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INTERNATIONAL PACIFIC HALIBUT COMMISSION

Annual Report
2005

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

This report produced by IPHC staff
and Bob King
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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's 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.

Bob King

of Juneau, co-writer of this report, 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 fourth time as co-producer of the IPHC Annual Report.

Thanks!

The Commissioners and Staff wish to thank all the agencies, industry, and individuals who helped us in our scientific investigations this year including: The Gulf of Alaska and Bering Sea NMFS/RACE division groups in Seattle for accommodating our samplers aboard their surveys; Dr. Robert Gerlach (ADEC); Carol Henry (WDFW rockfish sampling) and Steve Kupillas (ODFW rockfish sampling); WDFW and ODFW samplers who scanned sport-caught halibut in Washington and Oregon; the Makah and Quinault samplers who scanned halibut in the Area 2A tribal fisheries; and to all the processing plants who worked hard to accommodate our scan sampling efforts for the PIT tag program. A special thanks goes to the United States Coast Guard in Alaska.

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Activities of the Commission

"To compete in the world market today, it is imperative that we utilize leading edge expertise in management."

Drew Scalzi, January 18, 2002

Ask a simple question

Halibut catches remained near historically high levels in 2005; the market remained firm and prices strong; stock assessments continued to look healthy in most areas and progress was made in a variety of scientific endeavors during the year. This was another strong year for the halibut industry and the IPHC. As always, the year began with the Commission's Annual Meeting, held in Victoria, British Columbia, January 19 through 25.

Stock assessment continued to provide a healthy outlook and progress was made in a variety of scientific endeavors.

Setting the season

The key orders of business at the Annual Meeting are to set the catch limit – just under 71.7 million pounds in 2005 – and the season dates. As in past years,

On the last day of every Annual Meeting, the Commission holds a publicly attended meeting to set catch limits and other regulations. IPHC photo archive.

there were conflicting opinions regarding the opening date. Kodiak longliners supported an opening in early February while others, including the Halibut Association of North America and the Fishing Vessel Owner's Association in Seattle, wanted an opening in March.

The Commissioners received a staff report that found very little difference between the size compositions of halibut landed in the first two weeks of March compared with that during the last two weeks of the month. Still, there was some reservation expressed with a February opening before data on early interceptions are available. After considerable discussion, the Commission adopted season dates similar to those during the past two years, with the agreement to open the fishery on a Sunday to facilitate marketing. The season was set to run between February 27 and November 15.

The Commission reviewed a number of issues including season length, various research projects, and migration issues.

The Commission agreed to continue reviewing season length and formed a working group of staff and advisory board members to examine a report provided to industry by the staff. The working group was to review the relative merits and expense of different research options intended to examine the timing and extent of winter migratory movements of halibut among regulatory areas.

An in-depth discussion took place regarding winter fishery experiments needed to understand spawning migrations. Both pop-up satellite tags (PAT tags) and passive integrated transponder tags (PIT tags) were considered. The Commission agreed that migration between areas is an important life history question that needs to be answered before deciding on an extended fishing season.

Aquaculture update

One of the arguments for an extended season is to head off possible competition from farmed halibut and a report was presented at the Annual Meeting on the status of U.S. aquaculture activity. Currently, laboratories are rearing halibut for study but none are actively trying to develop halibut aquaculture, although a consulting firm is working to be the middleman between American companies interested in aquaculture and European companies that have the technology. The National Oceanic and Atmospheric Administration (NOAA) is actively involved in developing an offshore infrastructure for aquaculture but not specifically for halibut.

Ecosystem management

The Commissioners heard concerns from industry about whale predation on longline gear.

A Presidential subcommittee has been formed to advance ecosystem management in the U.S. and the IPHC staff is currently working with National Marine Fisheries Service (NMFS) researchers who are studying this issue. The IPHC already contributes to ecosystem research in many ways, such as making survey data available to a wide range of users. The IPHC is also seeking additional opportunities such as employing its survey vessels for oceanographic and ecosystem monitoring studies, but there are budgetary concerns associated with this type of research.

Whale predation

A proposal to look at whale predation during halibut fishing and how that may affect catches was discussed during the meeting. IPHC port samplers already ask fishers if whales and sharks affected their catch but since that is a subjective opinion, much of the data are of limited value. The staff agreed to look into possible research projects to study the issue.

Enforcement

DFO in Canada planned to begin year-round surveillance on the fishing grounds in 2005.

The Canadian Department of Fisheries and Oceans (DFO) reported that year-round aerial surveillance on the fishing grounds was to begin in 2005. They also reported on the continuing program for electronic monitoring in Canadian fisheries. The goal for 2005 is 20 percent electronic coverage for the longline fleet. The cost is approximately $262 per day for electronic monitoring compared to $450 per day for observer coverage.

The U.S. Attorney's Office reported that the IPHC would receive $200,000 as restitution for damage to the halibut resource from the owners of the *F/V Unimak*, who were found guilty of underreporting halibut. The captain and mate were also fined, with the proceeds divided between the IPHC and the Magnuson-Stevens Fund.

At the request of NOAA, the Commission clarified its regulation to ensure that halibut fillets are not allowed on board a commercial vessel.

Public forum

The Annual Meeting provides an opportunity for fishers, processors and the public to address the Commission and this year a wide range of topics were raised. Concerns ranged from rising fishing costs that are leading to lower crew shares, to low enforcement coverage, to the IPHC stock assessment model for Areas 3B and 4. The Commissioners addressed all the concerns raised in the administrative sessions that followed.

Pacific Halibut Flat or Fiction?

The IPHC published a children's book about halibut in 2005 that is available free of charge to schools and libraries.

Of all the work of the IPHC in 2005, one of the more rewarding projects was a children's book about halibut. Why a children's book that depicts halibut as big as a car, balancing a teeter totter with 10 first graders and taking on the probing question, "What about those eyes?" Since its inception in 1923, the IPHC has spanned many generations, longer than any other international fisheries treaty, and what better way to ensure the future conservation and management of this remarkable species than by educating the upcoming generation about halibut, its fishery, and research.

There are copies of this book available free of charge for educational and library use. To order, please contact the IPHC at info@iphc.washington.edu.

REMEMBERING ANDREW SCALZI

February 13, 1952 - July 21, 2005

"In order that this short time we have here on earth be productive, remembrance to those gone before us is, indeed, a fitting tribute to the living."

Drew Scalzi in Seafarers' Memorial, published post.

Former IPHC commissioner, fisherman, and Alaska state lawmaker, Drew Scalzi of Homer, died of cancer in July, 2005 at the age of 53. Born in Meriden, Connecticut and raised in Florida, Drew moved to Alaska in 1975 to work on the Trans-Alaska oil pipeline but soon moved to Homer.

A commercial fisherman, Drew was an active participant in several fishing groups and IPHC meetings, and served as an IPHC Commissioner from 1998 to 2003. He was also a member of the Kenai Peninsula Borough Assembly and in 2000 was elected to represent District 7 in the Alaska State House.

Drew (white cap) works comfortably with fellow crew-mates. Photo courtesy of Scalzi family.

As an IPHC Commissioner, Drew worked to keep the Commission moving forward on issues that were important to fishers such as season extension and monitoring of aquaculture. Regardless of the issue though, the health of the resource was always his first priority. In the late 1990s, when the Commission funding was seriously threatened, Drew worked tirelessly to not only maintain, but to increase funding to the IPHC from the U.S. government.

Drew began work on a Seafarer's Memorial on the Homer Spit in 1995, the same year he was diagnosed with non-Hodgkin's lymphoma. He underwent a grueling stem-cell transplant which kept the cancer at bay for several years while he continued to work on the memorial. He watched as the concrete was poured for a bell pedestal just before going to the hospital for the last time. After his death, friends hurried to finish the project and the bell was rung at his memorial service for the first time.

The one that didn't get away. Photo courtesy of Scalzi family.

A personal remembrance

"Drew was, plain and simply, a wonderful person to know and work with. He was keenly interested in almost everything! He would frequently send me articles on various scientific issues and ask me what I thought about them. More than once, I would end up saying something like, "Gee, Drew, that's very interesting but I don't actually know anything about how deep-space gravitational waves affect galaxies." He was insatiably curious about everything to do with biology. He read everything we sent to him, and read it thoroughly. His questions back to us were invariably perceptive and probing. He simultaneously held our feet to the fire on making sure that we understood the status of the halibut resource and were doing the right research, but he also supported the staff in making the difficult but necessary decisions for the good of the resource.

Much beyond this, Drew became a good friend to me. He was a constant source of counsel on issues affecting halibut and the management of fisheries in the north Pacific. Generous and gregarious, he touched many peoples lives in often profound ways. It was wonderful to be with Drew around his family. The easy and open affection was a joy to share. Wife Barb, and children Luke and Lacey, joined in Drew's spirit of adventure – and there certainly were some adventures!

Memories of Drew invariably bring a smile to my face. He was the kind of person you liked to share life with, because he was just so full of it. We miss him."

– Bruce Leaman

DIRECTOR'S REPORT

This year we saw the second full year of recoveries from our major PIT tagging experiment. The analysis of these recovery data showed much the same results as we saw in the 2004 recoveries. The data produce anomalously high estimates of stock biomass from the western Gulf of Alaska and Bering Sea, relative to both commercial fishery and survey results. In an attempt to understand the low rate of recoveries from tag applications in these areas, the staff has examined this issue in some detail. To research potential explanations we deployed pop-up archival satellite (PAT) tags across the Gulf of Alaska in 2005, with scheduled pop-up to occur one year after deployment. These tags should give greater understanding of the seasonal movement of fish and, in particular, whether fish are likely to be leaving the western Gulf and Bering Sea. PIT tag recoveries have not indicated significantly greater rates of movement for fish of different sizes above 70 cm (28 in), although the movement rates (14-17%) are higher than those estimated for legal-sized fish (82 cm, 32 in) from previous Commission studies. However, even these movement rates are insufficient to account for the low level of recoveries to the west of the Gulf of Alaska. In contrast, PAT tags deployed in the summer of 2004 near Adak and Attu islands which popped up in the winter, showed only limited movement by adults. This result would suggest that tagged fish are not emigrating away from those areas, and should therefore be recovered in the fishery. The PIT experiment has also shown lower rates of tag recovery for larger fish than for smaller fish, in many areas. All in all, this experiment has certainly

Dr. Leaman and Dave Stewart of the *F/V Alford Rock* in Prince Rupert, B.C. IPHC photo archive.

raised a number of fundamental questions about the behaviour of halibut and we will continue to seek answers to these questions.

Recreational fisheries for halibut continue to grow and both countries have developed agreements concerning the sharing of halibut catch among various user groups or sectors. The Commission incorporates consideration of these agreements in its management and it is important that the catch limits contained in these agreements are adhered to, if we are to achieve the stock management goals for each regulatory area. This adherence is normally accomplished through the domestic regulations of the two countries. In 2005, IPHC regulatory area catch limits were exceeded in Areas 2B and 2C because actual harvests by recreational harvesters exceeded projections and the total harvest exceeded the targets specified. Domestic regulations of the two countries must provide tools which are effective in managing the harvest by all sectors to achieve the overall IPHC regulatory area catch limits. The Commission will continue to work with the management agencies of the two countries to avoid exceeding IPHC catch limits in the future.

Bruce M. Leaman
Executive Director

Commercial fishery in 2005

"Technology has advanced the capabilities of the fleets, and it's time to look at new ways — innovative ways — to make this industry more viable."

Drew Scalzi - March 15, 2002

The ex-vessel worth of halibut topped $215 million in 2005.

From the depths of the sea to the dinner table, commercial fishers landed 71.8 million pounds of Pacific halibut in 2005, just over the quota of 71.7 million pounds but down from last years catch of 73.1 million pounds. It was the fifth year in a row that catches have topped 70 million pounds, and with the average ex-vessel price unchanged at $3 (US) a pound, the catch was worth over $215 million to the fleet.

Halibut being unloaded by straps. Photo by Lara Hutton.

Where did they fish?

Boundary lines for IPHC regulatory areas have remained the same since 1990:

Area 2A - all waters off the coast of California, Oregon, and Washington.
Area 2B - all waters off the coast of British Columbia.
Area 2C - all waters off the coast of Southeast Alaska, south 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 58°00' N, and west of 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 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.

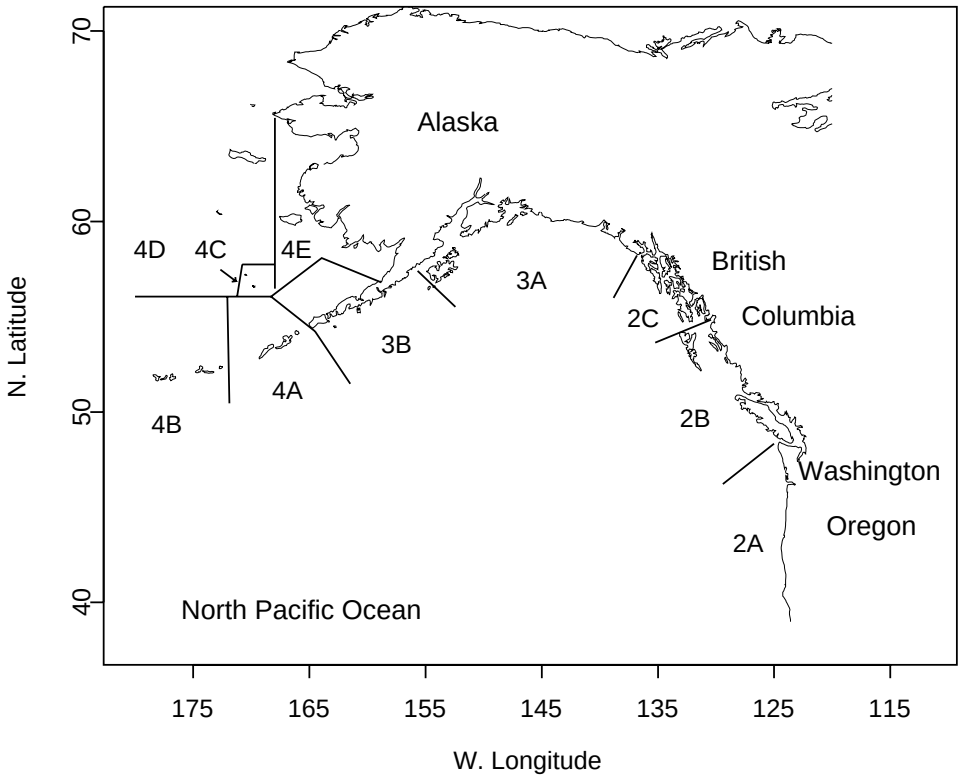


Figure 1. IPHC regulatory areas for the 2005 commercial fishery.

What are the rules?

The Commission routinely adopts Council catch sharing plans for Areas 2A and 4CDE to divide the catch among user groups and areas.

Regulations for the 2005 fishery were adopted at the IPHC's Annual Meeting in Victoria and later approved by the Canadian and United States governments with one exception: Canada again allowed the landing of live halibut in British Columbia.

The Commission adopted biologically-based catch limits for all individual regulatory areas and for Areas 4CDE combined. Individual catch limits for Areas 4C, 4D, and 4E were determined by a catch sharing plan implemented by the North Pacific Fishery Management Council (NPFMC). That catch sharing plan allows Area 4D CDQ to be harvested in Area 4E and in 2005 the Council allowed Area 4C IFQ and CDQ to be fished in Areas 4C or 4D.

The Pacific Fishery Management Council (PFMC) allocates halibut catch limits between user groups in Area 2A through a catch sharing plan. A court ordered adjustment in halibut allocations required 25,000 pounds be transferred from non-tribal to tribal fisheries in 2005, after applying the allocation percent by tribal (35 percent) and non-tribal (65 percent) fisheries. Area 2A licensing regulations have remained unchanged since 2000. All fishers had to choose between a commercial or sport charter license and commercial fishers then had to choose between a license for retaining halibut caught incidentally during the salmon troll fishery, or fishing in the directed commercial halibut fishery south of

Point Chehalis, WA, and/or retaining halibut caught incidentally in the sablefish fishery north of Point Chehalis.

In Area 2A, the non-treaty directed commercial fishery had 10-hour fishing periods beginning at 8:00 a.m. and closing at 6:00 p.m. on June 29, July 13, July 27, and August 10, 2005. Catches were monitored after each fishing period and the fishery was closed when the catch limit was taken.

For the second year, IPHC adopted a combined sport and commercial catch limit of 13.25 million pounds for Area 2B that was to be allocated by DFO. Initially. 88 percent of the total catch limit was allocated to the commercial fishery by DFO. For further details of the fishery in all areas, see Appendices I and II in this report.

How was the season?

Area 2A

A total of 756 vessels were licensed to fish for halibut in Area 2A, but not all of those fished. Fishers must choose between sport and commercial when applying for the license.

Area 2A was managed for an allowable catch of 1,330,000 pounds for all user groups. The allocation between user groups was recommended by the PFMC and adopted by the IPHC. The sport fishery was allocated 503,379 pounds. The treaty Indian fishery was allocated 490,500 pounds: 38,000 pounds for ceremonial and subsistence use and 452,500 pounds for their commercial fishery. The PFMC catch sharing plan states if the total allocation is over 900,000 pounds, part of the Washington sport allocation poundage is allocated to the sablefish fishery north of Point Chehalis, so 70,000 pounds was allocated to this sablefish season. The remaining non-treaty commercial catch limit was 266,121 pounds, with 226,203 pounds allocated to the directed fishery south of Point Chehalis and 39,918 pounds to the incidental catch in the salmon troll fishery.

IPHC licensed 756 sport charter and commercial vessels for Area 2A in 2005: 392 for the incidental catch of halibut during the salmon troll fishery; 216 for the directed commercial fishery and incidental halibut during sablefish fishery; and 148 for the sport charter fishery. Except for an increase in the number of licenses for the incidental halibut during the salmon troll season, there was little change in the number of licenses issued from the previous year.

In the salmon troll season, the allowable incidental catch ratio was one halibut per three chinook, and one “extra” halibut per landing, regardless of ratio but the total number of incidental halibut per vessel could not exceed 35 per landing. The ratio of halibut to chinook has remained the same since 2000. The fishery opened May 1 and closed on August 7 and the halibut catch was 2,100 pounds, or five percent over the limit.

The directed commercial fishery consisted of four 10-hour fishing periods with fishing period limits. The fishing period limits by vessel class remained high for the first three openings with H-class vessels receiving 8,000 or 9,000 pounds. The last opening still had a relatively high limit with H-class vessels receiving 4,000 pounds. The total directed commercial catch was 2.6 percent over the catch limit.

The incidental halibut fishery during the limited-entry sablefish season opened May 1 and closed on October 23. For the first time, the retention of halibut closed prior to the end of the sablefish season and the catch came within 2,000 pounds or three percent of the 70,000 pound limit.

In the tribal fishery, 75 percent of the commercial catch limit was allocated

to specific tribes or tribal groups and occurred between February 27 and July 30. The remaining 25 percent was open to all tribes with daily vessel limits of 500 pounds. The total tribal commercial catch came within two percent of the catch limit.

Metlakatla fishery

The Metlakatla Indian Community at the tip of the Alaska panhandle is authorized by the United States government to conduct a commercial halibut fishery within the Annette Islands Reserve. In 2005, eleven 48-hour fishing periods took place between April 30 and September 18 that produced a catch of 44,982 pounds, only half of last year's harvest of 90,000 pounds. The Metlakatla fishery has varied over the years from a high of 126,000 pounds in 1996 to a low of 12,000 pounds in 1998 and is included as part of the Area 2C commercial catch.

Quota share fisheries

The Quota Share (QS) fisheries of Area 2B and Alaska were open from February 27 to November 15.

Area 2B

The IPHC adopted a combined sport and commercial catch limit of 13,250,000 pounds for Area 2B, that was to be allocated to the user groups by DFO plus 20,000 pounds to account for projected commercial wastage. The initial commercial allocation of 88 percent of the total catch limit was reduced by 20,000 pounds to account for wastage, but increased by 590,229 pounds available from the 2004 underage/overage program and later leased 292,000 lbs from the recreational sector when it fell below its 12 percent allocation. After all the adjustments the total commercial quota was 12,540,000 pounds. Each vessel was allocated a fixed poundage of halibut, or an Individual vessel quota (IVQ), as calculated by DFO. The Area 2B catch of 12,248,000 pounds was within five percent of the catch limit.

Careful release of bycatch is practiced in the commercial fishery. Photo by Ivan Loyola.

After all the adjustments, the commercial catch limit for Area 2B was 12.54 million pounds.

When the initial IVQ program was implemented in 1991, 435 vessels received IVQs which were split into two

shares called blocks. Beginning in 1993, the blocks could be transferred between vessels but no vessel could fish more than four blocks. The fleet size dropped to about 280 vessels until 1999 when vessel owners were allowed to make unlimited temporary or permanent reallocation of halibut IVQ. Since 1999, the number of active vessels has varied from a high of 257 in 1999 to a low of 214 in 2002. In 2005, 221 vessels actively fished and 9,781,000 pounds or 78 percent of the catch limit was transferred between vessels, with 363,687 pounds transferred permanently.

The Native Communal Commercial Fishing Program had 21 active vessels in 2005 compared to 19 in 2004. Total landings, from 105 separate deliveries, amounted to 541,882 pounds, which was slightly more than in the previous year.

Several small sub-areas within Area 2B were closed to halibut fishing to protect stocks of non-halibut species.

Several small sub-areas in Area 2B were closed to halibut fishing to protect localized stocks of non-halibut species and to provide improved access to food fish for the First Nations' communities.

IPHC biologist, Lara Hutton and sampler, Anne Williams, sample the catch at Sitka Sound Seafoods in March. Photo by Tom Kong.

The number of QS holders in 2005 has dropped 31% since the program began.

Alaska

The Indiviual fishing quota (IFQ) halibut and sablefish fisheries have been in effect in Alaska since 1995. NOAA's Restricted Access Management (RAM) allocated halibut QS to recipients by IPHC regulatory area. Quota share transfers were permitted with restrictions on the amount of QS a person could hold and the amount that could be fished per vessel. Halibut quota was held by 3,332 persons in 2005, down from 4,830 individuals at the start of the program.

The total 2005 catch from the IFQ halibut fishery for the waters off of Alaska was 57.3 million pounds, three percent under the catch limit. For Areas 2C, 3A, 3B, and 4A, the commercial QS catches were within 1-4 percent of

the catch limits and Area 4B's catch was within 15 percent of the limit. The Commission adopts a biologically-based catch limit for Areas 4CDE combined, with catch limits adopted for each sub-area by a catch sharing plan implemented by the NPFMC. This plan allowed Area 4D CDQ to be harvested in Area 4E and Area 4C IFQ and CDQ to be fished in Areas 4C or 4D which is why the 4D catch exceeded its limit. The overall catch of 3.5 million pounds from the combined Area 4CDE fell under its limit of just under four million pounds.

Where do they catch the most halibut?

Once again, Homer was the top halibut port on the Pacific with landings of 10.7 million pounds or about 18 percent of the commercial catch in Alaska. Kodiak and Seward ranked second and third in landings, each moving between 10 to 14 percent of the Alaska catch. In Southeast Alaska, Sitka and Juneau tied as the top port, each with landings of 3.7 million pounds, and Petersburg wasn't far behind at 3.4 million pounds. Only 3.8 percent of the Alaska catch was landed outside of the state.

Port Hardy was the top landing port in B.C. receiving 41 percent of the catch, and Homer was the top port in the U.S. receiving 18 percent of the Alaska commercial catch.

Port Hardy and Prince Rupert/Port Edward topped the charts in British Columbia receiving 41 and 38 percent of the Area 2B catch, respectively. A total of 1,121 commercial trips from Area 2B landed halibut in 15 different BC ports in 2005. Smaller ports like Bella Bella, Coal Harbour, French Creek, and Port McNeill received fewer than three deliveries each in 2005.

The QS fishery landings were spread over nine months of the year. As it has been in recent years, May was the busiest month for Alaska landings in 2005, accounting for 15.6 percent of the total catch. March was the busiest month for poundage delivered in British Columbia, representing 16.5 percent of the Area 2B Catch.

The *F/V Ginny C* at the dock in Sitka, AK. Photo by Lara Hutton.

The landing of live halibut from Area 2B was again allowed by DFO. Live fish landings in 2005 totaled 14,502 pounds compared to a low of 7,900 pounds in 1998 and a high of 103,000 pounds in 1999. Six vessels made a total of 14 landings with live halibut in Port Hardy and Port McNeil, and no halibut were penned.

How old do they get to be?

The average age of halibut sampled in the commercial catch from all areas decreased slightly in 2005 relative to 2004, but the overall average age of halibut

The average fork length of halibut in the commercial catch decreased in all areas except Areas 2A and 3B.

in 2005 (13.4 years) was still one year higher than it was in 1996 (12.3 years). The average age of samples taken in Areas 2A, 2B, 4B, and 4D increased in 2005 while otoliths collected from Areas 2C, 3, 4A, and 4C showed a decrease from 2004.

The average size (measured fork length) of sampled halibut increased in Areas 2A and 3B in 2005 but decreased in all other areas. Average fork length for all areas combined remained the same between 2004 and 2005.

The 1995 year class accounted for the largest proportion (in numbers) of the overall commercial catch (15 percent) in 2005. The next most abundant year classes were 1994 and 1996, accounting for 13 percent and 9 percent of the catch, respectively. Ten-year-olds were also the most abundant age class in Regulatory Areas 2, 4A, 4C, and 4D, and the second most abundant in Area 3B. Eleven-year-olds from the 1994 year class made up the most abundant age class in Regulatory Area 3B, while 17-year-olds from the 1988 year class were the most abundant age class in Areas 3A and 4B.

The youngest and oldest halibut in the 2005 commercial or "market" samples were five and 51 years old, respectively. There were nine five-year-olds; six captured in Area 2B, and one each taken from Areas 2C, 3B, and 4C. The 51-year-old was captured in Area 4A and had a fork length of 113 cm. The largest halibut in the 2005 commercial sample was a 250-cm fish from Area 2C, which was determined to be 29 years old.

Keeping track on the web

Since 2002, IPHC, Alaska Department of Fish and Game (ADF&G), and NOAA have worked with the Pacific States Marine Fisheries Commission to develop a cooperative electronic reporting system for commercial fishery landings in Alaska. In 2005, the web-based Interagency Electronic Reporting System was designed, tested and went operational in August to record landings from the Bering Sea and Aleutian Island crab fisheries. Catches of halibut, sablefish and groundfish will be added to the reporting system in 2006 and salmon and herring will be plugged in the following year. For halibut, the "eLandings" system will eliminate the duplicative reporting requirements of ADF&G fish tickets and NOAA quota share reports. It also allows processors to easily import or export data into their own databases, so double entry will not be necessary.

THE 2005 SPORT FISHERY

"We Alaskans are somewhat the victims of our own prosperity. We need to invest in our future."

Drew Scalzi, May 6, 2001

Sport fishers have been more prosperous than ever in recent years, with anglers landing just under 10 million pounds of halibut in 2005, second only to the previous year's record of 10.7 million pounds. Revised figures released this year showed sport harvest records set in British Columbia, Southeast Alaska and the Gulf of Alaska in 2004.

Living by the rules

Sport fishing regulations in Alaska and British Columbia remained the same as in 2004. Allocative regulations for fisheries in Area 2A were set by the PFMC and adopted by the IPHC. The catch sharing plan divided the sport fishery into several subareas within which seasons were managed by catch limits. Charter vessels were required to declare whether they intended to operate as a sport

The catch sharing plan in Area 2A divides the sport fishery in several smaller sub-areas.

Sport fishers enjoy modern fish cleaning facilities in Homer, Alaska. Photo by Cal Blood.

charter or commercial vessel. Minor in-season modifications were needed to facilitate management strategies and protect certain species of rockfish.

In Alaska, 2005 saw much debate over IFQs for charter boats but ultimately in December, the NPFMC voted to rescind the program. The Council also discussed management options to bring the catch back under the Guideline Harvest Level (GHL) limit, after revised estimates of the 2004 sport harvest indicated that the charter sector had exceeded the GHL in Areas 2C and 3A by 22 percent and one percent, respectively.

In December, the Council voted to rescind a sport charter IQ program.

Estimating the catch

A variety of statistical methods are used to estimate sport harvests of halibut. Harvest estimates for Area 2A were provided by the Oregon Department of Fish and Wildlife (ODFW) and Washington Department of Fish and Wildlife (WDFW) based on in-season creel census estimates, except for the Washington Inside Waters (WIW) which is assessed by a post-season phone survey.

The Area 2B harvest estimate is provided by DFO based on a methodology developed in 1998 to which the IPHC adds Canadian fish landed at Neah Bay, Washington. Since average weight information is unavailable from British Columbia, the catch in numbers of fish is converted into pounds using the average weights from adjacent areas, Ketchikan for northern BC catches and Neah Bay, Washington for southern BC landings. The Commission will use average weights from British Columbia waters when they become available.

The ADF&G typically provides revised harvest estimates for the previous year for Areas 2C, 3, and 4. Current year projections are made annually by ADF&G staff for the IPHC based on a creel survey in Area 2C, port sampling in Area 3A, and the results of the statewide harvest survey for both areas.

What's in your creel?

Area 2A

The estimated harvest from Area 2A in 2005 was 486,322 pounds, about three percent under the catch limit. The Washington North Coast fishery closed just one week into the fishery and reopened for only two days in June with a catch that fell within 7,288 pounds of its quota. The average weight of North Coast halibut was 21.4 pounds, similar to that of previous years. The June opening was divided among two separate days to slow the catch and allow more anglers an opportunity to catch a halibut.

The Washington South Coast fishery centered out of Westport closed 4,231 pounds above the quota. The average weight of South Coast halibut was 18.5 pounds, a bit more than last year. The nearshore South Coast fishery re-opened to allow for incidental retention of halibut while fishing for other groundfish by transferring uncaught poundage from the North Coast fishery to cover overages on the South Coast.

The Columbia River area closed slightly more than 1,200 pounds over its quota. Halibut caught in the Columbia River area weighed considerably more on average on the Oregon side (21 pounds) than on the Washington side (about 14 pounds). As in previous years, a very high proportion of the catch, 30 percent of North Coast landings and 100 percent of the Columbia River catch, was

ADF&G sport fish sampler, Chris Russ, interviews a sport fisher at the docks in Homer, Alaska. Photo by Cal Blood.

sampled to provide the average weights for their respective areas.

The harvest estimate for the WIW (Washington Inside Waters) was 62,370 with most of the halibut landed in the eastern section of the fishery. The average weight was 23.1 pounds.

The Oregon sport fishery came closer to the catch limit than in recent years with ample opportunity provided to anglers, especially late in the season, but after the initial excitement of the fishery wore off, attention turned more to salmon and albacore tuna. The albacore came closer to shore than usual this year and for the first time the fishery in waters less than 40 fathoms had to be shut down early due to high rockfish harvests.

The average weight of a sport caught halibut from Area 2A ranged from 18-23 pounds, depending on where it was caught.

The overall average weight for the Oregon sport halibut fishery was 18 pounds in 2005, two pounds less than in 2004. As in Washington, a substantial portion of the available harvest was measured to determine the average weight.

Area 2B

The revised sport catch of 1.613 million pounds of halibut in 2004 was a record for Area 2B. That amount includes 8,820 halibut caught in Canadian waters and landed in Neah Bay, Washington. That's 2,000 fewer than in 2003 and the third straight year Neah Bay landings were down. Using the average weight of 21.4 pounds provided by WDFW, the Neah Bay landings were estimated at 189,013 pounds.

The 2005 harvest was projected at just under 1.456 million pounds based on a linear regression of catches from 2000-2004 and expanded using average weights from adjacent fishing areas.

Area 2C

The Area 2C harvest for 2004 was a record high and 2005 came in close behind.

The revised 2004 Area 2C harvest is estimated to be a record 2.937 million pounds and the harvest in 2005 fell not far behind, estimated at 2.544 million pounds. The numbers of fish harvested were identified by State Wide Harvest Survey (SWHS) area and converted using average weights from each respective user group. Length data were gathered in Ketchikan, Klawock, Craig, Petersburg, Wrangell, Sitka, Gustavus, Elfin Cove, and Juneau. Catches are not sampled in Haines and Skagway so harvests there are projected based on average weights in nearby Juneau. The overall average weight for Area 2C in 2004 was 19.9 pounds and preliminary indications show the average weight dropped to 16.7 pounds in 2005.

Area 3A

The projected harvest in Area 3A for 2005 was 5.437 million pounds, slightly off the revised 5.606 million pounds in 2004, also a record. The Area 3A catch was also estimated for each user group using estimates of the numbers of fish caught by each group as supplied by the SWHS and average weights collected from the primary ports of Yakutat, Whittier, Valdez, Seward, Homer, Deep Creek, Anchor Point, and Kodiak. Care was taken to properly account for harvests by the charter, private, and military recreation camps. The average weight for 2004 was 16.9 pounds, unchanged in 2005.

Areas 3B and 4

As elsewhere in Alaska, 2005 SWHS numbers were not available for Areas 3B and 4, so an estimate of the catch was made. In 2004 and 2005, the average weight obtained from ADF&G sport fish sampling on Kodiak Island was used to estimate the Areas 3B and 4 harvests in pounds. Since the average weight has apparently decreased from 19.5 pounds to 18.5 pounds, the projected harvest for 2005 also showed a decrease. This may or may not reflect the actual catches. Anecdotal reports from charter operators and in sport fishing magazines suggest that average weights of halibut landed in Dutch Harbor and Unalaska were quite high and the overall harvest in Areas 3B and 4 may have been higher than estimated.

Sport tag recoveries

IPHC port samplers continue to recover fish tagged by sport fishing groups in the mid to late 1990s. Eight such tags were recovered in 2005 by samplers from Cape Flattery, Washington to Sitka, Alaska. IPHC samplers also continued to encounter unauthorized tag releases, so-called “rogue” tags, including 17 recoveries from a large release of tagged fish by a single charter operator off the Washington coast earlier this decade. A total of 44 of these tags have been recovered by IPHC port samplers since 2002 from fishing grounds off of the central Washington coast and as far north as southeast Alaska. They are often recovered in the Canadian longline fishery both early and late in the season, presumably as the fish are traveling to and from the spawning grounds.

About 10 percent of the tags released in the Homer Halibut Derby this year were recovered.

The Homer Jackpot Halibut Derby once again purchased tags through the IPHC for their derby in Lower Cook Inlet. A total of 99 tags were released in 2005 and 10 tags were recovered. Twelve tags from previous derby releases were also recovered this year, nearly all of which occurred very close to their release sites. Jim Corliss of Corvallis, Oregon won the Homer Jackpot Derby with a 310 pounder that netted a prize of $48,504.

WASTAGE IN THE HALIBUT FISHERY

"With the advent of individual fishing quotas in 1995, we have entered a new era."

Drew Scalzi, April 27, 2001

Changes enacted since the derby days have significantly reduced the amount of halibut wasted after being caught by lost or abandoned fishing gear but wastage remains a significant removal from the biomass. Wastage also includes mortality caused when sublegal halibut are returned to the sea, or when predators such as sharks or sand fleas attack hooked fish still on the line, rendering it unmarketable. Whatever the cause, the IPHC accounts for wastage as it does any other removal from the biomass.

Wastage estimates were up in 2005 from the previous year, but still far below removals seen in the derby days of the fishery.

Overall, wastage from lost or abandoned gear was estimated at 228,000 pounds in 2005, up from 199,000 pounds in 2004 but still well below levels in excess of two million pounds in the derby days before individual quotas. Estimates of mortality of sublegal halibut totaled 1,927,000 pounds in 2005, slightly less than the 2.1 million pounds the previous year but still at a comparatively high level. The 2005 data are preliminary and the 2004 data were recalculated using the final catch figures.

Sharks sometimes make short work of halibut captive on longline gear. Photo by Lauri Sadorus.

Lost or abandoned gear

Information on the amount of gear lost or abandoned in the halibut longline fishery is collected through logbook interviews or fishing logs received in the mail from which fishery-wide estimates can be made. Gear types vary considerably as to skate length, hook size and spacing but the data are standardized as an effective skate.

Wastage is calculated as the ratio of effective skates lost to effective skates hauled, multiplied by total catch. Prior to 1998, the gear type used for the wastage calculation was the gear type used to calculate catch per unit effort (fixed hook gear was used in Alaska and a combination of fixed hook and snap gear was used in B.C. and Area 2A).

Skates of lost gear compared to skates hauled ranged on average from 0.2 to 3 percent depending on regulatory area.

The Area 2A catch included the non-treaty directed commercial catch, treaty commercial catch, and incidental catch during the longline sablefish fishery.

Wastage from lost or abandoned gear was first calculated in 1985 and since the implementation of the quota share fisheries in 1995 the ratios have fluctuated somewhat from year to year but are still lower than during the derby fisheries. The 2005 ratios of effective skates lost to effective skates hauled by regulatory area were as follows: Area 2A = 0.03; Area 2B = 0.003; Area 2C = 0.004; Area 3A = 0.003; Area 3B = 0.002; and Area 4 = 0.004.

Sublegal discard mortality

Prior to 2000, the amount of sublegal halibut caught in the commercial fishery was estimated from the ratio of sublegal to legal pounds found in the setline survey catch but now the ratio is based only on those survey stations that represent the highest one-third of the legal catch weight.

The ratios of sublegal to legal pounds calculated from the 2005 grid survey data are as follows: Area 2A = 0.16; Area 2B = 0.18; Area 2C = 0.14; Area 3A = 0.14; Area 3B = 0.26; and Area 4 = 0.15. These adjusted ratios are 57 to 89 percent of the ratios resulting from calculations using all stations. In comparison to the 2004 ratios, the 2005 ratios of sublegal to legal pounds increased in Area 2A, 2B, 4 and decreased in the other regulatory areas.

A discard mortality rate of 16 percent has been used for all U.S. areas since 1996 and for the Canadian IVQ fishery since 1991. This rate is based on discard mortality rates observed in the 1992-1993 Bering Sea/Aleutians sablefish hook and line fishery where the fishing pace is similar to that of the quota halibut fisheries.

To estimate the pounds of sublegal-sized halibut captured in the commercial halibut fishery, the area-specific ratios of sublegal halibut from the annual IPHC setline surveys were multiplied by the estimated commercial catch in each regulatory area, for each year. The resulting poundage was then multiplied by the discard mortality rate of 16 percent to obtain the estimated poundage of sublegal-sized halibut killed in the commercial fishery.

PERSONAL USE

Personal use halibut are taken in a variety of traditional ways such as the recently-recognized subsistence fishery in Alaska, the First Nations food fish fishery in Canada, ceremonial and subsistence removals in the Washington treaty Indian fishery, and sublegal-sized halibut retained in the Bering Sea. Little catch data are available for many of these fisheries and past estimates of personal use have varied widely.

In fact, personal use was initially estimated at over two million pounds but that was cut by half the very next year and halved again as better methods were used to estimate the catch. With the introduction of a new survey in 1998, the estimate jumped to about 750,000 pounds. It remained there until 2003, when new subsistence fishing regulations in Alaska required a better survey that estimated the catch at 1.382 million pounds. The difference was largely attributed to better estimation methods and not an actual change in harvest levels.

Improved methods of estimating the personal use harvest has put the catch at about 1.4 million pounds.

In 2004, the most recent year for which information is available, the personal use harvest is placed at 1.529 million pounds.

Alaska

The majority of the personal use harvest is taken in Alaska and estimates by the ADF&G's Subsistence Division put the statewide total at 1,193,000 pounds in 2004, a 15 percent increase over 2003. This is attributed to more subsistence permit holders than in 2003, and an increase in the proportion of permit holders who actually fished. The average harvest per fisher was very similar: 211 lbs in 2003 and 199 lbs in 2004.

Roughly 60 percent of the subsistence harvest in Alaska occurred in Area 2C and 27 percent was taken in Area 3A. The Bering Sea and Aleutian areas totaled just five percent of the coast-wide harvest, most of which came from communities within Area 4E.

The average annual harvest per Alaskan fisher in 2004 was 199 pounds.

IPHC includes the sublegal halibut caught and retained by the Area 4D/4E CDQ fishery in its estimates of personal use but these fishers were not required to register for the subsistence fishery.

British Columbia

The primary source of personal use halibut in British Columbia is the First Nations food fish fishery, whose harvests were estimated by DFO at 300,000 pounds. IPHC has received some logbook and landing data for this harvest in past years but not enough to make an independent estimate of the food fishery harvest. So-called "take-home fish" in the commercial fishery were once considered personal use but since implementation of the IVQ program, are now considered part of the vessel's overall catch.

Washington, Oregon, and California

The Area 2A catch limit is allocated by the PFMC including the treaty Indian fisheries off northwest Washington. In 2004, this ceremonial and subsistence fishery was allocated 19,400 pounds and was fully harvested. As in Canada, personal removals from the directed commercial fishery were reported as part of the commercial catch.

Sublegal halibut retained in the CDQ fishery

The retention of sublegal halibut in Area 4E was first allowed by the IPHC in 1998 and was later broadened to include adjacent Area 4D. After the new subsistence fishery was created in Alaska, the IPHC agreed to look at whether the retention program was still needed but that review has yet to occur.

In 2005, sublegal retention totaled 23,122 pounds, up 43 percent from the previous year. Rising fuel costs contributed to the increase as fishers sought to combine their commercial and subsistence catches. Reports were received from the Bristol Bay Economic Development Corp. (BBEDC), Coastal Villages Regional Fund (CVRF), and Norton Sound Economic Development Corp. (NSEDC).

The IPHC receives reports from three organizations accounting for sublegal retention in the CDQ fishery.

BBEDC fishers filled out a log which included the lengths of any retained sublegal halibut which were later converted to weights from the IPHC length/weight table to estimate the total catch. BBEDC fishers retained 955 halibut for a total of 8,750 pounds. The fish, landed in Dillingham and Togiak, had an average size of 9.2 pounds and 29 inches and were primarily dried or smoked and shared within their communities.

CVRF separates undersize halibut during offloads and tallies the poundage retained by each fisher. In 2005, plants in Chefornak, Hooper Bay, Kipnuk, Mekoryuk, Quinhagak, Toksook Bay, and Tununak, recorded a total of 11,335 pounds of sublegal halibut, a 59 percent increase from 2004. In all, 1,362 halibut were landed with an average weight of 8.3 pounds. Most of the catch was landed at Toksook Bay.

NSEDC required its vessels in either 4D or 4E to offload all halibut and the sublegal halibut were returned after being weighed. Landings included a total of 358 sublegal halibut weighing 3,555 pounds for an average net weight of 8.8 pounds. As in past years, the fish were all landed in Nome.

INCIDENTAL CATCH OF HALIBUT

In its diligence to conserve Pacific halibut, the IPHC keeps close tabs on all fisheries that catch halibut, even when that catch is unintended. Fishers setting their nets or hooks for other species occasionally catch halibut and while the law requires these fish to be returned to the sea without additional injury, some fish die from the trauma of being caught and released. This incidental harvest also called bycatch, is substantial: the second largest removal of halibut from the biomass.

Bycatch mortality of Pacific halibut continued to decline in 2005 to a total of 12.084 million pounds, down from 12.579 million pounds in 2004 and the lowest since 1987. Bycatch mortality decreased in Areas 3 and 4, but increased slightly in Area 2. Changes in fishery scheduling, closure of some Alaskan fishing grounds to protect Steller sea lions, and lower halibut bycatch rates in certain fisheries resulted in lower halibut bycatch off Alaska. The closure of areas off Oregon and Washington to bottom trawling reduced bycatch mortality in that area. Increased trawl effort for arrowtooth flounder off B.C. increased bycatch mortality in Area 2B.

Bycatch can take place on any gear. Here a trawl codend is full of rockfish. Photo by Hilary Emberton.

Sources of bycatch information and estimates

NMFS in the U.S. and DFO in Canada provide estimates of incidental catch of halibut in groundfish fisheries.

For most fisheries, the IPHC relies upon information supplied by observer programs for bycatch estimates. Research survey information is used to generate estimates of bycatch in the few cases where fishery observations are unavailable. NMFS observer programs covering the groundfish fisheries off Alaska and the U.S. west coast provides the IPHC with estimates of bycatch. Estimates of bycatch mortality in crab pot and shrimp trawl fisheries off Alaska have been made by IPHC staff from previous studies and are based on bycatch rates observed on research surveys because direct fishery observations are lacking.

The amount of information varies for fisheries conducted off British Columbia. For the trawl fishery, bycatch is managed with an Individual Vessel Bycatch Quota (IVBQ) program instituted in 1996 by DFO. Fishery observers sample the catch on each 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.

Halibut bycatch in the domestic groundfish trawl fishery operating in Area 2A is estimated from information collected by at-sea observers. Bycatch rates 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.

Not all bycatch dies when caught so a rate is applied to the total catch to estimate those that will die. These rates vary among fisheries and gear.

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 available, DMRs are calculated from data collected on the release viability or injury of halibut. NMFS manages the groundfish fisheries off Alaska according to a schedule of DMRs. In Area 2B, Canadian trawl observers examine each halibut to determine survival.

When data to determine DMRs for certain fisheries are not available, assumptions are made on likely DMRs based on similar fisheries where DMRs are known. 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.

Bycatch mortality by regulatory area

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. The total bycatch mortality (excluding the Japanese fishery in the Bering Sea) peaked in 1965 at about 21 million pounds. Bycatch mortality declined during the late 1960s, but increased again to about 20 million pounds in the early 1970s. During the late 1970s and early 1980s, bycatch dropped to roughly 13 million pounds, as foreign fishing off Alaska came under increasing control. By 1985, bycatch mortality had declined to 7.2 million pounds, its lowest level in 25 years but 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. Bycatch mortality has since declined; preliminary estimates for 2005 total 12.08 million pounds, representing a four percent decrease from 2004 and a 40 percent decrease from the peak in 1992. Most of the decrease is attributed to the introduction of IFQs in the Alaskan sablefish fishery, the Careful Release program for the Alaskan hook-&-line fishery, and IVBQs in the Canadian trawl fishery.

Photo by Hilary Emberton.

Area 2

Bycatch mortality in Area 2 in 2005 was estimated at 0.98 million pounds, up about nine percent from the previous but below the 10-year average of 1.26 million pounds. 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 2004 west coast trawl fishery at 245,000 pounds, based on observer data. This is a 47 percent decline from 2003 due to the movement of trawl effort to shallower water as a product of the closure of certain areas for rockfish conservation. The 2004 estimate has been rolled over for 2005 and will be updated when an actual estimate for 2005 is obtained. Trawl 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. No new estimate is available for the shrimp trawl fishery, so the most recent estimate has been rolled forward to 2005.

Area 2A bycatch is expected to continue to decline as large areas are closed to trawl gear.

In Area 2B, trawl fishery bycatch was estimated at 0.36 million pounds, an increase of 42 percent from the 0.25 million pounds estimated for 2004. This increase is a result of increased effort directed towards arrowtooth flounder in 2005. The 2005 estimate is significantly above the average of 0.24 million pounds which has occurred since the IVBQ 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. These fisheries have not been reviewed since the early 1990s, but we are assuming mortality has been relatively unchanged since then.

Area 3

Bycatch mortality in Area 3 was estimated at 4.26 million pounds in 2005, a 14 percent decrease from 2004 and well below the 10-year average of 4.5 million pounds. The groundfish fishery continued to be affected by fishery closures inside sea lion critical habitat, which reduced effort and forced vessels to fish in less productive areas. Quotas for Pacific cod were also lower in 2005 and helped to reduce halibut bycatch.

Bycatch mortality decreased in both Areas 3A and 3B. In Area 3A, trawl mortality dropped from the abnormally high level seen in 2004 of 3.0 million pounds, to 2.5 million pounds in 2005. The 2005 trawl fishery bycatch also declined in Area 3B but only by five percent.

Area 4

Bycatch mortality in Area 4 increased a modest 1.7 percent in 2005, to 6.85 million pounds. Since 2003, bycatch mortality has not varied much, averaging roughly 6.8 million pounds annually. For 2005, total bycatch mortality was lower for CDQ trawl and longline fisheries, and higher for the open access trawl fisheries than in 2004. The open access longline fishery bycatch was quite a bit below the halibut bycatch mortality limit in 2005, but the open access trawl fisheries took their entire bycatch limit. The 2005 quotas for cod were lower than in past years. Halibut mortality in the pot fishery for cod dropped to 5,000 pounds, the lowest seen since the inception of pot fishing for cod in the early 1990s. The CDQ fishery targeted primarily pollock and resulted in about 107,000 pounds of bycatch mortality, less than in 1999 when the CDQ fishery focused more on cod.

Halibut bycatch and foodbanks

Dutch Harbor processors, Unisea and Alyeska along with SeaFreeze, Coastal Transportation, Horizon Lines, and Smoki Foods in Seattle, all donated time and effort to bring 50,000 halibut meals to area food banks.

Since 1998, a portion of the halibut bycatch from Bering Sea trawl fisheries has been retained and given to Seattle area food banks. Although limited to shore-based trawl catcher vessels that land in Dutch Harbor, there is no limit on the amount of pounds that can be donated. The program was extended in 2003 with the requirement that it be reviewed every three years.

Dutch Harbor processors, UniSea and Alyeska, again participated in the 2005 program and delivered 29,556 pounds of frozen, headed & gutted halibut, almost twice the 15,890 pounds delivered in 2004.

Halibut donated under the program in 2005 were delivered to SeaFreeze in Seattle with shipping donated by Coastal Transportation and Horizon Lines. The fish were processed into steaks, sleeved, and repackaged for delivery to regional food banks by Smoki Foods. SeaFreeze's Quality Assurance manager reported that the halibut donated in 2005, which represented over 50,000 meals, were generally of excellent quality. Recipients of the processed halibut in 2005 included Food Lifeline in Seattle.

ASSESSING THE HALIBUT POPULATION

How does the IPHC gauge the health of Pacific halibut? Each year the Commission goes to great lengths to assess the abundance of Pacific halibut using data from the commercial fishery and scientific surveys. From that, the exploitable biomass in each IPHC Regulatory Area is estimated by fitting the data into a detailed population model for that area. Estimates for Area 2A also incorporate survey information from neighboring Area 2B and the estimate for Area 4CDE includes NMFS trawl survey data.

Commercial, survey, and NMFS trawl data are all used to estimate the halibut biomass.

From these estimates, a target level for total removals is calculated by applying a fixed harvest rate. This is called the "constant exploitation yield" or CEY for that area. The target level for directed fisheries is called the fishery CEY and includes the commercial setline catch in all areas plus the sport catch in Areas 2A and 2B. It is calculated by subtracting from the total CEY an estimate of all unallocated removals—bycatch of legal-sized fish, wastage of legal-sized fish in the halibut fishery, fish taken for personal use, and sport catch except in Areas 2A and 2B.

Halibut landing in the checker on the *F/V Kristiana*. Photo by Levy Boitor.

Catch limits in each area are based on the estimates of fishery CEY but may be higher or lower depending on a number of statistical, biological, and policy considerations.

Estimates of exploitable biomass and CEY

Like last year, the model fits in Areas 2B-4B were satisfactory in 2005, and the estimates of abundance are little changed in most areas. The Area 2C estimate was down by about 10 percent because of a lower catch rate (CPUE) in both the commercial fishery and the setline survey. The decline of both commercial and survey CPUE in Area 3B also resulted in a substantial downward revision of estimated biomass, from 56 million pounds in last year's assessment to 40 million this year. Estimated biomass for the beginning of 2006, in this area, is up to 45 million because of strong estimated incoming recruitment.

The exploitable biomass in Area 2A is calculated as the three-year running mean CPUE of the Area 2B estimate, weighted by bottom area. The survey CPUE is an index of density and multiplying it by the total bottom area gives an

index of total biomass. The proportion has been 12 or 13 percent for the last three years so a working value of 12.5 percent was adopted this year with the aim of sticking with it unless the calculated value moves very far in either direction.

In last year's assessment, the estimate of biomass in Area 4CDE was calculated by scaling the Area 4A estimate by the same procedure. But lacking setline survey data from the eastern Bering Sea shelf, the calculation was based on NMFS trawl survey catch rates and a past comparison of trawl and setline survey catch rates in the Bering Sea. Using this procedure, the estimated biomass in Area 4CDE in last year's assessment was 160 percent of the Area 4A estimate or 32 million pounds. Because survey CPUE in Area 4A continued to decline in 2005, this year's scaling factor would be 190 percent and the Area 4CDE estimate would be 36 million pounds. Total CEY is calculated by applying a harvest rate of 22.5 percent in Areas 2A, 2B, 2C, and 3A, and 20 percent in Areas 3B and 4A, the same as rates in past years. In Areas 4B and 4CDE the harvest rate was reduced from 20 to 15 percent.

The survey CPUE is an index of density and multiplying it by the bottom area gives an index of total biomass in Area 2A.

Estimates of Area 4CDE biomass from the NMFS trawl survey

The NMFS has conducted an annual trawl survey on the eastern Bering Sea shelf using the same gear and station pattern since 1982. Standard survey stations are placed on a 20-nautical-mile grid, and the survey area extends northward to about 61° N. In areas where both the NMFS trawl survey and the IPHC setline survey are conducted, the trends in catch rates at length agree quite well. The trawl survey rates tend to be somewhat more variable from year to year but still provide a reliable index of halibut abundance in trawlable areas.

In NMFS flatfish assessments, the absolute density of fish is estimated from the survey catches and the area swept by the trawl, the distance between the trawl wings multiplied by the distance towed, and this density is multiplied by the entire survey area to estimate absolute biomass.

The trawl survey rates tend to be somewhat more variable from year to year but still provide a reliable index of halibut abundance in trawlable areas.

In nearly all NMFS flatfish assessments, the catchability of smaller fish is assumed to be lower due mainly to their distribution in shallower water outside the survey area. Halibut selectivity should be the same, generally increasing with length but it may decrease among the largest fish. Estimates of the selectivity of the roller trawl used in surveys found that for halibut, selectivity peaked at 65 cm and then declined gradually, dropping to 50 percent at 120 cm while setline survey selectivity continued to increase beyond 120 cm.

Commercial setline selectivity is well determined in the assessment, and we can use that to estimate the true length composition in any area by scaling up the commercial length composition. The survey trawl selectivity can then be calculated from the trawl survey length composition. There is not enough overlap between the commercial fishery and the trawl survey to do that in Area 4CDE, but we can do the calculations for Area 3A, 3B, and 4A, which are surveyed by the roller trawl.

The numbers are not very consistent among areas but on the whole they suggest little change in selectivity with length up to at least 125 cm, which covers the bulk of fish in the stock nowadays.

For estimating halibut biomass in Area 4CDE, we assume no decrease in selectivity with length, and we assume that because of herding, the trawl catches

130 percent of the fish in the path of the net, the midpoint of the NMFS estimates for other flatfish. Both assumptions are conservative. With these estimates of total abundance at length, we can calculate exploitable biomass by applying the fixed length-specific commercial setline selectivity schedule used in all Alaska areas.

The estimates for each of the trawl survey strata vary substantially from year to year, but the total for the shelf survey has been fairly stable at an average of 40 million pounds over the last five years. Of that total, about 10 percent is in stratum 5, which is mostly in Area 4A, so the Area 4CDE estimate is 36 million pounds, which by coincidence is exactly the number we would have calculated with the old estimation procedure.

NMFS also conducts a trawl survey of the eastern Bering Sea slope but the exploitable biomass estimate for 2004 was less than five million pounds, and almost half was in the Area 4A sector. So for simplicity's sake, we have chosen to treat this component as negligible.

The new estimation procedure for Area 4CDE yielded an estimate of 36 million pounds which is exactly what the old estimation procedure would have yielded.

Analysis of PIT tag recoveries through 2005

In 2003 and 2004, the IPHC tagged nearly 67,000 halibut with PIT tags and ever since, port samplers have scanned a substantial part of the landings to recover tags. The primary purpose of this massive undertaking was to estimate the harvest rate of fully selected halibut by the commercial fishery. The project also permits estimates of length-specific selectivity, rates of migration between areas, and the rate of natural mortality.

Raw data

Except for Area 2B, recapture rate patterns are quite similar for both release groups and both recovery years. In Area 2B, the pattern of recapture rates of fish in the 90-130 cm length range in 2005 is the same for both release groups but

IPHC sampler, Michele Drummond, scans for PIT tags in Juneau, AK. Photo by Lara Hutton.

The difference in recapture rates from 2004 to 2005 suggests a difference in commercial selectivity.

much lower than the recapture rates observed in 2004, suggesting a difference in commercial selectivity between 2004 and 2005.

One would expect the recapture rates of 2003 releases to be lower in 2005 than in 2004 due to natural mortality. This is mostly the case in Areas 2B and 2C. In Area 3A the 2005 recapture rates of 2003 releases are about the same as in 2004, and in Area 3B they are actually higher, suggesting that some recaptured tags were not detected in 2004. This was actually suspected at the end of 2004 and experiments were carried out this year to check detection rates with the result that we are confident that almost all recaptured tags were detected in 2005.

In both 2004 and 2005, there is a strong east-to-west trend in recapture rates. In Areas 2B and 2C, the recapture rate of fish around 100 cm was about 10 percent, dropping by half to about five percent in Area 3A, again by half to 2-3 percent in Area 3B, then down to under one percent in Area 4A and to practically nil in Area 4B. In Areas 3 and 4 these rates are dramatically lower than the commercial fishing mortality rates at length estimated in the stock assessment.

Except for the significant number of Area 3A tags recovered in Area 3B, recoveries outside the release area mostly occurred to the east of the release area, consistent with the notion of an eastward migration from nursery areas to adult summer feeding areas. But there is no indication of higher migration rates among smaller fish. Out-of-area recoveries amounted to 10-20 percent of total recoveries in all length groups, with no discernible differences among areas.

Length interval at release (cm)	Total recoveries	Out-of-area recoveries	Proportion out-of-area
70-79	76	12	0.16
80-89	324	54	0.17
90-99	321	45	0.14
100-109	222	37	0.17
110-119	135	22	0.16
120-129	88	7	0.08
130+	106	14	0.13

Sublegal fish

Some tagged sublegals are taken in non-commercial fisheries but we cannot estimate how many because we do not sample those fisheries and there are no commercial landings of sublegal fish. For these fish we have to use the assessment estimates of fishing mortality at length. Fortunately the estimates are all very small, and if the assessment is in fact underestimating stock abundance in western areas the true values are even smaller.

We do not have analytical estimates for sublegal mortality in Area 2A. Relative stock sizes and catch levels imply that sublegal sport plus personal use mortality in Area 2A is about three times the Area 2B value and sublegal bycatch mortality about ten times. A reasonable working value for Area 2A is therefore 0.03. In Area 4CDE we can use the Area 4A value.

There is also some mortality of discarded sublegals in the commercial fishery but the amount is considered negligible.

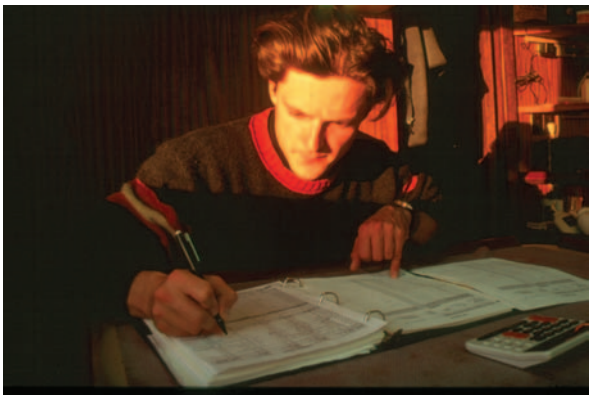
Recoveries in the year of release

Because recoveries in the year of release have been few and spotty, fishing mortality rates at length in the year of release are computed from the raw recoveries and applied to the release numbers to estimate the number surviving to the beginning of the next year. The removals in the year of release are therefore fully accounted but have no influence on the estimates of selectivity, fishing mortality, natural mortality, and migration.

Model fits and estimates

We now have two full years of recoveries from the 2003 PIT tag releases and one full year from the 2004 releases in Areas 2B and 3A, enough to estimate a selectivity schedule and fishing mortality rate in each area, and a migration matrix and natural mortality rate. Recoveries in Areas 2A, 4B, and 4CDE were too few to provide any meaningful estimates, so all releases and recoveries in those areas were left out of the modeling work.

All of the estimates for natural mortality are similar and all are close to the working value of 0.15 used in the assessment. But in view of the large variances, the conclusion for the time being is that the data are not informative as regards the natural mortality rate. In all of the fits reported below the natural mortality rate was fixed at 0.15.



IPHC sampler, Levy Boitor, checks survey data collected for the stock assessment. IPHC archive.

We now have enough recoveries to estimate a fishing mortality rate in each area.

Fits of the full model showed that except for a couple of length groups in Areas 2B and 2C, estimates of fishing mortality at length were not significantly different in 2004 and 2005. This was expected, because fishing effort in 2005 was almost the same as in 2004 in every area except Area 2C which was about 15 percent higher. Estimated fishing mortality in Area 2C in 2005 was about 30 percent higher than in 2004 but the difference was not significant. In Areas 3A and 3B the 2005 estimates were 40-50 percent higher than the 2004 estimates. While the differences were not significant, they may indicate lower detection rates in 2004 than in 2005. But since all of the estimates of fishing mortality at a length of 100 cm in Areas 3A and 3B fall between 0.03 and 0.06, the effect of any incomplete detection in 2004 on the model calculations and estimates is very small in absolute terms.

For the reported fits, the model was used to estimate a single selectivity schedule and fishing mortality rate for each area in both recovery years. To the extent that there were differences between years, the reported estimates are average values. The estimates of fishing mortality rates and migration rates are quite similar to those reported last year.

Comparison with assessment estimates

Because of the lower recapture rates of larger fish in Area 2B in 2004, the mark-recapture estimates of fishing mortality are now substantially lower than the assessment estimates for fish larger than 100 cm, whereas in the 2004 analysis they were about the same. In Area 2C the two kinds of estimates are still in approximate agreement. In Area 3A the mark-recapture estimates are still much lower than the assessment estimates, but the pattern now looks quite similar to the one in Area 2B. In Areas 3B and 4 the two sets of estimates still differ by an order of magnitude.

The corresponding estimates of exploitable biomass are shown below, along with the swept-area estimates of total biomass at length from the NMFS trawl survey converted to exploitable biomass. In Areas 2B and 2C the mark-recapture and assessment estimates are comparable. There is no trawl survey value for Area 2B, and the trawl survey value for Area 2C is certainly much too low because of the extent of very rough bottom in that area. In Areas 3A, 3B, and 4A, the assessment and trawl survey values are comparable both in magnitude and in the relative distribution of biomass among areas, while the absolute mark-recapture estimates are much higher and show a much a higher relative abundance in Areas 3B and 4A. This pattern is at odds with all other data on the relative distribution of halibut biomass among areas.

In Areas 2B and 2C, the mark-recapture and assessment estimates are comparable.

Area	Mark-recapture	Assessment	Trawl survey
2B	80	61	---
2C	45	61	6
3A	292	143	92
3B	364	45	53
4A	372	19	13
3A-3B-4A total	1,028	207	158

Net migration rates

The 2005 recoveries show much the same pattern as the 2004 recoveries and a dramatic difference in estimated abundance between the mark-recapture experiment and the analytical stock assessment. A possible reason for the difference is that the stock assessment assumes that the stock in each regulatory area is a closed population, or at least that net migration is negligible. The mark recoveries have shown higher than expected migration rates among fish 65 cm and larger at release, and no apparent relationship between size and migration rates. If net migration (out or in) is significant in some areas, that would affect the stock assessment estimates because net migration is effectively included in the estimate of fishing mortality.

The estimates show a large immigration into Area 2B, of which about half is due to a significant migration rate from the comparably-sized Area 2C stock and the other half due to very low rates of migration from the much larger Area 3A and 3B stocks. Of the 22 tags released in Area 2C and recovered in Area 2B,

The *F/V Pender Isle* has worked with the IPHC for several years on the stock assessment surveys. Photo by Levy Boitor.

nine had been released in statistical areas on the regulatory area boundary and the remainder farther north. For the purpose of this analysis, the disputed part of Dixon Entrance was treated as being in Area 2B.

Area 4A shows a substantial net emigration rate but estimated net migration is negligible in Areas 2C, 3A, and 3B, so it does not appear that a proper treatment of migration in the stock assessment would resolve the disagreement with the mark-recapture estimates.

It does not appear that a proper treatment of migration in the stock assessment would resolve the disagreement with the mark-recapture estimates.

"With a refocusing of fisheries management, the state should be able to regain its strong foothold in the worldwide market."

Drew Scalzi, Feb. 20, 2002

2005 standardized stock assessment survey

The 2005 survey encompassed all offshore waters from Oregon to the Bering Sea.

The standardized stock assessment (SSA) survey provides catch information and biological data using standardized methods, bait, and gear, and provides an important comparison with data collected from the commercial fishery. Survey data on the size, age, and sex composition of halibut are used to monitor changes in biomass, growth, and mortality in the population.

The IPHC has conducted standardized setline surveys since 1963, except from 1987 to 1992, and the current design and sampling protocols have been the same since 1998. The 2005 survey encompassed all offshore waters from Oregon to the Bering Sea with survey stations located on a 10 by 10 square nautical mile grid.

Overhauling and baiting the gear aboard the *F/V Waterfall*. Photo by Ivan Loyola.

Standard survey gear consisted of fixed-hook, 1,800-foot skates with 16/0 circle hooks spaced 18 feet apart. Seven skates were fished at each station. All hooks were baited with a quarter pound piece of semi-bright chum salmon and each vessel set its gear at first light and let it soak a minimum of five hours before hauling.

All legal-sized halibut caught during the survey were retained and sold to offset survey costs. Rockfish and Pacific cod landed as bycatch, were also retained. Catch deliveries were divided among 19 different ports to distribute sales among buyers. Getting a fair market price was also a factor.

Most vessel contracts provided a lump sum payment along with a 10 percent share of the halibut proceeds, and a 50 percent share of the bycatch. Vessels working the Oregon and Washington regions and the far reaches of the

Bering Sea operated under special cost-sharing arrangements. The arrangements helped offset the costs to survey these regions which are very expensive.

Special projects

The SSA survey presents an opportunity to collect information on halibut biology and to conduct other experiments not directly associated with halibut stock assessment.

- A water column profiler which measured temperature, depth, salinity, and dissolved oxygen, was deployed in the Vancouver, Goose Island, and Ommaney regions.
- Forty eight adult halibut were tagged with Pop-up Archival Transmitting (PAT) tags in the Gulf of Alaska in an attempt to better understand seasonal movement of halibut.
- Tissue samples were collected from approximately 1,900 halibut from 20 sites in a study of the halibut's genetic structure across its geographic range and over time.
- Samples were taken as part of an ongoing study by the Alaska Department of Environmental Conservation into the presence of contaminants such as pesticides, dioxins, furans, PCBs, mercury, and heavy metals in fish.
- Vessels fishing Canadian waters carried a third sampler to study bycatch, record hook by hook data for all hooks, and collect age, sex, and maturity data of rockfish.
- An IPHC intern investigated the occurrence of halibut ambicoloration (also known as mottled or grey belly halibut) and its relation to the development of chalky flesh.

Getting ready to deploy the profiler from the deck of the *F/V Pender Isle*. Photo by Levy Boitor.

The survey entertained several special projects including those involving oceanography, migration, ambicoloration, and heavy metal exposure.

Results

Catch per unit effort

As the SSA includes both commercial grounds as well as those not routinely targeted by the fishery, the average CPUE was below that of the commercial fleet. Compared to the 2004 results, CPUE increased slightly in Areas 2A, 3A, and 4B. All other regulatory areas saw CPUE drop compared to the 2004 results. The largest changes in CPUE were seen in Area 4B (+18 percent) and the largest drop was in Area 4D (-48 percent). Downward trends have been seen in Areas 3B and 4A for the last seven years and in Area 4D for the past four years.

The CPUE on the survey is routinely less than that seen in the commercial fishery. This is because the survey encompasses the entire area, not just commercial fishing grounds.

Compared to 2004, the 4A and 4D Edge regions saw an appreciable downward trend in CPUE, while it appears to have leveled off elsewhere in the Aleutian chain. CPUE increased in the western regions of Area 3A but decreased in eastern 3A. Notably the Shumagin region (Area 3B) saw CPUE levels drop by 56 percent.

The distribution of sublegal- and legal-size halibut by depth was consistent with previous surveys showing higher abundance of sublegal-size fish in shallow waters and a wide variation in depth occurrence for legal-size fish.

The *Selendang Ayu* oil spill prevented three stations near Unalaska from being fished and three stations near Sanak were not fished due to mechanical problems.

Bycatch

Approximately 110 unique species of fish and invertebrates were caught as bycatch during the survey. No seabirds or marine mammals were caught in 2005.

The most common bycatch in Areas 2A and 2C was sablefish. Most common bycatch in Areas 2B and 3A were sharks, primarily dogfish. The most frequent bycatch in Areas 3B, 4A, 4B, and 4D was Pacific cod. In Area 4B, the most frequently encountered bycatch species were Pacific cod and yellow Irish lord sculpins.

IPHC survey vessels in Area 2A encountered double the number of spiny dogfish and soupfin sharks compared to 2004, while only half as many blue sharks. In Area 2B, the catch of blue sharks dropped about 90 percent compared to 2004, which was an unusually strong year for blue shark bycatch.

Biologists on the surveys do bird counts during each haul and in 2005, over 62,000 birds were seen within 50 meters of the stern of the vessels.

Seabirds

A total of 1,222 seabird observations were conducted during the SSA in which a total of 62,214 birds were seen within 50 meters of the stern of the survey vessels. Sixteen unique species were identified and seven unidentified bird categories were used.

Black-footed albatross were seen in all regulatory areas and were most abundant in Area 3A. Laysan albatross were seen primarily west of Kodiak Island and were observed at highest density in the central Aleutian Islands. There were 27 sightings of the endangered short-tailed albatross.

Otolith collection

The otolith collection goal for the 2005 survey was 2,000 otoliths per regulatory area and a minimum of 1,500 per area. The minimum attainments were not attained in Areas 2A and 4D, which is not uncommon despite sampling all fish caught. An error in the random selection table and a low CPUE resulted in a lower than desired sample size in Area 3B.

Length distribution

The median length of all halibut caught on survey stations in 2005 was 84.5 cm, representing no change from 2004. The largest halibut on average were found in Areas 4B (97.5 cm), and 4D (93.5 cm). In comparison to 2004, median lengths increased in four regulatory areas in 2005 and decreased in four areas.

Sex ratio

Consistent with previous year's results, the sex ratio for mature halibut catches showed considerable variation across regulatory areas, ranging from 39 percent to 71 percent females. In general, the regions to the west of the central Gulf of Alaska had lower percentages of females in the catch. These areas have had the lowest historical exploitation rates. Area 2C had the highest percentage of females. Most female halibut caught in the summer months when the surveys are conducted are in the ripening stage and are expected to spawn in the coming fall and winter.

The areas west of the Central Gulf of Alaska had a smaller percentage of females in the catch than in the east.

Age distribution in the 2005 SSA

Halibut ranging from 4 to 53 years old were captured during the 2005 SSA, with 10-year-olds comprising the largest age group in the overall catch. Average age was higher and average fork length was lower for males than females in all areas.

F/V Waterfall **tied at the dock in Seward. Photo by Ivan Loyola.**

The 1995 year class dominated the survey catch.

The 1995 year class (10-year-olds) accounted for the largest proportion (in numbers) of sampled halibut for all areas and sexes combined in 2005. The next most abundant year classes were 1994 and 1996 (11- and 9-year-olds) respectively.

Ten-year-olds were the most abundant age class for female halibut sampled in Areas 2A, 3B, 4A, and 4B as well as for females from all areas combined. The second and third most abundant age classes for sampled females were 11- and 9-year-olds, respectively. The 1995 year class was also the largest for male halibut in Areas 2B, 2C, 3B and 4B and from all areas combined. The second and third most abundant age classes for male halibut were 11- and 18-year olds, respectively.

The largest and smallest fish captured on the survey were both from Area 4A.

The youngest and oldest halibut in the 2005 setline survey samples were determined to be four and 53 years old. There were seven four-year-olds: four males measuring between 45 and 90 cm, and three females measuring between 42 and 57 cm. There was a single 53-year-old: a male from Area 4A with a fork length of 145 cm.

The largest halibut in the 2005 setline survey was a 221 cm female from Area 4A, which was determined to be 21 years old. The smallest halibut was also captured in Area 4A: a 42 cm fish that was four years old.

To ensure accuracy of aging information, 553 halibut were aged twice and 87 percent of these paired readings agreed to within one year.

Cruise report for the Bering Sea trawl survey

For the eighth straight year, the IPHC participated in the annual NMFS Bering Sea shelf trawl survey. The survey is intended to assess crab and groundfish stocks and an IPHC biologist aboard one vessel was able to sample halibut caught for length, gender, maturity, otoliths, and prior hooking injuries.

The survey spanned the eastern Bering Sea continental shelf from inner Bristol Bay to the shelf break, and between Unimak Pass to north of St. Matthew Island. Within this area, 405 stations were positioned on a 20 by 20 nautical mile grid in depths ranging from 30 to 200 meters. A NMFS otter trawl was used with equipment that recorded net height and width while fishing, temperature and depth, and a tilt sensor to detect when the footrope hit bottom.

During the Bering Sea trawl survey, 883 halibut were sampled for otoliths, length, gender, and maturity.

NMFS chartered survey vessel *Arcturus*. Photo by Ivan Loyola.

Results

A total of 1,637 halibut were measured on both survey vessels and 883 halibut were captured and sampled, including 439 female, 441 male, and two unidentified halibut. Of the females sampled, 97 percent were immature. Of the males sampled, 60 percent were considered immature, a smaller percentage of immature males than in other recent surveys. As part of a special otolith study, 39 fish under 30 cm were shipped back to the IPHC lab for additional testing.

All halibut caught on the survey were measured for length. Estimates of relative abundance were derived by expanding the survey catches from the area swept by the trawl to the total survey area. Estimates were not adjusted for size-

specific selectivity, but total abundance as estimated by the trawl survey in 2005 was the highest seen since 1990, at 69 million fish.

Because the Bering Sea survey is conducted annually, it is possible to observe the growth of particular size and age classes within the juvenile population. In 2000, a group of very small halibut (10-19 cm) became apparent and aging information indicated these were 2-year-olds from the 1998 year class. For the following three years, that age class made a respectable showing, comprising 30 to 21 percent of the total catch. In 2004, the 20-29 cm halibut showed strongly. In 2005, these now 30 to 50 cm halibut continue to make a solid contribution.

Cruise report for the Gulf of Alaska trawl survey

The IPHC participated in the NMFS Gulf of Alaska bottom trawl survey in 2005 continuing a series that started in 1984. Three vessels were chartered to carry out the survey and the scientific crew included NMFS samplers and one biologist from the IPHC.

The survey area stretches from the Aleutian's Islands of Four Mountains to Dixon Entrance, at depths of approximately 15 and 1000 m. The survey area was divided into 59 strata based on depth, geographic features, and statistical areas. Gear used included a NMFS standard trawl equipped with electronic equipment to record net height and width, temperature and depth, and a sensor to detect when the footrope was in contact with the bottom. Each tow was at least 10 minutes in length or approximately 0.74 nautical miles at a speed of three knots.

NMFS personnel measure the length of every halibut brought aboard all the trawl survey vessels.

All halibut caught by the IPHC-staffed vessel were sampled for length and prior hooking injuries (PHI) and half of the fish were retained for otolith extraction and assessment of gender and maturity. On the two vessels not staffed by IPHC, the lengths of all halibut caught were recorded, and the fish were subsequently released. As part of an elemental fingerprinting project, all halibut under 30 cm in the otolith sample were packaged for further analysis at the IPHC lab in Seattle.

Results

A total of 2,599 halibut were captured and measured by the IPHC sampler. Of those, 1,307 were retained for otolith extraction and gender/maturity sampling. Of the 556 females sampled, 92 percent were immature while 97 percent of the 752 males sampled, were considered mature. The maturity rates for males were much different than in recent years when typically about one third to two thirds of the males have been immature.

A total of 48 halibut less than 30 cm in length were sent to the IPHC lab for further assessment.

Size distribution and abundance

Relative biomass and abundance estimates are derived by calculating a mean density of halibut for each stratum and multiplying by the stratum area. The 2003 abundance estimate was the highest in over a decade, at 208 million fish, and the estimate for 2005 remains high at 192 million fish. It is important to note that due to gear differences, and limitations of the trawl for halibut assessment, these estimates may differ somewhat from the IPHC stock assessment.

Halibut size-class trends in the Gulf of Alaska are hard to track because the survey is not conducted annually but some trends are apparent. The survey tracked the exceptionally large 1987 year class from 1993 through 1999, by which time the fish had grown to where they were less vulnerable to the trawl gear.

The 2003 survey found 4-year-old halibut (1999 year class) in the 35-55 cm range made up 21 percent of the catch. In 2005, those 6-year olds continued to make a strong showing.

Prior hook injuries

Since the mid-1990s, halibut fishers have taken note of rates of hook injuries from previous captures. Although fishers are required to practice careful release techniques for returning halibut to the sea, it was suspected that either the regulations were not being observed by all, or that careful release procedures inflicted worse damage than expected. The SSA survey provides a means of examining trends in hook removal injuries across the entire range of halibut.

Since 1997, all halibut captured during the SSA survey have been examined for the presence of PHI. These injuries are usually to the jaw or eye socket and can be difficult to see. Past injuries can be healed over while fresh injuries can be mistakenly attributed to the current capture. Samplers rank the severity of the injuries on a scale of one to four.

PHI incidence ranged from 3.9 percent to 16.4 percent depending on area.

Baiting gear aboard the *F/V Pacific Sun*. Photo by Tracee Geernaert.

Approximately 110,000 halibut were examined in 2005, substantially more than in the past two years and 6,258 halibut were found to have a prior injury. By regulatory area, the percentage of halibut with a prior injury ranged from a low of 3.9 percent in Area 2B to a high of 16.4 percent in Area 4D and averaged 5.7 percent coastwide (down from 5.9 percent in 2004). The highest PHI rates in 2005 were in Areas 2A (8.6 percent), 4A-Bering Sea (10.6 percent), 4B (10.7 percent), and Area 4D (16.4 percent).

Among sublegal halibut, the overall incidence of PHI remained essentially unchanged, decreasing from three percent in 2004 to 2.9 percent in 2005. The highest occurrences of sublegal PHI were seen in Areas 2B (5.9 percent), and 4D (13.1 percent).

IPHC samplers on NMFS trawl surveys in the Gulf of Alaska and Bering Sea also gathered PHI data. PHI rates in the Bering Sea came to 4.2 percent and in the Gulf of Alaska it was 3.6 percent, similar to rates seen in previous years.

While the overall incidence of halibut PHI decreased in 2005, it remains at an increased level in the Bering Sea and Area 2A. High PHI rates observed in the Bering Sea reflect the interception of halibut by the Pacific cod fisheries in that area.

While many fishers undoubtedly handle halibut bycatch with careful release, substantial improvements are unlikely without direct incentives for such behavior. Fisher education efforts in the last decade seem to have only stabilized rates of hooking injury. Continued progress in reducing halibut PHI will require the cooperation of all fishers, and may require a more individualized accounting as a disincentive.

A group effort

It takes industry, biologists, and agencies working together to gather the data needed for the stock assessment.

Survey operations occur over a large geographic range, in a wide variety of weather conditions, and often involve long, demanding days. The IPHC thanks the sea samplers, charter vessels and their crews, plant personnel, port samplers, scan samplers, and permanent staff whose dedicated contributions and efforts made the 2005 SSA survey a success.

Fourteen commercial longline vessels, seven Canadian and seven U.S., participated in the 2005 SSA survey, including the fishing vessels *Blackhawk, Bold Pursuit, Clyde, Free to Wander, Heritage, Kema Sue, Kristiana, Viking Joy, Pacific Sun, Pender Isle, Predator, Proud Venture, Star Wars II, and Waterfall.*

Vessels chartered for the NMFS trawl survey in the Bering Sea and Gulf of Alaska included the fishing vessels *Arcturus, Aldebaran, Gladiator, Sea Storm,* and *NW Explorer*.

IPHC RESEARCH

"[I'm] a strong proponent of 'show me the science'."

Drew Scalzi, February 20, 2001

Fulfilling the responsibilities of the IPHC's mandate involves several components. Among these are the understanding of the resource and its behavior through a program of ongoing scientific research.

From satellite tags that study migration patterns to earbone fingerprinting to determine origin, IPHC scientists continued a wide range of biological studies in 2005, even trying to analyze the effect of hook size and spacing on catches, and whether there was a relationship between greybelly halibut and chalky flesh.

A scan sampler tests halibut heads for PIT tags in Prince Rupert, British Columbia. Photo by Lara Hutton.

Tagging studies

The IPHC began tagging halibut in 1925. Since that time, over 450,000 tagged halibut have been released to study migration, utilization, age, growth, and mortality. To date, more than 47,000 of these releases have been recovered. While no tagged halibut were released in 2005, 14 wire tags were recovered from previous experiments, not including the PIT tag study. Most of these 2005 recoveries were from two mortality studies in 1994 and 1995 and the tagged fish recovered were captured close to their area of release.

In other recovery news, a fish released in Area 2A off Newport, Oregon grew only 16 cm in 16 years while a fish released in Area 3A, in Alaska's Prince William Sound, grew 19 cm in 4 years. The largest increases in size were seen in recoveries of female fish.

Overall, recovery rates from recent experiments vary from a total of four percent in a 1995 trawl mortality experiment to 47 percent in the 1988 Sitka Spot Experiment. The highest recovery rates predictably occurred in older experiments, from which fish have been available for capture the longest.

A fish released off of Newport, Oregon 16 years ago was recovered this year and had grown only 16 cm during its time at large.

Portside sampling for PIT tags

This was the third year of perhaps the most ambitious tagging study in IPHC history. In 2003, the IPHC tagged and released 43,999 halibut using PIT tags. A PIT tag consists of an integrated circuit chip and antenna coil wrapped in glass and is about the size of a grain of rice. Inserted into the white side of the head, each tag has a unique alphanumeric code that can be read by an electronic scanner. Another 23,437 PIT tags were released in 2004 off British Columbia and in the Gulf of Alaska. The experiment was intended to provide the IPHC with estimates of exploitation rates independent from the assessment model, as well as information on halibut migration.

With good cooperation from processors, 1,252,054 halibut were scanned for PIT tags this year, 22,000 more than in 2004. Samplers detected 791 tags over the season: 464 releases from the primary experiment, 296 from those released in 2004, and an additional 31 recoveries from pilot studies and double-tag experiments.

Seasonal migration of adult halibut along the Aleutian chain using PAT tags

Halibut fisheries target the summer feeding grounds but during the winter, these fish leave the relatively shallow waters of the continental shelf to spawn in deeper waters along the shelf-edge, from the Queen Charlotte Islands to the southeast Bering Sea. Our knowledge about these winter spawning areas is entirely based on surveys prior to 1981 and information gaps exist. For instance, much of what we know about spawning grounds in the central-western Aleutians comes from a single, two-day research trip in 1972. However, juveniles are captured regularly in NMFS trawl surveys west of Atka. It is unlikely the Bering Canyon could be the source of these western Aleutian halibut, since prevailing currents would carry these larvae either north along the shelf-edge or east into Bristol Bay. In contrast, a gyre by Bowers Ridge may help to retain larvae spawned in the western Aleutians. If true, a distinct Aleutian sub-population may exist that is more isolated from the Gulf of Alaska than halibut found in the southeast Bering Sea.

It's possible that a distinct Aleutian sub-population of halibut exists.

These questions about spawning populations west of Unalaska would be difficult to answer without conducting midwinter charters in the Aleutians, but recent advances in tag technology provide a tool that can help uncover some of these mysteries. Pop-up Archival Transmitting (PAT) tags record temperature, depth and light while attached to the fish and on a programmed date, release from the fish, float to the surface, and transmit data to a satellite. The result is a record of an individual fish's spawning location, along with important environmental and behavioral data, without the need for tag retrieval. PAT tags provide a fisheries-independent technique for identifying the movement patterns and potential spawning sites of halibut.

What's a PAT tag, anyway?

Manufactured by Wildlife Computers of Redmond, Washington, PAT tags are shaped somewhat like a microphone, with a diameter of about 0.75 in (2 cm), a length of about 6.5 in (17 cm), and a 5 in (12 cm) antenna. The tag contains

A PAT tag records light level, temperature, and depth every minute. However, when the data are transmitted via satellite, they are truncated into 12 hour blocks.

sensors and a satellite transmitter, and is attached to the fish by a 7 in leader embedded near the dorsal fin.

The tags record light level, temperature, and depth every minute but detailed data can only be retrieved if the tag is physically recovered. Data sent via satellite transmissions are summarized in 12-hour blocks within user-defined intervals for depth and temperature. When an electric current causes the metal leader to rapidly corrode, the tag floats to the surface and begins to transmit data to polar-orbiting satellites. The summarized temperature and depth data and light-based geoposition estimates are broadcast. The tag's endpoint position is determined or if the fish is captured before the pop-up date, the full archival record can be downloaded with its highly detailed environmental data and daily geoposition estimates.

Results

A total of 25 adult halibut were tagged at two locations during the 2004 IPHC summer setline survey; 13 fish at survey stations southeast of Attu Island, and 12 fish tagged adjacent to Atka Island. Tags were programmed to release from the fish on February 15, during the winter spawning season.

A halibut has just been tagged and is ready for release. Photo by Bonnie Gauthier.

Eleven tags from the Attu deployments successfully released from their host fish and transmitted data in 2005. Locations are available at this time, but depth and temperature information have not yet been fully analyzed. Nine of the Attu fish moved to the southwest between tagging and pop-up but not very far. The maximum distance moved was only about 37 miles (60 km) and tags from two fish popped up almost exactly where the fish had been tagged. Fish appeared to be somewhat congregated on the pop-up date with seven of the eleven fish located within 19 mi (30 km) of each other in a deep saddle just east of Agattu Island. An eighth fish was located just upslope of the rest, approximately 16 miles (25 km) to the southwest.

Only five of the Atka tags successfully released and transmitted. The largest

movement was to the west by approximately 100 miles (160 km). All other fish moved less than 13 miles (20 km) and no pattern of aggregation was apparent.

These results suggest that large halibut (likely mature females) in the Aleutian Islands may remain in the region during the winter spawning season rather than migrate long distances as observed in the Gulf of Alaska. While sample sizes are small, none of the 16 tag recoveries were made outside of the shelf zone associated with the islands at which fish were tagged. Whether these fish spawned in the Aleutians cannot be determined by tag data alone but the pattern of aggregation in deep water east of Attu suggests that spawning grounds may well exist along the Aleutian chain. Confirmation of this would require targeted sampling during the winter spawning season when maturity states could be assessed.

Evidence from PAT tags and genetic work suggest that the deep Aleutian passes may act as a barrier to spawning migrations.

The lack of evidence that any of these fish crossed the deep passes separating the islands is consistent with preliminary genetic results. This suggests some degree of reproduction in the Aleutians and prompted the hypothesis that the deep Aleutian passes act as a barrier to spawning migrations. More detailed genetic analyses are planned and increased sample sizes from future tagging would also be useful.

The low tag return rates at Atka, just 42 percent compared to 85 percent from Attu, is hard to explain. This may represent a large tag loss, post-tagging mortality, or a tag malfunction. One of the missing Atka tags was recovered by a longliner fishing at the western tip of Atka and it may be possible to determine why the tag apparently malfunctioned.

Seasonal migration in the Gulf of Alaska using PAT tags

PAT tags could also help answer another lingering question about seasonal halibut migration in the Gulf of Alaska. Prompted by industry concerns, the IPHC has been looking at extending the season into the winter months which raises the question whether biomass distribution is different in winter. Spawning occurs during winter in relatively deep water along the shelf break from at least the Queen Charlotte Islands to the Pribilof Canyon. Rather than simply moving directly offshore to spawn, tag studies indicate that halibut may move considerable distances along shore during their seasonal migration. Many halibut move northward and as a result, winter distribution patterns may be different than those in summer upon which quotas are largely based. A winter fishery could intercept migrating fish, effectively transferring exploitable biomass among affected areas. In such a case, separate winter quotas or time-area management may be necessary to account for such interceptions. A better understanding is needed of when halibut begin to move in the fall, reach their deep-water spawning grounds, and when they start and complete their return migrations in the spring.

Halibut move offshore in winter to spawn, but they may also move along shore considerable distances for the same reason.

PAT tags provide a novel technique for identifying these movement patterns as well as environmental conditions experienced by halibut. Daily depth profiles for each tagged fish can be used to assess the timing and duration of their residence in deep water which can indicate the start of the fall spawning migration and the return spring migration to summer feeding grounds.

Progress in 2005

A total of 48 adult halibut were tagged by IPHC samplers in 2005: 24 in the eastern Gulf of Alaska and another 24 in the western Gulf. During the course of the late summer and fall fishery, four tags were recovered by the commercial fishery, one each near Goose Island, Sitka, Yakutat and Chignik. The tag recovered near Yakutat was reprogrammed and redeployed near Ketchikan in August. The data retrieved next year will be used to examine autumn and spring migration timing, as well as the duration of deep-water residence in winter.

Using otolith chemistry to determine halibut nursery origin, a progress report

Nursery grounds for Pacific halibut are located throughout the Gulf of Alaska and Bering Sea after which juveniles migrate southeast to fishing grounds at age 4-5. Little is known, however, about the distances juveniles migrate, whether individual fishing grounds are supplied by specific nursery areas, or are populated by a mixture of individuals reared throughout the geographic range. To better understand this issue, it was suggested that the nursery origin of adults might be determined based on the composition of trace metals in their earbones or otoliths, what's been called an Otolith Elemental Fingerprint or OEF. Over the past three years, juvenile halibut have been collected from dozens of locations, from British Columbia to the Bering Sea. Subsequent analyses suggest that halibut do retain elemental signatures within their otoliths that are distinct enough to distinguish fish on regional scales. In 2005, work continued to add more sites to the statistical model, and additional field sampling in southeast Alaska.

A new model was implemented in 2005 which increased accuracy by more than 30%.

Progress in 2005

Prior analysis that tested for differences among OEFs from five different sites (Kamishak Bay, Puale Bay, Sitkinak Strait, Black Hill, and Nunivak Island) was able to distinguish fish by general region, but not to site level, with 50-76 percent accuracy. This model was driven largely by readings of manganese and copper but potential contamination issues cast doubt on the validity of the results. In the spring of 2005, a new model was constructed based on carbon and oxygen isotopes that excluded these potentially biased trace elements. Classification accuracy increased markedly with this new bias-free model, to 80-90 percent.

Laboratory analyses continued in 2005 and results from these analyses will allow us to include more sites in our examination of regional patterns in OEFs, and the scales at which they are distinguishable. Trace element and stable carbon-oxygen isotope analysis was conducted on fish sites along the southern Alaska Peninsula, as well as additional tow locations in Kamishak and Sitkinak. Models incorporating all available data will be finalized in the coming year.

In early summer, Fanshaw Bay in eastern Frederick Sound was successfully re-sampled, with the capture of eight age-1 halibut and 21 age-2+ fish.

Hook size and spacing experiment

Since the 1920s, the IPHC has standardized factors to compare commercial fishing data in CPUE calculations. The first standard adopted in 1931 defined a

unit of fishing gear as 1800 feet of groundline, regardless of the number of hooks. This was replaced in 1943 by a standard based on 120 hook units, regardless of hook spacing. The "length-standard" model implied that catch was a function of the length of gear while the "hook-standard" implied that the number of hooks determined catch. In the 1970s, and persisting to present, the IPHC adopted a "spacing-standard" which allowed for both these possibilities and defined a standard skate of gear as an 1800-foot skate with 100 #3 hooks spaced 18 feet apart. This formula, however, was based on J-hooks and in the mid-1980s, the introduction and immediate acceptance of circle hooks changed everything. Studies found circle hooks caught 2.2 times the weight of fish that J-hooks caught and this factor was used to compare relative catches. A hook spacing study using circle hook gear was attempted in 1985 and while there was a general trend of increasing catch per hook with increasing hook spacing, this wasn't apparent in all areas and the small sample size limited its statistical validity.

IPHC researcher, Steve Kaimmer, cradles a halibut. IPHC photo archive.

Hook spacing on commercial halibut gear has changed considerably over the years.

Meanwhile, hook spacing took a U-turn. Spacing between hooks increased from nine feet in the 1920s to 13 feet in the 1930s, 18 feet by the late 1950s and by the 1970s, hook spacings of 21 to 26 feet were common in the commercial fishery. The adoption of individual quotas for halibut and sablefish and the beginning of concurrent fishing for the two species turned that around. Sablefish are best caught with small #5 or #6 circle hooks at a short, 3 to 4 foot interval, and the increased use of combination gear for sablefish and halibut prompted the IPHC to investigate the relationship of catching power and selectivity by these different gear types.

Experimental design

In July and August, the IPHC chartered a vessel to fish in the central Gulf of Alaska using a randomized design based on two factors: hook size and spacing. Four different hook sizes were used: #3, #4, #5, and #6 circle hooks with spacing levels at 18, 12, 9, and 3.5 feet. Not all combinations of hook size and spacing were fished. Almost no large hooks are fished on short spacings and likewise none of the small hooks are fished on long spacings so a limited set of size and spacing combinations, those common in the commercial fishery, were tested in the experiment.

Each day, two strings of twelve 100-hook skates were set, with the hook size and spacing randomized within each string. Skates had a standard number of hooks so length varied from 1800 ft for 100 hooks at 18-foot spacing to 350 ft for 100 hooks at 3.5-foot spacing. Similar gangions were used for all combinations. Strings were set parallel to each other between one and three nautical miles apart and at a similar depth. Sets were made shortly after first light and soaked for at least five hours before hauling. The effects on catch in weight and number, for both legal-sized and sublegal-sized fish, were then examined.

Results

The experiment was completed in four trips that spanned 22 days. A total of 44 sets were successfully completed from which 10,408 legal-sized halibut were caught, with an estimated weight of 196,262 pounds, as well as 6,074 sublegal halibut.

Catch rates during the experiment, in numbers of fish and weight of legal fish, were approximately similar to the values expected from the examination of previous survey data. Catch rates for the 18-foot spacing #3 hook skates were similar to IPHC survey data, which are based on the same size and spacing. Numbers of legal-sized fish averaged only nine percent greater than previous surveys, while the catch in weight was essentially equal to the previous survey. However, the number of sublegal fish caught in the experiment was substantially higher than during survey fishing.

Hook spacing does indeed affect the catch rate of legal-sized halibut, but not necessarily in a linear fashion.

Catch rate in both weight and number of legal and sublegal halibut was highly variable among different treatments and, in fact, much more variable than on the standard survey which reduced the statistical power of the tests. Subsequent analysis for the experiment may include computerized re-sampling to improve estimation based on these data.

The analysis of the effect of hook size and hook spacing on catch rates indicated significant effects of hook spacing and capture depth on weight of legal-sized halibut, but that relationship was not linear. It increased to a maximum at 9-foot spacing and declined at 18-foot spacing. While significant, the effect of hook spacing on the legal weight catch rate is minor compared to the effect of depth. The catch rate of legal halibut increases significantly with depth while the weight of sublegal halibut decreases significantly.

There are trends in catch in number with hook size and spacing in the analysis as well, however neither hook size nor hook spacing effects were significant. Catch in number of both legal and sublegal fish as a function of hook spacing showed a similar relationship to catch in weight. As a function of hook size, catch in number was also similar to catch in weight but there was a stronger tendency for increased numbers of sublegal fish on the smallest hooks.

Discussion

Preliminary results of the 2005 experiment confirm a direct effect of hook spacing on catch rate of legal-sized halibut. However the results also suggest that this relationship may not be linear. The catch rate decreased at the largest spacing. No significant effect of hook size on catch of legal-sized fish was noted. Current practice in the IPHC stock assessments is to adjust commercial halibut data to account for hook spacing but not for hook size and these preliminary results suggest that no alteration of this practice is required.

We have yet to examine the size composition of halibut obtained by the experimental treatments. The data suggest that use of smaller hooks will result in larger numbers of sublegal fish. If higher numbers of sublegal fish are discarded as a result of the use of larger numbers of smaller hooks, an adjustment to the wastage fraction of the commercial catch may be required.

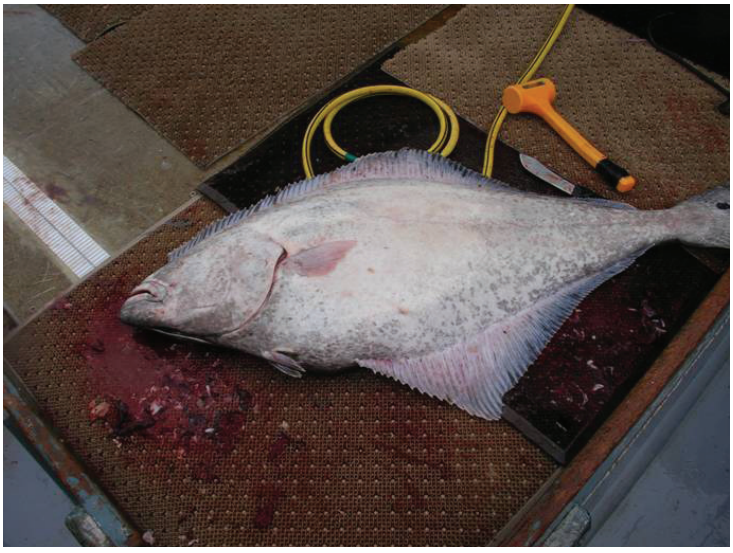
Lastly, this experiment was conducted in an area of high halibut density which may mask the effects of either hook spacing or, less likely, hook size. This experiment may be repeated in an area of low halibut density to examine the sensitivity of effects to halibut density.

Ambicoloration and flesh quality in Pacific halibut

Ambicoloration, or blind side pigmentation, is commonly observed in Pacific halibut. Industry concerns about the flesh quality of halibut that exhibit a type of ambicoloration called staining, also referred to as grey halibut or "greybellies," and questions about the sex ratio of these fish prompted an investigation into stained halibut and whether there was any link with the potential to develop chalky flesh.

The study found that 85% of grey bellied halibut show no sign of going chalky.

During the 2005 standardized stock assessment survey, a random sample of just over 100 normal colored halibut and a comparable number of stained fish were collected and examined for length, sex and flesh acidity (pH). Some differences were indeed apparent.



The grey mottling is clearly seen on the white side of this halibut. Photo by Erin Lowery.

The lengths of stained fish were greater than that of normal colored fish, 98.7 cm compared to 91.5 cm, respectively. The male to female ratio of stained fish was significantly different than that of normally colored fish, 8.7 to 1 compared to the usual 1.2 to 1 ratio. The percentage of stained halibut exhibiting a pH indicative of chalky flesh was 14.5% compared to 2.7% in normal fish. While there is a higher probability that a stained halibut will develop chalky flesh compared to a normal colored halibut, it is important to remember that only nine percent of the entire population is grey bellied and over 85% of those exhibit no indicators that the flesh will turn chalky.

APPENDICES

The tables in Appendix I provide catch information for the 2005 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 2005 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 2005 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), 1997 - 2005.

Table 3. The total catch (thousands of pounds, net weight) from the 2005 commercial fishery, including IPHC research catch, 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 2005 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 2005 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 2005.

Table 7. Commercial halibut fishery catch (thousands of pounds, net weight) in 2005 by country, statistical area, and regulatory area.

Appendix II.

Appendix III.

Appendix I.

Table 1. The 2005 removals of Pacific halibut by regulatory area (thousands of pounds, net weight).

Area	2A	2B	2C	3A	3B	4	Total
Commercial[1]	803	12,331	10,625	26,033	13,171	8,860	71,823
Sport	484	1,456	2,544	5,437	6	37	9,964
Bycatch Mortality:							
Legal-sized fish	170	190	140	1,320	360	2,950	5,130
Sublegal-sized fish	116	166	200	1,810	765	3,897	6,954
Personal Use[2]	38[3]	300	677	404	34	95[4]	1,548
Wastage:							
Legal-sized fish	5	37	32	156	26	31	287
Sublegal-sized fish	8	353	234	572	550	208	1,925
Total	1,624	14,833	14,452	35,732	14,912	16,078	97,631

[1] Commercial catch includes IPHC research catch.
[2] Includes revised estimates for the 2004 subsistence harvest in Alaska.
[3] Treaty Indian ceremonial and subsistence harvest authorized in the Catch Sharing Plan.
[4] Includes 16,200 pounds of sublegal halibut retained in the 2004 Area 4DE Community Development Quota fishery.

Appendix I.

Table 2. Commercial catch (including IPHC research catch) and catch limits of Pacific halibut by IPHC regulatory area (in thousands of pounds, net weight), 1997 - 2005.

Reg. Area	Commercial Catch[1]								
	1997	1998	1999	2000[2]	2001	2002	2003[2]	2004	2005
2A[3]	413	460	450	482	680	851	819	884	803
2B	12,420	13,172	12,705	10,811	10,288	12,074	11,789	12,162	12,331
2C	9,920	10,196	10,143	8,445	8,403	8,602	8,410	10,233	10,625
3A	24,628	25,698	25,316	19,288	21,541	23,131	22,748	25,168	26,033
3B	9,072	11,161	13,835	15,413	16,336	17,313	17,231	15,460	13,171
4A	2,907	3,418	4,369	5,155	5,015	5,091	5,024	3,562	3,404
4B	3,318	2,901	3,571	4,692	4,466	4,080	3,863	2,719	1,975
4C	1,117	1,256	1,762	1,737	1,647	1,210	886	954	534[4]
4D	1,152	1,308	1,891	1,931	1,844[4]	1,753[4]	1,965[4]	1,655[4]	2,578[4,5]
4E	251	188	264	351	479[4]	555[4]	415[4]	314[4]	369[5]
Total	65,198	69,758	74,306	68,305	70,699	74,660	73,141	73,111	71,823
Reg. Area	**Commercial Catch Limits[6]**								
	1997	1998	1999	2000	2001	2002	2003	2004	2005
2A[3]	374.2	440.9	412.5	468.1	681.4	817.9	817.9	890.4	788.6
2B	12,500	13,000	12,100	10,600	10,510	11,750	11,750	12,550	11,658
2C	10,000	10,500	10,490	8,400	8,780	8,500	8,500	10,500	10,930
3A	25,000	26,000	24,670	18,310	21,890	22,630	22,630	25,060	25,470
3B	9,000	11,000	13,370	15,030	16,530	17,130	17,130	15,600	13,150
4A	2,940	3,500	4,240	4,970	4,970	4,970	4,970	3,470	3,440
4B	3,480	3,500	3,980	4,910	4,910	4,180	4,180	2,810	2,260
4C	1,160	1,590	2,030	2,030	2,030	2,030	2,030	1,720	1,815
4D	1,160	1,590	2,030	2,030	2,030	2,030	2,030	1,720	1,815
4E	260	320	390	390	390	390	390	345	359
Total	65,874.2	71,440.9	73,712.6	67,138.1	72,721.4	74,427.9	74,427.9	74,665.4	71,685.6

[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] Area 4C CDQ and IFQ could be fished in Area 4D as of July 22, 2005.
[5] Area 4D CDQ could be fished in Area 4E by NMFS enforcement waiver (2001) and IFQ regulation (since 2002).
[6] 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 2005 commercial fishery, including IPHC research catch, of Pacific halibut by regulatory area and month.

Reg. Area	Feb/Mar	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Total
2A	60	202	63	230	149	77	21	1	-	803
2B	2,031	1,287	1,041	1,427	1,466	1,583	1,528	1,008	960	12,331
2C	1,248	1,513	1,728	1,507	1,311	1,361	974	624	359	10,625
3A	3,525	3,884	4,527	3,572	2,462	2,831	2,517	2,364	351	26,033
3B	498	1,233	2,256	2,249	1,994	2,168	1,374	1,175	224	13,171
4A	2	84	347	630	804	807	402	241	87	3,404
4B	35	29	245	207	397	670	265	50	77	1,975
4C	-	-	-	156	244	102	19	13	-	534
4D	-	-	-	367	523	951	583	154	-	2,578
4E	-	-	46	138	123	45	14	3	-	369
Alaska Total	5,308	6,743	9,149	8,826	7,858	8,935	6,148	4,624	1,098	58,689
Grand Total	7,399	8,232	10,253	10,483	9,473	10,595	7,697	5,633	2,058	71,823

Appendix I.

Table 4a. Number of vessels and catch (thousands of pounds, net weight) of Pacific halibut by vessel length class in the 2005 commercial fishery for Area 2B, Alaska, and the Alaskan regulatory areas.

Overall Vessel Length	Area 2B No. of Vessels	Area 2B Catch (000's lbs.)	Alaska No. of Vessels	Alaska Catch (000's lbs.)
Unk. Length	23	569	82	323
0 to 25 ft.	0	0	193	369
26 to 30 ft.[1]	-	-	129	831
31 to 35 ft.[1]	6	118	248	5,554
36 to 40 ft.	52	1,721	182	3,112
41 to 45 ft.	57	2,787	176	4,817
46 to 50 ft.	24	2,091	150	5,774
51 to 55 ft.	27	2,133	70	4,102
56 + ft.	35	2,912	271	33,807
Total	224	12,331	1,501	58,689

Overall Vessel Length	Area 2C No. of Vessels	Area 2C Catch (000's lbs.)	Area 3A No. of Vessels	Area 3A Catch (000's lbs.)
Unk. Length	60	149	13	46
0 to 25 ft.	50	108	33	98
26 to 30 ft.	47	339	30	141
31 to 35 ft.	103	1,340	104	2,436
36 to 40 ft.	109	1,271	79	1,449
41 to 45 ft.	95	1,515	98	2,394
46 to 50 ft.	87	1,901	82	2,518
51 to 55 ft.	40	1,122	40	1,839
56 + ft.	110	2,880	202	15,112
Total	701	10,625	681	26,033

Overall Vessel Length	Area 3B No. of Vessels	Area 3B Catch (000's lbs.)	Area 4 No. of Vessels	Area 4 Catch (000's lbs.)
Unk. Length[2]	-	-	7	101
0 to 25 ft.[2]	4	32	109	158
26 to 30 ft.	0	0	54	351
31 to 35 ft.	34	895	58	883
36 to 40 ft.	23	312	5	81
41 to 45 ft.	34	743	6	164
46 to 50 ft.	33	1,005	7	349
51 to 55 ft.	25	737	4	404
56 + ft.	150	9,447	74	6,369
Total	303	13,171	324	8,860

For confidentiality reasons:

[1] Vessels 26 to 36 ft. in the Area 2B fishery were combined with 31 to 35 ft. vessels.

[2] Vessels of unknown length in the Area 3B fishery were combined with 0 to 25 ft. vessels.

Appendix I.

Table 4b. Number of vessels and catch (thousands of pounds, net weight) of Pacific halibut by vessel length class in the 2005 commercial fishery for Area 2A commercial fisheries not including the treaty Indian commercial fishery.

	Area 2A Directed Commercial	
Overall Vessel Length	**No. of Vessels**	**Catch (000's lbs.)**
Unk. Length[1]	-	-
0 to 25 ft.[1]	5	4.8
26 to 30 ft.	3	0.8
31 to 35 ft.	3	0.7
36 to 40 ft.	17	19.0
41 to 45 ft.	17	33.0
46 to 50 ft.	16	41.6
51 to 55 ft.	8	18.7
56 + ft.	14	129.4
Total	83	248.0

	Area 2A Incidental Commercial (Salmon)		Area 2A Incidental Commercial (Sablefish)	
Overall Vessel Length	**No. of Vessels**	**Catch (000's lbs.)**	**No. of Vessels**	**Catch (000's lbs.)**
Unk. Length	0	0.0	0	0.0
0 to 25 ft.	11	2.4	0	0.0
26 to 30 ft.	16	2.4	0	0.0
31 to 35 ft.	19	1.4	0	0.0
36 to 40 ft.[2]	40	4.5	-	-
41 to 45 ft.[2]	38	20.8	10	19.2
46 to 50 ft.	33	8.8	5	10.4
51 to 55 ft.	9	1.0	0	0.0
56 + ft.	3	0.5	12	38.5
Total	169	41.8	27	68.1

For confidentiality reasons:
[1]Vessels of unkown length in the 2A Directed Commercial fishery were combined with 0 to 25 ft. vessels.
[2]Vessels 36 to 40 ft. in the Incidental Comercial (Sablefish) fishery were combined with 41 to 45 ft vessels.

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 2005 Pacific halibut commercial fishery.

Area	Fishing Period	No. of Days	Catch Limit	Catch		
				Commercial	Research	Total
2A treaty Indian	2/27 – 7/30	154				
	Restricted: 3/21 – 4/30; 5/4-5/24; 5/31-6/6	65				
treaty Indian total			452.5	445		445
2A Commercial Incidental in Salmon fishery	May 1 – August 7	99	39.9	42		42
Incidental in Sablefish fishery	May 1 – Oct 23	176	70.0	68		68
Directed	June 29[1]	10-hrs		82		
	July 13[1]	"		65		
	July27[1]	"		36		
	August 10[1]	"	226.2	49		
Commercial total				232	16	248
2A Total			**788.6**	**787**	**16**	**803**
2B	2/27 – 11/15	261	11,658[2]	12,248[3]	83	12,331
2C	2/27 – 11/15	261	10,930[4]	10,489[5]	136	10,625
3A	2/27 – 11/15	261	25,470[4]	25,228	805	26,033
3B	2/27 – 11/15	261	13,150[4]	12,874	297	13,171
4A	2/27 – 11/15	261	3,440[4]	3,329	75	3,404
4B	2/27 – 11/15	261	2,260[4]	1,923	52	1,975
4C	2/27 – 11/15	261	1,815[4]	534[6]		534
4D	2/27 – 11/15	261	1,815[4]	2,556[6,7]	22	2,578
4E	2/27 – 11/15	261	359	369[7]		369
Alaska Total			59,239	57,302	1,387	58,689
Total			71,685.6	70,337	1,486	71,823

[1] Fishing period limits by vessel class.
[2] Additional 882,000 pounds available as carryover from 2004.
[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 = 267; 3A = 250; 3B = 192; 4A = 55; 4B = 31; 4C = 51 and for 4D a negative balance of 25.
[5] Includes 44,982 pounds taken by Metlakatla Indians during additional fishing within reservation waters.
[6] Area 4C CDQ and IFQ can be fished in Area 4D as of July 22, 2005.
[7] Area 4D CDQ can be fished in Area 4E since 2002.

Appendix I.

Table 6. Commercial landings (thousands of pounds, net weight) of Pacific halibut by port, country of origin and IPHC research catch for 2005.

Port Region	Canada	United States	IPHC Research	Grand Total
CA & OR	-	259	16	275
Seattle	-	104	-	104
Bellingham	-	1,355	-	1,355
Misc. Washington	-	514	-	514
Vancouver	823	-	-	823
Port Hardy	5,054	-	36	5,090
Misc. Southern BC	810	-	8	818
Prince Rupert & Port Ed.	4,686	-	65	4,751
Misc. Northern BC	875	-	-	875
Ketchikan, Craig, Metlakatla	-	775	47	822
Petersburg, Kake	-	3,405	-	3,405
Juneau	-	3,694	32	3,726
Sitka	-	3,742	48	3,790
Hoonah, Excursion, Pelican	-	1,412	-	1,412
Misc. Southeast AK	-	1,217	-	1,217
Cordova	-	1,560	-	1,560
Seward	-	5,700	233	5,933
Homer	-	10,725	99	10,824
Kenai	-	185	-	185
Kodiak	-	8,119	446	8,565
Misc. Central AK	-	7,070	290	7,360
Akutan & Dutch Harbor	-	5,425	130	5,555
Bering Sea	-	2,828	36	2,864
Grand Total	**12,248**	**58,089**	**1,486**	**71,823**

Appendix I.

Table 7. Commercial halibut fishery catch (thousands of pounds, net weight) in 2005 by country, statistical area, and regulatory area.

Stat Area Group	Catch			Regulatory Area	Catch for Reg. Area
	Commercial	Research	Total		
00-03	190	4	194	2A	803
04	155	1	156		
05	442	11	453		
06	559	7	566	2B	12,331
07	279	3	282		
08	473	3	476		
09 - I	470	8	478		
09 - O	304	6	310		
10 - I	1,795	19	1,814		
10 - O	1,303	1	1,304		
11 - I	1,974	19	1,993		
11 - O	398	-	398		
12 - I	353	3	356		
12 - O	154	-	154		
13 - I	3,359	9	3,368		
13 - O	827	5	832		
14 - I	335	19	354	2C	10,625
14 - O	152	16	168		
15 - I	1,100	16	1,116		
15 - O	780	30	810		
16 - I	2,390	11	2,401		
16 - O	1,785	18	1,803		
17 - I	811	5	816		
17 - O	727	9	736		
18S - I	1,287	7	1,294		
18S - O	1,122	5	1,127		
18W	1,599	8	1,607	3A	26,033
19	1,136	23	1,159		
20	1,450	26	1,476		
21	1,044	21	1,065		
22	1,142	14	1,156		
23	1,044	18	1,062		
24	4,469	57	4,526		
25	3,663	150	3,813		
26	4,359	229	4,588		
27	3,272	139	3,411		
28	2,050	120	2,170		

Appendix I.

Table 7. continued

29	4,629	61	4,690	3B	13,171
30	2,501	103	2,604		
31	1,724	47	1,771		
32	2,171	28	2,199		
33	1,137	33	1,170		
34	712	25	737		
35	377	17	394	4	8,860
36	669	5	674		
37	78	7	85		
38	395	11	406		
39	54	3	57		
40	561	2	563		
41	69	3	72		
42+	427	29	456		
Bering Sea	6,081	72	6,153		
Grand Total	**70,337**	**1,486**	**71,823**		**71,823**

Appendix II.

Table 1. The fishing period limits (net weight) by vessel class used in the 2005 directed commercial fishery in Area 2A.

Vessel Class		Fishing Periods (pounds)			
Letter	Feet	June 29	July 13	July 27	August 10
A	0-25	755	755	670	335
B	26-30	945	945	840	420
C	31-35	1,510	1,510	1,345	670
D	36-40	4,165	4,165	3,705	1,850
E	41-45	4,480	4,480	3,985	1,990
F	46-50	5,365	5,365	4,770	2,385
G	51-55	5,985	5,985	5,320	2,660
H	56+	9,000	9,000	8,000	4,000

Table 2. Metlakatla community fishing periods, number of vessels, and halibut catch (net weight), 2005.

Fishing Period Dates	Number of Vessels	Catch (Pounds)
April 30 – May 1	4	1,250
May 14 – 16	10	3,472
May 28 – 30	14	6,950
June 10 – 12[1]	18	8,470
June 24 – 26	14	7,791
July 8 – 10	11	4,978
July 22 – 24	7	2,688
August 5 – 7	8	3,113
August 19 – 21	8	2,511
September 2 – 4	7	2,541
September 16 – 18	3	1,218
11 Fishing Periods		44,982

[1] Includes incidental troll catch.

Appendix III.

Table 1. Fishing dates, opportunity, size limits, and bag limits for the 2005 Pacific halibut sport fishery.

Area	Fishing dates	Fishing days	Days open	Size limit	Bag limit
2A					
WA Inside Waters (east of Low Point)	April 16-June 20	50	5 (Thur-Mon)	None	1
WA Inside Waters (Low Point to Sekiu River)	May 26-July 31	49	5 (Thur-Mon)	None	1
WA North Coast (Sekiu River to Queets River)	May 10-14	5	5 (Tues-Sat)	None	1
	May 17-18	2	(Tues-Sat)	None	1
	June 16, 18	2	(Thur, Sat)	None	1
WA South Coast (all depths; Queets River to Leadbetter Point)	May 1-30	22	5 (Sun-Thur)	None	
South Coast (nearshore fishery)	July 15-Sept 30	23	2(Fri-Sat)	None	1
Columbia River (Leadbetter Point to Cape Falcon)	May 1-June 12	43	7	None	1
	Sept 15-30	16	7	None	1
OR Central Coast (Spring, all depths; Cape Falcon to Humbug Mt.)	May 12-21	6	3 (Th-Sat)	None	1
	June 2-30	7	3 (Th-Sat)	None	1
	July 1-30	8	3 (Th-Sat)	None	1
OR Central Coast (Summer/Fall, all depths; Cape Falcon to Humbug Mt.)	August 5-28	12	3 (Fri-Sun)	None	1
	Sept 2-30	13	3 (Fri-Sun)	None	1
	Oct 1-30	14	3 (Fri-Sun)	None	1
OR Coast (<40 fathoms; Cape Falcon to Humbug Mtn.)	May 1-Oct 17	170	7	None	1
OR/CA (south of Humbug Mt.)	May 1-Oct 31	194	7	None	1
2B, 2C, 3 and 4	Feb 1-Dec 31	335	7	None	2

Appendix III.

Table 2. 2005 catch limits and harvest estimates (in pounds, net weight) by subarea within Regulatory Area 2A.

Subarea	Catch limit	Harvest estimate	Over/under
WA Inside Waters	64,800	62,370	2,430
WA North Coast	115,437	108,149	-7,288
WA South Coast	50,146	54,377	+4,231
Nearshore Fishery	N/A	1,000	+1,000
Columbia River	13,747	15,031	+1,284
OR Central Coast (all depths)	173,372	165,238	-8,134
OR Coast	57,791	64,293	+6,502
OR Coast (<40 fathoms)	20,101	5,450	-14,651
OR/CA (south of Humbug Mt.)	7,984	7,984	0

Table 3. Estimated harvest by sport fishers (millions of pounds, net weight) by IPHC regulatory area, 1977-2005.

Year	Area 2A	Area 2B	Area 2C	Area 3A	Area 3B	Area 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	4.202	0.013	0.048	8.011
2003	0.404	1.218	2.258	5.427	0.009	0.031	9.348
2004	0.487	1.613	2.937	5.606	0.007	0.053	10.703
2005[1]	0.484	1.456	2.544	5.437	0.006	0.037	9.963

[1] Only Area 2A is current; all other areas are projected harvests.

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 2005 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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Pop-up Archival Transmitting tag research and reward information

The International Pacific Halibut Commission (IPHC) has tagged halibut throughout the northeast Pacific Ocean, using Pop-up Archival Transmitting (PAT) tags. A total of 96 tags were at large as of Fall, 2006. These tags are unique in appearance (see below): the body of the tag is shaped like a microphone approximately 6½ inches (17 centimeters) long, and attaches to the fish by a seven inch (18 centimeter) leader, secured by a titanium dart embedded below the dorsal fin.

Electronic satellite tags record the temperature and depth experienced by the fish. The tags are programmed to release from the fish on a pre-determined date, float to the surface, and emit a satellite signal that indicates their position and transmits data to a land-based facility. The result is a record of the fish's final location and environmental data during the time at liberty. The leader remains on the fish after the tag body has released, serving as a conventional "spaghetti" tag. Both tag bodies and leaders bear information directing fishers to return them to the IPHC.

Rewards are offered for all returned PAT tags and leaders. A **$500** reward will be given for the return of each satellite tag body. An IPHC tagging program baseball cap (or $5) will be offered for returning catch information and the leader from any halibut that no longer carries the tag body. Any vessel that does not hold halibut IFQ can land and retain a PAT-tagged fish, as long as the halibut with the tag leader still attached is reported to IPHC at landing. In addition, fishers who hold IFQ should be aware that **the weight of PAT-tagged fish should NOT be deducted from the fisher's halibut IFQ**. The presence of the dart may prompt the buyer to "#2" the fish, but the fisher may sell it without quota penalty, provided that the fisher possesses halibut IFQ.

PAT tag recovery information

When you catch a satellite-tagged halibut:

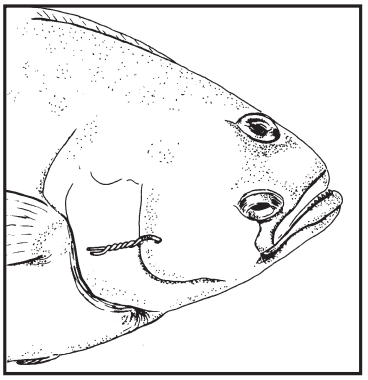
1. Record the date, capture location, sex, and the fork-length of the halibut.
2. Ideally, otoliths (earbones) from the fish should be removed in order to determine its age. If the fish is being landed at a port staffed by an IPHC port sampler, please present the fish to the port sampler during offload so that the otoliths can be removed. The IPHC has port samplers at the following ports during the commercial halibut fishing season: Newport, OR; Bellingham, WA; Vancouver, Port Hardy, and Prince Rupert, BC; Petersburg, Sitka, Juneau, Seward, Homer, Kodiak, Dutch Harbor, Adak, and Saint Paul, AK.
3. *If you do not possess halibut IFQ:* If the fish carries a tag body, remove the tag by cutting the leader about 1½" (4 cm) below the point at which the leader attaches to the tag body; **do not pull on the tag**. Retain the tag body so it may be turned in. Do not remove the leader from the fish until after it has been landed and reported to IPHC. Leave the leader attached to the fish and report the capture at time of landing to IPHC at **(206) 634-1838** or to an **IPHC port sampler.**
4. *If you possess halibut IFQ:* Remove the tag by removing the metal dart from the halibut's flesh or by cutting the nylon leader at skin-level; **do not pull on the tag**. Removing the entire metal dart is preferred, since the dart should not remain in the fish when it is processed.
5. Retain the tag and/or leader, and contact the IPHC at **(206) 634-1838**. Or, turn in the tag and information (and fish, if possible) to an **IPHC Port Sampler**.

The PAT tags are used to study seasonal migrations and to learn more about the physical conditions that fish typically experience during the tagging period. In particular, the Commission is examining the location of Bering Sea spawning grounds, and the timing of seasonal migration in British Columbia and the US Pacific Northwest.

For further information, please contact Dr. Tim Loher at (206) 634-1838 (ext. 212), or via email at tim@iphc.washington.edu.

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, the usual reward of one hat or $5 will apply.