ISSN: 0074-7238

INTERNATIONAL PACIFIC HALIBUT COMMISSION

Annual Report
2003

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

This report produced by IPHC staff
and Bob King
2004

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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. 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 IPHC 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.

Note from the Editor, Lauri Sadorus: The Annual Report is routinely a collaborative effort among IPHC staff, a contract writer, as well as the Commissioners and their advisors. Constructing this 80th anniversary edition was especially challenging, albeit rewarding, and I would like to particularly thank IPHC staff member Tom Kong for spending countless hours designing the historical insert contained within.

A helping hand - Bob King

Co-writer of this report, Bob King of Juneau, previously served as Press Secretary for Alaska Gov. Tony Knowles and as news director of Dillingham radio station KDLG where he was known for his reporting on commercial fishing in Bristol Bay and the Bering Sea. This is Mr. King's second time as co-producer of the IPHC Annual Report.

The Commissioners and Staff wish to thank all the agencies, industry, and individuals who helped us in our scientific investigations this year. A special thank you goes to: Bering Sea and Gulf of Alaska NMFS/RACE division groups in Seattle for saving us a spot on the surveys; Dr. Robert Gerlach (ADEC); Greg Clapp and Terri Bonet (AMR/DFO); NOAA enforcement and the U.S. Coast Guard; and to all the processing plants who worked hard to accommodate our scan sampling efforts for the PIT tag program.

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Activities of the Commission

Hippoglossus Octogenarius – 80 Years of halibut management

Born at a time of crisis, when the stocks of one of the world's great seafood resources were being threatened by overfishing and indifference, the International Pacific Halibut Commission turned 80 years old in 2003. Its birthday was marked by a season of strong catches, record value, major advances in our scientific understanding of the species, and continued discussion of how to make the next 80 years even better.

Commercial catch accounted for about 75% of the halibut removals in 2003.

Total halibut removals for the year were 97 million pounds, of which the commercial catch was 73.1 million, just slightly below the season's catch limit and last year's record harvest. With the average price soaring to $3 (US) a pound, the harvest was worth an unprecedented $220 million.

2003 saw the largest tagging study in Commission history with almost 45,000 high tech passive integrated transponder (PIT) tags and a dozen even higher-tech pop-up satellite transmitting archival (PSAT) tags deployed to better understand halibut migration patterns. The 80th year for the Commission was also reason to celebrate, just for reaching octogenarian status on such a high note and was marked by commemorative publications and even prizes for the 80th delivery in key ports.

Live halibut at the Seattle Aquarium. Photo by Guy Becken.

And meanwhile, the work of the Commission continued, setting the rules for the season, charting a course of continued scientific inquiry, continuing discussion of extending the season and a change in management philosophy, known as CCC, and the mundane necessity of figuring out how to pay the bills.

The rules of the game

The 2003 Annual Meeting of the International Pacific Halibut Commission was held in Victoria, British Columbia on January 21 through 24 and approved regulations for the 2003 season.

Always of interest, the catch limits for the entire coast totaled 74.4 million pounds. The breakdown by area can be found in Appendix I of this report. The

area limits were broken down further as per the Pacific Fishery Management Council (PFMC) and North Pacific Fishery Management Council (NPFMC) catch sharing plans for Areas 2A and 4CDE, respectively. The IPHC does not allocate halibut to users, but does sign off on the plans to aid in management of those areas.

The fishing period for the Alaska and British Columbia IFQ fishery was set to begin on March 1 and finish up on November 15. Area 2A does not currently have an IQ fishery, and waters there are harvested through a series of 10-hour summer openings with vessel trip limits.

An item up for discussion was the use of VMS units in lieu of clearance requirements into and out of Area 4.

There were several smaller regulatory issues decided, one of which was the allowance of vessels equipped with a properly working Vessel Monitoring System (VMS) to skip the clearance requirement into and out of Area 4.

Issues far and wide: Aquaculture to winter tagging

A wide array of issues facing the halibut stocks and the industry were discussed at the Annual Meeting. Among some of the highlights:

- Local depletion is an issue that weighs heavily in some areas such as the Pribilof Islands, some areas of southeast Alaska, and the west coast of Vancouver Island. While the productivity of halibut is based on much larger areas, the Commission staff will continue to work with groups representing those regions in order to find solutions to local allocation.

- Although no regulatory decisions were required at this meeting, the Commission was briefed on halibut-related issues the NPFMC is working on such as subsistence, charter boat guideline harvest limits, charter boat IQ, and a plan to allow 42 different communities to hold halibut IFQ.

- The U.S. Coast Guard (USCG) presented a report on enforcement plans for the year. Due to its new homeland security responsibilities, the USCG was unable to deploy patrols for the derby fisheries off the west coast but crews would monitor ongoing fisheries when flying on other missions.

Although managing halibut aquaculture is not part of the IPHC mandate, the Commission agreed to monitor its development to ensure there are no risks to the wild population.

- The commissioners heard testimony from those in the industry concerned about halibut aquaculture, and subsequently discussed the role they should play, if any on the issue. The Commission acknowledged that the health of the wild halibut stock was its most important concern, and agreed to monitor the progress of the developing halibut aquaculture industry.

- There was much discussion at the Annual Meeting regarding two major policy issues: extending the season (see Chapter 2) and a change in management philosophy called Conditional Constant Catch, or CCC (Chapter 7).

Paying the piper

While the finances of the Commission are generally in good shape and the IPHC staff has done a good job of consistently being on or below budget

for its basic functions, concerns remain that appropriations received from the Canadian and U.S. governments could fluctuate in the future, placing at risk the Commission's ability to perform its responsibilities for the halibut resource across its range from the Bering Sea through Canada and into northern California.

As a result, the Commission announced that major new research projects and fishery management changes should have a sound source of funds and not generate undue risk to the Commission before staff recommends such proposals. Examples include future tagging experiments and regulatory proposals that result in increased staff costs.

The commissioners adopted an operating strategy to help minimize the impact of future fluctuations in funding.

The peer reviewed PIT tagging project will put a severe strain on the Commission's financial condition for the next few years. If this were coupled with significant reductions in government appropriations, the Commission would have to undertake significant changes to its survey and research plans, making it more difficult for the Commission to fulfill its mandate.

Additionally, the staff was instructed to minimize the sale of halibut caught for research purposes; undertake research projects that result in significant halibut catches when stocks are in high abundance and minimized on the other end of the spectrum; and limit the Commission's annual financial carryover to no more than $2.4 million (US).

A statement released by the commissioners concluded by noting that "The Commission has been successful for 80 years and, with some prudent financial planning for the future, should be around for another 80."

IPHC Commissioners at the 80th Annual Meeting held in Victoria, B.C. Photo by Robert Tobin.

Director's Report

One of the most remarkable things about working with halibut is the sense of history associated with this fishery. Although the halibut fishery is one of the oldest commercial fisheries on the Pacific coast, some other fisheries have similar or longer records. However, halibut is unique because it has a cooperative management structure whose legacy surpasses that of every other species. The Commission and the industry have been working cooperatively on behalf of the halibut resource for eighty years. In the centre of this report, you will find an insert celebrating this partnership. It was a considerable challenge for the staff to distil highlights of 80 years into a few pages, particularly to blend the rich traditions with the significant changes. Lauri Sadorus, who is the overall editor of this report, was assisted primarily by Tom Kong in producing this insert. We hope you enjoy the historical journey.

Rhonda Miller and Bruce Leaman scanning halibut heads for PIT tags in Port Hardy.

Thanks to the initiative and foresight of industry individuals, and the commitment of the governments of Canada and the United States, the Commission was created in 1923. In 1923 and earlier, the halibut stocks were in trouble – catches and catch rates were low and the harvesters knew that something had to be done to save the stocks. The newly minted Commission began a series of management actions, coupled with biological research, to rehabilitate and maintain the stocks. This endeavour has been largely successful and stocks are now near all-time high levels. This was achieved only because harvesters shared their knowledge of halibut behaviour and their fishing activities with the Commission, and supported the Commission's conservative management policies. Without this support, no amount of work by the Commission on its own could have rehabilitated the halibut resource. That support was critical then, and it remains equally critical today.

The Commission's major research focus this year was the initiation of the tagging program using PIT (passively integrated transponder) tags, details of

which are reported later in the report. We had spent almost two years doing prepatory work for this project to ensure that the tagging location on the fish was appropriate and that we had the necessary technical procedures and equipment worked out and in place. The tagging portion of this project went well, with 43,999 fish tagged – you'd think we could find one more to make 44,000 but that's the number tagged! Survey vessel crews took very good care of the fish to be tagged and it was amazing to watch them pull a 200-pounder aboard with almost no damage. Scanning programs to detect the PIT-tagged fish are in place in the major ports and we are anxiously awaiting the returns of the tagged fish. This is the first time that a marine fish population has been tagged simultaneously throughout its range and while we think we have a good understanding of the halibut stock, there may very well be some surprises in store for us.

We are still trying to determine if there are finer subdivisions to halibut population structure than the coastwide aggregate that we use at present. There are an increasing number of localized areas with high fishing effort. Many different users and local communities wish to have dedicated access for subsistence, commercial, and recreational halibut fishing. More importantly, they hope to have a connection between management actions in these smaller areas and the productivity of halibut in them. Our present stock view is that actions within these local areas cannot change the productivity of or recruitment into these areas, however we need to conduct this additional research to ensure that this is indeed the case. These studies involve measuring concentrations of elements in otoliths of adult and juvenile fish, genetic analysis, as well as tagging fish with pop-up satellite tags and the internal PIT tags. If our present understanding of stock structure is confirmed, the problems of high local fishing effort will need to be addressed through cooperative allocative and restrictive actions by local users to control rate of catch.

The staff of the Commission wishes to extend its heartfelt thanks to all the participants in the halibut fisheries for keeping the continued health of the resource as our primary goal over the past 80 years. It is that commitment to the future that has kept the halibut fishery strong and healthy.

Bruce M. Leaman
Executive Director

Commercial Fisheries

One big fish, one big season

What might have been the largest Pacific halibut ever documented in the 80 years of the IPHC was pulled from the Bering Sea off St. Lawrence Island on September 5, 2003 by the crew of the F/V *Miss Mary*. The 8-foot, 2-inch behemoth was estimated at 533.6 pounds according to its skipper, Pat Davis from Seattle. No official records are kept on the size of individual halibut in Alaska, but the IPHC pegs the largest fish as an 8 foot, 33-year old female caught commercially in the Bering Sea that weighed 375 pounds gutted and was estimated at 500 pounds whole. The fish, landed from a depth of 210 feet by the *Miss Mary,* was two inches longer.

But the 98-inch halibut was never weighed. The 533.6-pound weight was estimated from the IPHC's "Halibut Length/Weight Chart" developed in 1989 to estimate the weight of halibut from 18 inches (2.2 pounds) to 100 inches (569.7 pounds). Based on the length-weight relationship of over 5,000 halibut caught from British Columbia to the Aleutians, the chart is considered accurate for calculating the average weights when computing overall tonnages, but when it comes to an individual halibut, much less a record one, there is room for error. In fact, an individual halibut's weight can vary by as much as 10 to 20 percent. By that measure, the *Miss Mary's* halibut could have weighed as much as 640 pounds or as little as 427 pounds. So was it a record or not? As the *Anchorage Daily News* reported, "all anyone will ever know for certain is that it was one big fish."

Regardless of whether it was 427 or 640 pounds, the crew on the F/V Miss Mary hooked a big one.

F/V Star Wars II crew hauling in a monster in the Queen Charlotte Islands. Photo by Tracee Geernaert.

One big year

The year, 2003, was a big one for the commercial halibut fleet. The total commercial catch was 73.2 million pounds, slightly below the catch allocation of 74.4 million, and last year's catch of 74.7 million pounds. The average ex-vessel price for halibut was close to $3.00 per pound (U.S. dollars) in 2003, the highest price in years, which put the ex-vessel value of the catch at almost $220 million, a record.

Regulatory areas for 2003

Regulatory areas for the commercial halibut fishery have remained the same since 1990. A brief description of the regulatory areas for the 2003 halibut fishery follows:

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

The IPHC regulatory areas have remained the same over the past several years.

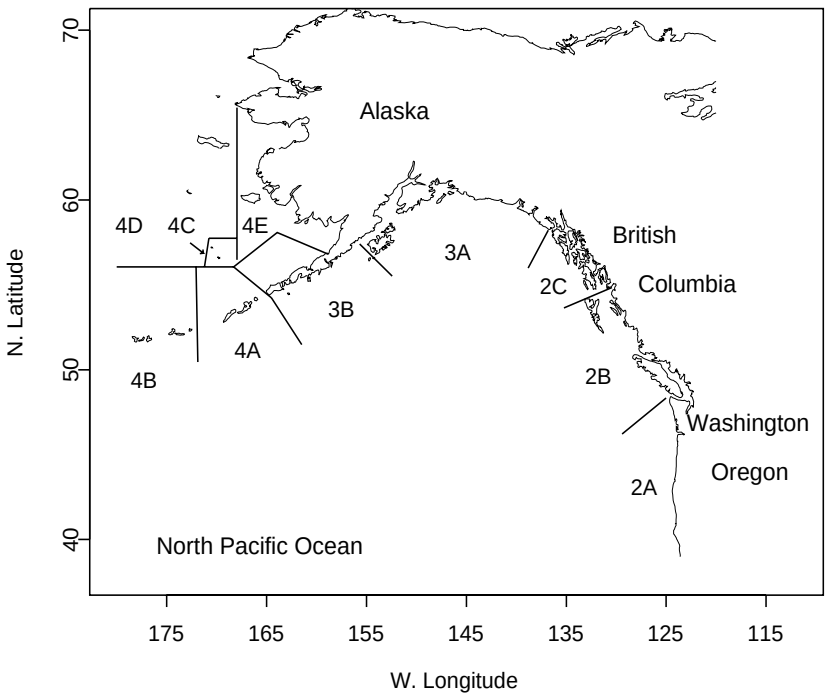


Figure 1. IPHC regulatory areas for 2003.

Dividing the halibut pie – Allocation issues

The responsibility of making allocation decisions among user groups is not up to the IPHC, rather it is left to each government and currently both the United States and Canada are working on allocation plans involving commercial and recreational users.

In British Columbia, an allocation program between the commercial and sport sectors has been talked about for years and in October 2003, the Minister of Fisheries and Oceans (DFO) announced an allocation framework had been reached. The recreational sector will be allocated a 12 percent "ceiling" of the combined commercial/recreational harvest until a mechanism is developed to allow the recreational sector to acquire quota from the commercial section. This allocation will allow both sectors' catch to fluctuate with stock abundance, however, if abundance levels decline or recreational angling increases, DFO will implement measures such as bag limits to restrict the sport catch to avoid season-length closures. In 2003, DFO estimates that the sport sector accounted for eight percent of the combined Area 2B commercial/recreational removals.

In 2003, the sport sector accounted for about 8% of the commercial/sport removals in Area 2B. According to a new allocation framework, the sport sector will be allowed up to 12% of the total.

Unloading the F/V Kristiana in Kodiak. Photo by Levy Boitor.

In Alaska, the NPFMC reviewed several allocation options for the sport charter fishery before adopting a program to manage the sport charter harvest in Areas 2C and 3A with a Guideline Harvest Level (GHL). National Marine Fisheries Service (NMFS) implemented this program in September 2003 with a GHL based on 125 percent of the average charter harvest in each area from 1995 through 1999. The GHL was not reached in 2003 but the program needs to deal with that eventuality. Initially, the program included restrictive measures that would kick in the following year to reduce sport charter levels below the GHL but the NOAA General Counsel's office raised concerns whether NMFS could act in a timely manner. The final rule only required NMFS inform the Council when the GHL has been reached and left it to NMFS to determine how best to keep the sport charter harvest within the GHL.

Managers for the U.S. fisheries are working on an allocation framework as well, but there are still some hurdles.

The NPFMC also approved an Individual Fishing Quota (IFQ) program for the sport charter industry which, if implemented, will replace the GHL. In designing such a program, NMFS recognized the need for a timely reporting

system for sport charter catches and began a review of current sport catch reporting programs used by other state and federal agencies. The review will include recommendations for an effective system for Alaska.

A comprehensive user group allocation occurs off Washington, Oregon, and California, where the PFMC allocates the harvest among users with a Catch Sharing Plan approved by the IPHC. There are three commercial fisheries: directed, incidental with salmon troll, and incidental with limited-entry sablefish longline; a treaty Indian fishery, and two sport divisions with nine sub-areas. The combined catch in 2003, 1.2 million pounds for commercial, sport, and treaty Indian users, was slightly under the catch limit.

The Area 2A halibut catch is managed using a Catch Sharing Plan where three commercial and two sport divisions are given allocations.

Commercial catches in detail

Commercial fisheries are quite varied under the IPHC jurisdiction, including an open-access fishery, two incidental catch fisheries, and a treaty Indian fishery in Area 2A; and the quota share (QS) fisheries in British Columbia and Alaska. Additionally, the IPHC tracks catches authorized by the U.S. government from the Metlakatla fishery within the Annette Island Reserve in southeast Alaska.

In Area 2A, a total of 710 vessel licenses were issued in 2003, 323 or 45 percent were for the incidental commercial catch of halibut during the salmon troll fishery; 260 (37 percent) for the directed commercial fishery and the incidental halibut during the sablefish fishery; and 127 (18 percent) for the sport charter fishery. There was little change in the number of licenses issued between 2002 and 2003.

In the incidental commercial halibut fishery conducted during the salmon troll season, the allowable incidental catch ratio was one halibut per three chinook salmon, and an "extra" one halibut regardless of ratio, but the total number of incidental halibut landed per vessel could not exceed 35. The ratio of halibut to number of chinook has remained the same since 2000. The incidental commercial halibut fishery during the salmon season opened on May 1 and closed on August 6, two weeks earlier than in 2002. The catch was slightly over the catch limit, by approximately 7,000 pounds or 19 percent.

The directed commercial fishery in 2A came within 1% of the catch limit in four 10-hour openings.

The directed commercial fishery consisted of four 10-hour fishing periods. The fishing period limits remained high, with the H-class vessels ranging from 2,500 to 5,300 pounds. The total directed commercial catch was about 2,000 pounds over the catch limit, or one percent.

The incidental halibut fishery during the sablefish season opened May 1 and closed October 31. The catch limit was 70,000 pounds, down from the 2002 catch limit (88,389 pounds) due to a change in allocation between users by the PFMC. The catch was right at the limit, closer than in the past.

The treaty Indian catch of 467,000 pounds was over the catch limit by less than one percent. During the unrestricted fishery, there were two fishing periods (March 1-3 and April 15-16) for a total catch of 311,000 pounds. The restricted fishery with fishing period limits of 500 pounds had a total catch of 156,000 pounds. Last year 40 percent of the treaty Indian commercial catch was taken during the restricted fishery compared to 67 percent this year. See Appendix I and II for more details.

Area 2C

The Metlakatla commercial catch of 82,344 pounds is included in the Area 2C total. This years' catch was slightly less than the 2002 harvest and within the range of harvests that have varied from 126,000 pounds in 1996 to just 12,000 pounds in 1998.

Quota share fisheries

The total 2003 catch from the IFQ halibut fishery for the waters off of Alaska was 59.6 million pounds, four percent under the catch limit. NMFS reported that 3,440 persons held quota shares in 2003, down from the initial 4,830 persons at the start of the program. Since 2002, the IFQ regulations allowed 4D Community Development Quota (CDQ) to be taken in Area 4E. This was not a biological concern because Areas 4CDE are managed as one stock. The combined Area 4DE catch was four percent under the combined limit. The Area 4C catch was substantially under the limit, with less than half the allocation taken.

The number of active vessels in 2B has varied in recent years, fluctuating between about 200 and 260.

An Individual Vessel Quota (IVQ) fishery has been in effect in Area 2B since 1991. The IVQ fishery allowed each vessel to catch a predetermined poundage based on the 11.75 million pound catch limit, plus an additional 123,531 pounds available as carryover from 2002. The Area 2B catch of 11.72 million pounds was within one percent of the catch limit. The number of active vessels in recent years has varied from a high of 257 vessels in 1999 to a low of 214 in 2002. In 2003, 8,219,000 pounds, or 70 percent of the catch limit, was transferred between vessels, with 544,317 pounds permanently transferred.

IPHC biologist Lara Hutton measuring a halibut during the 2A opener in Newport, Oregon. Photo by Tom Kong.

Fine tuning the Alaska QS program

Changes to the regulations for the Alaska IFQ fishery proposed by the IFQ Implementation Team, an advisory panel to the NPFMC composed of both fishers and processors, were approved in 2002 and implemented in August 2003. Among the changes:

- The Prior Notice of Landing (PNOL) was shortened from six hours to three.
- The PNOL was changed to accommodate auction sales by requiring only a landing location instead of buyer information.
- The QS clearance requirement was changed to allow vessels to depart Alaska with IFQ catch with a verbal clearance instead of a written departure report.
- Elimination of the shipment reports by requiring that IFQ species be reported on the NMFS Transfer Report.

Landing patterns and highlights

Homer was the top Alaskan landing port this year with Kodiak slipping in second.

Homer was once again the top halibut port in the Pacific, with deliveries of over 12 million pounds, or about 20 percent of Alaska's commercial catch. Kodiak came second, moving 7.7 million pounds, or 13 percent of Alaska's commercial catch. In southeast Alaska, Sitka and Juneau each received just under three million pounds. In the Bering Sea, Adak landings were down almost 60 percent from the previous year. Only three percent of the QS catch was landed outside of Alaska.

In British Columbia, the catch from over 1,000 commercial trips from Area 2B was delivered to 19 different ports in 2003, but the ports of Prince Rupert/Port Edward, Port Hardy, and Vancouver were again the major landing locations, receiving about 88 percent of the Area 2B commercial catch.

Out in the Bering Sea, Adak experienced a near 60% drop in landings from last year.

The QS fishery landings were spread over eight and a half months of the year. Because the 2003 fishery opened two weeks earlier than previous seasons, a month-to-month comparison between years is difficult, but May was the still busiest month for landings in Alaska with over 15 percent of the year's total catch. With the increased fishing time in March, this month was the busiest in poundage delivered in British Columbia, where previously most landings came in April. A trend is apparent in recent years of more BC deliveries occurring during the beginning and ending months of the season, rather than the months of May through August.

The landing of live halibut from Area 2B was again allowed by DFO but this remains a small part of the fishery. Live landings in 2003 totaled approximately 15,000 pounds, well off the peak live deliveries of 103,000 pounds in 1999 and slightly above the low of 7,900 pounds in 1998. Six vessels made a total of 15 landings with live halibut and no halibut were penned.

Joint programs for data collection

The Commission works with many agencies to improve accounting of halibut removals and several projects were underway in 2003.

Logbook projects

IPHC shares catch and bycatch information with DFO to aid in bycatch management, but the information is released only if the skipper approves it in writing.

The IPHC provided DFO with 2002 Area 2B fishing logbook information including numbers of skates hauled and lost, and bycatch species recorded. The data were obtained through skipper interviews. Data provided had the skipper's signature acknowledging the release and it was by DFO statistical area and unique vessel identifiers to maintain confidentiality. The goal is to provide DFO with additional information for better bycatch accounting.

For the fifth year, IPHC and NMFS participated in a joint IFQ catcher vessel logbook program for vessels 60 ft and greater operating off Alaska in which IPHC staff interviewed IFQ fishers for information on sablefish as well as halibut. IPHC and NMFS are working to finalize a document for each agency to sign that includes an agreement about the confidentiality of the data.

Electronic reporting project for Alaska

Since 2002, IPHC, NMFS, and ADF&G have worked with the Pacific States Marine Fisheries Commission to develop an electronic program for reporting groundfish and halibut landings in Alaska. A needs analysis and technological recommendations were completed last year. In 2003, an interagency committee tested communications capabilities and processor reporting capabilities in Alaska and got feedback from the processors on the system's performance.

We are getting closer to an electronic reporting system for groundfish and halibut in Alaska. The next step will be to design a prototype.

St. Paul halibut vessel, Aleut Crusader. Photo by Tom Kong.

Additionally, a facilitator was hired to get input from those outside the committee and a second meeting is planned for 2004 that will include processors and others. The goal is to have a Memorandum of Understanding that ensures each agency's interests are protected and that all are committed to working toward a cooperative electronic reporting system. The next phase will be to design a prototype and test it on a small scale.

The presence of swivels on snapped hook gear

In the 1990s there was a noticeable increase in the use of swivels on snap-on gear in the commercial halibut fishery. Since 2001, data on the presence of swivels on snap-on gear have been collected in British Columbia and in 2003, this was extended to all areas of the coast. The percentage of snap-on gear with swivels in BC has increased each year. Areas 2B and 4B were found to have the highest incidence of swivel snap-on gear, with Areas 4C, 4D, and 2C having the lowest. The possible effects of this change in gear on catch rates have not been assessed, but the collection of these data will continue in 2004.

Report from the industry work group on the implications of extending the halibut season

The threat of farmed halibut in the marketplace is often cited as the main reason to extend the 8.5 month season out to 10.5 or even 12 months. Since the market is not in immediate danger of being flooded with farmed halibut, the IPHC is working with other agencies and industry to thoroughly research the pros and cons of an extended season.

For several years, the IPHC has wrestled with the idea of extending the current 8.5 month season to 10.5 months or even year round. The potential threat from farmed halibut is frequently cited as the main reason for extending the season, although the market is not in immediate danger of being flooded with farmed halibut. A longer season could also reduce bycatch and prior hooking injuries by allowing retention of legal-sized halibut in wintertime cod and sablefish fisheries.

In July, 2003, the IPHC chaired a multi-agency and industry work group to review the administrative issues associated with a halibut season extension. The meeting consisted of discussions on administrative changes needed to accommodate a longer halibut season and issues that may arise affecting processors, harvesters, and fishery managers if such an extension were to occur. The options considered were a 10.5- or 12-month season.

It was recognized that both governments were discussing different integrated fisheries plans. Each agency's decisions could affect other fisheries. Changes to the halibut season would affect other fisheries, such as the SE rockfish, Pacific cod, and sablefish fisheries.

The goal of the meeting was not to discuss whether the season should be changed but whether it could be done. Even so, opinions were voiced and mixed on whether there should be any season extension. The Coast Guard expressed safety concerns about an extended season since the winter months are typically the worst for fishers due to heavy weather and icing. Some processors supported a season extension, but the sentiment was not unanimous and many processors were against it because of cost. There was a recurring theme with the harvesters for promoting integrated fisheries along with reducing bycatch and discard mortality. Some harvesters supported the longer season while others expressed concerns about the lack of data on winter migration patterns. It was recognized that continued research on migration and good science and knowledge of stocks are necessary.

A longer season would incrementally increase costs for monitoring, sampling, and enforcement, although these could be paid for through higher fees. It was determined that there were no additional operational problems with opening different regulatory areas at different times.

The Commission set the groundwork for a possible season extension in the future by working to remove potential roadblocks.

By most accounts, a 10.5-month season is more practical from an administrative and logistical point of view than a 12-month season. A 12-month season would require significant redesign of the Alaska QS program by the NPFMC. A 10.5-month season could be implemented in one to two years. The Alaska QS program could accommodate the 10.5-month season as the closed period would allow for calculations of QS and IFQs, implementations of regulations, and collection of fees. DFO would accommodate the change with the Condition of License and the Integrated Fisheries Management Plan. The exact changes required would depend on the specific season dates. Therefore, the first decision point would be to determine the season dates.

One recommendation from the meeting was that the IPHC should request that NMFS restructure the date-specific quota share regulations to reference a time relative to the season opening and closing dates. This would allow the Commission flexibility in setting season dates regardless whether the season is extended or not.

Sport Fisheries

Tony's new lure

Tony Davis was trying out some new lures he had just designed in July, 2003, when he felt something grab his hook. The employee of the Kitoi Bay Salmon Hatchery was fishing with a friend off the Afognak Island hatchery and cast his lure in about 100 feet of water. For the better part of three-quarters of an hour, Davis and his companion were unsure of what they had tied into but slowly coaxed a large halibut off the bottom. It was a lunker. With no way to bring the halibut aboard their 20-foot skiff, they towed it back to the dock. There, Tony's halibut weighed in at 420 pounds, just 39 pounds shy of the world record halibut caught near Dutch Harbor by Jack Tragis in 1996.

Sizing up the day's catch in Sitka, Alaska. Photo by Eric Coonradt.

You don't need to catch a near record halibut to satisfy the hunger for the chase or a hearty appetite. In fact, with increasing numbers of visitors to BC and Alaska every year, sport fishing for halibut is becoming increasingly popular, to an extent greater than ever seen in the 80 years of the IPHC, and putting new demands on fishery managers.

A sporting chance

Allocations for sport, commercial, and treaty Indian fisheries in Area 2A were specified by the PFMC and adopted by the IPHC. The sport fishery in Area 2A was divided into several subareas where seasons were managed by catch limits. Charter vessels were again required to obtain an IPHC license and declare whether they would operate as a sport charter or commercial vessel. Minor in-season modifications were implemented to extend fishing time due to low catch rates with specific area-closures to protect certain rockfish species.

In Area 2A, a vessel operator has to decide whether he wants to operate as a commercial or sport boat when it comes to halibut fishing.

In October of 2003, DFO announced an allocation framework between commercial and recreational sectors in the halibut fishery in Area 2B. A 12 percent recreational catch ceiling will be allocated to the recreational sector until both parties can develop an acceptable mechanism that would allow recreational users to acquire additional quota from the commercial sector.

In Southeast Alaska and the Gulf, Areas 2C and 3A, GHLs were implemented on the sport/charter industry in September. The amounts, 1,432,000 pounds for Area 2C and 3,650,000 pounds for Area 3A, equate to 13.05 and 14.11 percent respectively of the combined commercial and guided sport quota. The NPFMC is continuing to consider individual fishing quotas for the guided sport industry and further work on this is expected in 2004.

Angling for estimates

The 2003 Area 2A harvest estimates for the various subareas were provided by the Oregon Department of Fish and Wildlife (ODFW) and Washington Department of Fish and Wildlife (WDFW) from in-season creel census estimates. The exception to this was Washington Inside Waters (WIW), which was assessed by a post-season phone survey. The Area 2B harvest estimate was provided by DFO plus the reported Canadian catch landed at Neah Bay, Washington.

The Alaska Department of Fish and Game (ADF&G) typically provides final harvest estimates for the previous year for Areas 2C, 3, and 4. Final harvest estimates for the previous year are also incorporated into the estimate of current year harvest.

Creel surveys are used by ADF&G for estimating the recreational harvest for Area 2C.

Current year projections are made annually by ADF&G based on in-season creel survey estimates for Ketchikan, Juneau, and Sitka for Area 2C, and the most recent breakdown in charter/private operations for each subarea. The Area 3A estimate for 2003 was based on halibut harvests during 1998-2002 by each user group in six subareas. The resulting numbers are converted to pounds by applying the 2003 average weight for each area. Areas 3B and 4 estimates were projected from the 1998-2002 harvest estimates from the Statewide Harvest Survey (SWHS). The average weight from 2003 for Kodiak, the nearest sampled port, was applied to the projected numbers to convert to the estimated weight. For a breakdown of allocations and catch, see Appendix III.

Area 2A

The 2003 sport harvest from the Pacific northwest states, Area 2A, was 404,297 pounds, about 18 percent under the catch limit of 494,500 pounds. The harvest estimate for WIW was 68,300 pounds, about 5,000 pounds over its catch limit. As in 2002, the WIW season was split so that the area east of Low Point opened and closed two weeks sooner than to the area to the west. The resulting catch estimate is considerably higher than recorded last year. The Washington North Coast fishery closed only 4,177 pounds below the 113,915 pound quota. The Washington South Coast fishery, centered principally out of Westport, closed 5,370 pounds below the 48,623 pound quota.

Halibut fishing was slower than usual in Area 2A, presumeably because salmon and Albacore fishing was very good, helping to keep anglers away.

Halibut fishing was open for a considerably longer period than the previous year because salmon were abundant, luring away many halibut fishers. Albacore tuna fishing also diverted anglers later in the season. The Columbia River area remained open through the end of September but still closed 1,919 pounds short of its quota. Most of this catch was taken by Washington anglers, primarily from Ilwaco, but some was also taken in Oregon. As in previous years, a high proportion of the catch was sampled so we can say that halibut averaged about

20.5 pounds on the Washington side while halibut measured in Oregon ports weighed about a pound more.

As in 2002, the Oregon sport halibut fishery harvest was considerably under the area quota as ample opportunity for salmon also diverted attention from halibut. As a result, fishing time was extended into October. The nearshore fishery also under-harvested its quota by a considerable margin, catching just six percent of the nearly 20,000 pounds allowed.

Ample opportunities to sport fish for salmon may have contributed to the halibut catch falling short of the quota in Oregon this year.

Area 2B

The sport catch for 2002 was provided to the IPHC by the Pacific Region of DFO in numbers of halibut. While some average weight information from the west coast of Vancouver Island was provided by DFO, average weights from surveys in the adjacent areas of southeast Alaska and Washington were used to expand the catch to pounds. The Commission intends to use average weights from DFO surveys in British Columbia waters, in the near future, when they are expanded to cover more sport fishing grounds.

The 2003 projected harvest was estimated based on catches from the years 1999-2002 along with current average weights. Washington anglers caught 10,805 halibut in Canadian waters and landed them in Neah Bay, 1,700 more than the previous year. Using an average weight of 20.3 pounds provided by WDFW, the estimated harvest is 219,666 pounds.

Area 2C

The 2002 sport harvest in southeast Alaska is estimated at 2.090 million pounds and the projected 2003 harvest is 2.125 million pounds. The numbers of fish harvested were identified by area and converted to pounds using the average weight from each respective user group. The average weight for Area 2C in 2002 was 20.4 pounds and preliminary indications for 2003 showed the average weight to be 18.3 pounds.

Area 3A

The harvest for the Gulf of Alaska in 2002 is estimated at 4.201 million pounds and the projected 2003 harvest is 4.897 million pounds. The Area 3A harvest biomass was also estimated for each user group from numbers supplied by the SWHS and average weight generated from length data collected from the primary ports of sport landings, Yakutat, Whittier, Valdez, Seward, Homer, Deep Creek, Anchor Point, and Kodiak. Care was taken to account for harvests by the charter, private, and military recreation camps. The average weight for 2002 was 17.4 pounds but preliminary indications suggest the average weight in 2003 is slightly higher at 19.3 pounds.

Areas 3B and 4

In 2002, we used the average weight obtained from sport fish sampling on Kodiak Island to estimate the Area 3B and 4 harvests in pounds and observed a harvest of 13,000 pounds and 48,000 pounds, respectively. Since the average weight has apparently increased from 19.4 pounds to 22.8 pounds, the projected harvest for 2003 shows an increase to 15,000 pounds and 56,000 pounds for

Areas 3B and 4, respectively. This may or may not reflect the actual catches. Anecdotal information from sport fishing publications and conversations with local charter operators suggest the average weight may be quite high in Unalaska so the final harvest in Areas 3B and 4 may be higher than initially reported.

Preliminary information suggests that the average weight per halibut in the sport catch may have increased in Areas 3 and 4 in 2003.

80 CM AND 80 YEARS
WASTAGE IN THE 2003 PACIFIC HALIBUT FISHERY

Apart from the 80th year of the IPHC, another 80 resonates in the Pacific halibut fishery. Halibut about 80 centimeters and less (under 81.3 centimeters or 32 inches) are considered sublegal and have to be returned to the sea. Most survive but roughly one in six sublegal halibut is killed by the ordeal of being hooked and pulled from the depths. Legal-sized halibut also die, as sometimes fishing gear is simply lost at sea; its catch never recovered.

Pacific halibut sporting a sleeper shark bite. Photo by Tracee Geernaert.

The waste in 2003 of about 2 million pounds is up from 2002 levels but still well below those seen during the derby days.

It is, for the lack of a better term, a waste, and it is significant enough to be tracked and included when we compute total removals from the resource. Wastage in 2003 is estimated at just over 2.0 million pounds, up from 1.6 million pounds the previous year, but still well below levels of 3.5 million pounds seen during the derby fishing years.

Sublegal mortality in 2003 is estimated at 1.783 million pounds, up from 1.4 million last year. Estimated wastage of legal-sized halibut from lost or abandoned gear is estimated at 225,000 pounds, up from the previous year's 175,000 pounds. This amount is still well below levels in excess of two million pounds during the free-for-all derby years, when the amount of lost gear was significantly higher.

And there are other losses, as sometimes halibut are discarded because the flesh has been attacked by sharks, sand fleas, or other predators while on the hook. The halibut discarded because of poor flesh are tracked and reviewed but these discards are not included in the waste totals. The amounts are low, as in most cases legal-sized fish have to be retained.

Getting to the numbers: Lost gear

Information on the amount of lost or abandoned gear is collected during logbook interviews and from fishing logs received in the mail. While gear types vary as to the length of skates, hook size, and hook spacing, the information is standardized for use in subsequent calculations. Log data that cannot be standardized or is incomplete are not used in the calculation of effective skates,

such as in the Area 2A fishery when sablefish gear is used to target sablefish and incidentally caught halibut.

Wastage is calculated from the ratio of effective skates lost to effective skates hauled multiplied by total catch. The calculation is done using both fixed hook and snap gear in all areas. Prior to 1998, the gear type used for the wastage calculation was fixed hook gear used in Alaska and a combination of fixed hook and snap gear used in B.C. and Area 2A. These were the gear types used to calculate catch per unit effort for stock assessment. The Area 2A catch includes the non-treaty directed commercial catch, treaty commercial catch, and incidental catch during the longline sablefish fishery.

Both conventional and snap gear are used when calculating the total gear lost and the total poundage of halibut that was lost on that gear.

The ratios of effective skates lost to effective skates hauled by regulatory area in 2003 are as follows: Area 2A = 0.006; Area 2B = 0.002; Area 2C = 0.004; Area 3A = 0.004; Area 3B = 0.002; and Area 4 = 0.004. Since the implementation of the QS fisheries in 1995, the ratios have fluctuated slightly among years, but are still lower than they were during the derby fisheries.

The notable increase in 2003 was in Area 3A where the very low gear loss ratio (0.001) seen in the previous three years, increased (0.004), and resulted in a four-fold increase in the wastage estimate from 23,000 pounds to 91,000 pounds. This was still well below lost gear mortality estimates of 1.5 million pounds for Area 3A during the peak of the derby fishery in the late 1980s.

Sublegal discard mortality

The IPHC's annual Standardized Stock Assessment (SSA) survey is a good gauge of the ratio of sublegal- to legalsized halibut present throughout the north Pacific fishery. This grid survey information can be applied to the catch results from each area to estimate the total amount of sublegal halibut that is caught and released - with one twist.

The formula to calculate sublegal halibut lost has been modified in recent years to better reflect what is actually happening during the commercial fishery.

At the 1999 Annual Meeting it was suggested that the grid survey data did not represent the catch of the commercial fleet since survey vessels tended to catch more sublegal fish. As a result, the current method used to estimate sublegal catch by the commercial fleet is to calculate the sublegal/legal ratio from only those grid survey stations that represent the highest one-third of the legal catch weight.

The ratios of sublegal to legal pounds from these data were calculated from the 2003 grid survey data and are as follows: Area 2A = 0.17; Area 2B = 0.17; Area 2C = 0.08; Area 3A = 0.17; Area 3B = 0.22; and Area 4 = 0.07. The adjusted ratios are 60 to 94 percent of the ratios resulting from calculations using all stations and when compared to the previous year, the 2003 ratios of sublegal to legal pounds were similar in Areas 2C and 4 and increased in the other areas.

The discard mortality rate that has been used since 1995 is 16 percent for all areas. This rate was originally based on the bycatch discard mortality observations in the Bering Sea/Aleutians sablefish hook and line fishery in 1992 to 1993, where the pace is similar to that of the quota fisheries. Observer data from the 1996 and 1997 sablefish IFQ fishery also had a 16 percent discard mortality rate, confirming that this as an appropriate rate. The 16 percent discard mortality rate has been used for the Canadian IVQ fishery since 1991.

To calculate the pounds of sublegal-sized halibut in the commercial fishery, the ratios of sublegal halibut from the surveys were multiplied by the estimated commercial catch in each regulatory area. The resulting poundage was then multiplied by the discard mortality rate (16 percent) to obtain the estimated poundage of sublegal-sized halibut killed in the commercial fishery.

The Commission estimates that 16 out of 100 sublegal halibut caught on longline gear and released will die from their wounds.

Satisfying the human hunger
Estimates of the 2003 personal use harvest

The personal use category emcompasses a number of removals, many of which have very little documented data.

Throughout the north Pacific, halibut is taken as personal use or subsistence harvest from several sources including the treaty Indian ceremonial & subsistence (C&S) fishery in Area 2A, the Native food fish fishery in Area 2B, and personal use fishing off Alaska. Estimates for personal use removals of halibut in 2003 total 767,000 pounds. That is up slightly from 2002 and largely due to an increase in the ceremonial and subsistence allocation to the treaty tribes in Area 2A.

Personal use includes removals from a variety of sources for which little documented data are available. Sources of personal use harvest include (1) the sanctioned First Nations food fish fishery in Canada, (2) the retention of sublegal halibut in Areas 4D and 4E under IPHC regulations, (3) rod and reel catch not documented in the sport catch, (4) illegally-set commercial gear, (5) illegally-retained bycatch in other fisheries, and (6) C&S removals in the Area 2A treaty Indian fishery.

Filleting the catch in Homer, Alaska. Photo by Tracee Geernaert.

Since 1995, all take-home fish from the commercial halibut fisheries in Alaska and Canada has been included in the commercial catch and not under personal use.

In Area 2A, the treaty Indian fishery removals are part of the PFMC catch sharing allocation plan.

Taking it personally…reported harvests by area

Washington, Oregon, and California

In Area 2A, the catch limit is allocated by the PFMC to several fisheries, including the treaty Indian fisheries that operate off northwest Washington. For 2003, the treaty Indian C&S fishery was allocated 27,000 pounds. The personal use removals from the directed commercial fishery are included in the commercial catch, consistent with procedures used in the quota share fisheries.

British Columbia

In the IVQ fishery, take-home fish is monitored and weighed at the time of the offload by the port monitors and is included as part of the vessel's quota.

The primary source of unreported personal use halibut in British Columbia is the Indian food fish fishery which Canada's DFO estimates at 300,000 pounds. Currently, IPHC receives some logbook and landing data for the Indian food fish fishery from DFO but it does not represent the complete catch.

Alaska

With the implementation of the IFQ fishery, the take-home fish or the amount recorded as "retained weight" is now accounted for as part of a person's IFQ. Personal use fish only includes non-commercial and non-sport caught halibut.

Subsistence catches in Alaska are estimated based on information gathered by household interviews and postal surveys conducted by the ADF&G. The interview and survey results were adjusted to account for some amount of overlap in the reporting of sport fishery catches and for areas where no data were collected.

The estimate of personal use for all areas of Alaska in 2003 is 440,000 pounds, which represents a rollover of the 2002 estimate plus the addition of sublegal halibut retained in the Area 4D/4E CDQ fishery.

A total of 14,351 pounds of sublegal halibut were retained by coastal villages in Bristol Bay, the Yukon Kuskokwim, and Norton Sound regions in 2003. As reported by their regional CDQ corporations, the annual catch was down from 18,437 pounds retained last year and the peak of 30,267 pounds reported in 2001.

Personal use has been estimated only intermittently for many areas in Alaska since 1991 and for some years, individual estimates covered two or more regulatory areas. IPHC intends to rollover current estimates until new information becomes available.

New Alaska subsistence rules

Residents in 118 rural communities and 123 Native tribes can now obtain a certificate to legally harvest halibut for subsistence.

In May 2003, the NMFS implemented new halibut subsistence regulations in Alaska waters. Developed by the NPFMC, the fishery is limited to residents of 118 rural Alaska communities and 123 Alaska Native tribes with customary and traditional uses of halibut. Participants must obtain a Subsistence Halibut Registration Certificate, or SHARC, from NMFS and through the end of 2003, 11,571 SHARCs had been issued across the state.

No catch information is available but the ADF&G will survey certificate holders in 2004. An important goal of the program is gaining additional information about subsistence uses of halibut in Alaska.

Unintended Consequences
Halibut bycatch in 2003

Say you're casting for Rainbow trout and a Dolly Varden takes your fly. That's bycatch: the incidental catch of a non-target species. Even if you release the Dolly, a certain number of fish will be lost due to the trauma of being hooked. Call it incidental, accidental, or just a fact of life, bycatch is the unintended consequence of fishing and in a region like the north Pacific that supports some of the largest commercial fisheries in the world, halibut bycatch is substantial enough that it has to be accounted for. In fact, it is the second largest removal of the halibut resource.

Historically, halibut bycatch mortality was relatively small until the 1960s, when it increased rapidly due to the development of the foreign trawl fisheries off the North American coast. Total bycatch mortality peaked at about 21 million pounds in 1965 and that didn't include the Japanese directed fishery in the eastern and western Bering Sea. As foreign fishing off Alaska came under increasing control in the late 1970s, bycatch dropped to a low of 7.2 million pounds in 1985, the lowest level since the IPHC began monitoring bycatch nearly 25 years earlier. Bycatch increased again in the late 1980s due to the growth of the U.S. groundfish fishery off Alaska and peaked at 20.3 million pounds in 1992, but has since steadily declined.

Trawl net being hauled aboard. Photo by Ivan Loyola.

Bycatch is the second highest removal from the halibut resource next to the commercial catch. Even so, it was 39% lower this year compared to 1992 when halibut mortality in the U.S. domestic trawl fishery was at its peak.

Preliminary bycatch estimates for 2003 total 12.3 million pounds, about 15 percent of all removals but two percent less than in 2002 and a 39 percent decrease from 1992. Most of the decrease is attributed to the introduction of IFQs in the Alaska sablefish fishery, the Careful Release program for the Alaska hook-&-line fishery, and Individual Vessel Bycatch Quotas (IVBQs) in the Canadian trawl fishery. Changes in the fishery schedule and closure of some Alaska fishing grounds to protect Steller sea lions lessened the halibut bycatch off Alaska.

Sources of bycatch information and estimates

For most fisheries, the IPHC relies upon information supplied by observer programs for bycatch estimates. Research survey information is used to generate bycatch estimates where fishery observations are unavailable. NMFS oversees observer programs covering the groundfish fisheries off Alaska and the U.S. west coast, and provides IPHC with estimates of bycatch. Estimates of bycatch off Alaska for 2003 were based on bycatch reported from fishing conducted through mid-November and projections for the remainder of the year.

Estimates of bycatch mortality in crab pot and shrimp trawl fisheries off Alaska are made by IPHC staff based on bycatch rates observed on research surveys because direct fishery observations are lacking.

Octopus trying to grab a halibut caught by St. George fisher, Rodney Lekanof. Photo by Rodney Lekanof.

The amount of information varies for fisheries conducted off British Columbia. For the trawl fishery, bycatch is managed with an individual bycatch quota program managed by Canada's DFO. Fishery observers sample the catch on each bottom trawler and collect data to estimate bycatch. Bycatch in other fisheries, such as the shrimp trawl, sablefish pot, and rockfish hook-&-line fisheries, is largely unknown but is believed to be relatively low.

In B.C. bycatch on bottom trawlers is managed through an individual bycatch quota system. The actual bycatch amount is determined using observer data.

Halibut bycatch in the domestic groundfish trawl fishery operating in Area 2A is estimated from information collected by at-sea observers. Bycatch rates (number per hour) are derived from the observer data, and applied to commercial fishery effort from logbooks. Shrimp trawl fishery bycatch estimates are provided by ODFW staff from examinations of halibut bycatch during gear experiments. The estimates are considered rough approximations given the limited amount of data available, but appear reasonable and are updated every few years. Bycatch in the hook-&-line fishery has been determined through comparisons with the Alaskan sablefish fishery.

Discard mortality rates and assumptions

Discard mortality rates (DMRs), used to determine the fraction of the estimated bycatch that dies, vary by fishery and area. Where observers are used for fishery sampling, DMRs are calculated from data collected on the release

viability or injury of halibut. For areas without observers, assumed DMRs are used, based on the similarity of fisheries to those in other areas where data are available.

Observer data are used to estimate DMRs in the groundfish fishery off Alaska. NMFS manages these fisheries according to a schedule of DMRs. IPHC assumes DMRs for most other fisheries. For Area 2A, the domestic groundfish trawl and shrimp trawls are assumed to have a 50 percent mortality rate, whereas the unobserved hook-&-line fishery for sablefish is assigned an assumed DMR of 25 percent. The midwater fishery for whiting is assumed to have a 75 percent rate, based on the large catches of whiting typical of this type of fishery. In Area 2B, observers monitoring the Canadian trawl fishery examine each halibut to determine survival. Data collected by observers in the state-managed scallop fisheries indicate a 50 percent discard mortality rate is appropriate.

Determining how many halibut will survive capture is determined using a variety of information, e.g. observer criteria or how fishing is being conducted.

Bycatch mortality by regulatory area

Area 2

Bycatch mortality in Area 2 in 2003 was estimated at 1.14 million pounds, essentially unchanged from 2002 and below the 10-year average of 1.54 million pounds recorded since 1994. The primary sources for bycatch mortality in Area 2 are the groundfish trawl fisheries in 2A and 2B, and the crab and shrimp fisheries in 2C. NMFS estimated halibut bycatch mortality for the 2002 trawl fishery at 512,000 pounds, using observer data for the first time. This estimate has been rolled over for 2003, but will be updated when an actual estimate for 2003 is obtained. Trawl fishery effort has been declining annually for the past few years in Area 2A and will likely decline even further in response to large-scale area closures instituted by the PFMC, and a recently-approved vessel buy-back program. These closures are expected to significantly affect trawl effort but the impact on bycatch will not be known for several years. No new estimate is available for the shrimp trawl fishery, so the most recent estimate is rolled forward.

Area 2B trawl bycatch has remained fairly steady for the past several years at right around 0.23 million pounds.

In Area 2B, trawl fishery bycatch was estimated at 0.25 million pounds, unchanged from 2002. This is only slightly above the average of 0.23 million pounds which has occurred since the IBQ program began in 1996. In Area 2C, crab pot fishing and shrimp trawling occur in various locations and harvests have held steady over the years. IPHC staff have not reviewed these fisheries since the early 1990s, but we assume mortality has been relatively unchanged since then.

Area 3

Bycatch mortality in Area 3 was estimated at 4.35 million pounds in 2002, a six percent increase from 2002. The groundfish fishery continued to be affected by fishery closures inside sea lion critical habitat, which forced vessels to fish in less productive areas and ultimately reduced effort. Pot effort for cod continues to grow and in 2003 pots took the largest share of the cod harvest. Bycatch increased 27 percent in Area 3A but decreased 19 percent in Area 3B. In Area 3A, trawl and hook-&-line fishery bycatch jumped up after an unusually low level in 2002. For both gears the 2003 estimates remained below the 10-year average.

In Area 3B, trawl and hook-&-line fishery bycatch declined roughly 20 percent from 2002, to levels seen during 1997-2000. As in Area 3A, these changes were in response to changes in fishing locations.

Area 4

Bycatch mortality in Area 4 decreased six percent in 2003, to 6.8 million pounds, the lowest level since 1987. Total mortality was lower for both hook-&-line and trawl fisheries, due in part to lower quotas for Pacific cod. In particular, hook-&-line fisheries encountered lower halibut bycatch rates in 2003, caught roughly 20 percent less cod than in 2002 and were not closed by the halibut bycatch limit. Trawl fishery bycatch went down slightly, also reflecting lower quotas for cod and closures of prime grounds to protect Steller sea lions. Mortality in the pot fishery for cod dropped to 7,000 pounds, the lowest seen since the early 1990s when pot fishing for cod began. The CDQ fishery targeted mainly on pollock and resulted in about 200,000 pounds of bycatch mortality, more than in 1998-1999 when the CDQ fishery focused more on cod.

Small halibut from Shelikof Bay. Photo by Tim Loher.

Closures for stellar sea lions and lower cod quotas contributed to a 6% decrease in Area 4 halibut bycatch.

Making the best of bycatch: The Bering Sea donation program in 2002 and 2003

Making the best of an unintended consequence, for the past six years the IPHC has allowed some halibut bycatch to be donated to hunger relief programs in the Pacific Northwest. The program involving SeaShare (formerly Northwest Food Strategies) of Bainbridge Island, Washington operates under a Prohibited Species Donation permit adopted by NMFS and the NPFMC, and approved by the IPHC. While limited to shore-based trawl vessels that land in Dutch Harbor, there is no limitation on the amount of pounds that can be donated nor a requirement that the bycatch come from certain fisheries.

The amount of halibut collected by SeaShare in 2002 was 33,974 pounds, with two processors, UniSea and Alyeska Seafoods, participating. In 2003, UniSea and Alyeska again participated and through early December, 26,005 pounds of frozen, headed & gutted halibut had been received and with pro bono

shipping to Seattle by Western Pioneer. There, the fish were processed into steaks and repackaged for delivery to regional food banks. This represented over 78,000 meals provided to regional area food banks.

The quality of the halibut donated in 2003 was reported to be generally of excellent quality. Any substandard fish was discarded at the time of processing. Since inception of the program in 1998, donations of halibut under this program have totaled 147,499 pounds.

The halibut donation program out of Dutch Harbor provided about 78,000 meals to regional food banks in 2003.

Stock Assessment
On Seeing, the Sea, and CCC

Vision, the poet tells us, is the ability to see beyond the limits of our own horizon. For biologists at the IPHC, the challenge is to see to the very depths of the ocean to assess the abundance of Pacific halibut. Doing so is at the core of the mission of the IPHC for we must accurately assess the resource in order to ensure that harvests do not impair its sustainability.

We cannot, of course, see to the very bottom of as vast an expanse as the north Pacific but information gathered from commercial catches, the annual standardized setline survey, trawl surveys, and ongoing scientific research gives us some snapshots of what's going on with the halibut stocks below. Mathematical models based on years of information allow us to expand these numbers across the benthic plain.

Port sampler Lynn Mattes with a large halibut caught on the survey vessel Angela Lynn. Photo by Kelly Attridge.

But the basic assumptions that go into those calculations are always subject to challenge themselves, which has resulted in a proposal for a new way to utilize that data. More conservative than the constant harvest rate policy previously used to calculate allowable removals, it is called "Conditional Constant Catch," or CCC.

Summary of the 2003 stock assessment

The exploitable biomass of halibut in Regulatory Areas 2B, 2C, and 3A is estimated by fitting a detailed population model to the data from that area going back to 1974. This year, for the first time, the same model has been fitted to data from Areas 3B, 4A, and 4B which go back to 1996. Prior to that, no surveys were conducted in those areas and catch limits were lower than in recent years. Exploitable biomass in Areas 2A and 4CDE is estimated by applying a survey-based estimate of relative abundance to the analytical estimate of biomass in the adjoining area.

A target for total removals is then calculated by applying a fixed harvest rate to the estimate of exploitable biomass. This target level is called the "constant exploitation yield" or CEY. The corresponding target for directed setline catches,

This year Areas 3B, 4A, and 4B were added to the list of areas that are assessed using a detailed population model instead of the relative abundance method used in the past.

called the setline CEY, is calculated by subtracting an estimate of all other removals—sport and personal use catches, bycatch, IPHC survey catches, and waste.

Staff recommendations for catch limits in each area are based on the estimates of setline CEY but may be higher or lower depending on a number of statistical, biological, and policy considerations. Likewise, the Commission's final quota decisions are based on the staff's recommendations but may be higher or lower.

The Commission's final quota decisions are based on staff recommendations, but may be higher or lower depending on other factors.

Features of the 2003 assessment

Length-specific selectivity

"Selectivity" is the relative vulnerability of halibut to capture by setline gear. Older and larger fish are generally more vulnerable than smaller and younger fish but until last year it was uncertain whether size or age was more important. Previously, selectivity was treated as a function of age because that produced lower estimates. It was the conservative choice.

But the fit of this model to Area 3A did not track well from year to year, hinting that something was wrong with that assumption. Treating setline survey and commercial selectivities as length-specific rather than age-specific largely eliminated the problem. Accumulated data showing similar trends in catch at length in IPHC setline surveys and NMFS trawl surveys provided further evidence that setline selectivity is indeed determined mainly by size rather than age. In this year's assessment selectivity is treated as a function of observed mean length at age in survey and commercial catches.

Separate accounting of females and males

The realization that length, not age, was more important in selectivity affected estimates of the number of females and males in the population, since females are larger at each age. That plus the overall decline in size at age seen in the last several years begged the question whether a decrease in fishing mortality on males came at the expense of females, meaning a drop in female spawning biomass. IPHC scientists that examined the sex-specific assessment showed that female spawning biomass is still well above the historical minimum that occurred in the mid-1970s.

IPHC scientists have concluded that surface age readings - used for years - are accurate for younger fish but underestimate the age of older fish. Once identified, this bias was fixed in the stock assessment.

Allowance for the bias and variability of age readings

For many years, the ages of halibut were determined by counting the rings seen on the surface of the otolith, or earbone. This method is reliable through about age 15 but after that underestimates the true age, which has to be determined by breaking and burning the otolith to bring out the rings in cross section. The bias of surface readings can be corrected in the assessment by doing all the calculations with fish grouped by true age and then predicting and fitting the observed distribution of surface readings. The variance of both surface and break-and-burn readings can be handled the same way.

Model-based estimates of abundance in Areas 3B, 4A, and 4B

Estimating abundance with an age-structured model requires a long enough series of survey data to track several year-classes as they pass through the fishery, plus large enough catches that are a substantial fraction of total mortality. Previously, this was never possible for Areas 3B and 4, where survey and catch data were lacking. Abundance in these areas was estimated based on an index that relied on information from an adjoining area. But now 7 to 8 years of survey data are available for these areas and higher catch limits since 1997 have provided the necessary data base that makes it possible to fit the model and obtain analytical estimates in those areas. In Areas 2A and 4CDE the survey-based method is still used.

Because there is not enough information to use the assessment model, abundance is estimated in Areas 2A and 4CDE using an indexing method.

Sea sampler Sara Wilson goofing off on the survey vessel Pacific Sun. Photo by Suzanne Sullivan.

Quality of model fits

The fitted model uses the same values (mortality, catchability, and selectivity) for both females and males. While frugal, it still predicts the catch at age of females and males very well. This is remarkable because size at age differs greatly between the sexes and has declined substantially for both in recent years. The ability of this simple model to predict the catches by age and sex over such a wide range of observed and predicted values leaves little doubt that variation in size at age accounts for the bulk of variation in selectivity at age.

Effects of model changes on abundance estimates

The 2003 model can be fitted in various ways to show the incremental effect of the new features. These are most notable in Area 2C, where the cumulative change is a 50 percent increase. The overall increases in other areas are smaller but still substantial: 20 percent in Area 2B and 35 percent in Area 3A.

Length-specific fits have always produced substantially higher estimates of abundance than age-specific fits in Alaska. The effect has always been much less in British Columbia because the change in size at age was smaller there. That component of the increase is therefore as expected, and it makes sense that treating the sexes separately would compound the effect, because it introduces a larger variation in length at age.

It is somewhat surprising that correcting the ages also increases the recruitment estimates. That feature must result from an increase in the number of natural deaths that occurs when lifespans are increased by allowing for greater ages and the same natural mortality rate is used.

Males were fully vulnerable to the gear by age 15 twenty-five years ago, but since then, the length at age has decreased to the point that even the oldest males are only about 20% vulnerable.

Estimates of length- and age-specific selectivities

As in previous length-specific model fits, commercial selectivity is estimated to be higher in Area 2B than in Area 3A, with Area 2C intermediate. The estimates for Areas 3B, 4A, and 4B are similar to the Area 2C estimates.

Because length-specific commercial selectivity appears to have been the same for the last thirty years while mean length at age has declined greatly over the last fifteen years, age-specific commercial selectivity has also declined greatly over that period.

Because males in the age range of 10 to 15 years were less vulnerable to begin with, the relative decline in age-specific selectivity of males has been greater than that of females. In Area 3A, males reached full vulnerability by age 15 in the 1970s and 1980s; now even the oldest males are only about 20 percent vulnerable, while the oldest females are still fully vulnerable. The same sort of change has occurred elsewhere. Females always sustained higher fishing mortality rates than males because they were larger, but twenty years ago females and males both reached the size of full vulnerability at some point. Males no longer reach that point, so an even larger share of fishing mortality is falling on the females.

Calculation of exploitable biomass

Exploitable biomass is calculated as the equivalent of all age and sex groups in the stock, so it depends on the commercial selectivities that are used to scale the biomass of each group. Recent assessments represented a good compromise among areas and between the sexes but are no longer appropriate, because they are age-specific rather than length-specific as we now believe to be correct, and because size at age has continued to decline. A new set of length-specific selectivities were adopted to calculate exploitable biomass, which will be lower than the old exploitable biomass, partly because of the decline in size at age since 1999 but mostly because the calculation will be done separately for females and males and the males will contribute less.

The number of halibut aged 8 and older is now 5-10 times greater than at the stock's lowest point in 1974, but because the halibut are smaller at age, the biomass is only about 3-5 times greater.

Estimates of historical and present biomass in Areas 2B, 2C, and 3A

The Commission's primary management objective is to maintain a healthy spawning biomass above the minimum that occurred in the mid-1970s. Previously we calculated spawning biomass by applying the female maturity schedule to the total biomass including males because we did not have sex-specific abundance estimates. We now have those estimates, and they show that female spawning biomass is 3-4 times what it was in the mid-1970s. On that score the stock is in good shape.

The numbers of fish aged 8 and older are now 5-10 times what they were in 1974, but due to the dramatic decline in size at age over the last fifteen years, their total biomass is only 3-5 times the 1974 level and the exploitable biomass only 2-3 times greater. A significant part of the age 8+ biomass now consists of males that never get large enough to be caught in any numbers, which is evident by the near disappearance of these age classes from commercial catches in Area 3A.

Estimates of present biomass in Area 3B, 4A, and 4B

In these areas the model is fitted to data from 1996-2003 only. Although less data is available for these areas, the model is simple enough that the abundance and selectivity estimates are very well determined. The model fits indicate that survey catchability in Areas 4A and 4B is about the same as in Area 3A, but that it is higher in Area 3B. The model fits also show that selectivity is lower in Area 3A than in Area 3B and 4. Using the fixed selectivities to calculate exploitable biomass increases the 3A value by about 40 percent, which has the effect of shrinking the other area's estimates relative to the Area 3A estimate. In short, the analytical estimates in all three areas are lower than the survey-based estimates relative to Area 3A mainly because selectivity is lower in Area 3A than in those areas.

Estimates of present biomass in Areas 2A and 4CDE

For these areas we cannot do an analytical assessment so we continue to use the survey-based estimate scaled to an adjoining area. For Area 2A this is 13 percent of the Area 2B estimate. For Area 4CDE we have been scaling to Area 3A because that was the nearest area with an analytical estimate. We now have an estimate for Area 4A, and by the same procedure can estimate the Area 4CDE biomass as 142 percent of the Area 4A biomass.

Estimated CEY in 2004

The adoption of new length-specific commercial selectivities produces much lower estimates of exploitable biomass than the old fixed age-specific selectivities. In the past we calculated CEY by applying the established 20 percent harvest rate to exploitable biomass, but we cannot do the same thing now because that rate was chosen on the basis of simulations that used the old age-specific selectivities. A new set of simulations with the new, lower selectivities can be expected to lead to a higher target harvest rate, but that work is currently in progress. For this year's CEY calculations, we have adopted a provisional target harvest rate of 25 percent for Areas 2 and 3. For Area 4, we have stuck with 20 percent because of uncertainty about the long-term productivity of the Bering Sea/Aleutians region relative to the Gulf of Alaska.

For this year, we have adopted a provisional target harvest rate of 25% for Areas 2 and 3 and 20% for Area 4.

The resulting estimates of setline CEY are considerably higher than last year's in Areas 2A, 2B, and especially 2C, where this year's assessment changes had the largest total effect. In Area 3A setline CEY is a little lower. In Areas 3B and 4 the numbers are much lower—half or less—because of the lowered selectivities and in Area 4 the continued use of a 20 percent harvest rate.

Conditional constant catch (CCC) harvest policy

The impact in stock assessment that resulted from changing just from an age to a length specific selectivity is a good example of why biologists have been increasingly concerned of the reliability of our understanding of the data and how it pencils out in mathematical models. This concern led to consideration of a new harvest policy which attempts to separate setting of annual catch quotas from the

A new harvest policy was considered that would separate the setting of annual catch quotas from the vagaries of our understanding of the resource.

vagaries of our understanding of the resource. Known as Conditional Constant Catch, or CCC, it was first proposed in 2002 and IPHC commissioners agreed to consider a CCC policy for possible adoption in the future.

CCC is based on the assumption that as a long lived animal that is exploited at a relatively low level, halibut catches should not sharply rise or fall from year to year. This was sometimes the case with the existing Constant Harvest Rate (CHR) policy but it wasn't necessarily the biomass that varied, rather it was our perception of it. If the assessment model was overhauled, or an important parameter was reassessed, estimates of the exploitable biomass could abruptly change and with it the allowable catch.

The CCC policy is based on the long term productivity of the stock.

The CCC policy is based on the long term, repeatedly demonstrated, productivity of the halibut stock. In CCC, "Catch" refers to all halibut removals: the commercial harvest, bycatch, sport, personal use and waste. The word "Conditional" refers to the application of a harvest rate throughout most of the range of abundance and the third C, the "Constant," refers to a catch ceiling at the top.

In many respects, the "Conditional" part of CCC is comparable to the CHR policy now in effect, with a lower biomass limit below which no harvest is allowed to protect the stocks and a higher threshold for application of a catch ceiling. It is the catch ceiling that naturally prompted much discussion among harvesters and what that would mean to their allowable catch.

The catch ceilings and ceiling harvest rates ensure that the spawning stock will be conserved even in times of low productivity. At the current high biomass, the catch ceilings are likely to be a factor. Over the long term, the average catches with the ceilings are not much lower than catches that are not limited by a ceiling. When biomass declines in times of lower recruitment, some of the forfeited catch – up to 20 percent - will be recaptured thus tempering impact of the catch ceiling.

Taking CCC for a test drive

To assess the performance of the CCC policy, simulations were conducted for IPHC Regulatory Areas 2B, 2C, and 3A – both individually and as one large management area. The population dynamics were modeled according to our current understanding and simulations were conducted over a range of growth and recruitment possibilities. Policy performance was measured with a variety of indicators, a range of catch ceilings and ceiling harvest rates for each area. Finally, minimum spawning biomass thresholds and limits were established equal to the historic minimum observed biomass and the biomass threshold level at which the harvest begins to be scaled down was set at 1.5 times the biomass limit.

In the CCC model, there is a threshold reference point that triggers remedial action. If the reference point is removed, the chance of the spawning stock biomass dropping below the historical minimum increases.

Ceiling harvest rates

While the CCC policy incorporates a threshold reference point to trigger remedial action, an overriding concern is conservation of the stock and avoiding any approach to the limit reference point. In the absence of these reference points, the probability of spawning stock biomass dropping below the historical minimum increases substantially at harvest rates above 0.25. Inclusion of these

reference points in the management policy should avoid this occurrence, if the reference points are determined accurately. The reference points are determined by assessing the performance of the stock over the long term but this can vary greatly during a particular climate regime. In view of this and the fact that the benefits in yield at harvest rates above 0.25 are relatively minor, we recommend adoption of a harvest rate of 0.25 as a conservative operational value for the CCC policy.

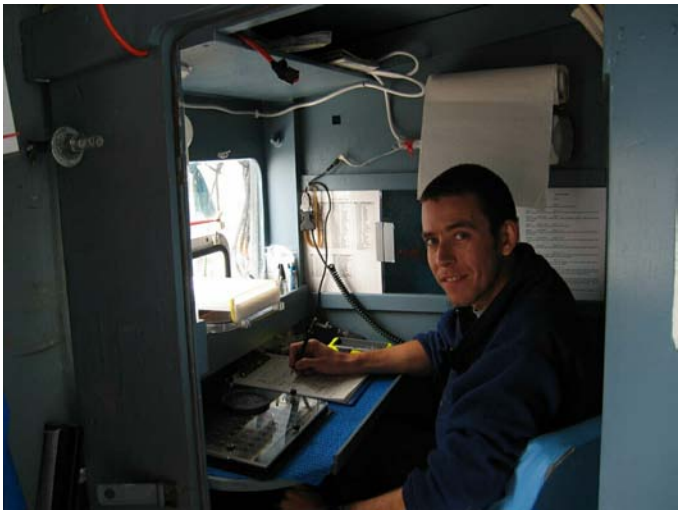
Catch ceilings

Catch ceilings would be an integral part of the CCC if adopted as policy.

Under a CCC policy, catch ceilings will be established for each area. As an operational guideline, IPHC staff recommends using a combination of a catch ceiling and 0.25 harvest rate that achieves 90 percent or more of the catch ceiling at least 60 percent of the time. The rationale for this choice is that it achieves a substantial portion of the maximum possible yield and protects the stock over the long term, while not introducing a substantial and destabilizing shift in removals at current biomass levels.

Recapture of forfeited catch

If the CCC harvest policy is adopted, there will be years in which the catch will be limited by the catch ceiling. Some of that forfeited catch, however, will be captured in years when the biomass is cycling downwards. Removals drop as biomass declines but under a catch ceiling some biomass is conserved and removals do not drop as quickly. The amount of potential recapture of forfeited catch is hard to estimate but could be between 10 and 20 percent.



Eric Soderlund working the shack during the Vancouver grid survey on the F/V Viking Joy. Photo by Dennis Moore.

To estimate the fraction of forfeited catch recaptured in subsequent years, we compared how catches might be affected as biomass naturally cycles up and down, and utilizing a range of catch rates and catch ceilings. Estimates of the fraction of forfeited catch eventually recaptured varies from nearly zero to nearly 100 percent, depending on the assumptions used but in ranges that are considered reasonable for all areas, the fraction of forfeited catch that would be recaptured is generally around 20 percent for Areas 2B and 2C and 10 percent for Area 3A.

In a CCC scenario there would be years where the catch would be limited by the ceiling. However, some of that forfeited catch would be available for harvest as the biomass cycled downward.

Conclusions

The CCC harvest policy was developed in response to a perceived need to reduce annual variability in harvest recommendations as well a desire to insulate the harvest policy from the annual stock assessment. A major advantage to the CCC policy is that it is a policy based on the long term, repeatedly demonstrated, productivity of the halibut stock rather than exclusively on annual estimates of production. The catch ceilings and ceiling harvest rates ensure that the spawning stock will be conserved even in times of low productivity.

While questions about CCC policy remain to be answered in the minds of many fishermen, during the 2003 Annual Meeting Dr. Bruce Leaman observed that there were several reasons the CCC policy is desirable and one is truly biological. When scientists try to follow the ups and downs of the stock, they have to assume certain aspects of our knowledge of halibut that may or may not be real. These possible inaccuracies can be threatening when they inadvertently allow an excessive harvest of the resource. In seeking a ceiling on overall catches, CCC attempts to insulate us from the limits of our understanding of the resource upon which we all depend.

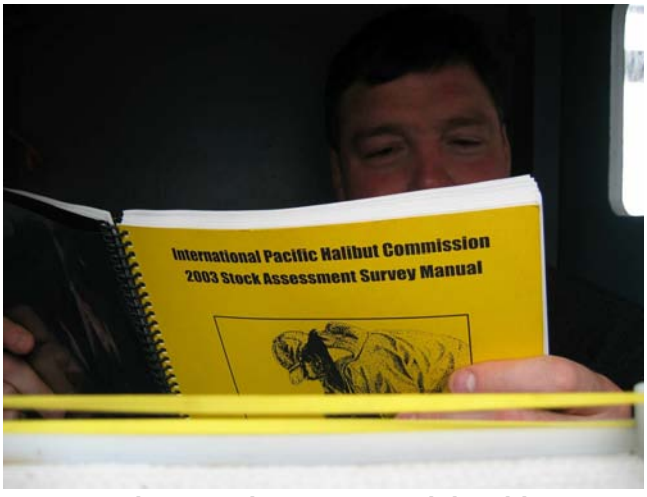
Cruising for Science

2003 stock assessment survey

The stock assessment survey not only brings in valuable biological information on the resource, but also serves as a platform for many other related studies.

For half of its 80 years, the IPHC has taken stock of Pacific halibut populations through a coast-wide, comprehensive survey that gathers information across the entire range of halibut in the northeast Pacific and Bering Sea. Known as the Standardized Stock Assessment Survey, or SSA, the data collected on size, age, and sex composition are used to monitor changes in biomass, growth, and mortality in halibut populations. The SSA provides biological information independent of samples taken from the commercial catch and a unique opportunity for the IPHC to conduct other scientific research such as tagging operations, examining prior hook injuries, and seabird interactions. First started in 1963, the SSA has been conducted annually except for a break between 1987 and 1992.

In 2003, twelve longline vessels, six Canadian and six U.S., were chartered for survey operations - their crews supplemented with two biologists (comprised of eight IPHC staffers, 21 seasonal hires, and one intern). During 68 trips and 694 charter-days, these vessels sampled halibut habitat from Oregon to the island of Attu at the end of the Aleutian Islands. A total of 1,233 grid stations were completed and 1,034,477 pounds of halibut were landed. Compared to the most recent surveys, halibut catch per unit effort dropped in all IPHC Regulatory Areas.



Sea sampler Dennis Moore studying his survey manual. Photo by Eric Soderlund.

The 2003 survey design encompassed all offshore waters of Oregon, Washington, British Columbia, southeast Alaska, Gulf of Alaska, Aleutian Islands, and the northeast Bering Sea. These areas were divided into 27 separate regions, with fishing stations placed on a10 nmi by 10 nmi square grid. Standard survey gear consisted of fixed-hook, 1,800-foot skates with 16/0 circle hooks spaced 18 feet apart. Eight skates were fished at each station, each hook baited with a quarter pound piece of semi-bright chum salmon. Each vessel set one to three stations daily beginning at first light and allowed the gear to soak a minimum of five hours before hauling.

Although legal by-catch is retained and sold on the surveys, the IPHC does not keep the proceeds. Generally, half is given to the vessel as part of the contract and half is given to the state/provincial agency that manages that fishery.

On deck, the fork lengths of all halibut landed were recorded to the nearest centimeter and the length was converted to weight in pounds using a standard formula. This calculated weight was used to generate the catch per unit effort (CPUE) data. All legal-sized halibut and a percentage of sub-legal halibut were sampled to determine the sex and maturity stage. Otoliths (earbones) were collected from a sample of all halibut caught selected by a pre-determined random number table.

All legal-sized halibut, except those fish released as part of the PIT tagging study, were retained by survey vessels and sold to offset the cost of the survey program. Survey vessels also retained rockfish and Pacific cod landed as bycatch because they are generally considered dead from being hauled up from the depths. Sales were awarded based primarily on getting a fair market price but other factors were also taken into account. Most vessel contracts provided a lump sum payment along with 10 percent of the halibut proceeds, and 50 percent of the allowable bycatch proceeds. Special cost-sharing arrangements helped offset the expense of surveying the Bering Sea and Oregon/Washington regions, which are very costly.

Getting results: Catch per unit effort

In 2003, CPUE decreased in all regulatory areas compared to the 2002 results. The largest drop of 33 percent occurred in Area 2A; the smallest drop occurred in Area 4A. Downward trends have been seen in Areas 3B and 4A for the last five years and in Area 4B for the last four years. The commercial CPUE displayed a similar trend in those areas over the past four years. The distribution of sub-legal and legal-sized halibut by depth was consistent with previous surveys, showing higher abundance of sub-legal fish in shallow waters, and a wide variation in depth occurrence for legal size fish.

Bycatch

The target of 2000 otoliths was met in all but one regulatory area.

Approximately 73 separate species of fish and invertebrates were caught as bycatch during the 2003 survey. The most common bycatch in Areas 2A and 2C was sablefish. Common bycatch in Area 3A were sharks, primarily spiny dogfish. The most frequent bycatch in Areas 3B and 4A was Pacific cod. Sculpins were the largest component of the other species category in Area 4B while skates were the largest component of the other species category in Area 4D.

Otolith collection and gender

The otolith collection goal for the 2003 survey was 2,000 otoliths per regulatory area and this was met in all but Area 2A. Despite sampling all fish caught there, only 742 otoliths were taken.

The sex ratio for mature halibut from the survey catches showed considerable variation across most areas, ranging from 40.2 percent to 72.0 percent females. These figures are consistent with last year's results. In general, the regions to the west of the central Gulf – Areas 3B, 4A, and 4B that had the lowest historical exploitation rates – had lower percentages of females in the catch. Paradoxically, Area 4D had the highest percentage of females.

Age distribution

The 1994 year class (9-year olds) accounted for the largest proportion (in numbers) of sampled halibut for all areas and sexes combined, 11 percent, in 2003. The next most abundant year classes were 1995 and 1987 (8 and 16-year olds) respectively. Nine-year-olds were the most abundant age class for female halibut sampled in Areas 2A, 2C, 3B, and 4A as well as for females for all areas combined. The second and third most abundant age classes for sampled females were 8- and 16-year olds, respectively.

The most abundant female age classes in the survey were 9, 8, and 16 year olds - in that order.

The 1987 year class was the largest for male halibut from Areas 3B, 4A, and 4B and from all areas combined. The second and third most abundant age classes for sampled males were 15- and 8-year-olds, respectively.

Survey vessel, Predator, ready to set. Photo by Tracee Geernaert.

Future work

The IPHC plans to continue most of the standardized stock assessment surveys into the foreseeable future but survey operations are dependent upon the ability of the project to remain self-funding. Although the surveys are designed to fulfill scientific needs, we have selected station densities and fishing effort so that our ability to conduct the surveys can withstand limited variation in price or CPUE. However, if halibut prices or CPUE fall significantly in the future, the Commission will need to find alternate funding for this necessary data collection.

Proceeds from the sale of halibut caught on the survey are used to fund future research.

Cruising the Gulf
Report of the 2003 NMFS Gulf Trawl Survey

Since 1984, the NMFS has conducted a Gulf of Alaska groundfish trawl survey, originally once every three years, then every other year since 1999. The survey was made again in 2003 and IPHC samplers were deployed on two of the three vessels to sample halibut. This year sufficient funding allowed the survey to be conducted over the full intended range from Dixon Entrance to the Islands of Four Mountains and to a maximum depth of 700 m.

The IPHC objective was to sample one-third of the halibut caught on two separate vessels for length, gender, maturity, and prior hooking injuries (PHI). The information was then used along with data from other sources such as the

IPHC setline surveys and commercial catch information to create a data series describing total abundance and year-class trends.

While the Commission relies on setline surveys and commercial data for its stock assessments, scientists have been looking to incorporate trawl surveys but this is difficult because trawl surveys have produced different abundance results than setline surveys for similar sized halibut in recent years. The trawl gear has limitations that make the data collected difficult to include in the IPHC stock assessment. Halibut are vulnerable to the trawl from about 20-100 cm, but a significant portion of the commercial-sized (>81 cm) population exceeds 100 cm. However, the information can still be used for forecasting purposes and in other varying capacities.

Trawl survey data are not currently used in the IPHC stock assessment, but can offer a glimpse to the future.

Survey design and results

The Gulf area was divided into 49 strata based on depth, geographic features, and International North Pacific Fisheries Commission (INPFC) statistical areas. The net used was a standard NMFS eastern otter trawl equipped with gear to record net height and width while fishing; temperature and depth; and time on bottom.

In 164 tows, a total of 835 halibut were captured and sampled: A total of 423 female, 411 male, and one unidentified halibut were sampled during the survey. Of the females sampled, 401 were immature, 21 were ripening, and one was actively spawning. Of the males sampled, 322 were considered immature, and 89 were mature. These maturity rates are consistent with samples from recent years.

Size class trends

Halibut size-class trends in the Gulf of Alaska are difficult to track because of the survey's triennial/biennial frequency. The 1993 survey, though, showed a large abundance of 50 to 60 cm halibut that proved to be the exceptionally large 1987 year class followed by another smaller, but larger than average 1988 year class. Those halibut tracked through the 1996 and 1999 trawl surveys as they grew larger and became less vulnerable to the trawl gear.

Distribution by depth

Routinely, a large congregation of juvenile halibut is found in the western Gulf .

When halibut distribution was broken down by area and depth, certain trends were apparent. The Kodiak region generally yielded the highest abundance estimates followed by Shumagin and Chirikof with substantially less halibut. Many of the halibut caught in those regions were below 80 cm and were perhaps still actively migrating. Including all areas over the last four surveys, 82 to 90 percent of the fish were found in depths of 1-100 m, with 9-17 percent in water from 101-200 m.

Cruising the Bering Sea
Report of the NMFS Bering Sea trawl surveys

Since 1979, NMFS has conducted an annual groundfish trawl survey of the eastern Bering Sea shelf from Unimak Pass, Bristol Bay to north of St. Matthew

Island, and the IPHC has taken part in these surveys for the past six years. The 2003 survey consisted of approximately 380 stations positioned on a 20 nmi x 20 nmi grid at depths ranging up to 200 m. The area was surveyed using a standard NMFS eastern otter trawl with equipment that recorded net height and width while fishing; recorded temperature and depth; and time on bottom. A 30-minute tow was attempted at each station.

The IPHC objective was to sample all of the halibut caught aboard one of the two vessels in the survey for length, gender, maturity, otoliths and prior hooking injuries. As part of a special otolith study, all fish less than 30 cm were shipped back to the IPHC lab for additional data collection.

NMFS trawl vessel in the Bering Sea. Photo by Ivan Loyola.

Length and age distribution

All 2,039 halibut caught on the survey were measured for length and 835 fish were sampled. Estimates of relative abundance were derived by expanding the survey catches from the area swept by the trawl to the total survey area. Total abundance as estimated by the trawl survey (which includes very small halibut from about 15 cm in length and includes very few fish greater than about 100 cm in length) varies somewhat from year to year.

Because the Bering Sea shelf survey is conducted annually, it is possible to observe particular size and age classes traveling through the juvenile population. A group of very small halibut, 10-19 cm in length, showed up in the 2000 survey and were aged as 2-year-olds. For the next two years, that age class continued to make up a considerably larger proportion of the total catch than its adjacent year classes. The 2003 survey indicated an increase in halibut sized between 40 and 80 cm and while it is reasonable to assume that these may include the 1998 year class, aging data needed to confirm this is not yet available.

A year class, larger than those around it, first showed up in the 2000 survey as 2 year olds and has consistently appeared strong in subsequent years. The IPHC will be watching closely to see if they remain strong as they become large enough to enter the commercial fishery.

Cruising for a bruising: Prior hook injuries recorded in the 2003 SSA and Trawl Surveys

Longline fishers in Alaska are required to practice Careful Release techniques for all halibut returned to the sea. All halibut captured on the setline and trawl surveys were examined for the presence of prior hooking injuries or

Each halibut on the survey is examined for a prior hooking injury. The injury is noted and classified by severity.

PHI and those data give an idea of how much injury is being inflicted in those fisheries.

The fish may have been hooked recently, in which case the injury should be easily noticed, or it may have happened some time ago and scarred over. Some fresh injuries are mistakenly attributed to the current capture, whereas old injuries may have healed sufficiently to actually hide the injury. Injuries are observed primarily to the jaw, but may occur to the eye and eye socket.

In all, some 73,000 halibut were examined on the 2003 SSA survey vessels. Slightly more than 4,700 halibut were found to have a prior injury. The percentage of halibut with an injury ranged from a low of 2.7 percent (4A-Aleutians) to a high of 25.1 percent (Area 4D) and averaged 6.4 percent coast-wide. This result was just over a half percent higher than the coast-wide rate of 5.7 percent found in 2002, and continues an overall increase seen in that year.

Among sublegal halibut, the incidence of PHI was down half a percentage point at 2.6 percent. Sublegal PHI levels increased in all of Areas 2 and 3, and decreased in all of Area 4. The highest occurrences of sublegal PHI were seen in Areas 4A, 9.4 percent, and 4D, 9.7 percent and likely reflect the bycatch of sublegals in the Pacific cod and other groundfish fisheries in the Bering Sea and Aleutians.

IPHC samplers on board NMFS trawl surveys in the Gulf of Alaska and Bering Sea regions also gathered PHI data. Their results were lower than what was found on the IPHC surveys, but the NMFS survey covers different overall areas than those covered by the IPHC. In the Bering Sea, 8,954 fish were inspected and showed an overall PHI incidence of 1.5 percent. In the Gulf of Alaska, a total of 835 fish were inspected and 3.5 percent were observed with a PHI. These rates are similar to those seen in previous years.

Sea sampler Jim Gough holding a halibut with a torn jaw prior hooking injury. Photo by Tracee Geernaert.

While PHI is spread throughout the range of halibut, there are several locations where it is quite high, notably Shelikof Strait, Seward Gully, and eastern Yakutat in Area 3A; the northern and inside areas of Area 2C; inside areas in Area 2B; and the southern Washington/northern Oregon coast in Area 2A. The Bering Sea edge, particularly in Area 4D, shows a high rate of severe PHI injuries indicating halibut there are receiving less-than-careful handling when being released, and probably due the pace of fishing for other species like Pacific cod.

The effect of PHI on halibut feeding habits

It seems only logical to assume that injuries caused by the process of being hooked in the mouth affects the feeding habits of halibut. In an effort to understand the feeding patterns of fish that have sustained hooking injuries, 170 halibut, roughly half with PHI and half without, were collected during the Gulf of Alaska trawl survey in 2003 and their stomach contents analyzed. Trawl-caught halibut were necessary for this study because halibut that are hooked through the mouth tend to regurgitate their stomach contents, presumably to expel the hook.

A total of 31 identifiable prey items were present in the stomachs, including various species of crab, pollock, sand lance, and a variety of other species in much lower quantities. There were also categories for stones, onion, and "unidentified mush" encompassing any unidentifiable organic material.

While the halibut with PHI had smaller numbers of prey on average than those without, the average weight of prey per halibut varied. Neither the stomach weight nor the number of prey was statistically different between the two groups. Perhaps the most interesting finding was that the presence of PHI appears to have affected the diversity of prey items consumed.

Halibut are opportunistic feeders and prey upon a large variety of animals but there were only three prey items found exclusively in the PHI group compared to 13 items found only in fish without PHI. This suggests that a halibut's ability to identify or capture specific types of prey may be altered when a hooking injury occurs.

It appears as though halibut who have sustained a minor to moderate hooking injury are capable of capturing volumes of food comparable to their uninjured counterparts. However, there is some evidence to suggest that an injury might somehow limit the variety of prey they can capture.

Bird watching
Results from the 2002 seabird occurrence data

In 2002, the IPHC and Washington Sea Grant Program developed a protocol for collecting seabird occurrence data in longline research operations. At the conclusion of hauling, samplers recorded the presence and abundance of seabirds within a 50 m radius of the vessel's stern. IPHC has incorporated the seabird counts as part of the SSA, and NMFS and ADF&G have agreed to continue the counts on their annual sablefish surveys. This data will be used to determine variations in the abundance of seabirds and ultimately, may help identify appropriate seabird mitigation measures.

Seabird occurrence data collected in 2002 included a total of 79,131 birds recorded during 1,450 observations between May 21 and September 3, 2002. There was an average of 54.6 birds per observation. The most common species

for all observations was northern fulmar (*Fulmarus glacialis*), making up 75 percent of the sightings. Albatross (11 percent) and gulls (8 percent) were also common. Laysan albatross were most common in western Alaska, whereas black-footed albatross were seen coastwide. Seabirds were absent in 223 (15.4 percent) post-haul observations, 43 percent of which were in inside waters.

IPHC has been collecting observations on the sea-birds seen while survey fishing.

Thanks to the cruisers

Survey operations actually are no sea cruise at all, often involving grueling work over long, demanding days, and in a wide variety of weather conditions. Sixteen vessels took part in the 2003 SSA and trawl surveys. Assisting on the SSA (in alphabetical order) were the *F/V Blackhawk*, *F/V Bold Pursuit*, *F/V Free to Wander*, *F/V Heritage*, *F/V Kristiana*,, *F/V Norska*, *F/V Pacific Sun*, *F/V Predator*, *F/V Star Wars II*, *F/V Viking Joy*, *F/V Viking Spirit*, and the *F/V Waterfall*. Thanks also to the NMFS trawl survey vessels, *F/V Aldebaran, F/V Arcturus, F/V Gladiator, and F/V Sea Storm.*

A mixed flock of gulls feeding on discarded bait. Photo by Kendra Holt.

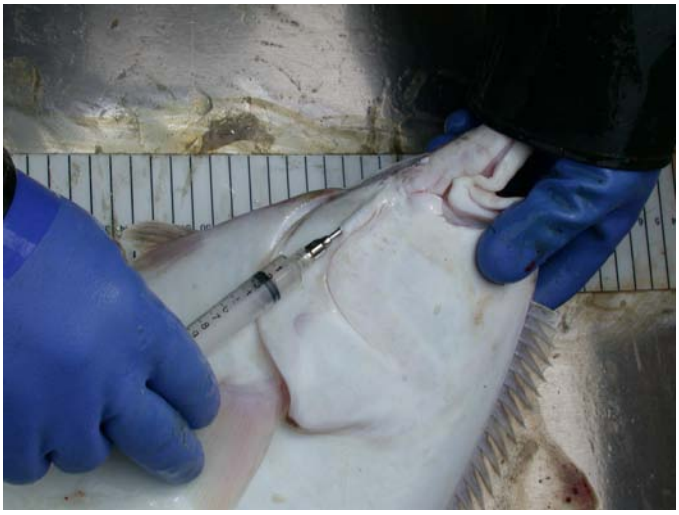
2003 Almanac

3 – Age in years of the youngest halibut sampled, 5 fish measured between 52 and 68 cm
4 – Age in years of the smallest halibut sampled, 42 cm
9 – Age in years of the most abundant year class sampled
36 – Age in years of the largest halibut sampled, 225 cm
48 – Age in years of the oldest halibut sampled, 136 cm
85.5 – Median length in cm. of all halibut caught on survey stations in 2003
101.5 – The largest median length in cm of halibut found in any regulatory area, Area 4D
694 – Number of charter-days to complete the 2003 SSA
1,233 – Number of person-days of seasonal employees hired to complete the SSA
1,233 – Number of grid stations fished during the SSA
1,450 – Number of seabird observations made during the SSA in 2002
79,131 – Number of seabirds observed in all regulatory areas in 2002
1,034,477 – Pounds of halibut caught during the 2003 SSA
125,678 – Pounds of Pacific cod caught
62,559 – Pounds of rockfish caught
379,981 – Pounds of #2 semi-bright chum salmon used as bait
43,999 – Number of halibut tagged with passive integrated transponder (PIT) tags 583,289 – Number of halibut in the commercial catch scanned for PIT tags
95 – Number of PIT tags recovered in 2003
91 – Number of days needed to deploy all PIT tags
12 – Number of Pop-up Satellite Archival Tags (PSATs) deployed in 2002
10 – Number of PSATs successfully recovered
72,000 – Approximate number of halibut examined for PHI during the SSA
6.4 – Overall percentage halibut observed with prior hook injuries (PHI)
459 – Weight in pounds of the record sport-caught halibut landed near Dutch Harbor by Jack Tragis in 1996
420 – Weight in pounds of a sport-caught halibut landed off Afognak Island by Troy Davis in 2003
533.6 – Estimated weight in pounds of a 98-inch commercially caught halibut landed in the Bering Sea in 2003 by the F/V *Miss Mary* skippered by Pat Davis
1 gazillion to 1: Unscientific estimate of odds that biggest sports and commercial halibut of any given year would be landed by persons with the same last name

Putting it to the Test: Research

From straps and spaghetti to PITs and PSATs: New tags for a new age

Throughout its 80-year history the IPHC has conducted tagging experiments to learn about exploitation rates, migration patterns and other basic information about halibut, and the technology of tagging has evolved considerably over the decades. Early biologists experimented with button and dart tags, and even tattoos to mark the fish, but the former were easily shed by the halibut while tattoos faded and were hard to notice. The first successful halibut tags were monel straps clamped onto the halibut's cheekbone. Straps, both large and small, were used to tag tens of thousands of halibut in the first four decades of the Commission until the 1960s, when the IPHC went strapless.



A halibut being PIT tagged. Photo by Eric Soderlund.

Tagging took on a new look in 2003 with the deployment of almost 50,000 PIT tags that are invisible to the naked eye.

Its replacement was named after the spaghetti-like polyethylene tube that held the number and return information. Brightly colored and easier to notice than straps, spaghetti tags were attached to the cartilage near the cheekbone with a thin nickle-silver wire, and boasted a lower shedding rate than straps. Spaghetti became the tag of choice for the next four decades with releases in the hundreds of thousands but like strap tags, still relied on the good will of harvesters, plus the incentive of a free IPHC ball cap, to get results.

The PIT tags are similar to those used by vets to tag household dogs and cats in case the animal becomes lost.

Enter the new century and while diet-conscious consumers began to shun pasta, biologists too were looking beyond spaghetti tags, not because of the carbs, but because new technology offered something better. Enter PITs and PSATs, high tech tags that did not rely on someone else finding them. PITs immediately became the most deployed tag in any single year of IPHC history and while PSATs were the least deployed tag in terms of overall numbers, they claimed the highest data return rate of any program. Together, PITs and PSATs combined to make 2003 the most ambitious year for tagging in the IPHC's 80 years of scientific research.

Life on PIT Row

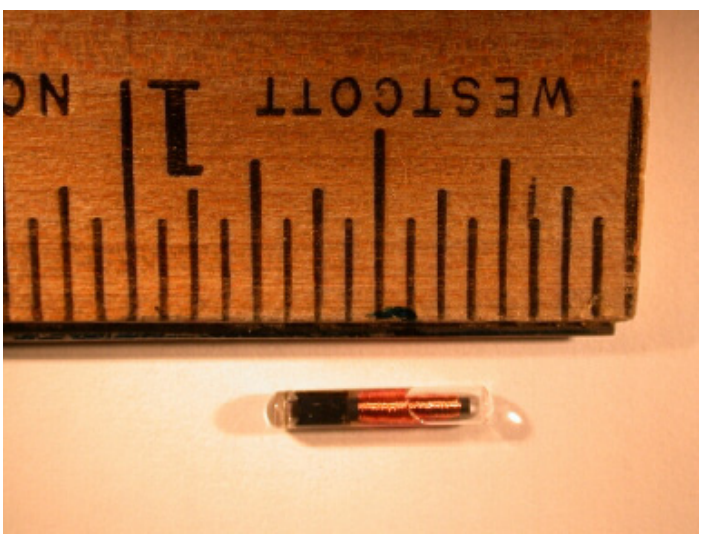
In 2003, the IPHC embarked on its most ambitious tagging program in its 80-year history. During the annual grid survey, samplers tagged and released 43,999 halibut with PIT tags from Oregon to Attu and including the Bering Sea. Prior to that, the most tags deployed in a single year was just over 36,000 tags in 1980, and that was for six separate studies.

The 2003 releases were the culmination of three years of preparation involving gear evaluation and selection, and the development of a tagging protocol and data capture system that allows acceptable tag retention, quick tagging and accurate recording of tag release data. By the end of the commercial season, over half a million halibut had been scanned and 95 tags were recovered. Tag releases will continue during 2004 and tag recovery efforts will continue over the next few years providing the IPHC with non-biased estimates of exploitation rates independent from the assessment model as well as information on migration.

Scan samplers look for tags in halibut that are being delivered commercially. By year's end, 95 tags had been detected.

So what is a PIT tag anyway?

The Passive Integrated Transponder, or PIT, tag is an integrated circuit chip and antenna coil encased in glass about the size of a grain of rice. Inserted by a hypodermic needle, the tag's unique alphanumeric code can be read even from within the halibut itself when the tag is energized by a scanner. Read by IPHC samplers in key ports, PIT tags don't rely on others to return them and promise a greater return than other tags which makes a large, widespread tagging operation cost effective.



Close up view of a passive integrated transponder tag. Photo by Stephen Wischniowski.

Hardware and software

The tags – All tags released during the grid survey were supplied by Biomark and Destron Technologies. Identical in size, (11.5 mm x 2 mm) to tags used in earlier studies the new model offered an increased read range. A 'BioBond' sleeve was slipped on the end of the tag to reduce movement after it was injected with a 12-gauge hypodermic needle.

The scanner – Originally designed for cattle and veterinary operations, the simplicity and price of the Allflex-Boulder or "stick" reader was chosen for scanning during tag releases. The Allflex handheld "Boulder" reader was chosen for tag recovery scanning in ports.

Preparation for the PIT program encompassed everything from equipment field testing to extra training for IPHC samplers to writing special programs for data capture.

The computer – Data was captured into a DELL PocketPC using a data entry program written in-house. Data were sent to the program from the scanning devices via a custom made serial cable connection to stream data from the stick reader to the PDA.

Waterproofing – Obviously an issue at sea and in processing plants, the PDAs were contained within a waterproof case that protected the unit from moisture or abuse. This case has a soft clear top, allowing use of the stylus when the case was shut. The wand and its connections were further protected with a plastic sleeve over the on-off switch, and waterproofing tape that wrapped over the tip of the wand, the joint between the sleeve and the wand, and over the plug connection at the wand's base and just to be sure, the wands were dipped in a rubber coating to protect the seam on the scanning end.

F/V Heritage while on the PIT tagging trial survey in Kodiak, Alaska.

Sampler training and support – An extra day was added to the usual three-day training program for samplers to deal just with the PIT study. As part of this training, freshly landed halibut and halibut heads were obtained to provide hands-on instruction. To assist samplers in the field, IPHC staff prepared a 47-page tagging manual as a companion to the 233-page survey manual. The IPHC also maintained a 24-hour tech support line to address problems in the field and maintained a log on the IPHC Intranet which documented problems and shared solutions.

Preparation for tagging

Pilot studies were conducted by the IPHC in 2001 and 2002 to ensure the tags were placed in an area where they will be retained over time and easily detected during portside scanning operations. Finding the right location was perhaps the most troublesome part of the overall protocol. The halibut's head was chosen for two reasons: there was no risk of tags ending up in the food

supply, and heads were often kept at the offloading site longer than the rest of the carcass. The precise location for the tag needed good short and long-term retention rates and a location that would not be damaged by hooking, gaffing, hook removal during recapture, or removal of the head at the processing plant. The final site was identified in 2002 on the opercular plate, just below the preopercular groove on the white side.

To further ease operations, a marking station was developed to maximize the tagging rate and minimize the time a fish is out of the water. The station consisted of a PIT tag transceiver (reader/wand) connected to a PDA running data collection software. As each fish was placed into a measuring cradle and tagged, the PIT code was scanned into the PDA. The vessel shack person entered the length and injury code, and confirmed the tag number had been recorded, after which the fish was returned to the sea. The shack person then loaded the tagging needles for the next fish.

Before heading out to sea, the IPHC staff held a final dress rehearsal aboard a vessel out of Kodiak in the spring. For five days, the crew and IPHC staff fished off Kodiak in a mock SSA, with each day's fishing as closely as possible mimicking a typical day of combined grid work and tagging. This experiment tested the reliability of the electronics in a marine climate and the equipment and programs both performed exceptionally well. We tested whether proximity to the vessel's radar had any effect on the data storage cards and found none. For one whole day, we simulated the loss of the wand-PDA streaming capability, scanned tags with the battery-operated boulder readers, and hand entered data onto forms. Although this slowed operations a great deal, it was still workable.

All the preparation and planning paid off resulting in a relatively smooth tagging season.

Another objective was to examine the effect of tagging on normal grid survey operations. On the tagging skates, fish intended for tagging required careful handling by the crew but this and the handling needed to inspect and tag the fish did not appear to make tagging skates any more difficult or time-consuming than grid skates. Thirteen sets were completed during the charter with daily catch rates that would be typical for a normal charter trip. The conclusion was that the PIT tagging project would not be too onerous on the vessel crews or IPHC staff.

2003 tagging and scanning operations

The entire summer of 2003 was spent in support of the PIT tagging experiment. The first halibut was tagged on May 26 off Sitka in southeastern Alaska and 91 days later, the last halibut was tagged in Dixon Entrance. In between, twelve different vessels tagged halibut from Oregon to Attu, and into the Bering Sea. The time and energy spent in preparation for the tagging was repaid with a relatively smooth tagging season.

Portside sampling for PIT tags

On the recovery side of the PIT tag program, samplers were stationed in major ports with the goal of scanning at least 25 percent of the commercial landings by regulatory area. Samplers were instructed to scan as many fish as possible on their scheduled work days. Individual deliveries were the sample unit. For each sample, the port, dealer, vessel, vessel number, delivery date, regulatory

Wanding a freshly tagged halibut. Photo by Eric Soderlund.

area fished, number of fish scanned, and number and ID of tags detected (if any) were recorded. Portside samplers were equipped with the handheld, battery-operated Boulder readers. It is possible to download tag numbers from the Boulder to a computer, but given the wet conditions the samplers are working in, as well as the relative rarity of detecting a PIT tag, computer downloading after each sample is not practical. Instead, portside scan samplers hand-copied the ID numbers of any detected PIT tag twice; once from the Boulder LCD screen when tag was detected, and a second time from the Boulder's memory, comparing the two numbers to make sure they matched. At the end of every sample, samplers checked the memory even if they didn't notice a tag, since it was possible to miss a tag number due to the background noise and glare in the plant while scanning.

Scanning results

Over half a million landed halibut were scanned for tags resulting in an average scanning rate of 38%.

The first season of the PIT scan sampling program went relatively smoothly with good cooperation from processors. A total of 583,289 halibut was scanned between June 2 and November 15. A total of 95 PIT tags were detected over the season; 86 were releases from the primary experiment conducted on the setline survey this summer and nine were from the demonstration charter or shedding-rate test releases.

Scanning rates, calculated by dividing the estimated pounds scanned by landed weight for each regulatory area, exceeded 25 percent in all areas, with an overall average of 38 percent. Estimated pounds scanned was calculated for each area by multiplying the pieces scanned for that area by the average weight of halibut in the 2002 commercial catch for that area. Fifty-eight percent of scanned halibut were scanned 'head-on' or whole.

Test tags, piece counts and superglue: Quality control

In order to ensure quality control of the scanning process, and make sure there was no electromagnetic interference from nearby motors or other devices, test tags consisting of a functional PIT tag embedded in plastic were periodically run through the scanning line.

To evaluate accuracy of piece counts, every twentieth offload was scanned twice. Piece count precision tests were performed on 68 deliveries in 11 different ports with an overall precision of 99.5 percent. And just to make sure tags were

Janis Frederick looking for PIT tags from the IPHC survey vessel, Viking Joy. Photo by Dennis Moore.

During quality control tests, PIT tags were detected 92% of the time. This information will be considered when making assumptions about the stock using the PIT tag recovery information.

being accurately read, IPHC at-sea staff also seeded tags in certain deliveries. Samplers injected PIT tags in halibut that were caught prior to the fish being put on ice. A total of 114 seeded halibut were delivered on 45 survey trips to sampled ports over the summer of which 105 were detected, a rate of 92 percent. PIT tags are more easily shed from dead halibut as they are handled in the hold and on the dock, and despite the use of Superglue™ to close the injection site, tag shedding may account for the relatively low detection rate in seeded halibut.

An experiment to test the retention and durability of PIT tags was conducted in Area 2B in September. Previous tag shedding studies utilized fish held in tanks but we wanted to examine retention on actual fish released at sea. To do this, 2,661 halibut were doubled tagged with PIT tags and traditional spaghetti tags, and released in Hecate Strait. As an added incentive, the IPHC offered a double reward for these external tags when still attached to the head. Since mid September 23 double tagged fish were recovered with only one PIT unavailable for scanning. The rest of these were successfully scanned and in most cases the insertion wound appeared to be healed.

Murphy's Law, Zip-locs and the Energizer bunny: Equipment problems

Designed for veterinary use and not for fish, there were some problems with the Boulder readers over the season. While the units are water-resistant, they are not waterproof. A silicone sealant was added around the buttons to increase water resistance, and heavier o-rings were used on the battery compartment seals after leaks there caused the failure of some units. Just to be safe, scanners operated the units inside plastic freezer bags to limit exposure to moisture. Condensation would occasionally build up inside the bags due to the cold, damp environment, but there were no further equipment failures resulting from water getting into the units.

The PIT program was postponed in 2002 in an eleventh hour decision because IPHC biologists were not yet confident in the methods. Waiting until 2003 turned out to be a good move.

The most frequent Boulder problems were linked to batteries. The Boulder unit requires four AA batteries and to be cost-effective, samplers were provided with rechargeable batteries and fast rechargers. The use of these batteries, however, was linked to several types of malfunction. Switching Boulders throughout the day became common practice, especially in busy ports, although the delay caused by troubleshooting or replacing equipment resulted in some fish not being scanned.

Conclusion and changes for 2004

The PIT tagging study was originally intended to take place in 2002, but in retrospect, waiting until 2003 was a great decision. The extra year allowed for final development of the tagging location and refine protocols for the rest of the tagging program. On all accounts, the tagging program in 2003 was very successful. Scanning protocol and sampling rates will remain the same in 2004, and scanning will take place throughout the entire commercial halibut season. Area 2A tribal and Washington sport halibut fisheries will also be sampled. Sitka will be staffed through the entire season but due to low landings in 2003, Adak landings will not be scanned in 2004. It is likely that tagging will continue in selected areas in 2004 and portside scanning will continue at least through 2005.

Seasonal migration of adult halibut in the Gulf of Alaska using pop-up satellite-transmitting archival tags

Pop-up satellite tags were deployed on a handful of fish in 2002. They popped up in 2003 and gave us a fascinating glimpse at the habits of halibut.

Responding to industry concerns for a longer season, the IPHC needed information on the winter migration of Pacific halibut. Traditional tagging programs are inadequate to document winter migration since there is no targeted winter fishery in which to recover tags but Pop-up Satellite-transmitting Archival Tags or PSATs allow us to study these movements and more without the need to recapture fish.

PSATs are attached via a flexible leader secured with a thin metal pin. On a pre-programmed date, an electrical charge is applied to the pin causing it to rapidly corrode and within a few hours the tag releases and "pops up" to the surface. Once released, the tag emits a radio signal that is received by the satellite network used to track vessels in distress via their EPIRB signals.

An archival tag, PSATs can also collect at regular intervals environmental data such as temperature, depth, and light level, the latter useful to approximate location. The tag's signal is used by the satellite to calculate the tag's location,

and the stored data are downloaded to the satellite, providing a record of the fish's approximate location on the pop-up date and the environmental conditions experienced by the fish, although detailed information can only be downloaded if the tag is physically recovered.

During the 2002 summer setline survey, twelve adult halibut were tagged with PSATs: six were tagged between northern Vancouver Island and Icy Strait in Southeast Alaska, and another six between Sanak Island in the eastern Aleutians and Prince William Sound. The PSATs were attached to the fish with a dart inserted just below the dorsal fin. Ten tags successfully detached from the tagged fish and transmitted data. The reason for the loss or malfunction of two tags, both deployed off Southeast Alaska, is unknown.

Kelly Attridge holding a hlaibut with a satellite tag in place on the F/V Angela Lynn. Photo by Lynn Mattes.

Six of the ten fish from which we received information, moved considerable distances while tagged, and all of those moved in a northward direction.

Results

Six fish moved considerable distance between the tagging and pop-up dates, as much as 1,100 km (800 miles), and all of those fish moved northward to some extent. Two fish tagged in Area 2B were located in Area 2C at the end of the tagging period, and one moved from Area 3B to 3A. Four fish moved very little over the tagging period. Most halibut moved to relatively deep water and offshore by the end of the tagging period, but two fish moved inshore: one to deep water in Chatham Strait and the other into shallow water in Cook Inlet.

Only larger fish were tagged with the assumption that they were mature and would migrate to deeper water in winter to spawn.

Daily average depth experienced during the tagging periods varied considerably among fish, but some patterns were apparent. Fish tagged in Area 2 had more variable depth profiles than most of those in Area 3, and gradually

moved to deeper water at the end of their tagging period. Most of the tags in Area 3 demonstrated a more delayed and abrupt movement into deep water, beginning in December or January.

While the number of fish tagged in this study was limited, the results support two existing models of seasonal movement. First, the tendency towards movement offshore and into deep water in fall or early winter is consistent with the notion that halibut migrate from shallow summer feeding grounds to mid-winter spawning areas located along the shelf-edge. Second, it was common for fish to migrate northward, converging upon the central Gulf of Alaska. This supports the conventional tagging data that suggest a relative decrease in biomass occurs in the winter in Areas 2B and 3B as halibut move into the northern Gulf of Alaska.

Some of the fish moved slowly from the shelf to the slope over a period of months while others made an abrupt depth shift to deeper water in December or January. Four fish did not migrate towards the slope at all during the tagging period.

The nature and timing of the seasonal migration was somewhat variable. Some fish moved gradually to increasing depth beginning in August or September, while others remained at relatively constant depth until moving abruptly deeper in December or January. Those that were tagged further south and migrated the greatest distance displayed the most protracted period of vertical movement. This suggests that halibut moving the greatest distances begin their seasonal migration earlier in the year but additional tagging would be required to test this hypothesis.

In contrast, four fish did not migrate a substantial distance or move toward the shelf edge, suggesting that they spawned close to their summer feeding grounds. However, one fish that moved inshore by mid-January back reports that large fish in spawning condition can be found in Alaska's inside waters during the winter. The behavior of another fish that remained in shallow water throughout the tagging period and was found well within Cook Inlet in January, cannot be explained. It is possible that spawning also occurs in Cook Inlet, or alternatively, this fish simply may not have spawned during the 2002-03 season or may have moved elsewhere to spawn after the pop-up date.

Despite the wide range of fish that were tagged, nearly all of the tagged halibut experienced a narrow range of water temperatures, mainly between 5-7^{o} C. This may represent an environmental preference or it simply may indicate that there is little variability in temperature throughout the water column. Two tags experienced intermittent satellite reception and produced only limited environmental data. This typically occurs because of rough seas that cause the tag's antenna to dip underwater, interrupting the signal.

Other ongong inquires

The IPHC is investigating whether it might be possible to tell where an adult halibut spent its early childhood from looking at the otolith.

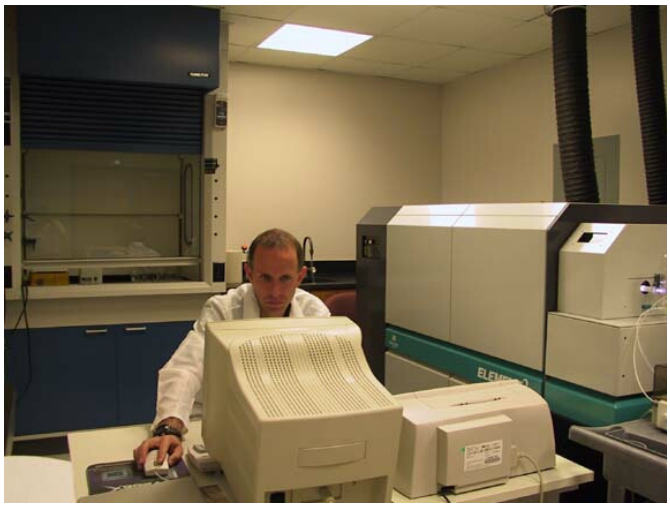
Using otolith microchemistry to determine nursery origin: A progress report

The goal of this project is to determine whether the chemical composition of otoliths from early juvenile halibut can be used as natural tags to identify the nursery origins of adult fish and track the movement of juveniles into the adult population.

Otoliths, the halibut's earbones, are comprised primarily of calcium carbonate, the same compound that makes up limestone and clam shells.

Throughout development, otoliths absorb the calcium and carbon to crystallize and, in the process, take on other elements that are present in the environment. Seven minor elements and 23 trace elements have been detected in otoliths, the most prevalent being metals that exist in seawater such as iron, lead, magnesium, manganese, etc.

The elemental composition of otoliths remain stable after being deposited and as a result constitute a life-long, sequential record of the environmental and metabolic conditions to which the fish was subjected. This is known as an Otolith Elemental Fingerprint or OEF and if the elemental signatures of different environments are known, OEFs can be used as a natural tag to track fish as they move from one region to another.



Dr. Simon Thorrold working the mass spectrometer at Woods Hole Oceanographic Institution. Photo by Stephen Wischniowski.

Scientists at Woods Hole Oceanographic Institute worked with IPHC scientists to process the otoliths.

OEF analysis has previously been used to distinguish between sub groups of fish such as Atlantic croaker, cod, and orange roughy. While the geographic range of halibut nurseries is far greater than these other populations, the fact that juvenile halibut are more abundant in inshore waters where there is greater variation in water chemistry is reason to believe that juvenile halibut possess geographically distinct OEFs.

The project began in summer 2002 with nearly 500 otoliths collected under strict protocols from early juvenile halibut, mostly 2 and 3 year olds, from numerous sites from central British Columbia through the southeast Bering Sea and Aleutian Islands. In 2003, over 1,000 fish were added to the database. Analysis of the otoliths must be conducted by a specialized instrument known as a "sector field inductively coupled plasma mass spectrometer." The work, at the Woods Hole Oceanographic Institution in Massachusetts began in December 2003 and results are expected in early 2004.

Mercury and heavy metal contamination in Alaska halibut

During setline surveys in 2002 and 2003, the IPHC collected halibut muscle and liver samples as part of a study on environmental contaminants in fish conducted by the Alaska Department of Environmental Conservation (ADEC). Initial results indicate there is no danger to Alaskans, including pregnant women and children, when consuming halibut or other fish from Alaskan waters.

Recent reports have raised the profile of environmental contamination in fish and in 2002, ADEC and the Environmental Protection Agency (EPA) launched a study into levels of pesticides, dioxins, furans, PCBs, methyl mercury and heavy

Environmental contamination of seafood has become a hot consumer issue in recent years. The IPHC offered to collect the samples for tests on halibut.

Halibut fared well in the tests, with contaminant levels well below FDA levels of concern.

metals such as arsenic, lead, cadmium, nickel, and chromium in 13 Alaska fish species, including halibut.

During the setline surveys in 2002, sixty samples of large and small halibut were collected from southeast Alaska to the Bering Sea and shipped to ADEC's Seafood and Food Safety Lab in Palmer. Of these samples, the average methyl mercury level was just over 0.20 ppm, well below the FDA level of concern of 1.00 ppm, and the EPA action level of 0.50 ppm. A large percentage of the samples registered non-detectable levels of cadmium and chromium, and nickel readings fell below the detectable range for all samples tested.

This project was continued in 2003 and focused on three areas: the Bering Sea, Gulf of Alaska, and southeast Alaska. A commercial lab has been contracted to analyze the samples for pesticides, selected PCB congeners, dioxins, and furans following EPA approved methods, and results will be published as they become available. The IPHC anticipates working cooperatively with ADEC on this project for the foreseeable future.

Seabird and longline gear

The incidental take of seabirds, including the endangered short-tailed albatross (*Phoebastria albatrus*), is known to occur in the Alaska longline fleet but the lack of at-sea observations has resulted in little information on seabird bycatch numbers and on the level of compliance with seabird avoidance measures within the halibut fishery.

Video cameras are mounted above the roller to monitor the catch. Photo by Robert Ames.

Under contract to NMFS, the IPHC investigated the ability of an electronic monitoring system (EMS) to detect and monitor seabird avoidance devices behind a vessel setting halibut gear; and monitor the incidental catch of seabirds. The project was conducted on two stock assessment survey vessels in 2002. Comparing 106 paired vessel and video

observations on halibut gear being set, demonstrated that EMS was successful in detecting streamer line deployment and relative position on 100 percent of daytime sets when two stern cameras operated in tandem; and the accuracy of streamer line performance evaluations were related to video recording speed. Examination of the images of retrieved dead seabirds at the roller using two cameras showed high identification accuracy with large albatross species, and improved species recognition with a higher recording speed. (Note: The dead seabird specimens were provided by the NMFS North Pacific Groundfish Observer program, Seattle, WA.)

The cost of monitoring programs was estimated at two levels of coverage. Full monitoring of all setting and haul backs was estimated at $8.5 million for an on-board observer program and $2.7 million for EMS. Coverage of all vessels over 125 feet, none under 60 feet, and 30 percent of those vessels in between was estimated at $410,000 for an on-board observer program, whereas EMS came in at $220,000.

The IPHC investigated the possibility of using an electronic monitoring system to detect and monitor seabird avoidance devices.

APPENDICES

The tables in Appendix I provide catch information for the 2003 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 2003 seasons, and Appendix III reports on the most current sport fishing statistics.

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

Appendix I.

Table 1. The 2003 total removals of Pacific halibut by regulatory area (thousands of pounds, net weight).

Table 2. Commercial catch (including IPHC research catch) and catch limits of Pacific halibut by IPHC regulatory area (thousands of pounds, net weight), 1995 - 2003.

Table 3. The total catch (thousands of pounds, net weight) from the 2003 commercial fishery, including IPHC research, of Pacific halibut by regulatory area and month.

Table 4. Number of vessels and catch (thousands of pounds, net weight) of Pacific halibut by vessel length class in the 2003 commercial fishery a) for Area 2B, Alaska, and the Alaskan regulatory areas, and b) Area 2A commercial fisheries not including the treaty Indian commercial fishery.

Table 5. Commercial fishing periods, number of fishing days, catch limit, commercial, research, and total catch (thousands of pounds, net weight) by regulatory area for the 2003 Pacific halibut commercial fishery.

Table 6. Commercial landings (thousands of pounds, net weight) of Pacific halibut by port, country of origin and IPHC research catch for 2003.

Table 7. Commercial halibut fishery catch (thousands of pounds, net weight) in 2003 by country, statistical area, and regulatory area.

Appendix II.

Table 1. The fishing period limits (net weight) by vessel class used in the 2003 directed commercial fishery in Area 2A.

Table 2. Metlakatla community fishing periods, number of vessels, and preliminary halibut catch (net weight), 2003.

Appendix III.

Appendix I.

Table 1. The 2003 removals of Pacific halibut by regulatory area (thousands of pounds, net weight).

Area	2A	2B	2C	3A	3B	4	Total
Commercial[1]	819	11,789	8,410	22,748	17,231	12,144	73,141
Sport	404	1,065	2,596	5,002	12	43	9,122
Bycatch Mortality:							
Legal-sized fish	367	154	167	1,364	584	3,241	5,877
Sublegal-sized fish	186	93	174	1,426	980	3,560	6,419
Personal Use	27[2]	300	170	74	20	176[3]	767
Wastage:							
Legal-sized fish	2	35	25	68	35	49	214
Sublegal-sized fish	8	320	102	616	602	133	1,781
Total	1,813	13,756	11,644	31,298	19,464	19,346	97,321

[1] Commercial catch includes IPHC research catch.
[2] Treaty Indian ceremonial and subsistence fish authorized in the catch sharing plan.
[3] Includes 18,437 pounds of sublegal halibut retained in the Area 4E Community Development Quota.

Appendix I.

Table 2. Commercial catch (including IPHC research catch) and catch limits of Pacific halibut by IPHC regulatory area (thousands of pounds, net weight), 1995 - 2003.

Reg.	Commercial Catch[1]								
Area	1995[2]	1996[2]	1997	1998[2]	1999[2]	2000[2]	2001	2002	2003
2A[3]	297	296	413	460	450	482	680	851	819
2B	9,623	9,545	12,420	13,172	12,705	10,811	10,288	12,074	11,789
2C	7,766	8,872	9,920	10,196	10,143	8,445	8,403	8,602	8,410
3A	18,336	19,693	24,628	25,698	25,316	19,288	21,541	23,131	22,748
3B	3,125	3,662	9,072	11,161	13,835	15,413	16,336	17,313	17,231
4A	1,617	1,699	2,907	3,418	4,369	5,155	5,015	5,091	5,024
4B	1,680	2,069	3,318	2,901	3,571	4,692	4,466	4,080	3,863
4C	668	680	1,117	1,256	1,762	1,737	1,647	1,210	886
4D	643	706	1,152	1,308	1,891	1,931	1,844[4]	1,753	1,956
4E	127	120	251	188	264	351	479[4]	555[4]	415[4]
Total	43,882	47,342	65,198	69,758	74,306	68,305	70,699	74,660	73,141
Reg.	Commercial Catch Limits[5]								
Area	1995	1996	1997	1998	1999	2000	2001	2002	2003
2A[3]	278	275	374.2	440.9	412.5	468.1	681.4	817.9	817.9
2B	9,520	9,520	12,500	13,000	12,100	10,600	10,510	11,750	11,750
2C	9,000	9,000	10,000	10,500	10,490	8,400	8,780	8,500	8,500
3A	20,000	20,000	25,000	26,000	24,670	18,310	21,890	22,630	22,630
3B	3,700	3,700	9,000	11,000	13,370	15,030	16,530	17,130	17,130
4A	1,950	1,950	2,940	3,500	4,240	4,970	4,970	4,970	4,970
4B	2,310	2,310	3,480	3,500	3,980	4,910	4,910	4,180	4,180
4C	770	770	1,160	1,590	2,030	2,030	2,030	2,030	2,030
4D	770	770	1,160	1,590	2,030	2,030	2,030	2,030	2,030
4E	120	120	260	320	390	390	390	390	390
Total	48,418	48,415	65,874.2	71,440.9	73,712.6	67,138.1	72,721.4	74,427.9	74,427.9

[1] Commercial catch includes IPHC research catch and in Area 2C, the Metlakatla fishery catch.

[2] Poundage figures have been updated from previous publications.

[3] Does not include treaty Indian ceremonial and subsistence fish.

[4] Areas 4D CDQ could be fished in Area 4E by NMFS enforcement waiver (2001) and IFQ regulation (since 2002).

[5] Additional carryover from the underage/overage plan for the QS programs not included.

Appendix I.

Table 3. The total catch (thousands of pounds, net weight) from the 2003 commercial fishery, including IPHC research, of Pacific halibut by regulatory area and month.

Reg Area	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Total
2A	216	248	21	87	160	65	19	3	0	819
2B	1,858	1,678	1,067	1,098	1,225	1,414	1,202	1,161	1,086	11,789
2C	1,034	1,762	1,278	1,112	897	918	713	480	216	8,410
3A	4,016	4,534	3,472	2,940	1,502	2,209	1,945	1,569	561	22,748
3B	533	1,591	3,540	3,275	2,003	2,366	2,441	1,020	462	17,231
4A	1	165	438	691	1,197	1,360	773	302	97	5,024
4B	27	54	522	773	468	1,098	484	268	169	3,863
4C	0	0	0	246	354	137	128	10	11	886
4D	13	0	80	139	481	606	424	182	31	1,956
4E	0	3	49	196	72	27	61	7	0	415
Alaska Total	5,624	8,109	9,379	9,372	6,974	8,721	6,969	3,838	1,547	60,533
Monthly Total	7,698	10,035	10,467	10,557	8,359	10,200	8,190	5,002	2,633	73,141

Appendix I.

Table 4a. Number of vessels and catch (thousands of pounds, net weight) of Pacific halibut by vessel length class in the 2003 commercial fishery for Area 2B, Alaska, and the Alaskan regulatory areas.

Overall Vessel Length	Area 2B		Alaska	
	No. of Vessels	Catch (000's lbs.)	No. of Vessels	Catch (000's lbs.)
Unk. Length	18	551	57	212
0 to 25 ft.	0	0	239	393
26 to 30 ft.[1]	-	-	146	761
31 to 35 ft.[1]	7	107	265	5,188
36 to 40 ft.	57	1,788	206	3,059
41 to 45 ft.	62	2,747	179	4,755
46 to 50 ft.	24	1,927	150	6,119
51 to 55 ft.	25	1,955	75	4,153
56 + ft.	34	2,714	282	35,893
Total	227	11,789	1,599	60,533

Overall Vessel Length	Area 2C		Area 3A	
	No. of Vessels	Catch (000's lbs.)	No. of Vessels	Catch (000's lbs.)
Unk. Length	46	126	11	54
0 to 25 ft.	69	128	34	99
26 to 30 ft.	51	280	30	135
31 to 35 ft.	117	1,096	105	1,899
36 to 40 ft.	125	1,038	90	1,418
41 to 45 ft.	96	1,082	103	2,158
46 to 50 ft.	94	1,693	85	2,554
51 to 55 ft.	39	880	42	1,598
56 + ft.	105	2,087	216	12,833
Total	742	8,410	716	22,748

Overall Vessel Length	Area 3B		Area 4	
	No. of Vessels	Catch (000's lbs.)	No. of Vessels	Catch (000's lbs.)
Unk. Length[2,3]	-	-	-	-
0 to 25 ft.[2]	5	17	134	161
26 to 30 ft.	0	0	66	346
31 to 35 ft.	33	945	61	1,248
36 to 40 ft.[3]	28	527	4	97
41 to 45 ft.	36	942	5	573
46 to 50 ft.	36	1,252	9	619
51 to 55 ft.	30	1,328	5	346
56 + ft.	161	12,220	87	8,754
Total	329	17,231	371	12,144

Appendix I.

Table 4b. Number of vessels and catch (thousands of pounds, net weight) of Pacific halibut by vessel length class in the 2003 Area 2A commercial fishery not including the treaty Indian commercial fishery.

Overall Vessel Length	Area 2A Directed Commercial	
	No. of Vessels	Catch (000's lbs.)
Unk. Length[4]	-	-
0 to 25 ft.	5	2.0
26 to 30 ft.[4]	-	-
31 to 35 ft.[4]	3	2.6
36 to 40 ft.	27	44.0
41 to 45 ft.	19	38.0
46 to 50 ft.	14	18.0
51 to 55 ft.	10	28.0
56 + ft.	23	92.0
Total	101	224.6

Overall Vessel Length	Area 2A Incidental Commercial (Salmon)		Area 2A Incidental Commercial (Sablefish)	
	No. of Vessels	Catch (000's lbs.)	No. of Vessels	Catch (000's lbs.)
Unk. Length[5,7]	-	-	-	-
0 to 25 ft.[5]	6	3.0	0	0.0
26 to 30 ft.	7	1.5	0	0.0
31 to 35 ft.	11	1.0	0	0.0
36 to 40 ft.	24	4.5	4	5.8
41 to 45 ft.	25	21.9	9	15.2
46 to 50 ft.	17	13.0	4	7.4
51 to 55 ft.[6,7]	8	1.7	3	8.4
56 + ft.[6]	-	-	10	33.6
Total	98	46.6	30	70.4

[1] 26 to 30 ft vessels were combined with 31 to 35 ft vessels in Area 2B
[2] Unknown length vessels were combined with 26 to 30 ft vessels in Area 3B
[3] Unknown length vessels were combined with 35 to 40 ft vessels in Area 4
[4] Unknown length vessels and 26 to 30 ft vessels were combined with 31 to 45 ft vessels in the Area 2A Directed Commercial fishery
[5] Unknown length vessels were combined with 0 to 25 ft vessels in the Area 2A Incidental Commercial (Salmon) fishery
[6] 56+ ft vessels were combined with 51 to 55 ft vessels in the Area 2A Incidental Commercial (Salmon) fishery
[7] Unknown length vessels were combined with 51 to 55 ft vessels in the Area 2A Incidental Commercial (Sablefish) fishery

Appendix I.

Table 5. Commercial fishing periods, number of fishing days, catch limit, commercial, research, and total catch (thousands of pounds, net weight) by regulatory area for the 2003 Pacific halibut commercial fishery.

Area	Fishing Period	No. Of Days	Catch Limit	Commercial Catch	Research Catch	Total
2A treaty Indian	3/1 – 3/3	2.0		144		
treaty Indian total	4/15 – 4/16	1.0		167		
	Restricted:3/1-31,4/2-9			94		
	Restricted:4/23 - 4/30			62		
			467.5	467		467
2A Commercial Incidental in Salmon fishery	May 1 – Aug 6		39.3	47		47
Incidental in Sablefish fishery	May 1- Oct 31		70.0	70		70
Directed	June 25[1]	10-hrs		70		
	July 9[1]	"		82		
	July 23[1]	"		31		
	August 6[1]	"		43		
			222.7	225	10	235
Commercial total			332.0	342	10	352
2A Total			817.9	809	10	819
2B	3/1 – 11/15	259	11,750[2]	11,724[3]	65	11,789
2C	3/1 – 11/15	259	8,500[4]	8,286[5]	124	8,410
3A	3/1 – 11/15	259	22,630[4]	22,324	424	22,748
3B	3/1 – 11/15	259	17,130[4]	16,965	266	17,231
4A	3/1 – 11/15	259	4,970[4]	4,949	75	5,024
4B	3/1 – 11/15	259	4,180[4]	3,817	45	3,863
4C	3/1 – 11/15	259	2,030[4]	886		886
4D	3/1 – 11/15	259	2,030[4]	1,908[6]	48	1,956
4E	3/1 – 11/15	259	390	415[6]		415
Alaska Total			61,860	59,551	982	60,533
Total			74,427.5	72,084	1,057	73,141

[1] Fishing period limits by vessel class.

[2] An additional 123,531 pounds available as carryover from 2002.

[3] Includes the pounds that were landed by Native communal commercial licenses (F licenses).

[4] Additional net carryover pounds (thousands) from the underage/overage program were: 2C = 120; 3A = 150; 3B = 188; 4A = 53; 4B = 64; 4C = 85; 4D = 13.

[5] Includes 82,000 pounds taken by Metlakatla Indians during additional fishing within reservation waters.

[6] Areas 4D CDQ could be fished in Area 4E by IFQ regulation.

Appendix I.

Table 6. Commercial landings (thousands of pounds, net weight) of Pacific halibut by port, country of origin and IPHC research catch for 2003.

Port Region	Canada	United States	IPHC Research	Total
California & Oregon	-	248	10	258
Seattle	-	74	-	74
Bellingham	-	1,455	-	1,455
Misc. Washington	-	546	-	546
Vancouver	1,027	128	6	1,161
Port Hardy	4,368	-	20	4,388
Misc. Southern BC	867	-	3	870
Prince Rupert & Port Ed.	4,927	-	123	5,050
Misc. Northern BC	535	-	-	535
Ketchikan, Craig, Metlakatla	-	999	10	1,009
Petersburg, Kake	-	2,077	-	2,077
Juneau	-	2,620	36	2,656
Sitka	-	2,841	32	2,873
Hoonah, Excursion, Pelican	-	2,080	-	2,080
Misc. Southeast AK	-	1,136	-	1,136
Cordova	-	1,507	-	1,507
Seward	-	7,252	236	7,488
Homer	-	12,049	53	12,102
Kenai	-	241	-	241
Kodiak	-	7,713	220	7,933
Misc. Central AK	-	7,115	140	7,255
Akutan & Dutch Harbor	-	6,599	140	6,739
Bering Sea	-	3,680	28	3,708
Grand Total	**11,724**	**60,360**	**1,057**	**73,141**

Table 7. Commercial halibut fishery catch (thousands of pounds, net weight) in 2003 by country, statistical area, and regulatory area.

Stat Area Group	Catch			Regulatory Area	Catch for Reg. Area
	Commercial	Research	Grand Total		
00-03	204	2	206	2A	819
04	66	1	67		
05	539	7	546		
06	327	2	329	2B	11,789
07	259	2	261		
08	460	1	461		
09 - I	412	10	422		
09 - O	241	2	243		
10 - I	1,940	18	1,958		
10 - O	1,044	-	1,044		
11 - I	1,780	14	1,794		
11 - O	123	2	125		
12 - I	233	3	236		
12 - O	267	-	267		
13 - I	3,543	7	3,550		
13 - O	1,095	4	1,099		

Table 7. continued

Stat Area Group	Catch			Regulatory Area	Catch for Reg. Area
	Commercial	Research	Grand Total		
14 - I	377	20	397	2C	8,410
14 - O	278	15	293		
15 - I	1,030	14	1,044		
15 - O	479	23	502		
16 - I	1,822	11	1,833		
16 - O	1,335	20	1,355		
17 - I	473	6	479		
17 - O	747	8	755		
18S - I	984	5	989		
18S - O	761	2	763		
18W	1,637	6	1,643	3A	22,748
19	1,149	18	1,167		
20	942	21	963		
21	809	20	829		
22	1,092	8	1,100		
23	751	10	761		
24	4,606	30	4,636		
25	3,143	61	3,204		
26	3,428	99	3,527		
27	3,123	74	3,197		
28	1,644	77	1,721		
29	5,831	45	5,876	3B	17,231
30	3,456	68	3,524		
31	2,205	60	2,265		
32	2,877	39	2,916		
33	1,879	39	1,918		
34	717	15	732		
35	423	10	433	4	12,144
36	507	5	512		
37	299	8	307		
38	1,069	12	1,081		
39	39	1	40		
40	986	-	986		
41	189	4	193		
42+	676	19	695		
Bering Sea	7,788	109	7,897		
Grand Total	**72,084**	**1,057**	**73,141**		**73,141**

Appendix II.

Table 1. The fishing period limits (net weight) by vessel class used in the 2003 directed commercial fishery in Area 2A.

Vessel Class		Fishing Periods (Pounds)			
Letter	**Feet**	**June 25**	**July 9**	**July 23**	**August 6**
A	0-25	405	445	295	210
B	26-30	505	555	370	265
C	31-35	805	890	590	420
D	36-40	2,220	2,455	1,620	1,160
E	42-45	2,390	2,640	1,745	1,245
F	46-50	2,860	3,160	2,085	1,490
G	51-55	3,190	3,525	2,330	1,665
H	56+	4,800	5,300	3,500	2,500

Table 2. Metlakatla community fishing periods, number of vessels, and preliminary halibut catch (net weight), 2003.

Fishing Period Dates	Number Of Vessels	Catch (Pounds)
May 2 - 4	3	2,177
June 7 - 9	10	4,123
June 20 - 22	12	8,372
June 4 - 6	11	4,899
July 18 - 20	16	13,639
August 1 - 3	19	15,211
August 16 - 18	19	16,280
August 30 - September 1	15	10,525
September 13 - 15	9	6,301
September 27 - 29	7	817
10 Fishing Periods		82,344

Appendix III.

Table 1. Fishing dates, opportunity, size limits, and bag limits for the 2003 Pacific halibut sport fishery.

Area	Fishing Dates	Fishing Days	Days Open	Size Limit	Bag Limit
2A					
WA Inside Waters (east of Low Point)	5/8-7/18	52	5 (Thur-Mon)	No	1
WA Inside Waters (Low Point to Sekiu River	5/22-8/1	52			
WA North Coast (Sekiu River to Queets River)	5/1-5/17 5/23-5/24 6/18-6/21 8/9	20	5 (Tues-Sat) 2(Fri-Sat) 4(Wed-Sat) 1 (Saturday)	No	1
WA South Coast (all depths) (Queets River to Ledbetter Point)	5/1-6/26 6/27-9/30	41 95	5 (Sun-Thur) 7	No	1
WA South Coast (near shore)	5/1-9/30	153	7	No	1
Columbia River (Leadbetter Point to Cape Falcon)	5/1-9/30	153	7	First @ 32”	1
OR Central Coast (all depths) (Cape Falcon to Siuslaw River)	5/8-5/10 5/15-17 6/19-6/21	9	3 (Th-Sat) 3 (Th-Sat) 3 (Th-Sat)	First @ 32”	1
OR South Coast (all depths) (Siuslaw River to Humbug Mt.)	5/8-5/10 5/15-5/17	6	3 (Th-Sat)	First @ 32”	1
OR Coast (<30 fathoms)(Cape Falcon to Humbug Mountain)	5/1-10/31	184	7	First @ 32”	1
OR Coast (all depths) (Cape Falcon to Humbug Mountain)	8/1,2,8,9,22,2329,30 9/5,6,12,13,19,20,26,27 10/3,4,10,11,17,18	22	2 (Fri-Sat)	First @ 32”	1
OR/CA (south of Humbug Mt.)	5/1-9/30	153	7	First @ 32”	1

Appendix III.

Table 2. 2003 harvest allocations and estimates (in pounds, net weight) by subarea within Regulatory Area 2A.

Subarea	Allocation	Catch Estimate	Over/Under
WA Inside Waters	63,278	68,300	+5,032
WA North Coast	113,915	109,738	-4,177
WA South Coast (all depths)	48,623	43,253	-5,370
WA South Coast (near shore)		0	0
Columbia River	11,923	10,009	-1,914
OR Central Coast (all depths)	156,835	88,384	-68,451
OR South Coast (all depths)	14,609	14,904	+,295
OR Coast (<30 fathoms)	19,797	1,100	-18,697
OR Coast[1]	57,660	60,749	+3,089
OR/CA (south of Humbug Mt.)	7,860	7,860	0

Table 3. Harvest by sport fishers (millions of pounds, net weight) by regulatory area, 1977-2003.

Year	2A	2B[1]	2C	3A	3B	4	Total
1977	0.013	0.008	0.072	0.196			0.289
1978	0.010	0.004	0.082	0.282			0.378
1979	0.015	0.009	0.174	0.365			0.563
1980	0.019	0.006	0.332	0.488			0.845
1981	0.019	0.012	0.318	0.751		0.012	1.112
1982	0.050	0.033	0.489	0.716		0.011	1.299
1983	0.063	0.052	0.553	0.945		0.003	1.616
1984	0.118	0.062	0.621	1.026		0.013	1.840
1985	0.193	0.262	0.682	1.210		0.008	2.355
1986	0.333	0.186	0.730	1.908		0.020	3.177
1987	0.446	0.264	0.780	1.989		0.030	3.509
1988	0.249	0.252	1.076	3.264		0.036	4.877
1989	0.327	0.318	1.559	3.005		0.024	5.233
1990	0.197	0.381	1.330	3.638		0.040	5.586
1991	0.158	0.292	1.654	4.264	0.014	0.127	6.509
1992	0.250	0.290	1.668	3.899	0.029	0.043	6.179
1993	0.246	0.328	1.811	5.265	0.018	0.057	7.725
1994	0.186	0.328	2.001	4.487	0.021	0.042	7.065
1995	0.236	0.887	1.759	4.511	0.022	0.055	7.470
1996	0.229	0.887	2.129	4.740	0.021	0.077	8.084
1997	0.355	0.887	2.172	5.514	0.028	0.069	9.025
1998	0.383	0.887	2.501	4.702	0.017	0.096	8.585
1999	0.338	0.859	1.843	4.228	0.017	0.094	7.379
2000	0.344	1.021	2.258	5.305	0.015	0.073	9.017
2001	0.446	1.015	1.925	4.675	0.016	0.029	8.106
2002	0.399	1.260	2.090	4.201	0.013	0.048	8.010
[2]2003	0.404	1.166	2.125	4.897	0.015	0.056	8.664

[1]Area 2B harvest is based on DFO provided report and indexed retroactively to account for lowered catch estimates.

[2] Preliminary harvest, only Area 2A is based on current harvest

PUBLICATIONS

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 2003 by the Commission and staff are shown below and a list of all Commission publications is shown on the following pages. In addition, a listing of articles published by the Commission staff in outside journals is available on our website at www.iphc.washington.edu.

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Reports

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2. Life history of the Pacific halibut. Marking experiments. William F. Thompson and William C. Herrington. 137 p. (1930).
3. Determination of the chlorinity of ocean waters. Thomas G. Thompson and Richard Van Cleve. 14 p. (1930).
4. Hydrographic sections and calculated currents in the Gulf of Alaska, 1927 and 1928. George F. McEwen, Thomas G. Thompson, and Richard Van Cleve. 36 p. (1930).
5. History of the Pacific halibut fishery. William F. Thompson and Norman L. Freeman. 61 p. (1930).
6. Biological statistics of the Pacific halibut fishery. Changes in the yield of a standardized unit of gear. William F. Thompson, Harry A. Dunlop, and F. Heward Bell. 108 p. (1930). [Out of print]
7. Investigations of the International Fisheries Commission to December 1930, and their bearing on the regulation of the Pacific halibut fishery. John Pease Babcock, William A. Found, Miller Freeman, and Henry O'Malley. 29 p. (1930). [Out of print]
8. Biological statistics of the Pacific halibut fishery, Effects of changes in intensity upon total yield and yield per unit of gear. William F. Thompson and F. Heward Bell. 49 p. (1934). [Out of print]
9. Life history of the Pacific halibut - Distribution and early life history. William F. Thompson and Richard Van Cleve. 184 p. (1936). [Out of print]
10. Hydrographic sections and calculated currents in the Gulf of Alaska. 1929. Thomas G. Thompson, George F. McEwen, and Richard Van Cleve. 32 p. (1936).
11. Variations in the meristic characters of flounder from the northeastern Pacific. Lawrence D. Townsend. 24 p. (1936).
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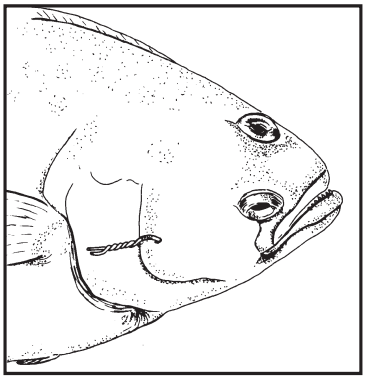
TAGGED HALIBUT

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
P.O. Box 95009
Seattle, WA 98145-2009
Phone: (206) 634-1838

DOUBLE REWARD!!

In September 2003, the IPHC released more than 2,600 halibut with both a highly visible two-toned orange wire tag and an embedded PIT tag. This project was necessary to assess the retention and durability of the PIT tags. If you find one of these fish, do not remove the wire tag. Instead, deliver the entire head to an IPHC sampler or contact the IPHC office.

The IPHC will reward two tag hats or $10 for all two-toned orange tags left on the fish for scanning. If the tag is removed,