

**Effects of IFQ Management on Resource Conservation:
Survey Responses of Alaska Halibut Fishermen**

by

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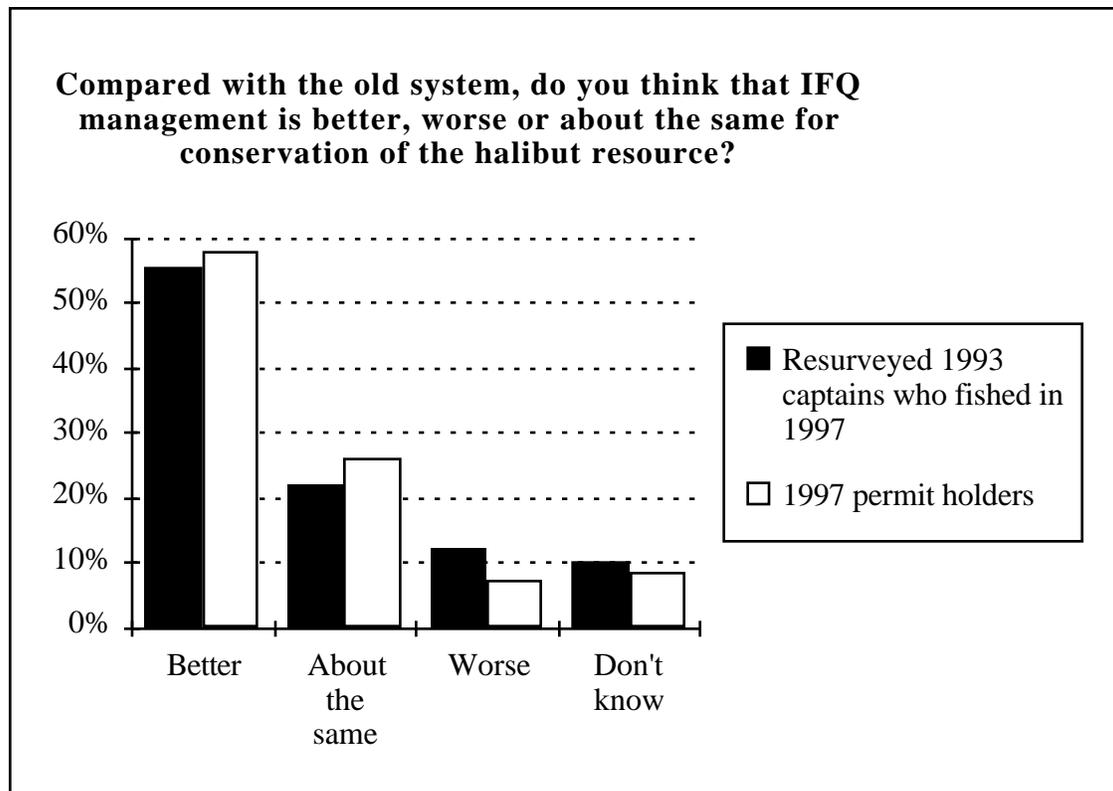
ISER Working Paper Series:
Surveys of Alaska Halibut Fishermen
About Effects of IFQ Management

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Summary

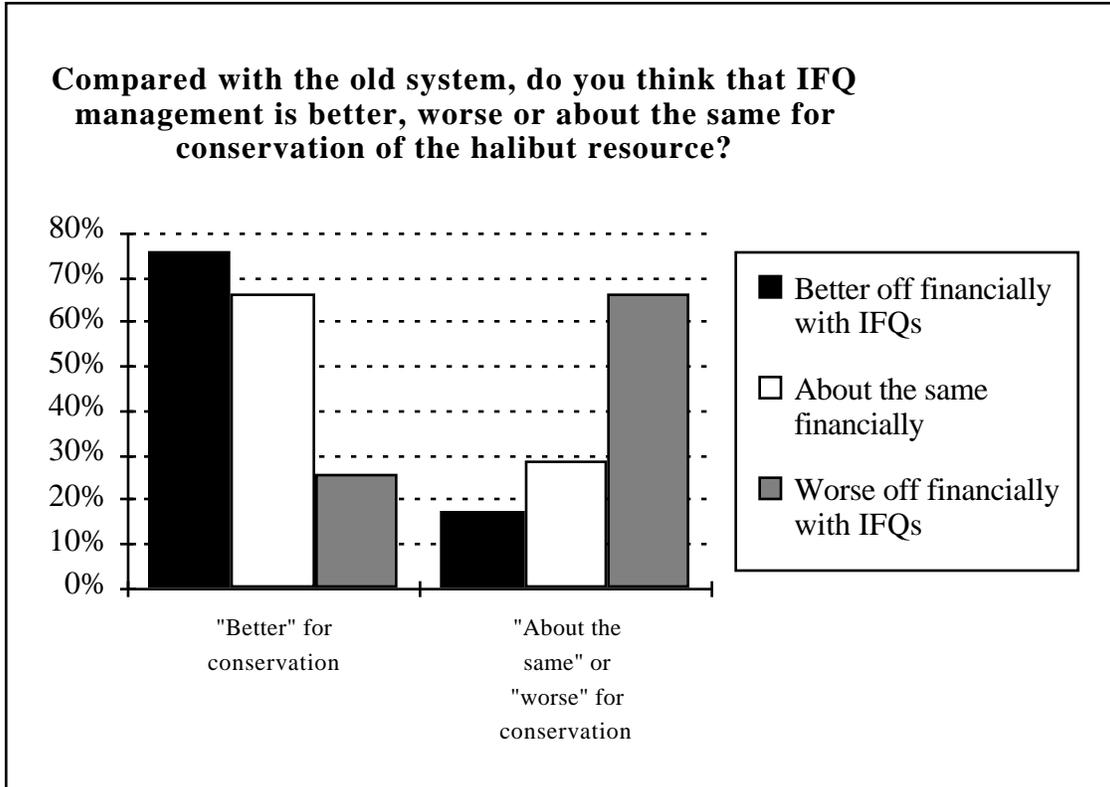
In 1998, the University of Alaska Institute of Social and Economic Research (ISER) conducted two telephone surveys of Alaska halibut fishermen about the effects of Individual Fishing Quota (IFQ) management of the Alaska halibut fishery. Funding for the surveys was provided by the Alaska Sea Grant College Program. This paper, one of a series reporting results of the surveys, discusses fishermen's responses about the effects of IFQ management on conservation of the halibut resource.

The majority of halibut fishermen believe that IFQ management is better for conservation of the halibut resource than the earlier open-access system. More than half of the respondents to both surveys answered "better" in response to the question "Compared with the old system, do you think that IFQ management is better, worse, or about the same for conservation of the halibut resource?" About one-quarter responded "about the same," while about 10% answered "worse."



It is likely that responses about effects on resource conservation were affected or biased in part by respondents' overall attitudes towards IFQ management. Respondents who gave positive responses about other effects of IFQ program were much more likely to give a positive response about the effects of IFQ management on conservation. As a result, it is difficult to draw definitive conclusions from the survey responses about fishermen's actual perceptions of effects on resource conservation (as opposed to what they told survey interviewers). Contrasting the responses of those with "positive" and "negative" attitudes towards IFQ management suggests that between 13% and 74% of fishermen believe that IFQ management is better for conservation, while between 3% and 37% believe IFQ management is worse for resource conservation.

The most frequently cited reason offered as to why IFQ management is "better" for conservation was a reduction in gear loss. Other reasons included better control by managers, spreading out of fishing over a greater area and a longer season, and better treatment of fish. The most frequently cited reason offered as to why IFQ management is "worse" for conservation was highgrading.



Introduction

In 1998, the University of Alaska Institute of Social and Economic Research (ISER) conducted two telephone surveys of Alaska halibut fishermen about the effects of Individual Fishing Quota (IFQ) management of the Alaska halibut fishery. Funding for the surveys was provided by the Alaska Sea Grant College Program. This paper, one of a series of working papers reporting results of the surveys, discusses fishermen's responses about the effects of IFQ management on conservation of the halibut resource.^{1, 2}

The *Captains Resurvey* was a resurvey of halibut captains ISER surveyed in 1994, just before the IFQ program went into effect.³ The purpose of the Captains Resurvey was to gather information about how the introduction of IFQ management in the Alaska halibut fishery in 1995 had affected the halibut fishery and those who fished for halibut before the program was introduced.

The *Permit Holders Survey* was a survey of a random sample of 1997 State of Alaska halibut permit holders. The purpose of the Permit Holders Survey was to gather information about the 1997 halibut fishery from a random sample of participants, including persons who did not fish for halibut before IFQ management.⁴

Table 1 summarizes the sample sizes, response rates, and number of interviews for each survey. The survey results reported in this paper for the Captains Resurvey are based on only the 93 interviews conducted with captains who continued to fish for halibut in 1997. The samples for both surveys were stratified by vessel size. Except where noted otherwise, the survey results reported in this paper are weighted to adjust for this stratification.⁵

Table 1
Survey Sample Sizes, Response Rates, and Numbers of Interviews

	Captains Resurvey	Permit Holders Survey
Sample size	249	200
Respondents contacted	208	134
Response rate = (respondents contacted)/(sample size)	84%	67%
Number of interviews*		
Captains Resurvey, Total	208	
1993 captains who fished in 1997*	93	
1993 captains who did not fish in 1997	91	
1993 respondents were vessel owners but not captains	19	
1993 respondents who fished in 1997 under a CDQ allocation	5	
Permit Holders Survey, Total		134
1997 permit holders who fished vessels listed on their permits*		97
1997 permit holders who fished other vessels*		11
1997 permit holders who did not participate in IFQ fishery		26

*Only the responses of those groups marked with a * and with numbers shown in bold font, who fished for halibut in 1997 under IFQ management, are reported in this paper.
File: Survey summary.

Most of the questions asked in the two surveys were the same, except that the Captains Resurvey included questions about respondents' fishing in 1995 and 1996. In interpreting responses to the two surveys, keep in mind that the Captains Resurvey is representative only of 1993 halibut captains who continued to fish in 1997. In contrast, the Permit Holders Survey is representative of all 1997 permit holders.

An indication of how representative Permit Holder Survey respondents were of 1997 permit holders may be gained by comparing the actual 1997 harvest and the actual number of boats participating in the 1997 fishery (as reported by the International Pacific Halibut Commission) with estimates based on weighted survey responses. The estimated 1997 harvest based on survey responses was 90% of the actual harvest, while the estimated number of boats based on survey responses was 94% of the actual number of boats. This suggests that the survey respondents were reasonably, although not perfectly, representative of all 1997 permit holders.⁶

Responses About Effects of IFQ Management on Resource Conservation

The surveys included a series of questions about respondents' perceptions about the effects of IFQ management. One of these questions asked, "Compared with the old system, do you think that IFQ management is better, worse, or about the same for conservation of the halibut resource?" Table 2 summarizes responses to this question by survey, vessel size class, and 1997 harvest level.

Table 2
Compared with the old system, do you think that IFQ management is better, worse, or about the same for conservation of the halibut resource?

	Better	About the same	Worse	Don't know	Total	Number of responses
By Survey Group						
Resurveyed 1993 captains who fished in 1997	56%	22%	12%	10%	100%	93
1997 permit holders	58%	26%	7%	8%	100%	108
By vessel size class						
<i>Resurveyed 1993 captains who fished in 1997</i>						
Vessel class B (over 60')	52%	26%	17%	6%	100%	18
Vessel class C (35'-60')	61%	19%	12%	7%	100%	42
Vessel class D (under 35')	51%	26%	12%	12%	100%	33
<i>1997 permit holders</i>						
Vessel class B (over 60')	50%	40%	10%	0%	100%	10
Vessel class C (35'-60')	63%	23%	8%	6%	100%	70
Vessel class D (under 35')	48%	30%	8%	15%	100%	27
By 1997 harvest level						
<i>Resurveyed 1993 captains who fished in 1997</i>						
1-4,999 lbs	52%	26%	17%	6%	100%	18
5,000-19,999 lbs	48%	26%	20%	6%	100%	17
20,000 lbs or more	76%	18%	4%	2%	100%	22
<i>1997 permit holders</i>						
1-4,999 lbs	51%	25%	7%	17%	100%	29
5,000-19,999 lbs	54%	35%	8%	3%	100%	37
20,000 lbs or more	71%	19%	8%	2%	100%	38

Notes: All responses are weighted. "Don't know" includes "no answer" responses.

Source: 1997 Captains Resurvey and 1997 Permit Holder Survey, Question K3.

File: Question K3.

The majority of halibut fishermen believe that IFQ management is better for conservation of the halibut resource. More than half of the respondents to both surveys answered that IFQ management was "better" for conservation of the halibut resource, while only 12% of the resurveyed 1993 captains and 7% of the 1995 permit holders answered "worse." Responses were similar across vessel classes and 1997 harvest levels: differences in responses among groups were not statistically significant.⁷

Relationship Between Responses About Effects on Resource Conservation and Responses to Other Questions

Table 3 compares responses about whether IFQ management is better for conservation of the halibut resource with responses to selected other questions about effects of IFQ management. Respondents who gave positive responses about other effects of IFQ program were much more likely to give a positive response about the effects of IFQ management on conservation.⁸ For example, 76% of those who responded that the IFQ program made them better off financially said that IFQ management was "better" for conservation of the halibut resource, but only 26% of those who responded that the IFQ program made them worse off financially said that IFQ management was "better" for conservation.

Table 3
Compared with the old system, do you think that IFQ management is better, worse, or about the same for conservation of the halibut resource?
Comparison with Responses to Other Questions

	Better	About the same	Worse	Don't know	Total	Number of responses
<i>Do you think IFQs have made fishing for halibut safer?</i>						
Yes	55%	31%	8%	6%	100%	238
No	17%	29%	42%	13%	100%	24
<i>Do you think that the IFQ system allocated halibut fairly among the people who worked in the halibut fishery?</i>						
Yes	70%	21%	7%	2%	100%	91
No	38%	37%	16%	10%	100%	176
<i>Do you think that the IFQ program made you better off financially, worse off, or about the same?</i>						
Better	76%	16%	1%	7%	100%	82
About the same	66%	26%	2%	6%	100%	53
Worse	26%	42%	24%	8%	100%	133
<i>Overall, how would you describe your attitude toward the IFQ Management System for halibut?</i>						
Positive	74%	20%	3%	4%	100%	110
Mixed	45%	37%	10%	9%	100%	105
Negative	13%	41%	37%	10%	100%	63

Notes: Unweighted responses for 1997 Captains Resurvey and 1997 Permit Holders Survey combined.

Source: 1997 Captains Resurvey and 1997 Permit Holder Survey, Questions K2, K3, K4, L5, L8.

File: Question K3.

Since there is no obvious other reason why responses about effects of IFQ management on conservation of the halibut resource should be correlated with responses about safety effects, fairness of initial allocations, or financial effects, it appears likely that responses about effects on resource conservation (and other effects) were affected or biased in part by respondents' overall attitudes towards IFQ management. Put differently, whether fishermen liked or disliked IFQ management for other reasons may have affected what they said about the effects of IFQ management on conservation of the halibut resource. Thus it is difficult to draw definitive conclusions from the survey responses about fishermen's actual perceptions of effects on resource conservation (as opposed to what they told survey interviewers).

However, we can set approximate bounds on these perceptions, if we assume that fishermen's actual perceptions about specific effects of IFQs are neither more positive on average than those with positive attitudes towards IFQ management, nor more negative on average than those with negative attitudes towards IFQ management. Under this assumption, the ranges of responses between those with positive and negative attitudes suggests that between 13% and 74% of fishermen believe that IFQ management is better for conservation, while between 3% and 37% believe IFQ management is worse for resource conservation.

Reasons for Opinions about Conservation Effects of IFQ Management

After asking the question "Compared with the old system do you think that IFQ management is better, worse, or about the same for conservation of the halibut resource?" the survey asked the open-ended follow-up question "Why?" The survey interviewers summarized the answers in short phrases. Subsequently the author grouped answers into the broad categories of reasons shown in Table 4. Although this grouping was somewhat arbitrary, it provides a general indication of the reasons most frequently cited by fishermen for their opinions about conservation effects of IFQ management.

Table 4
Reasons for Opinions about Effects of IFQ Management on Conservation of the Halibut Resource

	Number of respondents
<i>Why do you think IFQ management is better for conservation of the halibut resource?</i>	
Less gear loss	46
Better control by managers	13
Fleet spread out more	8
Fish treated better	7
Less mortality for discarded small fish	6
Fishing spread out over longer time period	5
Other reasons	42
<i>Why do you think IFQ management is worse for conservation of the halibut resource?</i>	
Highgrading	12
Local overfishing	4
Other reasons	11

Note: Based on open-ended responses to Question K3a ("Why?"), which followed question K3 ("Compared with the old system do you think that IFQ management is better, worse, or about the same for conservation of the halibut resource?"). Grouping into different reasons is based on author's judgment. Table shows number of respondents who mentioned each reason. Some respondents mentioned more than one reason.

File: Question K3a open ended.

By far the most frequently cited reason offered as to why IFQ management is "better" for conservation was a reduction in gear loss. Other reasons included better control by managers, spreading out of fishing over a greater area and a longer season, and better treatment of fish.

The most frequently cited reason offered as to why IFQ management is "worse" for conservation was high-grading, or the discarding of lower-valued (usually smaller) fish to allow IFQ to be used for higher-valued fish. A separate survey question asked for

fishermen's opinions about the extent to which "halibut was caught and then discarded in 1997 without being sold or reported." Responses to this question, shown in Table 5, indicated that about one-third of fishermen believed that "some" or "a lot" of unreported discards took place. For a more detailed discussion of responses to this question, see the paper in this series on *Unreported Discards of Halibut under IFQ Management: Survey Responses of Alaska Halibut Fishermen*.

Table 5
How much halibut do you think was caught and then discarded in 1997
without being sold or reported--very little, some, or a lot?

	Very little	Some	A lot	Don't know	Total	Number of responses
Resurveyed 1993 captains who fished in 1997	54%	21%	14%	11%	100%	93
1997 permit holders	59%	25%	8%	8%	100%	108

Notes: All responses are weighted. "Don't know" includes "no answer" responses.

Source: 1997 Captains Resurvey and 1997 Permit Holder Survey, Question L2.

File: Question L2.

Responses about reasons for opinions about resource conservation effects of IFQ management are listed below, as summarized by the survey interviewers and grouped by the author. These responses provide more insight into the opinions of fishermen about these effects.

"Why do you think IFQ management is better for conservation of the halibut resource?"

Less gear loss

A lot less gear being set and left.

Amount of gear that is not lost anymore each year.

Because no gear loss.

Because people aren't just leaving gear after limiting out.

Before gear didn't get retrieved. Weather can be selected.

Don't catch too many fish.

Don't have as many waste problems, not as much gear put out and left. Now people only put out as much gear as they can hold.

Don't have as much gear in water at one time. Not as much gear left.

Don't have as much lost gear.

Don't have waste factor. Before the temptation was to put out as much gear as you could pick in ideal conditions.

Don't worry about lost gear fishing.

During the old days when only so much time there was gear set that was never hauled back. There were guys who just cut boys off and left it.

For the most part we are not fishing on the same day, a lot less gear loss.

In old system, 24 hr openings people put out all the gear they could and many times they had to leave their gear because of time weather etc. Before so many people they'd be fishing over you and cut your lines.

It allows you to retrieve gear, you don't have to leave it behind because of lack of time or bad weather.

Less gear left after derby closing.

Less gear left in the water.

Less gear loss

Less gear lost.

Less gear on bottom. I work selling gear and the amount of gear bought since IFQ's is way down.

Less lost gear

Less lost gear.

Less waste of gear and fish.

Less waste of the halibut meaning less lost gear and dead halibut.

Little loss of gear.

Losing less gear.

Lost gear is less.

No derbies, derbies not very good for the resource: people under pressure, dumped all gear at once.

No derbies, less gear loss

No gear left on grounds.

No gear left.

No gear loss keeps the fishing healthier.

No gear loss or very little.

No lost gear.

No where near the amount of waste because of lost gear before.

Not a lot of dead fish, not a lot of gear left in ocean as before.

Not as much gear left in water.

Not as much gear loss for him personally.

One day system had lots of waste and loss of gear.

People lose a lot less gear.

So much gear used in short time, gear not left in water.

There is not as much gear set and left as in derby system. Gear not left because of weather.

Time to fish, no lost gear.

Way less waste, less gear left on ground, easier on resource.

When derby everyone would have lost gear or it would stay in water. Not as much is laid out initially, lay out comfortably, some gear wasn't retrieved under derby or if rough weather gear is lost. 80% of time was rough weather and gear was lost.

You don't have guys out there leaving gear on the bottom that's still fishing.

Better control by managers

Because catch is a set number now.

Because its slower and they can keep better track of it.

Because limits fishing to a certain tonnage per year.

Because more time to take care of business. Better information on amount of halibut.

Better control over fish. Never go over the quota this way.

Easier for feds to determine biomass and allocate lbs instead of a free for all.

Have time to catch, you know how many lbs you have. You know how much quota for each area. They have a better record of what is going on. It preserves it. Knows the catch. Easier to keep track of lbs.

Less overfishing

Managed more accurately

More closely watched! Fish "hawks" are all over!

Should be better from standpoint of tracking better as far as fishing and landing of fish.

They can watch it better because there are no derbies. Know how many boats are fishing.

Whatever they set the quota at that's what it will be.

Fleet spread out more

Catching from different halibut stocks.

Doesn't concentrate everyone in one area, bet best price early though, so still like a derby.

Easier on fish. Spread effort out geographically.

Keep track of sizes of halibut certain areas got hit harder before. Could have been spawning grounds. IFQ's spread you out.

Old system had concentrated gear so local depletion. Especially in bad weather when fleet was forced into small area.

Spreading people out and stocks moving in.

Spreads the fishing out a little bit more so you're not depleting one area trying to get your whole limit.

The fishing is spread out more.

Fish treated better

Handle halibut better, have time not too much gear.

Not rushing, taking better care of fish. Ran a lot of gear before would leave it all night and it would get banged up.

Not tearing up the fish as much, when its rough out they lose a lot.

People are a lot easier on the fish.

People set way too much gear, and they hauled the gear so fast they tore their mouths and horned them so they didn't survive.

Treating fish better.

We take better care of fish, and quality we bring to port much better.

Less mortality for discarded small fish

Asset to conservation. If you are in a hurry you horn off fish. Mortality rate is less on small fish now.

Doesn't require throwing back smaller fish or rushing and damaging fish.

Not putting too much gear in water. Catch close to quota without exceeding time to release juveniles without hurting them. Fishing fishery more than just laying out gear.

Not shaking off small fish.

Take your time to release babies.

Taking care of the small ones, better handling them easier, all goes back alive.

Fishing spread out over longer time period

Even yield of the fish is better for the resource.

Fishing halibut through out the year.

Fishing is spread out over the year.

Fishing spread out evenly, impact on fishery during derby was tremendous.

It scatters out the fishing pressure over time also. Owners of IFQ's can be more relaxed too because he knows he can always go a little later.

Other reasons

By product of change in black cod. Marathon fishery weren't targeting halibut but were killing them.

Have full retention, we don't have to discard halibut when caught as by-catch. Only discarded 10-20 halibut in 1997.

Overlap of halibut/black cod not nearly as much halibut being killed as by catch because you don't run out of room to fish. Less gear loss.

More time, less wastage.

Not as much waste, more time to be careful.

Lost of fishermen don't get all their share so more fish left in water.

No one will fish quotas if the price stays so low, so that means lots of halibut out there.

Seems not reaching the quota every year.

Fewer fish discarded.

We can release fish.

Able to fish different times of the year allows fisherman to find big fish.

Better than derby day process.

Don't lose gear as much.

Don't target for halibut, less catch and release

During opening, keep by catch. Shake smaller ones, at price break keep all fish.

Hasn't been hurt by it.

It allows fishermen to fish more carefully, without time pressure.

Minimizing number of fishermen. 7000 fishing in 3A alone in 93, now its less than half. More than half got cut out, 25% of 3A catch was left on grounds because quotas were so small (100 - 150 lbs) so not worth it to ever go out.

Need some rule changes, size limit to protect old cows. 32 up to 36 inches lay millions of eggs.

No derbies, derbies not very good for the resource: fish on the last strings go to waste due to sand fleas. instead of using 30 skate sets, use only 10 skate sets, set a lot of skates.

No line cutting, some guys cut off smaller ones, overall better. Better quality fish.

Not a derby with billions of hooks laid over every inch. Little halibut are able to grow up.

Not as wasteful to halibut, fishermen can be more relaxed and do a better, safer job.

Other fisheries whip things out. Charters (12', 15', 20') going too, can't get under 32', do whatever they want.

People now own the resource so they tend to take better care of it.

Room for improvement, cons still needs improvement. Meant to slow down the fishery, care of fish, still lots of loopholes that people can use, read, to their benefit.

Stay out of areas where small halibut are.

Taking more time on the fish, not going around the clock.

The by catch problem - fish that weren't kept were horned off. By catch was wasted more before.

[The old system had] a lot of wanton waste.

Don't put out so much gear. Fish came up better, aren't all eaten up by sand fleas.

Less waste

Less waste

Lots of fish were lost under the 24 hr openings.

Not as much waste

Not as much waste of halibut.

Not as much waste!

Not as much waste, more time to be careful.

Not as wasteful to halibut.

Not much loss.

Wasting less fish

You aren't wasting the halibut.

"Why do you think IFQ management is worse for conservation of the halibut resource?"

Highgrading

Because lots of little fish are discarded.

Because with IFQ's the big halibut get money and the small ones go back.

Fish caught and thrown back undoubtedly died.

Fishermen shake bad fish off. Wait for a better fish to get a better price.

High grading especially last year. Not as much this year.

High grading happens, some disregard small fish. Caught and released, while in derby days took all.

Lot of people shake small halibut, any halibut that's a number 2 don't make it to the beach. A lot of people won't say that but fish go to the fish companies it use to be 5% or more of catch. You don't see it any more.

Need some rule changes. High grading going on. Less financial reward for that.

Shake little fish in favor of bigger = mortality.

The halibut commission hasn't given enough credit to claims of high grading. Because you have the option to leave gear if weather turns bad and then come back and reset your gear. I see a lot of high grading, discarding smaller fish for larger ones.

This year in 98 there was a lot of high grading by big guys, company ships. Independent fishermen do better job with resource.

When you have time to throw them away, they ask us not to "horn" the fish, but people do, especially to the small ones and they probably die in the water. Fishermen do that more now than they used to because of price differences.

Local overfishing

Diversified all over state. People are lazy. People ever fish certain areas, don't go far.

Everyone fishes in Icy Straight because it's convenient for them to be close to a fishing hub. They aren't spreading their gear out. People are fishing across boundaries and in inside waters instead of outside waters and that is depleting the supply.

Local populations getting harmed.

Over all is better but causing some problems, worse because causing boats to fish closer to home and make more trips.

Other reasons

Because until 1998, large vessel owners who had IFQ have continually lobbied the halibut commission for increased quotas, or increased exploitation rate however you care to look at it. They put pressure on the commission to serve their own situations.

I think guessing high on the total amount of fish.

Keep increasing quotas too much.

Season open year round. Fishermen leave gear out all the time, fish get eaten by sand flies.

I feel that halibut is being sold outside the reporting system.

Depleting bigger halibut supply which are mainly females. There should be a limit on 150 # plus halibut unless you are sport fishing. Ten years down the road it will make a difference if these larger females with 300 plus eggs are allowed to survive and

I like IFQ system but not sure conservation is better of because the halibut commission quota system looks at biomass, so difficult to say.

In terms of number of hooks put in the water, far more hooks being fished in 8 months vs. derby openers. Release of small fish over and over contributes to mortality rate.

Over harvesting the fish more so than when with the 24 hr opening.

Season too long.

The new biomass formula, we are catching smaller halibut now.

Endnotes

¹A list of working papers in this series may be found at the ISER web site at <http://www.iser.uaa.alaska.edu>. Copies of these papers may be downloaded from this site in pdf format.

²A growing body of research discusses effects of IFQ management in Alaska and elsewhere. In these working papers, we do not attempt to describe this research, or to compare results of the ISER surveys with other sources of information about effects of IFQ management. Our purpose is simply to report the results of the ISER surveys. At the end of this paper, we have included a list of references about the Alaska IFQ program.

³The earlier survey, which we refer to as the "1993 survey", was a survey of a random sample of 1993 permit holders. Most but not all of these permit holders were vessel captains in 1993: responses for the Captains Resurvey reported in this paper are only those of 1993 vessel captains. Funding for the 1993 survey was provided under Saltonstall-Kennedy program grant #NA37FD0184. A description of the 1993 halibut fishery, based largely on that survey, is provided in a 20-page report by ISER researchers Matthew Berman and Linda Leask entitled "On the Eve of IFQs: Fishing for Alaska's Halibut and Sablefish (1994)". Copies of the report by Berman and Leask are available upon request from the author of this paper.

⁴All vessels participating in Alaska halibut longline fisheries are required to have a State of Alaska halibut permit holder aboard. The permit holder is usually, although not always, the vessel captain. The State of Alaska requirement to have a permit holder on board is unrelated to (and predates by many years) the IFQ management system, which is a federal program. Under the IFQ management system, vessel halibut landings are limited by IFQ holdings of persons on board (or, in some cases, hired captains). IFQ holders are not necessarily permit holders, or vice versa.

⁵A separate working paper (*Methodology for ISER Surveys of Alaska Halibut Fishermen*) provides a detailed discussion of sample stratification, weighting, and other technical issues for both surveys.

⁶Slight underestimates were to be expected because the estimates are based only on responses of the 97 permit holders who fished vessels listed on their permits.

⁷In chi-squared tests of homogeneity, the null hypothesis of homogeneity among survey groups, vessel classes, or harvest level groups was not rejected at the 10% significance level for any of the groupings shown in Table 2. Pearson chi-squared statistics, degrees of freedom, and significance levels were as follows for the groupings shown above. By survey group: 1.37, 3, .714. By vessel size class, for resurveyed 1993 captains who fished in 1997: 1.65, 6, .949. By vessel size class, for 1997 permit holders: 4.63, 6, .592. By 1997 harvest level, for resurveyed 1993 captains who fished in 1997: 2.79, 6, .384. By 1997 harvest level, for 1997 permit holders: 9.08, 6, .169.

⁸In chi-squared tests of independence, the null hypothesis of independence among survey responses was rejected at the 1% significance level for all of the groupings shown in Table 3. Pearson chi-squared statistics, degrees of freedom, and significance levels were as follows for the groupings shown above. Made fishing for halibut safer: 14.11, 3, .003. Allocated halibut fairly: 21.32, 3, .002. Better off financially: 50.02, 6, .000. Attitude towards IFQ management: 49.87, 6, .000.

The Alaska Halibut IFQ Program: Selected References

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