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INTERNATIONAL PACIFIC HALIBUT COMMISSION

Annual Report
1999

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

Produced by the IPHC staff
Seattle, Washington
2000

PREFACE

The International Pacific Halibut Commission (IPHC) was established in 1923 by a convention between Canada and the United States for the preservation of the halibut (*Hippoglossus stenolepis*) fishery of the North Pacific Ocean and the Bering Sea. The convention was the first international agreement providing for the joint management of a marine resource. The Commission's authority was expanded by several subsequent conventions, the most recent being signed in 1953 and amended by the protocol of 1979.

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

The Commission meets annually to review all regulatory proposals, including those made by the scientific staff and industry; specifically the Conference Board and the Processor Advisory Group. The measures recommended by the Commission are submitted to the two governments for approval. Upon approval the regulations are enforced by the appropriate agencies of both governments.

The 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.

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On the Cover:
"Bottom Cheeks" - watercolor by Dot Bardarson

Dot Bardarson is well known in Alaska, not only for her award winning watercolors and serigraphics, but also as art juror, artist in residence, amateur theater set designer, and past board member of the Alaska State Council on the Arts.

Her public art commissions number six, including a 24-foot mural for the State of Alaska.

Being born in New York and raised on the East Coast hardly prepared her for her early adult life as a deck-hand on a fish tender or raising her family in Alaska canneries. She now lives in Seward, Alaska where she is owner of Bardarson Studio, an art and gift gallery located in the town's boat harbor.

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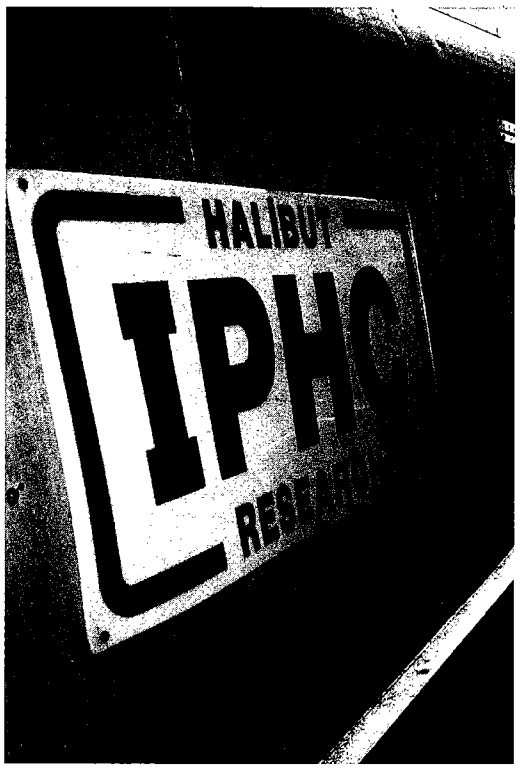
GOING STRONG AND MOVING ALONG: ACTIVITIES OF THE COMMISSION

Three quarters of a century

The seventy-fifth Annual Meeting of the International Pacific Halibut Commission (IPHC), held in Prince Rupert, British Columbia might have seemed uneventful from the perspective of the normal business of halibut stock management. The Pacific halibut stocks were declining, but not dramatically, and few biological concerns were at the discussion table. In an ordinary year, these simple facts might have led to an ordinary meeting. Instead, much of the discussion was within the administrative meetings of the commissioners and not among the industry. Low halibut prices and revenue from Commission surveys in 1998 had accentuated the chronic shortfall between government funding and Commission operating programs. The commissioners spent a large portion of the meeting looking at ways to help offset the Commission's financial deficit, both in the short and longer term. Although no solutions were adopted at the meeting, the Commission committed to meet informally throughout the year until the crisis abated.



"S. S. Sign"
IPHC archive photo.

The commissioners spent a large portion of the January meeting looking at ways to help offset the Commission's financial deficit, both in the short and longer term.

On the industry front, a few Canadian fishers landed live halibut late in the 1998 season which were then penned and sold at a premium price during the 4-month winter closure. Although an innovative approach to adding value to the catch, it was also illegal under IPHC regulations. The Commission adopted a regulation during the days of the intense derby fisheries that required all fish to be landed with gills and entrails removed. This regulation was primarily to assure fish quality and also to ease scientific sampling of the catch. Landing of round fish is no longer a problem under Individual Quota (IQ) management but some harvesters saw the live penning of fish as a step toward halibut aquaculture, hence a threat to their

livelihoods. The commissioners considered a motion to strike the regulation but could not agree to do so. While both governments support aquaculture development, individual state regulations in the U.S. would not permit even live penning and the Commission made no change in the existing regulation. However, the Canadian government chose not to adopt the IPHC regulation this year, as is the right of either country under the Halibut Convention, and thus allowing live penning during 1999. Both the Department of Fisheries and Oceans, Canada (DFO) and IPHC agreed to work together to solve the dilemma.

The staff was asked to chair an agency work group in 1999 to identify obstacles and possible solutions to an extended fishing season.

Live fish landings gave rise to another issue. U.S. harvesters asked the Commission to consider an extended season, which would even the playing field with penned fish. The Commission soon recognized that there were logistical, enforcement, and IQ issues that needed to be addressed before changing the season. The staff was asked to chair an agency work group in 1999 to identify obstacles and possible solutions. The season dates were left status quo for 1999, but in order to accommodate a possible March 1 instead of March 15 opening the following year, the 2000 Annual Meeting was scheduled two weeks earlier than tradition dictated.

Aside from these more volatile issues facing the Commission at the 1999 Annual Meeting, the rest was business as usual. The staff presented reports of research and the status of the fishery at an open session, followed by a public comment session. The Commission considered these comments, as well as Conference Board (CB) and Processor Advisory Group (PAG) recommendations throughout the remainder of the week.

The Commission again took the conservative approach when approving catch limits. Area 2A and Areas 4CDE catch limits were adopted and then split according to the PFMC and NPFMC catch sharing plans, respectively.

	Catch limit recommendations (millions of pounds)			
Area	**Staff**	**CB**	**PAG**	**Adopted**
2A	0.69	0.81	0.69	0.76
2B	11.21	12.5	12.50	12.10
2C	10.49	10.49	10.49	10.49
3A	24.67	26.67	24.67	24.67
3B	13.37	13.37	13.37	13.37
4A	4.24	4.24	4.24	4.24
4B	3.98	3.98	3.98	3.98
4CDE	4.13	4.50	4.50	4.45
Total	**72.78**	**76.56**	**74.44**	**74.06**

Among the other major issues were:
* revision of the clearance requirements in Area 4 to allow for clearances in Adak;
* VHF radio clearance out of Area 4B; and
* re-authorization of an experimental fishing permit allowing the harvest of up to 20,000 pounds of halibut in the Chukchi Sea.

Black to red and back: The IPHC budget

The finances of the Commission, a topic normally discussed in administrative sessions, were in such serious condition that the Commission Director presented the whole picture at the 1999 Annual Meeting public session. Traditionally, the Commission operated on money contributed by each country and to a lesser extent, on money from fish caught and sold during research cruises. Recently, a series of events accentuated the fact that the money received from the two countries had remained more or less fixed since 1987 but Commission costs have been increasing. The primary forces creating the shortfall included the reduction of appropriations in 1994, the increased costs to the Commission associated with monitoring the individual quota systems, and the scientifically necessary but costly re-establishment of comprehensive setline surveys for stock assessment. These events coupled with a lower than average ex-vessel price for research fish landings created a substantial shortfall in 1998.

The Commission undertook drastic measures to offset the deficit including the reduction of staff, not re-staffing a key stock assessment scientist position when the incumbent resigned, restricting both operations and research travel, and curtailing other operational spending. Unfortunately, these measures alone were insufficient, so some field experiments were delayed until the off-season in order to maximize the return from any fish caught during the experimental fishing.

The fact that Commission core operations were becoming increasingly dependent on research revenue made this a hot topic for discussion among both the Commission and harvesters throughout the year. About $2.1 million is needed to keep operations at the current level, and the Commission is now funded at a base level of $1.6 million. Ex-vessel price for research fish was better in 1999 and several high-cost areas were dropped from the survey, relieving some of the immediate pressure. By year's end the Commission's Director had developed long-term plans and taken action to minimize problems created by short-term price fluctuations. Discussions between the two countries on ways to stabilize funding for core Commission operations continued throughout the year.

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In the mean time...

The Interim Meeting, normally scheduled in November, took place in September this year in an effort to coincide with the fiscal year-end. The commissioners traditionally review research, consider staff and industry proposals, and begin anticipating areas for debate during the next Annual Meeting. Being so early this year, staff presentations were mainly reports of works still in progress. A large portion of the meeting was devoted to the ongoing discussions on finances. The Commission was briefed by conference call later in the year on stock status, catch limit recommendations, and other new items for the 2000 Annual Meeting.

The Research Advisory Board was formed to help the staff get direct industry input on the planning of long-term research on halibut.

Keeping our ears to the ground: Research Advisory Board

The Commission Director formed a new advisory group during 1999. This group, called the Research Advisory Board (RAB), brings together seven U.S. and Canadian harvesters and processors. The RAB was formed to help the staff get direct industry input on the planning of long-term research on halibut. The 1999 meeting of the group was largely spent reviewing current research and background studies. The eventual goal for the group is to bring the knowledge of industry to bear on building new research programs that answer questions important to industry, as well as to improve the programs put forward by the staff. The group plans to meet each year during the development of the coming year's programs.

DIRECTOR'S REPORT

Someday, I might be able to determine what a 'normal' year looks like. After 'experiencing' 1998, with the large drop in price and consequent economic disruption of both the industry and the Commission, we saw a rebounding of prices in 1999. This rebound came despite an increase in the commercial fishery quota of around three million pounds over 1998. The increase in price did much to help all of us out of the problems created the previous year. In the case of the Commission, we have been able to put some measures in place that will help to avoid the financial problems that were created in 1998. The two governments are still working to create some improvements in the Commission financing that will allow us to carry on our basic monitoring and sampling programs within our appropriations budget.

"Talking shop"
Bruce Leaman talking with F/V *Cora Lee* skipper, Mike Mayo, and NMFS enforcement officer, Matt Stratton, in Bellingham. Photo by Tracee Geernaert.

It is no less difficult to determine what is 'normal' from the fish's point of view. Halibut biomass had been on a long run of yearly increases resulting from favourable environmental conditions for recruitment, and a continual re-evaluation of harvesting strategy to ensure conservation. The north Pacific experienced a regime shift around 1977 and another one around 1989. The former created conditions that were very favourable for halibut recruitment while the latter created conditions that were unfavourable. We do not get a good look at halibut year-class strength until the fish are 8-10 years old but the year classes arising from spawning in the early 1990s do not look very strong. This means the stock will decline from the abnormally high levels, we have observed over the past decade to a more 'normal' level from the long-term perspective.

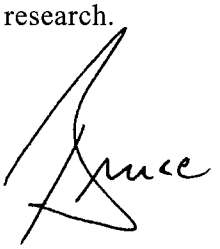
It is worth remembering that the long-term average of total removals (commercial, sport, bycatch, wastage, and personal use) from the halibut stock is about 65 million pounds. We are presently at total removals of

around 95 million pounds, so that is about 50% above the long-term average yield. The halibut stock clearly responds to environmental conditions and it is the job of the Commission staff to incorporate knowledge of these conditions into our harvesting strategy. Over the past three years, we have been re-evaluating this strategy to ensure that it incorporates our understanding of these long-term population dynamics. As we learn more about the dynamics of the ocean environment itself, we will hopefully improve our ability to recommend good management decisions.

A continuing problem for our industry is the issue of chalky fish. Is this normal? From what we have been able to discover thus far, in large part the answer is yes. Chalkiness is more prevalent as water temperature warms in late summer (particularly in August) and in more southern parts of the halibut range where the water is also warmer. However, the industry is seeing more chalky fish now because so much more of the harvest is being directed into the fresh fish market, rather than the frozen market as was typical prior to IFQs. Freezing the fish suspends the process that creates chalkiness. The process starts again at thawing, but historically the product was probably on the consumer's plate before chalkiness developed. In addition, during the derby days it was generally only in the colder waters of the Bering Sea that there were traditional fishery openings during August, the time when chalkiness is most common.

The Commission undertook some research this year to examine several ways of treating fish after capture to try to reduce the occurrence of chalkiness but no method appeared to be effective. We did discover that male fish are far more likely to be chalky than females, if conditions favouring chalkiness are prevalent. We are continuing to look at means to detect chalkiness but prevention may be more an issue of not fishing when such conditions exist.

I am also trying to make it a 'normal' event for you to have better ways to communicate with the Commission staff. While it is difficult for me to get to every port, I recognize that it is also difficult for many of you to get to our meetings. The Commission and staff need to make themselves available to you and that is why you will continue to see me in the ports. Our port samplers are also an important part of this contact and we rely on their discussions with you to keep us aware of your views. Lastly, I formed a Research Advisory Board in 1999, made up of seven harvesters and processors, to help us design research that answers questions critical to you, as well as those that are important to us. This Board is an important part of making sure we get your observations, experience, and insight into our research.

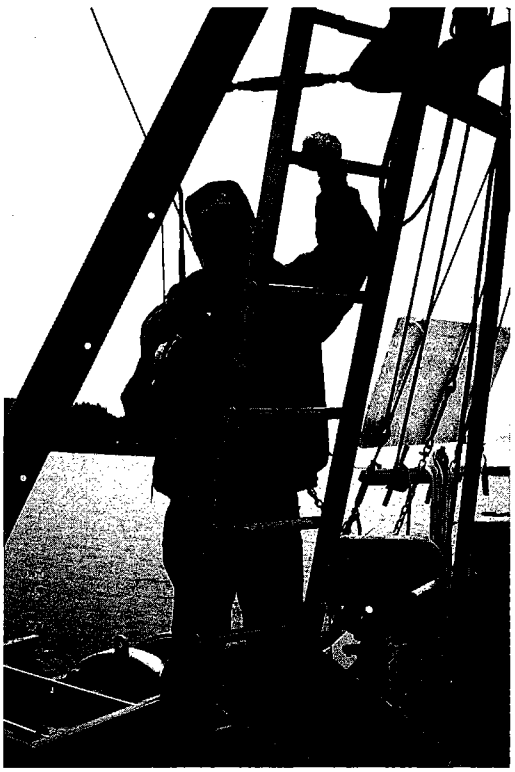


Bruce M. Leaman
Director

ASSISTANT DIRECTOR RETIRES AFTER 30 YEARS OF SERVICE

Stephen Hoag, the Assistant Director for 15 years, retired in 1999 following 30 years at the Halibut Commission. Steve started work with the Commission in 1968 after graduating with a Master's degree in fisheries from the University of Washington. Former Director, the late F. Heward Bell, was looking for a bright young master's student to inject original ideas into the halibut stock assessment, and after a tip from a friend, his focus fell on Steve.

The stock assessment was catch-per-unit-effort based when Steve came to work for the Commission and he was the first to suggest a cohort analysis approach. His assessment focus eventually led to establishing setline surveys as a fishery independent measure of the stock — a tool that was used for several years. After a brief hiatus, setline surveys are now a critical piece of today's halibut assessment.



"The good life"
Photo by Tracee Geernaert.

Steve was also at the forefront of bycatch monitoring at a time when Japanese vessels fished the Bering Sea. When the Fishery Conservation and Management Act was implemented by the U.S. in 1977, teams of scientists were established to address the problems affecting the fishing fleets. Steve was on one of the first plan teams to address the issue of incidental catch.

Steve went from associate biologist to Senior Biologist in 1978 and then to the position of Assistant Director in 1985. His elevated position dictated a more all-encompassing approach to halibut management and that meant more time behind the desk directing others and less time in the field, but he continued to participate in field work whenever possible.

The IPHC staff and commissioners will miss Steve, and although he has left us behind for his beloved hunting and fishing trips, his legacy is the framework on which so many of our management practices today are based. Steve has been a valuable colleague and friend to all of us at the Commission. We wish him the best of luck and good health in his retirement.

DOCK TO DINNER: THE COMMERCIAL FISHERY

There are wonderful verses that sing of the sea.
A lot of what's written is true
But reading it while you sit under a tree
Will give an inaccurate view

The verses found throughout this report are from a poem entitled, "To Readers of Sea Poetry" by Captain Robert Hilton, described by his son as a "sea captain and occasional poet." On the day we received permission from his son to re-print this poem, Capt. Hilton was sailing a cargo ship into Copenhagen harbour.

The Pacific halibut commercial fishery has taken place since the late 1880s and now encompasses the entire range of halibut in both U.S. and Canadian waters of the west coast. Adequate management practices and a little luck have kept the commercial fishery relatively healthy over the last 75 years when many other fisheries have fluctuated wildly. Pacific halibut stocks are currently on a natural decline and commercial catch limits are likely to follow suit over the next several years. Still, catch limits are higher (about 74 million pounds in 1999) than the long-term average and fishers are enjoying good prices at the dock.

"An Accurate View"
Deck of the F/V *Ocean Viking*. Photo by Greg Krivonak.

To better manage the commercial fishery, the IPHC has broken the larger area up into 10 smaller regulatory regions. The IPHC manages Bering Sea Areas 4CDE as one since there is not enough biological information to make

distinct assessments. However, the catch limits are then applied individually according to the North Pacific Fishery Management Council (NPFMC) catch sharing plan. Figure 1 shows the specific areas used in the 1999 fishery.

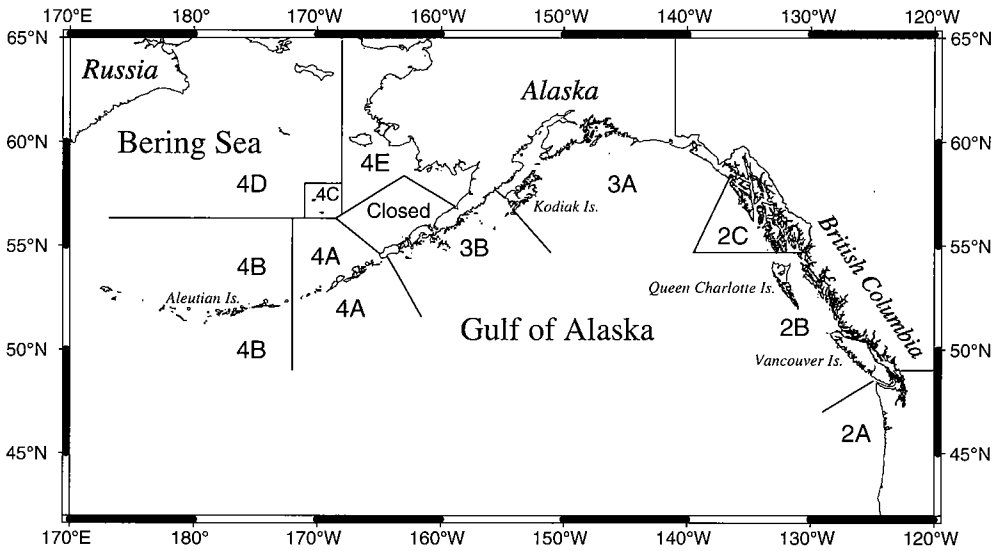


Figure 1. IPHC regulatory areas in 1999.

Area 2A - all waters off the coast of the states of California, Oregon, and Washington.

Area 2B - all waters off the coast of British Columbia.

Area 2C - all waters off the coast of Alaska, south and east of Cape Spencer.

Area 3A - all waters between Cape Spencer and Cape Trinity, Kodiak Island.

Area 3B - all waters between Cape Trinity and a line extending southeast from Cape Lutke, Unimak Island.

Area 4A - all waters west of Area 3B and the Bering Sea closed area that are south of 56°20'N. and east of 172°00'W.

Area 4B - all waters in the Gulf of Alaska and the Bering Sea west of Area 4A and south of 56°20'N.

Area 4C - all waters in the Bering Sea north of Area 4A and the closed area that are east of longitude 171°00'W., south of latitude 58°00'N., and west of longitude 168°00'W.

Area 4D - all waters in the Bering Sea north of Areas 4A and 4B, north and west of Area 4C, and west of longitude 168°00'W.

Area 4E - all waters in the Bering Sea north and east of the closed area, east of Areas 4C and 4D, and south of 65°34'N.

New rules for an old game

The regulations for the 1999 commercial fishery were adopted by the Commission at the Annual Meeting then later approved by the U.S. government. The Canadian government chose to accept all but the regulation requiring fish to have gills and entrails removed when offloaded from the vessel, because it conflicted with the landing of live fish. Discussions continue with DFO and IPHC to jointly recommend non-conflicting regulations to the Commission.

To keep track of vessels fishing in remote areas, clearances for non-local vessels into and out of Area 4 have been in place for several years. This year, Area 4B clearance requirements were modified to relieve some transiting burdens of the harvesters as well as avoid unfair market advantages to plants in certain ports. Adak was added as a clearance port for Area 4B. A fisher had to appear in person when clearing into Area 4B, however the exit clearance was allowed by VHF radio with no visual identification of the vessel.

Adak was added as a clearance port for Area 4B to relieve some transiting burdens of the harvesters as well as unfair market advantages to plants in certain ports.

"Life on the Edge"
Atka Island. Photo by Kelly VanWormer.

In 1998, the IPHC approved a program allowing Area 4E Community Development Quota (CDQ) fishers to keep incidentally caught undersized halibut for personal use. This year, the regulation was modified to require reporting of the catch and the methods for the estimates. The entire program was approved through the end of 1999 and will be reconsidered at the 2000 Annual Meeting.

All non-retained halibut must be released by one of three "careful release" methods. This regulation was put into place several years ago in hopes of minimizing the injuries endured by non-retained fish. This year, the IPHC regulation was modified to mirror the National Marine Fisheries Service (NMFS) regulation which had been used for other longline fisheries. The new regulation specified releasing the fish outboard of the roller

whereas the old regulation did not specify a location of release. Some harvesters were concerned that this would prohibit retaining marginal-sized fish brought on board for measuring, however NMFS enforcement made clear at the 1999 Annual Meeting that it was not the intent of the regulation to hamper this practice.

Area 2A licensing requirements did not change except that the Pacific Fishery Management Council (PFMC) specified that a vessel possessing a commercial fishing license was not eligible to be used for halibut sport fishing.

Like other recent years, the IPHC adopted an overall catch limit for Area 2A, and the PFMC then allocated that amount among several user groups. In both British Columbia and Alaska, the IPHC adopted commercial limits only. All other removals were accounted for in the stock assessment, but were not allocated by the IPHC.

Like other recent years, the IPHC adopted an overall catch limit for Area 2A, and the PFMC then allocated that amount among several user groups.

This year's story: 1999 catch statistics

IQ fisheries continued in Alaska and British Columbia over a 245-day season. Some changes occurred in both systems but they were primarily run the same as in the past. The Area 2A non-treaty fisheries were again open-access. Bouncing back from lower than expected ex-vessel prices in 1998, harvesters received an average of just over $2.00 per pound coastwide in 1999. See Appendix I for detailed catch information.

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Washington, Oregon, and California

The total catch limit for Washington, Oregon, and California was 760,000 pounds in 1999 divided up as follows: 337,402 pounds to the sport fishery; 266,000 pounds to the treaty Indian fishery; and 156,598 to the non-treaty commercial users with 133,108 pounds of that going to the directed fishery and the remaining 23,490 pounds going to the incidental catch during the salmon troll fishery.

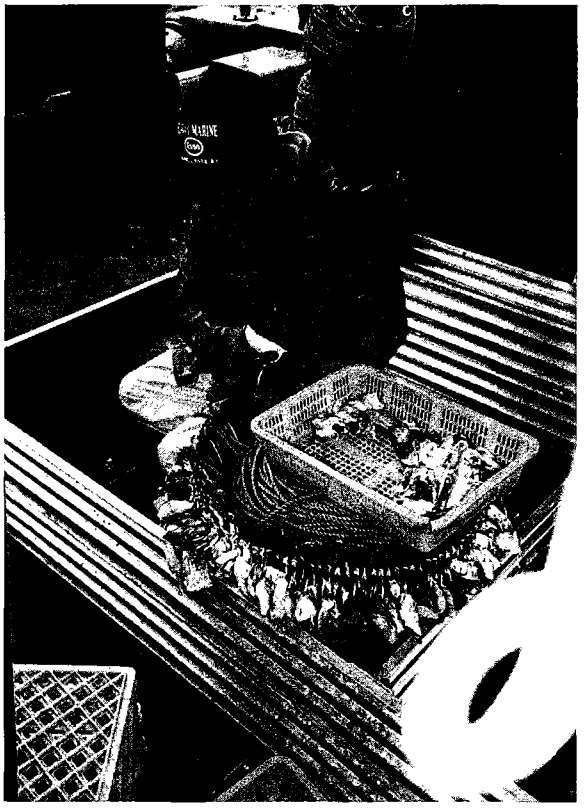
One halibut was allowed for every five salmon caught in the incidental fishery, a much more liberal number than the one to 20 ratio in the first year of the program. In spite of that, only about 10,000 pounds of the 23,490 pound incidental fishery limit was taken in the May and June salmon troll fishery. The remaining poundage was rolled over into the directed commercial catch limit. The directed catch was taken in two 10-hour openings (Appendix II Table 1). Based on vessel length, each vessel had a pre-determined amount of fish that it was able to retain. In spite of trying to set conservative trip limits, the catch was 157,000 pounds, about 10,000 pounds over the combined catch limit.

The treaty Indian allocation was divided, with 256,000 pounds for the commercial fishery and 10,000 pounds for the year-round ceremonial and subsistence fishery. The treaty Indian commercial catch of 264,000 pounds exceeded the catch limit by 8,000 pounds. The tribal fishery lasted 37 days,

much longer than the three to six day fishery in 1998. Tribal managers attributed the longer season to poor weather and the use of fishing period limits.

This year, 696 total licenses were issued — 284 for incidental commercial, 286 for directed commercial, and 126 for sport charter.

The IPHC no longer issued fishing licenses to IQ fishers, but continued to do so in Area 2A. This year, 696 total licenses were issued — 284 for incidental commercial, 286 for directed commercial, and 126 for sport charter. The number of directed commercial licenses issued has steadily decreased over the past several years although actual participation increased slightly this year.



"Hanging Out"
Robert Stanley baiting gear on the F/V *Tyanaa*. Photo by Bruce Biffard.

Area 2C Metlakatla

Although the total catch is included in the Area 2C catch limit, the Metlakatla tribe conducts its own fishery.

Since 1991, the Metlakatla Indian Community in southeast Alaska has been authorized by the United States government to conduct a commercial fishery within the Annette Island Reserve — an area that includes waters within 3000 feet of the island. Although the total catch is included in the Area 2C catch limit, the Metlakatla tribe conducts its own fishery. This year, between May 22 and October 31, there were thirteen 48-hour fishing periods, and 34,996 pounds were landed (Appendix II Table 2). This amount is higher than the 11,000 pounds caught in 1998, but still lower than the 88,000 pounds landed in 1997.

Quota Share Fisheries

The IQ fisheries in both Alaska and British Columbia opened on March 15 and closed on November 15. A significant advantage to these fisheries is that landings are spread across the 8-month open season, generally giving harvesters a better price and providing fresh fish to the consumer most of the year.

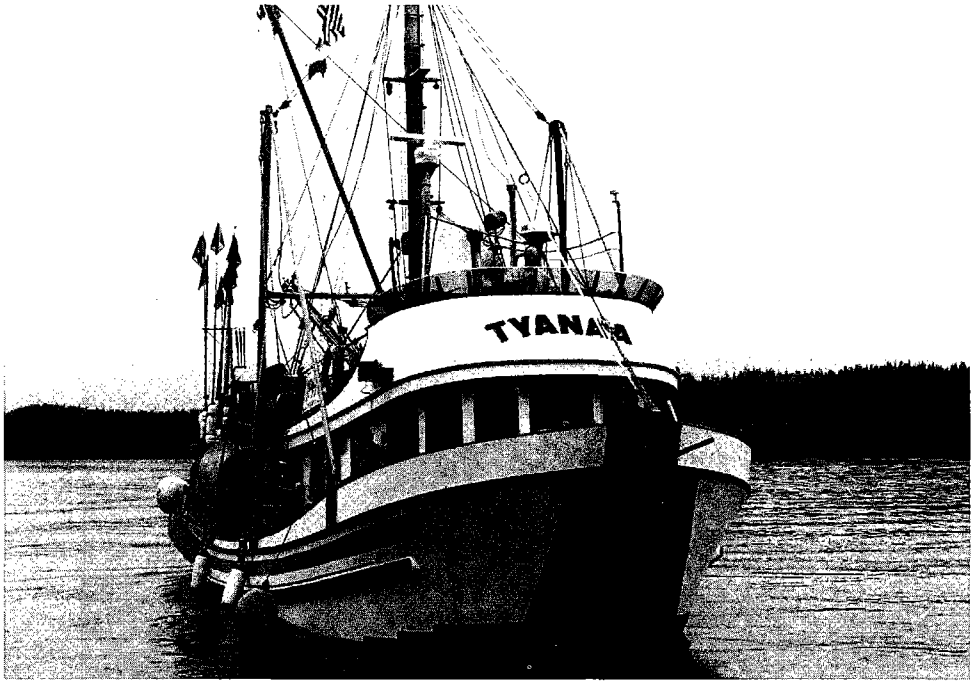
British Columbia

The fishery in Area 2B is an Individual Vessel Quota (IVQ) system where the total area catch limit is divided among qualified vessels according to a DFO formula. The quota can then be fished any time throughout the eight month season. In its ninth year, the system has proven to be a success both in terms of providing fishers with more flexibility about when and where to fish as well as improved safety.

When the program was first put in place in 1991, a total of 435 vessels received quotas. The initial quota was split into two blocks per vessel and starting in 1993, the blocks could be transferred between vessels with the stipulation that any one vessel could fish up to four blocks. The transfer program enabled the fleet to consolidate until by 1995, the total number of vessels fishing bottomed out at about 280. This year, there were once again some changes to the transfer program. Subject to minimum and maximum holdings, vessels were allowed to make unlimited permanent or temporary transfers of quota. The result was a decreased active fleet size to 268 vessels. About seven million pounds of quota were transferred in 1999 amounting to 61% of the catch limit.

In its ninth year, the IVQ system has proven to be a success both in terms of providing fishers with more flexibility about when and where to fish as well as improved safety.

The total catch limit was 12.1 million pounds plus 119,000 pounds carried over from 1998 through the underage/overage program. The actual catch of 12.4 million pounds came in over the limit for the first time since the IVQ program began.



"Staying Seine"
The F/V *Tyanaa* skippered by Robert Irwin. Photo by Bruce Biffard.

The Native communal fishing program (F licenses) was started in 1996 as part of the commercial IVQ program. This year, seven vessels participated landing a total of 260,911 pounds of halibut — 51,000 pounds more than in 1998.

This year, 103,000 pounds of halibut from one operation were landed live compared to only 7,900 pounds in 1998. Although the operation was labor intensive, the goal was to have premium fish available in-season as well as fresh fish after the season closed. Many fishers from both Alaska and Canada see the landing of live fish as a step towards aquaculture and a threat to the wild fish market. The commissioners will be discussing this issue further at the 2000 Annual Meeting.

Four small sub-areas in Area 2B were closed to halibut fishing throughout the season to protect local abundance and provide better food fish opportunities for aboriginal communities.

Alaska

The total catch of 59 million pounds was about six million pounds higher than the 1998 catch but was still under the overall catch limit of 61.2 million pounds.

The Individual Fishing Quota (IFQ) system began in 1995. It is different from the system in Canada in that quota allocations are given to individual harvesters instead of vessels. The overage policy was revised this year because of policy concerns. Previously, anything up to 110% of the total quota was handled administratively by deducting the overage amount from the next year's quota and anything over 110% was forfeited. As a result, many fishers targeted 10% over their quota if they thought the price would be better in that year than the next. The program was changed in 1999 so that when an IFQ catch exceeded the 110% mark, the entire overage was seized and forfeited. Anything under 110% was handled administratively.

The total catch of 59 million pounds was about six million pounds higher than the 1998 catch but was still under the overall catch limit of 61.2 million pounds. Area 4A came closest to the catch limit with landings totaling within 1% of the 4.42 million pound limit. Most of the other areas came in under the catch limit by 2-7% except Areas 4B and 4C where only 87% of the catch limit was landed and Area 4E where only 67% of the catch limit was taken. The fishery there was hampered by sea ice and many local buyers chose not to participate.

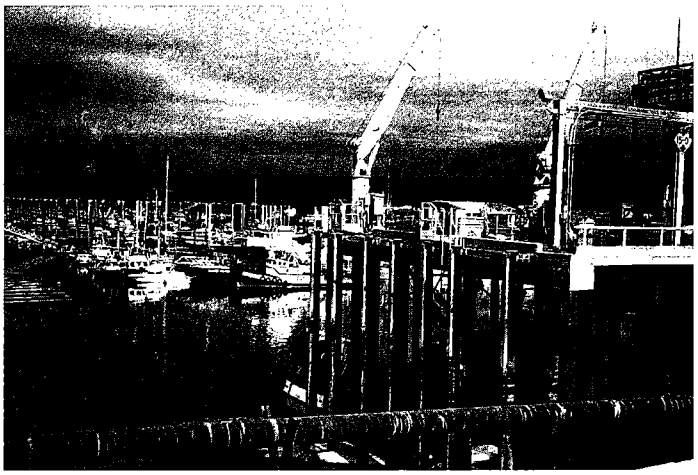
In southeast Alaska, Juneau surpassed both Sitka and Petersburg for the first time, with over three million pounds landed, making it the largest landing port in that area.

Where do we go from here: Landing patterns

Homer, Alaska was the leading landing port for halibut for the second year in a row with 11.9 million pounds landed over the eight month season. In southeast Alaska, Juneau surpassed both Sitka and Petersburg for the first time, with over three million pounds landed, making it the largest landing port in that area. The reason for the change is daily ferry service from Juneau which can carry the fresh fish to Haines for truck transport to

other distribution ports. Prince Rupert/Port Edward remained the top landing port in B. C., receiving about six million pounds. Ninety percent of the landings in B. C. were delivered to three ports; Prince Rupert, Port Hardy, and Vancouver.

Landing patterns were similar to 1998 in Area 4 in terms of port of landing and month of delivery with a few earlier and later deliveries. In the Gulf of Alaska and British Columbia, more fish was landed earlier than usual. An example is in Area 2C where by the end of May, 51% of the catch was taken, whereas only 42% was taken by the same time last year. The higher price in 1999 was most likely the reason for the shift.



"Quiet Harbor"
Homer spit. Photo by Rebecca Barrick.

Halibut immigration

The North American halibut industry has been concerned about imports of Pacific halibut from the western Pacific for several years. The Commission asked its staff to investigate the magnitude of the problem and any biological concerns that might arise. Tracing the country of origin for products in international trade is a common problem in the seafood industry. Discrepancies have been found in the identification of several other species from different countries, and it is possible that Pacific halibut is also mis-identified or products are labeled as such when they are actually something else.

The North American halibut industry has been concerned about imports of Pacific halibut from the western Pacific for several years.

Having said that, for quantifying purposes, we can only assume that the products are as they are labeled. Imports into North America peaked in 1994 at 11.6 million pounds and have dropped since that time to 6.8 million pounds in 1998.

While it appears that most of the halibut came from Russia and a small amount from China and Japan, there is again no way of verifying these assumptions. Russian fishery regulations specify a 62-cm minimum size limit on halibut. From a North American enforcement perspective, the smaller size limit is problematic because the origin of fish in the marketplace less than 82 cm must be verified. Not knowing whether an undersized fish is domestic or imported, makes it difficult to enforce size regulations in Canada and the U.S.

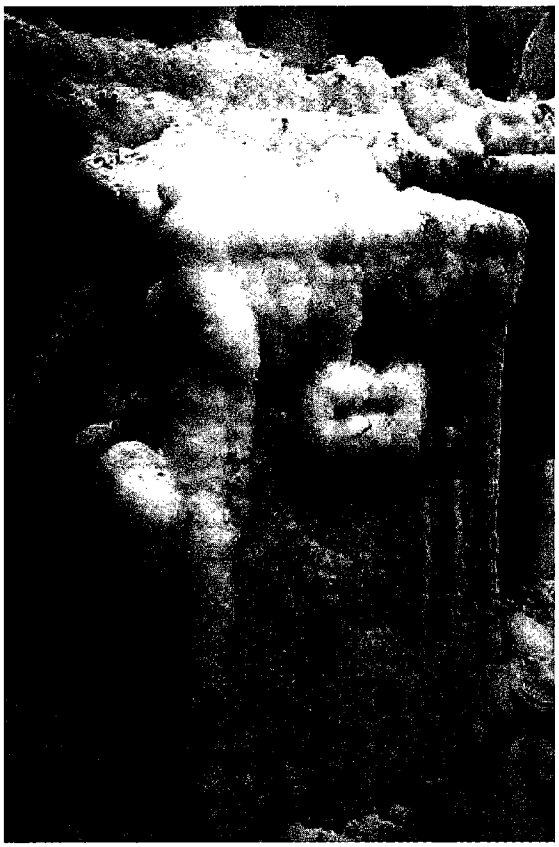
Since the dissolution of the Soviet Union, fisheries management in that area has been unstable and it is unclear whether the minimum size limit of 62 cm is adequately enforced. IPHC scientists will continue to monitor the health of the western Pacific stock and the possible implications on its eastern Pacific counterpart.

Extending the commercial fishing season

The task of the work group was to examine regulatory, enforcement, administrative, logistical, and fishery interaction aspects of an extended season.

An industry proposal was submitted at the 1999 Annual Meeting to extend the Pacific halibut commercial season. The individual quota and Area 2A treaty Indian season currently takes place from March 15 to November 15. Although the Commission was not prepared to change the season at this meeting, they intentionally set the 2000 Annual Meeting two weeks earlier in order to accommodate a possible season extension. In the meantime, the staff was asked to look at both biological and logistical aspects to determine what an extension would involve or even if it was feasible.

Over the summer, the staff organized a work group which included representatives from government agencies of both Canada and the U.S.. The task was to examine regulatory, enforcement, administrative, logistical, and fishery interaction aspects. The interagency group found that a two week extension would be possible with minimal disruption to the current programs.



"Modern Igloo"
Research shack iced over on winter charter. IPHC archive photo.

When considering anything longer than two weeks however, several concerns were expressed. The IPHC currently uses the previous year's data for the following year's stock assessment. A longer season would mean less data available in time for the assessment, so scientists would most likely use the more complete data set from the previous year. Although Canadian officials expressed no concern over an extended season, U.S. agencies indicated that anything longer than a two week extension would require considerable reorganization of the IFQ program. Enforcement agencies were concerned that

an extended season would spread an already thinly dispersed workforce even thinner. The U.S. Coast Guard expressed concern that an extended season and possibly a better price in winter, may inspire smaller vessels to fish in weather that they would not ordinarily consider. No insurmountable problems were identified with sablefish, rockfish, and sea-bird interactions.

Independent of the interagency work group, IPHC scientists examined the biological ramifications of an extended season. Halibut are known to spawn in the winter months and migrate to and from deeper waters, often times moving from one regulatory area to another. The staff concluded that even a small winter fishery (10-15% of the annual catch limit) would result in interceptions of fish and a shift in biomass distribution among regulatory areas.

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One concern that both scientists and fishers share is the impact on future stock size. Would catching actively spawning fish affect the stock in the long term? Longline gear is what is know as "passive" meaning that a fish has to actively take the bait in order to be hooked — unlike trawl gear for example which is "active" and does not greatly depend on the behavior of the fish to be effective. Studies have shown that halibut probably do not feed while actively spawning so those fish would essentially be immune to longline gear.

The commissioners plan to consider the findings of the staff and the work group at the 2000 Annual Meeting.

CATCH YOUR FISH AND EAT IT TOO: SPORT FISHERY

You may read of the glorious tropical moon
Reflected on gunmetal swells,
But your girl isn't there, and you see it alone,
And you're aching, but nobody tells.

"To Readers of Sea Poetry" - second verse

The IPHC monitors all removals but depends on state and federal agencies to maintain catch statistics and reporting for sport catch.

Sport fishing for Pacific halibut is a growing past time among locals and tourists alike. Just fifteen years ago the total recreational harvest was estimated at a relatively modest 1.9 million pounds. In 1998, nearly 10 million pounds was harvested coastwide (Appendix III). As a growing piece of the pie, sport harvest is gaining the attention of other resource users. If the halibut stock decreases over the next several years, as scientists believe that it will, and in the absence of an allocation protocol the friction between sport and commercial interests will likely intensify.

The IPHC monitors all removals but depends on state and federal agencies to maintain catch statistics and reporting for sport catch. The information for all U.S. areas except Area 2A is obtained through a postal survey and there is a one year lag for final statistics, so most of the estimates presented in this section are for 1998.

"Pole Position"
Sport fishing in British Columbia. IPHC archive photo.

Regulations for bag and possession limits in Alaska and British Columbia are approved by the Commission, but overall harvest is left open-ended. For the U.S. west coast, the Commission approves an overall halibut harvest limit which is then further divided among sport, commercial, and treaty Indian interests by the PFMC.

Regulations for the sport fishery remained the same in 1999 as last year for Alaska and British Columbia. The only change in regulations was in

Area 2A where a fisher had to indicate on the IPHC license application whether he intended to operate a charter or fish commercially, but could not do both.

Washington, Oregon, and California

Estimates of harvest for the U.S. West Coast are collected by the Oregon Department of Fish and Wildlife (ODFW) and the Washington Department of Fish and Wildlife (WDFW) through in-season point intercept. The area is broken down into seven separate sub-areas with individual catch limits, seasons, and size limit restrictions. Current year estimates of catch are available in this area because of the in-season management.

The catch for Area 2A in 1999 was 338,134 pounds, just 733 pounds over the recreational allocation of 337,401 pounds. Average weight of fish landed was generally about 20 pounds.

British Columbia

An estimate for sport harvest in British Columbia is still being worked out. IPHC scientists believed that a new estimating procedure was needed since the tidal diary information used for earlier estimates was several years old. The staff went to the 1995 Canadian National Survey for a more recent picture of sport catch in the area and revised the estimate accordingly from 0.66 million pounds used previously to 1.582 million pounds for 1998.

In the meantime, the DFO also addressed the problem of an outdated estimate by gathering data from past creel surveys and more recent logbook programs — estimating the 1998 sport catch at 0.959 million pounds. The report was received late in the year after the stock assessment was completed, but the IPHC staff will look at the new estimate over the next year and make any needed adjustments to the assessment.

Alaska

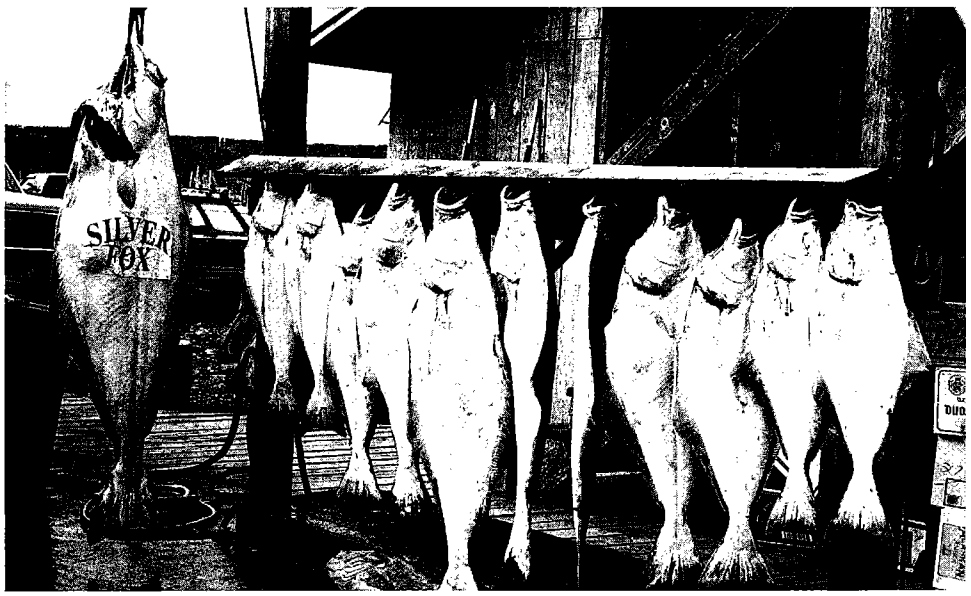
Recreational fishers in Alaska enjoyed another prosperous year. Catch estimates in Area 2C showed an increase of 60% from 1997 to 1998, but most of that was due to increases in the harvest and effort from remote areas where Alaska Department of Fish and Game (ADF&G) did not sample in-season. A post-season accounting of the catch revealed greater harvest than previously thought. Average weight in that area ranged from 40.1 pounds in Petersburg-Wrangell to 16.4 pounds in Ketchikan, somewhat higher than the previous year.

Average weight of sport caught halibut in Area 2C ranged from 40.1 pounds in Petersburg-Wrangell to 16.4 pounds in Ketchikan, somewhat higher than the previous year.

Harvest in Area 3A was down by seven percent by weight from 1997, but only two percent by numbers — representing an average weight decrease per fish of 1.3 pounds from 1997 to 1998. Yakutat enjoyed the highest average weight per fish of 35.4 pounds while Deep Creek and Anchor Point averaged a still respectable 16.0 pounds per fish.

Recreational fishing in Areas 3B and 4 is one of Alaska's best kept secrets.

Recreational fishing in Areas 3B and 4 is one of Alaska's best kept secrets. The fish tend to be large and fishers are scarce. Most of the fishing in Area 3B is centered around Sand Point and Popof Strait while Area 4 sport harvest takes place mainly in Dutch Harbor-Unalaska. Since there is no sampling program in either Sand Point or Dutch Harbor-Unalaska, the average weight for fish landed in Kodiak is used to estimate the Area 3B/4 catch. Fish of 300 pounds are not uncommon in this area and if we are underestimating the average size of the fish, the estimate of 0.136 million pounds is low.



"Bounty"
Sport catch on display in Homer. Photo by Darcie Hook.

THE ONE THAT GOT AWAY: NON-RETAINED HALIBUT CATCH IN THE COMMERCIAL FISHERY

Over the past several years, the Commission staff have made an effort to account for all removals from the halibut population. The more precise our information, the clearer the stock assessment picture. One removal that we started estimating in 1985 is the discards of halibut that happen in the directed fishery or what we call "waste." Starting in 1997, waste of legal-sized fish have been figured into the stock assessment and sub-legal sized fish were accounted for when setting exploitation rates. Before 1997, there was no distinction between legal and sub-legal sized fish and both were accounted for the same way in the stock assessment. IPHC scientists believe that the updated accounting method provides a more accurate picture of removal impacts.

Wastage can occur from lost gear. Sometimes gear is set and never retrieved if the groundline parts or the tide pulls the marker buoys under, but that gear continues to fish until the hooks have either captured something or are bare.

Pacific halibut is a robust animal and can withstand capture and release given the right conditions. To help minimize mortality, halibut must be discarded using one of three approved methods designed to increase their chances for survival. Regardless of the release methods used, however, a portion of those fish still die.

Sometimes gear is set and never retrieved if the groundline parts or the tide pulls the marker buoys under, but that gear continues to fish until the hooks have either captured something or are bare.

Waste from Lost or Abandoned Gear

Gear that is lost or abandoned continues to fish until the bait is gone, whether the "bait" is a previously hooked fish or something intentionally threaded on the hook by the vessel crew. We gain information about lost or abandoned gear when port samplers interview skippers or via mail. Gear types vary widely and are standardized for our calculations. Some log data can not be standardized and are not used, for example sablefish gear which uses smaller hooks than traditional halibut gear. Snap gear was incorporated into the calculation in 1998.

Waste is calculated from a ratio of skates lost to skates hauled and then multiplied by the total catch. Area 2B, 3A, and 3B ratios decreased slightly or remained the same as in 1998. Area 2C and 4 ratios increased from 1998. The overall poundage wasted in Area 4 nearly doubled due both to an increased ratio as well as an increased catch limit. An estimated 393,000 pounds of legal-sized fish were lost in 1999 coastwide.

Sublegal Halibut killed in the Commercial Fishery

In the past, the pounds of undersized fish killed in the commercial halibut fishery were calculated using the amount of sublegal versus legal-

sized halibut caught in the IPHC setline surveys. Discussions at the 1999 Annual Meeting suggested that the ratio was too high, because the survey caught more sublegal-sized fish than the commercial fishery. In light of this, the calculation was modified to include only the top third of those stations with the highest legal-sized catch weight. Even after adjusting the method, most of the sublegal to legal catch ratios in 1999 were similar to 1998 except in Areas 2A and 2B where the ratios were lower and higher, respectively.

An estimated 1.37 million pounds of sublegal-sized halibut were killed in the 1999 fishery coastwide.

Once the total amount of sublegal-sized fish caught was figured, the pounds that actually die during capture and release were calculated. The mortality rate came from observer data collected on the sablefish hook and line vessels. The same rate of 16% was used this year as in previous years since 1995.

Having all the components, the IPHC staff then took the ratios, multiplied them by the commercial catch in each area and applied the mortality rate. An estimated 1.37 million pounds of sublegal-sized halibut were killed in the 1999 fishery coastwide. The pounds decreased in all areas primarily due to the modified ratio.

STAND UP AND BE COUNTED: PERSONAL USE

Personal use is another removal accounted for in the stock assessment. It encompasses a variety of sources, both legal and otherwise, that do not fit neatly elsewhere and often times are not well documented. Over the years, personal use has included:

- a sanctioned Native food fishery off British Columbia;
- ceremonial and subsistence removals in the Area 2A treaty Indian fishery;
- the legal retention of undersized halibut in Area 4E CDQ fisheries;
- rod and reel catch not documented in the sport category
- fish caught on illegally set commercial gear; and
- illegally retained halibut bycatch from other fisheries.

One removal which has been moved from this list to the commercial fishery removals, was "take home" fish from directed halibut trips. Prior to the IQ programs, a very rough estimate was the best we could do. With the advent of the IQ programs, all fish landed including those kept by the crew, were recorded on state/provincial fish tickets and counted as part of the commercial catch.

Alaska

Last year, based on information gathered by ADF&G from household interviews and postal surveys, we developed a methodology for estimating subsistence catch in Alaska. After adjusting for some overlap in the reporting of sport catch and accounting for areas where no data were collected, the personal use estimate was 730,000 pounds, and that figure remained on the books for this year. In fact, the estimate will most likely remain the same until new, updated information can be obtained.

Sub-legal halibut retention in the Area 4E CDQ fishery

In 1999, the Commission amended the regulation, requiring that all sublegal catch from the Area 4E CDQ fishery be reported.

At the 1998 Annual Meeting, the Commission approved a regulation which allowed retention of sublegal halibut during the Area 4E CDQ fishery. Only afterward was it realized that a reporting requirement was not included in the regulation. Both the Coastal Villages Regional Fund and the Bristol Bay Economic Development Corporation offered their full cooperation in reconstructing what happened in 1998 to give us a value to work with. In 1999, the Commission amended the regulation, requiring that all sublegal catch be reported.

An estimated 7,901 pounds were taken in 1999, up from 3,590 pounds in 1998. The Commission will discuss whether to continue the program at the 2000 Annual Meeting.

British Columbia

The primary source of personal use fish in Area 2B is the First Nations food fishery estimated by DFO at 300,000 pounds in 1999. The IPHC received some logbook and landing information from that fishery, but it did not represent the entire DFO estimate. Until more complete information is collected, the 1999 figure will be rolled over in future years.

The major personal use removal in Area 2A was the treaty Indian ceremonial and subsistence catch. This was part of the PFMC catch sharing plan, and amounted to 15,000 pounds this year.

Washington, Oregon, and California

Dividing up the halibut pie was handled differently in Area 2A than in other areas. The Commission approved an overall harvest limit which encompassed commercial, sport, and treaty Indian fisheries. A catch sharing plan developed by the PFMC dictates the allocations to individual user groups. The major personal use removal in Area 2A was the treaty Indian ceremonial and subsistence catch. This was part of the PFMC catch sharing plan, and amounted to 15,000 pounds this year.

GROUND OUT: INCIDENTAL CATCH AND MORTALITY

Your watches at times are just writing the log,
And looking at sea after sea,
And then in dense traffic you run into fog,
Alert as you ever can be.

"To Readers of Sea Poetry" - third verse

The north Pacific is rich with edible organisms and people who fish for them. Pacific halibut is certainly one of the higher profile species, but there are many others such as sablefish, pollock, and Pacific cod, to name just a few. Various gear types are used including trawls, longlines, and pots, and no gear catches only the species for which it is fishing. IPHC stock assessment scientists need to account for halibut removed from the population that incidentally end up on this gear.

"Tubs o' buts"
Halibut bycatch. IPHC archive photo.

An ample amount of attention has been given to bycatch issues over the past decade — everything from gear research aimed at decreasing halibut catch rates to handling practices once the fish has been captured, to management scenarios that place halibut bycatch caps on fisheries and individuals. The Commission has no direct jurisdiction over those fish caught outside of the directed halibut fishery, but it has nonetheless been steadily involved in all of these efforts. The Commission has formally met with the NPFMC once a year for the past several years to discuss the status of bycatch in Alaska.

The Commission has no direct jurisdiction over those fish caught outside of the directed halibut fishery, but it has nonetheless been steadily involved in efforts to reduce catch and the resulting mortality in those fisheries.

Dramatic bycatch measures had brought the foreign fisheries under control by the mid-1980s, but by the late 1980s the groundfish fleet was mostly domestic and posed new problems for managers. Incidental mortality in the domestic fishery peaked in 1992 at 20.3 million pounds. Primarily

three management measures are credited with reducing that number by 35% since the early 1990s — IQs for sablefish and halibut in both Canada and the U.S., careful release regulations for the Alaskan longline fisheries, and an individual vessel bycatch quota program (IBVQ) for trawlers in Canada.

An estimated 12.9 million pounds of halibut were incidentally killed in 1999 — virtually the same as in 1998. IPHC biologists arrived at this figure by first taking into account how many halibut were caught. A mortality rate was then applied to each fishery based on condition factors assessed by field observers. Where observer data were lacking, assumptions were made based on survey data or similar fisheries where observers were present.

Observer programs both in Alaska and British Columbia provide catch and condition information of the halibut caught.

Having confidence in bycatch estimates is key to the current management regime. Bycatch accounting is at last reaching acceptable levels in some areas. Regulations require that halibut be returned to the sea with no additional injury, but a percentage do succumb to their injuries. In order to get a handle on that number, observer programs both in Alaska and British Columbia provide catch and condition information of the halibut caught. Although there is some debate about what constitutes a lethal injury, estimates are based on tag recovery programs and the program provides what we think is a fairly accurate accounting of bycatch mortality overall. In an effort to constantly improve our estimates, the criteria used by observers to assess halibut condition were revised in 1999, and will be used in the 2000 fisheries. The hope is that the new guidelines will make the assessment more uniform from one observer to the next.

United States

Bycatch in Area 2A remains largely unmonitored. The latest estimate of 614,000 pounds was from 1995, based on trawl fishery effort, and bycatch rates from the mid-1980s. We have continued using this estimate until newer data become available. A data collection program to monitor species composition in trawl catches took place from 1996-1998 and the PFMC and NMFS are in the process of analyzing that data. The PFMC is attempting to work towards an observer program, but limited funding is hampering efforts.

One program that looks promising is a vessel bycatch accounting program for trawl fisheries designed to make each vessel responsible for its own bycatch.

The Alaska groundfish fishery on the other hand, is closely regulated primarily through halibut bycatch mortality limits. The NMFS uses a pre-determined mortality rate, derived from previous year's observer data, for each fishery. When the limits set by the NPFMC are reached, the fishery is closed regardless of whether the target catch limit has been reached. This management tool has acted to halt further increases in halibut mortality but, unfortunately, can also cost the industry through lost yield of target species.

The NPFMC and industry are both working to find solutions that enable maximum groundfish harvest while actively reducing halibut bycatch and the resulting mortality. One program that looks promising is a vessel bycatch accounting program for trawl fisheries designed to make each vessel responsible for its own bycatch. Another industry-proposed program is called the Halibut Mortality Avoidance Program, which is essentially a

structured deck sorting requirement accompanied by strict operational requirements on tow speed, tow length, and tow size. Both programs are being considered at the NPFMC level.

At the June, 1998 meeting, the NPFMC adopted a prohibition of bottom trawl gear in the Bering Sea/Aleutian Islands pollock fishery. Midwater, or pelagic nets are still legal and experienced fishers can manage to fish them close to the sea floor. Even so, the larger mesh sizes should reduce halibut bycatch. The NPFMC staff estimated this savings at about 100 t, and the mortality cap was reduced by that amount. Unfortunately, regulations were not in place in time for the 1999 fishery, but NMFS did the next best thing which was to set the halibut mortality limit for bottom trawl gear at zero — essentially halting use of that gear. The bottom trawl gear prohibition should be in place for the 2000 fishery.

"Fish soup"
Photo courtesy of Kelly Van Wormer.

Last year was also the first for a pollock cooperative program formed under the American Fisheries Act. We have yet to receive the data from the program, but the IPHC will be very interested to see if the program resulted in less halibut bycatch.

Alaskan fisheries incidentally caught and killed 12.08 million pounds of halibut in 1999. Area 3 mortality climbed 12% from 1998, the highest since 1996. The increase is attributed primarily to overages in the shallow water fisheries mortality limit. Non-IFQ fisheries for Pacific cod and rockfish also exceeded their caps. Pot fisheries are traditionally not capped and mortality in the cod pot fishery increased 5-fold this year — this is still low compared to other fisheries, however, making up less than one percent of the Alaskan total.

Alaskan fisheries incidentally caught and killed 12.08 million pounds of halibut in 1999.

Pot fisheries are traditionally not capped and mortality in the cod pot fishery increased 5-fold this year — this is still low compared to other fisheries, however, making up less than one percent of the Alaskan total.

Bycatch mortality in Area 4 decreased seven percent from 1998. The decrease was seen in both trawl and longline fisheries, attributed primarily to lower levels of harvest on target species.

Canada

Observers on the vessels examined every halibut that came aboard so the mortality estimate is thought to be one of the best available.

In 1996, Canada instituted an IVBQ program which made each vessel in the trawl fishery responsible for its own bycatch, and that program continued this year. Observers on the vessels examined every halibut that came aboard so the mortality estimate is thought to be one of the best available. Still some fisheries are not observed such as the Pacific cod longline in Canada. Estimates for these fisheries were made from adjacent area information or previous year's data. All totaled, Canadian fishers caused an estimated 204,000 pounds of halibut mortality incidentally in 1999.

Making headway at the footrope: Gear Research

The NMFS has been conducting gear research. The idea is to allow the halibut to escape from the net before the net is brought to the surface without allowing the target species to do the same.

The NMFS has been conducting gear research over the past several years and within the last two years, have been working on a halibut excluder device for trawls. The idea is to allow the halibut to escape from the net before the net is brought to the surface, without also allowing target species to do the same. With some technical changes to the gear configuration, the second year of trials was conducted in 1999, and the results look promising.

There were three different escape panels tested including a 7-inch flexible grid, a 7-inch mesh panel, and a 6-inch mesh panel. Both the 7-inch grid and the 6-inch mesh had very similar characteristics — about 80% of the target species was retained while almost all of the halibut was excluded. The 7-inch mesh retained more larger halibut so only about one half the total weight of halibut was excluded, but virtually all target species was retained.

An important note here is that these panels will be more or less effective depending on the size difference between the halibut caught versus the target species. In the Gulf of Alaska for example, a large portion of the halibut bycatch in trawls is made up of larger fish. A fishery in this area where there is a definite size difference between halibut and the target would likely benefit more from such a device than a fishery where the size differences are less, as in the Bering Sea. Research and analysis will continue looking at other aspects such as size selectivity of target species. In many markets, the larger target is more valuable, so there may be less savings overall if the larger target species are also being excluded along with the halibut.

Feeding the hungry: Halibut donation program

A Washington state based group called Northwest Food Strategies (NFS) was given permission in 1998 to begin accepting halibut bycatch landed at one port for charity donation. Since not all halibut die when they

are captured, the halibut industry was concerned that this program would lead to retaining halibut bycatch that would have survived if returned to the sea. However, the NMFS regulations were sufficiently restrictive to alleviate concerns — halibut collected was restricted to fish landed by shore-based trawlers that could not sort at sea, limited to deliveries at three Dutch Harbor processing plants, and limited to a total retention of 50,000 pounds annually.

In its second year, the harvest of halibut was much less. Two of the three authorized processors — UniSea and Alyeska — participated. A total of 4,476 pounds was collected by NFS from the pollock "A" and "B" seasons in 1999 compared to 21,196 pounds from the pollock "B" season only in 1998.

About 65,000 meals were provided to hunger relief agencies in the Puget Sound area in 1998.

Last year, the product was quality tested by an independent seafood laboratory who deemed the majority of the fish firm-fleshed and high grade. NFS asked that any fish graded sub-standard, be discarded. The bottom line? — About 65,000 meals were provided to hunger relief agencies in the Puget Sound area.

ABACUS TO ALGORITHM: STOCK ASSESSMENT

The power unharnessed in one living storm
Is a marvel that catches the breath.
It always excites me as long as I'm warm;
In not too much danger of death.

"To Readers of Sea Poetry" - fourth verse

Assessment of the Pacific halibut stock is the reason for just about every project in which the IPHC staff is involved. Each year the staff assesses the abundance and potential yield of Pacific halibut using all available data from the commercial fishery and scientific surveys. Exploitable biomass in each IPHC regulatory area is estimated by fitting a detailed population model to the data from that area. A biological target level for total removals is then calculated by applying a fixed harvest rate — presently 20%-- to the estimate of exploitable biomass. This target level is called the constant exploitation yield or CEY for that area in the coming year. The amount available for commercial harvest — called the setline CEY — is calculated by subtracting all other removals from the total CEY — including sport catch, bycatch of legal sized fish, waste from the halibut fishery, and fish taken for personal use.

The staff makes commercial fishery catch limit recommendations to the Commission based not only on the setline CEY but also with considerations to statistical, biological, and policy concerns.

Area	1999 Exp. biomass (million pounds)
2A/B	55.5
2C	42.2
3A	94.9
3B	96.8
4A	36.1
4B	35.1
4CDE	35.1
Total	395.7

Once this process is complete, the staff makes commercial fishery catch limit recommendations to the Commission based not only on the setline CEY but also with considerations to statistical, biological, and policy concerns. The Commission's final catch limit decisions are based on the staff's recommendations but may be higher or lower as they too consider other factors.

The Analytical Model - Assessment in Areas 2 and 3A

This year, the assessment model itself did not change. Since 1995, stock size has been estimated by fitting an age and length-structured model to commercial and setline survey catch-at-age and catch-per-unit-effort data. Halibut growth rates have declined dramatically over the past few years and this model accounts for those changing rates. An age element was retained in the model, because it appears that age could still be influencing selectivity. To account for these two changing elements, the model has been fitted in two

ways: by assuming that the surveys catch fish of the same length consistently over time, or by assuming that the surveys catch fish of the same age consistently over time. The age-specific fits generally produce lower estimates of recent recruitment (eight-year-old fish) and therefore present abundance. To be conservative the staff has used those estimates to calculate CEYs.

Although the two models often produce different results, some trends are constant between models and across areas. Virtually all the area fits except the age-specific fit for Area 3A showed the 1987 year-class as strong, and all fits showed a drop in recruitment after the 1987 year-class. In Area 3A, the drop has been steep and sustained, to the point where estimated recruitment at age eight is the lowest in the 1974-1999 time series. It is possible that the decline is not as steep as the fit is showing, and we suspect this because of other evidence which calls into question length-specific vulnerability to hooking.

The models indicate a steep and sustained drop in recruitment of 8-year-olds, but it is possible that the decline is not as steep as the fit is showing. We suspect this because of other evidence which calls into question length-specific vulnerability to hooking.

What's in a Bait?

A major change this year in how the stock size was estimated was the introduction of an increase in setline survey catchability beginning with the 1993 survey data. In other words, the survey estimates were essentially generated again from 1993 to present using this updated information.

"Sitting Bait"
Photo by Tracee Geernaert.

What caused us to change our mind about how effective our survey gear was at catching fish? In 1998, the Commission conducted several at-sea experiments. Since 1993, chum salmon was the only bait used on our surveys in an effort to maintain consistency from one year to the next and over large areas. One of the baits tested was herring which showed to be 50% less effective at catching halibut than salmon. Many of the current survey assumptions regarding catchability are based on surveys conducted in the 1980s where salmon and herring were fished on alternate

hooks. The new experimental information suggested that 1990's survey catchability was actually 33% higher than we previously thought — meaning that the gear was better at catching halibut than we figured — which reduced our abundance estimates by about 25%.

Science is not often that easy however. The experiment that brought to light this discrepancy was very small and not specifically designed to compare the two baits in exactly the configurations used in the surveys. These two factors gave the staff some pause as to whether to include the higher catchability estimate in the assessment this year, or to wait until further studies could be done. Too big to ignore, even if preliminary, scientists included it in the 1999 assessment. In the meantime, more research is slated for the summer of 2000 to test the exact configurations from the surveys.

Too big to ignore, even if preliminary, scientists included a bait correction in the 1999 assessment - used to set catch limits for the 2000 season.

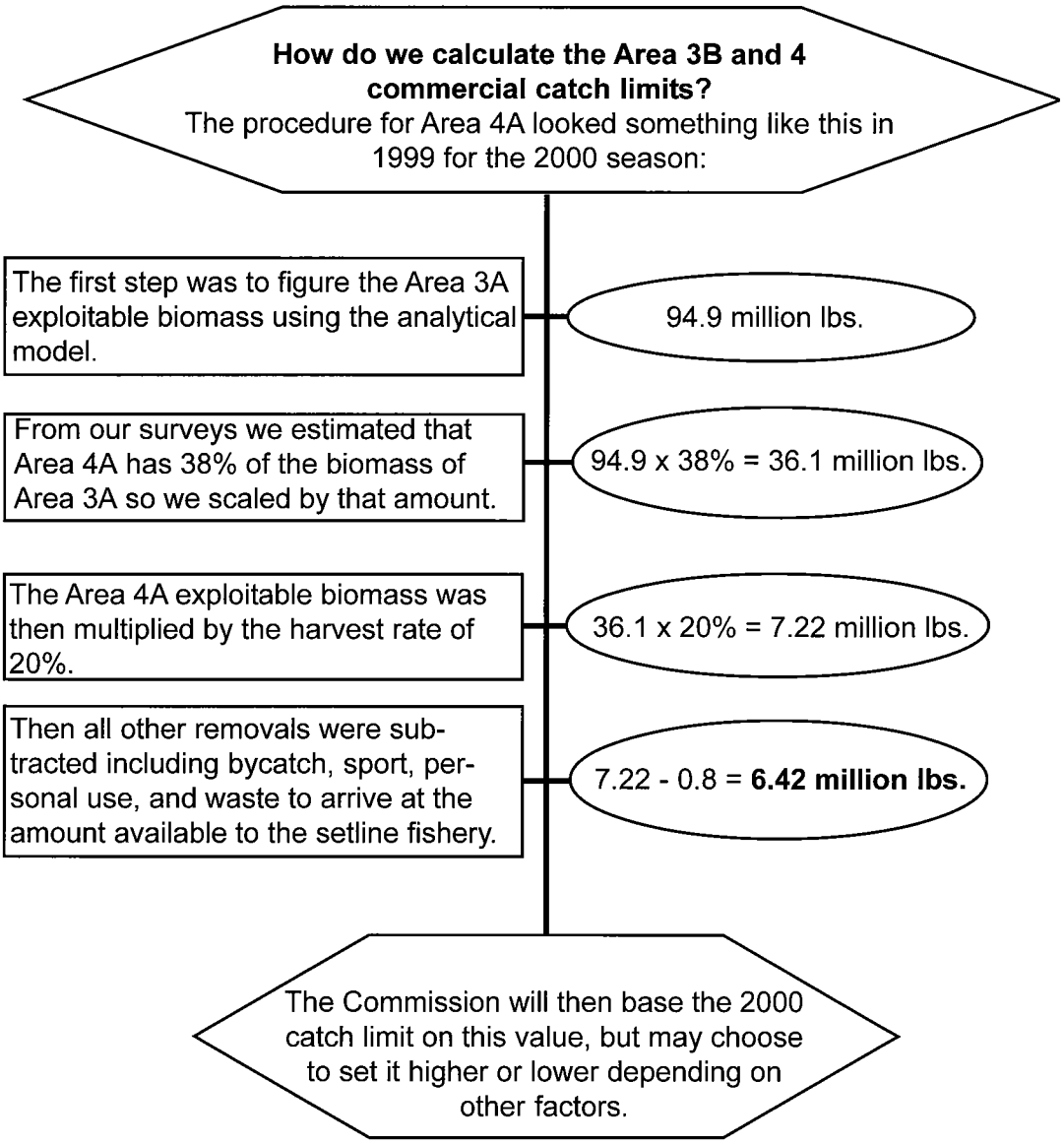


Figure 2. An example of how the assessment is computed in Areas 3B and 4.

Counting heads: Area 3B and 4 assessment

Until 1997, the analytical model was used to estimate halibut abundance for the entire Commission area, including lightly fished regions in the western Gulf of Alaska (Area 3B) and the Bering Sea/Aleutian Islands (Area 4). Because there is no historical survey data for western Alaska, the assessment relied entirely on commercial data for those areas. In 1997, the Commission did setline surveys of the entire area, and they showed substantially more halibut to be available in western Alaska (relative to other areas) than the analytical model had estimated. We think that when the commercial data were used with no survey data, the model was estimating the size of the exploited population. In western Alaska where fishing intensity is low or completely absent, a substantial part of the stock is effectively un-exploited and therefore invisible to the model, but not to our surveys.

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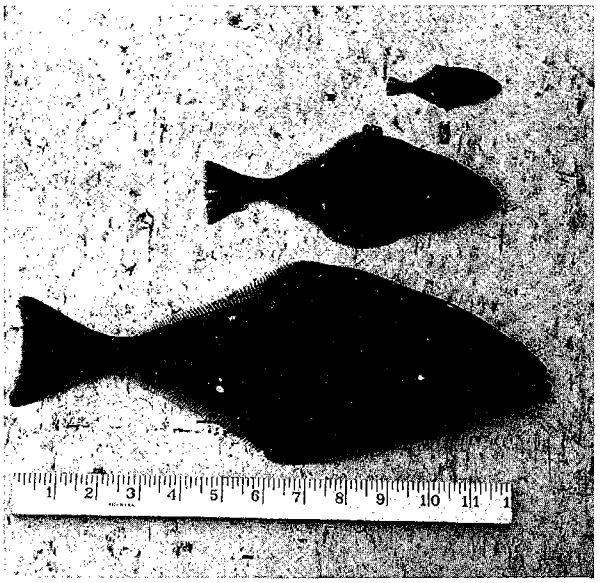
In light of our survey results, analytical estimates of stock size in Areas 3B and 4 were suspended in 1997. The current procedure is to calculate analytical estimates for Areas 2A, 2B, 2C, and 3A, and then to scale those absolute estimates by survey estimates of relative abundance in Area 3B and 4 to obtain absolute estimates for western areas. This year, only Area 3A was used to scale the estimates as it was believed that survey catch rates there were more comparable to survey catch rates farther west. The procedure used all available information from 1996-1999, but put more weight on the more recent values. Bottom areas were also factored in.

Future outlook: No shades necessary



"Sizing up"
IPHC archive photo.

It appears likely that coastwide recruitment has declined from the high levels of 1985-1995, and size at a given age is also still going down. So while numbers of fish remain quite high relative to the low levels of 1975 or 1980, biomass levels (the amount of fish by weight) are not as high as recent years and the prospect is for a continuing decline as relatively strong year-classes move out of the stock and relatively weak ones enter and grow more slowly.

The prospect seems poorest in Area 3A, because it appears that there has been a near failure in recruitment in that area. However, NMFS trawl surveys show a much higher number of 8-year-old fish than our analytical assessment shows which is based on the setline surveys. This is a puzzle, because for legal-sized halibut, the two surveys agree reasonably well on trends in relative abundance, but since 1990, the trawl survey catch rates of sublegal halibut have greatly outpaced setline survey catch rates.

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Another cause for suspicion is that a familiar pattern is emerging in that area. As halibut move through the fishery and each year's data are added, the population for a given year-class increases from assessment to assessment. We saw this before when size-at-age was declining. However, we know that size at age has changed very little for fish ages 8 and younger so this is some other factor at work. It therefore is possible that exploitable biomass in Area 3A is underestimated and that incoming recruitment will turn out to be no worse than in other areas. Even though the degree of change is called into question, we believe the trend to be true — biomass will decline over the next several years.

How old is the population?

IPHC staff have been collecting otoliths (earbones) from halibut since about 1930. Otoliths range in size from very small to nearly the size of a quarter and resemble the shape of a hand. As the halibut grows, so does the otolith. Two rings — differing in appearance between winter and summer — are laid down each year and scientists can then place the otoliths under a microscope and count rings to estimate age in years. Since age is a key element to the stock assessment, otoliths are collected from many sources including commercial catch, setline surveys, NMFS trawl surveys, and fish recovered with tags attached. In 1999, a total of 27,862 otoliths were aged from all sources combined.

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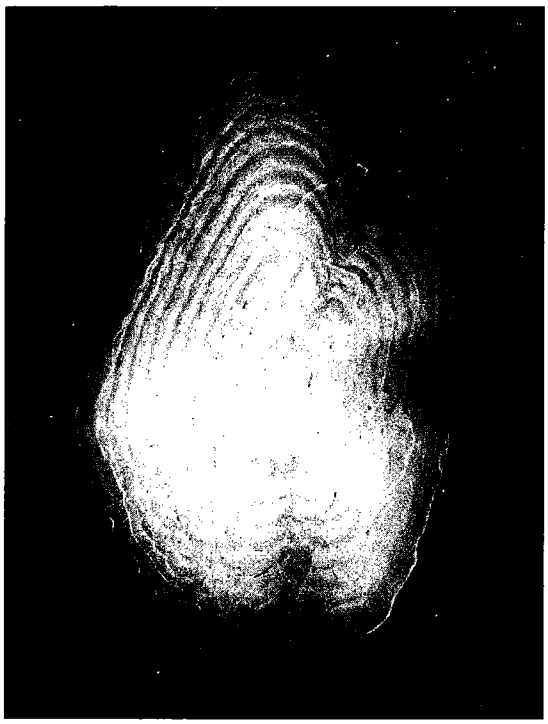
1999 otoliths	# Aged
Commercial fishery	12,796
IPHC setline survey	11,967
NMFS trawl survey	3,029
Tag recoveries	70

This year, age reading biologists noted some cases of slow otolith growth among the samples. Normally, the narrow translucent or "winter" growth zone is present on the otolith margin by March to mid June. Many otoliths collected in those months also have new opaque or "summer" growth from the current year. Usually by July, halibut otoliths have at least some new opaque edge growth. In 1999, however, about 15% of otoliths collected in July had no new opaque growth. Most of these "slow" otoliths came from fish captured in the Bering Sea. In contrast, there were some otoliths from the 1998 samples that showed accelerated growth, with a translucent zone appearing on the margin as early as August. The decision to classify opaque edge growth as "new" (current year) or "old" (previous year) is based on the amount of growth in proportion to the previous opaque zone and the amount of edge growth on other otoliths in the sample. For instance, if there is a translucent zone on



"Earbone"
IPHC archive photo.

the edge of an otolith collected in July, and other otoliths in the sample (i.e., same capture date and location) have a large amount of opaque growth, a reader would assume the translucent zone was being laid down early in that otolith. On the other hand, if other otoliths in the sample had very little opaque growth, the reader would assume that the translucent zone on that otolith was from last winter and that the otolith had not yet begun to lay down any new summer growth. What all this means has yet to be determined, but we are hoping that additional research slated to take place in 2000 will shed some light.

Commercial fishery

The minimum size limit in the commercial fishery is 81.3 cm (32 inches) so most, but not all, of the fish in this sample are at least eight years. The largest year class of fish caught in the commercial fishery in 1999 was the 12-year-olds, or those spawned in 1987 — making up about 25% of the catch. The 1987 year class was unusually large and it has been the most abundant in the commercial fishery since 1996.

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The average halibut in this year's market sample was 105 cm (41 inches) in length and 13 years old, the same as in 1998. The oldest fish aged this year was a 42-year-old from Area 4B and the youngest was a 4-year-old from Area 4A. Average age ranged from 11 years in Area 2A to 15 years in Area 4B. Average length ranged from 97 cm (38 inches) in Area 2A to 114 cm (45 inches) in Area 4C. The largest fish caught was 213 cm (84 inches) from Area 2C and was determined to be 23 years old.

Setline Survey

The entire size range of fish caught on the setline survey was sampled for otoliths, not just those of commercial size. This gives us a glimpse of year classes as they approach the commercial fishery as well as providing critical information about fish already vulnerable to commercial capture. Even so, longline gear tends to catch fish greater than about 60 cm

The oldest survey caught fish were a 40-year-old female caught in southeast Alaska and a 40-year-old male caught in Area 4A.

"Triple team"
Bringing a halibut aboard the F/V *Angela Lynn*. Photo by Reisa LaTorra.

(24 inches), so we are limited somewhat in our forecasting ability.

Both males and females as young as 3 years old were captured in this year's survey in waters off British Columbia. The oldest were a 40-year-old female caught in southeast Alaska and a 40-year-old male caught in Area 4A. Fish length ranged from 48 cm (19 inches) to 217 cm (85 inches). Females captured outnumbered males in all areas except 3B and 4B.

Trawl Surveys

The trawl surveys conducted by the NMFS each year provide us with our earliest look at up and coming year classes of halibut. Whereas longline gear has a lower catch range of around 50-60 cm (20-24 inch) fish, the trawl catches fish as small as 15-20 cm (6-8 inches) in length -- about two years old. Why don't we just use trawl surveys for all our assessment needs? There are several reasons, but one reason is because halibut tend to become less vulnerable to trawl gear at about 100 cm (39 inches) — peak vulnerability in the commercial fishery.

We began placing biologists aboard the trawl surveys beginning in 1996 to collect otoliths and other information on the halibut caught. The table on the next page shows the percentage of fish caught at each year of age and each survey sampled. Clearly, the 1987 year class, now mentioned several times is still visible early on but has more recently grown out of the range of the gear.

The Gulf of Alaska trawl survey was conducted in 1996 and 1999. The average fish was just over seven years old and measured 62 cm (24 inches) in 1996 and was just under seven years old and measured 58 cm (23 inches) in 1999.

The Bering Sea trawl survey is conducted every year and we began sending biologists out in 1998. The average fish in that area was just under seven years old and measured 59 cm (23 inches) in 1998 and was about 5 1/2 years old and measured 51 cm (20 inches) in 1999.

The Aleutian Island survey was conducted in 1997 and will be done again in 2000. Fish in that area tend to be larger and older in both the commercial catch and the setline survey. The same is true here where the average fish in 1997 was just over nine years old and measured 73 cm (29 inches).

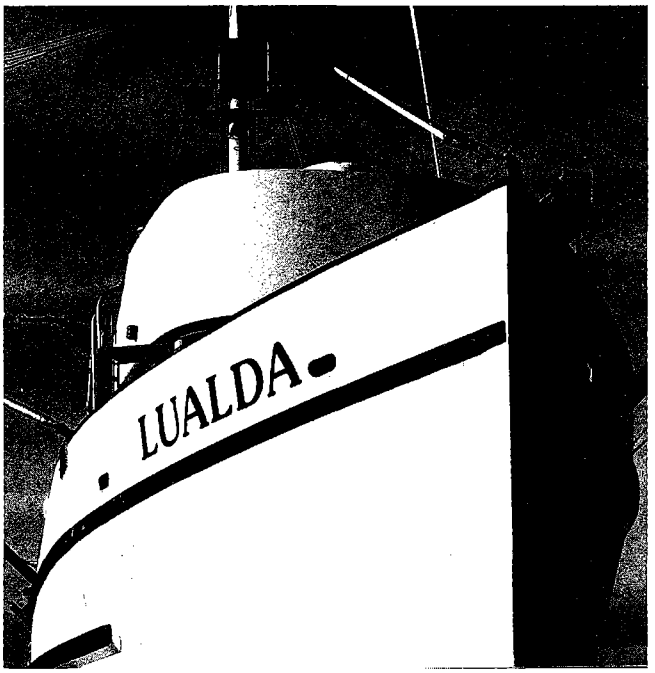
SAILING THE SEAS: STOCK ASSESSMENT SURVEYS

To deny the romance of the sea is unjust,
But what is "Sea Fever's" allure?
"...go down to the seas again," well if you must
You're in need of the money for sure

"To Readers of Sea Poetry" - fifth verse

Commission scientists use several sets of information for halibut stock assessment each year. Each data set has its strengths and when put altogether, provides what we think is a fairly accurate picture of the stock size. The IPHC staff carried out the third year of a five-year series of comprehensive setline surveys in 1999. We also worked with the NMFS to place biologists aboard their vessels surveying the Bering Sea and Gulf of Alaska with trawl gear.

Currently, the setline survey data is used directly in the stock assessment and the trawl data is used for forecasting. However, IPHC scientists hope to incorporate some of the trawl data in coming years.



"Steady as she goes"
Photo by Gregg Williams.

Currently, the setline survey data is used directly in the stock assessment and the trawl data is used for forecasting. However, IPHC scientists hope to incorporate some of the trawl data into the stock assessment over the next year or two.

Surveying with a groundline

The standardized stock assessment survey is a longline survey designed to provide information independent of the commercial fishery. Everything was standardized from boat to boat, area to area, and from year to year to ensure a non-biased accounting of the catch. Fishing locations were pre-determined and laid out in a 10-nmi square grid across almost the entire

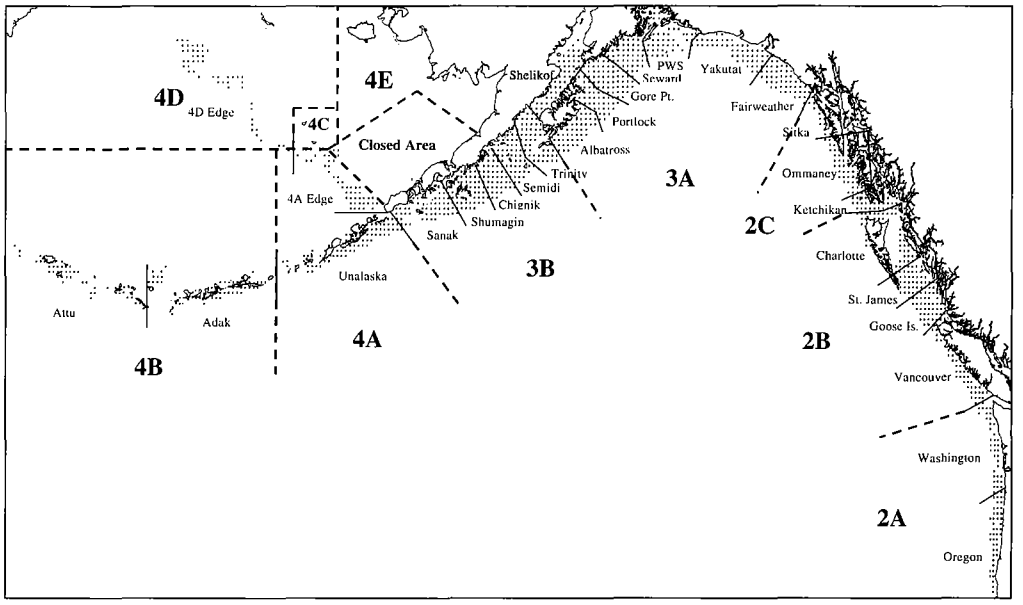


Figure 3. Setline survey stations.

"Lifeline"
Gear aboard the F/V *Trident*. Photo by Tracee Geernaert.

range of Pacific halibut from the Oregon/California border to the Aleutian Island Chain and Bering Sea.

IPHC biologists gathered length, gender, maturity, and otoliths for aging from the halibut caught. (For more information about age composition, please refer to the stock assessment section in this book.) In addition, the head and mouth were checked for hook injuries sustained during previous captures. A supplemental project in 1999 having to do with food web studies had samplers cutting small pieces of flesh from the heads of the fish and packaging them for lab analysis. More information on this project should be forthcoming in next year's

IPHC biologists gathered length, gender, maturity, and otoliths for aging from the halibut caught.

report. In addition, all major and minor details about each set were logged and used for this and future research.

What happened this year

Fourteen commercial longline vessels were chartered this year — six Canadian and eight U.S.

Fourteen commercial longline vessels were chartered this year — six Canadian and eight U.S. Originally, the *F/V Royal Pursuit* was chartered to fish areas in northern British Columbia, but ran aground just prior to the beginning of the charter and was considered a total loss. The *F/V Cape Ball* and *F/V Pender Isle* were chartered in its place.

Vessel	Home Port	Stations completed
Angela Lynn	Vancouver, B.C.	137
Blackhawk	Fort Bragg, CA	84
Bold Pursuit	Comox, B.C.	142
Cape Ball	Richmond, B.C.	44
Defiant	Kodiak, AK	46
Kristiana	Seattle, WA	88
Lualda	Seattle, WA	47
Ocean Viking	Pender Harbor, B.C.	98
Pacific Sun	Newport, OR	61
Pender Isle	Vancouver, B.C.	124
Taasinge	Kodiak, AK	44
Tradition	Kodiak, AK	76
Trident	Adak	83
Tyanaa	Campbell River, B.C.	42

Areas 2A and 4B are very costly to survey. The financial outlook for the Commission was such that we could not afford to hire vessels under traditional lump-sum contracts to survey those areas. The staff turned to industry for help who was asked to come up with "creative low cost ways" of surveying the stations. The *F/V Blackhawk* and the *F/V Trident* came through with financial agreements that the Commission could live with and were chartered for the two areas.

All totaled, 1,116 stations were completed out of 1,143 planned.

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	Survey CPUE (lbs/skate)		
Area	1997	1998	1999
2A	49	-	37
2B	131	94	88
2C	390	224	209
3A	331	282	241
3B	414	438	441
4A	245	293	368
4B	281	216	204
4C	64	-	-
4D	68	-	-

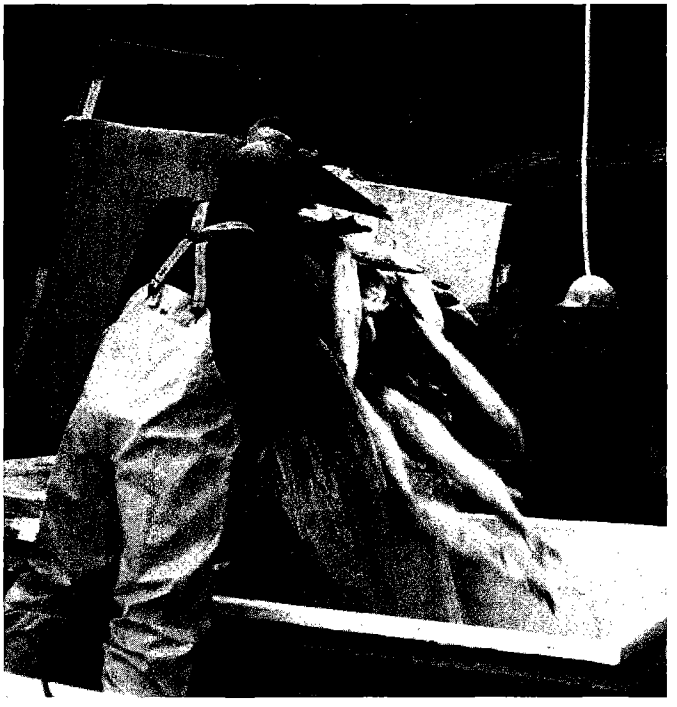
Halibut less than 82 cm (considered undersized) were sub-sampled for otoliths and gender so that a portion of them could be returned to the sea alive. The commercial-sized fish were kept for sale and the resulting revenues helped to fund the research. Average price for the survey halibut in 1999 was $2.15 per pound — a substantial increase from the unusually low $1.12 per pound in 1998.

Testing the Design

Prior to 1998, the setline survey was designed as a series of triangles. The survey was completely redesigned that year as a 10-nmi square grid for two reasons — to increase station density for better estimates and to allow vessels more flexibility in how the stations were fished, making the survey more efficient. A notable drop in catch per unit effort (CPUE) in Areas 2B, 2C, and 3A coincided with the design change, prompting the IPHC staff to conduct an experiment in 1999 comparing the two designs.

Since Area 2C showed the largest drop, that area was chosen for the experiment. Stations from both designs were fished in an order which proved most efficient. Average catch rates were higher for the old stations versus the new stations in the outside waters, but were still within the acceptable range of variability. In other words, IPHC scientists do not believe the design is to blame for the drop in CPUE.

The new and old survey designs were compared and the consensus among IPHC staff scientists is that this change is not responsible for CPUE drops seen in some areas.



"Falling Fishes"
F/V *Angela Lynn* taking on bait. Photo by Joan Forsberg.

Is there a better bait for our setline survey?

In December of 1998 and into 1999 the IPHC experimented with different bait types for the setline surveys. The standard bait since 1991 has been #2 semi-brite chum salmon cut in 1/4 to 1/3 pound pieces. The experiment was designed to see if any other of the common and widely available baits might be acceptable substitutes for chum salmon when or if chum salmon might not be available.

In addition, the baits were tested in winter and spring to compare their relative effectiveness at different times of the year.

The *F/V Heritage*, *F/V Angela Lynn*, *F/V Bold Pursuit*, *F/V Royal Pursuit*, and *F/V Masonic* were chartered to conduct experiments in Areas 2B and 3A. The winter portion took place in December of 1998, and January and February of 1999. The spring portion was conducted during May of 1999.

All vessels fished with standard survey gear and the same information was collected for each halibut as on the traditional surveys. Several different bait types and sizes were used including 4-ounce chum salmon and large and small pieces of herring or squid. Other common halibut baits such as Pacific cod, pollock, and pink salmon were excluded because they often are not readily available throughout the year.

Although the data has not yet been fully analyzed, preliminary results showed specific and significant differences between the baits.

A total of 217 sets in Area 2B and 164 sets in Area 3A were completed in the winter portion. Overall, 289,500 pounds of legal-sized halibut were sold from Area 2B and 391,000 pounds were sold from Area 3A. The summer portion of the Area 3A experiment successfully completed 35 sets and about 102,000 pounds were sold there. The Area 2B experiment completed 95 sets, and almost 46,000 pounds were sold. The amount sold from Area 2B would have been higher except that the *F/V Royal Pursuit* ran aground and was a total loss with an estimated 25,000 pounds of halibut aboard. No crew or IPHC biologists were injured.

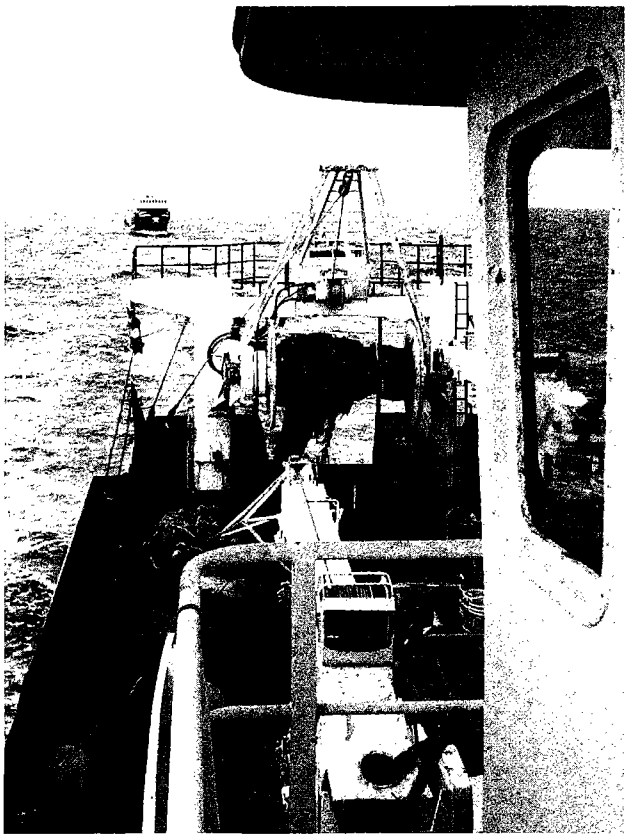
Although the data has not yet been fully analyzed, preliminary results showed specific and significant differences between the baits. One difference had an immediate impact on the IPHC stock assessment and is described in more detail in that section.

By incorporating trawl information with our setline surveys, we can watch year classes of fish from the time they are about two or three years old all the way through adulthood.

Catching a glimpse of what's to come: Bering Sea trawl survey

Each year since 1979, the NMFS has conducted a groundfish trawl survey of the Bering Sea shelf from Bristol Bay to the shelf break and between Unimak Pass to north of St. Matthew Island. Trawl gear tends to catch fish smaller than those caught by longline. By incorporating this information with our setline surveys, we can watch year classes of fish from the time they are about two or three years old all the way through adulthood. Another advantage to the Bering Sea survey is that it covers a large area — often referred to as "the flats" — which the Commission survey does not. We know that halibut exist on the flats but the survey would be extremely costly and beyond Commission means.

To get as much information as possible about the halibut caught on the survey, IPHC biologists participated for the second consecutive year. Two vessels — the *F/V Arcturus* and *F/V Aldebaran* — were chartered to conduct the survey. The Commission biologist was aboard the *F/V Arcturus* for the entire survey which took place from late May to mid-July. As in the setline surveys, length, gender, maturity, and hooking injuries were assessed on each halibut sampled. In addition, the NMFS scientists measured the length of all halibut caught on both vessels.



"Running Behind"
Looking back from the F/V *Arcturus* to the F/V *Aldebaran*. Photo by Joan Forsberg.

The survey was scheduled to fish a total of 380 stations, and in 188 of those halibut were sampled. Fewer halibut were sampled this year — 831 compared to 903 in 1998 — with about an equal number of males and females. As expected, the majority of fish were deemed immature and were not yet spawning participants.

Another piece of the puzzle: Gulf of Alaska trawl survey

The Gulf of Alaska shelf trawl survey has been conducted by the NMFS every three years since 1984. Beginning in 1999, the Gulf will be surveyed every two years which is good news to the IPHC since every piece of information helps. The Gulf survey spans a geographical region from the Islands of Four Mountains in the Aleutians to Dixon Entrance in southeast Alaska in depths ranging from 16 to 500 m. Deeper stations were added this year, but halibut tend to stay within the 500 m depth gradient in the summer so that is the area on which IPHC scientists concentrated.

Beginning in 1999, the Gulf will be surveyed every two years instead of every three, which is good news to the IPHC since every piece of information helps.

Three vessels were chartered to conduct the survey — *F/V Vesteraalen*, *F/V Dominator*, and *F/V Morning Star*. The IPHC biologist sampled all halibut caught on the *F/V Vesteraalen* and halibut from all vessels were measured for length. The *Vesteraalen* completed 290 of the 776 scheduled stations beginning mid-May and ending in late July. In all, 2,347 halibut were subject to sampling. Male halibut outnumbered females by only about 2%. Immature fish accounted for 92% of the females and 69% of the males, and the rest were in various stages of maturity.

Once bitten - twice shy doesn't apply: Prior hooking injuries

Several years ago, sport fishing interests voiced concern that an increasing number of hooking injuries were appearing on halibut. Longline fishers for halibut and other species in Alaska are required to release non-retained halibut in one of three ways to minimize injury. If there is indeed a large number of injured halibut, it could mean that the regulations are not being followed. The setline surveys and now the trawl surveys offer a unique opportunity to get a close up view of the types of injuries and to what extent they may be occurring.

"Ouch"
Healing prior hook injury. IPHC archive photo.

Beginning in 1997, biologists on the surveys began assessing whether an injury sustained in a prior hooking incident was present. When it became clear that prior hooking injuries were indeed present on a percentage of the fish, IPHC biologists refined the criteria to reflect condition categories used by observers in the groundfish fisheries.

Roughly 5.4% of fish examined on the surveys reflected some form of prior hooking injury ranging from minor to severe

This year, a whopping 104,810 halibut were examined for prior hooking injuries on the setline survey and roughly 5.4% of those reflected some form of injury ranging from minor to severe — a drop from the 1998 value of 6.1%. Area 4A showed the lowest incidence with 4.6% and Area 3A came in the highest with 6.1%. Looking at only sub-legal halibut, the lowest incidence was in Area 3B with 1.9% and highest in Area 4B with 4.2%.

Biologists on board the NMFS trawl surveys also looked for prior hooking injuries. A total of 2,347 halibut on the Gulf survey and 831 in the Bering Sea survey were examined. The Gulf reflected an injury rate of 2.9%, slightly higher than the Gulf-wide sublegal rate seen in the setline survey. The Bering Sea rate of 2.0% is not comparable to any of our setline surveys, because different areas are covered. However, this rate reflects a 5.0% decrease from the 1998 trawl survey.

What do we hope to learn? We expect to be able to identify areas where severe injuries are more common and provide education and feedback to fisheries operating in those areas on methods of releasing halibut with fewer injuries, thereby improving survival.

OCEAN IN MOTION: BIOLOGICAL RESEARCH

Sea life is just life with its doldrums and gales,
Its reefs and hospitable shores.
But it's real, and not a collection of tales,
And it's mine, but the fantasy's yours.

"To Readers of Sea Poetry" - final verse

Although surveys were a main focus of the Commission staff's efforts, other forms of research were not forgotten. This year marked the third of a comprehensive oceanography project which involved the IPHC as well as many other agencies and data sets. The research is relatively new and promises to shed light on stock dynamics of many species in the north Pacific and Bering Sea. A related project discovered that the Commission's 70-year otolith collection may be the key to certain historical oceanographic information -- a role far beyond the original one of providing ages.

Other projects were smaller in scale, but important nonetheless. At industry request, the IPHC continued looking into the occurrence of "chalky" halibut and its causes, and tag recoveries continued to pad our data sets.

How's the weather? Halibut, Climate, and Fisheries Oceanography

The traditional way to manage a fish population is to find out all there is to know about life history, feeding habits, and the fishery surrounding it — then model its population dynamics and response to harvest rates based on that information and a number of other assumptions. Scientists have known for some time that environmental factors likely play a role in the survival and growth of fish. In this age of information networking, it is now possible to link different, seemingly unrelated sets of data that together paint a much bigger picture of the forces affecting fish populations.

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"The Thinkers"
IPHC archive photo.

In 1997, the Commission initiated new research on halibut fisheries

oceanography in an effort to expand beyond a single-species, environment-free model. The hope is that we will gain a better understanding of factors influencing halibut growth and recruitment, and be able to link that information more closely with the stock assessment.

The research has come a long way in the past few years. By pooling together different sets of data early in the 1990s, evidence began accumulating that a major climatic event had taken place in 1976-77 — and this event had widespread consequences for the inhabitants of the northeast Pacific Ocean and Bering Sea. The 1976-77 climate or "regime" shift was the most recent change in the climate phenomenon called the Pacific Decadal Oscillation (PDO). The PDO is described as an El Nino-Southern Oscillation (ENSO) type climate cycle but with some important differences. Both show widespread variations in Pacific Basin and North American climate, but the PDO is remarkably persistent, lasting decades versus months in the case of ENSO. Secondly, the climatic "fingerprints" of the PDO are strongest in the North Pacific/North American sector, while secondary in the tropics — the opposite is true for ENSO.

Over the past couple of years, scientists have been trying to pinpoint what factors determine a regime shift. Some believe that another shift took place in the late 1990s, while others believe that 1989 was the most recent year. Still others maintain that no shift has taken place since the mid-1970s. An analysis of just climate data does not unequivocally establish a post-1976/77 regime shift; however adding ecological data to the analysis pinpoints 1989 as the most likely year for a shift. Scientists are quick to point out though that if a change indeed took place, it was not a simple reversal of conditions established by the 1976-77 regime shift.

Halibut recruitment — as well as recruitment in salmon stocks and other groundfish — coincided with the regime shift.

What does this mean for halibut stock assessment? Scientists produced various models to test whether regime shift knowledge helped or hindered the recruitment assessment process. Regime shift models consistently outperformed the non-regime shift models. That means that halibut recruitment — as well as recruitment in salmon stocks and other groundfish — coincided with the PDO. Environmental factors presumably act most strongly on halibut in their first year of life, so depending on the phase of the PDO, halibut may be in a strong or weak productivity pattern. Therefore, it is possible to provide short-term recruitment predictions for halibut.

What does the model predict for the next several years? Regardless of whether a regime shift took place in 1989 or not, the outlook is for weaker recruitment over the next several years than seen over the past decade. The occurrence of a regime shift in 1989 affects the degree to which recruitment has declined. However, it will be several years before we are confident in our predictions. Understanding the role the PDO plays on the stock is one step closer to understanding the relationship between stock and recruitment. The IPHC plans to continue research on the subject.

The diary of an otolith

Perhaps not knowing exactly why, IPHC scientists kept and stored every halibut otolith ever read for age since 1930. It turns out that the otoliths may hold the key to identifying significant environmental events over much of the 20th century. Sea-bottom temperature is one of the gauges to track environmental shifts and otoliths contain two forms of oxygen isotopes, the ratio of which varies depending on temperature.

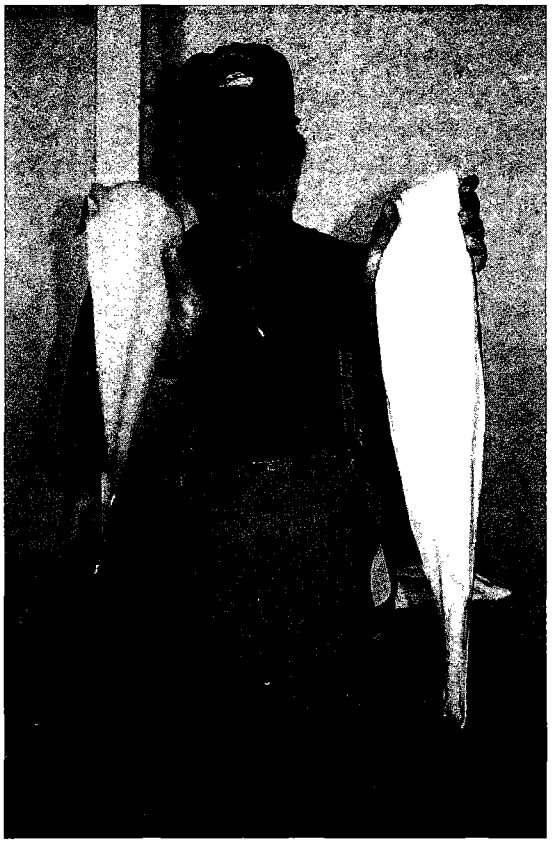
It turns out that otoliths may hold the key to identifying significant environmental events over much of the 20th century.

Scientists studied several otoliths this year in an effort to first find the best sampling method and then to actually look at the story the otoliths had to tell. This preliminary work suggested that environmental changes can indeed be deduced from the isotopes in halibut otoliths, but there is a lot of variation in the results. There are many questions yet to be answered such as whether salinity plays a role in the isotope ratios and exactly how oxygen isotopes are linked to temperature and water masses — but it appears that the IPHC possesses a new data set for characterizing the marine environment of the north Pacific.

Chalky Halibut: A product of their environment?

Chalky condition in halibut has been an ongoing concern to processors and buyers as it renders the flesh opaque and coarse. Most claim that it does not affect the taste, but the altered appearance of the fish makes it difficult to sell to the consumer. At the request of industry, the IPHC staff has been investigating the degree and cause of the problem over the past three years.

Two vessels — the *F/V Angela Lynn* and *F/V Star Wars II* — were chartered to carry out experiments in Areas 2B and 3A designed to test whether handling methods might be to blame. The fish were subject to one of four



"Chalk it up"
Non-chalky (left) vs. chalky halibut (right), and IPHC biologist, Steve Kaimmer in the middle. Photo by Linda Gibbs.

At the request of industry, the IPHC staff has been investigating the degree and cause of chalkiness over the past three years.

handling treatments after capture — stunning, bleeding, stunning and bleeding, and no treatment. Time on deck, fish length, gender, maturity, and core body temperature were recorded for each fish, and the fish were marked with tags so they could be tracked through the plant.

Prior sale arrangements with New West Fisheries and S&M Products facilitated checking for chalkiness after landing. The rate of chalkiness in the experiment, about 14% in Area 2B and 9% in Area 3A turned out to be significantly higher than seen in the commercial fishery, which was to be expected since we intentionally fished areas and times of known chalkiness.

While stunning and bleeding are good practice, and undoubtedly improve the appearance and shelf life for Pacific halibut, these techniques did not have an effect on chalkiness.

Neither stunning nor bleeding had an effect on chalkiness. While they are good practice, and undoubtedly improve the appearance and shelf life for Pacific halibut, these techniques did not have an effect on chalkiness. Similarly, neither the soak time nor the time the fish was left on deck before cleaning was significant. The factors that were significant in this study are those particular to the fish prior to capture. The most significant effect came from the sex of the fish, particularly in the Alaskan data. Males had a rate of chalkiness four times that seen in females. Within females, immature and spent females were much less chalky than mature females. Other than for the considerations of maturity, fork length does not seem to be a factor in chalkiness of females. The number of observations across lengths is small enough that this comparison cannot be as well documented for males. There were also different rates of chalkiness seen among the three fishing grounds in the Alaskan study, with the relative rates of chalkiness among males and females consistent across these areas. The reason for the differences by area is unclear. The area with the highest percentage of chalky fish was also the shallowest and had the highest bottom temperatures.

The area with the highest percentage of chalky fish was also the shallowest and had the highest bottom temperatures.

The differences seen in the study suggest physiological or behavioral bias for some fish to be chalky. Sex effects, along with effects of area, and possibly bottom temperature and depth, are more important than fish handling within the limits of the generally good handling associated with this experiment.

Tagging along

Tagging fish has long been a method used by many agencies to track migration patterns and to answer other pressing questions. The IPHC has not actively tagged fish for several years although there are some tag releases by other parties each year and tags continue to be recovered from earlier experiments.

In 1999, a total of 125 tags were released — all in the sport fishery. The Homer Derby Association released approximately 75 tags and the Ninilchik Chamber of Commerce released 50 tags. An IPHC based program to provide sport charter operators with tags for catch and release was started in 1994 and discontinued in 1999 as a result of low participation.

The IPHC depends on fishers and processors to recover tags. A reward of $5 or a tag recovery cap are given for each tag. This year, there were 153 tags recovered, down from 201 in 1998. Most of the fish recovered

this year were from a 1993-94 longline mortality study. Three of the tags recovered came from fish that had been at large 18 years after being tagged in 1981 as part of a small fish study. Most of the fish were recovered relatively close to the area of release although there were some that traveled great distances — for example a fish tagged in 1986 off Kodiak Island reappeared off the southern coast of Queen Charlotte Island, and one fish tagged off the Trinity Islands in 1993 traveled to Dutch Harbor before recapture.

Recovery rates from the most recent experiments are as high as 47%. The highest rates occur with the older experiments where more fish have been available for capture for a longer period. Nearly half the fish released in the 1988 Sitka Spot experiment have now been recovered. The study done in 1989 off Central Oregon has a recovery rate of 30%, and the longline mortality studies done in 1993-94 have recovery rates of seven and nine percent. The most recent project — a 1995 trawl mortality experiment — has the lowest and most disappointing recovery rate of only three percent.

Attention: Turn in halibut tags to our office or port samplers with as much information as possible. We would like catch date, location, and depth along with length, and gender information. In return, we'll send you a tag reward cap or $5.00 - your choice.

"Say Cheese"
IPHC biologist, Tracee Geernaert, holding a tagged juvenile halibut.
Photo by Kelly Van Wormer.

APPENDICES

The tables in Appendix I provide catch information for the 1998 commercial and tribal fisheries. The areas specified are the IPHC regulatory areas, depicted in Figure 1 of this report. Appendix II shows the fishing period limits used during the 1998 seasons, and Appendix III shows the current sport fishing statistics.

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

Appendix I.

Table 1. Commercial catch and catch limits of Pacific halibut by IPHC regulatory area (in thousands of pounds, net weight), 1992 - 1999.

Table 2. The total catch (thousands of pounds, net weight) from the 1999 commercial fishery, including IPHC research, of Pacific halibut by regulatory area and month.

Table 3. Number of vessels and catch (thousands of pounds, net weight) of Pacific halibut by vessel length class in the 1999 commercial fishery a) for Area 2B, Alaska, and the Alaskan regulatory areas, and b) Area 2A commercial fisheries not including the treaty Indian commercial fishery.

Table 4. Fishing periods, number of fishing days, catch limit, commercial, research and total catch (thousands of pounds, net weight) by regulatory area for the 1999 Pacific halibut commercial fishery.

Table 5. Commercial landings (thousands of pounds, net weight) of Pacific halibut by port, country of origin and IPHC research catch for 1999.

Table 6. Commercial halibut fishery catch (thousands of pounds) in 1999 by country, statistical area, and regulatory area.

Appendix II.

Table 1. The fishing period limits (net weight) by vessel class used in the 1999 directed commercial fishery in Area 2A.

Table 2. Metlakatla community fishing periods, number of vessels, and halibut catch (net weight), 1999.

Appendix III.

Appendix I.

Table 1. Commercial catch and catch limits of Pacific halibut by IPHC regulatory area (in thousands of pounds, net weight), 1992 - 1999.

	Commercial Catch[1]							
Regulatory Area	1992	1993	1994	1995	1996	1997	1998	1999
2A[2]	437	504	370	297	295	413	460	450
2B	7,626	10,628	9,911	9,625	9,557	12,420	13,150	12,704
2C	9,819	11,290	10,379	7,761	8,860	9,920	10,192	10,168
3A	26,782	22,738	24,844	18,342	19,696	24,628	25,703	25,292
3B	8,620	7,855	3,860	3,122	3,662	9,072	11,160	13,835
4A	2,699	2,561	1,803	1,617	1,694	2,907	3,418	4,369
4B	2,317	1,962	2,017	1,680	2,075	3,318	2,901	3,571
4C	793	831	715	668	680	1,117	1,256	1,762
4D	727	836[3]	711[3]	643	703	1,152	1,308	1,891
4E	72[4]	64[4]	120[4]	127	120	251	188	264
Total	59,892	59,269	54,730	43,882	47,342	65,198	69,736	74,306
	Commercial Catch Limits							
Regulatory Area	1992	1993	1994	1995	1996	1997	1998	1999
2A[2]	396.3	361	355.3	278	275	374.2	440.9	412.5
2B	8,000	10,500	10,000	9,520	9,520	12,500	13,000	12,100
2C	10,000	10,000	11,000	9,000	9,000	10,000	10,500	10,490
3A	26,600	20,700	26,000	20,000	20,000	25,000	26,000	24,670
3B	8,800	6,500	4,000	3,700	3,700	9,000	11,000	13,370
4A	2,300	2,020	1,800	1,950	1,950	2,940	3,500	4,240
4B	2,300	2,300	2,100	2,310	2,310	3,480	3,500	3,980
4C	800	800	700	770	770	1,160	1,590	2,030
4D	800	800[3]	700[3]	770	770	1,160	1,590	2,030
4E	130[4]	120[4]	100[4]	120	120	260	320	390
Total	60,126.3	54,101	56,755.3	48,418	48,415	65,874.2	71,440.9	73,712.6

[1] Commercial catch includes IPHC research catch and in Area 2C the Metlakatla fishery catch.
[2] Does not include treaty Indian ceremonial and subsistence fish.
[3] Includes Subarea 4D-N : 1993 = < 1,000 pounds; 1994 = 18,000.
[4] Area 4E includes Area 4E-SE (Bristol Bay fishery) and Area 4E-NW (Nelson Island fishery).

Table 2. The total catch (thousands of pounds, net weight) from the 1999 commercial fishery, including IPHC research, of Pacific halibut by regulatory area and month.

Area	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Total
2A	0	0	169	95	4	12	170	0	0	0	0	450
2B	159	112	1,100	2,349	1,913	1,558	1,393	1,376	1,196	1,194	354	12,704
2C	14	0	1,579	1,815	1,615	1,446	855	838	905	678	423	10,168
3A	71	252	3,107	3,531	5,057	3,574	1,735	2,279	2,564	2,082	1,040	25,292
3B	0	0	166	894	2,511	3,023	1,522	2,254	2,000	856	609	13,835
4A	0	0	0	137	419	403	1,103	1,337	685	180	105	4,369
4B	0	0	0	0	143	618	793	992	751	196	78	3,571
4C	0	0	0	0	0	268	681	516	295	2	<1	1,762
4D	0	0	0	0	84	296	494	518	176	88	235	1,891
4E	0	0	0	0	0	54	99	72	21	18	0	264
Alaska Total	85	252	4,852	6,377	9,829	9,682	7,282	8,806	7,397	4,100	2,490	61,152
Monthly Total	244	364	6,121	8,821	11,746	11,252	8,845	10,182	8,593	5,294	2,844	74,306

Appendix I.

Table 3a. Number of vessels and catch (thousands of pounds) of Pacific halibut by vessel length class in the 1999 commercial fishery, including research trips, 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	7	261	59	677
< 26 ft.	0	0	289	685
26 to 30 ft.	4	41	148	1,153
31 to 35 ft.	25	593	258	4,973
36 to 40 ft.	67	1,812	283	3,809
41 to 45 ft.	68	2,510	237	5,236
46 to 50 ft.	41	2,804	178	6,207
51 to 55 ft.	20	1,773	92	3,750
56 + ft.	38	2,910	311	34,662
Total	270	12,704	1,855	61,152

Overall Vessel Length	Area 2C		Area 3A	
	No. of Vessels	Catch (000's lbs.)	No. of Vessels	Catch (000's lbs.)
Unk. Length	37	64	13	131
< 26 ft.	97	204	51	113
26 to 30 ft.	68	278	44	196
31 to 35 ft.	110	1,029	120	1,656
36 to 40 ft.	166	1,644	125	1,614
41 to 45 ft.	121	1,547	147	2,774
46 to 50 ft.	104	1,837	107	2,769
51 to 55 ft.	57	1,227	53	1,514
56 + ft.	119	2,338	244	14,525
Total	879	10,168	904	25,292

Overall Vessel Length	Area 3B		Area 4	
	No. of Vessels	Catch (000's lbs.)	No. of Vessels	Catch (000's lbs.)
Unk. Length	1	NA	10	21
< 26 ft.	2	NA	140	363
26 to 30 ft.	0	0	37	679
31 to 35 ft.	30	664	47	1,623
36 to 40 ft.	35	4,36	3	115
41 to 45 ft.	41	850	2	65
46 to 50 ft.	37	1,184	7	416
51 to 55 ft.	20	686	4	322
56 + ft.	160	10,004	92	8,251
Total	326	13,835	342	11,855

Appendix I.

Table 3b. Number of vessels and catch (thousands of pounds) of Pacific halibut by vessel length class for the 1999 Area 2A commercial fisheries. Information shown does not include the treaty Indian commercial fishery.

Overall Vessel Length	Area 2A Directed Commercial		Area 2A Incidental Commercial	
	No. of Vessels	Catch (000's lbs.)	No. of Vessels	Catch (000's lbs.)
Unk. Length	2	NA	0	0
< 26 ft.	7	1	3	0.1
26 to 30 ft.	2	NA	4	0.2
31 to 35 ft.	4	1	13	1.0
36 to 40 ft.	21	24	29	3.0
41 to 45 ft.	27	44	19	2.0
46 to 50 ft.	16	25	13	3.3
51 to 55 ft.	11	21	2	NA
56 + ft.	13	37	1	NA
Research (56 + ft)	1	19	0	0
Total	104	176	84	10.0

Appendix I.

Table 4. Fishing periods, number of fishing days, catch limit, commercial, research and total catch (thousands of pounds, net weight) by regulatory area for the 1999 Pacific halibut commercial fishery.

Area	Fishing Period	No. Of Days	Catch Limit	Commercial Catch	Research Catch	Total Catch
2A treaty Indian	3/15 - 4/21	37	256	264		264
2A Commercial						
Incidental	May - June	61	23.5[1]	10		10
Directed	July 7[2]	10-hrs		120		
	July 21[2]	10-hrs		37		
			133.1[1]	157		
Total Commercial			156.6	167		167
2A Total			412.6	431	19	450
2B[3]	3/15 – 11/15	245	12,100[4]	12,214	490	12,704
2C[5]	3/15 – 11/15	245	10,490[6]	9,902	266	10,168
3A	3/15 – 11/15	245	24,670[6]	24,310	982	25,292
3B	3/15 – 11/15	245	13,370[6]	13,160	675	13,835
4A	3/15 – 11/15	245	4,240[6]	4,220	149	4,369
4B	3/15 – 11/15	245	3,980[6]	3,452	119	3,571
4C	3/15 – 11/15	245	2,030[6]	1,762		1,762
4D	3/15 – 11/15	245	2,030[6]	1,891		1,891
4E	3/15 – 11/15	245	390[6]	264		264
Alaska Total			61,200	58,961		61,152
Total			73,713	71,606	2,700	74,306

[1] Pounds were carried over from the incidental to directed commercial catch limit.
[2] Fishing period limits by vessel class.
[3] Includes the pounds that were landed by Native communal commercial licenses (F licenses).
[4] An additional 119,000 pounds available as carryover from 1998.
[5] Includes 35,000 pounds taken by Metlakatla Indians during additional fishing within reservation waters.
[6] Additional net carryover pounds (thousands) from the underage/overage program were 2C = 384, 3A = 748, 3B = 208, 4A = 95, 4B = 160, 4C = 51, 4D = 40.

Appendix I.

Table 5. Commercial landings (thousands of pounds, net weight) of Pacific halibut by port, country of origin and IPHC research catch for 1999.

Port Region	Canada	United States	IPHC Research	Total
California and Oregon		228	20	248
Seattle		282		282
Bellingham	51	2,497		2,548
Misc. Washington		325	2	327
Vancouver	2,197			2,197
Port Hardy	3,575		62	3,637
Misc. Southern B.C.	1,172		9	1,181
Prince Rupert	5,099	200	689	5,988
Misc. Northern. B.C.	120		25	145
Ketchikan, Craig, Metlakatla		1,016		1,016
Petersburg, Kake		2,316		2,316
Juneau		2,968	52	3,020
Sitka		2,789	11	2,800
Hoonah, Excursion, Pelican		1,473		1,473
Misc. Southeast Alaska		1,980		1,980
Cordova		1,437	1	1,438
Seward		6,853	693	7,546
Homer		11,517	395	11,912
Kenai		184		184
Kodiak		9,237	337	9,574
Misc. Central Alaska		4,940	136	5,076
Akutan & Dutch Harbor		5,877	195	6,072
Bering Sea		3,273	73	3,346
Total	12,214	59,392	2,700	74,306

Appendix I.

Table 6. Commercial halibut fishery catch (thousands of pounds) in 1999 by country, statistical area, and regulatory area.

Stat. Area	Catch			Regulatory	Catch for
Group	Commercial	Research	Total	Area	Reg. Area
00-03	157	13	170		
04	57	1	58	2A	450
05	217	5	222		
06	240	11	251		
07	151	2	153		
08	1,086	3	1,089		
09 - I	403	7	410		
09 - O	283	3	286		
10 - I	1,467	29	1,496		
10 - O	1,482	0	1,482	2B	12,704
11 - I	1,388	70	1,458		
11 - O	129	0	129		
12 - I	381	3	384		
12 - O	154	0	154		
13 - I	4,261	353	4,614		
13 -O	789	9	798		
14 - I	586	50	636		
14 - O	133	42	175		
15 - I	1,462	27	1,489		
15 - O	559	48	607		
16 - I	2,389	15	2,404	2C	10,168
16 - O	1,349	45	1,394		
17 - I	893	6	899		
17 - O	800	12	812		
18S - I	975	5	980		
18S - O	757	15	772		
18 W	1,657	18	1,675		
19	1,013	42	1,055		
20	1,624	47	1,671		
21	580	121	701		
22	958	129	1,087		
23	964	75	1,039	3A	25,292
24	4,183	70	4,253		
25	2,862	180	3,042		
26	3,831	134	3,965		
27	3,835	75	3,910		
28	2,802	92	2,894		
29	6,292	118	6,410		
30	1,944	177	2,121		
31	1,034	126	1,160	3B	13,835
32	2,343	111	2,454		
33	884	98	982		
34	663	45	708		
35	552	36	588		
36	1,209	15	1,224		
37	95	12	107		
38	93	37	130		
39	4	3	7	4	11,857
40	191	5	196		
41	471	14	485		
42+	795	66	861		
Bering Sea	8,179	80	8,259		
Total	**71,606**	**2,700**	**74,306**		**74,306**

Appendix II.

Table 1. The fishing period limits (net weight) by vessel class used in the 1999 directed commercial fishery in Area 2A.

Vessel Class		Fishing Periods (Pounds)	
Letter	Feet	July 7	July 21
A	0-25	295	200
B	26-30	370	200
C	31-35	590	200
D	36-40	1,620	555
E	42-45	1,745	600
F	46-50	2,085	715
G	51-55	2,330	800
H	56+	3,500	1,200

Table 2. Metlakatla community fishing periods, number of vessels, and halibut catch (net weight), 1999.

Fishing Period Dates	Number Of Vessels	Catch (Pounds)
May 22 – 24	7	1,316
June 6 – 8	9	2,392
June 18 – 20	8	2,804
July 9 – 11	5	3,589
July 16 –18	10	4,094
July 3- Aug 1	7	4,553
August 13 – 15	9	7,376
August 27 – 29	2	NA
September 3 – 5	8	4,067
September 17 –19	5	1,374
October 1 –3	7	2,088
October 15 –17	2	NA
October 29 – 31	0	0
13 Fishing Periods		34,996

Appendix III.

Table 1. Fishing dates, opportunity, size limits, and bag limits for the 1999 Pacific halibut sport fishery.

Area	Fishing Dates	Fishing Days	Days Open	Size Limit	Bag Limit
2A					
WA Inside Waters (east of Bonilla-Tatoosh Line)	5/27-7/12	35	5 (Thur-Mon)	No	1
WA North Coast (Bonilla Tatoosh Line to Queets River)	5/1-7/9	50	5 (Tues-Sat)	No	1
WA South Coast (all depths) (Queets River to Ledbetter Point)	5/2-5/31	22	5 (Sun-Thur)	No	1
WA South Coast (near shore)	5/2-9/30	152	7	No	1
Columbia River (Ledbetter Point to Cape Falcon)	5/1-8/29	121	7	First @ 32".	1
OR Central Coast (all depths) (Cape Falcon to Siuslaw River)	5/13-5/22	6	3 (Thur-Sat)	First @ 32"	1
OR Central Coast (<30 fathoms)	5/1-9/30	153	7	First @ 32"	1
OR South Coast (all depths) (Siuslaw River to Humbug Mt.)	5/13-5/22	6	3 (Thur-Sat)	First @ 32"	1
OR South Coast (<30 fathoms)	5/1-8/15	107	7	First @ 32"	1
OR Coast (Cape Falcon to Humbug Mountain)	8/6	1	1 (Friday)	First @ 32"	1
OR/CA (south of Humbug Mt.)	5/1-9/30	153	7	First @ 32"	1
2B, 2C, 3 and 4	2/1-12/31	334	7	No	2

Appendix III.

Table 2. 1999 harvest allocations and estimates (in pounds, net weight) by sub-area within Regulatory Area 2A.

Sub Area	Allocation	Catch Estimate	Over/Under
WA Inside Waters	52,623	56,375	+3,752
WA North Coast	91,484	88,298	-3,186
WA South Coast (all depths)[1]	31,081	29,729	-1,352
WA South Coast (near shore)	1,000	1,850	+850
Columbia River	7,747	7,596	-151
OR Central Coast (all depths)	93,740	106,560	+12,820
OR Central Coast (<30 fathoms)	9,650	2,353	-7,297
OR South Coast (all depths)	8,732	11,277	+2,545
OR South Coast (<30 fathoms)	2,183	1,069	-1,114
OR Coast[2]	34,463	28,329	-6,134
OR/CA (south of Humbug Mt.)	4,698	4,698	0
Total	337,401	338,134	+733

[1]The Washington South Coast all depth fishery was restricted to fishing in near shore waters when the harvest was projected to be within 1,000 pounds of the overall quota.
[2]After accounting for underages and overages in previous openings from Cape Falcon to Humbug Mountain, about 19,775 pounds remained to be harvested. Therefore, 7,225 pounds were re-allocated from the >30-fathom fisheries to allow the August all-depth fishery to occur.

Table 3. Harvest by sport fishers (millions of pounds, net weight) by Regulatory Area, 1977-1999.

	Area						
Year	2A	2B	2C	3A	3B	4	Total
1977	0.013	0.017	0.072	0.196			0.298
1978	0.010	0.009	0.082	0.282			0.383
1979	0.015	0.018	0.174	0.365			0.572
1980	0.019	0.011	0.332	0.488			0.850
1981	0.019	0.023	0.318	0.751		0.012	1.123
1982	0.050	0.066	0.489	0.716		0.011	1.332
1983	0.063	0.103	0.553	0.945		0.003	1.667
1984	0.118	0.124	0.621	1.026		0.013	1.902
1985	0.193	0.525	0.682	1.210		0.008	2.618
1986	0.333	0.372	0.730	1.908		0.020	3.363
1987	0.446	0.527	0.780	1.989		0.030	3.772
1988	0.249	0.504	1.076	3.264		0.036	5.129
1989	0.327	0.635	1.559	3.005		0.024	5.550
1990	0.197	0.762	1.330	3.638		0.040	5.967
1991	0.158	0.584	1.654	4.264	0.014	0.127	6.801
1992	0.250	0.580	1.668	3.899	0.029	0.043	6.469
1993	0.246	0.657	1.811	5.265	0.018	0.057	8.054
1994	0.186	0.657	2.001	4.487	0.021	0.042	7.394
1995	0.236	1.582	1.759	4.488	0.022	0.055	8.142
1996	0.229	1.582	1.534	4.822	0.022	0.071	8.260
1997	0.355	1.582	1.714	5.637	0.028	0.072	9.388
1998	0.383	1.582	2.708	5.270	0.022	0.114	9.974
1999[1]	0.338	1.582	1.830	5.243	0.022	0.108	9.122

[1]Only Area 2A harvest is current data, all other areas are projected harvests. These projections will be updated when data becomes available. Alaska (Areas 2C, 3A, 3B and 4) harvests for 1998 are still considered preliminary.

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 1999 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.

Calendar Year 1999

Clark, W.G. 1999. Effects of an erroneous natural mortality rate on a simple age-structured stock assessment. Can. J. Fish. Aquat. Sci. 56:1721-1731.

Clark, W. G., Hare, S. R., Parma, A. M., Sullivan, P. J., and Trumble, R. J. 1999. Decadal changes in growth and recruitment of Pacific halibut (Hippoglossus stenolepis). Can. J. Fish. Aquat. Sci. 56: 242-252.

Hare, S. R., Mantua, N. J., and Francis, R. C. 1999. Inverse production regimes: Alaskan and West Coast Salmon. Fisheries 24(1):6-14.

International Pacific Halibut Commission. 1999. IPHC Annual Report 1998. 80 p.

Kaimmer, S. 1999. Direct observations on the hooking behavior of Pacific halibut, *Hippoglossus stenolepis.* Fish. Bull. 97: 873-883.

Stanley, R. D., Kieser R., Leaman, B. M., and Cooke, K. D. 1999. Diel vertical migration by yellowtail rockfish, *Sebastes flavidus*, and its impact on acoustic biomass estimation. Fish. Bull. 97:320-331.

Sullivan, P. J., Parma, A. M., and Clark, W. G. 1999. The Pacific Halibut Stock Assessment of 1997. Int. Pac. Halibut Comm. Sci. Rep. 79. 84 p.

Williams, G. H. and Hare, S. R. 1999. Pacific halibut discard mortality rates (DMRs) in the 1990-1998 Alaskan groundfish fisheries, with recommendations for monitoring in 2000. Appendix B [*In*] 2000 Stock assessment and fishery evaluation (SAFE) report for the groundfish resources of the Gulf of Alaska and Bering Sea/Aleutian Islands. North Pacific Fishery Management Council, Anchorage, AK. 99501

Publications 1930-1999

Reports

1. Report of the International Fisheries Commission appointed under the Northern Pacific Halibut Treaty. John Pease Babcock, William A. Found, Miller Freeman, and Henry O' Malley. 31 p. (1931).[Out of print]
2. Life history of the Pacific halibut. Marking experiments. William F. Thompson and William C. Herrington. 137 p. (1930).
3. Determination of the chlorinity of ocean waters. Thomas G. Thompson and Richard Van Cleve. 14 p. (1930).
4. Hydrographic sections and calculated currents in the Gulf of Alaska, 1927 and 1928. George F. McEwen, Thomas G. Thompson, and Richard Van Cleve. 36 p. (1930).
5. History of the Pacific halibut fishery. William F. Thompson and Norman L. Freeman. 61 p. (1930).
6. Biological statistics of the Pacific halibut fishery. Changes in the yield of a standardized unit of gear. William F. Thompson, Harry A. Dunlop, and F. Heward Bell. 108 p. (1930). [Out of print]
7. Investigations of the International Fisheries Commission to December 1930, and their bearing on the regulation of the Pacific halibut fishery. John Pease Babcock, William A. Found, Miller Freeman, and Henry O'Malley. 29 p. (1930). [Out of print]
8. Biological statistics of the Pacific halibut fishery, Effects of changes in intensity upon total yield and yield per unit of gear. William F. Thompson and F. Heward Bell. 49 p. (1934). [Out of print]
9. Life history of the Pacific halibut - Distribution and early life history. William F. Thompson and Richard Van Cleve. 184 p. (1936). [Out of print]
10. Hydrographic sections and calculated currents in the Gulf of Alaska. 1929. Thomas G. Thompson, George F. McEwen, and Richard Van Cleve. 32 p. (1936).
11. Variations in the meristic characters of flounder from the northeastern Pacific. Lawrence D. Townsend. 24 p. (1936).
12. Theory of the effect of fishing on the stock of halibut. William F. Thompson. 22 p. (1937).
13. Regulation and investigation of the Pacific halibut fishery in 1947 (Annual Report). IFC. 30 p. (1948).
14. Regulation and investigation of the Pacific halibut fishery in 1948 (Annual Report). IFC. 30 p. (1949).
15. Regulation and investigation of the Pacific halibut fishery in 1949 (Annual Report). IFC. 24 p. (1951).
16. Regulation and investigation of the Pacific halibut fishery in 1950 (Annual Report). IFC. 16 p. (1951).
17. Pacific Coast halibut landings 1888 to 1950 and catch according to areas of origin. F. Heward Bell, Henry A. Dunlop, and Norman L. Freeman. 47 p. (1952).
18. Regulation and investigation of the Pacific halibut fishery in 1951 (Annual Report). Edward W. Allen, George R. Clark, Milton C. James, and George W. Nickerson. 29 p. (1952).
19. The production of halibut eggs on the Cape St. James spawning bank off the coast of British Columbia 1935-1946. Richard Van Cleve and Allyn H. Seymour. 44 p. (1953).
20. Regulation and investigation of the Pacific halibut fishery in 1952 (Annual Report). Edward W. Allen, George R. Clark, Milton C. James, George W. Nickerson, and Seton H. Thompson. 29 p. (1953).
21. Regulation and investigation of the Pacific halibut fishery in 1953 (Annual report). IPHC. 22 p. (1954).

22. Regulation and investigation of the Pacific halibut fishery in 1954 (Annual Report). IPHC. 32 p. (1955).
23. The incidental capture of halibut by various types of fishing gear. F. Heward Bell. 48 p. (1955).
24. Regulation and investigation of the Pacific halibut fishery in 1955 (Annual Report). IPHC 15 p. (1956).
25. Regulation and investigation of the Pacific halibut fishery in 1956 (Annual Report). IPHC. 27 p. (1957).
26. Regulation and investigation of the Pacific halibut fishery in 1957 (Annual report). IPHC. 16 p. (1958).
27. Regulation and investigation of the Pacific halibut fishery in 1958 (Annual Report). IPHC. 21 p. (1959).
28. Utilization of Pacific halibut stocks: Yield per recruitment. IPHC Staff. 52 p. (1960).
29. Regulation and investigation of the Pacific halibut fishery in 1959 (Annual Report). IPHC. 17 p. (1960).
30. Regulation and investigation of the Pacific halibut fishery in 1960 (Annual Report). IPHC. 24 p. (1961).
31. Utilization of Pacific halibut stocks: Estimation of maximum sustainable yield, 1960. Douglas G. Chapman, Richard J. Myhre, and G. Morris Soutward, 35 p. (1962).
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33. Regulation and investigation of the Pacific halibut fishery in 1962 (Annual Report). IPHC. 27 p. (1963).
34. Regulation and investigation of the Pacific halibut fishery in 1963 (Annual Report). IPHC. 24 p. (1964).
35. Investigation, utilization and regulation of the halibut in southeastern Bering Sea. Henry A. Dunlop, F. Heward Bell, Richard J. Myhre, William H. Hardman, and G. Morris Soutward. 72 p. (1964).
36. Catch records of a trawl survey conducted by the International Pacific Halibut Commission between Unimak Pass and Cape Spencer, Alaska from May 1961 to April 1963. IPHC. 524 p. (1964).
37. Sampling the commercial catch and use of calculated lengths in stock composition studies of Pacific halibut. William H. Hardman and G. Morris Southward, 32 p. (1965).
38. Regulation and investigation of the Pacific halibut fishery in 1964 (Annual Report). IPHC 18 p. (1965).
39. Utilization of Pacific halibut stocks: Study of Bertalanffy's growth equation. G. Morris Southward and Douglas G. Chapman. 33 p. (1965).
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Scientific Reports

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68. Sampling Pacific halibut (*Hippoglossus stenolepis*) landings for age composition: History, evaluation, and estimation. Terrance J. Quinn, II, E.A. Best, Lia Bijsterveld, and Ian R. McGregor. 56 p. (1983).
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79. The Pacific halibut stock assessment of 1997. Patrick J. Sullivan, Ana M. Parma, and William G. Clark. 84 p. (1999).

Technical Reports

1. Recruitment investigations: Trawl catch records Bering Sea, 1967. E.A. Best. 23 p. (1969).
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15. Regulations of the Pacific halibut fishery, 1924-1976. Bernard E. Skud. 47 p. (1977).
16. The Pacific halibut: Biology, fishery, and management. International Pacific Halibut Commission. 56 p. (1978). [Out of print]
17. Size, age, and frequency of male and female halibut: Setline research catches, 1925-1977. Stephen H. Hoag, Cyreis C. Schmitt, and William H. Hardman. 112 p. (1979).
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40. The Pacific halibut: Biology, fishery, and management. International Pacific Halibut Commission. 64 p. (1998).

Annual Reports

Annual Report 1969. 24 p. (1970).
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Annual Report 1971. 36 p. (1972).
Annual Report 1972. 36 p. (1973).
Annual Report 1973. 52 p. (1974).
Annual Report 1974. 32 p. (1975).
Annual Report 1975. 36 p. (1976).
Annual Report 1976. 40 p. (1977).
Annual Report 1977. 39 p. (1978).
Annual Report 1978. 40 p. (1979).[Out of print]
Annual Report 1979. 43 p. (1980).
Annual Report 1980. 49 p. (1981).[Out of print]
Annual Report 1981. 48 p. (1982).
Annual Report 1982. 56 p. (1983).[Out of print]
Annual Report 1983. 59 p. (1984).
Annual Report 1984. 63 p. (1985).[Out of print]
Annual Report 1985. 59 p. (1986).
Annual Report 1986. 73 p. (1987).[Out of print]
Annual Report 1987. 51 p. (1988).
Annual Report 1988. 62 p. (1989).[Out of print]
Annual Report 1989. 39 p. (1990).
Annual Report 1990. 52 p. (1991).
Annual Report 1991. 57 p. (1992).[Out of print]
Annual Report 1992. 57 p. (1993).
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Annual Report 1998. 80 p. (1999).

Information Bulletins

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