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INTERNATIONAL PACIFIC HALIBUT COMMISSION

Annual Report
2007

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

This report produced by IPHC staff
and Jim Hale
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International Pacific Halibut Commission
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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.

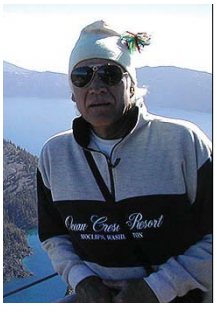
The IPHC publishes three serial publications: Annual Reports (U.S. ISSN 0074-7238), Scientific Reports—formerly known as Reports— (U.S. ISSN 0074-7246) and Technical Reports (U.S. ISSN 0579-3920). Until 1969, only the Report series was published; the numbers of that series have been continued with the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

Jim Hale of Juneau, co-writer of this report, is a technical editor for the National Marine Fisheries Service/Alaska Region, where he has worked since 1995. A former professor of English literature, Mr. Hale also conducts technical writing workshops around Alaska and the Pacific Northwest.

On the Cover

Pacific Northwest marine artist Philip J. Skochilich was born and raised in Washington State, becoming an avid fisherman, outdoorsman and skilled woodworker. To create full size hand carved marine art, Phil collects hardwood logs that have been harvested from the Pacific Coast in Washington and Oregon. He cuts no trees, relying on hardwood timber that was removed for other reasons. His natural outdoor studio includes a full scale sawmill enabling him to produce hardwood carving blanks to his extraordinary specifications. Through his passion for the hardwoods he has accumulated a woodyard of various exotic woods including the Western large leaf Maple, Black Walnut, Cherry and a small stock of Pacific Northwest Red Cedar. He only works in the Red Cedar by request, as he has great respect for the Pacific Northwest Native Americans who hold carvings, in this medium, to be a heritage.



"The creations are there, in the log, I just have to pull them out."

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Thank You!

The Commissioners and Staff wish to thank all the agencies, industry, and individuals who helped us in our scientific investigations this year. A special thanks goes to:

- The Gulf of Alaska and Bering Sea NMFS/RACE division groups in Seattle for saving us a spot on their surveys;
- Jane DiCosimo (NPFMC), Jay Ginter (NMFS), and Scott Meyer (ADF&G) for their welcome assistance in dealing with sport fish management issues;
- Dr. Robert Gerlach of ADEC;
- Andy Seitz of University of Alaska, Fairbanks;
- Carol Henry of WDFW for rockfish sampling;
- Steve Kupillas of ODFW for rockfish sampling;
- WDFW and ODFW for scanning of sport caught fish in Washington and Oregon;
- Makah and Quinault samplers for scan sampling in Area 2A tribal fisheries.

Activities of the Commission

In the mid-1880s, the Northern Pacific and Canadian Pacific Railways completed the first transcontinental railroads to connect Seattle and Vancouver with the eastern cities of the United States and Canada. It was this opening of trade routes to markets in the east that, in 1888, gave rise to the commercial Pacific halibut fishery. From a small beginning off Cape Flattery and the southern end of Vancouver Island, the fishery rapidly expanded in sheltered waters and by 1910 covered some seven hundred miles northward to Cape Spencer in southeastern Alaska. By the late 1920s, the fishery ranged into offshore waters throughout the known range of Pacific halibut along the North American coast—a distance of more than two thousand miles from northern California to the Bering Sea.

By 1910, the commercial halibut fishery extended from Cape Flattery to Cape Spencer in Southeast Alaska.

In a relatively short time, however, the fledgling halibut fishery began to suffer the classic problems of an unrestricted and unregulated fishery: localized depletion, increased fishing pressure, overcapitalization. Soon, the fishery became caught in a downward spiral of increasing fishing effort and decreasing stocks.

With a sharp decline in the abundance of halibut on the older banks, annual landings after 1915 declined in spite of increased fishing and the exploitation of new fishing grounds. Even so, initial calls for regulating the fishery—by imposing a winter closure—were not prompted by the need for conservation, but to prevent a crisis in overproduction: a winter closure would allow time for the

Vintage photograph (date unknown) of the Seattle longline fleet tied up at Fisherman's Terminal in Seattle. IPHC photo archive.

sale of each year's accumulating stock of frozen halibut. But as the abundance of stocks on the newer fishing grounds also began to show signs of decline, the need for conservation became more imperative.

At increasingly urgent requests from industry and the general public, Canada and the U.S. signed the first treaty for conservation of the halibut fishery in 1923—the first treaty concluded anywhere for the conservation of a deep sea fishery. Out of that Convention of 1923, what is now known as the IPHC was created to investigate the decline of the Pacific halibut fishery and, at first, to simply make recommendations for its conservation and development. The Commission's initial scientific investigations revealed a fishery in a very unsound condition, with landings being maintained only by constant increases in the intensity of fishing. The abundance of halibut had declined greatly on all grounds—critically so on the long-fished grounds off British Columbia and southeastern Alaska—and continued to decline in spite of the closed season. These findings led to the revised Conventions of 1930 and 1937, which granted the Commission broad authority to regulate the fishery.

With no clear model before them for successfully restoring a fishery in decline, the IPHC set out one step at a time to carefully develop management actions and regulations that were grounded in known biological and economic conditions, relying on observation and science at each step of the way.

Issuing directly from the Commission's investigations then, the regulations succeeded in halting the decline of the fishery, increasing the abundance of the stocks, and improving conditions for halibut fishers. By 1948, the Commission was able to permit an annual catch of 56 million pounds, 13 million pounds more than the last annual harvest under an unregulated, unrestricted fishery—and with a third less fishing effort. Consequently, the Commission was able to announce that the Pacific halibut stocks were again healthy, but cautioned that "much more remains to be done" to achieve the Commission's goal of a stable, sustainable fishery.

Since that time, the fishery has changed greatly. More comprehensive observations of catch and bycatch, more efficient management systems such as individual quota programs, and the advent of new technology bring the promise of continued advances in conservation and management. But the IPHC's guiding assumptions remain unchanged: management must be driven always by observation, investigation, and conservation.

The job of maintaining a stable, sustainable fishery is a continuing challenge.

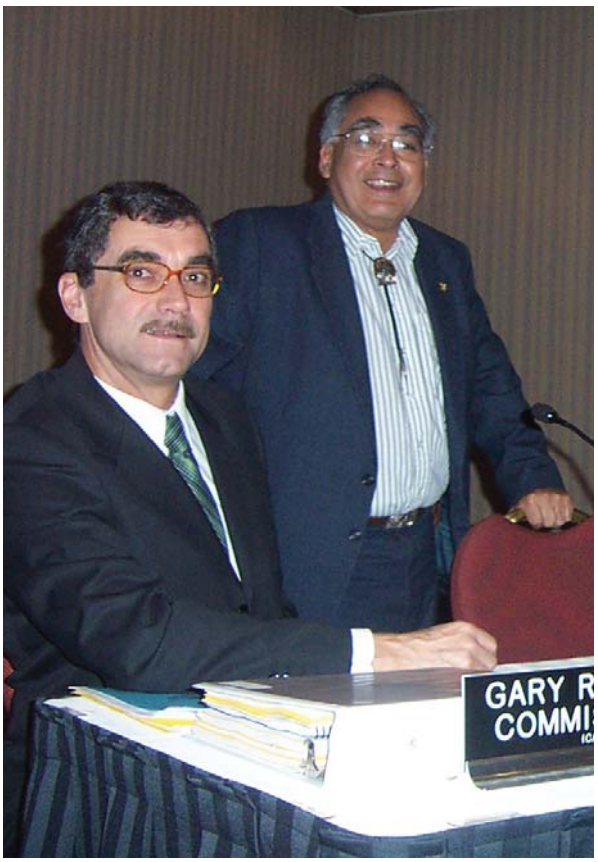
Or if those assumptions have changed at all since 1948, when Commissioners seemed optimistic of achieving their goal, the change lies in the realization that, in fact, the work of conservation is never done. Maintaining a stable, sustainable fishery will always present a continuing challenge to understand the biology of halibut more comprehensively, to count removals from the stocks more completely, and to thus manage the fishery more wisely.

With this publication, the Commission issues its 60th Annual Report. And once again we try to answer those ongoing questions: How's the health of the stock? How did the fishing go last year? What new information have we gathered from research?

The news has not always been good, but the fishery has, in the main, flourished. And the Commission stands ready and eager to take on the challenges that lie ahead.

Opening the 2007 fishing year

With Dr. Laura J. Richards presiding as the Commission's chair, the IPHC convened its eighty-third Annual Meeting from January 16 through 19, 2007 at the Delta Ocean Pointe Resort in Victoria, B.C. As always, we started off the halibut fishing year by setting the catch limits, establishing the opening and closing dates for the upcoming fishing seasons, adopting the year's regulations, receiving reports from the IPHC staff, and hearing comments and proposals from the public.



Commissioners Gary Robinson (left) and Cliff Atleo (right) at the 2007 Annual Meeting. Photo by Rhonda Miller.

The 2007 catch limit decreased 6.7 percent from 2006 to 65.17 million pounds coastwide.

How many fish? How much time? Catch limits and season dates

For 2007, the Commission set an overall catch limit of 65,170,000 pounds, a 6.7 percent decrease from the 2006 catch limit of 69,860,000 pounds and the fourth year in the row that the Commission has taken precautionary actions to lower the catch limit.

In the Commission's discussions on season length, industry recommended possible opening dates of March 4, 10, or 25. The U.S. members of the Conference Board recommended a season opening of March 4, while Canadian members of the Conference Board recommended March 25. This was the second year this unusual situation arose, as the Conference Board usually presents a united recommendation for the opening date. The Processor Advisory Group offered a third recommended opening date of March 10, which recommendation the Commission ultimately accepted. Thus, the Canadian Individual Vessel Quota (IVQ) fishery in Area 2B and the United States Individual Fishing Quota (IFQ) and Community Development Quota (CDQ) fisheries in Areas 2C, 3A, 3B, 4A, 4B, 4C, 4D, and 4E all commenced at 12 noon local time on March 10 and closed at 12 noon local time on November 15. The treaty Indian commercial fishery in Area 2A also took place during the period from March 10 to November 15.

Other issues before the Commission

Changes in the 2007 regulations

A regulation was adopted that allowed halibut retention in sablefish trap gear during the IQ season.

The Commission approved regulations to change the California sport fishery possession limit as part of the catch sharing plan. The sport fishery possession limit on land and on the water in California was one daily bag limit. For Area 2B, the Commission adopted a regulation to allow the retention of halibut in sablefish trap gear during the halibut IQ season, provided that harvesters held halibut quota shares for the mortality and retention of halibut. This was passed to assist the Canadian Department of Fisheries and Oceans (DFO) with the Integrated Groundfish Fisheries Plan, which is a three-year pilot program. However, after the Commission passed this regulation, DFO recognized that they had not changed an internal DFO regulation, so retention of halibut in the sablefish trap fishery did not occur in 2007. The regulation will be reviewed at the 2009 IPHC Annual Meeting to determine if retention of halibut in sablefish traps should continue to be allowed.

Cal Blood staffs the information booth at the Annual Meeting. Photo by Rhonda Miller.

For Alaska, the Commission agreed to revise the regulation which prohibits the processing or mutilation of sport caught halibut that prevents the determination of the minimum size or number of fish. The regulation change limits the application to on board the catcher vessels only, so that halibut may be subsequently cut up as necessary off of the vessel.

The Commission agreed to change the recording date from December 1 to November 1 for the CDQ managers to report the amount of sublegal-sized halibut retained in Area 4E and 4D CDQ fisheries. IPHC regulations require that halibut caught in the commercial fishery that are not retained shall be immediately released outboard of the roller and returned to the sea with minimum of injury. The Commission agreed to revise the regulation to allow halibut to be measured on board the vessel to determine if they meet the legal-size limit and to then be returned to the sea with minimal injury.

As it has in past years, the Canadian government chose not to approve the Commission's requirement that commercially-caught halibut have their gills and entrails removed before being offloaded from a vessel and, instead, to allow the landing of live halibut caught in British Columbia waters.

With the support of its advisory bodies, the Commission passed a regulation to reduce the halibut bag limit from two fish to one for sport guided charter fishing in Area 2C from June 15 to July 31, and for Area 3A from June 15 to 30.

The IPHC has used bag limits to regulate the sport fishery since 1973, when the Commission first adopted sport halibut rules. The bag limit has been reduced to one fish per day only once before during this period, in 1974. But the situation in Alaska seemed to call for such a reduction once again.

In recent years, the guided (or charter) sport fishery in Alaska has substantially exceeded the Guideline Harvest Levels (GHLs) by which the North Pacific Fishery Management Council (NPFMC) manages charter fishery harvests in Areas 2C and 3A. Prior to the Annual Meeting, the Commission staff initiated dialogue with the NPFMC to determine what control measures would be enacted by the Council to constrain harvest to the GHLs in 2007. The NPFMC indicated that, although it is committed to management of this fishery to the GHL limits, it would not be able to complete analyses and develop a regulatory framework to effect control of this fishery until 2008. For this reason, the Commission approved the proposed bag limit reduction.

Dr. Ray Webster presents the results of the PIT tag research at the public meeting. Photo by Robert Tobin.

The United States government chose not to adopt the regulation. Instead, it decided to adopt regulations through its domestic procedures that would reduce halibut mortality in Area 2C. NMFS thus restricted the bag limit on sport charter vessels to two halibut per day in Area 2C with the requirement that at least one of the two fish be no more than 32 inches long. Additionally, the Alaska Department of Fish and Game (ADF&G) prohibited retention of halibut by charter skippers and crew in both Areas 2C and 3A. The goal of both the NMFS action and the ADF&G action was to reduce the harvest to the GHL with minimal impact on the sport charter fishery.

The U.S. government chose not to adopt the Commission regulation which would lower the daily bag limit for some sport harvesters. However, domestic regulations were put into place to achieve a similar reduction in catch.

Coastwide stock assessment

The Commission spent considerable time discussing migration, coastwide stock assessment versus closed-area stock assessment, and apportionment among regulatory areas. The Conference Board and the Commission recommended a workshop be held to allow the industry and agencies to better understand the coastwide stock assessment model. The Commission staff was tasked with

determining the best method for the workshop and review, in consultation with the respective agencies.

The Commission agreed to hold a public workshop regarding the coastwide stock assessment.

Hook straightening

In addition, the Conference Board requested a report on the effects of hook straightening and careful release in relation to halibut viability. The Commission staff agreed to complete a report prior to the next Annual Meeting. The Commission will continue its research in Areas 4B and 4CDE, which was also highlighted by the Conference Board.

DIRECTOR'S REPORT

The year started off with some major events concerning both stock assessment and stock management, the effects of which persisted well into the year. The first issue concerned how the staff proposed to assess the stock and recommend catch limits for each Regulatory Area. The second concerned the Commission's response to the inability of the two contracting parties to manage sport fisheries to the limits agreed upon in their internal allocation processes.

Results of the Commission's multi-year PIT tag and recapture experiment have indicated that movement of halibut among Regulatory Areas is far too extensive and continuous to support an assessment approach that assumes such movement is negligible. Our traditional closed-area stock assessment had made this assumption. In 2006, the staff addressed this issue by conducting the stock assessment on a coastwide basis, rather than by individual Regulatory Areas. The resulting coastwide estimate of exploitable biomass was apportioned into Regulatory Area biomass using data from the annual IPHC setline survey and estimated bottom area in each Regulatory Area. This was a significant shift in approach and neither the industry nor the Commission was entirely happy with switching to a new methodology without additional discussion. Accordingly, the Commission reverted to the previous closed-area assessment approach to derive the catch limits for 2007. Recognizing the evident problems with this method, the Commission also directed the staff to conduct a workshop to more fully examine the coastwide assessment approach with industry and agency staffs. The staff had previously planned on having an external peer scientific review of the assessment so the workshop and the peer review were combined. The workshop was well attended and allowed a great deal of free-flowing discussion. The peer review endorsed the staff's conclusion that continuation of the closed-area assessment was inappropriate and recommended either a coastwide assessment or one that included detailed rates of migration among areas. However, given that the assumed migration rates are likely to vary by size and age of fish, year, and density of halibut, and be highly influential in such an assessment approach, it is unlikely that they will ever be known with accuracy sufficient for use in an assessment model. Consequently, the staff adopted the approach of a coastwide assessment for 2007 and this was accepted

Bruce Leaman climbs aboard a vessel on a cold March day in Sitka, Alaska. Photo by Lara Hutton.

by the Commission and the industry. The methodology for apportionment of the coastwide biomass was slated for further discussion at a 2008 workshop.

Management of sport fisheries has proved problematic for both the United States and Canada. In Alaskan waters, GHLs for charter halibut fisheries in IPHC Area 2C (southeast Alaska) had been regularly exceeded by 20-40% during the 2004-2006 period. In Canada, the share of halibut yield for the recreational fishery also exceeded the allocated share by 30-40% in 2005 and 2006. In consequence, the Commission's management targets were exceeded during these years resulting in harvests greater than those approved. The Commission initiated discussions with management agencies in the two countries prior to the Commission's annual meeting in January 2007, to determine if regulations to curtail these sport fisheries were to be enacted for 2007. Both countries indicated that, while appropriate regulations were being developed, they would not be in place for the 2007 fishing season. Accordingly, the Commission approved regulations to limit sport fisheries for halibut in the two countries for 2007. This action, while within the Commission's authority and mandate, proved highly controversial to say the least. Neither country accepted the sport fish regulations passed by the Commission but the United States did specify that it would implement domestic regulations that would achieve catch reductions for Area 2C fisheries similar to those contemplated in the IPHC regulations. Canada also pledged to meet the targets specified in its allocation agreement between commercial and recreational sectors.

The Commission staff acted on the basis of conservation concerning both of these issues. The IPHC Commissioners exercised judicious oversight in both instances, to ensure that the sustainable yield from the halibut stock would be protected and that users had opportunity to explore the topics. These were not simple issues to resolve and they could not have been addressed adequately without the participation and assistance of industry and agency staffs.

The halibut stock is undergoing a decline from very high biomass levels that were fuelled by strong year classes of the late 1980s. In addition, recent research has prompted us to alter our approach to determining catch limits. These changes were substantial and required time for all of us to fully understand both the need for the changes and their impacts. While we anticipate that incoming recruitment will have some positive impacts over the mid-term future, these impacts are several years away. It will also be important to reduce the high levels of exploitation experienced in Area 2 in recent years, if we are to realize the benefits of this recruitment in that Area.

Bruce M. Leaman
Executive Director

2007 Commercial Fishery

I thought, as I have my living to get, and have not eaten to-day, that I might go a-fishing. That`s the true industry for poets. It is the only trade I have learned.

--Henry David Thoreau

When the eyes of young halibut wander, they really wander. When a halibut is first born, the fish's eyes are on separate sides of its head, and the halibut swims upright as most other fish do. But then, obeying the biological commands of its nature, the young fish undergoes a transformation. Over the course of the fish's first year, the eye on its left side migrates—wanders, if you will—over to the right side. Then the halibut begins swimming on its side and takes its place as a member of the family Pleuronectidae (the biological term for "side-swimmers").

And that's when the fish becomes identifiable as the Pacific halibut we all know and love—love to eat, that is.

Halibut offload in Sitka, Alaska. Photo by Lara Hutton.

In 2007 commercial halibut fishers requited that love with harvests that, although still at historically high levels, were down from catches over the last few years. The commercial halibut fisheries caught an overall total of 61,979,000 pounds, down from the previous year's catch of 66,989,000 pounds and reflecting decreased catches across all areas, with the exceptions of Area 3A and Areas 4CDE.

The ex-vessel price in 2007 averaged over $4.00 per pound coastwide.

And once again, fishers and processors and others in the halibut industry were rewarded with good prices. Fishers received an average ex-vessel price of over $4.00 (USD) a pound in 2007, with some prices reaching $5.50 a pound late in the 2007 season.

Regulatory areas for 2007

Regulatory areas remained unchanged from previous years.

Boundary lines for the commercial halibut fishery have remained unchanged since 1990 (Fig. 1). The southeastern flats in the Bering Sea, excluding Bristol Bay, remained closed in 2007 to all halibut fishing. At present, the Commission's regulatory areas are as follows:

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

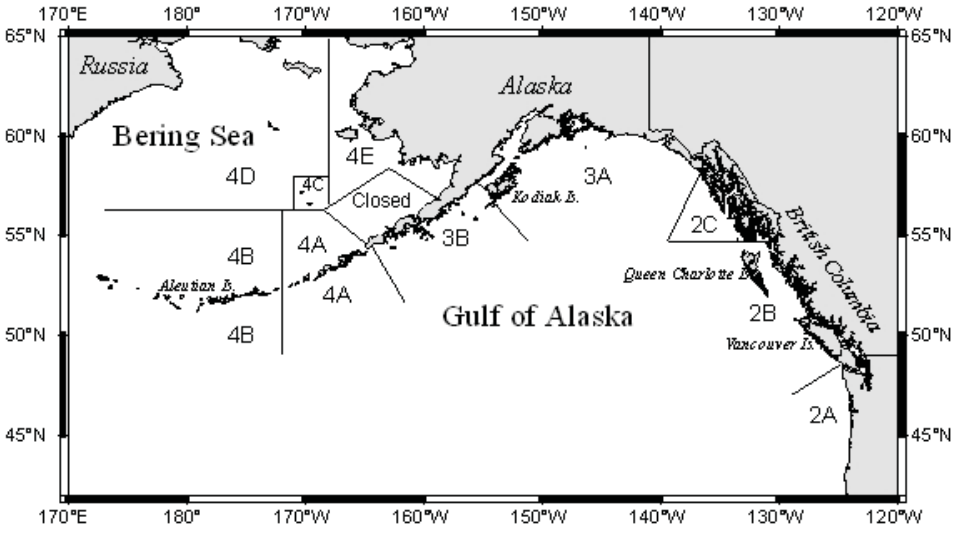


Figure 1. IPHC regulatory areas for the 2007 commercial fishery.

Season dates

The Canadian IVQ fishery in Area 2B, and the United States IFQ and CDQ fisheries in Areas 2C, 3A, 3B, 4A, 4B, 4C, 4D, and 4E commenced at 12 noon local time on March 10 and closed at 12 noon local time on November 15. All Area 2A commercial fisheries, including the treaty Indian commercial fishery, took place also between March 10 and November 15.

The non-treaty directed commercial fishery in Area 2A had seven 10-hour fishing periods scheduled, beginning at 8:00 a.m. and closing at 6:00 p.m. local time, on June 27, July 11, July 25, August 8, August 22, September 5, and September 19, 2007. Catches were monitored after each fishing period, and when the catch reached the catch limit the fishery was closed.

There were seven non-treaty directed fishing periods scheduled in Area 2A for 2007. The catch limit was taken in four openings and subsequently closed.

Catch limits

The Commission adopts biologically-based catch limits for all individual regulatory areas and for Areas 4CDE combined. The individual catch limits adopted for Regulatory Areas 4C, 4D, and 4E in Alaska are determined by the catch sharing plan implemented by the NPFMC. This catch sharing plan and IPHC regulations allow Area 4D CDQ to be harvested in Area 4E and Area 4C IFQ and CDQ to be fished in Areas 4C or 4D.

In Area 2A, the Pacific Fishery Management Council (PFMC) allocates halibut catch limits among user groups through a catch sharing plan, also. In 2000, the U.S. Federal courts ordered an adjustment in the halibut allocations for the years 2000 through 2007. Therefore 25,000 pounds of catch limit was transferred from non-tribal to tribal fisheries in 2007, after applying the allocation percent by tribal (35 percent) and non-tribal (65 percent) fisheries.

A detailed accounting of catch and catch limits can be found in Appendix I of this report.

Allocation issues

The IPHC does not determine allocations for the various user groups, but leaves that responsibility to the governments of Canada and the United States. Both governments are currently working on allocation plans by regulatory area or smaller local areas.

In British Columbia (Area 2B), the DFO has adopted an allocation framework for the commercial and recreational sectors of the halibut fishery, where the recreational sector is allocated a 12 percent “ceiling” of the combined commercial/recreational harvest. When managed to the allocation ceilings, both sectors’ catch will fluctuate with stock abundance. The Commission adopted a combined Area 2B catch limit of 11.47 million pounds for the recreational and commercial fisheries. An additional 35,000 pounds was added for the projected commercial fishery wastage, resulting in a total catch limit of 11.505 million pounds. DFO then allocated to the commercial fleet 88 percent of the total catch limit and reduced it by 35,000 pounds to account for the wastage, which resulted in the commercial allocation of 10,089,400 pounds. In 2006, the underage/overage program resulted in a 36,976 pound deficit roll-over to the 2007 catch limit and an adjusted catch limit of 10,052,424 pounds. The remaining 1.381 million pounds of the combined catch limit was allocated to the recreational

sector. The 2007 combined commercial and sport catch of 11.3 million pounds was under the combined 13.2 million pound catch limit.

For Alaska, in 2000 the NPFMC adopted a GHL program for managing the harvest by sport charter vessels in Areas 2C and 3A. The NMFS implemented this program in September, 2003. The GHL program included a provision that the GHL declines by specified increments if halibut abundance declines, but the catch should not increase above the original GHL. In 2007, the GHL in Area 2C was exceeded by about 35 percent and in Area 3A by about 10%.

The PFMC allocates halibut among commercial, tribal, sport, and subsistence users off the U.S. West Coast.

IPHC sampler, Jessica Marx, measures halibut delivered to Homer, Alaska. Photo by Lara Hutton.

The Commission adopts biologically-based catch limits for all individual regulatory areas and for Areas 4CDE combined. IPHC considers Area 4CDE to be one biological unit. A Catch Sharing Plan (CSP) developed by the NPFMC specifies catch limits for Areas 4C, 4D, and 4E. This CSP also allows Area 4D CDQ to be harvested in Area 4E, and Area 4C quota shares to be harvested in Areas 4C or 4D.

The one area where comprehensive user group allocation occurs is off Washington, Oregon, and California (Area 2A). The Commission determines the total allowable catch for all user groups, and the PFMC allocates the harvest among user groups according to a CSP. The Commission annually approves the CSP, which determines the catch limits for the different fisheries. There are three commercial fisheries (directed, incidental with salmon troll, and incidental with limited-entry sablefish longline), a treaty Indian fishery, and two sport divisions (with nine sub-area sport fisheries). The 2007 total catch (1.326 million pounds) for commercial, sport, and treaty Indian users was slightly under the area catch limit.

The fishing season by area

Area 2A

Regulations for Area 2A licensing have remained unchanged since 2000. All fishers have had to choose between a commercial or sport charter vessel license.

Makah tribal biologists take a break from sampling the halibut catch to pose for a picture. Photo by Kirsten MacTavish.

Further, commercial fishers have had to choose between a license either for retaining halibut caught incidentally during the salmon troll fishery or for fishing in the directed commercial halibut fishery (south of Point Chehalis, WA) and/or retaining halibut caught incidentally in the primary sablefish fishery (north of Point Chehalis). The 2007 deadline dates for mailing license applications remained the same as previous years: March 31 for the incidental halibut license for the salmon season, and May 1 (as April 30 was on the weekend) for the license for the directed commercial fishery and halibut incidentally taken during the sablefish fishery.

The total allowable catch for all harvesters in Area 2A was 1.34 million pounds in 2007.

Area 2A was managed to provide a total allowable catch of 1,340,000 pounds for all user groups. The allocation among user groups was recommended to the IPHC by the PFMC, and the IPHC adopted their recommendations. The treaty Indian fishery was allocated 461,000 pounds for their commercial fishery. The PFMC catch sharing plan stated that if the Area 2A total allocation were over 900,000 pounds, the primary limited entry longline sablefish fishery north of Point Chehalis, WA would be allocated part of the Washington sport allocation poundage. Therefore, there was an incidental halibut fishery with a catch limit of 70,000 pounds during this sablefish season. The remaining non-treaty commercial catch limit was 268,182 pounds, with 227,955 pounds allocated to the directed fishery and 40,227 pounds to the incidental catch in the salmon troll fishery. The directed commercial fishery was restricted to waters south of Point Chehalis, WA (46°53’18”N) and the incidental halibut fishery during the sablefish season was restricted to waters north of Point Chehalis, under regulations promulgated by NOAA.

The IPHC licenses sport charter and commercial vessels in Area 2A. In 2007, the Commission issued 659 Area 2A vessel licenses: 292 licenses for the incidental commercial catch of halibut during the salmon troll fishery, 225 for the directed commercial fishery and the incidental halibut during sablefish fishery, and 142 for the sport charter fishery. The number of 2007 sport licenses issued (142) was similar to the number issued in 2006. There was a decrease in number of licenses issued between 2006 and 2007 for the directed commercial/incidental during sablefish fishery (-73) and an increase for the incidental halibut during the

salmon troll season (+68). The change within the commercial fisheries reflects a return to ”normal” salmon troll fisheries in 2007, without the restrictions placed on these same fisheries in 2006 that prompted fishers to try the directed halibut fishery as an option.

In the incidental commercial halibut fishery conducted during the salmon troll season, the allowable incidental catch ratio was one halibut per three chinook (*Oncorhynchus tshawytscha*), plus an “extra” halibut per landing. However, the total number of incidental halibut per vessel per landing could not exceed 35. The 1:3 ratio of halibut to chinook has remained the same since 2000, but had increased over the previous years, from the 1:20 ratio seen in the first year of the program (1995). The incidental commercial halibut fishery during the salmon season opened on May 1 and closed on November 15 when the commercial halibut fishery closed for the year. In August, the incidental salmon troll fishery catch limit was increased by a roll-over amount that was made available from the directed fishery and was estimated, at the time of the fishery closure, to be 3,400 pounds. The halibut catch was 12 percent (5,013 pounds) under the non-expanded catch limit.

Within the amount of 2A halibut allocated to the treaty fishery, the tribes further divide it among specific tribes and groups of tribes.

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 two openings, with H-class vessels receiving 9,000 pounds per opening. The last two fishing periods had relatively low limits, with H-class vessels receiving 4,500 and 3,000 pounds, respectively. The total directed commercial catch was four percent (9,246 pounds) under the catch limit. The remaining catch limit from the directed fishery, estimated at 3,400 pounds at the time of the fishery closure, was made available for harvesting incidental halibut in the salmon troll fishery, as stated in the Catch Sharing Plan. The incidental halibut fishery during the limited entry sablefish season opened May 1 and closed on October 31 with the closure of the sablefish season. The catch was 31 percent (21,498 pounds) under the catch limit of 70,000 pounds. The decrease in the incidental halibut catch was proportional to the decrease observed in sablefish catch during the 2007 season.

Since 2005, the Treaty Indian tribes have agreed upon a management plan that includes allocation levels to tribes or groups of tribes. In the tribal fishery, 75 percent of the commercial catch limit was allocated to specific tribes or tribal groups and was taken between March 10 and July 30. The remaining catch limit (25 percent) was open to all tribes, subject to daily limits of 500 pounds per vessel. The total tribal commercial catch was two percent (10,427 pounds) over the catch limit.

Area 2C Metlakatla fishery

The Metlakatla Indian Community was authorized by the Bureau of Indian Affairs to conduct a commercial halibut fishery within the Annette Islands Reserve which includes the waters within 3,000 feet of the land. Ten 48-hour fishing periods took place between April 27 and September 2, producing a total catch of 39,252 pounds, which was included in the Area 2C commercial catch. The catch was almost five thousand pounds more than last year’s catch of 35,000 pounds. The total catch has varied over time from a high of 126,000 pounds in 1996 to a low of 12,000 pounds in 1998.

The Quota Share fisheries

Area 2B

The IPHC adopted a combined sport and commercial catch limit of 11.47 million pounds for Area 2B that was to be allocated to the user groups by DFO. After adjustments, the total expanded commercial catch limit was 10.052 million pounds. The Area 2B catch of 9,694,000 pounds was within four percent of the catch limit; the catch has generally been closer to the limit, i.e., within 1% for the last several years.

When the initial halibut IVQ program was implemented in 1991, four hundred and thirty-five vessels received IVQs. Each initial IVQ was split into two shares called blocks. Numerous changes have been made since then, including first allowing temporary block transfers (1993) and then permanent block and IVQ transfers (1999). Since 1999, the number of active vessels has varied from year to year, ranging from a high of 257 (in 1999) to a low of 182 (in 2006). 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.

Offloading the *F/V Valiant Lady*. Photo by Kirsten MacTavish.

2007 was the second year of the integrated management plan in British Columbia.

In 2006, DFO implemented a Groundfish Integrated Fisheries Management Plan (Plan) to meet conservation needs, including addressing rockfish conservation concerns and improving catch monitoring. This Plan was developed with consultation by the groundfish industry and others through the Commercial Groundfish Integrated Advisory Committee (CGIAC). A pilot program was developed by a sub-committee of the CGIAC and implemented in 2006. With the implementation of this three-year pilot program, significant changes were made to the longline groundfish fisheries, including the halibut fishery. The pilot fishery

included IQs for all hook and line groundfish fisheries, limited transferability between license holders, 100 percent at-sea and dockside monitoring, and vessel accountability for all catch, both landed and discarded.

A key component of the Plan was the 100 percent monitoring through logbook recordings, at-sea video camera coverage, and dockside coverage. A newly designed logbook allowed the recording of all retained and discarded species and can be used to compare to the video recordings. IPHC will be reviewing how the Plan has affected the halibut fleet dynamics and fishing patterns. Data are not available to report on any changes to fishing patterns, number of active vessels landing halibut, or number of vessels and landings from within the Native Communal Commercial Fishing Program.

Over three thousand people held quota shares this year in Alaska's IFQ fishery.

***F/V Resolute* tied up at the dock in Seward, Alaska. Photo by Lara Hutton.**

Alaska

The IFQ Program for halibut and sablefish fisheries has been in effect in Alaska since 1995. The Restricted Access Management (RAM) division of NMFS 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. In early June 2007, RAM reported that 3,099 persons held quota shares, down from the initial 4,830 persons awarded QS at the start of the program.

The total 2007 catch from the IFQ/CDQ halibut fishery for the waters off Alaska was 51,511,000 pounds, two percent under the catch limit (not adjusted for underage/overage program). In Areas 2C and 3B, the commercial QS catch was within two percent of the catch limit. In Area 3A, the commercial QS catches was within one percent of the catch limit. In Area 4A, the catch was within four percent, and Area 4B's catch was within six percent of the limit. The individual catch limits adopted for Regulatory Areas 4C, 4D, and 4E are determined by the catch sharing plan implemented by the NPFMC. As mentioned previously, this catch sharing 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. These two regulations are the reason why the catch in Area 4D exceeded

the catch limit. The total commercial catch of 3,830,000 pounds was under the combined Area 4CDE catch limit (4,100,000 pounds).

Landing patterns and highlights

As in the past, Homer received over 9,871,000 pounds of halibut, or about 19 percent of the commercial Alaskan catch (51,511,000 pounds). Kodiak and Seward received the second and third largest landing volumes, each moving between 11 percent and 16 percent of the Alaskan commercial catch. In southeast Alaska, Sitka received 3,484,000 pounds, Juneau 2,206,000 pounds, and Petersburg 2,405,000 pounds. Only 2.7 percent of the Alaskan QS catch was landed outside of Alaska.

Homer and Sitka were the top landing ports in Areas 3 and 2C respectively.

Commercial harvests from Area 2B were delivered to 18 different ports in 2007. The ports of Prince Rupert/Port Edward, Port Hardy, and Vancouver were the major landing locations, receiving about 91 percent of the Area 2B commercial catch. Port Hardy and Prince Rupert/Port Edward received about 44 and 40 percent of the B.C. commercial landings, respectively. Several small ports (Bella Bella, French Creek, and Sooke) received fewer than three deliveries each in 2007. Nanaimo received only two landings and Bellingham, WA received five 2B landings in 2007.

The 2007 QS fishery landings were spread over nine months of the year. May was the busiest month for Alaska landings, as it has been for the last seven years, with the month's landings representing 17.0 percent of the total catch for Alaska, the same percentage as in May of 2006. As in 2006, March was the busiest month for landings in British Columbia. In 2007, a total of 20.5 percent of the Area 2B catch was landed in March compared with 19.3 percent during the same month last year. The 2007 average ex-vessel price was likely well over $4.00 (U.S.) per pound, which was greater than in 2006, and some prices reached $5.50 per pound late in the 2007 season.

March was the busiest month for halibut landings in British Columbia.

The landing of live halibut from Area 2B was legally allowed by DFO. Live fish landings have ranged from a low of 7,900 pounds in 1998 to a high of 103,000 pounds in 1999. Live fish landings in 2007 amounted to a total landing weight of 24,191 pounds.

Electronic reporting project for Alaska

IPHC, ADF&G, and National Marine Fisheries Service (NMFS) staffs have implemented a cooperative interagency electronic fishery reporting system for commercial landing records in Alaska. The project included designing a web-based Interagency Electronic Reporting System (IERS) with the repository database in the State Office Building in Juneau. In May 2006, IERS was optional for statewide groundfish landings and IFQ/CDQ halibut and sablefish. For halibut, the system reduces duplicative reporting resulting from the current requirements of completing ADF&G fish tickets and NMFS RAM quota share reports. The software application (eLandings) records data elements required by regulations, prints fish tickets, and connects with the NMFS quota share database. The appropriate data from IERS are then sent to the agencies for their internal databases. The application allows processors to import or export data into their own databases so double entry is not necessary. Data from eLandings were used to determine the 2006 final commercial fishery catch estimates and were available for the entire 2007 fishery.

Age distribution of the commercial halibut catch

The 1995 year class showed strongly in the commercial catch.

In 2007, port samplers collected 13,900 market sample otoliths. The age distribution of halibut sampled from the 2007 commercial catch ranged from five to fifty years old, with 12-year-olds comprising the largest age group in the overall catch. Average age was slightly higher than in 2006 for all areas combined.

The 1995 year class (12-year-olds) accounted for the largest proportion (in numbers) of the overall commercial catch (13 percent) in 2007. The next most abundant year classes were 1994 and 1996, each accounting for slightly over 10 percent of the catch. Twelve-year-olds were also the most abundant age class in Regulatory Areas 2A, 3A, 3B, and 4D, and the second most abundant in Areas 2B, 2C, 4A, 4B, and 4C. In Areas 2B and 4C, nine-year olds (1998 year class) made up the most abundant age class. Thirteen-year-olds (1994 year class) made up the most abundant age class in Regulatory Area 2C, while 11-year-olds (1996 year class) were the most abundant age class in Areas 4A and 4B.

Average size (measured fork length) of sampled halibut increased in Areas 2A, 2B, 3B, and 4B in 2007 but decreased in all other areas. Average fork length for all areas combined decreased by 0.1 centimeter in 2007.

Average age of fish sampled from Areas 2C, 3A, 4B and 4C increased in 2007 relative to 2006, while average ages from Areas 2A, 3B, and 4D decreased. The average age of fish sampled from 2B and 4A remained the same in 2006 and 2007. The average age from all areas combined in 2007 increased by 0.1 years from 2006, and overall average age in 2007 was a year and a half higher than it was in 1998.

Gone fishing! Photo by Lara Hutton.

The youngest and oldest halibut in the 2007 commercial, or "market", samples were determined to be 5 and 50 years old, respectively. There were five 5-year-olds, all captured in Area 2B. The 50-year-old was captured in Area 4B and had a fork length of 115 cm. The largest halibut in the 2007 commercial samples was a 206-cm fish from Area 4B, which was determined to be 21 years old.

The oldest commercially caught halibut this year was 50 years old and measured 115 cm in length.

Fishing and Philosophy

One of the favorite debates among ancient philosophers and writers was over the relative virtues of contemplation and action: whether the nobler life was to be found in devoting oneself to contemplation of the great philosophical issues or in committing oneself to the productive work necessary to support human society.

Seventeenth-century writer and fisherman Isaac Walton, the author of the first and most famous treatise on fishing in the English Language, ***The Compleat Angler*** (1653), puts it this way:

> *In ancient times a debate hath risen, (and it is not yet resolved) whether Contemplation or Action be the chiefest thing wherein the happiness of a man doth most consist in this world?*

Considering this debate, Walton argues for a "third way," a way of life that is nobler than either contemplation or action alone and produces the benefits of both. That third way of life is *fishing.*

> *I shall rest myself contented in telling you, my worthy friend, that both these meet together and do most properly belong to the most honest, ingenious Art of Angling.*

For Walton, the patience that fishing requires necessarily makes a person grow philosophical, and while waiting for the fish to bite we have the time for such contemplations. And the action of fishing itself contributes immensely to maintaining human society by giving fishers the means to do good for others, i.e., to feed them.

> *Oh the brave Fisher's life,*
> *It is the best of any!*

Scattered around the pages of our Annual Report, as our own tribute to halibut fishers, are some quotations from Walton's great tribute to fishing and from other philosophers and poets who have taken time to reflect on fishers and fishing, and on fish and their watery habitat.

The Recreational Fishery

As inward love breeds outward talk,
Some praise the Hound, and some the Hawk,
Some better pleas'd with private sport,
Praise Tennis, and some a Mistress court:
But these delights I neither wish,
Nor envy, while I freely fish.
--Isaac Walton

The sport fishery is estimated to have brought in the highest harvest on record in 2007. The 2006 sport harvest was the fourth-highest ever recorded, and for 2007 a projected harvest estimate looked to be a little over a million pounds greater: in Area 2A, sport harvests are estimated at 504,094 pounds; in Area 2B, 1.556 million pounds; and in Alaska, an estimated 3.049 million pounds from Area 2C and 6.283 million pounds from Area 3A. Guided sport (or charter) harvests of halibut in Alaska continue to be a significant concern to the Commission.

The 2007 sport harvest is estimated to be the highest recreational harvest on record.

Charter halibut issue in Alaska

In recent years, the charter halibut fishery in Areas 2C (southeast Alaska) and 3A (central Gulf of Alaska) has exceeded the Guideline Harvest Levels

Recreational fishers enjoying their catch near Ninilchik, Alaska. Photo by Lara Hutton.

(GHLs) set by the North Pacific Fishery Management Council (NPFMC) for charter halibut harvests. While the Commission leaves allocations of the overall catch limit to the governments of Canada and the U.S., the growing harvests by the charter fishery have the potential to pose a conservation risk that the Commission is obligated to address. Commission staff initiated dialogue with the NPFMC to determine what control measures would be enacted to constrain charter harvests to the GHLs in 2007. The NPFMC indicated that, although it is committed to managing this fishery within the GHL limits, it would not be able to develop the regulations necessary to constrain charter harvests until 2008.

The Commission is obligated to address conservation risks brought about by over harvesting.

The Commission, with the support of its advisory bodies, therefore passed a regulation for a one-fish halibut bag limit for sport guided charter fishing in Area 2C from June 15 - July 31, 2007 and for Area 3A from June 15 - 30, 2007. The Commission took this action with some reluctance, but believed the action to be necessary, given the magnitude by which the charter/guided catches exceeded the GHL limits and the belief that such overharvesting poses a conservation risk for the halibut stock.

The IPHC has used bag limits effectively to regulate the sport halibut fishery since 1973, when it first adopted sport halibut fishing rules, and this would not have been the first time the Commission has seen fit to reduce the bag limit to one fish per day. Nevertheless, the United States government rejected this regulation as too restrictive. Recognizing, however, that without some kind of catch restrictions the GHLs would continue to be exceeded, the U.S. modified the two-fish bag limit to require that one of the fish not be larger than 32 inches (81.3 cm) as measured from the head to the middle of the caudal fin. In addition, the Alaska Department of Fish and Game (ADF&G) instituted an emergency order that restricted charter skippers and crew from retaining any fish while paying clients were on board. The NPFMC meanwhile continues its discussions of management measures to successfully restrain harvests within the GHLs.

Regulations

Detailed statistics of the sport catch are included in this report in Appendix II.

Sport fishing regulations for 2007 in British Columbia and areas south were similar to those in 2006. Allocative regulations for sport, commercial, and treaty Indian fisheries in Area 2A, were specified by the PFMC CSP and the area was divided into several subareas within which seasons were managed by catch limits. Charter vessels were required to obtain a license from the IPHC to possess halibut during open seasons. Vessels were also required to declare whether they intended to operate as a sport charter or commercial vessel; licenses could be held for only one category. Minor modifications to the CSP were implemented to facilitate management strategies. Specific area-closures were also in effect to protect certain species of rockfish (*Sebastes* spp.) on sport halibut fishing grounds.

In Area 2B, the sport halibut share of the combined sport and commercial catch limit is capped at 12 percent. In 2006, the Sport Fishery Advisory Board (SFAB) commissioned a sampling program of the British Columbia sport halibut fishery to collect information on the size of the halibut taken by the sport fishery. These data were reanalyzed by DFO and, in consultation with IPHC staff, resulted in a set of average weights for DFO statistical areas in British Columbia. A similar set of average weight data was used to estimate the 2007 catch.

Harvest estimates

The 2007 Area 2A harvest estimates for the various subareas were provided by the Oregon Department of Fish and Wildlife (ODFW) from in-season creel census estimates. The exception to estimation via creel census was the Washington Inside Waters (WIW) area, which was assessed by a post-season phone survey.

The 2007 Area 2B harvest estimate was provided by the Canadian DFO. In Alaska, the ADF&G typically provides final 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. However, because of the focus of attention placed on the estimates by the NPFMC, several new estimation methods were evaluated by ADF&G.

A number of different harvest projection methods were evaluated by ADF&G this year.

For Area 2C, the best harvest estimation methods were double exponential projections of Area 2C-wide charter harvests and single exponential projections of Area 2C-wide private harvests. Because these projections were not done by Statewide Harvest Survey (SWHS) area, and because the weight data cannot be pooled to estimate the Area 2C average, ADF&G evaluated methods of obtaining the 2C-wide average weights for the charter and private harvests. The performance of the mean weight projections was calculated using the average proportions of harvest by SWHS area for the previous 1-3 years for charter and previous two years for private. The 2007 charter harvest projections were not adjusted downward to account for the prohibition on skipper and crew harvest in 2006 or 2007. Unlike the linear trend projection used last year, the exponentially weighted projection for 2007 should take into account the drop in harvest in 2006 caused by the restriction. Despite all of the precautions taken, the projection of 2.545 million pounds underestimated the final estimate of 3.049 million pounds by about one-half million pounds.

For Area 3A, the best method for estimating the charter fishery harvest was a projection of the linear trend from the previous six years. Because these projections were based on a linear trend of past years, they required downward adjustment to account for the prohibition on skipper and crew harvest enacted in 2007. Since the projections were done by SWHS area, each projection was reduced based on the proportions of harvest by skipper and crew reported in the 2006 logbook in that SWHS area. These reductions by SWHS area reduced the Area 3A charter harvest overall by 10 percent. The best method for estimating the private fishery harvest was single exponential projections done by SWHS area. As in Area 2C, despite all the precautions taken to accurately estimate the catch of Area 3A, the projected catch of 5.045 million pounds underestimated the final estimate of 6.283 million pounds by about 1.3 million pounds.

Harvest estimates for Areas 3B and 4 were also reevaluated for the 2007 projections. The single exponential projections proved to be the best method for Area 4. For Area 3B, ADF&G chose the 5-year moving average for projections but another method may prove to be better with additional data. The average weight from 2007 for Kodiak, the nearest sampled port, was applied to the projected numbers of fish harvested in each of Areas 3B and 4 to generate the 2007 estimated net harvest weights.

Area 2A

The estimated 2007 harvest from Area 2A was 504,094 pounds. This was about one percent under the catch limit of 507,818 pounds. The harvest estimate for WIW was 45,415 pounds, considerably under the 65,562 pound catch limit. This is the fifth year the WIW area has been partitioned into sub-regions. The Washington North Coast fishery left an estimated 1,710 pounds on the grounds relative to the 116,199 pound quota. Management was accomplished by intensive dock-side monitoring by Washington Department of Fish and Wildlife (WDFW) and an adjustment in the season structure that included alternate day fishing early in the season and depth-restricted openings. The North Coast average weight ranged from 21 to 34 pounds, with higher average weights coming from the nearshore areas. This year's fishery included nine days of all-depth fishing and five days of nearshore fishing.

The 2A sport harvest came in slightly below the catch limit.

The Washington South Coast fishery, centered principally out of Westport, closed at an estimated 259 pounds above the quota. The average weight of South Coast halibut was 25.6 pounds, a pound higher than last year's average weight. Because of the overage, the nearshore Washington South Coast fishery could not be re-opened to allow for incidental retention of halibut while fishing for other groundfish and the season lasted only six days. The Columbia River area closed at 223 pounds over its quota. Pacific halibut in the Columbia River area generally weighed between 15 and 17 pounds, although larger halibut were caught in September on the Washington side. The fishing season once again ranged into September.

Time to box up the day's catch. Photo by Lara Hutton.

The Oregon sport fishery closed 16,000 pounds, or six percent, over its catch limit in 2007. Ample opportunity was provided to anglers into September, weather permitting. The spring fishery stretched well into July, when anglers seemed to turn their attention to salmon (*Onchorynchus* spp.) and albacore (*Thunnus alalunga*). Albacore, in particular, has enthralled Oregon anglers in recent years. Oregon anglers were given a brief increase to a two-fish bag limit in September, which seemed to attract more attention to the halibut

fishery and, combined with an exceptionally good weather weekend, drove the Oregon Central Coast over its quota. As a result, the less-than-40-fathom fishery was shut down when the Oregon Central Coast fishery exceeded its quota. The overall average weight for the Oregon sport halibut fishery was 17 pounds in 2007, a pound lower than in 2006. As in Washington, a substantial portion (32 percent) of the available harvest was measured to determine the average weight.

About 25 percent fewer halibut were caught in Canadian waters then subsequently landed in Neah Bay, Washington compared to 2006.

Area 2B

The catch in numbers of halibut for 2007 was provided by the Pacific Region of DFO. Average weight information provided by DFO is used in lieu of our past practice of using average weights from adjacent Alaska and Washington sport fishery areas as proxies. The final catch estimate for 2007 was 1.556 million pounds and exceeded the sport allocation by less than 200,000 pounds.

In 2007, WDFW reported that Washington anglers caught 9,977 halibut in Canadian waters and landed them in Neah Bay, almost 25 percent lower than the 13,045 halibut landed in 2006. The estimated harvest was 140,676 pounds.

Area 2C

The updated 2006 Area 2C harvest was estimated to be 2.526 million pounds net weight and the 2007 final harvest was estimated to be 3.049 million pounds. The numbers of fish harvested were identified by SWHS area and were converted to net weight using the average weight from each respective user group. Length data were gathered in Ketchikan, Klawock, Craig, Petersburg, Wrangell, Sitka, Gustavus, Elfin Cove, and Juneau. In 2002, a catch sampling program was initiated in Gustavus and Elfin Cove, so the Gustavus/Elfin Cove average weight is now applied to Glacier Bay. Neither Haines nor Skagway have been sampled for length information, so their harvests have historically been projected using Juneau average weights as a surrogate. The overall average weight for Area 2C in 2006 was 17.9 pounds net weight and 17.1 pounds in 2007.

Sport caught halibut were sampled in eight different ports in Area 3A.

Area 3A

The updated 2006 Area 3A harvest was estimated at 5.337 million pounds. The projected 2007 harvest of 5.045 million pounds was lower than the actual of 6.283 million pounds. The Area 3A harvest biomass was also estimated for each user group using estimates of the numbers of fish caught by each group as supplied by the SWHS, and expanded using average weight estimated from length data collected from the primary ports of sport landings. The sampled ports for 2007 included Yakutat, Whittier, Valdez, Seward, Homer, Deep Creek and Anchor Point beaches, and Kodiak.

The estimate of the charter average weight in Homer was stratified by user group to account for differences in sizes of halibut cleaned at sea and cleaned onshore. Care was taken to properly account for harvests by the charter, private, and military recreation camps. The average weight for 2006 was 16.7 pounds. Final estimated of the average net weight in 2007 dropped slightly, to 15.6 pounds.

Areas 3B and 4

As in Areas 2C and 3A, 2007 SWHS numbers were not yet available for Areas 3B and 4 at press time, so an estimate of the catch in pounds was made.

When the survey data become available, harvest figures will be updated. In previous years, 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. The average weight dropped from 21.0 to 17.2 pounds net weight between 2006 and 2007. This may or may not reflect the actual catches. Anecdotal information gleaned from sport fish publications and conversations with local charter operators suggested that average weight may have been quite high in Dutch Harbor and Unalaska; therefore, the harvest in Areas 3B and 4 may have been higher than reported in this document.

It appears as though the average weight of sport caught fish in Areas 3B and 4 has decreased, but not all the data is in yet.

Sport tag recoveries

Five tags released through the voluntary charter-boat tagging program of several years ago were recovered in 2007. Release information on three of these tags indicate they were released in 1997 and 1998 in Area 2A near Cape Flattery and two were subsequently recovered in the Canadian longline fleet off of central Vancouver Island and lower Hecate Strait in the early part of the fishing season. The third tag was found on the floor of a Vancouver processing plant in October and could not be traced back to any particular landing. The remaining two recovered tags were released near Craig and Sitka, Alaska in the late 1990s and recovered near Cape Ommaney and Cape Fairweather, respectively.

In addition, four unauthorized or “rogue” tags were recovered in 2007. One tag was released in Area 2A and recovered in Area 2B. Two tags were recovered in Area 2C from unknown release areas. The fourth tag was released from the Anchor Point, Alaska (Area 3A) region and recovered at the dock in Petersburg, Alaska.

WASTAGE IN THE 2007 COMMERCIAL HALIBUT FISHERY

The inhabitants of the watery Element were created for wise men to contemplate, and fools to pass by without consideration.

--Isaac Walton

Waste includes the legal sized halibut removals that ocurred from lost or abandoned gear.

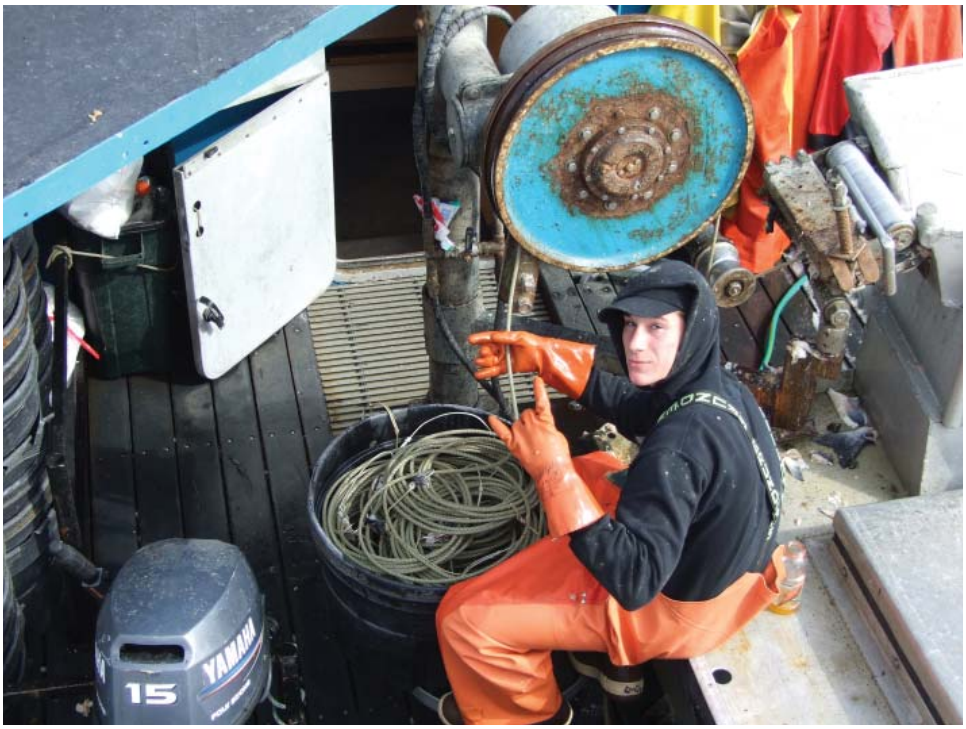
Wastage in the commercial fishery includes legal-sized halibut killed by lost and abandoned longline gear and sublegal-sized halibut that are discarded and die. Along with removals from commercial and sport catch, personal use, and bycatch, the Commission also accounts for removals of Pacific halibut from the population by wastage. Since 1997, the commercial fishery wastage estimate included in the stock assessment has represented legal-sized removals occurring from lost or abandoned gear in the commercial halibut fishery. The estimated mortality of discarded sublegal halibut is accounted for when setting exploitation rates. Prior to 1997, wastage from the mortality of discarded sublegal halibut was deducted prior to calculating the setline constant exploitation yield (CEY).

Wastage can also occur if more gear is set than is needed to obtain fishing period limits in Area 2A, IVQ in Area 2B, and IFQ and CDQ in the Alaska regulatory areas. Wastage occurs when the halibut above these limits are discarded and die. In addition, halibut may occasionally be discarded at sea due to poor fish quality, which can result from sand flea, shark, or other predation. The amount of legal-sized halibut caught in excess of quota, or catch limits, and discarded at sea is recorded during logbook interviews. These amounts are reviewed and over-limit legal-sized discards are not currently included in the wastage removals.

Wastage from lost or abandoned gear

Information on the amount of gear lost or abandoned in the halibut longline fishery was collected through logbook interviews or from fishing logs received via mail. Fishery-wide estimates were then extrapolated to total catch values using qualified logbook catch and effort statistics. Gear types varied considerably as to the length of skates, hook size, and hook spacing but the data were standardized. Only this standardized gear was used in subsequent calculations. Some log data could not be standardized because there were missing data or because the gear fished differently; such data were not used in the calculation of effective skates. With the directed halibut IFQ fishery in Alaska, and with the incidental halibut catch during the sablefish longline fishery in Area 2A, there were mixed halibut and sablefish trips as well as trips which targeted sablefish and landed incidentally-caught halibut. Sablefish gear is considered a non-standard halibut gear that fishes differently, and therefore was not included in the calculation of wastage.

Wastage was calculated from the ratio of effective skates lost to effective skates hauled, multiplied by total catch. The calculation was performed using both fixed-hook and snap gear in all areas. Prior to 1998 the gear-standardization process described above was not conducted. Rather, the gear type used for the



Baiting the gear on the *F/V Heritage*. Photo by Levy Boitor.

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). The Area 2A catch has always 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.

The ratio of skates lost to skates hauled has remained low since the IFQ fishery began in 1995.

The 2007 ratios of effective skates lost to effective skates hauled by regulatory area were as follows: Area 2A = 0.004; Area 2B = 0.003 Area 2C = 0.003; Area 3A = 0.002; Area 3B = 0.002; and Area 4 = 0.003. Since the implementation of the quota share fisheries in 1995, the ratios have fluctuated slightly between years, but have remained lower than they were during the derby fisheries.

Discard mortality of sublegal halibut

Halibut smaller than the commercial minimum size are returned to the sea when caught in the commercial fishery, but a fraction of them die. We have no data on the numbers of pounds of sublegal halibut discarded, so we have estimated the amount by applying the ratio of sublegal to legal-sized catch in our setline surveys. Initially, when sublegal mortality was first estimated, all survey sets were used. However more recently stations with catch per skate in the top third in each area were used, being that the stations with higher catch rates would better represent the commercial catches. In 2007, the sublegal to legal-sized catch in weight, from catch per skate in the top third in each area was estimated back to 1974. There was a fair amount of variation from year to year, so a data smoother

The Commission applies a mortality rate of 16 percent to discarded halibut in quota share fisheries and 25 percent to discarded halibut in derby fisheries.

has been run through the points and some projections were made where surveys were not done.

A mortality rate of 16% is applied to all discards for individual quota fisheries and in Area 2A and the derby fisheries a 25% rate is applied. The Area 2A commercial catch numbers used include the catch from the directed commercial fishery and the incidental halibut fishery during the sablefish season, but does not include catch from either the tribal fishery (as sublegal halibut are accounted for as part of the ceremonial and subsistence fishery), or from the incidental halibut during the salmon season (as it is an incidental troll fishery). Applying the mortality rates to the estimated discard ratios gives the mortality ratio estimates i.e., sublegal discard mortality in weight as a fraction of legal-sized catch in weight. Applying the mortality ratios to the commercial landings gives the estimates of sublegal discard mortality. In 2007, the total mortality of sublegal-sized fish that died in the commercial halibut was estimated 2.286 million pounds.

PERSONAL USE

The gods do not deduct from a man's allotted span the hours he spends fishing.

--Babylonian Proverb

Halibut is taken throughout its range as a personal use harvest by several sources, mainly by the treaty Indian ceremonial and subsistence fishery occurring in the waters off northwest Washington State; by the First Nations food fish fishery in British Columbia, and by the subsistence fishery off Alaska. Sublegal-sized halibut taken in the commercial fisheries in Areas 4D and 4E may also be retained for personal use under IPHC regulations. Removals of halibut for personal use are accounted for in the stock assessment.

Estimates of the coastwide personal use harvest in 2006, the most recent year for which we have complete information, totaled 1.48 million pounds, a four percent decrease from 2005. Harvests in all areas changed very little from 2005, and the subsistence harvest in Alaska declined only slightly. No clear yearly trends have yet been identified in the Alaskan subsistence fishery harvest.

2006 is the most recent year of data. It appears as though the harvest may have decreased slightly from 2005.

Estimated harvests by area

The Commission estimated the coastwide personal use harvest at more than two million pounds in 1991. Personal use harvests declined rapidly through 1995 and became relatively stable over the following two years. In 1998, the harvest estimation methods were revised, and the resulting estimates were

Cleaning the catch in Homer. Photo by Cal Blood.

subsequently somewhat higher and remained fairly stable through 2002. Harvests leaped up again in 2003, following the implementation of new subsistence fishery regulations in Alaska and a more comprehensive harvest estimation survey. Many of the changes seen in the harvest estimates prior to 2003 resulted primarily from changes in estimation methods and may not necessarily have reflected actual changes in harvest levels. The majority of the personal use harvest was taken from waters off Alaska.

Alaska

The IPHC began estimating the personal use harvest in Alaska in 1991, when we estimated that personal use in Alaska totaled 1.95 million pounds that year. The estimate for 1992 dropped in half, to one million pounds. Estimates were subsequently made for each IPHC area independently, but not necessarily annually for all areas.

In 1998, a new methodology was developed to estimate personal use from halibut catch information gathered by household interviews and postal surveys conducted by the ADF&G. The surveys did not distinguish between sport and personal use harvests, however, so gathering information on personal use from the surveyed required assumptions about the relative amounts of sport and personal use in native and non-native households. The resulting estimates were used for Alaska for 1998-2002, with the only annual changes being the amount of sublegal poundage retained by the Area 4E CDQ fishers.

An ADF&G survey indicated that the highest subsistence harvest came from Area 2C, at 51 percent of the total.

In 2003, a subsistence fishery for halibut was created by the NPFMC, and governed by a separate set of fishery regulations, which vary somewhat by IPHC regulatory area. One provision of the subsistence fishery management program was the establishment of an annual survey of fishers to determine the annual harvest. The 2006 voluntary survey, the fourth since the surveys began in 2003, was conducted under contract to the NMFS by the Subsistence Division of ADF&G. The estimates from the 2006 survey totaled 1,128,000 pounds (net weight) in Areas 2C through 4E. This represented a four-percent decrease from 2005.

The ADF&G survey indicated that roughly 51 percent of the total subsistence harvest in Alaska occurred in Area 2C, with 34 percent harvested in Area 3A. The five subareas of Area 4 totaled 117,355 pounds, or 10.4 percent of the subsistence harvest off Alaska. The communities within Area 4E accounted for 60 percent of the subsistence harvest within Area 4.

The IPHC also adds to its annual estimates of personal use the sublegal halibut harvest by the Area 4D/4E CDQ fishery. The ADF&G subsistence survey included all registered fishers and households in all Areas, but Area 4D and 4E fishers were instructed to not include any retained sublegal halibut caught during commercial fishing. Also, fishers who retained sublegals as part of their Area 4D/4E commercial harvest were not required to register for the subsistence fishery and should not have participated in the survey. Therefore, the sublegal harvests were added to the subsistence harvest estimates to fully account for the total 2006 personal use harvest.

British Columbia

The primary source of personal use harvest in British Columbia was the First Nations' Food, Social and Ceremonial (FSC) fishery, whose harvests were estimated by the DFO at 300,000 pounds. In past years the IPHC has received some logbook and landing data for this harvest from DFO, but those data have

not been adequate for IPHC to make an independent estimate of the food fish fishery harvest. Thus, IPHC relies on DFO for an estimate. In the commercial fishery, take-home (personal use) fish was considered personal use harvest prior to the implementation of the IVQ program. Currently, in the IVQ program all halibut landed by a vessel is weighed by the port monitors at the time of the offload and any take-home fish is taken from this quantity; thus, personal use is included as part of the vessel's catch.

In Area 2B, personal use fish is weighed at the time of offload and included in the vessel's catch.

Washington, Oregon, and California

In Area 2A (Washington, Oregon, and California), the PFMC allocates the catch limit to directed and incidental commercial fisheries, sport fisheries, and treaty Indian fisheries operating off northwest Washington. During 2006, the treaty Indian tribes allocated 36,000 pounds to their ceremonial and subsistence fishery but actual harvest was 33,000 pounds. State regulations required that personal use fish from the commercial longline halibut fisheries be recorded on the fish tickets. The personal use removals from the directed commercial fishery were included in the commercial catch, which is consistent with the procedure used in the quota share fisheries, and therefore are not reported here.

Retention of sublegal halibut in the 2007 Area 4D/4E CDQ fishery

Since 1998, sublegal halibut (less than 32 inches in length) have been retained by the Area 4E CDQ commercial halibut fishery, under an exemption requested by the NPFMC and approved by the Commission. Beginning in 2002, the retention allowance was expanded to include Area 4D for only those vessels that land all of their annual catch in Areas 4D or 4E. The amount of retained halibut has grown from 3,590 pounds in 1998 to as high as 30,267 pounds in 2001. For 2007, a total of 19,049 pounds was reported by three CDQ organizations, a decrease of 3.4 percent from 2006. This harvest should be added to the subsistence harvest reported by the ADF&G for a full accounting of annual subsistence removals in Alaska.

A minor change in the reporting requirement went into effect in 2007, which provided that reports be submitted to IPHC by November 1. In previous years, organizations were required to report their retained amounts to IPHC by November 15. This date coincided with the closure of the IFQ fishery and was believed to give the organizations enough time to compile and submit their data. In later years it became apparent that local fishers in Areas 4D and 4E were finishing their fishing well before November. At the same time, IPHC staff found that the original reporting date did not give enough time for the reports to be received, reviewed, and compiled for Commission review. At the 2007 Annual Meeting, the Commission moved the reporting date to November 1.

The harvests reported here have not been included in the household survey conducted by the ADF&G for the subsistence harvest within Alaska. Survey participants are instructed to not include any sublegal halibut retained during commercial fishing. Thus, a complete accounting of subsistence harvests should include the figures reported here.

The Commission received reports for 2007 from three organizations: Coastal Villages Regional Fund (CVRF), Bristol Bay Economic Development

Corp. (BBEDC), and Norton Sound Economic Development Corp. (NSEDC). Overall sublegal landings in 2007 totaled 19,049 pounds, down 3.4 percent from 2006. BBEDC and NSEDC reported slightly higher amounts retained in 2007 compared to 2006. In contrast, the amount retained by CVRF fishers declined. The following sections provide additional details on the reports from the three organizations.

A little over 19 thousand pounds of sublegal halibut was landed.

Coastal Villages Regional Fund

Crews at Coastal Villages Seafoods facilities at seven ports separated undersized halibut during offloads and then weighed them separately from the legal-sized halibut. Once this was completed, the plant's record keeper recorded on a tally sheet the name, number of halibut, and the poundage of the sublegal halibut retained by the fishers. Each plant sent the tally sheets to the Coastal Villages Seafoods headquarters on a weekly basis, where the information was entered onto a spreadsheet. CVRF has followed this same procedure for several years.

In 2007, plants in Chefornak, Hooper Bay, Kipnuk, Mekoryuk, Toksook Bay, Tununak, and Quinhagak recorded sublegal halibut caught between June 1 and August 10. CVRF reported 11,398 pounds (net weight) were landed, which is a 15 percent decrease from 2006. A total of 1,766 halibut was recorded, for an average weight of 6.5 pounds. Toksook Bay received the largest share of the CVRF landings. Together with Mekoryuk, these two ports received 59 percent of the total reported by CVRF, similar to previous years.

Bristol Bay Economic Development Corp.

BBEDC fishers kept a reporting log, which included the lengths of any retained sublegal halibut. Lengths were tabulated by BBEDC at the conclusion of the season, converted to weights using the IPHC length/weight table, and summed to estimate the total catch. As in previous years, BBEDC vessels landed halibut at two primary ports, Togiak and Dillingham, and delivered fish also at Naknek.

BBEDC reported that fishers landed 313 sublegal-sized halibut representing 3,135 pounds being retained, up from 2006. The fish had an average size of 10.0 pounds; 89 percent of the halibut were 28-31 inches in length.

Norton Sound Economic Development Corp.

NSEDC required their vessels to offload all halibut, legal and sublegal. The sublegal halibut were weighed and then returned to the fishers. NSEDC had landings from August 12 through October 13, and reported 503 sublegal halibut weighing 4,516 pounds net weight (head-off, no ice/slime). The fish had an average net weight of 9.0 pounds. All fish were caught in the local CDQ fishery, and delivered to the Nome plant. The amount retained in 2007 was an increase of 33 percent from 2006.

INCIDENTAL CATCH

Fisheries targeting on other fish and shellfish inadvertently catch substantial amounts of Pacific halibut. Regulations require that halibut be returned to the sea with no additional injury. However, some fish do die from being caught and handled. Estimates of the bycatch mortality of Pacific halibut in 2007 totaled 12.2 million pounds (net weight), a decrease of 5.6 percent from 2006 and the lowest seen since 1987. Bycatch mortality decreased in most major regulatory areas from 2006. Most of the decrease is attributable to lower bycatch in the Alaskan groundfish fishery. In Area 2A, bycatch mortality decreased seven percent in 2006, despite an increase of trawl effort. Bycatch mortality in Area 2B remained slightly higher than in 2003-4. Lower trawl bycatch in Area 4 was the primary reason for reduced bycatch mortality in that area.

The 2007 estimate of bycatch is the lowest seen since 1987.

Halibut are sometimes inadvertently caught by trawl gear. Photo by Paul Logan.

Sources of bycatch information and estimates

The Commission relies on information supplied by observer programs for bycatch estimates in most fisheries. We also use research survey information to generate estimates of bycatch in the few cases where fishery observations are not available.

In the U.S. NMFS operates observer programs covering the groundfish fisheries off Alaska and the U.S. west coast, and provides IPHC with estimates of bycatch. Estimates of bycatch off Alaska for 2007 were based on bycatch

Bycatch is managed through an individual bycatch quota program in B.C.

reported from fishing conducted through mid-November and projections for the remainder of the year. Estimates of bycatch mortality in crab pot and shrimp trawl fisheries off Alaska have been made by IPHC staff from previous studies of these fisheries and are based on bycatch rates observed on research surveys because direct fishery observations of bycatch are lacking.

The amount of information varies for fisheries conducted off British Columbia. For the trawl fishery, bycatch is managed with an individual bycatch quota program instituted in 1996 by Canadian DFO. Fishery observers sample the catch on each bottom trawler, collecting 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, particularly for the shrimp trawl fishery. A new management program in 2006 which included 100 percent at-sea monitoring (observers or video) required groundfish vessels to account for their bycatch of all non-target species, and will likely provide new information on halibut bycatch levels in many fisheries where little has been known.

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

Discard mortality rates and assumptions

The discard mortality rates (DMRs) that we use to determine the fraction of the estimated bycatch that dies vary by fishery and area. Where observers are used for fishery sampling, DMRs are calculated from data collected on the release viability or injury of halibut. For areas without observers, we employ assumed DMRs, which are based on the similarity of fisheries to those in other areas where data are available.

Observer data are used to estimate DMRs in fisheries in two major areas. NMFS manages the groundfish fisheries off Alaska according to a schedule of DMRs. In Area 2B, observers monitoring the Canadian trawl fishery examine each halibut to determine survival. Data to determine DMRs for other fisheries are not available, so 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 sudden development of the foreign trawl fisheries off

the North American coast. The total bycatch mortality (excluding the Japanese directed fishery in the eastern and western Bering Sea) peaked in 1965 at about 21 million pounds. Bycatch mortality declined during the late 1960s, but increased to about 20 million pounds in the early 1970s.

During the late 1970s and early 1980s, it 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, the lowest level since the IPHC began its monitoring nearly 25 years earlier. Bycatch mortality increased 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 2007 total 12.2 million pounds, representing a 5.6 percent decrease from 2006 and a 40 percent decrease from the peak in 1992 of 20.3 million pounds. Bycatch mortality has ranged between 12-14 million pounds since the late 1990s.

Area 2

Bycatch mortality in Area 2 in 2007 was estimated at 1.06 million pounds, up slightly from 2006 and below the 10-year average of 1.25 million pounds. The primary sources for bycatch mortality in Area 2 are the groundfish trawl fisheries in 2A and 2B, and the crab pot and shrimp trawl fisheries in 2C.

NMFS estimated halibut bycatch mortality for the 2006 trawl fishery operating in Area 2A at 333,000 pounds, a seven percent decrease from 2005 despite an increase of 8.2 percent in overall trawl effort. Trawl effort in depths less than 150 fm, where halibut bycatch rates are generally higher, increased by only two percent. The 2006 estimate has been used for 2007, but will be replaced when an actual estimate for 2007 is obtained. Finally, no new estimate of halibut bycatch mortality is available for the shrimp trawl fishery, so the most recent estimate has been rolled forward to 2007.

In Area 2B, trawl fishery bycatch mortality was estimated at 0.35 million pounds, an increase of 18 percent from the 2005 estimate of 0.30 million pounds. This latest estimate is significantly above the average of 0.26 million pounds which has occurred since 1996, when the Individual Bycatch Quota program was started.

In Area 2C, crab pot fishing and shrimp trawling occur in various locations and harvests have held steady over the years. Pot fishing for brown king crab (*Lithodes aequispina*) occurs in the deep waters of Chatham Strait during the winter months, and beam trawling occurs for shrimp and flounders in the inside waters of southeast Alaska. These fisheries have not been reviewed since the early 1990s, but these fisheries are small scale in nature, with low bycatch. It is assumed that mortality has been relatively stable since first examined.

Lower overall bycatch is a side affect of stellar sea lion critical habitat closures.

Area 3

In 2007, bycatch mortality in Area 3 was estimated at 4.02 million pounds, an 8.2 percent decrease from 2006. The groundfish fishery continued to be affected by fishery closures inside stellar sea lion critical habitat, which forced vessels to fish in less productive areas. In all Gulf areas, the trawl fishery was more closely managed in 2007 to prevent overruns of fishery-specific bycatch mortality limits. For some fisheries, NMFS required daily reporting by observers to achieve this goal. Also, a study which permitted a portion of the rockfish trawl fishery to operate as a fishery cooperative resulted in less than 82,000 pounds

(50 tons) of mortality for those vessels, compared to 350,000-500,000 pounds (200-300 tons) in previous years. Vessels participating in the rockfish cooperative were able to fish more off-bottom and at a slower pace offered by the cooperative structure.

In other fisheries, the catch of Pacific cod, which typically accounts for the majority of the halibut bycatch in Area 3 for all gear types, was similar to 2006. Pot effort for cod, which has lower bycatch properties than other gears, continues to be quite high. Within Area 3B, trawl and hook-&-line fishery bycatch each dropped 13 percent from 2006. The total 2007 Area 3 bycatch mortality is below the 10-year average of 4.45 million pounds.

Area 4

Bycatch mortality in Area 4 was estimated at 7.1 million pounds, a drop of 5.5 percent from 2006. Since 1998, bycatch mortality in this area has ranged from 6.8 to 7.7 million pounds annually, averaging 7.3 million pounds. This year's estimate is slightly below the long term average. For 2007, an 11 percent decrease in trawl fishery bycatch was somewhat offset by minor increases in bycatch by the hook & line and CDQ fisheries. Driven by cod fishing, bycatch by hook & line gear increased markedly, even with lower cod quotas. CDQ fisheries also expanded their effort on cod, which previously they had fished primarily on pollock. Within the non-CDQ trawl fisheries, big decreases in bycatch by the cod and arrowtooth flounder fisheries were offset by bycatch increases in the midwater pollock, rock sole, and Atka mackerel fisheries.

Trawl codend. Photo by Hilary Emberton.

In Area 4, decreases in bycatch by the cod and arrowtooth flounder fisheries were offset by increases in the midwater pollock, rock sole, and Atka mackerel fisheries.

The Bering Sea Prohibited Species Donation Program

Since 1998, SeaShare of Bainbridge Island, Washington has operated a program which acquires unintentionally-landed halibut bycatch in Alaska for donation to hunger relief programs. The program is conducted under a Prohibited Species Donation program adopted by NMFS and the NPFMC following several years of development and, ultimately, approval by the Commission.

A preliminary estimate of the halibut collected for this program in 2007 totaled 36,619 pounds of halibut landed by shore-based catcher vessels at two participating processors in Dutch Harbor. Donations in the program have totaled 230,457 pounds (net weight) since program inception. NMFS Enforcement Division has monitored the halibut donated to this program and has reported no incidents.

Final 2006 results

The amount of halibut collected by SeaShare in 2006 was 10,762 pounds, with two participating processors. Unisea was the leading contributor, followed by Alyeska. Processing and inspection was conducted by SeaFreeze personnel, as in previous years. Food Lifeline in Seattle was one of the recipients of the processed halibut.

Preliminary 2007 results

As in past years, UniSea and Alyeska of Dutch Harbor participated in 2007. A preliminary estimate of 34,619 pounds (net weight) of frozen, headed and gutted halibut had been received: 69 percent from Unisea and 31 percent from Alyeska. The total amount processed increased substantially from 2006, an increase attributed to contributions from Unisea. SeaShare officials noted that while most of the fish came in during the latter half of 2007, both companies accumulated fish as it was received and stored it in their freezers. The fish were shipped as needed, so could have been in the freezer for several months. Also, a late summer visit to Dutch Harbor by SeaShare officials may have created renewed interest in the program and spurred an increase in donations.

The Unisea and Alyeska plants in Dutch Harbor participated in the Halibut Donation program in 2007.

Handling of fish was similar to past years. The fish were delivered to SeaFreeze in Seattle through shipping donated by Coastal Transportation. SeaFreeze weighed the halibut in totes and estimated the net weight. The fish were processed in Seattle into steaks, then sleeved, and repackaged for distribution to food banks in San Jose and Oakland, California.

The initial program adopted by the Council in 1998 expired on December 31, 2000. NMFS and IPHC staff conducted a review of the program during 2000 for the purpose of examining the appropriateness of extending it. The review was discussed with the Council at its June, 2000 meeting and formed the basis of an extension of the program. The extension contains no sunset provision but does require a review every three years. Although limited to shore-based trawl catcher vessels that land in Dutch Harbor, there is neither a limitation on the amount that can be donated nor a requirement that the halibut bycatch originates from specific fisheries.

Assessing the Pacific Halibut Stock

An ocean is forever asking questions
And writing them aloud along the shore
--American poet, Edwin Arlington Robinson

The poet's imaginative sentiments notwithstanding, we are the ones forever asking the ocean questions, trying to gain a better understanding of Pacific halibut and their marine environment. An important part of our investigations consists of making sure we are asking the right questions—questioning the questions, as it were—to ensure that the answers we get accurately reflect the state of the stocks. And to this end, over the last few years the Commission has been reassessing its methods for assessing the overall health of the halibut stocks across the species' range.

We now know from tagging experiments that there is a continuing migration of legal sized fish from Areas 3B and 4 to areas in the east.

For many years the Commission has assessed the stock in each regulatory area with the assumption that the stock of fish of catchable size in each area was closed or—to put it another way—that the net migration of fish between areas was negligible. A growing body of evidence from our annual stock assessments and from ongoing mark-recapture experiments suggests otherwise; researchers have seen a continuing eastward migration of catchable fish from Areas 3B and 4 in the Western Gulf of Alaska into Area 2 in the eastern Gulf.

This evidence of migration has led the Commission to question the accuracy of the closed-area assessments of past years. In 2006, in addition to the closed-

F/V Clyde **anchors up for the night while on charter with the IPHC to collect data for the stock assessment. Photo by Greg Riepma.**

area assessments, we conducted a coastwide stock assessment and used survey data to apportion the resulting coastwide biomass estimate into separate biomass estimates for each regulatory area.

To better understand the assumptions and implications of a coastwide assessement, the Commission hosted a Stock Assessment Workshop in Seattle on June 27 and 28, 2007. The workshop brought scientists, fishers, and industry representatives together with IPHC staff for detailed discussions of the coastwide assessment model and for practical scientific advice on its implementation.

In the following section, we summarize the proceedings of the workshop. But first, since the workshop focused on a new assessment "model," perhaps a word or two would be appropriate about statistical models in fishery science.

Without going into the details of statistical analysis and modeling here, we can say that, as the name suggests, a model allows fish biologists to create a statistical replica of a fish population. That statistical replica or "model," while not as accurate as, say, a photograph, nevertheless provides scientists with a statistically reasonable picture of what a fish population looks like and what it will look like at a given time in the near future. Basically, a statistical model allows us to input what we do know about the halibut stocks (from our surveys and other research) to find out some of what we don't know (because we can not simply go down and count all the fish) and to predict short-term trends in biomass with some certainty.

A workshop was held in June to discuss the coastwide approach to stock assessment.

The IPHC Stock Assessment Workshop

Day One

IPHC Director, Dr. Bruce Leaman, convened the workshop by introducing the external scientific reviewers Drs. Chris Francis and Paul Medley from the Center for Independent Experts, who attended the meeting as part of an IPHC independent assessment review. Dr. Leaman also introduced Dr. Steve Martell of UBC Fisheries Centre, who served as moderator of the workshop and whose opening remarks called attention to the substantial change involved in shifting the halibut assessment from a closed area to a coastwide approach. Dr. Martell then introduced the workshop's purpose: to look at the technical details of the model; at the data going into the model; and at the method for apportioning the coastwide biomass into IPHC regulatory area biomass.

Dr. Leaman presented an overview of Pacific halibut management, followed by staff presentations on the various removals from the stock, on setline survey information, on PIT tag study results, and on the Commission's data pre-processing practices. The often substantive discussions that attended these presentations clarified issues and practices ranging from observer coverage to survey design and sampling methods, and to evidence of site fidelity and migration from tagging studies. These presentations and discussions took up the morning of the first session and provided a foundation for the main purpose of the workshop: to gain a better understanding of the assumptions and details involved in coastwide assessment.

The afternoon of the first day's session then moved on to the presentation of the IPHC stock assessment model. Dr. William Clark of the IPHC staff began the afternoon by describing the basic 'vanilla' model for stock assessment. A significant discussion of catchability, defined as the proportion of the population

that will be caught with one unit of effort, followed, as catchability is one of the most significant variables in the model. In the closed-area assessment, different catchabilities are assigned to each fishery, while in the coastwide version, there is one estimated value each for males and females. Dr. Clark continued his presentation with a discussion of fitting the model to the data, noting that the model fits well with data for both females and males in the survey but is divergent with males in the commercial fishery.

Dr. Martell reminded participants that one purpose of the workshop was to open a discussion about the subjectivity that goes into the model and to better understand how different assumptions can lead to divergent views on management outcomes.

In discussion of the IPHC staff's evaluation of gains and losses in the different model fits, Dr. Leaman explained that the staff does not expect to go back to closed-area assessments given the compelling evidence of migration and its estimated impacts. The IPHC Commissioners in attendance reserved judgment on this change pending this workshop and further study.

The workshop was interactive which allowed participants to present opinions as well as ideas on how things might be done differently.

Further discussion of closed-area versus coastwide assessment models pointed out that these two options represent extremes between which there may be other options, and the staff noted that there are two separate topics here: the coastwide assessment itself and the subsequent apportionment into areas. Exploitation is higher in the east than in the west, and the coastwide model protects the stock as a whole. It was suggested that PAT tags could be used to look at migration rates, but the staff noted that they had been unsuccessful at getting funding for such a costly PAT tag project. Dr. Francis suggested including information on migratory movements that we already have as well as hypothetical scenarios into the coastwide assessment model to see how the results change. It was agreed that such a process could be a valuable simulation exercise but in the absence of accurate and detailed migration estimates of high precision, the model results would be largely driven by values in which we cannot place great confidence. It was also remarked that in the closed-area assessments the model did not pick up declining trends in the stock and that a better understanding of the reasons for this is crucial. A counterpoint was made that it is not a biological problem, but may be from the timing of how the fishery is executed and results may carry over into selectivity.

Dr. Martell redirected the discussion back to the alternate models and suggested focusing less on age and more on the survey CPUE, as age composition alone does not give information on absolute abundance and that is important to remember when making allocations.

Dr. Clark then presented area apportionment strategies and noted that the declines in survey biomass indices for Areas 3B and 4 were expected given the low historical exploitation in these areas and the 'fishing down' effect of higher exploitation rates in recent years. Concerning relative catchability among areas, the recovery rate of PIT tags per 10,000 fish scanned was similar in Areas 3A and 3B. If catchability was actually higher in an area, we would expect a higher recovery rate of PIT tags in that area.

During a discussion of the use of trawl data, Dr. Francis asked the staff to produce for the workshop an estimate of absolute abundance based on trawl surveys. A discussion of hook competition ensued. Dr. Clark conducted an analysis of hook competition among areas and noted that except for possibly Areas 2A, 4B and 4D, CPUE is consistent among areas on the survey. He

Hauling a halibut aboard the Canadian *F/V Waterfall* during the stock assessment survey. Photo by David Bryan.

examined bait competition and found that the fraction of baits recovered on survey stations is consistent across Areas 2B-4A. Staff further explained that some studies suggest a local depletion effect around the gear in some areas. Dr. Clark concluded that setline survey CPUE appears to be a consistent index of density in Areas 2B-4A, and a case could be made for scaling upward in Areas 2A and 4B.

Biomass allocation among areas was of concern to the attendees.

Discussion of methods of biomass allocation among areas noted that this is a policy decision, but should be based on sound science and sustainability. The final discussion of the day reviewed apportionments for other species such as sablefish, rockfish, pollock, and cod.

Day Two

Dr. Clark opened the second day's session with a presentation on the results of the alternative model fits that had been suggested in the last session. In general, the model modifications had very little effect on either the fit of the model to the data or the resultant estimates of exploitable biomass.

A third data source, the NMFS trawl survey, was suggested for gathering information on incoming year classes. Staff noted that exceptionally strong cohorts are generally observed in the trawl surveys several years before their appearance in the exploitable stock. However, it was also noted that cohorts observed in Bering Sea trawl surveys may not index cohorts in the Gulf of Alaska.

Dr. Steven Hare of the Commission staff presented the IPHC harvest policy and concluded that only Area 2 appears to be currently harvested too high. It was requested that Dr. Hare look at catchability and harvest levels at the edges of areas. Substantial discussion focused on coastwide versus closed-area approach at assessment. Staff reiterated the two separate components under review: the assessment itself and then the apportionment.

The Commission justified its decision to not adopt the coastwide assessment at the 2007 Annual Meeting and pointed out that the Commission was not rejecting the coastwide approach, but rather wanted to understand it better. It was further clarified that the coastwide model along with the 20 percent harvest rate were all part of the same package at the Annual Meeting, and the Commission's decision to not adopt the coastwide model adopted by default the status quo harvest rates as well. Discussion of the 60 percent U.S./40 percent Canadian split policy for Area 2 catch noted that the 1979 Protocol to the Halibut Convention

between Canada and the United States allowed the Commission after 1981 to alter that policy in light of 'pertinent information,' which includes estimates of biomass distribution and available yield.

Dr. Hare discussed how the Commission treats bycatch and sport catch data sets in the assessment. The areas of concern were limited observer coverage requirements for some fisheries in Alaska, the lack of length data for the sport fishery, and the possibility of visiting the impact of the sublegal mortality on the sector of the fishery from which it came. Also raised was the issue of vessels in Alaska being able to choose when to take an observer and the resulting assumed observation rate.

Dr. Martell summarized the proceedings with three points:

1. The rationale for adopting a coastwide approach was to avoid the closed-area assessment's problems with sparsity of data and conflicting data sets, as well as the assumption of closed populations. However, the change introduces additional assumptions; analysis of data that are aggregated is not insensitive to potential differences in catchability in each area.

A more detailed accounting of the workshop can be found on the IPHC website. Just click on "Stock Assessment Workshop 2007."

2. Regarding apportionments, the setline survey currently assumes constant catchability among areas. If bathymetric contours and area habitats were mapped, there may not be good correlation of catch by depth ranges among areas. Tagging may be a way to groundtruth this problem.

3. The immediate problem is what to do in the interim.

IPHC Commissioner Dr. Laura Richards thanked the Commission staff and the contributors to the meeting. She noted that the Commission's task is to make policy decisions around the scientific advice. Some alternate methods of apportionment should be explored instead of CPUE only, and more work needs to be done to look at longer term shifts in effort and the resulting effects to achieve an optimally harvested stock.

Dr. Leaman noted in closing that this workshop will be followed with the independent review. A more detailed report of the workshop, as well as participants' comments and suggestions for future assessment workshops, is available on the Commission's website at: http://www.iphc.washington.edu/halcom/meetings/workshop2007/wrkshp2007.htm.

SURVEYING THE WATERS

The Waters are Nature's storehouse in which she locks up her wonders.
--Isaac Walton

The 2007 standarized stock assessment survey

The Commission's standardized stock assessment (SSA) survey provides catch information and biological data that are independent of the commercial fishery. These data, which are collected using standardized methods, bait, and gear during the summer of each year, provide an important comparison with data collected from the commercial fishery. The survey fishing effort, however, is only a small fraction of the commercial effort and takes place only during the summer. The commercial fishery is more variable in its gear composition and distribution of fishing effort over time but presents a broad spatial and temporal sampling of the stock. Biological data collected on the surveys (e.g., the size, age, and sex composition of halibut) are used to monitor changes in biomass, growth, and mortality in adult and sub-adult components of the population. In addition, records of non-target species caught during survey operations provide insight into bait competition, rate of bait attacks, and serve as an index of abundance over

The IPHC stock assessment survey gives scientists a fishery independent set of information on the halibut population.

The *F/V Heritage* is a veteran of several years service to the IPHC stock assessment surveys. Photo by Levy Boitor.

time, making them valuable to the assessment, management, and avoidance of bycatch species.

The Commission has conducted standardized setline surveys in selected areas during most years since 1963 (with a break from 1987 to 1992). Historical information regarding previous standardized survey operations has been presented in IPHC Annual Reports and Survey Manuals 1963-1965, 1976-1986, 1993-current; IPHC Report of Assessment and Research Activities (RARA) documents 1993-current; and IPHC Technical Report No. 18. The current base survey station design and most sampling protocols have been the same since 1998.

In 2007, the Commission chartered twelve commercial longline vessels, five Canadian-flagged and seven U.S.-flagged, for survey operations. During a combined 68 trips and 620 charter days, these vessels successfully completed 27 charter regions covering halibut habitat from southern Oregon to the island of Attu in the Aleutian Islands and north along the Bering Sea shelf edge. All of the 1,280 planned stations were completed. Of these, 1,274 (99.5 percent) were considered successful for stock assessment analysis. Approximately 781,187 pounds of halibut, 120,884 pounds of Pacific cod, and 36,669 pounds of rockfish were landed from the standardized survey stations. Compared to the 2006 survey, halibut catch per unit effort (CPUE) decreased in IPHC Regulatory Areas 2B, 2C, 3A, 4A, and 4B; CPUE increased in 2A,3B and 4D.

IPHC sea sampler, Wolfgang Rain, tallies a 20-hook count at the beginning of a string aboard the *F/V Kema Sue*. Photo by Levy Boitor.

The twelve longline vessels that participated in the 2007 survey were:
Bold Pursuit
Bernice
Blackhawk
Clyde
Free to Wander
Heritage
Kema Sue
Pacific Sun
Pender Isle
Predator
Proud Venture
Waterfall

The 2007 survey design encompassed all offshore waters of Oregon, Washington, British Columbia, southeast Alaska, Gulf of Alaska, Aleutian Islands, and the Bering Sea continental shelf edge. These areas were divided into 27 regions, each requiring between 13 and 46 charter days to complete. Stations were located at the intersections of a 10 nmi by 10 nmi square grid within the depth range occupied by Pacific halibut during summer months. The rockfish index stations in the Washington charter region, however, are arranged in a different pattern.

Five skates were fished at each station in all charter regions except for the rockfish index stations in the Washington charter region, where, to allay concerns about exceeding permitted yelloweye rockfish catch, only three skates were fished at each station.

The standards for gear, bait, set and soak times employed on the setline surveys are consistent among years. Standard survey gear consists of fixed-hook, 1,800-foot skates with 16/0 circle hooks spaced 18 feet apart. The gangion length ranges from 24 to 48 inches. All hooks were baited with pieces of Alaska Seafood Marketing Institute grade No. 2 semi-bright or better chum salmon (*Oncorhynchus keta*) weighing between 0.25 to 0.33 pounds each. Each vessel set one to four stations daily (or up to five stations if fishing rockfish index stations) beginning at first light or around 0500 and let the gear soak a minimum of five hours before hauling. Soaking the gear at night was avoided whenever possible. Data from soaks in excess of 24 hours were not used.

Sets were deemed ineffective for stock assessment if pre-determined limits for lost gear, snarls, predation, or station displacement were exceeded. The fork lengths of all halibut landed from survey stations were recorded to the nearest centimeter. Each length was converted to weight using a standard formula, which was then used to generate the CPUE data. Average CPUE, expressed as pounds per skate, is calculated by dividing the catch in pounds (net weight) of legal-sized halibut (smaller than 81 cm) by the number of standardized skates hauled for each station and averaging these values for each area (statistical, charter, or regulatory).

The surveys are standardized as much as possible so that all vessels are fishing the same size and type of bait, gear configurations, and time of day among other things.

Sampling protocols

While the gear was being set, IPHC samplers evaluated the performance of the bird avoidance devices and recorded the exact number of baits lost and hooks per skate.

During gear retrieval, samplers monitored 20 consecutive hooks of each skate and recorded the hook status, i.e., the animal it captured, or whether it was empty, still baited, damaged, or missing. Samplers targeted the first 20 consecutive hooks of each skate for this sample and completed samples always involved 20 consecutive hooks. However, processing needs for fish from previous skates, particularly in areas with high catch rates, sometimes affected where in the 100-hook sequence of the skate the sample was taken.

The lengths of all halibut caught were recorded with the corresponding skate number. Vessel crew dressed all halibut greater than 81 cm and then passed them to an IPHC sampler, who collected a suite of data: sex and maturity, age structure (otolith), prior-hooking injury severity, and presence of a passive integrated transponder (PIT) tag. Males were coded as either mature or immature, and females were assessed as immature, mature, spawning, or spent/resting. When the maturity stage of either sex was difficult to determine, the sampler coded the maturity stage as unidentified. The sex and maturity of halibut less than 81 cm were recorded only if a fish was randomly selected for otolith collection or was already dead when brought aboard.

Individuals were selected using a random sampling table. Sublegal fish that were not selected for otolith collection were measured and released alive. The incidence of prior hooking injuries (PHI) was documented for all measured halibut. Samplers scanned all halibut captured for the presence of a PIT tag; a discussion of scanning methods and PIT tag recoveries on survey vessels can be found in this volume.

At the conclusion of hauling, samplers recorded the presence and abundance of seabirds within a 50-meter radius of the vessel's stern. Seabird occurrence data will be used to determine the spatial and temporal variation in the abundance of seabirds.

Special projects

The SSA survey presents the opportunity to collect information on halibut biology and to conduct other experiments not associated with halibut stock assessment. Since 2002, the IPHC has been retaining all rockfish caught on the 2A surveys, marking them with a tag to link the fish to data from the skate and station of capture. After the rockfish were offloaded, WDFW biologists collected additional data from each fish, which, via the tag numbers, could be associated with the skate of capture and thereby location and depth. In 2007, IPHC and WDFW received funding from the Pacific States Marine Fish Commission (PSMFC) for the second year of a joint project concerning rockfish. To examine rockfish populations, eighteen rockfish index stations were added to the Washington survey region.

WDFW determined the location of the stations with the intent of targeting more rocky-bottom habitat than the standard survey stations. Ten of these rockfish index stations were fished in 2006 while eight were new locations for 2007. Aside from identifying and tagging all rockfish, sampling activities at rockfish index stations were identical to those on standard IPHC stations. A summary of this project will be submitted to PSMFC by the end of November 2007. It is anticipated that there will be a third season of sampling, although station locations may be changed to better sample rocky bottom type.

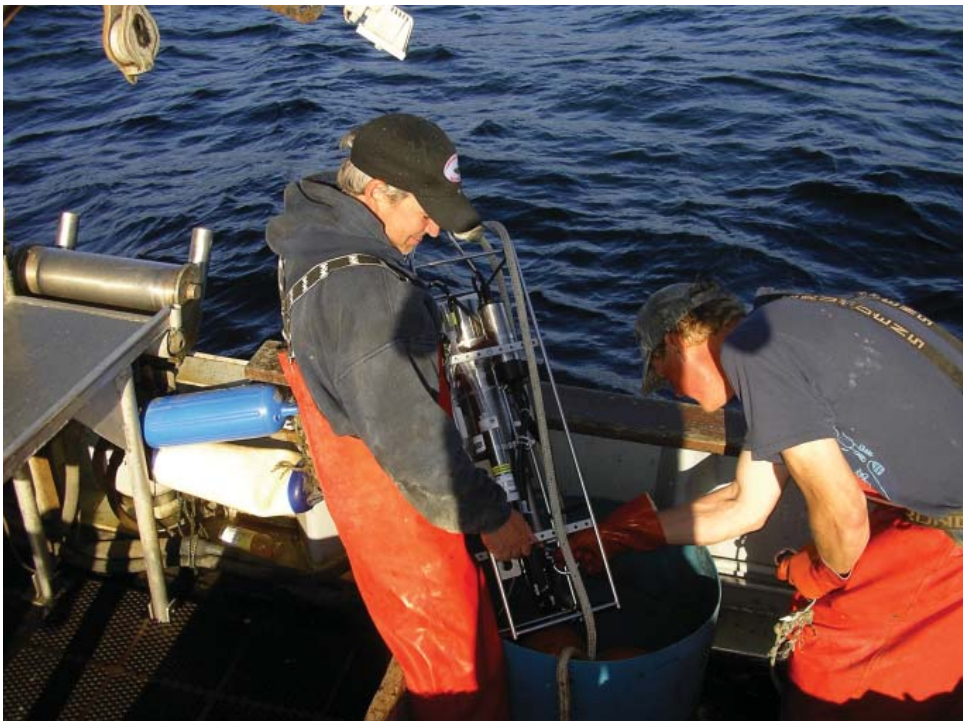
The IPHC worked with state and provincial agencies on cooperative projects up and down the coast.

In conjunction with the Pacific Halibut Management Association and DFO, IPHC samplers aboard survey vessels working in Regulatory Area 2B collected sequential information about the status of every hook. This work required a third IPHC sampler to be aboard our operations in these regions (in 2003-2006 the third sampler was provided by Archipelago Marine Research, Ltd. of Victoria). In addition to the hook by hook tallies, the IPHC third sampler also recorded rockfish (*Sebastes* spp. only) sex, maturity, and length; and otoliths were collected from all *Sebastes* spp. according to the sampling criteria in the 2007 Bycatch Sampling Manual (an in-house publication). These data were then shared with DFO. This project is expected to continue in future years.

This year in Regulatory Area 2C and in the Fairweather and Yakutat charter regions of Regulatory Area 3A, IPHC biologists sampled incidentally captured rockfish in concert with ADF&G. In Alaska, all demersal shelf rockfish (DSR) from these areas were marked with tags and retained. Most deliveries were met by ADF&G biologists, who sampled rockfish portside; however, ADF&G subcontracted DFO to sample the two deliveries of fish captured in Alaska and delivered to Prince Rupert, British Columbia. The rockfish tag number associated individual fish data collected by ADF&G biologists with the skate depth, capture location, and other information collected by IPHC samplers.

A water column profiler, which measured temperature, depth, salinity, and dissolved oxygen was deployed in the Vancouver, Goose Island, and Ketchikan regions. A second profiler, funded through a grant from the ODFW Restoration and Enhancement program, was deployed in the Oregon region and on the stations in the Washington charter region that are offshore of Oregon. This profiler also measured temperature, depth, salinity, and dissolved oxygen, plus chlorophyll and pH.

IPHC samplers collected halibut flesh samples as part of Alaska Department of Environmental Conservation's (ADEC) ongoing study of environmental contaminants in Alaskan fish. Three vessels were involved in the collection of 60 halibut (three size-classes) each from the Fairweather, Attu, and Trinity charter



Preparing to deploy the water column profiler from the *F/V Blackhawk* in Oregon waters. Photo by Bruce Biffard.

regions. These samples are part of a larger study involving 13 species of fish and examining a broad suite of environmental contaminants. These data will be put into a searchable database maintained by the Seafood and Food Safety Lab in Anchorage, Alaska. Results of the 2007 tests will be published by ADEC at a later date. Continued collaborative work between ADEC and IPHC is anticipated.

NMFS's Alaska Fisheries Science Center's Pacific cod stock assessment team, along with support from Pacific cod industry groups, teamed with the IPHC to investigate the use of data from Pacific cod captured on IPHC surveys to bolster data currently used by NMFS to assess the Bering Sea and Aleutian Islands Pacific cod stock. IPHC survey vessels delivering Pacific cod to St. Paul and Dutch Harbor were met by IPHC port samplers, who collected length, sex, and weight (if possible) data from a subsample of the delivered cod. Sea samplers provided the port samplers with data about sets with retained Pacific cod. This project is anticipated to continue in 2008 on an expanded scale and will be modified based on experience gained in 2007.

The survey vessels delivered fish to 22 different ports in 2007.

Fish sales

Legal-sized halibut caught during the survey were retained and sold to offset costs of the survey program. Survey vessels also retained and sold incidentally captured rockfish (*Sebastes* and *Sebastolobus* spp.) and Pacific cod (*Gadus macrocephalus*). Rockfish and cod were retained because they are generally dead or dying from distended swim bladders when they are brought aboard the vessel.

IPHC chartered vessels delivered fish to 22 different ports during the 2007 SSA survey. Fish sales were awarded based on the objectives of obtaining a fair market price and distributing sales among buyers and ports. When awarding sales, the Commission considered the price offered, the number of years that

A typical vessel contract is a lump sum payment with a 10 percent share of the halibut proceeds going to the vessel and remainder to the IPHC to help offset the cost of the research. In low CPUE regions, these contracts may be different.

a buyer had been buying and marketing halibut, how fish were graded at the dock (including the determination of No. 2 halibut and chalky fish), and the promptness of settlements following deliveries. Obtaining fair market value was the main consideration in awarding fish sales; however, sales were awarded to buyers offering slightly lower prices when some of the other factors were considered, thereby meeting the goal of distributing sales among as many qualified buyers as possible. Sales arrangements were evaluated after each event to ensure that each buyer was meeting IPHC's standards.

Most vessel contracts provided the vessel a lump sum payment along with a 10 percent share of the halibut proceeds, and a 50 percent share of the bycatch proceeds. Vessels in the second year of a two-year renewable contract received a 12 percent share of the halibut proceeds and a 60 percent share of the bycatch proceeds to compensate for their decreased revenues due to a reduction in fishing effort to five skates per station from six as stipulated in the original contracts. Vessels in the third year of a three-year renewable contract received a 14 percent share of the halibut proceeds and a 70 percent share of the bycatch proceeds to compensate for their decreased revenues due to a reduction in fishing effort to five skates per station from seven as stipulated in the original contracts.

The shack, used by biologists on the surveys, is lifted off the *F/V Bold Pursuit* as the survey comes to an end. Photo by David Bryan.

The *F/V Blackhawk*, surveying the Oregon region, worked under a special contract that paid 100 percent of the fish sale revenues as partial compensation for completing the charters. The *F/V Heritage* received no share of halibut proceeds in the 4D Edge and Attu regions, the *F/V Bernice* received no share of halibut proceeds in the Washington charter region, and the *F/V Pacific Sun* received no halibut proceeds in the Adak charter region. These special cost-sharing arrangements helped offset direct IPHC costs for these remote or low CPUE regions, which are very expensive to survey.

Catch per unit effort

As the SSA covers commercial as well as non-commercial grounds, the average CPUE for all regulatory areas surveyed remained below that of the commercial fleet. Not all of the CPUE data included in this report are used in the analytical stock assessment. Several of the SSA stations fall outside of the analytical boundaries for Area 4A, and some of the inside stations in southeast

Alaska occur at a different density than the acceptable level for the analytical model. In addition, four stations in the Charlotte charter region listed in this report as Area 2B fall under Area 2C for the analytical assessment.

Compared to the 2006 results, CPUE increased slightly in Regulatory Areas 2A (16 percent), 3B (5 percent), and 4D (8 percent). All other regulatory areas saw CPUE drop compared to the 2006 results. The largest drops in CPUE were seen in Areas 4A (down 21 percent) followed by 3A and 4B, (both down 9 percent). Downward trends have been seen in Areas 2C and 4A for the last five years, while 3B ended an eight-year downward trend this year.

Compared to 2006, in 2007 the Attu, Unalaska and 4A Edge charter regions saw a downward trend in CPUE, while a slight increase was observed in the 4D Edge charter region. In the Aleutian chain regions as a whole, CPUE appears to be leveling off; the Adak charter region CPUE has been very similar for the past four years. Interestingly, an increase in CPUE in the Shumagin charter region continued for a second year, while in all other charter regions in 3B the CPUE was similar to 2006. Similarly, the Ommaney charter region in 2C had a slight increase in CPUE, while the other 2C charter regions experienced a continued slight decline in CPUE. In 2B, CPUE increased in the Goose Island charter region while decreasing in the other 2B charter regions.

Clusters of stations around the Pribilof and St. Matthew Islands have been added to the standard survey.

On average, the rockfish index stations in 2A had higher CPUE than the region as a whole, an anticipated result because the rockfish index stations are clustered near the standard grid stations in Washington with the highest CPUE.

Stations clustered around the Pribilof Islands and St. Matthew Island that were part of the Eastern Bering Sea survey in 2006 have been incorporated into the standard grid survey. Of these clusters of stations, the St. George Island cluster had the highest CPUE, while the highest CPUE for single station was one off St. Matthew. The distribution of sublegal- and legal-sized halibut by depth was consistent with previous surveys showing higher abundance of sublegal-sized fish in shallow waters and a wide variation in depth occurrence for legal-sized fish.

Bycatch

At least 106 unique species of fish and invertebrates were caught as bycatch during the survey. Unfortunately, one Stellar sea lion was taken during the survey in 2007. Despite vigilant deployment of bird avoidance devices, two black-footed albatross were taken in 2007.

The most frequently encountered incidentally captured species on 2007 surveys was spiny dogfish, followed by Pacific cod. Most common bycatch in Areas 2A, 2B, 2C, and 3A was sharks, primarily spiny dogfish. The most frequent bycatch in Areas 3B, 4A, 4B, 4C, and 4D was Pacific cod. In Area 4B, although the most frequently encountered bycatch species was Pacific cod, the 'other species' group, composed primarily of white-blotched skates (*Bathyraja maculata)* and yellow Irish lord sculpins (*Hemilepidotus jordani*), predominated in the area.

Dogfish were the largest component of the shark species category in Area 2A (90 percent), Area 2B (slightly less than 100 percent), Area 2C (97 percent), Area 3A (96 percent), and Area 4B (100 percent). Sleeper sharks (*Somniosus pacificus*) made up the largest component of the shark species category in Area 3B (72 percent), Area 4A (92 percent), 4C (100 percent), and 4D (100 percent). Only one shark, a sleeper shark, was captured in Area 4C.

In 2007, IPHC survey vessels encountered blue sharks in Areas 2A and 2B. Salmon sharks were encountered in Areas 2B and 3A only.

Seabirds

Eighteen unique species of birds were observed within a 50-meter radius of the stern.

In total, 1,317 seabird counts were conducted on twelve charter vessels between June 4 and September 14, 2007. During 177 of the counts, birds were absent from within a 50-meter radius of the stern. On the remaining counts, 66,374 birds were observed. Eighteen unique species were identified and nine unidentified bird categories were used. The variety of birds identified has increased, likely reflecting the sea samplers' improved identification ability.

Northern fulmars made up 75 percent of the total number of individual bird species seen. The next most abundant species were the glaucous-winged gulls and black-footed albatross. These two species were seen in eight of the nine regulatory areas surveyed and were most abundant in Area 3A. Laysan albatross were observed primarily west of Kodiak Island and were at their highest density in the western Aleutian Islands. Because of their listing as an endangered species, all short-tailed albatross sightings are recorded. Forty short-tailed albatross were seen during the seabird counts (22 inside the count area and 18 outside); they were present in Areas 3A, 3B, 4A, 4B, and 4D. Four short-tailed albatross were recorded outside of the hauling events (while vessels were steaming or drifting). Typically, bird species seen outside the count area are the same as inside, but in different abundances. This was true in 2007 except for bald eagles, which were seen in Areas 2C and 4A only. Terrestrial birds are rarely seen offshore but this year two unidentified hummingbirds were recorded in Area 2C, on a station close to shore.

Puffins are a common site along Alaskan shores. Photo by Levy Boitor.

Otolith collection

The otolith collection goal for the 2007 survey was 2,000 otoliths per regulatory area, with a minimum target of 1,500 per area. In Areas 2A and 4D we did not attain the minimum target. Because of lower catch rates and fewer stations than other areas, it is not unusual to collect fewer than 1500 otoliths in Areas 2A and 4D despite sampling all fish caught.

Length distribution

The median length of all halibut caught on survey stations in 2007 was 83 cm, representing a 1-cm decrease from 2006. Areas 2B, 3B, and 4A all had average lengths below the legal size limit. The largest median lengths were found in Areas 4B (91 cm) and 4D (93 cm).

Sex ratio of the catch

The gender of every legal-sized halibut was recorded, except when its gonads were lost on deck or were missing due to predation. Because gender determination requires the removal and examination of the gonads, samplers recorded the gender of only those sublegal-sized halibut that were selected for otolith removal as well as those that died as a result of capture.

The sex composition for halibut from the survey catches showed considerable variation across most areas, ranging from 36 percent to 89 percent females. These figures are consistent with previous years' results. In general, the regions to the west of the central Gulf of Alaska (Areas 3B, 4A, and 4B) had lower percentages of females in the catch. It is interesting to note that these areas have had the lowest historical exploitation rates. Area 4C again had the highest percentage of females in the catch. Most female halibut caught in the period during which surveys are conducted (i.e., summer months) are in the ripening stage and are expected to spawn in the coming fall and winter.

An interesting observation is that in the survey, the areas with the lowest historical exploitation rates also have the lowest percentages of female halibut.

Prior hook injuries: results from the 2007 IPHC SSA

The establishment of a coastwide, comprehensive longline survey along the North American west coast provides a unique opportunity to gather information showing geographic differences among components of the Pacific halibut population. In the mid-1990s, halibut fishers began to notice increasing rates of hook injuries from previous captures. Although groundfish and halibut longline harvesters in Alaska are required to practice careful release techniques for all halibut intended for return to the sea, it was suspected that either the regulations were not being observed by all fishers, or that careful release procedures were inflicting worse damage than expected. The SSA surveys provide a means of examining geographic and size trends in hook removal injuries across the entire range of halibut in the northeastern Pacific Ocean and Bering Sea.

In 1997, PHI data were collected during the IPHC coastwide survey for the first time. The collection method proved to be successful and allowed us to continue the research of PHI incidence in 1998 and subsequent years. In 1998, the PHI categories were expanded to more closely reflect those used by NMFS observers. These new classifications provided more details about the severity of an individual injury.

In 2007, the incidence of PHIs decreased in Areas 2B, 2C, 3A, and 4D, and increased in Areas 3B, 4A-Aleutians, 4A-Bering Sea and 4B. Rates remained relatively unchanged in Area 2A. PHI rates remain very high in Areas 4A-Bering Sea and especially in Area 4D, and have risen markedly this year in Area 4A-Aleutians.

The coastwide average of prior hooking injuries rose only slightly in 2007 to 6.6 percent.

Overall, the coastwide average (6.6 percent) has risen only slightly since 2006 (up from 6.5 percent). Sublegal PHI rates have decreased in Area 2B, 2C, 3A, and 4A-Bering Sea, have risen in Areas 2A, 3B and 4C, and have risen dramatically in Area 4A-Aleutians. The rate of sublegal PHI in the other Bering Sea areas is relatively unchanged from 2005.

Results

Approximately 75,000 halibut were examined during the 2007 IPHC SSA surveys. The proportion of moderate injuries in Areas 4A increased relative to

the minor injuries. The distribution in other areas remained relatively unchanged. Since we started collecting PHI data, the incidence of PHIs in the Gulf of Alaska areas has ranged from 4 to 8 percent, and has not exceeded 10 percent.

Bering Sea NMFS trawl survey

In 2007 the Commission participated in the NMFS's annual Eastern Bering Sea shelf trawl survey for the tenth straight year. The survey is a continuation of a time series started in 1975, then conducted annually since 1979. The 2007 survey took place from June 4 to August 2 aboard vessels chartered by NMFS ; the *F/V Arcturus* and *F/V Aldebaran*. An IPHC sampler was aboard the *F/V Aldebaran* to assess Pacific halibut for length, otoliths, gender, maturity, and prior hooking injuries. In addition, all halibut greater than 55 cm fork length were scanned for PIT tags.

A total of 1570 halibut were examined in the Bering Sea during the NMFS trawl survey.

The survey spanned a geographical region from the eastern Bering Sea continental shelf from inner Bristol Bay to the shelf break, and between Unimak Pass to north of St. Matthew Island. It consisted of 376 stations (176 performed by the *F/V Aldebaran* and 200 by the *F/V Arcturus)* positioned on a 20 nmi x 20 nmi grid on the continental shelf in the eastern Bering Sea, in depths ranging from 30-200 m. In areas surrounding St. Matthew and the Pribilof Islands, grid block corners were also sampled to better assess blue king crab (*Paralithodes platypus*) concentrations. Survey sampling began in Bristol Bay and progressed westward toward the EBS outer shelf along alternate grid columns. West of the Pribilofs, the *F/V Aldebaran* generally sampled the southern stations and the *F/V Arcturus* the northern stations.

In total, 1,570 halibut were captured and sampled: 946 on trip one, 579 on trip two, and 45 on trip three. Of those sampled, 818 were female, 730 were male and 22 were unidentified. Prior hooking injuries were found on 2.2 percent of the fish; 20 showed minor damage, 12 showed moderate damage, and three was severely damaged. Of those, 19 were female and 16 were male. All halibut encountered that were greater than 55 cm in length were scanned for PIT tags regardless of whether they fell within the otolith sample. Due to failing equipment, there was a period of several days on the second trip where no halibut were scanned. In all, 426 halibut were scanned and no tags were detected.

Gulf of Alaska NMFS trawl survey

In 2007 the Commission also participated in the NMFS Gulf of Alaska (GOA) bottom trawl survey of groundfish and invertebrate resources. The survey was a continuation of a time series started in 1984. Three vessels were chartered to carry out the survey; *F/V Gladiator, F/V Sea Storm*, and *F/V Vesteraalen*. Each vessel was staffed with a fishing crew and six scientific crew. The main objective was to gather data to extend this time series for monitoring trends in distribution, abundance, and biological condition of various groundfish stocks in the northeast Pacific Ocean. An IPHC sampler was aboard the Gladiator to specifically collect Pacific halibut data and to assist the NMFS scientific crew in attaining their survey goals.

The survey area stretched from the Islands of Four Mountains (170^{0} W longitude) to Dixon Entrance (132^{0}W longitude) between the depths of

approximately 15 and 1000 m. The *Gladiator* left Dutch Harbor on May 28 and conducted the first survey tow on May 30. A total of four trips were made with ports of call being Sand Point, Kodiak, Seward, and Ketchikan. The final tow was made on August 4 and the vessel reached Ketchikan on August 5 to conclude the cruise.

The biologists aboard the *F/V Gladiator* sort the haul. Photo by Paul Logan.

The *Gladiator* attempted 311 tows over the course of the survey, completing 283 successfully: 68 on trip one, 86 on trip two, 87 on trip three, and 70 on trip four (62, 80, 84, and 59 successful tows, respectively). The stations ranged in depth from 38 to 598 m. A total of 2,598 halibut were captured and sampled; 1,048 females and 1,549 males.

All halibut caught were examined for PHI: 73 showed minor damage, 45 showed evidence of moderate damage, and six were severely damaged. This was a PHI rate of 4.8 percent, within the range seen in the past several surveys. All halibut greater than 55 cm in length were scanned for PIT tags, but none were found. A total of 209 halibut smaller than 30 cm in length were bagged and shipped to the IPHC office for further assessment.

Size at maturity

Of the females sampled, 92.7 percent were coded immature, and 7.2 percent of the males were coded immature. The percentage of mature females has remained relatively constant over time while the percentage of mature males has increased in recent years. Concurrently, the average length of the mature males has decreased. A similar trend has been observed in the Bering Sea NMFS trawl data.

The percentage of females coded mature has remained relatively constant over the years while the percentage of males coded mature has increased.

IPHC Research

Tagging studies

There are currently several different kinds of tagging studies taking place at the IPHC including ongoing wire tag recoveries, PIT tags, and PAT tags.

Tagging studies allow the Commission to better understand various aspects of halibut: age, growth, migration, and mortality, as well as the stock's utilization by the fishery. Since we began tagging halibut in 1925, over 450,000 tagged halibut have been released, and, to date, we have recovered more than 47,000 of these releases. In 2007, although the Commission conducted no tag release experiments during the year, one wire-tagged halibut was recovered and eight passive integrated transponder (PIT) tags from demonstration charters, as well as 73 recoveries from double-tagging (wire and PIT) experiments.

In addition to wire and PIT tags, in 2002 the Commission began using Pop-up Archival Transmitting (PAT) tags: electronic tags that collect environmental data such as temperature, depth, and light while attached to the fish by a leader and a thin metal wire. On a pre-programmed date, the wire is broken by an electrical current, sending the tag floating to the surface, where it begins transmitting to a satellite that uploads the accumulated data and determines the tag's final position. In 2007, a number of IPHC studies, summarized below, relied on PAT tags for data.

Tag recoveries

The IPHC offers rewards for the recovery of wire tags and PAT tags from halibut. If you need information on how to redeem a tag, please contact the IPHC directly.

Recoveries from experiments using wire tags only

The IPHC has not conducted experiments which employed wire tags exclusively since 1995, therefore recoveries from these experiments are becoming increasingly rare. In 2007, one tag from the 1995 trawl mortality experiment was recovered. Overall, recovery rates from the most recent wire tag experiments vary from four percent in the trawl mortality experiment conducted in 1995 to 47 percent in the 1988 Sitka Spot Experiment.

PIT tag recoveries

In 2003, the IPHC undertook a large-scale mark/recapture experiment using PIT tags. In this primary experiment with PIT tags, the Commission PIT-tagged and released 43,999 halibut coast-wide on longline surveys between late May and early September, 2003. An additional 23,437 PIT tags were released in 2004 in IPHC Regulatory Areas 2B and 3A.

The PIT tag is about the size of a grain of rice and is composed of an integrated circuit chip and antenna coil encapsulated in glass. Each tag has a unique alphanumeric code that can be transmitted and read *in situ* when the tag is energized by an electronic reader. The PIT tagging experiment was designed to provide the IPHC with unbiased estimates of exploitation rates independent from the assessment model, with a secondary objective of providing information on migration.

Tachi Sopow scans whole halibut for PIT tags in Sitka, Alaska. Photo by Joan Forsberg.

Recoveries from experiments using both wire and PIT tags ("double-tag") experiments

The Commission conducted two double-tag experiments: in August 2001, two hundred eighty-one halibut were tagged with both a wire tag and a PIT tag inserted in the "old" tag site (on the dark side of the head anterior to the eye); and in September 2003, a second double-tag experiment conducted in Hecate Strait, BC used both wire and PIT tags. In the 2003 double-tagging study, the PIT tags were inserted in the site used for the main PIT tag experiment (under the skin and over the interopercular bone).

Two tags were recovered from the 2001 double-tag experiment in 2007. Both of the heads were scanned and both PIT tags were operational. There were 73 recoveries from the 2003 double-tag experiment this year.

An experiment in 2003 set out to look at the shedding rate of PIT tags. Of the 638 halibut examined, two percent (15 tags) either shed or were broken and inoperable.

The purpose of the 2003 double-tagging experiment was to determine the *in situ* PIT tag shedding rate. Of the 660 fish recovered from the double-tag study, 638 were scanned to determine whether their PIT tags were working. Thirteen PIT tags were found to have shed and an additional two were present but broken for a combined shedding/breakage rate of two percent.

In some cases, only the PIT tag was found from the double-tagged fish. Generally, if a PIT tag is found during scanning, the scan sampler examines both sides of the head. In some cases, the PIT tag was found in the memory of the hand-held scanner after the offload, so the head was not examined for the presence of a wire tag. Of the 660 recovered double-tagged fish, three heads were not examined for the presence of a wire tag. Wire tags were found to have shed from 37 recovered double-tagged fish, for a shedding rate of six percent.

Over 98 percent of the recoveries from the 2003 double-tag experiment have taken place in British Columbian waters. Nine double-tagged fish were recaptured in southeast Alaska, one was recovered in Washington and one in Oregon.

In 2007, over a million halibut were scanned for tags.

Portside and survey vessel sampling for recovered PIT tags

In 2007, the Commission conducted scanning for PIT tags in the coastwide commercial halibut catch, as well as on IPHC setline surveys and the NMFS trawl surveys. This was the fifth year and fourth full season of the PIT scan sampling program, and with continued good cooperation from processors, everything went smoothly. Samplers conducted scanning from March 10 through November 15, scanned a total of 1,094,979 halibut during that time, and recoverd 507 PIT tags.

In Alaska and B.C. samplers were deployed in the same ports staffed by IPHC port samplers, with the addition of Ucluelet and Tofino in BC. Scanning in BC and Alaska was concurrent with the start of the fishing season with the exception of St. Paul, where scanning occurred July through September. In Area 2A, the 2007 scan sampling began in March with the Washington tribal commercial fishery in the ports of Neah Bay, Taholah, and Bellingham. Non-tribal commercial sampling in Area 2A took place in Newport, Oregon for the four fishing periods occurring between late June and mid-August. Halibut landed as incidental catch in the Washington sablefish fishery were sampled in Bellingham from May through October. Area 2A is also the only IPHC area where samplers scan sport catch, due to the relatively large portion of the 2A quota (38 percent) that is allocated to the sport fishery. Sport catch sampling was conducted in the Oregon ports of Newport, Depoe Bay, Garibaldi, and Charleston, and in the Washington ports of Ilwaco, Westport, La Push, and Neah Bay. The overall coastwide scanning rate was 41%, and scanning rates were greater than 25% in all areas except Area 4B.

Scan sampler, Jennifer Conrad, works an offload in Homer, Alaska. Photo by Lara Hutton.

In terms of numbers scanned, April was the busiest month for Area 2C, May was the busiest month for Areas 2A and 3A, June was the busiest month for Area 4B, August was the busiest month for Areas 3B, 4A, 4C, and 4D, and October was the busiest month for Area 2B. The months with the most fish scanned corresponded to the months with most pounds landed in all regulatory areas except for 2B, 2C, and 4B.

Samplers detected 507 PIT tags over the season: 293 were releases from the primary experiment conducted on the 2003 setline survey; 194 were recoveries of tags released in 2004; eight were recoveries of tags from demonstration charters conducted in 2002 and 2003; and an additional 12 recoveries were tags released in the 2003 double-tag experiment.

Scanning of seeded commercial halibut deliveries

To evaluate the ability of scan samplers to detect PIT tags in a load of fish, port samplers would periodically seed deliveries of halibut with PIT tags. Seeding involves inserting a small, known number of PIT tags into a larger group of dead fish or heads. The seeded heads or fish are then mixed with untagged heads or fish; once the fish are scanned, the number of tags detected can be compared with the number seeded. In 2003 and 2004, sea samplers seeded PIT tags in every trip of IPHC setline survey halibut delivered to ports staffed by a scan sampler. To achieve a more even distribution of seeded PIT tag detection tests among ports and over the season, samplers began seeding commercial deliveries of halibut in 2005.

In order to make sure scanning protocols are detecting every tag, some deliveries are "seeded" with PIT tags as a quality control measure.

Seeding has been successful in indicating whether samplers are using standard scanning protocol. In 2004, detection rates of tags seeded in survey deliveries, along with other evidence, indicated the need for additional training of scan samplers and refinement of the scanning protocol. In addition, IPHC office staff conducted tests in January 2005 using tagged kitchen sponges (much easier to catch than halibut) to test the robustness of the scanning protocol under variations in scanning speed and number of passes over the tag site. The office staff found that scanning too quickly and in a single direction resulted in missed tags. So the Commission has stressed consistent application of the standard scanning protocol at scan sampler training and during follow-up visits in the field since 2005.

In 2007, PIT tag seeding detection tests were conducted on 202 commercial halibut deliveries. A total of 1,001 PIT tags were seeded among 52,649 halibut in these tests. Of the 202 tests, 191 were successfully scanned. Eleven tests were excluded from analysis either because the scan sampler was unable to scan all fish in the sample, or the sample was not scanned at all, or the electronic reader used to scan for PIT tags malfunctioned.

Detection rates of unmarked seeded tags were high for all ports and all areas combined, averaging 96% in successful tests. The average detection rate for seeded tags in 2007 was similar to that of the 2006 tests (97 percent) and much higher than in 2004, when the detection rate was only 77 percent. The number of tests performed and tags seeded in 2007 was lower than in 2006, and two major ports were significantly under the target number of 100 unmarked seeded tags for the season. Only slight differences appeared in the detection rate for halibut seeded and scanned as whole fish or as heads.

Scanning on survey vessels

Sea samplers scan the survey catches in both the setline and trawl surveys to look for PIT tags.

Sea samplers were instructed to scan all halibut caught on setline and NMFS trawl surveys beginning in 2006. However, some halibut were not scanned for various reasons (fish lost at roller, tag site damaged, equipment problems, sampler forgot to scan, etc.).

In 2006, setline survey samplers made notes if some or all fish on a set were not scanned, but this information was not entered into the database, so

PIT tags have been detected on the NMFS trawl survey.

an estimate of the number of fish scanned was derived from the number of fish measured

In 2007, sea samplers recorded a code on the data forms when an individual fish was not scanned. These non-scanning codes were entered into the database, so an accurate count of pieces scanned was available. All but 209 halibut measured on setline surveys in 2007 were scanned. Human error (i.e., forgetting to scan) and damage to the tag site were the most common reasons halibut were not scanned in 2007.

A total of 76,919 halibut were scanned on the summer setline surveys in 2007 and 49 PIT tags were recovered. Of the 49 tagged fish recovered, 46 were captured on the station of release and 48 were recovered within the statistical area of release. One halibut tagged in Area 4A in August 2003 was caught in Area 3A in July 2007.

As in 2006, in 2007 sea samplers onboard NMFS trawl surveys scanned all halibut larger than 55 cm. A total of 495 fish was scanned in 2006 on the Eastern Bering Sea survey, and 1,493 were scanned in 2007 (426 on the Eastern Bering Sea survey and 1,067 on the Gulf of Alaska survey). Thirty-seven halibut fitting the scanning criteria were not scanned on the third trip of the GOA survey because of equipment failure. No tags were found in either year in NMFS trawl survey-caught halibut.

Recoveries from experimental PAT tagging experiments

Data suitable for analysis were recovered from 72 tags: 56 that produced only satellite based data transmissions, appropriate for analysis of offshore-onshore migration, and 16 that were physically recovered, providing detailed archival records amenable to characterization of spawning behavior as well as analysis of migration. Of the tags that only reported to satellites, 23 produced full-year records covering the winter of 2005–2006, twelve produced records extending through the winter of 2006–2007 to March 1, and 21 produced records through the winter of 2006–2007 to February 15. None of the tags deployed in 2000 produced data transmissions because of an internal software error that prevented their release from their host fish.

Satellite tags have been used in recent years to gain a better understanding of halibut migration behavior.

However, three tags deployed in 2000 were physically recovered after collecting data throughout the winter of 2000–2001: recovery dates were April, 2001, September, 2002, and June, 2006. An additional 13 tags were physically recovered from the latter deployments. Eight tags from 2005 deployments were recaptured prior to their programmed release dates, with recapture dates that ranged from March 5 to May 29, 2006. Two tags from 2005 deployments were found awash following successful release and transmission after 365 days at-liberty. Three tags from 2006 deployments were found awash after release: two from the February 15 transmission group and one from the March 1 transmission group.

Using PAT tags to evaluate early-spring dispersion of halibut from Areas 2A and 2B

In recent years the halibut industry has requested that the Commission consider the merits of season extension, particularly by allowing commercial harvest earlier in the spring. While halibut spend the summer in shallow shelf waters, they are known to spawn on the slope in winter and many halibut in the eastern Gulf migrate northward to do so.

Analysis of conventional tagging data and early archival tagging suggest that a large proportion of Canada's fishable summer biomass spawns in northward Regulatory Areas and may therefore be susceptible to interception if the fishery is opened prior to their return to summer feeding grounds.

This study used PAT tags to examine the proportion of Area 2B stock that might be located out-of-area on three possible season opening dates: February 1, February 15, and March 1. Additionally, it examined the location of Area 2A summer residents on two dates: February 1, and February 15. A total of 78 PAT tags were deployed during the 2006 setline survey in Areas 2A and 2B, with tags programmed to pop up in 2007. Seven tags were physically recovered during 2006: two from the Area 2A deployments and five from Area 2B. Six tags were recaptured by the fishery prior to their release dates, ten released prematurely from their host fish, and three were never accounted for. Fifty-six tags functioned as programmed and reported on their pop-up dates: twelve from 2A and 44 from 2B.

In addition, one of the premature releases from the Area 2A tagging reported its position on January 18, and could therefore be included in the 2A dispersion estimate. Of the fish tagged in 2A, a total of five were located northward of Area 2A on their pop-up dates; four had moved to 2B and one to Cross Sound in southeast Alaska (Area 2C). There was no apparent difference in dispersion rate by date. A total of three fish tagged in Area 2B were located northward of Area 2B on their pop-up dates. These fish were all located in Area 2C: one at Cape Ommaney on February 1, one in Clarence Strait on February 15, and one in northern Dixon Entrance on March 1. Date-specific dispersion was considerably lower than we had predicted it would be, based on earlier analyses from conventional tagging. Differences may have resulted from having tagged larger fish in the PAT study than in conventional tagging work, a change in behavior in the period between the studies, having tagged fish in different seasons in the two studies, or recovery biases in conventional tagging that were absent in the PAT data.

PAT tagging suggests that the Area 2A summer-resident population moves northward in the winter to spawn.

This halibut is being outfitted with a PAT tag. Photo by Lynn Mattes.

The halibut that moved northward from 2A to 2B during the winter were aggregated with halibut that had been tagged further north in Area 2B.

In Area 2A, the results suggest that a large proportion of the summer-resident population migrates northward in mid-winter. Area 2A emigrants were found primarily around the Queen Charlotte Islands in British Columbia, near Langara Island and Cape St. James. This generally supports our hypothesis that 2A summer residents spawn in northern Regulatory Areas, since the location of the emigrants corresponds with known major spawning aggregations.

In addition, the fish that moved northward were aggregated with other fish that had been tagged in Area 2B, some of which conducted off-bottom putative spawning rises shortly before their tag release dates. However, total rates of dispersion were lower than anticipated, with approximately 60 percent of the tagged population being located in Area 2A on the chosen dates. Particularly intriguing is the observation that fish tagged in Washington waters off Cape Johnson, the farthest north tagging site in the Regulatory Area, tended to remain at their tagging location. One of these fish moved northward into Area 2C, but the four others displayed movements of only 14-34 km (6-21 nmi). The aggregation of these fish in this area may indicate a spawning ground farther south than previously documented by IPHC.

This hypothesis is supported by information from local Makah fishers who have reported that their ancestors historically fished this area during mid-winter with reasonable success. Alternatively, this may be an area where fish that are either immature or in the process of skipping spawning aggregate in lieu of participating in the autumn spawning migration. Given the size of these four fish, it is highly unlikely that they all could have been immature. Unfortunately, it is impossible to know whether any of these fish actually spawned at any time during the tagging period, but if their tags are ever physically recovered there is an excellent possibility of obtaining greater resolution on this issue.

For fish tagged in Area 2B, the results failed to corroborate our prediction, based on earlier analyses from conventional tagging, that a higher proportion of halibut would be found in northward Regulatory Areas on the selected dates. Dispersion rates observed here were roughly ten times lower than rates estimated in the conventional tag analysis. It can not be ruled out that some of the tagged halibut in the present study may have emigrated to Alaska earlier in the winter than their pop-up dates and then returned to Canadian waters by February 1.

Using PAT tags to assess seasonal migration and putative spawning location of adult Pacific halibut in the southeast Bering Sea

According to the behavior of the PAT tagged halibut in the Bering Sea, there is no evidence that Bering Sea halibut move to the Gulf to spawn in winter.

In 2002 the IPHC, in collaboration with the University of Alaska, Fairbanks, began an electronic tagging study designed to investigate fall migration timing and likely spawning areas for eastern Bering Sea halibut. Adult halibut were tagged with PAT tags at St. Paul Island in 2002 and at Atka and Attu Islands in 2004. In 2006, the originally-proposed five-site deployment design was completed. Twelve fish were tagged at Middle Canyon on the 4D Edge and another twelve at Bering Canyon on the 4A Edge. Fish ranged from 110-140 cm fork length. Tags released from their host fish on February 1, 2007. The majority of fish were located near to their tagging sites in Middle and Bering Canyons. One fish tagged at Middle Canyon moved to Bering Canyon, and another moved to the eastern Aleutian Islands, north of Amukta Island.

One fish tagged at Bering Canyon moved to the eastern Aleutians, north of Umnak Island. The results provide no evidence that adult Pacific halibut that feed in the eastern Bering Sea leave the region in the winter to spawn in the GOA and,

combined with the results of previous Bering Sea satellite tagging, suggest that Bering Sea halibut are reproductively isolated from those in the Gulf of Alaska. The results also suggest that Middle Canyon is likely to represent an important local spawning ground; this is considerably farther north than the northernmost documented spawning ground in the eastern Pacific (Pribilof Canyon).

The results of this study provide no evidence that adult Pacific halibut that feed in the eastern Bering Sea leave the region in winter to spawn in the GOA. This is consistent with the results of prior Bering Sea satellite tagging experiments that also failed to demonstrate seasonal mixing between the Bering Sea and Gulf of Alaska. The present experiment brings the total sample-size of Bering-tagged halibut to 42, and includes tagging at the geographic location most likely to yield movement between the two ocean basins: immediately north of Unimak Pass.

Use of archival tags to study migration and behavior of male and pre-recruit Pacific halibut: phase I

In 2006 the IPHC began investigating the possibility of implanting internal electronic archival tags into halibut that have traditionally been considered too small to carry standard PAT tags. Our long-term objectives are to obtain data on seasonal depth distribution, vertical migration, and light-based longitudinal estimates for small halibut and in situations where multi-year data are desirable. The objectives of the first phase of this project represent preliminary work required to initiate field-based studies: 1) develop surgical techniques required for implantation of archival tags, 2) assess and document physical recovery following tag-implantation, 3) compare the relative performance of three specific models of archival tags, 4) determine the effectiveness of ultrasound as a non-invasive technique for sex determination.

Twenty-four halibut were captured on July, 2006, transported to the Oregon Coast Aquarium (Newport Oregon), and 15 were surgically implanted with internal archival tags in October, 2006. The fish were held to subject them to a full-year post-surgical holding period to monitor for surgically-induced mortality, behavioral changes, and tag rejection. No mortalities were incurred due to tag implantation; one fish died nine months after surgery due to a dramatic uncontrolled increase in rearing temperature. No tag rejection has occurred, and no obvious tag-induced changes in behavior have been observed. The fish were sacrificed during the first week of December, 2007, and internally inspected for physiological interactions with the archival tags. Veterinary ultrasound will be investigated as a tool for determining their sex in a non-invasive manner.

Estimating halibut hooking success using DIDSON sonar

During the summer of 2007, the Commission conducted a fishing experiment using the DIDSON (Dual frequency IDentification SONar) acoustic camera to observe halibut around baited hooks. This study was designed to investigate halibut hooking behaviors to better describe the hooking success curve for halibut on #3 circle hooks.

The DIDSON acoustic camera is an effective tool for such studies; it can provide continuous, high-resolution imagery of approaches to the gear, hook attacks, and escapes, despite conditions of darkness and sometimes high turbidity.

The camera has been demonstrated as a device for observing fixed fishing gear, and our deployment borrowed much of the design of their system, although our frame was more rugged. This system was previously used by the IPHC in 2006 to investigate the behavior of halibut and rockfish in the vicinity of fish pots.

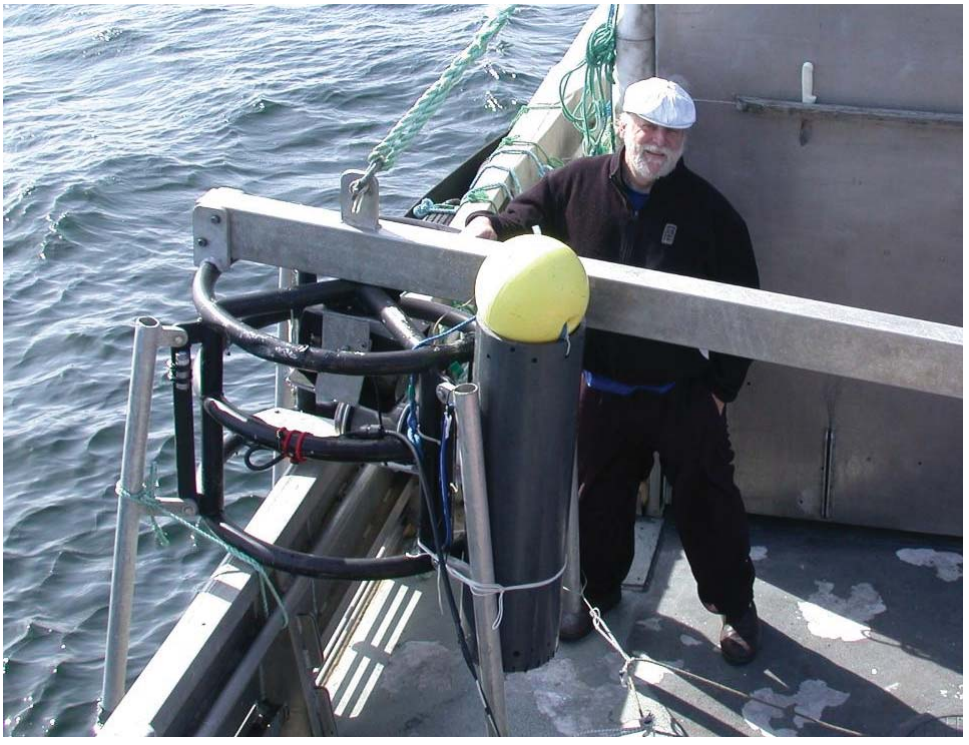
The purpose of the study was to verify, by direct observation, the hooking success curve for halibut on setlines. Halibut hooking success is an important component of the length-specific selectivity which is used in the Commission's stock assessment model. This selectivity has most recently been estimated using multiple marking experiments as being dome shaped: increasing from a low value for small halibut to a peak at some fork length around 110 to 140 cm, then dropping off again. The halibut hooking success curve was previously estimated from direct camera observations of 42 shallow-water hook attacks which resulted in 21 halibut captures. This current project was designed to generate a larger set of observations and operate in deeper, more appropriate depths.

IPHC researchers got a first hand look at how halibut attack bait by using a hi-tech acoustic camera.

A 10-day experiment was conducted 13-22 August, 2007 from the 17.7-meter fishing vessel *F/V Free to Wander.* Fishing locations were based on local knowledge of the vessel crew and a review of catches at IPHC survey grid stations during the previous three years. IPHC Regulatory Area 3A was selected as having fishing grounds suitable for the experiment. The vessel was supplied with a list of IPHC survey stations with high catches of halibut in Area 3A during recent years.

Fishing locations and fish catches

The vessel deployed the apparatus 68 times in total. Deployments, which averaged about one hour in duration were made between the hours of 6 AM and



Biologist Steve Kaimmer examines the DIDSON between launches. Photo by Steve Wischniowski.

10 PM. As many as twelve deployments were made per day.

The first three deployments were conducted in shallow water from the anchored vessel in order to configure the DIDSON and frame. The next five days were spent in Prince William Sound, around Montague Island. Catches on these days were disappointing. For the remainder of the charter, we ran to outside waters around Portlock Bank where catches were more favorable.

As many as four halibut were caught on many of these deployments. The charter ended a day early to avoid a large weather system. Because of a perceived problem with the DIDSON battery case, combined with the almost 14-hour run from the fishing area to harbor, it was decided that it would not be practical to return for a single, final day's fishing. In all, we caught 50 halibut on the DIDSON gear. While the live video feed remained in operation, we took note of halibut behaviors at sea. For each gear deployment, first observations and subsequent behaviors of halibut were observed and recorded. These behaviors were classed into one of the following categories: 1) approach or first observation; 2) lying on the seafloor; 3) biting the hook; 4) darting while hooked; and 5) successful escape. Subsequent to the loss of the transmission capability of our hauling cable, we performed cursory video file reviews after each download. Final file review will be conducted during the winter of 2007 and into 2008.

While bait attacks were not as numerous as hoped, the project proved the DIDSON to be the right tool for the job.

This project had many successes, not the least of which were the excellent performance of the DIDSON sonar and the deployment frame and protocol, and the continuing development of the data transmission system. While we had hoped to observe more fish captures, we did observe enough hook attacks and hooking events to generate an initial estimation of the hooking success curve. We have proposed a subsequent trip to be conducted during 2008 which will gather more observations on the #3 hooks, as well as a fresh set of observations on the smaller #6 hooks.

2007 hook size and spacing experiment

The Commission also conducted a fishing experiment using different combinations of hook sizes and hook spacings during the summer of 2007. The 2007 experiment was a repeat of an experiment conducted in 2005 that was conducted in an area with higher halibut densities. This study was designed to address potential differences in CPUE and size selectivity of selected combinations of hook size and hook spacing in the commercial fishery relative to the configuration of the standard IPHC survey skate. Compared with the 2005 experiment, the 2007 experiment in lower halibut density grounds resulted in a strong relationship between hook spacing and the weight of legal-sized halibut caught. Larger hook spacing resulted in higher catches of legal-sized halibut, by weight. Hook size had negligible impact on catch of legal fish (weight or number) but smaller hooks caught more sublegal-sized fish.

A hook size and spacing experiment was conducted to look at gear configurations in the commercial fishery compared to that used in the setline survey.

Results

Fishing commenced on 14 July and was completed on 12 August. The experiment was completed with three 6-fishing day trips, and one 5-fishing day trip. A total of 44 sets were successfully completed, occupying 22 station locations. During the course of the experiment, the gear caught 3,325 legal-sized halibut (this compares to 10,408 legal sized halibut caught during the 2005

experiment), with an estimated weight of 85,421 net pounds, and 2,596 sublegal-sized halibut. Fishing depth ranged from 29 to 160 fathoms.

The CPUE of legal-sized halibut increased with increasing hook spacing, and generally increased with hook size. The CPUE of the largest hooks (#3) was actually less than the next smaller hooks (#4). There is no clear relationship between the catch of sublegals and hook spacing, although sublegal catch is higher on the smaller hooks.

A complete analysis of the results of this experiment, in combination with the 2005 experiment, is in progress.

A tub of gear on the *F/V Waterfall*. Photo by David Bryan.

2007 dogfish mischmetal experiments

During 2007, the IPHC and the NMFS Fisheries Behavioral Ecology Program in Newport, Oregon, conducted joint studies on the effects of rare earth metals on dogfish and halibut feeding behavior. These studies were jointly funded by the IPHC and NOAA's Bycatch Reduction Program. The study purpose was to investigate the potential for using these metals as a deterrent for spiny dogfish (*Squalus acanthias*) capture on halibut longlines.

Mischmetal is a reactive metal that showed promise in the laboratory of possibly deterring attacks on baits.

There were two components to the study in 2007. The first was a laboratory study where attacks on baits by both dogfish and halibut were tested in the presence of two different rare-earth materials (neodymium-iron-boride magnets and cerium mischmetal[1]) believed to deter elasmobranch catch. Experiments were conducted with spiny dogfish and with Pacific halibut in pairwise tests of the rare-earth materials with inert metal decoys. Results of these experiments showed promise for the mischmetal.

Encouraged by the results of the laboratory studies, a fishing experiment, the second component of this study, was then conducted in August of 2007 using pieces of the mischmetal attached to circle hooks to determine whether the deterrent effect seen in the laboratory would transfer to the field.

Field fishing results

Fishing commenced on 25 September and was completed on 1 October. A total of 36 sets were successfully completed, with all fishing conducted within Katchemak Bay, and within 10 miles of the Homer Spit. Halfway through the experiment, the mischmetal pieces were removed from the hooks and weighed.

The mischmetal reacts electrochemically with seawater, giving off an electrical field while undergoing a process of ionization and dissolution, much like a protective zinc anode, but at a much faster rate. On average, the mischmetal triangles had lost half their mass during the first three days of fishing, about 20 hours of soak time on average for each piece of metal. Fresh pieces of metal were put on for the second half of the experiment.

During the course of the experiment, the gear caught 141 legal-sized halibut, with an estimated weight of 2,800 pounds; 178 sublegal-sized halibut; and 2,062 dogfish. Fishing depth ranged from 29 to 58 fathoms. The mischmetal gear caught fewer dogfish on average for 50 hooks fished (17.0) compared to the dummy and standard gear (19.2 and 21.1, respectively). The mischmetal gear caught slightly more halibut on average for 50 hooks fished (27.0) compared to the dummy and standard gear (26.5 and 24.6, respectively).

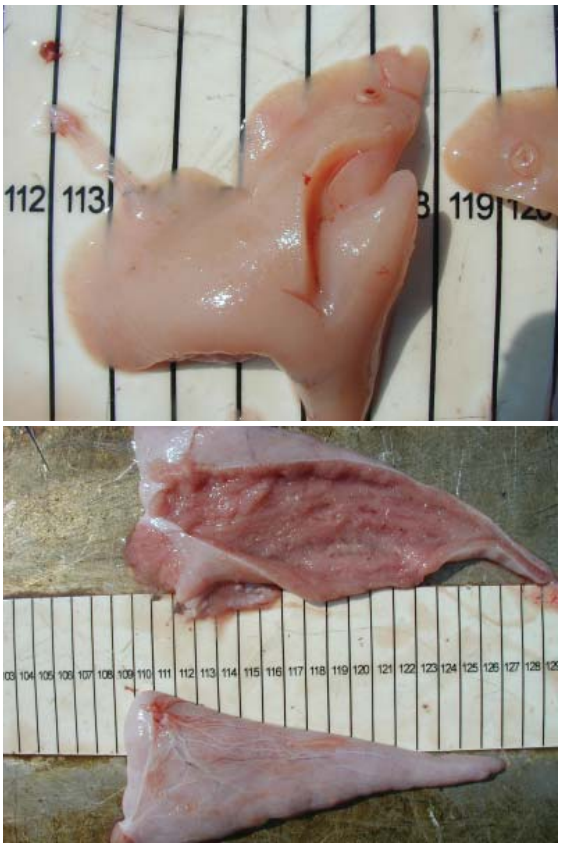
The field trials showed a 20 percent decrease in dogfish catches where mischmetal was used. However, the metal is expensive, highly reactive and degrades quickly, making it impractical.

The field trials showed a significant, 20 percent, decrease in the dogfish catches on gear protected with mischmetal. While this was statistically significant, the practical application of this particular metal for dogfish catch reduction is unlikely. The metal itself was reasonably expensive, somewhat difficult to cut and shape, and had a high rate of dissolution. There may be other reactive metals, or electrical field generators, which would be practical. The difference in effectiveness from the lab to the field might be due to a 'frenzy' type of feeding behavior. What might deter a single dogfish in a lab setting becomes less of a barrier when many dogfish are approaching baits in the field.

Genetic population structure in spawning adults of Pacific halibut

The IPHC manages Pacific halibut under the assumption that a single fully mixed population exists from California through the eastern Bering Sea. This assumption rests largely on studies that indicate that drift of larvae to the northwest is balanced by migration of juveniles and adults to the southeast, over broad geographic expanses. In an effort to explore the validity of this assumption, in 2002 a project was initiated to investigate genetic population structure in the northeast Pacific. Although the initial analyses suggested population differentiation, that interpretation could not be verified without replicating the study over time. Thus, the study was conducted again in 2004, expanded to spawning groups from British Columbia, the central Gulf of Alaska, and southeast Bering Sea, and then again in 2007. In 2007, a charter was conducted to obtain a sample from the Aleutian Islands that will allow us to expand the geographic scope of the analysis.

The Commission chartered three longline vessels during January and February 2007 to sample four regions: two in the Gulf of Alaska (the Queen Charlotte Islands and Portlock Bank); one in the southeast Bering Sea (Pribilof Canyon); and one in the Andreanof Islands. Fishing was not confined to specific set locations in any region. For the first three regions, vessels were allowed to fish anywhere within established rectangular boundaries that corresponded to the boundaries established in 2004. For the Andreanof region, the vessel was allowed to fish anywhere west of 172º W longitude. Within these general regions the captain of the vessel, in coordination with Commission staff, was allowed to "prospect" in order to find aggregations of spawning adult fish, targeting



Gonads from a mature male (top panel) and a mature female (bottom panel). Photos by Chris Clarke.

Samples were collected to look at the degree of genetic differences among mature halibut in different regions.

high catch regions in order to complete sets during good weather. Charter specifications stipulated that for the first three charter regions all fishing was to be conducted between January 10 and February 21. The Andreanof region could be fished until February 28. These periods correspond to the peak in known spawning activity. The Queen Charlotte Islands region was chosen to represent the southernmost known major spawning location in the Gulf.

Samples were collected from 100 mature males and 99 mature females at the Queen Charlotte Islands; from 100 males and 200 females at Portlock Bank; from 99 males and 100 females at Pribilof Canyon; and from 158 males and 100 females in the Aleutian-Andreanof Islands. Comparative analysis of these samples with those collected prior to 2007 suggests differentiation of the Pribilof Canyon population from the populations at Portlock Bank and the Queen Charlotte Islands.

Patterns observed in size structure and abundance between regions can be caused by factors other than reproductive isolation, such as regional differences in mortality or responses to environmental conditions. In light of this, attempts have been made to identify reproductive units using a variety of genetic techniques. However, the results of existing genetic analyses are themselves difficult to interpret due to a number of study limitations. Hence, the true nature of the relationship between population components within the Bering Sea and Gulf of Alaska remains elusive.

Results

In total, 6279 genotypes were obtained, with an average of 40 individuals of each sex screened at each location (a total of 392 individuals). The quality of genotypes was generally good. Although differentiation among all samples was not significant, pooling of 1998 and 2004 samples from the same showed a weak but significant overall differentiation supported by two locations. Paired tests for differentiation suggested genetic differences between Portlock Bank and the Pribilof Canyon.

The interpretation of the analyses of population differentiation is complicated by the various factors, but nevertheless the analyses indicate

differentiation between Pribilof Canyon and Portlock Bank populations. Interestingly, increasing the number of locations from previous studies had little effect on overall results, but increasing sample sizes by pooling temporal samples showed some significant differentiation.

Furthermore, as genotypic tests are sensitive to missing data, it would be important to fill gaps in the current data set. In the future, extending the geographic scope of the survey to include the Aleutian Islands west of Amchitka Pass may be productive, as would be the inclusion of samples from outside of the range, such as the western Bering Sea and even samples from a population of Atlantic halibut.

The nature of the relationship between Gulf of Alaska and Bering Sea halibut populations remains elusive.

In addition, researchers suggest two primary avenues of further research: using mitochondrial DNA as an additional marker, since it is maternally inherited and could provide evidence of sex-biased migration; additionally, analyzing other genetic markers may improve our ability to detect stock structure in a species with such high dispersal potential and such large populations as Pacific halibut.

Can otolith chemistry determine halibut nursery origin?

Nursery grounds for eastern Pacific halibut are located throughout the Gulf of Alaska and southeastern Bering Sea. Following approximately two years of nursery residence, juveniles are believed to migrate to the southeast, arriving on fishing grounds at age 4-5. Little is known, however, about the distances juveniles migrate or whether individual fishing grounds are supplied by specific nursery areas or are populated by a complex mixture of individuals reared throughout the geographic range.

The ultimate intent of this project is to study the dispersal patterns of early juvenile halibut and to determine the relative importance of various stretches of coastline in generating recruitment and the extent of a population's dependency on local and distant nurseries. Such information would be valuable in predicting the impact that localized disturbance and anthropogenic activities may have on recruitment, and would represent a link between past and future larval investigations, and ongoing adult tagging and genetic studies.

A project is underway to try and determine whether fishing grounds are supplied by particular nursery grounds or by a complex mix of halibut from throughout their range.

An earlier phase of this study demonstrated that the otoliths of juvenile halibut from different grounds possess unique chemical signatures that may be used to ascertain the nursery origin of adults and movement of juveniles. Field work during 2007 attempted to locate halibut nursery grounds—areas where halibut larvae settle from the water column and assume a benthic existence—between southern Dixon Entrance and southern Queen Charlotte Sound, British Columbia. The areas targeted in 2007 represented regions never before visited in this respect. In 1973, age-1 halibut were captured in southern Dixon Entrance, offshore Wiah Point, Graham Island. This strongly suggested that halibut nursery habitat might extend southward into Canadian waters. However, age-0 halibut were not encountered. No IPHC research has captured age-0 halibut south of Frederick Sound, Alaska, nor are we aware of other research having done so.

Vessel charter

In early summer, 2007, a charter was awarded to the *F/V Royal Pride* (home port Prince Rupert) to provide 22 days of vessel time in northern British Columbia. The *Royal Pride* is a 60' steel-hulled seiner-trawler, equipped with a

shrouded prop and hydraulic stern ramp. The charter began on August 20 from the port of Prince Rupert and was completed on September 11, also at Prince Rupert. Sampling was conducted by fishing a small otter trawl over relatively smooth bottom.

Sampling was initiated on August 21 at McIntyre Bay. A total of 10 sites were visited, and 113 effective tows were executed. Oval Bank and the span from Cape Scott through Hope Island were found to be composed of bottom that was too hard to effectively fish, and of a habitat-type not suitable for halibut settlement. Nets were destroyed at each of these sites. Although nets were not damaged at Virago Sound, depth sounder echoes also suggested bottom that was harder than ideal, and catch-composition was generally indicative of coarse-sediment species. McIntyre Bay, Oval Bay, and Goose Island Banks all produced promising flatfish catches, composed of early juvenile rock sole (*Pleuronectes bilineatus*), English sole (*Pleuronectes vetulus*), and sand dabs (*Citharichthys* spp.). Given the relatively low effort expended at the latter two sites, a reasonable possibility exists that these represent suitable nursery despite the fact that we did not encounter halibut on this charter; it would be premature to eliminate them as a possibility for future work.

The capture of age-0 halibut in Canadian waters suggests at least some level of local recruitment.

Although total halibut catch was small, we did find six age-0 and age-1 fish, from Rose Point through Sandspit. This represents a southern range extension for confirmed halibut nursery habitat, the first settlement area unequivocally identified in Canadian waters. In ecological terms, this may be important because it suggests that Area 2B may be capable of generating at least some level of local recruitment, if the larvae originate from Area 2B spawners. Although prior IPHC research and DFO have routinely encountered age -2 and -3 halibut in Dixon Entrance and Hecate Strait, the origin of these fish is unknown. We know little or nothing about the dispersal abilities of fish this age. Therefore, we do not know if the age-2 and -3 fish encountered in Area 2B may have settled in southeast Alaska, and were captured during their southward ontogenic migration. Age-0 fish captured in August and September are unlikely to have dispersed from their initial settlement sites, and knowledge of oceanographic currents and larval abundance suggests that halibut settling at Dogfish Bank are unlikely to have originated from northerly spawning grounds.

Prevailing currents are known to carry larvae northward along the coast of British Columbia and southeast Alaska. Spawning has not been documented south of Cape St. James, so there is a reasonable possibility that age-0 fish encountered on Dogfish Bank are the progeny of 2B spawners. While it is possible they could originate in the US Pacific Northwest (Area 2A), it is extremely unlikely they could have been spawned north of Area 2B and made their way southward. Further work is warranted to determine whether local hydrography or winter eddies in the Queen Charlotte region represent systems capable of retaining locally-spawned larvae in the area throughout their development period, or whether it is more likely that early juveniles at the Dogfish Bank nursery originate from farther south, at as-yet unidentified spawning grounds.

APPENDICES

The tables in Appendix I provide catch information for the 2007 fisheries. The areas specified are the IPHC Regulatory Areas, depicted in Figure 1 of this report. Appendix II 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 2007 total removals of Pacific halibut by regulatory area (thousands of pounds, net weight).

Table 2. The Area 2B 2006 and 2007 catch limits allocated by the Canadian Department of Fisheries and Oceans and the catch (thousands of pounds, net weight).

Table 3. The 2006 and 2007 sport guided halibut harvest and Guideline Harvest Level (thousands of pounds, net weight) for Areas 2C and 3A.

Table 4. The Area 2A 2007 catch limits allocated by the Pacific Fishery Management Council catch sharing plan and catch (pounds, net weight).

Table 5. The total catch (thousands of pounds, net weight) from the 2007 commercial fishery, including IPHC research catch, of Pacific halibut by regulatory area and month.

Table 6. Number of vessels and catch (thousands of pounds, net weight) of Pacific halibut by vessel length class in the 2007 commercial fishery; a) for Area 2B, Alaska, and the Alaskan regulatory areas, and b) for Area 2A commercial fisheries, not including the treaty Indian commercial fishery.

Table 7. Commercial fishing periods, number of fishing days, catch limit, commercial, research, and total catch (thousands of pounds, net weight) by regulatory area for the 2007 Pacific halibut commercial fishery.

Table 8. Commercial landings (thousands of pounds, net weight) of Pacific halibut by port, and vessel nationality; and IPHC research catch for 2007.

Table 9. Commercial halibut catch (thousands of pounds, net weight) in 2007 by statistical and regulatory area.

Appendix II.

Appendix I.

Table 1. The 2007 total removals of Pacific halibut by regulatory area (thousands of pounds, net weight).

Area	2A	2B	2C	3A	3B	4	Total
Commercial	774	9,694	8,346	26,133	9,047	7,985	61,979
Sport	504	1,556	3,049	6,283	10	46	11,448
Bycatch Mortality[1]:							
Legal-sized fish	250	150	210	990	450	2,880	4,930
Sublegal-sized fish	120	200	130	1,780	790	4,200	7,220
Personal Use[2]	33[3]	300	580	382	49	137[4]	1,481
Wastage:							
Legal-sized fish	3	29	25	53	18	24	152
Sublegal-sized fish	16	438	267	918	423	224	2,286
IPHC Research	15	78	127	360	202	109	891
Total	1,715	12,445	12,734	36,899	10,989	15,605	90,387

[1] Bycatch estimates for Area 2A are from 2006, the most recent year from which data are available.

[2] Estimates for areas off Alaska are from 2006, the most recent year from which data are available.

[3] Treaty Indian ceremonial and subsistence fish authorized in the 2007 Catch Sharing Plan.

[4] Includes 19,700 pounds of sublegal halibut retained in the 2006 Area 4DE Community Development Quota.

Appendix I.

Table 2. The Area 2B 2006 and 2007 catch limits allocated by the Canadian Department of Fisheries and Oceans and the catch (thousands of pounds, net weight).

Fishery	2006		2007	
	Allocation	Catch	Allocation	Catch
Commercial fishery	11,631	11,950	10,089	9,694
Sport fishery	1,589	1,773	1,381	1,556
Total allocation/ catch	13,220	13,723	11,470	11,250
Previous year carryover[1]	80		-37	
Total allocation with carryover / catch	13,300	13,723	11,433	11,250
IPHC research catch		55		78
Total	13,300	13,778	11,433	11,328

[1] Adjustment for carryover/overage amount from commercial fishery.

Table 3. The 2006 and 2007 sport guided halibut harvest and Guideline Harvest Level (thousands of pounds, net weight) for Areas 2C and 3A.

Area	Area 2C	Area 3A
2006 Guided sport harvest	1,804	3,664
2007 Guided sport harvest	1,919	4,002
Guideline Harvest Level	1,423	3,650

Table 4. The Area 2A 2007 catch limits allocated by the Pacific Fishery Management Council catch sharing plan and catch (pounds, net weight).

Area & Fishery	Catch Limit	Catch
Non-treaty directed commercial	227,955	218,709
Non-treaty incidental commercial with salmon troll fishery	40,227	35,214
Non-treaty incidental commercial with sablefish fishery	70,000	48,502
Treaty Indian commercial	461,000	471,427
Treaty Indian ceremonial and subsistence	33,000	33,000
Sport - North of Columbia River	239,636	220,020
Sport - South of Columbia River	268,182	284,074
Total allocation	1,340,000	1,310,946
IPHC research catch		14,784
Total	**1,340,000**	**1,325,730**

Appendix I.

Table 5. The total catch (thousands of pounds, net weight) from the 2007 commercial fishery, including IPHC research catch, of Pacific halibut by regulatory area and month.

Reg. Area	Feb.[1]	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Total
2A		101	67	223	164	162	54	12	6		789
2B		2,005	1,521	1,168	813	812	1,110	788	941	614	9,772
2C		784	1,280	1,645	1,258	824	1,145	739	509	289	8,473
3A	7	2,132	2,934	5,218	4,235	2,522	2,972	2,871	2,883	719	26,493
3B		131	473	1,625	1,827	1,595	1,951	687	723	237	9,249
4A	8		43	191	523	598	771	344	272	78	2,828
4B [2,3]				195	283	443	159	269	67		1,416
4C					15	229	246	61			551
4D [3]					218	420	1,046	385	651		2,720
4E [3]				8	219	206	94	14	38		579
Alaska Total	15	3,047	4,730	8,882	8,578	6,837	8,384	5,370	5,143	1,323	52,309
Grand Total	15	5,153	6,318	10,273	9,555	7,811	9,548	6,170	6,090	1,937	62,870

[1] Research landings

For confidentiality:

[2] May includes March and April landings

[3] October includes November landings

Appendix I.

Table 6a. Number of vessels and catch (thousands of pounds, net weight) of Pacific halibut by vessel length class in the 2007 commercial fishery for Area 2B, Alaska, and the Alaskan regulatory areas.

Overall Vessel Length	Area 2B		Alaska	
	No. of Vessels	Catch (000's lbs.)	No. of Vessels	Catch (000's lbs.)
Unk. Length	165	711	803	1,720
0 to 25 ft.	0	0	269	541
26 to 30 ft.[1]			120	855
31 to 35 ft.[1]	8	223	233	5,356
36 to 40 ft.	32	881	154	2,498
41 to 45 ft.	50	1,665	154	4,302
46 to 50 ft.	25	1,690	134	4,899
51 to 55 ft.	29	1,895	71	3,944
56 + ft.	38	2,707	255	28,194
Total	347	9,772	2,236	52,309

Overall Vessel Length	Area 2C		Area 3A	
	No. of Vessels	Catch (000's lbs.)	No. of Vessels	Catch (000's lbs.)
Unk. Length	403	233	442	812
0 to 25 ft.	53	105	40	130
26 to 30 ft.	46	258	23	141
31 to 35 ft.	103	1,117	93	2,748
36 to 40 ft.	89	898	65	1,249
41 to 45 ft.	83	1,009	79	2,564
46 to 50 ft.	80	1,440	67	2,312
51 to 55 ft.	43	1,066	47	1,929
56 + ft.	106	2,347	191	14,608
Total	1,006	8,473	1,047	26,493

Overall Vessel Length	Area 3B		Area 4	
	No. of Vessels	Catch (000's lbs.)	No. of Vessels	Catch (000's lbs.)
Unk. Length	195	235	96	440
0 to 25 ft.[2]			173	306
26 to 30 ft.[2]	4	13	52	443
31 to 35 ft.	31	635	51	856
36 to 40 ft.	25	300	3	51
41 to 45 ft.	32	572	5	157
46 to 50 ft.	32	752	7	395
51 to 55 ft.	18	547	3	402
56 + ft.	140	6,195	64	5,044
Total	477	9,249	454	8,094

For confidentiality:

[1] Vessels 26 to 30 ft. in the Area 2B fishery were combined with 31 to 35 ft. vessels

[2] Vessels 0 to 25 ft. in the Area 3B fishery were combined with 26 to 30 ft. vessels

Appendix I.

Table 6b. Number of vessels and catch (thousands of pounds, net weight) of Pacific halibut by vessel class in the 2007 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	0	0.0
0 to 25 ft.	0	0.0
26 to 30 ft.[1]		
31 to 35 ft.[1]	4	2.9
36 to 40 ft.	13	23.9
41 to 45 ft.	24	56.5
46 to 50 ft.	21	50.9
51 to 55 ft.	10	20.5
56 + ft.	16	78.8
Total	88	233.5

	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.	3	0.6	0	0.0
26 to 30 ft.	7	3.2	0	0.0
31 to 35 ft.	14	1.7	0	0.0
36 to 40 ft.	27	4.4	0	0.0
41 to 45 ft.	22	16.2	7	8.5
46 to 50 ft.	17	7.1	5	7.3
51 to 55 ft.[2]	6	1.6		
56 + ft.[2]	3	0.3	14	32.7
Total	99	35.1	26	48.5

For confidentiality:

[1] Vessels 26 to 30 ft. in the Area 2A Directed Commercial fishery were combined with 31 to 35 ft. vessels

[2] Vessels 51 to 55 ft. in the Area 2A Incidental Commercial (Sablefish) fishery were combined with 56+ ft. vessels

Appendix I.

Table 7. Commercial fishing periods, number of fishing days, catch limit, commercial, research and total catch (thousands of pounds, net weight) by regulatory area for the 2007 Pacific halibut commercial fishery.

Area	Fishing Period	Catch Limit	No. of Days	Commercial Catch	Research Catch	Total Catch
Area 2A						
treaty Indian	3/10– 7/30		143	357		
	Restricted:					
	3/19- 5/3		46	114		
Total		461.0		471		471
Commercial						
Incidental in Salmon fishery	May 1 – Nov 15	40.2[1]	199	35		35
Incidental in Sablefish fishery	May 1- Oct 31	70.0	184	49		49
Directed	June 27[2]		10-hours	98		
	July 11[2]		"	59		
	July 25[2]	228.0[1]	"	21		
	Aug 8[2]		"	41		
Direct total				219	15	234
2A Total		799.2		774	15	789
Area	Fishing Period	Catch Limit	Adjusted Catch Limit[3]	Commercial Catch	Research Catch	Total Catch
2B	3/10 – 11/15	10,089.4	10,052.0	9,694[4]	78	9,772
2C	3/10 – 11/15	8,510.0	8,790.0	8,346[5]	127	8,473
3A	3/10 – 11/15	26,200.0	26,395.0	26,133	360	26,493
3B	3/10 – 11/15	9,220.0	9,342.0	9,047	202	9,249
4A	3/10 – 11/15	2,890.0	2,951.0	2,786	42	2,828
4B	3/10 – 11/15	1,440.0	1,478.0	1,369	47	1,416
4C	3/10 – 11/15	1,866.5	1,904.0	547[6]	4	551
4D	3/10 – 11/15	1,866.5	1,903.0	2,704[6, 7]	16	2,720
4E	3/10 – 11/15	367.0	367.0	579[7]	0	579
Alaska Total		52,360.0	53,130.0	51,511	798	52,309
Grand Total		**63,248.6**	**63,981.2**	**61,979**	**891**	**62,870**

[1] 3,400 pounds remained from the directed fishery and were made available to the incidental halibut catch in the salmon troll fishery for a total catch limit of 43,667 pounds.

[2] Fishing period limits by vessel class.

[3] Includes adjustments from the underage and overage programs.

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

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

[6] Area 4C IFQ and CDQ could be fished in Area 4D by NMFS and IPHC regulations

[7] Area 4D CDQ could be fished in Area 4E by NMFS and IPHC regulations.

Appendix I.

Table 8. Commercial landings (thousands of pounds, net weight) of Pacific halibut by port and vessel nationality; and IPHC research catch for 2007.

Port Region	Canada	United States	IPHC Research	Grand Total
CA & OR		184	3	187
Seattle				
Bellingham[1]		1,490	12	1,502
Misc. Washington		468		468
Vancouver	712			712
Port Hardy	4,220		16	4,236
Misc. Southern BC[1]	484		4	488
Prince Rupert & Port Ed.	3,916		107	4,023
Misc. Northern BC	362			362
Ketchikan, Craig, Metlakatla		647	6	653
Petersburg, Kake		2,405		2,405
Juneau		2,206	17	2,223
Sitka		3,484	72	3,556
Hoonah, Excursion, Pelican		1,397		1,397
Misc. Southeast AK		1,249		1,249
Cordova		1,423		1,423
Seward		5,540	95	5,635
Homer		9,871	68	9,939
Kenai		63		63
Kodiak		8,155	131	8,286
Misc. Central AK		6,361	230	6,591
Akutan & Dutch Harbor		4,589	88	4,677
Bering Sea		2,753	42	2,795
Grand Total	**9,694**	**52,285**	**891**	**62,870**

[1] For confidentiality, Misc. Southern BC includes less than three Canadian vessels that delivered in Bellingham

Appendix I.

Table 9. Commercial halibut catch (thousands of pounds, net weight) in 2007 by statistical area and regulatory area.

Stat Area Group	Catch			Regulatory Area	Catch for Reg. Area
	Commercial	Research	Total		
00-03	212	1	213		
04	104	1	105	2A	789
05	458	13	471		
06	351	4	355		
07	130	2	132		
08	267	1	268		
09 - I	339	5	344		
09 - O	167	5	172		
10 - I	1,980	11	1,991		
10 - O	1,086		1,086	2B	9,772
11 - I	1,707	9	1,716		
11 - O	179		179		
12 - I	409	2	411		
12 - O	27		27		
13 - I	2,609	36	2,645		
13 - O	443	3	446		
14 - I	347	13	360		
14 - O	161	13	174		
15 - I	1,215	15	1,230		
15 - O	889	25	914		
16 - I	1,428	13	1,441	2C	8,473
16 - O	1,398	36	1,434		
17 - I	722	5	727		
17 - O	493	2	495		
18S - I	876	2	878		
18S - O	817	3	820		
18W	1,418	5	1,423		
19	1,181	14	1,195		
20	1,485	18	1,503		
21	930	9	939		
22	1,053	11	1,064		
23	1,230	10	1,240	3A	26,493
24	4,640	21	4,661		
25	3,969	53	4,022		
26	4,396	89	4,485		
27	3,323	65	3,388		
28	2,508	65	2,573		

Table 9. continued.

29	3,318	44	3,362	3B	9,249
30	1,748	48	1,796		
31	1,149	47	1,196		
32	1,759	32	1,791		
33	711	21	732		
34	362	10	372		
35	399	6	405	4	8,094
36	265	1	266		
37	41	2	43		
38	214	4	218		
39	15	1	16		
40	230		230		
41[1]		4	4		
42+[1]	400	19	419		
Bering Sea	6,421	72	6,493		
Grand Total	61,979	891	62,870		62,870

[1] For confidentiality, Stat Area Group 42+ includes commercial catch from Group 41.

Appendix I.

Table 10. The fishing period limits (pounds, net weight) by vessel class used in the 2007 directed commercial fishery in Area 2A.

Vessel Class		Fishing Periods			
Letter	Feet	June 27	July 11	July 25	Aug 8
A	0-25	755	755	380	250
B	26-30	945	945	475	315
C	31-35	1,510	1,510	755	505
D	36-40	4,165	4,165	2,085	1,390
E	42-45	4,480	4,480	2,240	1,495
F	46-50	5,365	5,365	2,680	1,790
G	51-55	5,985	5,985	2,995	1,995
H	56+	9,000	9,000	4,500	3,000

Table 11. Metlakatla community fishing periods, number of vessels, and halibut catch (net weight), 2007.

Fishing Period Dates	Number Of Vessels	Catch (Pounds)
April 27 - 29	4	1,969
May 11 – 13	8	3,574
May 25 – 27	16	6,711
June 8 – 10	17	7,324
June 22 – 24	8	4,068
July 6 – 8	10	5,116
July 20 – 22	9	3,140
August 3 – 5	7	1,814
August 17 – 19	6	2,097
August 31 – Sept. 2	7	3,439
10 Fishing Periods		**39,252**

Appendix II.

Table 1. Fishing dates, opportunity, size limits, and bag limits for the 2007 Pacific halibut sport fishery.

Area	Fishing dates	Fishing days	Days open	Size limit	Bag limit
2A					
WA Inside Waters (east of Low Point)	April 9-June 16	51	5 (Th-Mon)	None	1
WA Inside Waters (Low Point to Sekiu River)	May 24-Aug 3	53	5 (Th-Mon)	None	1
WA North Coast (Sekiu River to Queets River, all depth)	May 15, 17, 19	3	3 (Tu, Th, Sat)	None	1
	May 31	1	1(Th)	None	1
	June 23, 28	2	2 (Sat, Th)	None	1
	July 7, 22	2	2(Sat, Sun)	None	1
	August 4	1	1(Sat)	None	1
North Coast (Sekiu River to Queets River, nearshore)	June 19, 21	2	2(Tu, Th)	None	1
	August 18, 19	2	2(Sat, Sun)	None	1
	September 1	1	1(Sat)	None	1
WA South Coast (all depths; Queets River to Leadbetter Point)	May 1, 2, 3, 6, 7, 8	6	5 (Sun-Thur)	None	1
Columbia River (Leadbetter Point to Cape Falcon)	May 1-May 26	26	7	None	1
	Aug 3-5	3	3 (Fri-Sun)	None	1
	Aug 10-12	3	3 (Fri-Sun)	None	1
	Aug 24-26	3	3 (Fri-Sun)	None	1
	September 15	1	1 (Sat)	None	1
OR Central Coast (Spring, all depths; Cape Falcon to Humbug Mt.)	May 11-July 21	24	3 (Th-Sat)	None	1
OR Central Coast (Summer/Fall, all depths; Cape Falcon to Humbug Mt.)	August 3-Sept 16	21	3 (Fri-Sun)	None	1[1]
OR Coast (<40 fathoms; Cape Falcon to Humbug Mtn.)	May 1-Sept 20	143	7	None	1
OR/CA (south of Humbug Mt.)	May 1-Oct 31	184	7	None	1
2B, 2C, 3 and 4	Feb 1-Dec 31	335	7	None	2

[1] A two-halibut bag limit was allowed on September 14-16

Appendix II.

Table 2. 2007 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	65,562	45,415	-20,147
WA North Coast	116,199	114,489	-1,710
WA South Coast	50,907	51,166	+259
Columbia River	20,378	20,601	+223
OR Cent. Coast (spring, all depths)	170,242	133,090	-37,152
OR Cent. Coast (summer, all depths	56,747	122,636	+65,889
OR Coast (<40 fathoms)	19,738	8,652	-11,086
OR/CA (south of Humbug Mt.)	8,045	8,045	0
Total	**507,818**	**504,094**	**-3,724**

Table 3. Estimated harvest by sport fishers (millions of pounds, net weight) by IPHC Regulatory Area, 1977-2007.

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	0.484	1.841	2.798	5.672	0.014	0.050	10.860
2006	0.516	1.773	2.526	5.337	0.014	0.046	10.212
2007	0.504	1.556	3.049	6.283	0.010	0.046	11.448

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 2007 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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47. Vessel clearances in IPHC Area 4 for 2004. 2 p. (2004).
48. Joint sablefish log collection program between IPHC and NMFS Auke Bay Lab. 2 p. (2005).
49. Vessel clearances in Area 4 for 2005. 2 p. (2005).
50. Vessel clearances in Area 4 for 2006. 2 p. (2006).
51. Completion and submission of halibut logbooks. 2 p. (2006).
52. Joint sablefish log collection program between IPHC and NMFS Auke Bay Lab. 2 p. (2006).
53. Joint sablefish log collection program between IPHC and NMFS Auke Bay Lab, Alaska. 1 p. (2007).
54. Completion and submission of logbooks for the U.S. commercial halibut fisheries. 1 p. (2007).
55. Vessel clearances in IPHC Area 4 for 2007. 2 p. (2007).

You caught a tagged halibut

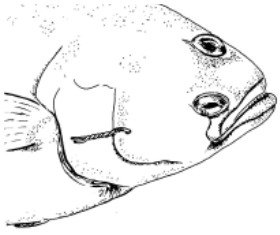
Now What?

Fishers should retain all tagged halibut regardless of gear type used, time of year caught, size of halibut, or type of tag!

Instructions:

- Leave the tag on the fish until landed.
- Notify the IPHC by telephone. If there is an IPHC port sampler in that port, they will redeem the tag, as well as take measurements and an otolith from the halibut. If there is no sampler in the area, a staff member will instruct you on safe removal of the tag and how to redeem your reward.

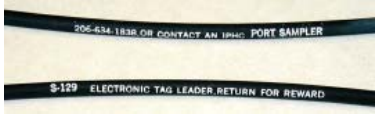
Reward offered for every tag returned!



1. Traditional wire tags

- Threaded through the operculum on the dark side of the body
- The reward is $5 cash or an IPHC tag hat

2. Pop-up archival transmitting tags



- Attached near the dorsal by a metal dart and leader*
- A $500 reward is offered for the return of any tag body
- A $50 reward is offered for the return of the leader and metal dart only
- A $5 cash or IPHC tag hat reward is offered for the return of the leader only

*Note that these tags may be recovered while attached to a halibut, found free floating, or washed up on a beach.

3. Electronic archival tags

- Attached near the dorsal via a plastic “cradle” and wires
- A $500 reward is offered for the return of the tag body

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