another. The IPHC divides the Pacific coast into ten regulatory areas to more closely manage the halibut stocks, and the pressures on them, in a way most appropriate to each area. The fish themselves range fairly freely across these boundaries—some individuals reared in the Bering Sea have been caught off the coast of Oregon; some have migrated in the counterclockwise wash of the marine currents off the northern Pacific coast. Harvesters migrate, too, across regulatory boundaries, though hopefully with more awareness of the changing regulations than the halibut might have.

The ten regulatory areas established for halibut management have remained the same for several years. They are:

Area 2A -	all waters off the coast of California, Oregon, and Washington.
Area 2B -	all waters off the coast of British Columbia.
Area 2C -	all waters off the coast of Alaska, south and east of Cape Spencer.
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.

The Southeastern flats of the Bering Sea region, excluding Bristol Bay, remained closed in 1996 to all halibut fishing.

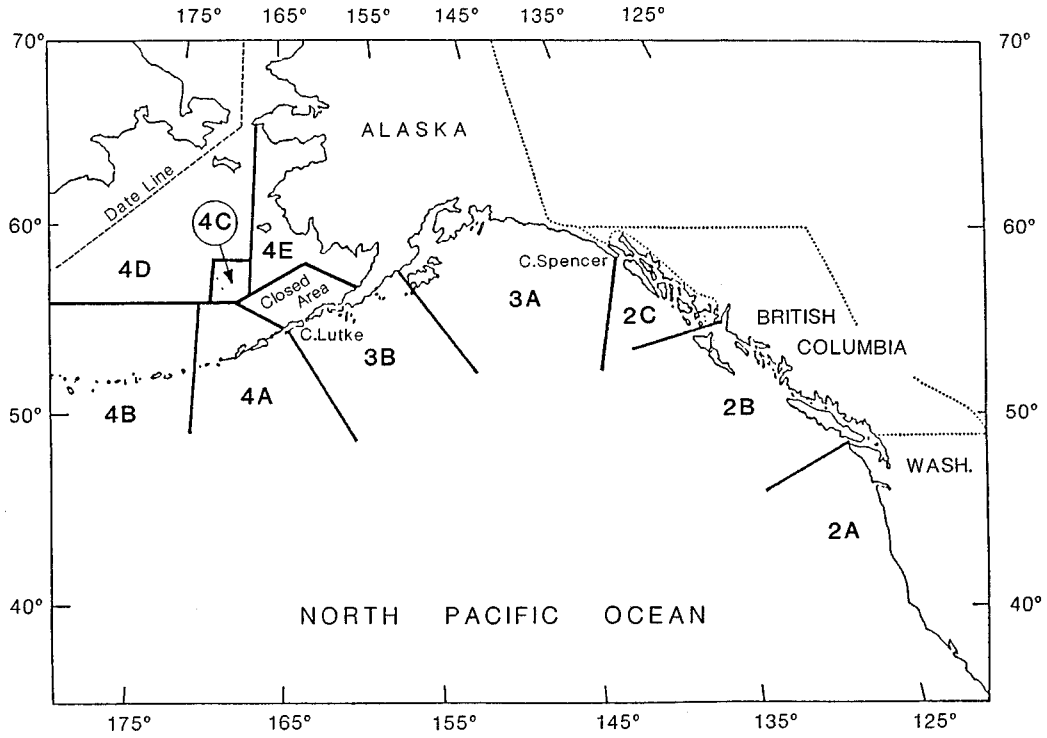


Figure 1. IPHC regulatory areas in 1996.

In 1996, just over 70 million pounds of halibut were taken off the Pacific coast—47.3 million pounds in the commercial fisheries, 7.7 million pounds in sport fisheries, 13.4 million pounds as bycatch mortality, 600,000 pounds as personal use and 1.2 million pounds classified as waste.

HALIBUT HARVESTS: A SYMPHONY IN 70 MILLION MOVEMENTS

The millions of pounds of Pacific halibut taken each year feed a diversity of communities and needs. In 1996, just over 70 million pounds of halibut were taken off the Pacific coast—47.3 million pounds in the commercial fisheries, 7.7 million pounds in sport fisheries, 13.4 million pounds as bycatch mortality, 600,000 pounds as personal use and 1.2 million pounds classified as waste. These levels are comparable to the 1995 total removals, and are close to the average of the last thirty-five years. The Appendices provide more specific figures for both the commercial and sport catches.

Commercial catch is the targeted effort by the commercial halibut fleet, which is comprised primarily of longline vessels. Sport catch is caught with a single line or spear, and cannot be sold. Sport harvesters are limited to one or two fish per person per day, depending on location. Bycatch mortality consists of halibut that are caught incidentally in fisheries targeting other species, and that die or are lost to the resource as a result. Halibut that are taken as Indian food fish, or for other non-commercial and non-recreational purposes are counted in the personal use category. Fish that are killed by lost or abandoned gear, and sub-legal halibut that are killed in the commercial halibut fishery but are too small to keep (under 32 inches or 82 cm) are

classified as waste. Balancing the needs of the various communities dependent upon halibut, while keeping a close eye on the health and habitat of the resource, is the Commission's delicate task.

TRADITION WITH A NEW TIME SIGNATURE: THE 1996 COMMERCIAL CATCH

The lion's share of the coastwide halibut harvest is taken as commercial catch. This year the total take including IPHC research fish was 47.3 million pounds.

The smell of the bait tubs, the whip of the wind through a harbor-ful of rigging, the sheen of yellow slickers on a fog-softened day, the pitch and yaw of a schooner on the high waters with the gear singing in the gurdy—halibut fishing can be back-breaking labor. Since the two-man dory days of 1888, longliners have worked the wild waters for halibut to sell. Though rules and regulations have changed dramatically since then, and the age of hydraulics has made life easier, the halibut fishing tradition runs deep in the North Pacific.

By far, the lion's share of the coastwide halibut harvest is taken as commercial catch. This year, the Commission set the commercial harvest limit at 48,415,120 pounds, divided among all fishing areas.

Catch Limit	
Area	Pounds
2A	275,120
2B	9,520,000
2C	9,000,000
3A	20,000,000
3B	3,700,000
4A	1,950,000
4B	2,310,000
4C	770,000
4D	770,000
4E	120,000
Total	**48,415,120**

Not all the allowable catch was taken, however. The commercial catch limit was under-harvested by nearly 2 million pounds, with a total commercial catch of 46,438,000 pounds. The volume of halibut harvested in the process of conducting research was just over 904,000 pounds, comprising a total commercial catch of 47,342,000 pounds, 1.1 million pounds below the 1996 commercial catch limit (Appendix I).

THE SHARED CATCH OF THE U.S. WEST COAST

This year, the IPHC issued 135 sport charter licenses, 123 incidental commercial licenses, and 403 directed commercial fishery licenses for halibut in Area 2A.

The Area 2A catch sharing plan, established by the Pacific Fishery Management Council (PFMC), divides the allowable halibut catch of 520,000 pounds off the coasts of Washington, Oregon, and California among four primary fisheries: the directed commercial fishery (91,052 pounds), the incidental salmon troll fishery (16,068 pounds), the treaty-Indian fishery (182,000 pounds), and the sport fishery (230,880 pounds). This year, the IPHC issued 135 sport charter licenses and 123 incidental commercial licenses—about the same number as in 1995. This year 403 directed commercial fishery licenses were issued, 51 more than in 1995.

The salmon troll fishery in May and June took 8,732 pounds of halibut, 7,336 pounds less than the limit set by the PFMC. As in 1995, this fishery was limited to the area south of Point Chehalis, Washington. In addition to the overall incidental catch limit, trollers are limited to the ratio of halibut to salmon they may carry on board. For 1996, the allowable

incidental catch ratio was one halibut per fifteen chinook salmon, one "extra" halibut regardless of ratio, and no more than twenty halibut per fishing trip. For example, if a vessel caught twenty chinook, two halibut could be landed.

Slightly looser incidental catch regulations this year contributed to significantly higher halibut catches than the 2,000 pounds caught in 1995. At the end of the June troll fishery, the unused 7,336 pounds were rolled into the directed commercial fishery . If commercial catches had been under the catch limit at the end of July, the original leftover 7,336 pounds could have rolled back into the troll fishery. However, the commercial catch limit was taken by the end of July.

In the fishery south of Point Chehalis, it took harvesters only two fishing periods to take the allowable limit that last year took seven periods.

As in 1995, the directed commercial fishery was restricted to waters south of Point Chehalis, Washington. This year, the directed fishery consisted of two ten-hour fishing periods with fishing period limits. There was far more interest in the directed fishery this year than last. In 1995 it took seven fishing periods to take the allowable limit, whereas this year the catch limit was taken in two periods. Last year, the fishing period limits for vessels greater than 56 feet in length ranged from 1,000 to 4,000 pounds; this year limits ranged from 1,500 to 3,000 pounds (Appendix II).

The treaty Indian allocation was 182,000 pounds; 168,000 pounds for the commercial fishery and 14,000 pounds reserved for ceremonial and subsistence use. The commercial catch limit of 168,000 pounds was divided between the directed fishery (142,800 pounds) and the incidental fishery (25,200 pounds). The directed longline fisheries, for a total of four days, yielded a catch of 155,000 pounds, 12,000 pounds over the catch limit. The incidental fishery, limited to 500 pounds per trip, did not last as long and caught less than anticipated due to an overage in the unrestricted fishing periods.

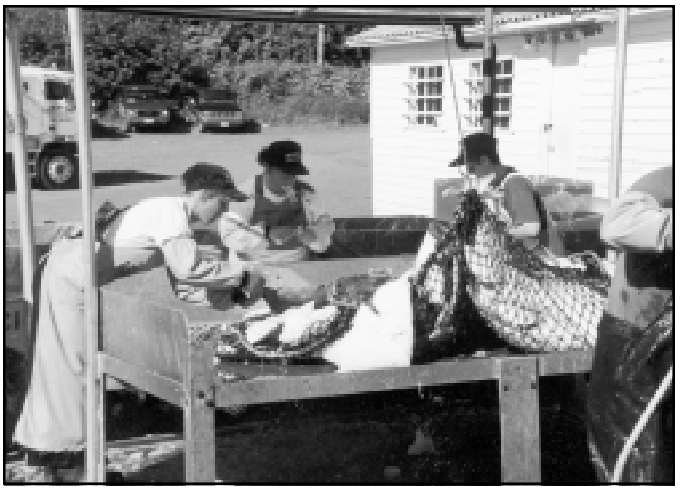
THE QUOTA SHARE FISHERIES

The commercial halibut fisheries off the coasts of British Columbia and Alaska are now managed by quota share systems—an Individual Vessel Quota (IVQ) program in British Columbia, and an Individual Fishing Quota (IFQ) program in Alaska. These two quota programs share some common characteristics, and also vary somewhat in design and implementation. Canada's IVQ program was established six years ago; the IFQ program in Alaska was first implemented in 1995.

The quota fisheries were open from March 15 to November 15; during that time quota holders could harvest and deliver halibut on their own schedule until their quota was fulfilled. In both the IVQ and IFQ programs, slight underages (within specified limits) are rolled over to the following year.

SHRINKING FLEET IN CANADA

Quota fisheries were open from March 15 to November 15, during which time quota holders could land halibut whenever they pleased.



The IPHC established a catch limit of 9.52 million pounds for Area 2B. This total poundage was divided among Canada's halibut vessels into predetermined vessel quotas as calculated by Canada's Department of Fisheries and Oceans (DFO). An additional 12,600 pounds of halibut were added to the overall catch limit as carryover from the underage/overage program in the 1995 fishery, which rolls unused quota of up to 10% from one year to the next. The 1996 catch was within 1 percent of the catch limit.

In Canadian waters, 216 quota blocks were transferred and the fleet shrank to 279 vessels.

This year 435 vessels received quota shares—that number has stayed constant since the IVQ program began. Quota shares are split into two equal blocks or shares, and a vessel could fish up to four shares or blocks. Out of a total of 870 blocks, 216 were transferred and the size of the fleet shrank to 279 vessels—down from 296 last year. The number of vessels fishing halibut has continually decreased since the initial transfer program was implemented in 1993, the third year of the IVQ program. It is important to note that because vessels can fish up to four shares, the number of vessels will not drop below 218, unless some vessels do not fish their quota at all.

A dockside tagging program for all Canadian IVQ halibut, initiated in 1995 for enforcement and marketing purposes, expanded this year to include U.S.-caught fish that were landed in Canada. Canadian fish were tagged with green tags, and U.S. fish with white tags, to better differentiate the fish on the market.

RICH HARVESTS OFF ALASKA

This was the second year under the IFQ program in Alaska. Here the IFQ program is managed by the NMFS, which divided the catch limit for each regulatory area off Alaska into predetermined quotas allocated to quota share holders (usually vessel owners). In addition to the catch limit in each area, there were carryover amounts resulting from the 1995 underage program.

While last year's underharvests are assigned to the individual quota share holders according to their harvest activities, the total volume harvested is still calculated by regulatory area. Hitting the catch limit precisely, without underharvests or overharvests, is not easy, especially in the first few years of a quota share program. This year, Area 4E was the only regulatory area in which the full catch limit was taken. In the other areas, catches fell below the limit by 3 to 13 percent. This is closer to the target than 1995 catches, which totaled 9 to 27 percent less than the catch limit, depending on the area. This year the biggest discrepancies were in Areas 4A and 4C, which fell 12 to 13 percent below catch limits. In 1995, Area 4B saw the greatest underharvest, falling below the catch limit by 27 percent.

Hitting the catch limit precisely is difficult in a quota program; this year catches fell below the limit by 3 to 13 percent.

Nearly 7 percent of the U.S. catch was landed in the first two weeks of the 1996 season; Canadians landed 14 percent of their entire catch in March.

In its second year, the IFQ program remains under intense scrutiny by the North Pacific Fishery Management Council (NPFMC), and will continue to be refined and updated over the next few years. Some of the refinements may evolve as the program matures; others became necessary immediately. For example, it was apparent that there was going to be a problem with the fact that there was no standard deduction for ice and slime in calculating landing weights for unwashed halibut. Without a standardized deduction, complaints arose over confusion and abuse of the system. In 1996, the NPFMC passed a regulation requiring a standard deduction of 2 percent for ice and slime in calculating landing weights for unwashed halibut. This regulation is scheduled for implementation in 1997.

THE SHIFTING SANDS OF LANDING PATTERNS

Kodiak remains the top U.S. halibut port, with 7.2 million pounds of halibut landed. Prince Rupert is the largest Canadian halibut port.

Among other changes it has brought to the halibut fisheries, the quota share program has modified landing patterns. Generally, one advantage of the quota system is that the landings in all ports are spread out over time far more than they were under the open access fishery. This year, the busiest month for all Alaskan quota share fisheries combined was May. The U.S. fishery got off to a much faster start in 1996 than in 1995; approximately 7 percent of the U.S. catch was landed in the first two weeks of the 1996 season, compared to only 1 percent landed in the first two weeks last year. Canadian harvesters got a good start this year as well, landing 14 percent of their entire year's catch in March, making it the busiest month. The last two

months, October and November, were the slowest months for all the quota share fisheries, followed closely by July.

Kodiak and Homer, Alaska, have been the leading U.S. halibut ports since 1986, and indeed they remained so this year. Kodiak received 7.2 million pounds of halibut in 1996, approximately 19 percent of the Alaska catch and Homer received nearly 4.0 million pounds; 10 percent of the Alaska catch. Sitka saw the most vessel landings—more than 1,000—and Kodiak was a close second at around 900 deliveries.

The top three landing ports in Canada were Prince Rupert, Port Hardy and Vancouver, as they have been since the IVQ program began in 1991. Together they received 91% of the 1996 landings by weight. Prince Rupert received the largest Canadian poundage (3.7 million pounds) and the most landings. Also, 767,000 pounds of Alaskan halibut was landed in Prince Rupert.

One question that was raised with the implementation of the IFQ fishery was: Would more fish that was caught in Alaska be landed in southern ports? It appears that just more than 11% of the Alaskan catch was landed in Washington, Oregon, California and British Columbia. This is close to the percentage of the Alaskan catch that was landed in these southern ports in 1994, before the quota program began, so it appears that the IFQ system has not changed this particular pattern.

TEASING THE TASTE BUDS OF THE DEEP: SPORT CATCHES IN 1996

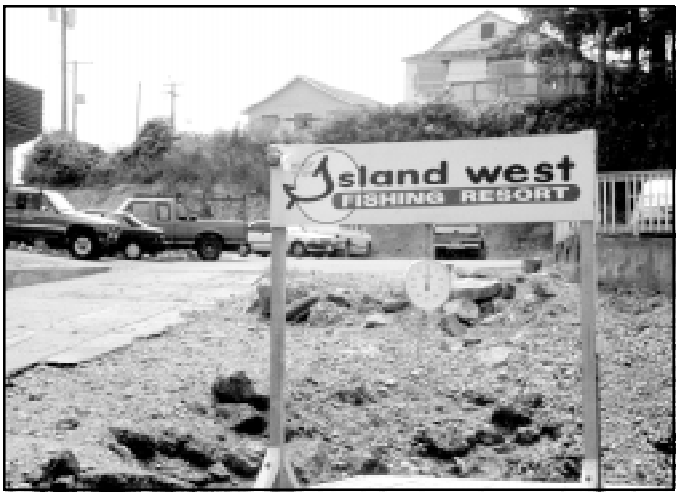
Fish are an endless source of meditation and astonishment. So, it seems are fishers, who collectively spend hundreds of millions of dollars each year in the U.S. and Canada for the privilege and the supporting gear to run down to the sea or step into a local river and contemplate its surface until a fish pops out. Angling is an art, and eating an angler's catch is a boon to both soul and taste buds.

Halibut has entranced recreational anglers for many years, more for its meat than its sport, though the challenge of hauling up a fish big as a car seat that can break a man's leg or sink a boat is challenge enough for most.

Sport harvesters caught 6.8 million pounds of halibut off Alaska in 1996.

Sport catches held steady off the North Pacific coast between 1995 and 1996. The largest sport catches by far come from Alaskan waters, where this year 6.8 million pounds of halibut were hooked by eager anglers. In British Columbia, sport harvesters took 660,000 pounds, and the combined sport catches off Washington, Oregon, and California totaled 229,000 pounds.

The IPHC began accounting for sport catch in 1977, and the estimated catch increased yearly until 1991, when figures wobbled slightly, and then peaked at 8 million pounds coastwide in 1993. In 1996, sport harvests represented 10 percent of total removals.



Area 2A is the only area with a sport catch limit. This year it was 230,880 pounds.

Area 2A is the only area with a sport catch limit, as part of the catch sharing plan established by the PFMC—this year it was 230,880 pounds—though in all areas there is a daily possession limit. Harvest estimates are based on creel census and telephone and postal surveys taken of everyone who obtains a fishing license in Alaska, Washington, Oregon or California, and over the years IPHC biologists have come to believe these estimates are fairly accurate. Sport catch estimates in British Columbia remain under review by the IPHC and the DFO. The goal of implementing a scientific-based estimating procedure has not been achieved, but we continue to discuss various ways this might be accomplished in the future. In the meantime, sport catches in Area 2B are estimated using the averages from 1987 through 1992.

THE STORY BETWEEN THE LINES: WASTE AND PERSONAL USE

WASTE NOT

The sea knows no such thing as waste, a fact we can learn from looking just beyond our toes, either at the dry ground beneath us or the abyssal plain at the bottom of the sea. Everything is put to use; even oceans are recycled. Every natural form takes its place, from flesh to mineral to rock to ash to phytoplankton.

The key to every successful system, the earth whispers in the language of her laws of physics, is balance. Fishery managers must assess all the factors that affect a marine resource such as Pacific halibut, and count them against the great balance of the species in the ecosystem. So, every year, the IPHC estimates the amount of halibut taken as personal use and lost as waste—that is, the number of fish that die as a consequence of harvesting and other activities but are not counted as directed harvests or bycatch. Both the personal use and waste figures are counted as part of the total annual removal of halibut from the resource.

Waste levels, while still lower than previous years, increased to 347,000 pounds coastwide.

Waste occurs when lost or abandoned gear continues catching fish, and when under-sized fish are caught and discarded and do not survive. For the most part, the quota fisheries are a lot less wasteful than the open access derby-style fisheries. Quota harvesters have more time to set and retrieve gear, are less likely to be fishing in rough weather, and, unless they find themselves pulling gear at midnight on November 15, they are not forced to cut their gear to stay within the law.

Even in the quota fisheries gear is sometimes lost, and in all cases under-sized halibut must be returned to the sea. The IPHC conducts logbook interviews and receives mailed-in log information to estimate the amount of halibut lost as waste.

We saw an 80 percent decrease in waste, to only 257,000 pounds, the lowest figure in decades, when the quota fisheries began in the waters off Alaska in 1995. This year the estimated waste bounced up slightly, to 347,000 pounds coastwide. Waste decreased in Canadian waters in 1996. The decrease is possibly because of the decrease in fleet size, improved fishing conditions, or the number of fishers choosing to fish in better weather.

In 1995, approximately 746,000 pounds of under-sized halibut were lost during the halibut fishery coastwide, down from 1.3 million in 1994. This year, under-sized halibut mortalities hit 900,000 pounds. Here, the biggest leaps were seen in Areas 2B and 2C, off British Columbia and Southeast Alaska.

Harvesters have to discard legal-sized halibut at times, either to stay within fishing period limits in Area 2A, or within quota levels in the quota fisheries off British Columbia and Alaska. The amount of legal-sized halibut caught but discarded is recorded during logbook interviews, but at this point it is not factored into the overall calculation of waste. Our goal is to include these figures in the future, either in the total waste calculation or at another level in the stock assessment.

This year, 900,000 pounds of sub-legal halibut were lost to discard mortalities.

COUNTING THE UNCOUNTABLE: PERSONAL USE

Not every part of the universe fits into a category, not every phenomenon can be measured, and not every halibut that leaves the waters of the great North Pacific can be accounted for. About seven years ago we devised a category called "personal use" to account for those halibut that are taken outside the commercial and recreational fisheries, and are neither bycatch nor waste. Take-home fish enjoyed by crew members on halibut boats used to count as personal use, but under the quota programs they are now counted against a quota along with the rest of the commercial catch. (In the Area 2A commercial fisheries, take-home fish already have been counted on fish tickets for several years.) There is little documentation for the remaining personal use harvests from non-commercial and non-sport landings.

Approximately 600,000 pounds of halibut were taken as personal-use fish.

Because keeping track of the personal-use take can be difficult at best, the estimates do invite some careful scrutiny. Personal use estimates that were calculated in 1993 now are being reviewed with the ADF&G, and may be revised in 1997. At this point, we estimate the total personal use take at 528,000 pounds.

STOCK ASSESSMENT: HALIBUT ARE MORE PLENTIFUL THAN WE THOUGHT

The new assessment indicates that the halibut population is larger than we previously thought.

This year the IPHC announced some startling news: the population of Pacific halibut is much larger than previously thought. How did such a shift in population assessment come about? How reliable is the new assessment?

Several years ago IPHC scientists became aware of a pattern of bias that existed in the Pacific halibut assessment. Retrospective analysis of biomass estimates showed that up to the mid 1980s, the initial assessments had been overestimating the stock size. Subsequently, the trend reversed from the mid 1980s to the mid 1990s when initial biomass estimates consistently underestimated the stock size. Although confident that the general trends we were seeing were reliable, we set out to discover the causes of the discrepancies in the annual estimates.

The first step was to examine parameters in the stock assessment model which were assumed to be constant. Catch per unit of effort (CPUE) seemed a good place to start since there were many technological and behavioral changes taking place in the fishery under the recently implemented Individual Vessel Quota system in Canada. In addition, the IPHC resumed standard stock assessment surveys in 1993 to provide a fishery-independent measure of CPUE along with other biological data unobtainable from the commercial fishery.

Survey CPUE was found to be consistent with, or increasing faster

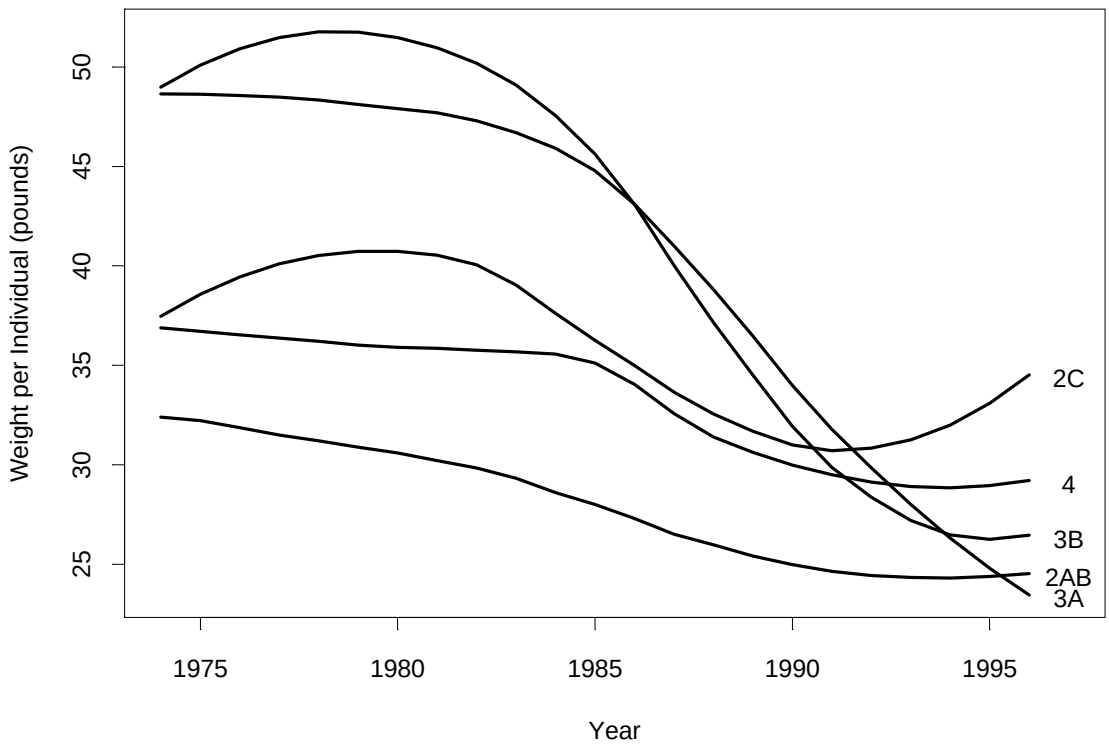


Figure 2. **Trends in average individual weight at age 12 for halibut in each IPHC regulatory area.**

than commercial CPUE. Size-at-age trends were also similar to those observed in the commercial catch. These observations indicated that a basic assumption (that selectivity of a fish to the fishing gear at a certain age is constant), was invalid.

The final conclusion was that halibut had decreased in length at age by 20 percent and in weight at age by up to 50 percent over the last decade, most rapidly in recent years. The change in size at age reduced the representation of younger age classes in the catch, which had been interpreted to be the result of poor recruitment. When we modeled the effects of reduced growth rate on catchability, it appeared that halibut numbers had not decreased as severely as previously thought. In other words, the halibut were there, they were just too small to be entering the fishery. Figure 2 illustrates the trends in average individual weight at age 12.

In 1995, the IPHC staff began developing a stock assessment model which would take into account changes in growth. For the 1996 season, the changes to the assessment were not yet complete, and so the Commission decided to maintain catch limits at the same level as in 1995. By fall of 1996, the IPHC scientists had prepared a new model for stock assessment.

The new stock assessment, which will be applied to the 1997 season, takes into account commercial age composition, catch, and catch per unit of effort (CPUE) as it has in the past. It also includes size at age of the commercial catch, as well as the catch, CPUE, age composition, and size at age of IPHC standardized setline surveys. In addition, the model now accounts for mortalities of legal-sized halibut taken as bycatch (Figure 3). Although many of the discrepancies in the model have been addressed, not all of the questions have been answered (such as some explanation for why this change in size has occurred).

Recruitment is declining coastwide, but the decline is not as severe as previously reported and some recent year-classes look promising.

RECRUITMENT INTO THE FISHERY

Incorporating growth patterns into the stock assessment has dramatically changed our estimates of year-class strength and trends in recruitment. We figure that halibut recruit into the fishery at age 8, but we now are able to discern the relative strength of a year-class in terms of potential recruits, as well as their level of entry into the fishery. Without taking growth patterns into consideration, it earlier appeared that recruitment estimates were sliding down a long, severe decline. With this new information we still see some decline in recruitment, both in coastwide averages and within most regulatory areas. However, the decline is not as severe as previously reported and the strength of some recent year-classes actually looks promising.

The 1987 year-class, in particular, is showing some significant strength as it recruits into the fishery. These recruiting halibut, shown as 8-year-olds in the 1995 survey data, will be ten years of age during the 1997 season. Of these fish, approximately one-third are estimated to be available to the fishery. We expect they will show up in greatest numbers in Area 4—though it must be said that Area 4 estimates are the ones we are least certain about. Recruitment biomass estimates here, and in other areas, are very

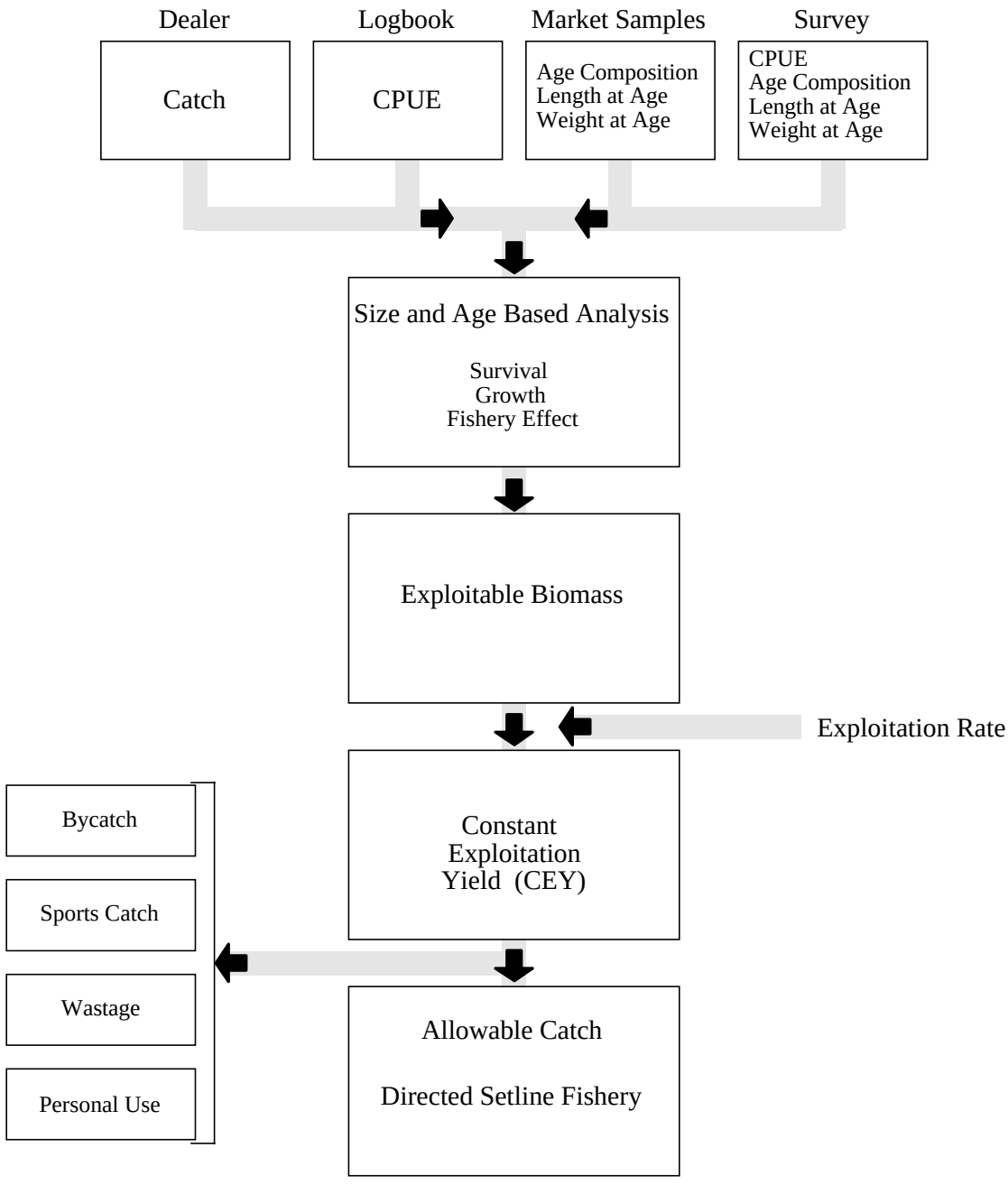


Figure 3. Overview of Pacific halibut stock assessment procedure.

imprecise in the most recent years, when fish of this year-class have been observed only once or twice in the fishery so far. Because these fish are so small, probably only a small fraction of them will show up in the fishery, and consequently our data on them is bound to reflect greater uncertainty.

Another consequence of smaller halibut is that they are likely to contribute less than normal to the overall volume of halibut in the North Pacific than the strong year-classes of larger individuals that grew up in the mid-1980s. Nevertheless, the strength of the 1987 year-class is good news for the fishery.

The 1987 year-class appears strong, however only about one-third of these fish are now available to the fishery.

THE NEBULOUS NARROWS

There are, in this inexact science, many areas of uncertainty. Survey data vary in relative precision for each regulatory area—and the amount of information we have to work from varies by area as well. We have long-term libraries of IPHC setline survey data from Areas 2A, 2B, 2C and 3A, providing information on trends in total abundance and year-class strength. There is no comparable long-term information from Area 3B and Area 4, so our estimates in those areas are less precise, and we hold about one-half to one-third the level of confidence there that we attach to areas we know a lot more about.

In Area 3B, we even have conflicting survey data to sort through. One independent assessment indicates that the exploitable biomass in Area 3B is roughly 30 percent the size of exploitable biomass for Area 3A. However, both the 1996 IPHC setline survey and the averages of NMFS trawl surveys conducted over the two areas indicate that Area 3B exploitable biomass is roughly 60 percent of that in Area 3A. We have not yet been able to reconcile these two estimates, even using all available information. Long-term survey data for Area 3B would help, but does not yet exist.

Different data sources indicate that the biomass in Area 3B is between 30 and 60 percent of the biomass of Area 3A.

In Area 4, low harvests in the 1970s also yielded spotty information about the commercial catch from the Bering Sea/Aleutian Islands region. There is still sparse commercial coverage of all the grounds in Area 4 known to contain halibut. The lack of comprehensive information is a serious concern in the stock assessments for Area 4, and is reflected in measures of relative uncertainty attached to stock assessment figures. Where there is uncertainty, we believe moderation is critical. For that reason, the IPHC is considering alternative assessment and management strategies for Area 4.

RECKONING THE RATIOS: A LOOK AT EXPLOITATION RATES

How different exploitation rates affect the biomass hinges on the relationship between adult biomass levels and future levels of recruitment. In other words, harvest levels must take into consideration the adult fish present in the biomass today, the rate of recruitment by the younger fish, and the expected rate of reproduction in the near future. Our data and observations lead us to believe that keeping exploitation rates between 20 and 25 percent

of the available biomass is most prudent if we hope to maintain halibut stock within its historic range.

In establishing a 20 percent exploitation rate, we began this year to calculate bycatch mortalities differently. We believe that a great portion of the bycatch mortalities, since they affect so many small, young fish that have not recruited into the fishery and have not yet begun to reproduce, have a significant affect on overall abundance; both in direct loss of the fish and loss of the generations they would have produced had they lived to maturity.

The IPHC adheres to exploitation rates between 20 and 25 percent of the available biomass.

In the past, we calculated a pound-for-pound compensation to the resource for bycatch losses in each area. This year, we changed that system. We incorporated legal-sized bycatch mortality into the calculation of stock abundance as we do with commercial and sport removals, and compensate for mortalities of sublegal-sized halibut by adjusting the recommended harvest rate.

We believe this method better addresses concern over the health of the stocks in each area. Admittedly, this is a new assessment method and doubtless it will continue to evolve as we gain new information and can better evaluate subtle differences in the assumptions of our models. We remain particularly cautious in our estimates of Areas 3B and 4, where we have little or no data independent of the fisheries taking place.

THE SILENT CENSUS: HALIBUT DISTRIBUTION IN AREA 2

In Areas 2A and 2B, 93 percent of the Pacific halibut congregate in Canadian waters, and only 7 percent south of the Canadian border.

From the summer of 1995 through early fall of 1996, the IPHC has focused intently on stock assessment surveys—both conducting setline surveys of our own, and participating in regular National Marine Fisheries Service trawl surveys.

Our Area 2A and 2B surveys took us to sea in the summer of 1995, when we plied the waters of Area 2A off the coasts of Oregon and Washington, and Area 2B off the coast of British Columbia. In this more southern region, 93 percent of the Pacific halibut biomass congregates in Area 2B, and only 7 percent reside south of the Canadian line. Within 2A, 70 percent of the biomass was south of Grays Harbor, in a sub-area we call Area 2A-2. This information is not new; halibut in these areas live in or near the same grounds as they have for years.

Here is how the surveys went: In the northern part of Area 2B, between Dixon Entrance and Cape Scott (called Area 2B-1) researchers fished 120 stations along a standard grid distributed evenly over the entire area. Of the 120 stations, five were rendered ineffective because of gear problems, and two were actually located south of Cape Scott. So for the purposes of this analysis, results from only the remaining 113 stations were used.

From Cape Scott southward, the distribution of halibut is patchy, so here researchers conducted a random stratified survey, locating 117 fishing stations along a random pattern between Cape Scott and the California-Oregon border. The survey covered both popular fishing grounds and unfished areas in each of the three sub-areas (Oregon and southern

Washington; northern Washington; and the west coast of Vancouver Island). At least 25 stations in each area were known halibut hot spots and about ten were off commercial grounds, for a total of 82 on commercial grounds and 29 off.

With the resulting information, we can estimate what percentage of the biomass lives in each part of an area by multiplying the average catch rate in that part by the bottom area of that part. For these two regulatory areas, where halibut might be very concentrated in some spots and very sparsely distributed in others.

To gain a more accurate picture of halibut distribution, we cover both popular fishing grounds and unknown areas in our surveys.

HALIBUT DISTRIBUTION THROUGHOUT ITS RANGE

During 1996, the IPHC conducted systematic setline surveys from the north end of Vancouver Island right around the Gulf of Alaska to Unimak Pass, covering thousands of square miles throughout Areas 2B, 2C, 3A and 3B. We combined results from those surveys with data collected in southern Area 2, and some reasonable guesses for Area 4, to map out the proportional distribution of the Pacific halibut throughout their entire range.

Survey data throughout the Pacific halibut grounds can be translated into maps that chart region-wide distribution.

This new bank of information can be added to our existing library of survey data collected in Areas 2A and 3B since the 1960s, and data from NMFS trawl surveys in Areas 2A, 2C, 3 and 4 that date back to the early 1980s. The pattern in recent years has been that NMFS conducts annual trawl surveys on the eastern Bering Sea shelf (to 200 meters) and triennial surveys in the Gulf of Alaska, the Aleutian Islands and the U.S. West Coast.

Southeast Alaska and the Aleutian region have a lot of rough ground and it does not appear that trawl survey results from these areas are comparable with results from other areas. For example, the straightforward swept-area estimates of halibut over 65 centimeters suggest that Area 2C has only about 5 percent of the halibut population that Area 3A has. One survey of the Bering Sea slope was done in 1991, and very few halibut were even caught.

Therefore, IPHC staff primarily focus on trawl survey results from Areas 2A, 3A, 3B, and 4C, D and E (NMFS also surveys the closed area). Gulf of Alaska surveys were done in 1984, 1987, 1990, 1993, and 1996; West Coast surveys in 1977, 1980, 1983, 1986, 1989, 1992 and 1995. By matching

each Gulf survey with the West Coast survey of a year earlier, comparisons can be drawn for all of the Gulf survey years.

The Bering Sea survey is conducted using a flatfish trawl; other areas are surveyed with a roller trawl. One might expect the flatfish trawl to be more efficient at catching halibut, but NMFS video observations in 1996 showed that none of the 28 halibut seen in the path of the roller trawl escaped beneath the footrope—all were caught. Moreover, catch rates by the two gears at the survey boundary north of Unimak Pass show substantially higher catch rates for the roller trawl. The direct comparison, therefore, may not be too far off.

In Southeast Alaska and in the Aleutian region, trawl surveys appear to underestimate relative density.

The following table shows the swept-area estimates in total numbers of fish over 65 centimeters. Because trawl selectivity peaks at around 50 centimeters and decreases steadily thereafter, this measure mostly indicates the distribution of halibut that are small, but large enough to have completed their migration from nursery grounds to permanent summer feeding areas. It is therefore a sort of index of recruitment, which should be a good measure of relative stock size. (This is not, however, a useful estimate of absolute population size. Because halibut sometimes herd together, the swept-area estimates probably overestimate the abundance of smaller fish, perhaps by a factor as large as 2, and owing to avoidance, underestimate the abundance of larger fish.)

Trawl selectivity peaks at around 50 centimeters, so swept-area trawl surveys primarily indicate the distribution of smaller halibut.

Swept-area estimates of total numbers of fish over 65 cm

Year	Area 2A	Area 3A	Area 3B	Area 4C, D&E & closed area
1984	190,000	11,950,000	9,230,000	7,750,000
1987	620,000	12,310,000	8,730,000	8,940,000
1990	560,000	14,160,000	16,740,000	7,700,000
1993	550,000	37,500,000	14,120,000	10,480,000
1996	1,140,000	37,720,000	27,970,000	19,390,000
Total	3,050,000	113,640,000	76,790,000	54,260,000

Note that the only purpose for figuring the sum of each column (which gives more weight to the recent values because they are larger) is in estimating relative abundance from area to area: Area 2A is about 3 percent of 3A, and 3B is about 70 percent of 3A. The Bering Shelf is about 30 percent of 3A and 3B combined, and about half of 3A by itself.

Both trawl and setline surveys show that catch rates approximately tripled between the mid-1980s and mid-1990s for fish of certain sizes.

WHY USE BOTH TRAWL AND SETLINE SURVEYS?

Only in Area 3A are there long series of both setline and trawl surveys. The overall results of trawl and setline surveys cannot be compared directly because gear selectivity is not comparable between trawls and longlines. Catch rates within restricted size intervals, however, should show similar trends. Indeed, they do show similar trends: both show that catch

rates approximately tripled between the mid-1980s and the mid-1990s for fish of 65-80 centimeters and fish of 81-95 centimeters. The abundance of larger fish has held steady or, among the very largest fish, decreased.

Trawl surveys catch a lot of small halibut, so they provide a preview of strong year-classes long before those small fish appear in the setline survey. For example, in 1990 we saw the estimated abundance of halibut under 35 centimeters (two- and three-year-old fish) jump to more than three times the previous level. In 1993, when those fish had grown to the 50-60 centimeter group, the same jump occurred. In 1996, those fish were mostly in the 60-80 centimeter class, and the abundance there is three to four times the level of the mid-1980s. These increases in setline survey catches in the mid-1990s could be seen much earlier in the trawl survey.

On the other hand, after the big baby boom that appeared in 1990 and passed through the length frequencies, the abundance of small halibut dropped back down and stayed there, so it appears that the year-classes spawned in the early 1990s will be comparable in number to those spawned in the early 1980s, although not necessarily comparable in weight.

Because trawl surveys catch primarily small fish, baby booms in the halibut population can be detected years before those booms hit the longline fishery.

UNHAPPY HARVEST: HALIBUT BYCATCH MORTALITIES

In these latter years of the second millennium, human beings are adrift in a sea of our own consequences. Technology cannot save us, we discover, from a head-on collision with ourselves. So we must grapple with the basic issues of how we use the resources we are given and how to avoid taking what we cannot use.

Halibut bycatch is certainly one of the issues that we grapple with most vigorously. On one side of the table are those who decry the waste of halibut as bycatch, especially in trawl gear, which is more likely to catch and mangle small halibut than longline gear. On the other side are those who protest shutting down a multi-billion-dollar groundfish fishery on behalf of a few million pounds of halibut that, if regulations were changed, could just as easily be delivered to market and counted as commercial catch as thrown back into the sea to die. And, on the Canadian side of the border, operators diligently strive to continually decrease their halibut bycatches under effective programs the U.S. cannot yet lawfully implement (though some of these restrictions have lifted under the re-authorized Magnuson-Stevens Fisheries Conservation and Management Act).

Coastwide halibut bycatch mortalities totaled 13.4 million pounds in 1996, significantly lower than the 17.2 million pounds in 1995.

Bycatch Mortality	
Area	Pounds
2A	433,000
2B	307,000
2C	342,000
3A	2,421,000
3B	1,748,000
4	8,111,000
Total	13,362,000

Here are the numbers: the coastwide halibut bycatch mortality for 1996 is estimated at 13,362,000 pounds—significantly lower than the 17.2 million pounds estimated for 1995. Bycatch mortality is not the volume of halibut caught as bycatch, but rather the volume that we estimate does not survive the experience. As we refine these initial 1996 estimates, we expect that the revised mortality will turn out to be slightly higher.

The most remarkable bycatch decrease occurred in Canada, where a bycatch quota program helped trawlers cut bycatch from 1.5 million pounds in 1995 to 307,000 pounds this year.

ESTIMATED BYCATCH MORTALITIES BY AREA FOR 1996

The most remarkable number here is the mortality estimate for Area 2B waters off British Columbia. This year Canada implemented an individual vessel bycatch quota program (IVBQ) for its trawl fleet that, combined with other trawl management programs, reduced trawl bycatch to 307,000 pounds in 1996, down from about 1.5 million pounds in 1995.

We glean bycatch mortality estimates from observer data collected on board groundfish vessels operating off the coast of Alaska. Recently, observer coverage in Canada has provided updated values for bycatch rates and discard mortality rates for some fishing areas. For the halibut grounds further south, the Oregon Trawl Commission and the ODFW have started a voluntary observer program, but information generated there is not yet available. We base Area 2A bycatch estimates on research data collected in 1987, updated with 1992 fishing effort figures.

FINGERS IN THE FOOD WEB: HOW HALIBUT BYCATCH IS MANAGED

Managing halibut bycatch is a coastwide collaboration among management agencies. In waters off Alaska, the NPFMC carries the primary burden, as does the PFMC for the coastline from Washington to California. The NMFS implements those two Councils' programs, monitors the fleet, and enforces regulations. In Canadian waters, all responsibility falls under the DFO. All these bodies respond to continuing requests from the IPHC, which holds responsibility for managing and conserving the halibut resource, to reduce halibut bycatch mortality caused by fisheries targeting on other species.

The goal of bycatch management: to minimize bycatch mortality while allowing each nation to harvest its groundfish resources.

In 1991, an IPHC bycatch working group established guidelines for reducing halibut bycatch to "levels that would allow each nation to reasonably harvest its groundfish resources while minimizing halibut bycatch mortality." The IPHC set as its goal the same bycatch levels achieved by foreign and joint venture groundfish fisheries in the early 1980s—namely, 7 million pounds minimum and 9 million pounds average for 1983-1986—as a reasonable goal for the North Pacific groundfish fisheries to shoot for.

In 1996, the best year seen since then, bycatch mortalities totaled 12,622,000 pounds in the Gulf of Alaska, Bering Sea and Aleutian Islands region alone.

In 1996, the best bycatch year of the decade, bycatch mortalities totaled 12.6 million pounds in the Gulf of Alaska, Bering Sea and Aleutian Islands region.

On the U.S. side of the border, bycatch management is part of the overall management plan of a region. Minor amendments to a management plan can take months, and new programs can take years to develop and implement. The Canadian process is much less structured and rigid than the U.S. system. Annual management plans for various groundfish fisheries may contain bycatch measures appropriate for each fishery. A management plan might be finalized with industry working groups in the fall and be approved by the Minister of Fisheries and Oceans prior to the next year's fishing season. Canadian fishing regulations contain flexibility sufficient to achieve many in-season management changes.

BYCATCH QUOTAS WORK IN CANADA

Canadian trawlers have made great strides to reduce halibut bycatch ahead of schedule.

In 1995, Canada began a program to progressively reduce trawl bycatch mortality to a target of 1 million pounds by 1997. Bycatch mortality caps began in the areas with highest bycatch, and moved progressively to include areas of lower bycatch. For 1995, bycatch mortality was capped at 580,000 pounds for the trawl fishery in Hecate Strait. This cap was reduced to 500,000 pounds in 1996, and a limit for the west coast of Vancouver Island (380,000 pounds) was introduced. The remainder of the B.C. coast will be included in 1997.

The Canadian trawl fisheries have taken other actions to reduce bycatch. In 1995, the Hecate Strait bycatch cap was taken by late September. Several key groundfish quotas had also been fully taken by then, and the groundfish fishery was shut down on October 1 for the year (A few midwater trawl opportunities were opened for the remainder of the year, with full observer coverage and bycatch standards required).

With its advisory committees, DFO designed a new approach to managing trawl fisheries in 1996 with the following multiple goals: keeping to groundfish management quotas, providing reliable information on catches and discards, minimizing halibut discards and waste, providing a year-round trawl fishery, and minimizing incidental catches of all non-target species.

To achieve these goals, DFO proposed some profound changes to the Canadian fishery. In 1996, Canada implemented 100 percent on-board observer coverage (paid for by vessels) and individual bycatch quotas for the group of vessels that account for more than 95 percent of the trawl landings. Vessels in this group (Option A) agreed to carry observers to make sure harvests did not exceed the total allowable catch, and to provide accurate data on bycatch, discards, and IVBQs. Vessel owners who did not want to operate under the IVBQ program could opt for more landing restrictions (Option B) and only 15 days of observer coverage per year. This year, 27 vessels chose this option; together they delivered less than 5 percent of Canada's total trawl catch. A third option was open to smaller vessels that fish only the inside waters of the Strait of Georgia. All vessels were required to pay for validation of landings at dockside by contract observers.

More than 95 percent of the trawl landings in Canadian waters now are monitored by observers.

HOW THE IVBQ WORKS

The annual bycatch quota for each trawler was calculated by dividing the bycatch caps for each of the two areas by the number of vessels participating in the IVBQ fishery. This year, that division gave each vessel 4,600 pounds of halibut mortality for Hecate Strait and 6,100 pounds mortality for Vancouver Island. Each vessel's bycatch quota was divided equally among trimesters. When a vessel hit its bycatch quota for that trimester, its trawling in that area was finished until the next trimester began. (The vessel still could conduct mid-water trawls, and could trawl in other areas where its IVBQ was not exceeded.)

In addition, the Option B vessels fished under an overall fleet bycatch cap for each area, divided equally among fishing periods. Option B

vessels were prohibited from fishing after the overall bycatch cap had been reached for a particular area. In addition, these vessels had a groundfish catch limit as well. For both options, halibut bycatch mortality was measured by assessing the condition factor of the halibut caught, according to standard IPHC methods.

The effect of the IVBQ program was dramatic. Immediately the trawl fleet reduced towing time, improved handling of discarded fish, and increased area/time/depth selectivity to avoid halibut. Some other measures of the plan helped, too, though they were not directed solely at reducing halibut mortality. Regulations increased trawl mesh size to 5.5 inches in Hecate Strait; the trawl fishery was delayed until February 16; Hecate Strait was closed until April 15, and was closed again from June 1 to July 15 on behalf of soft-shell crab; and Pacific cod was closed all year due to conservation concerns.

In 1996, 4,600 pounds of halibut bycatch mortality were allocated for each vessel in the Hecate Strait trawl fishery, and 6,100 pounds for vessels in the Vancouver Island area.

The net result: halibut mortality dropped from 1.5 million pounds in 1995 to less than 350,000 pounds in 1996. All Option A vessels caught less than 60 percent of their IVBQ for the year. The average vessel caught less than 25 percent of its IVBQ in Hecate Strait and less than 15 percent off Vancouver Island. The combination of stringent bycatch limits and individual accountability for each vessel is credited with these huge successes in Canada.

The effect of the IVBQ program was dramatic and immediate. Trawlers reduced towing time, improved handling of discarded fish and increased selectivity to avoid halibut.

AND ON THE U.S. SIDE OF THE LINE....

Until the Magnuson Act was reauthorized in September of 1996, the U.S. congress prohibited the fishery management councils that manage waters off the coasts of Alaska, Washington and Oregon from working on or developing any kind of individual quota programs. Individual accountability is commonly seen as the only way to effectively reduce bycatch mortality. While political and legal tangles were being argued out in Congress, management agencies in the U.S. focused on improving methods for monitoring and controlling halibut bycatch mortality.

Bycatch limits have been in place for all Alaska groundfish fisheries for several years, though none has been implemented for the Pacific Coast groundfish fisheries. Without individual incentives, the Olympic-style groundfish fisheries are caught in a race for fish—in this case, a race for

Under the IVBQ program, trawlers caught less than 25 percent of their Hecate Strait bycatch quota, and less than 15 percent off Vancouver Island.

bycatch, so each vessel can catch as much groundfish as possible before the fishery shuts down. Meanwhile, managers and industry participants alike have struggled to establish effective bycatch performance standards, mandatory careful release procedures for the groundfish hook-and-line fleet, a vessel incentive program for all trawl fisheries, and an IFQ system for halibut and sablefish, which did reduce halibut bycatch mortality somewhat.

In U.S. waters, bycatch caps are in place but political and legal obstacles so far have prevented any more effective bycatch reduction programs from springing to the fore.

The NPFMC did begin evaluating an individual bycatch quota system known as Vessel Bycatch Accounts (VBAs), before such studies were stopped by Congress. Now that that particular door is once again open, the effort toward VBAs may continue.

IN THE FUTURE.... BYCATCH QUOTAS OR TRADITIONAL METHODS?

Having studied numerous options for reducing bycatch mortality, the IPHC staff strongly supports the concept of individual quotas, but remains concerned about the practical application of Individual Bycatch Quotas in Alaska. Though individual incentives seem most effective, they come with a myriad of legal, financial and political problems that make incentives difficult to implement. In the huge groundfish fisheries off Alaska, where a few days in port could cost thousands of dollars, serious questions arise over how to provide for due process of law and still achieve in-season management, the costs of complying with due process, and political problems surrounding the initial allocation of bycatch quotas.

In the huge groundfish fisheries off Alaska, serious questions arise over how to provide for due process of law and still achieve in-season management.

Individual bycatch accounting is not likely to take shape in the North Pacific without major commitments from the U.S. government and from the groundfish fleet. Several of the solutions within our vision are not, at this point, within our grasp. Until those solutions can be investigated and implemented, the IPHC has recommended that the NPFMC pursue more traditional methods of bycatch management. We also recommend splitting the halibut mortality savings between lower halibut bycatch limits and increased groundfish harvests.

HALIBUT BYCATCH PLAYS TAG

The IPHC recommends splitting the halibut mortality savings between lower bycatch limits and increased groundfish harvests.

In 1993 and 1994, the IPHC tagged and released 13,000 longline-caught halibut off Kodiak Island. In 1995, we tagged nearly 5,000 trawl-caught halibut. As those tags return to our lab from harvesters who are landing these tagged fish, we can gain more information about the survival, movement and life span of incidentally caught halibut after they are returned to the sea. We encourage all fishers to watch for and return tags to us, as the participation will improve the accuracy of our results. Tagged fish which are undersized and caught on any gear are legal to land, but cannot be sold.

OBSTACLES AND SOLUTIONS TO INDIVIDUAL INCENTIVES FOR BYCATCH CONTROL IN ALASKA

OBSTACLE #1: Uncertainty about data

Observer data are fallible, especially unedited, in-season data, making bycatch mortality estimates disputable. Due process requires a hearing before assessing penalties. A disputed case could take two or three years to go through the courts, may delay or even invalidate any consequences to excessive bycatch, and would consume huge legal and financial resources.

Solution: An in-season IBQ for porpoise mortality in the eastern Pacific tuna fishery works because observers count all dead porpoise. If all halibut bycatch could be accurately weighed and logged before dumping, or if halibut lengths and condition factors could be tallied electronically, operators and enforcement officers would have more confidence in the bycatch data.

OBSTACLE #2: Real-time information is hard to come by

The current observer program sampling protocol is designed for estimating fleet-wide bycatch values, not for providing on-the-spot individual bycatch rates. Real-time weighing or measuring every single halibut that is hauled aboard may not be possible within technical or financial realities.

Solution: Require each vessel operator to report estimated bycatch. When the vessel report reaches the individual bycatch limit, NMFS can call the vessel to port because no data are in dispute. Compare vessel report to observer estimates to avoid major discrepancies. Increase the number of observers on board to improve the quality of information gathered.

Problem: Few vessels will report bycatch data accurately. Just as some drivers exceed the speed limit to the degree they think prudent, skippers will under-report bycatch to the degree that they perceive prosecution to be unlikely.

Solution: Require vessel operators to develop a bycatch sampling plan that meets with NMFS approval. NMFS certified observers must confirm that the plan was followed. Vessel operators will report bycatch results to NMFS.

OBSTACLE #3: An in-season IBQ system may not be feasible.

Solution: An after-the-fact IBQ system can work if observer data are precise enough on all vessels. More than one observer might be needed on each vessel. NMFS could provide cumulative bycatch accounting to each vessel, as other quota systems do, alerting each vessel when its quota is near the end. Overages and underages could be carried forward to compensate for minor errors, though large overages would require strong, effective enforcement and prosecution for the program to work. (If a vessel operator can merely consider violations as a cost of doing business, then the IBQ system would not work.)

OBSTACLE #4: Initial allocation of bycatch quota is a sticky wicket

Controversy over how much halibut bycatch quota each vessel should be allocated could become a political tornado. Vessels with the highest historical bycatch rates should not be rewarded with the largest IBQs. Controversies over allocation of groundfish through IBQs could delay IBQs even if other problems are solved.

Solution: Allocate IBQ among vessels based on past groundfish harvests and species composition, and the amount of bycatch necessary to maintain that harvest level. If the sum of IBQs exceeds the bycatch limits, each IBQ could be proportionately decreased. Give each skipper freedom to choose how to allocate his IBQs among the different target fisheries. Make bycatch quotas non-transferable initially, allowing for the possibilities of transfers after a review several years into the program.

FEEDING BYCATCH HALIBUT TO THE HUNGRY

In British Columbia, 700,000 pounds of bycatch species, including halibut, have been given to charities in the past three years.

What better use of halibut killed as bycatch than to distribute them to food banks, to share the bounty of the ocean with our needy brothers and sisters? Proponents of the food bank idea say it keeps bycatch halibut off the commercial market, does not reward the vessels that deliver the bycatch, and fulfills a moral imperative to feed the hungry and share what we have with the poor.

In Canada, the shoreside trawl fleet sometimes delivers unsorted codends directly to a plant where any bycatch halibut, which are all dead by then, are seized by the Crown and donated to the Salvation Army. The program does not involve great quantities of halibut; Canadian operators report that about 700,000 pounds of non-retainable species, including halibut have been given to charities in the past three years.

A similar program was proposed for the U.S. groundfish industry about three years ago, but was rejected for several reasons. This year, the IPHC approved a pilot program allowing trawlers delivering to shore plants in Dutch Harbor to land up to 83,000 pounds of halibut bycatch for distribution to U.S. food banks. (The Bering Sea factory trawler fleet participated in a bycatch program a few years ago involving salmon, in cooperation with Northwest Food Strategies, a Seattle-based philanthropic organization.) NMFS was to oversee the retention program, and finally approved the Northwest Food Strategies distribution plan in time for the fall pollock season.

This year, the IPHC allowed up to 83,000 pounds of halibut to be given to U.S. food banks. Due to problems, only 572 pounds actually were distributed.

However, during the season Northwest Food Strategies received only 572 pounds of halibut bycatch. Problems within NMFS about how to manage the program hampered its progress, but NMFS and Northwest Food Strategies will continue to work to resolve the problems.

KNOCKING ON THE DOOR OF THE DEEP: SCIENTIFIC INVESTIGATIONS

SURVEY SAYS…..

Scientific inquiry has changed the world, in big and tiny steps, more than any other force. At the IPHC, our current scientific inquiries focus on surveys. In 1996, IPHC researchers visited 659 survey stations between Cape Scott at the north end of Vancouver Island, and Cape Lutke at the southwest end of Unimak Island along the Aleutian shoulderblade of the western Gulf of Alaska. Between May 29 and September 17, eight chartered vessels fished 3,614 skates of gear and sold 903,065 pounds of halibut for this year's grid surveys.

Area	Vessel name	Survey dates	# of stations completed	Halibut sold (lbs)	Surv CPU (lbs/sk
2B - Charlotte	Cape Ball	July 3 - Sept 6	118	86,044	
2C - Southeast	Ocean Viking	June - Sept.	96	137,439	
3A - Yakutat/ Kodiak	Kristina	July 13 - Aug 20	66	116,784	
	Norska	Aug 20 - Sept 16	41	66,678	
	Cape Devon	May 29 - July 11	95	89,969	
	Kilkenny	Aug 2 - Aug 11	20	29,508	
3B - Chirikof/ Shumagin	Lualda	July 1 - Aug 18	112	191,075	
	Kristiana	July 3 - Aug 17	96	157,937	
	Kilkenny	Sept 2 - Sept 17	15	27,631	

All vessels used longline gear with 18-foot spacing and #3 circle hooks baited with chum salmon, and fished 9,000 feet of gear at each station, either in five 1,800-foot skates or six 1,500-foot skates. In all, IPHC staff spent 772 staff days at sea.

The IPHC surveyed 659 stations between Vancouver Island and Unimak Island in 1996.

The purpose of the grid survey is to collect data for stock assessments: CPUE, size, age, and sex composition of the stock, and species composition of the catch to determine which species the halibut are associating with in each area. From this information, we can learn more about growth and distribution of halibut, relative abundance of other species, sexual maturity and the rate of bait attacks on gear. Halibut distribution throughout the grounds teaches us about managing fisheries more precisely.

Blanketing the blue: How setline surveys are designed

Each time a survey is conducted, researchers must take into consideration the design of past surveys, to maximize consistency of the data, and current information needs, which may call for changes in the survey design. Surveys in Areas 2B, 3A and 3B between 1976 and 1986 were fished on a parallel transect pattern.

When the surveys were continued again three years ago, we adopted a triangular fishing pattern which was layed evenly over the grounds to give

a clear understanding of fish distribution. Each triangle consists of 4 fishing stations - three corners and one in the center. Part way through the 1996 survey season, it became evident that some of the chartered vessels were unable to fish four stations a day due to lack of time. The remaining triangles were shrunk slightly to decrease running time between stations (Figure 4).

Survey design was adjusted to gain more precise information and improve data collection.

In Area 2C, we sought information from a random distribution of stations within the inside waters of Southeast Alaska. We first identified all fishable waters (between 10 and 275 fathoms deep and allowing a clear path at least 2 nautical miles long along the north-south transect line). Then we drew a grid with transects at every 6 minutes of latitude and every 10 minutes of longitude, and chose a series of random points along the grid that coincided with fishable waters. Again, some adjustments were made to maximize a fishing day and reduce running time.

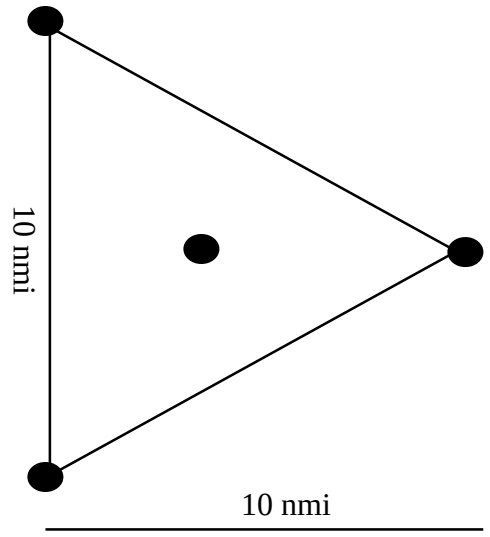


Figure 4. **Triangular grid survey design. The four fishing stations are shown; one at each corner and one in the center.**

Survey Role Call

Thanks to the eight vessels that participated in this year's surveys: F/V Cape Ball, F/V Ocean Viking, F/V Kristina, F/V Norska, F/V Cape Devon, F/V Kilkenny, F/V Lualda, F/V Kristiana.

The Charlotte region survey was conducted aboard the *F/V Cape Ball*, a wooden, 56-foot seine-style boat home-ported in Vancouver, B.C. with a four-man crew. The *Cape Ball* used 1,500-foot skates of conventional gear, and accommodated two IPHC staff.

The *F/V Ocean Viking*, a 57 foot seine-style vessel out of Pender Harbor, B.C. fished 96 stations and sold 137,263 pounds of halibut. The crew of 4 fished 1,800 foot skates and accommodated two IPHC staff members.

The *F/V Kristina* out of Sitka, Alaska, was also chartered for the eastern Area 3A survey. She is a wooden, 53 foot seine-style boat with a five-man crew that fished 1800-foot skates of conventional gear and accommodated two IPHC staff. Unfortunately, the *Kristina* charter was terminated early due to personnel and performance problems.

The *F/V Norska*, a steel, 63-foot whaleback style boat out of Newport, Oregon, finished the eastern Area 3A survey. The *Norska* used 900-foot skates of tub gear. Two tubs were fished as a skate during the survey. Two IPHC crew were aboard.

The Area 3A region survey chartered the *F/V Cape Devon*, a wooden, 60-foot seine-style boat out of Richmond, B.C. with a five-man crew; and

carried three IPHC staff. The *Cape Devon* used 1,500-foot skates of tub gear. Due to some problems with the gear, 6.9 percent of the hooks returned bent, broken or snarled—compared to 4.4 percent during the 1994 Kodiak survey, 1.6 percent during the 1995 survey, and 2.1 percent in the 1996 western Area 3B survey. The proportion of snarled hooks may have affected CPUE data by reducing catch rate data for sets aboard this vessel.

The *F/V Kilkenny* was chartered to pick up stations missed in both the western Area 3A survey and the eastern 3B survey. She is a 90-foot, schooner style ex-scalloper out of Homer, Alaska with a four-man crew, and carried three IPHC staff for the survey. The vessel fished 900-foot half-skates of conventional gear.

Part of the eastern Area 3B survey took place aboard the *F/V Lualda*, a wooden 60-foot seine-style boat out of Seattle, WA. She used 1800-foot skates of conventional gear.

The *F/V Kristiana*, a wooden, 69 foot seine-style boat out of Seattle, WA, was chartered to complete the western Area 3B survey. This is the *Kristiana*'s third year running IPHC survey charters. She fished 900-foot half-skates of conventional gear, and accommodated three IPHC staff.

Surveys contribute to the stock assessment by showing us the density and distribution of halibut in certain areas at certain times. One way to measure density is in catch-per-unit-of-effort, or CPUE, which tabulates how many halibut (and how many pounds) are caught per skate of gear. The highest CPUE calculated from the 1996 grid survey was 1,569 pounds per standard skate from one Area 3A station. The highest CPUE in Area 3B was 1,487 pounds per skate at one station; in Area 2C it was 1,077 pounds per skate; and in Area 2B it was 1,292 pounds per skate.

NET GAINS: GULF OF ALASKA TRAWL SURVEY

Trawl surveys lend a different view of the undersea world.

Trawl surveys provide an alternative view of the stock to the setline survey view. Comparing the data from trawl and setline surveys gives a more complete—if more complex—view of the life and times of *Hippoglossus stenolepis*.

This year the IPHC also participated in the NMFS triennial Gulf of Alaska trawl survey. For this survey, three trawlers fished the entire range, from the Islands of Four Mountains on the Aleutian Chain to Dixon Entrance

at the north end of the Queen Charlotte Islands, between May 18 and August 1.

The three trawlers, the *F/V Vesteraalen*, *F/V Dominator* and *F/V Golden Dawn*, sampled alternate stations throughout the survey range. Only the *Vesteraalen* carried an IPHC biologist; the goal on board was to record length and gender of every halibut caught by that vessel, and take otoliths. Each halibut also was examined for prior hooking injuries. In all, the *Vesteraalen* performed 301 tows and caught 2,269 halibut.

On board the trawler F/V Vesteraalen, an IPHC biologist recorded length and gender and took otoliths of every halibut caught.

The survey pattern followed a random stratified design. Each trawler used a Nor'eastern, four-seam, high-rise rockfish trawl net made of polyethylene, which is the standard NMFS survey gear. Each trawl net carried devices to record data on each tow. A ScanMar recorded net height and width while fishing; a microbathythermograph recorded temperature and depth; a tilt sensor indicated when the footrope hit bottom. This year, a 15-minute tow was attempted instead of the standard 30-minute tow from previous years. Following each tow, the codend was brought aboard and weighed. If the total weight was above 1,500 kilograms, the scientific crew subsampled for all species excluding halibut. (Halibut was sampled at 100 percent.) Biologists now are analyzing results from the Gulf of Alaska trawl survey.

VISIT TO THE NURSERY: TRAWL SURVEY IN THE BERING SEA

The Bering Sea shelf, north to about 61°N., is a summer nursery ground for Pacific halibut.

The eastern Bering Sea shelf north to about 61°N. (about even with Nunivak Island) is a summer nursery ground for the Pacific halibut population. Every year, NMFS conducts trawl surveys on these grounds, extending to the northern shelf and the slope every three years, to collect a multiplicity of data about all species in the area. These surveys measure total abundance of many different species. NMFS shares this data with the IPHC so we can learn as much as possible about Pacific halibut, and about their neighbors on these important underwater nursery grounds.

NMFS locates fishing stations on a 20-nautical-mile grid in depths from 30 to 200 fathoms. Since 1981, the survey trawl used on the shelf has been an Eastern flatfish trawl without roller gear, with a 25-meter headrope and a 34-meter footrope. (Before 1981, a slightly smaller net of the same design was used.)

Survey data shows a marked increase in halibut biomass in the Bering Sea, from 50,000 metric tons in 1980 to about 160,000 metric tons in recent years.

Total abundance in the area is estimated by expanding the survey catch from the trawled area to the total survey area, assuming the trawl catches everything between the wings and nothing outside that path. This estimate may be high or low, but it gives a good idea of relative abundance in the survey area during the summer, when both juvenile and adult halibut are mostly within the surveyable depths. A wintertime trawl survey would show very different results, because halibut migrate into deeper water in winter.

Survey data shows a marked increase in halibut biomass in this area, from about 50,000 metric tons in 1980 to about 100,000 metric tons in 1992. In 1993, the estimate jumped to 160,000 metric tons, and has held steady at that level ever since.

WATCHING THE CHILDREN GROW

Every mother believes her child to be special, and sometimes science proves it so. Out here in the romper room of halibut, an above-average year-class periodically pops onto the charts. Usually they are distinguishable by age 2, when they appear at around 20 centimeters in the survey length frequency. For example, the 1977 year-class was a standout at age 2 in 1979; their abundance sustained the overall level of juvenile abundance for the following few years.

Halibut year-classes usually distinguish themselves as large or small by the age of two.

Then in 1989, the age twos from 1987 showed up as an enormous spike, towering head and shoulders above its neighboring year-classes and even above the spike made by the 1977 year-class in 1979. This 1987 year class sustained its powerful presence in the 1994 surveys, appearing stronger every year than the 1977 year-class did at the same ages. This year-class is now nine years old, and most of the participants in this class are just below the legal size limit of 32 inches (82 cm), which is small for nine-year-olds. When they enter the fishery they are expected to make a huge impact. No other year-class since 1987 has appeared in particular strength.

The 1987 year-class, now nine years old, is the strongest group seen in the past twenty years.

AUTOBIOGRAPHY OF A HALIBUT: TAGGING STUDIES CONTINUE

The marine world enjoys a long, rich history of involving the public in its scientific inquiries. As early as 1662, the Royal Society of London for Improving Natural Knowledge sent lists of suggestions to sea captains asking them to perform basic investigations at sea. Captains were asked to measure weight and specific gravity of seawater at various times and locations; note the “ebbings and flowings” of the sea; chart wind and weather, ordinary and extraordinary tides; and provide comments on the nature of the ground beneath the sea.

This tradition continues at the IPHC, where we have recorded, tagged and released thousands of halibut over the years. We ask all sport and commercial harvesters, and anyone who lands a tagged halibut, to return the tag along with pertinent information about its size, location of harvest, and method and date of landing. Over the years, we have amassed a significant sum of data from these tagging studies, thanks to the thousands of people who willingly provide us with the information we need.

This year only 158 halibut were tagged and released. The Homer Derby Association used a new orange wire tag for their famous Homer Halibut Derby this year, and released 50 tagged halibut in Cook Inlet. The National Park Service released 108 marked halibut in Glacier Bay as part of a study on home range of halibut. Some of these fish were also tagged with sonic tags for underwater tracking. We have not yet seen any results from this study.

This year only 158 halibut were tagged and released, most of them in the sport fishery.

Postmarks from the deep

As a family waits for news from the front, IPHC biologists look forward to receiving tags recovered and returned. This year, only 389 tags were recovered, compared to 465 in 1995. Most of the recovered tags came through Kodiak, where the IPHC port sampler received 199 from local harvesters. Area 3A, where the most recent tag experiments took place, produced more tags by far than any other area. Most of these recovered tags were from the 1993-94 longline mortality study, and many of these fish were caught close to their release site.

Only 389 tags were returned to the IPHC in 1996, compared to 465 in 1995.

		Recovery Area							
		2A	2B	2C	3A	3B	4	Unkn	**Total**
Release Area	2A	3	5	-	-	-	-	-	**8**
	2B	-	12	1	-	-	-	1	**14**
	2C	-	-	57	-	-	-	-	**57**
	3A	1	4	1	234	7	1	4	**252**
	3B	0	3	-	19	26		1	**49**
	4	0	1	-	5	1	1	1	**9**
	Total	**4**	**25**	**59**	**258**	**34**	**2**	**7**	**389**

Of the Area 3A tagged fish that migrated, eight headed west: seven to the western Gulf and one to the Bering Sea. Six fish traveled south: one to Southeast Alaska, four to British Columbia and one to off Gray's Harbor, Washington. Most of the Southeast Alaska recoveries came from the Glacier Bay research project; these fish did not move out of Area 2C.

One fish tagged and released near Dutch Harbor in 1995 showed up this year off the northern Queen Charlotte Islands.

Gear type	# of tags recovered
Longline	**343**
Trawl	**19**
Sport	**18**
Pot	**1**
Troll	**1**
Unknown	**7**
Total in 1996	**389**

Tagged fish have not been released in the Bering Sea since 1987, but we are still witnessing interesting movement from those experiments. One fish released near Dutch Harbor in 1995 showed up this year off the northern Queen Charlotte Islands. As might be expected, most of the tags are recovered on longline gear.

In our most recent tagging experiments, recovery rates have varied from 2 to 47 percent. The highest recoveries, of course, are from the older

experiments where fish have been available for capture the longest. Nearly half the tagged fish released in the 1988 Sitka Spot experiment have now been caught, and 29 percent of the tags released in the 1989 Central Oregon study—608—have been recovered. The longline mortality experiments of 1993 and 1994 each have shown recovery rates of 5 percent.

Our most recent tagging experiment took place aboard the *F/V Forum Star* in May 1995, off Kodiak Island, Alaska. This project examined the mortality of halibut caught in bottom trawls and discarded. Researchers tagged fish during the on-board sorting process for up to an hour after the codend was dumped on deck. Each halibut was assigned a release condition (excellent, poor or dead) following the criteria used by fishery observers. Roughly, equal numbers of fish of each condition were released. So far, 72 of these tags have been recovered. Most of them were in excellent condition at release, but 25 had been in poor condition when they were tagged and six had been assessed a "dead" condition (which means they were deemed most likely to die). Most of these tags—77 percent— were recovered in the same area of release, but one fish headed west to Dutch Harbor and two went south. One was recovered by a trawler off northern Vancouver Island, and one by a trawler off Gray's Harbor in Area 2A. Both of these fish had been released in excellent condition, and were caught a year after release.

25 of the tags recovered from a 1995 Kodiak Island trawl experiment were from fish that had been released in poor condition.

Sport tagging program: Great idea, few takers

The voluntary sport tagging program has engaged strong support among a few, but participation has been minimal.

For several years, the IPHC has attempted to expand its pool of tagged fish by distributing tagging kits to sport charter operators and encouraging them to tag the halibut they and their clients catch and release. A pilot study among sport charter boat operators a few years ago showed that they were quite capable of tagging both large and small halibut, and that by doing so they might greatly broaden the pool of tagged fish over a greater geographic area. Tag releases from the sport fishery help shed light on home range data and seasonal movements to and from the spawning grounds, particularly from releases and captures early and late in the season.

A few years ago, we began distributing tagging kits containing tags, an applicator needle, a log form to record release information about the fish,

and a tagging certificate and pin for the client who landed the fish. The charter operator pays a minimal price for the equipment to help offset the cost of the program. Skippers are also offered an optional tagging pennant to fly from their vessel on days they tag halibut.

Skippers fill out the tagging certificates and give out pins that depict an angler landing a halibut (with the slogan: "I tagged a halibut" and "Pacific Halibut Tag and Release." Charter operators are encouraged to maintain contact with the clients, so that when the IPHC receives information about one of these sport-tagged fish, we can forward that information to the charter operator, who in turn can tell the client what happened to his or her fish.

When a sport-tagged halibut is recovered, the details of its story are forwarded to the angler who tagged and released the fish.

Initially, two sport tags were used, one large and one small. The large stainless-steel tag, for halibut too large to bring aboard, was applied over the side of the vessel. However, commercial processors objected to these tags, citing liability problems should the tag's metal head inadvertently be left in the flesh. We have not used stainless-steel tags since 1995. The smaller tags, with a plastic barbed head, were used on halibut small enough to be brought aboard safely. Tags are inserted in the nape or just behind the head of the fish. (Tagging in this part of the body significantly reduces downgrading of the fish at the processing plant.) We discourage tagging halibut smaller than 10 pounds, because they are more susceptible to injury from the tags than larger fish.

Since 1993, 111 charter operators have ordered tagging kits, resulting in distribution of about 6,000 tags. By October 1996, we had received sport-tag release information from 42 participants. Sixteen of them notified us that they received tagging kits from us but did not release any tagged fish. We still do not know what happened to more then 1,900 tags sent to operators who have not responded to our requests for information. A total of 123 tags has been recovered, most of them in Area 2C, and most of them pretty near where they were released.

Halibut smaller than 10 pounds are not tagged, because they are more susceptible to injury from the process than are larger fish.

ANOTHER YEAR BEHIND US, MYSTERY AHEAD

We as part of the scientific community plan to forge ahead, building on what we already know. Standardized setline surveys will be a focal part of our investigations for the next several years. By taking "snap shots" of the halibut stock distribution and composition each year and then combining them to achieve a more dynamic model, we hope to better understand the trends which are occurring. In addition, tagging experiments will continue to provide results on survival of fish subjected to commercial and sport operations.

APPENDICES

The tables in Appendix I provide catch information for the 1996 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 1996 west coast seasons, and Appendix III shows the current sport fishing statistics.

All of the weights used are dressed (eviscerated), head off. Round (live) weight can be calculated by dividing the dressed weight by 0.75.

APPENDIX I

Table 1. Commercial catch of Pacific halibut by regulatory area (thousands of pounds) for 1992 through 1996.

Table 2. Fishing periods, number of fishing days, catch limits, commercial, research, and total catch (thousands of pounds) by regulatory area for the 1996 Pacific halibut commercial fishery.

Table 3. Number of vessels and catch (thousands of pounds) of Pacific halibut by vessel length class in the 1996 commercial fishery. Information shown for Area 2A does not include the treaty Indian commercial fishery.

Table 4. Commercial landings in 1996 of Pacific halibut by port and country (thousands of pounds).

Table 5. Commercial landings (thousands of pounds), including research, in 1996 of Pacific halibut in Alaska and British Columbia by regulatory area and month.

Table 6. Commercial halibut fishery catch (thousands of pounds) in 1996 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 1996.

APPENDIX III.

APPENDIX I.

Table 1. Commercial catch of Pacific halibut by regulatory area (thousands of pounds) for 1992 through 1996.

REGULATORY AREA	1992	1993	1994	1995	1996
2A	437	504	370	297	295
2B	7,626	10,628	9,911	9,625	9,557
2C	9,819	11,290	10,379	7,761	8,860
3A	26,782	22,738	24,844	18,342	19,696
3B	8,620	7,855	3,860	3,122	3,662
4A	2,699	2,561	1,803	1,617	1,694
4B	2,417	1,962	2,017	1,680	2,075
4C	793	831	715	668	680
4D	727	836[1]	711[1]	643	703
4E	72	64	120	127	120
Total	**59,892**	**59,269**	**54,730**	**43,882**	**47,342**

[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 limits, commercial, research, and total catch (thousands of pounds) by regulatory area for the 1996 Pacific halibut commercial fishery.

Area	Fishing Period	No. of Days	Catch Limit	Commercial Catch	Research Catch	Total Catch
2A- treaty Indian	3/15 - 4/07	directed (4), incidental	142.8 25.2 168.0	155 13 168	-	168
2A-incidental	5/01 - 6/30	61	16[1]	9	-	9
2A directed	7/10[2] 7/24[2]	10 hrs 10 hrs	91 (98)[1]	76 42 118	-	118
2B	3/15 - 11/15	245	9,520[3]	9,456	101	9,557
2C[4]	3/15 - 11/15	245	9,000[5]	8,737	123	8,860
3A	3/15 - 11/15	245	20,000[5]	19,318	378	19,696
3B	3/15 - 11/15	245	3,700[5]	3,360	302	3,662
4A	3/15 - 11/15	245	1,950[5]	1,694	-	1,694
4B	3/15 - 11/15	245	2,310[5]	2,075	-	2,075
4C	3/15 - 11/15	245	770[5]	680	-	680
4D	3/15 - 11/15	245	770[5]	703	-	703
4E	3/15 - 11/15	245	120[5]	120	-	120
TOTAL			**48,415**	**46,438**	**904**	**47,342**

[1] 7,000 pounds carried over to directed commercial catch limit.
[2] Fishing period limits by vessel class.
[3] An additional 12,600 pounds available as carryover from 1995.
[4] Includes 126,000 pounds taken by Metlakatla Indians during additional fishing within reservation waters.
[5] Carryover in 000's of pounds from the underage/overage program were: 2C=289, 3A=485, 3B=33, 4A=11, 4B=106, 4C=13, 4D=4, 4E=0.

APPENDIX I.

Table 3. Number of vessels and catch (thousands of pounds) of Pacific halibut by vessel length class in the 1996 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	6	<1	1	7
<26 ft.	12	3	0	0
26 to 30 ft.	4	<1	1	18
31 to 35 ft.	16	3	26	415
36 to 40 ft.	48	25	71	1,441
41 to 45 ft.	37	32	81	2,582
46 to 50 ft.	25	29	39	1,658
51 to 55 ft.	15	20	27	1,545
56+ ft.	8	14	33	1,891
Total	**171**	**127**	**279**	**9,557**

Overall Vessel Length	Area 2C		Area 3A	
	No. of Vessels	Catch (000's lbs.)	No. of Vessels	Catch (000's lbs.)
Unk. Length	58	99	16	57
<26 ft.	149	261	59	80
26 to 30 ft.	72	200	41	119
31 to 35 ft.	124	732	142	980
36 to 40 ft.	184	1,250	139	1,050
41 to 45 ft.	145	1,396	186	1,977
46 to 50 ft.	134	1,708	144	2,016
51 to 55 ft.	58	948	57	1,134
56+ ft.	167	2,266	315	12,283
Total	**1,091**	**8,860**	**1,099**	**19,696**

Overall Vessel Length	Area 3B		Area 4	
	No. of Vessels	Catch (000's lbs.)	No. of Vessels	Catch (000's lbs.)
Unk. Length	9	19	18	19
<26 ft.	1	2	97	297
26 to 30 ft.	2	5	31	384
31 to 35 ft.	31	107	38	407
36 to 40 ft.	30	89	2	15
41 to 45 ft.	36	205	8	58
46 to 50 ft.	35	197	10	137
51 to 55 ft.	20	141	6	94
56+ ft.	169	2,897	103	3,861
Total	**333**	**3,662**	**313**	**5,272**

APPENDIX I.

Table 4. Commercial landings in 1996 of Pacific halibut by port and country (thousands of pounds).

Ports	Canada	United States	Total
California & Oregon		244	244
Seattle		1,021	1,021
Bellingham	54	1,808	1,862
Misc. Washington		346	346
Vancouver	2,435		2,435
Port Hardy	2,560[1]	1[1]	2,561
Misc. Southern B.C.	714		714
Prince Rupert	3,748	767	4,515
Misc. Northern B.C.	43		43
Ketchikan, Craig, & Metlakatla		1,080	1,080
Petersburg, Kake		3,012	3,012
Juneau		928	928
Sitka	3[1]	2,958[1]	2,961
Hoonah, Excursion, & Pelican		2,004	2,004
Misc. Southeast Alaska		1,034	1,034
Cordova		917	917
Seward		3,296	3,296
Homer		3,983	3,983
Kenai		330	330
Kodiak		7,171	7,171
Chignik, King Cove, & Sand Point		1,230	1,230
Misc. Central Alaska		1,262	1,262
Akutan & Dutch Harbor		3,145	3,145
Misc. Bering Sea		1,248	1,248
Totals	**9,557**	**37,785**	**47,342**

[1]Canadian vessel landed research fish in Sitka and Port Hardy from both Regulatory Areas 2B and 2C.

APPENDIX I.

Table 5. Commercial landings (thousands of pounds), including research, in 1996 of Pacific halibut in Alaska and British Columbia by regulatory area and month.

AREA	MARCH	APRIL	MAY	JUNE	JULY	AUG.	SEPT.	OCT.	NOV.	TOTAL
2C	1,051	1,307	2,009	1,192	620	806	1,074	619	182	8,860
3A	1,692	2,104	3,548	2,516	1,570	2,912	2,786	1,897	671	19,696
3B	8	201	362	481	582	1,046	580	317	85	3,662
4A	0	28	166	322	370	361	287	115	45	1,694
4B	0	13	145	432	508	501	296	77	103	2,075
4C	0	0	<1	261	294	82	39	4	0	680
4D	0	0	123	105	229	106	86	27	27	703
4E	0	0	22	76	22	0	0	0	0	120
Alaskan Total	2,751	3,653	6,375	5,385	4,195	5,814	5,148	3,056	1,113	37,490
Area 2B	1,366	1,334	1,279	1,151	1,088	1,176	1,104	699	360	9,557

APPENDIX I.

Table 6. Commercial halibut fishery catch (thousands of pounds) in 1996 by country, statistical area, and regulatory area.

Country	Statistical Area	Catch	Regulatory Area	Catch
United States	00-03	119		
	04	8	2A	295
	05	168		
Canada	06	158		
	07	43		
	08	518		
	09-O	271		
	09-I	515		
	10-O	1,006	2B	9,557
	10-I	1,107		
	11-O	191		
	11-I	1,286		
	12-O	82		
	12-I	187		
	13-O	871		
	13-I	3,322		
United States	14-O	127		
	14-I	513		
	15-O	375		
	15-I	1,235		
	16-O	1,340	2C	8,860
	16-I	1,875		
	17-O	1,033		
	17-I	585		
	18S-O	810		
	18S-I	967		
	18W	1,828		
	19	668		
	20	949		
	21	893		
	22	786		
	23	869	3A	19,696
	24	2,544		
	25	1,962		
	26	2,822		
	27	2,974		
	28	3,401		
	29	1,566		
	30	496		
	31	323	3B	3,662
	32	679		
	33	360		
	34	238		
	35	248		
	36	344		
	37	22		
	38	33		
	39	1	4	5,272
	40	159		
	41	149		
	42+	593		
	Bering Sea	3,723		

APPENDIX II.

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

VESSEL LTR	LENGTH CLASS (FT)	FISHING PERIOD	
		7/10	7/24
A	0-25	250	200
B	26-30	315	200
C	31-35	505	250
D	36-40	1,390	695
E	42-45	1,495	750
F	46-50	1,790	895
G	51-55	1,995	1,000
H	56+	3,000	1,500

Table 2. Metlakatla community fishing periods, number of vessels, and catch in 1996.

FISHING DATES	NUMBER OF VESSELS	CATCH
April 27 - 29	7	3,050
May 13 - 15	9	4,211
May 25 - 27	11	8,639
June 8 - 10	11	5,484
June 21 - 23	14	9,987
July 5 - 7	18	12,373
July 19 - 21	21	17,578
Aug 2 - 4	18	13,868
Aug 9 - 11	21	11,664
Aug 16 - 18	21	11,905
Aug 23 - 25	17	8,100
Aug 30 - Sept 1	15	11,475
Sept 6 - 8	9	6,117
Sept 13 - 15	5	1,822

APPENDIX III.

Table 1. Fishing dates, opportunity, size limits, and bag limits for the 1996 Pacific halibut sport fishery.

Area	Fishing Dates	Days open	Size Limit	Bag Limit
2A				
WA Inside Waters[1]	5/23-7/27	48	No	1
WA North Coast[2]	5/1-7/28	65	No	1
WA South Coast (all depths)[3]	5/1-5/26	26	No	1
WA South Coast (near shore)	5/27-9/30	127	No	1
Columbia River[4]	5/1-9/30	153	Yes	1
OR Central Coast (all depths)[5]	5/16-5/25	6	Yes	2
OR Central Coast (< 30 fathoms)[6]	5/26-8/1	67	Yes	2
OR South Coast (all depths)[7]	5/16-6/1	9	Yes	2
OR South Coast (< 30 fathoms)[8]	6/2-8/1	60	Yes	2
OR Coast[9]	8/2-8/3, 8/9	3	Yes	2
California[10]	5/1-9/30	153	Yes	1
2B, 2C, 3 and 4	2/1-12-31	334	No	2

[1] East of Bonilla-Tatoosh Line, closed Tuesday and Wednesday

[2] Bonilla-Tatoosh Line to Queets River, closed Sunday and Monday

[3] Queets River to Leadbetter Point, open 7 days per week

[4] Leadbetter Point to Cape Falcon, open 7 days per week, minimum size limit of 32 inches

[5] Cape Falcon to Siuslaw River, closed Sunday through Wednesday, minimum size limit of 32 inches for the first fish, and 50 inches or greater for the second fish

[6] Cape Falcon to Siuslaw River, inside 30-fathoms, open 7 days per week, minimum size limits same as for all depth fishery

[7] Siuslaw River to California/Oregon border, same open days and minimum size limits as in OR Central Coast Fishery (all depths)

[8] Siuslaw River to California/Oregon border, same open days and minimum size limits as in OR Central Coast Fishery (< 30 fathoms)

[9] Cape Falcon to California/Oregon border, same minimum size limits apply

[10] Open 7 days per week, minimum size limit of 32 inches

APPENDIX III.

Table 2. 1996 Harvest allocations and estimates of sport catch by sub-area[1] (pounds, net weight) within Regulatory Area 2A.

Sub Area	Allocation	Catch Estimate
WA Inside Waters	34,653	40,489
WA North Coast	71,410	71,803
WA South Coast (all depths)	15,222	13,290
WA South Coast (near shore)	1,932[2]	1,949
Columbia River	4,617	1,190
OR Central Coast (all depths)	64,392	49,920
OR Central Coast (<30 fathoms)	6,629	3,491
OR South Coast (all depths)	5,999	8,522
OR South Coast (<30 fathoms)	1,500	407
OR Coast	39,853[3]	35,267
California	2,785	2,785
Total	**230,880**	**229,113**

[1] See footnotes for Table 1

[2] The Washington South Coast all depth fishery was restricted to fishing in near shore waters when the harvest was projected to be within 1,000 pounds of the overall quota. After closure of the all depth fishery 1,932 pounds remained to be harvested.

[3] After accounting for underages and overages in previous openings from Cape Falcon to the California border, 39,853 pounds remained to be harvested.

Table 3. Harvest by sport fishers (thousands of pounds) by area, 1991-1995.

Area	1991	1992	1993	1994	1995
2A	158	250	246	186	236
2B	584	579	657	657	657
2C	1,654	1,668	1,811	2,001	1,759
3A	4,264	3,899	5,265	4,487	4,488
3B	-	-	-	-	16
4	74	40	72	51	41
Total	**6,734**	**6,436**	**8,051**	**7,382**	**7,197**

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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.

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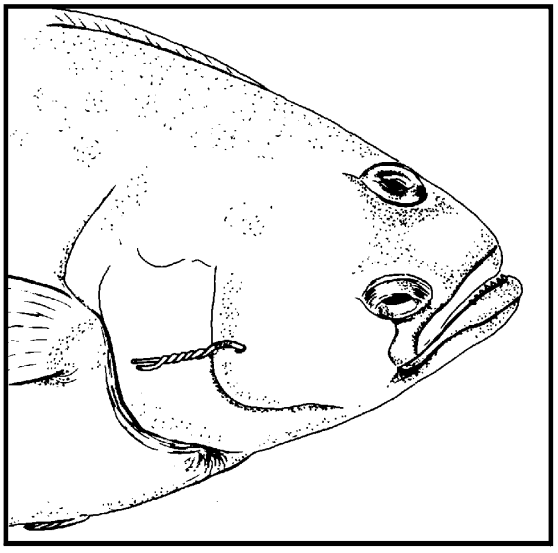
TAGGED HALIBUT

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