

MEMORANDUM

TO: Council, SSC and AP Members

FROM: Clarence G. Pautzke
Executive Director

DATE: April 6, 2000

SUBJECT: Groundfish Management

ESTIMATED TIME
3 HOURS

ACTION REQUIRED

- (a) Review SEIS Scoping Document.
- (b) Review discussion paper on TAC setting process.
- (c) Review halibut excluder experimental fishing permit.

BACKGROUND

(a) FMP updates/SEIS Scoping Document

Steve Davis, Regional NEPA Coordinator for NMFS, will again provide a status report on the development of the programmatic supplemental environmental impact statement (SEIS) on groundfish fishery management in the Exclusive Economic Zone (EEZ) off Alaska. NMFS published a scoping summary report on March 27, 2000, which we mailed to you on March 31. It summarizes the scoping process, identifies issues raised during scoping, and describes the SEIS structure and content including alternatives for analysis that resulted from scoping (Item D-1(a)(1)). The notice of availability for the scoping summary report was published on April 6, 2000, beginning a 30-day comment period (Item D-1(a)(2)). Our FMP coordinators will be contributing to the preparation of the SEIS and will also be revising the BSAI and GOA FMPs to coincide with the public review of the SEIS, a long-standing project of theirs.

(b) TAC setting process

NMFS staff will present a discussion paper on issues and options for revising the annual TAC setting process. In December 1996, the Council initiated the development of Amendments 48/48 to the groundfish fishery management plans. The Council took final action in April 1998 and submitted the analyses for Secretarial review in May 1998. The intent of these amendments was to streamline the Council's annual groundfish harvest specification process by: (1) rolling over final harvest specifications established for one year into the following year to serve as preliminary specifications and eliminate the need to publish interim specifications; and (2) issuing annual specifications through a single Federal Register document which would be published after the December Council meeting.

NMFS subsequently identified legal and technical problems with amendments 48/48. These problems stemmed largely from compliance issues with National Environmental Policy Act (NEPA), the Administrative

Procedure Act (APA), Regulatory Flexibility Act, and Endangered Species Act associated with "rolling over" TAC amounts from one year to the next, as well as the recent development of more rigorous agency guidelines for compliance with these statutes. As a result, the original concept for amendments 48/48 was tabled in mid-1999.

NMFS again is attempting to develop options for revising the existing TAC specification process to respond more effectively to the following objectives:

1. Manage fisheries based on the best available information;
2. Facilitate adjustments to TACs to respond to new information or conservation concerns;
3. Facilitate compliance of annual TACs with NEPA, ESA, and RFA provisions while minimizing unnecessary disruption to fisheries;
4. Provide adequate opportunity for public review and comment on new information leading to annual TAC recommendations; and
5. Promote administrative efficiency.

A draft analysis is scheduled for Council consideration at its June 2000 meeting. Final Council action could occur at the October meeting.

(c) Halibut excluder experimental fishing permit

NMFS is initiating consultation with the Council on an experimental fishing permit application to develop a device for the BSAI and GOA Pacific cod fisheries that would lower halibut bycatch rates without significantly lowering catch rates of cod by Groundfish Forum and At-Sea Processors Association (Item D-1(c)). John Gauvin, Groundfish Forum, and Dr. Craig Rose, NMFS-AFSC, will review the application for the Council. Upon approval by the Council, NMFS will initiate a regulatory amendment to allow the experiment by a head-and-gut vessel in the GOA in September 2000 and pollock/cod fillet vessel in the BSAI in March 2001 to occur.

**TABLE 3
PROPOSED MANAGEMENT REGIMES FOR ANALYTICAL PURPOSES**

| Alternative 1 - Current Regime | Alternative 2 - Increase Protection MM/Seabirds | Alternative 3 - Increase Protection Target Species | Alternative 4 - Increase Protection Non-Target/ Forage Species | Alternative 5 - Increase Protection To Habitat/EFH | Alternative 6 - Increase Long-Term Socioeconomic Benefits |
|--|---|---|--|---|--|
| MANAGEMENT TOOLS | | | | | |
| <p>OY and TAC Setting Process PSC Limits and Seasonal Allocations Inseason Time/Area Closures Gear Allocations Inshore/offshore Allocations Gear Restrictions Fishing Area Restrictions Effort Limitation Programs Observer Program Improved Retention/Improved Utilization Programs Habitat Protection Measures Catch/Processing Restrictions (Complete list of management tools can be found in FMP's)</p> | <p><u>Reduced TAC</u> Option A - Low daily harvest/ area closure - Analysis will use BSAI Pollock, Atka mackerel, cod fisheries as examples Option B - Quick intense harvest/long rest period Analysis will use BSAI/GOA pollock, cod, Atka mackerel as examples Option C - Set low TAC at outset <u>Gear Restrictions</u> Seabird avoidance and reduced take <u>Adaptive management</u></p> | <p><u>TAC Setting Process</u> - incorporate MSST into FMP's - incorporate survey biomass uncertainty - incorporate multi-species advice - evaluate MSY <u>Time/Area Closures</u> Increase use of time/area closures - close spawning areas during spawning seasons - more protection areas <u>Gear Modifications/ Restrictions</u> - increase selectivity to reduce harvest of immature fish Analysis will use BSAI/GOA pollock, cod, sablefish YFS, flathead, rocksole. Arrowtooth, POP, Atka mackerel as examples</p> | <p><u>Management/Species Category</u> - Establish a bycatch only category for all species not currently managed - Managed with assemblage MRB/ TAC - Priority non-targets managed with species/group TAC or time/area closure, depending on data - Priority based on ecosystem/ vulnerability criteria <u>Gear Modifications/ Restrictions</u> - Use gear modification to reduce bycatch (eg halibut excluder device) Analysis will use BS squid and GOA/BSAI skates as examples</p> | <p><u>Gear Restrictions</u> - Trawl gear not allowed for species that can be commercially harvested by fixed gear (cod) - Allow only pelagic trawl gear for species that can be taken commercially by this gear. Analysis will use dusky, NR, POP, pollock as examples <u>Closed areas</u> Restrict all gear types to historic areas with highest effort, modified by - existing closures - scientific closures - other sensitive habitat areas inside (HAPC) - analysis will look at BSAI and GOA Marine Protective Areas as examples <u>TAC settings</u> - reduce TAC by effort outside <u>Observer Program/ data collection modifications</u></p> | <p><u>Cooperatives</u> - Expand co-ops to all groundfish fisheries</p> |

Corporation and The Torrington Company v. United States, 822 F. Supp. 782 (CIT 1993) and *Floral Trade Council v. United States*, 822 F. Supp. 766 (CIT 1993). Therefore, the cash deposit rates for all companies except those covered by this review will be unchanged by the results of this review:

We will instruct Customs to continue to collect cash deposits for non-reviewed companies at the most recent company-specific or country-wide rate applicable to the company. Accordingly, the cash deposit rates that will be applied to non-reviewed companies covered by this order will be the rate for that company established in the most recently completed segment of this administrative proceeding under the Act, as amended by the URAA. If such a review has not been conducted, the rate established in the most recently completed administrative proceeding conducted pursuant to the statutory provisions that were in effect prior to the URAA amendments is applicable. See *Certain Welded Carbon Steel Pipe and Tube Products from Turkey; Final Results of Countervailing Duty Administrative Review*, 53 FR 9791 (March 25, 1988). These rates shall apply to all non-reviewed companies until a review is requested. In addition, for the period January 1, 1998 through December 31, 1998, the assessment rates applicable to all non-reviewed companies covered by this order are the cash deposit rates in effect at the time of entry.

Public Comment

Pursuant to 19 CFR 351.224(b), the Department will disclose to parties to the proceeding any calculations performed in connection with these preliminary results within five days after the date of publication of this notice. Pursuant to 19 CFR 351.309, interested parties may submit written comments in response to these preliminary results. Case briefs must be submitted within 30 days after the date of publication of this notice, and rebuttal briefs, limited to arguments raised in case briefs, must be submitted no later than five days after the time limit for filing case briefs. Parties who submit argument in this proceeding are requested to submit with the argument: (1) A statement of the issues, and (2) a brief summary of the argument. Case and rebuttal briefs must be served on interested parties in accordance with 19 CFR 351.303(f). Also, pursuant to 19 CFR 351.310, within 30 days of the date of publication of this notice, interested parties may request a public hearing on arguments to be raised in the case and rebuttal briefs. Unless the Secretary

specifies otherwise, the hearing, if requested, will be held two days after the date for submission of rebuttal briefs. The Department will publish the final results of this administrative review, including the results of its analysis of issues raised in any case or rebuttal brief or at a hearing.

This notice serves as a preliminary reminder to importers of their responsibility to file a certificate regarding the reimbursement of countervailing duties prior to liquidation of the relevant entries during this review period. Failure to comply with this requirement could result in the Secretary's presumption that reimbursement of countervailing duties occurred and the subsequent assessment of double countervailing duties.

This administrative review is issued and published in accordance with section 751(a)(1) and 777(i)(1) of the Act (19 U.S.C. 1675(a)(1) and 19 U.S.C. 1677f(i)(1)).

Dated: March 30, 2000.

Robert S. LaRussa,
Assistant Secretary for Import Administration.

[FR Doc. 00-8572 Filed 4-5-00; 8:45 am]
 BILLING CODE 3510-DS-P

DEPARTMENT OF COMMERCE

National Oceanic and Atmospheric Administration

[I.D. 032800D]

Groundfish Fisheries of the Bering Sea/Aleutian Islands Area and the Gulf of Alaska

AGENCY: National Marine Fisheries Service (NMFS), National Oceanic and Atmospheric Administration (NOAA), Commerce.

ACTION: Notice of availability; request for comments.

SUMMARY: NMFS is publishing a report summarizing the results of the scoping process used to initiate a programmatic supplemental environmental impact statement (SEIS) on Federal groundfish fishery management in the Exclusive Economic Zone (EEZ) off Alaska. The Scoping Report summarizes the scoping process, identifies issues raised during scoping, and describes the SEIS structure and content including alternatives for analysis that resulted from scoping.

DATES: Comments on the Scoping Report may be submitted until May 1, 2000.

ADDRESSES: Copies of the Scoping Report may be obtained from Steven K. Davis, phone or e-mail: 907-271-3523, or from steven.k.davis@noaa.gov or write to: NMFS, 222 West 7th Street, Room 517, Anchorage, AK 99508, or Carol Tocco, phone or e-mail: 907-586-7032 or carol.tocco@noaa.gov or write to: NMFS, Alaska Region, 709 West 9th Street, P.O. Box 21668, Juneau, AK 99802. The Scoping Report also is available on the NMFS, Alaska Region's World Wide Web site at www.fakr.noaa.gov.

Written comments on the scoping summary report should be submitted to Lori Gravel, National Marine Fisheries Service, Alaska Region, P.O. Box 21668, Juneau, AK 99802. Comments also may be hand delivered to Room 443-5, in the Federal Office Building, 907 West 9th Street, Juneau, AK, or sent via facsimile (fax) to 907-586-7255. Comments will not be accepted if submitted via e-mail or Internet.

FOR FURTHER INFORMATION CONTACT: Steven K. Davis, NMFS, 907-271-3523 or steven.k.davis@noaa.gov.

SUPPLEMENTARY INFORMATION:

- (1) *Alternative 1* (no action), continue with existing management policy;
- (2) *Alternative 2*, adopt a new management policy framework that emphasizes increased protection for marine mammals and seabirds;
- (3) *Alternative 3*, adopt a new management policy framework that emphasizes increased protection for target groundfish species;
- (4) *Alternative 4*, adopt a new management policy framework that emphasizes increased protection for non-target and forage fish species;
- (5) *Alternative 5*, adopt a new management policy framework that emphasizes increased protection for fish habitat; and
- (6) *Alternative 6*, adopt a new management policy framework that emphasizes an increase in long-term socioeconomic benefits.

Dated: March 31, 2000.

Bruce Morehead,
Director, Office of Sustainable Fisheries, National Marine Fisheries Service.
 [FR Doc. 00-8397 Filed 3-31-00; 4:37 pm]
 BILLING CODE 3510-22-F

CONSUMER PRODUCT SAFETY COMMISSION

Sunshine Act Meeting

AGENCY: U.S. Consumer Product Safety Commission, Washington, DC 20207.
TIME AND DATE: Thursday, April 13, 2000, 2 p.m.



FY AK REGION

NPFMC

001

UNITED STATES DEPARTMENT OF COMMERCE

National Oceanic and Atmospheric Administration

National Marine Fisheries Service

P.O. Box 21668

Juneau, Alaska 99802-1668

AGENDA D-1(c)

APRIL 2000

JK

March 17, 2000

Clarence G. Pautzke
 Executive director
 North Pacific Fishery Management Council
 605 West 4th Avenue, suite 306
 Anchorage, AK 99501

RECEIVED
 MAR 17 2000
 N.P.F.M.C.

Dear Clarence,

We have received a joint application for an experimental fishing permit (EFP) from Mr. John Gauvin, Groundfish Forum Inc. and Mr. Trevor McCabe, At-Sea Processors Association. Issuance of experimental fishing permits is authorized by regulations implementing the Alaska groundfish fishery management plans at 50 CFR parts 679.6 and 600.745(b). The goal of the EFP application is to develop a device for the Pacific cod fisheries in the Bering Sea and Gulf of Alaska that would lower halibut bycatch rates without significantly lowering catch rates of cod. The project would be conducted in coordination with Dr. Craig Rose, a gear development scientist at the Alaska Fisheries Science Center, NMFS. Dr. Rose would help the applicants select the most promising halibut excluder design for testing using criteria set out in the EFP application.

Under regulations at § 679.6, we have consulted with the Alaska Fisheries Science Center, and have determined that the application contains the information necessary to judge whether the proposal constitutes a valid fishing experiment appropriate for further consideration. We are initiating consultation with the North Pacific Fishery Management Council by forwarding the application to you as required by regulations. We understand that you have tentatively scheduled Council review of the attached application on the Council's April 2000 agenda in anticipation of our review and determination that the application warrants further consideration and consultation with the Council.

Please notify Mr. Gauvin and Mr. McCabe of your receipt of the application and invite the applicants to appear before the Council in April in support of the application if the applicants desire. We will publish a notice of receipt of the application in the Federal Register with a brief description of the proposal. A copy of the application is attached.

Sincerely,

Arnold J. Berg
 For Steven Penoyer
 Administrator, Alaska Region

Attachment



GROUND FISH FORUM, INC.

4215 21ST AVENUE W. SUITE #201
SEATTLE, WA 98199
(206) 301-9504 FAX (206) 301-9508

Mr. Steve Pennoyer
Regional Administrator
NMFS- F/AKR
P.O. Box 21668
Juneau, AK 99802

January, 21, 2000

RE: Development of a halibut excluder for the cod fishery through a joint EFP with At-sea Processors Association

Dear Steve:

The Pacific cod trawl fishery presents significant challenges in the development and use of halibut excluders. While effective halibut excluders are increasingly being used in the CDQ and open access flatfish fisheries, these excluders are unfortunately not effective in the Pacific cod trawl fishery. The excluders utilize a solid grate with square apertures that, when modified to be large enough to allow cod to pass through, also allow most (if not all) of the halibut encountered in cod fishing to pass through. The halibut bycatch allowance for the Bering Sea trawl cod fishery therefore continues to constrain the cod trawl fishery.

To address this important challenge, Groundfish Forum and Dr. Craig Rose of the Alaska Fisheries Science Center RACE Division asked participants attending a technical workshop on halibut excluders last fall to describe ideas and approaches that have been contemplated or attempted for excluding halibut in the cod fishery. That group agreed that there are promising ideas for such an excluder, but that the race for fish has prevented a collaborative effort in the development of an effective excluder. Drawing from the progress at the workshop and from Dr. Rose's ongoing commitment and assistance in this important endeavor, Groundfish Forum and At-sea Processors Association have drafted the attached application for an experimental fishing permit to develop an excluder for the cod fishery.

This application follows Groundfish Forum's earlier EFP project to develop an excluder for the flatfish fishery, but several important differences are also incorporated into the current project. Most evident is the difference in experimental design, in particular the use of a recapture bag instead of experimental blocks or pairs of similar tows. Although every experimental approach has unique limitations, the recapture approach has shown some promise in some of Dr. Rose's recent work. The attached EFP application requests a reduced amount of groundfish compared to Groundfish Forum's earlier excluder EFP, and we expect to gain as much statistical confidence as earlier experiments through this recapture approach.


Another important distinction is that this EFP application covers two related excluder experiments designed for different applications, one for the Gulf of Alaska for the fall of 2000 and one for the Bering Sea for the spring of 2001. These two fishing areas present different challenges for halibut excluders due to inherent differences in the size differential between the target cod and the halibut bycatch in the two fisheries. We hope this package approach in the EFP application reduces some of the burden on your staff and streamlines the approval process.

Thanks in advance for your efforts to review and approve this important experimental work described in the attached EFP application. As before, we very much appreciate the support your agency has provided in our endeavors to improve the fisheries. Please call us if you have any questions or require anything further.

Sincerely,



John R. Gauvin


Trevor McCabe

CC: Mr. R. Lauber, Chairman, NPFMC

Test of a halibut excluder device for Pacific cod trawls. January 2000

Date of Application: January 19, 2000

Name, mailing address, and phone number of applicant:

Groundfish Forum, Inc.; John R. Gauvin, Director
4215 21st Avenue West; Suite 201
Seattle, WA 98126
(206) 301-9504

At-Sea Processors Association; Trevor McCabe, Executive Director
4039 21st Ave. W., Suite 401
Seattle, WA 98199
(206) 285-5139

Purpose and Goals of the EFP: The applicants' goal is to develop a device for Pacific cod (cod) trawls used in the Bering Sea and Gulf of Alaska that lowers halibut bycatch rates without significantly lowering catch rates of cod. Groundfish Forum, under the guidance of Dr. Craig Rose of NMFS, will select for testing the most promising excluder design based on criteria set out in the EFP. Two vessels, a pollock/cod fillet catcher-processor and an H&G freezer-trawler will test the selected device under a rigorous, controlled, experimental design with a high probability of determining if the device excludes halibut and retains target cod successfully. The EFP will produce a report for public dissemination describing the device tested and the results of the test. Because the cod fishery is often constrained by halibut bycatch in the Bering Sea and Gulf of Alaska, widespread adoption of the device can be expected if the device is successful.

Justification for the EFP: Mandates to reduce bycatch and bycatch mortality are set out in the Magnuson-Stevens Act. The fishery will benefit from an opportunity to develop and test a halibut excluder outside of the regular open access fishery where *ad hoc* development of bycatch reduction devices suffers from extreme limitations (see attached description of Groundfish Forum's 1998 EFP).

The Pacific cod trawl fishery can experience relatively high halibut bycatch rates and is often constrained by halibut bycatch mortality caps. The October, 1999 Gulf of Alaska trawl cod fishery, for example, experienced rather high bycatch rates and accounted for a significant amount of halibut bycatch mortality. The situation may have been avoidable had an effective halibut excluder been available to and used by the vessels fishing in that GOA fall cod fishery.

The Pacific cod fishery presents a unique challenge when designing an effective trawl halibut excluder - the average size of halibut encountered in the cod fishery differs from that of the halibut bycatch in many flatfish fisheries. An additional factor of complexity is that the target and undesired species (cod and halibut) encountered in the trawl cod fishery are, on the average, much closer to one another in size than is the case in the flatfish fisheries where halibut excluders are currently being used.

Names of participating vessels, copies of vessel Coast Guard documents, names of vessel masters:
This information will be supplied after the vessel selection processes are completed.

Target and incidental species harvested: The estimated total harvest of allocated groundfish species is 396 MT of groundfish in the Gulf of Alaska and 594 MT of groundfish in the Bering Sea, principally Pacific cod. The experiment will be conducted in accordance with the published directed fishing standards, retaining all cod but not exceeding MRB amounts for all other groundfish species. The expected total halibut bycatch mortality from the experiment is 30 MT in the Gulf of Alaska and 8 MT in the Bering Sea (see attached document for a more detailed list of expected catch and bycatch). Halibut catch will be measured through a census conducted while deck sorting halibut under the direction of NMFS certified observers. The use of a recapture bag is thought to be the most feasible means of conducting this experiment (as opposed to doing blocks of similar tows to measure the effects of using an excluder) significantly decreases the number of tows needed to complete the experiment, thus lowering the total amount of halibut mortality required for the experiment. Deck sorting is expected to result in a considerably lower halibut mortality rate than the one assigned to the open-access fishery.

Disposition of allocated groundfish species caught in the EFP: Vessels selected for participation in the experiment can legally retain all groundfish catches in accordance with the published directed fishing standards, retaining all cod and pollock but not exceeding MRB amounts for all other groundfish species using Pacific cod as the basis species.

Expected impacts on marine mammals and endangered species: None.

Type and size of vessels and gear: One H&G boat and one pollock/cod fillet boat are expected to participate. Gear will be normal cod trawls with modifications in the net to exclude halibut. Recapture bags attached to the intermediate of the nets will retain all excluded catch for later sampling.

Approximate time and place for exempted fishing under EFP: The H&G vessel will conduct part A of the experiment in the Gulf of Alaska in September, 2000. The pollock/cod fillet boat will conduct Part B of the experiment in the Bering Sea during or following the winter cod fishery in March, 2001.

Signature of Applicant:

J. Trevor McCabe
Executive Director
At-sea Processors Association

Exempted Fishing Permit Application January 2000: Test of a halibut excluder device for Pacific cod trawls

Part One: Introduction

In 1998, Groundfish Forum sponsored an experimental fishery in which the performance of a halibut excluder device was tested on two H&G trawl vessels in the Gulf of Alaska flatfish fishery. The EFP was a successful demonstration of the effectiveness of halibut excluders in that trawl fishery and, for the first time, provided the interested fishing industry with quantitative, scientific data detailing the potential levels of reduction in halibut and target species catch. Experimentation with trawl halibut excluders has evolved into more widespread use in GOA flatfish and Bering Sea yellowfin sole fisheries. As in other Groundfish Forum EFPs, the experimental process also quantified the reduction in halibut mortality resulting from deck-sorting and releasing halibut soon after they were brought on board. These deck-sorting results from earlier Groundfish Forum experiments are the basis of the Halibut Mortality Avoidance Program proposal that the Council and NMFS have promised to consider in the Spring of 2000.

The purpose and rationale for the 1998 Groundfish Forum experimental fishery are detailed in the introduction of that EFP application. While much has changed in the management of our groundfish fisheries since that application was drafted, the underlying need to broaden efforts to reduce the mortality of halibut bycatch to other trawl fisheries and the range of tools available to industry to effect those reductions remain greatly unchanged.

Given the continuing need to reduce halibut bycatch mortality, Groundfish Forum and At-Sea Processors Association are submitting an EFP to test the use of halibut excluders in the Bering Sea and Gulf of Alaska cod trawl fisheries. The first part of this experiment (Part A) will be conducted by an H&G freezer-trawler during the fall cod fishery in the Gulf of Alaska. The second part (Part B) will be conducted during the winter/spring cod fishery in the Bering Sea by a pollock/cod fillet catcher-processor.

The need for additional experimental fishery work with halibut excluder devices might not be obvious given the successful outcome of the 1998 Groundfish Forum EFP. Indeed, the use of halibut excluders in the Gulf of Alaska flatfish fisheries continues to grow, and, more recently, similar excluders are starting to be used in the Bering Sea yellowfin sole fishery. Despite the advances that have been made by the industry in using halibut excluders to reduce halibut bycatch mortality in some flatfish fisheries, very little is known about the effectiveness of using trawl halibut excluders in the Pacific cod target fishery. The average size of halibut encountered in the cod fishery differs from that of the halibut bycatch in many flatfish fisheries. Perhaps of greater importance is the fact that the target and bycatch species (cod and halibut) encountered in the trawl cod fishery are, on the average, much closer to one another in size than is the case in the flatfish fisheries where halibut excluders are currently being used. This makes the exclusion of halibut bycatch without a significant loss of cod target catch much more of a challenge. For these reasons, the EFP applicants consider this project both important and unique, and certainly no less important than previous EFP work done with experimental excluder designs. The cod fishery is currently the fishery where the most halibut mortality in trawl fisheries occurs.

This experiment will utilize both strong statistical methods as well as the experience and innovation of the industry. Under the guidance of Dr. Craig Rose, Groundfish Forum will develop an excluder design based on the information and ideas presented at a recent halibut excluder workshop and Dr. Rose's experience in testing a variety of excluder types.

The device selected by Groundfish Forum and Dr. Rose will be subjected to a systematic field test to establish its effectiveness as well as some exploration to isolate the elements that make the device successful (placement, towing speed, sea conditions, ambient light conditions, etc.)

A detailed report will be provided describing the device, how it was tested, and the degree of halibut and target catch reduction measured in the test. The report will also hopefully provide some qualitative information that would indicate which factors and design elements were most critical to the effectiveness of the device. If the device is successful and particularly if loss of target catch can be minimized, then one could expect industry adoption of the device to lower halibut bycatch overall while maintaining the objectives of the directed fishery. Even if the device is not successful, the experiment has been designed to provide helpful information that can be used in the future to reduce halibut bycatch. In addition, the application and experimental process should help foster industry cooperation and should impress upon the industry the importance of additional collaborative efforts to reduce bycatch.

Part Two: method and approach for the experiment

Choice of a fishery to conduct a test of a halibut excluder

The experimental fishery will take place in two stages. Part A will be conducted by an H&G freezer-trawler in the Gulf of Alaska in late summer or early fall. Part B will be conducted by a pollock/cod fillet catcher-processor in the 2001 Bering Sea winter cod fishery. While both of these fisheries have relatively high halibut bycatch mortality rates at certain times of the year, there are significant differences in the two fisheries, and an examination of the halibut excluder's performance under the conditions of each of these fisheries is warranted.

Part A of the experiment will be conducted in the fall of 2000. Unlike the Bering Sea trawl cod fishery, the fishery in the Gulf of Alaska enjoys targetable quantities of cod from late summer through the winter period. This will allow the participating H&G freezer-trawler to conduct the experiment in September, when there are few options for open access fishing and therefore a relatively low opportunity cost for the vessel. Our earlier EFP projects have demonstrated the value of conducting a rigorous test outside of the regular open-access fishery. The EFP applicants therefore request a groundfish and prohibited species set-aside for this part of the EFP.

Since significant concentrations of cod are available to the Bering Sea trawl fishery primarily during the winter months, Part B may be conducted while the BSAI open-access fishery is still under way. The competitive disadvantage caused by the use of experimental fishing gear and the additional sampling and fish handling tasks associated with scientific observation of the gear's

performance would usually make the participation of any vessel infeasible during the course of an open access fishery. As a member of the at-sea pollock cooperative, however, the pollock/cod fillet catcher-processor will be more flexible in its fishing schedule and will be able to conduct the experiment during the open access fishery at a much lower opportunity cost than the average non-coop vessel.

The EFP applicants are nonetheless requesting a groundfish and prohibited species set-aside for Part B of the EFP for the following reasons: First, there is no guarantee that the directed fishery will still be open on the dates that the vessel will be available to conduct the experiment. In the event that the open-access fishery is closed, the lack of a set-aside would render an experimental fishery impossible. Under a similar scenario, the open-access trawl fishery for cod may be open, but the American Fisheries Act Pacific cod sideboard cap for the at-sea sector may have been reached, again preventing the participating vessel from doing the experiment without a set-aside. Second, the experimental design requires that the participating vessel encounter a certain amount of halibut bycatch in order to test the device's ability to exclude halibut. Thus the vessel would be prevented from fishing in areas where its halibut bycatch would normally be relatively low, such as the Aleutian Islands. It would therefore be unfair to both the participants in the experiment and the trawl cod fleet at large to count halibut bycatch from the experimental fishery against the open access cap. Lastly, there might be some confusion regarding which aspects of the vessel's operation fall within the purview of the EFP and which are being conducted under the auspices of the open access fishery. For example, the sampling procedures and priorities to be used during the EFP differ significantly from those that are used for the monitoring of catch in the open access fishery. For these reasons Part B of the EFP requires a groundfish and PSC set-aside regardless of whether it is conducted during or after the open access cod fishery for AFA at-sea pollock processors. The experimental fishery will be conducted entirely under the regulations and protocol of the EFP, and the participant vessel for Part B will be checked out of the open access fishery while the experiment is under way.

Selection of a Halibut Excluder Device for Testing in the EFP

Several trawl organizations invited Dr. Craig Rose of NMFS, fishermen, and gear manufacturers to participate in a workshop held on November 19, 1999 at Fish Expo in Seattle that focused on the design and use of various halibut excluders for the flatfish fishery as well as possible designs for excluders to be used in the cod fishery. Under the guidance of Dr. Rose, Groundfish Forum will use the information from the workshop to develop an excluder design. Dr. Rose's experience in working with excluders will be utilized in the selection of the device for testing.

Given the difficulty of designing an effective halibut excluder for the cod fishery, the EFP sponsors intend to do informal "Beta-testing" of a prototype of the agreed-upon excluder design. The Beta-test will be done during the 2000 Bering Sea cod fishery on the F/T Katie Ann, an AFA at-sea catcher processor and member vessel of the At-Sea Processors Association. This will provide the opportunity to make any gross adjustments to the excluder design, if necessary, prior to the actual EFP field test in part A of the EFP.

Further refinements may be made to the excluder design used in Part B if indicated by the results of Part A.

The following are aspects of an effective excluder device that is practical to the industry. Groundfish Forum and Dr. Rose will focus on the preferred aspects listed below while selecting an excluder design.

- 1) Release unharmed a large percentage of the halibut that come into the trawl
- 2) Avoid significant reductions in target catch
- 3) Function with limited failures or breakage and be resistant to clogging and debris jams
- 4) Durability and ease of storage on deck
- 5) Constructed from affordable materials that are readily available

Vessel Selection

Groundfish Forum will formally disseminate Part A application materials to all trawl H&G companies as well as make these materials available through the Council's website upon receiving Council approval of the EFP. Materials describing the experiment will detail the purpose of the EFP, application information required, catch and PSC limits for the experiment, a description of all responsibilities of applicants, and a description of the review process. If approval is still pending, application materials will note that the EFP will still be subject to final approval by NMFS following Council approval. Potential applicants will also be provided a rough schedule for the fishing activities (subject to change).

Applicants will have approximately four weeks to complete and submit applications from the time application materials are formally made available. Applicants for Part A must submit materials describing the suitability of the vessel as a platform for the experimental fishery as per the information contained in the application materials. All applicants must submit a statement of their fishing plan for the EFP as well as a description of the observer sampling facilities on the applicant's vessel. The fishing plan submitted must describe the number of tows per day the crew expects to make during the experiment and a description of the proposed coordination of observer sampling and deck crew duties during the experiment. These materials will be used by the EFP vessel selection committee to gauge the feasibility of obtaining valid data on the applicant vessel and to examine the suitability of the proposed observer coverage for the collection of data in the experiment.

The vessel selection for Part A is tentatively scheduled to take place in late July, subject to the availability of panel participants and other considerations. The vessel selection panel will evaluate all applications and choose the most appropriate vessel for the experiment. In the event that more than one vessel are considered equally suitable for the experiment, the participating vessel will be chosen randomly by a drawing conducted by the vessel selection panel.

The participating vessel in Part B will be a pollock/cod fillet catcher-processor that is a member of the At-Sea pollock cooperative. The Cooperative itself will designate a participating vessel

based on availability of the vessel to perform in the experimental fishery and suitability of the vessel as a platform for the experiment.

Experimental Design and Data Collection

The principal variables of interest for this experiment are the percent retention of Pacific cod and halibut from tows using the experimental device. Retention percentages of other groundfish will also be examined. The size composition of cod and halibut will be sampled to test for any size selectivity of the device. Auxiliary towing and environmental data, including depth, temperature, light level, speed, and time of day will be collected and analyzed for any important factors which may effect the selectivity of the device. The sample unit for all variables will be the trawl tow.

The experiment will consist of 60 tows made by two vessels with the number of tows divided equally between them (30 tows per vessel, see section on sample size calculations). At a rate of 4-5 tows per day, Part A will take 7-10 days to complete. Part B will take approximately the same amount of time.

All experimental tows will be made with an auxiliary net, which will recapture the fish that would have been released by the halibut excluder. By separately sampling the catch from this net and the main codend, estimates of percent retention will be available from each tow for each species and size category encountered.

Towing will be conducted with procedures and at sites used during the commercial fishery for Pacific cod in the Gulf of Alaska and Bering Sea. A small number of test tows of short duration (20-30 minutes) may be carried out to determine if the species mix is suitable before commencing experimental tows at a new site. Results of these tows will not be used in the analysis. Tows will also not be used if the trawl suffers such significant damage that it is considered unlikely to have fished in a normal manner.

The captain or other bridge crew will record the start and end times of each tow as well as the average speed, depth, and the captain's estimate of catch weight. A self-contained data-logger will be attached to the trawl net during every tow to measure the depth, temperature, and light level during fishing.

The contents of the main codend and the recapture bag from each tow will be treated as separate and distinct "catches" requiring independent sampling. Therefore, the contents of each must be kept separate throughout the sampling process. The order of priorities for sampling each catch is:

1. Enumeration of the halibut catch,
2. Enumeration of cod catch,
3. Size frequency of halibut catch,
4. Size frequency of captured cod,
5. Enumeration of other captured species.

Sampling will be conducted using procedures the NMFS Observer Program uses for North Pacific groundfish fisheries. The observers hired to carry out this sampling will be certified in

these methods by the NMFS. Catch volume will be estimated either through standard codend measurement procedures conducted by the observer or the use of a NMFS-certified flow scale (preferred). Catches from the codend and recapture bags of each tow shall not be mixed until all sampling is completed. From each catch, a species composition sample of at least 300 kg will be taken to determine species composition and density. Portions of this sample shall be collected to be representative of all portions of the catch (i.e. filling baskets from a conveyor belt at intervals during the period that it takes to empty a holding bin). The weights and number of each species in this sample will be recorded. Sampling procedures may be modified to improve the estimates of halibut and cod catch at the expense of some reduction in sampling for other species. For example, a portion of the sample may only be sorted to separate cod from other species, allowing more accurate estimates of cod catches. Sub-samples of cod will be measured to determine their size composition.

In addition, as in Groundfish Forum's earlier experiments, observers will be asked to help design and to carry out a regime for deck sorting halibut, allowing both accurate enumeration of halibut catches and expeditious return of halibut to the sea. Vessel personnel responsible for following the experimental protocol must agree to abide by this protocol throughout the EFP field work. A procedure will be developed to remove and measure most, if not all of the halibut catch on deck and return them to the sea as expeditiously as possible. This will minimize halibut mortality and improve the estimate of halibut catch. Any remaining halibut encountered during the sorting and processing of the catch shall be presented to the observer for enumeration and measurement and then placed overboard. Participants will work out an agreement in advance with observers regarding where any halibut that are not detected during deck sorting are placed so they can be enumerated before they are discarded. Based on Groundfish Forum's experience with sorting halibut out of the trawl catch on deck in previous experimental fisheries, we expect more than 95% of the halibut to be removed on deck and enumerated.

Each vessel will carry a project manager supplied by the EFP applicants. The project manager will be considered the field chief for experiment and will be responsible for field decisions regarding the design and implementation of the experimental fishery plan. In addition, Dr. Rose will be invited to assist on the participating vessels during Parts A and B of the experiment. Dr. Rose may provide underwater camera work to help understand the working of the excluder as well as troubleshooting for deployment difficulties.

Analysis

Main and recapture catches will be estimated for each haul from the volume, density and species composition measurements. These estimates will be used to calculate retention rates for each groundfish species and halibut in each haul. The resulting parameters will be tested for normality, and an arcsine transformation applied if necessary. Of particular interest will be if and how much the halibut and Pacific cod catches were affected. Estimates and confidence intervals for the effects will also be generated.

The size composition data will be used to partition the catches of cod and halibut into 2 to 5 size categories and size specific retention estimates will be generated. Analyses of variance will be

used to test the null hypothesis that the effect of the device did not vary between size groups. Plots of size composition and selectivity curves will be generated for halibut and Pacific cod.

A report to the industry and public will be prepared by Groundfish Forum and At-Sea Processors' Association describing the following: the device(s) tested in the experiment, how the test was conducted, placement and other factors (such as towing speeds, water conditions, amount of debris in the water, etc.), and performance of the device in terms of halibut bycatch reduction, target catch reduction, handling and maintenance. The findings will be presented at a NPFMC meeting (subject to the Council's scheduling requirements). The written report, prepared by Groundfish Forum and At-Sea Processors in conjunction with NMFS, will be made available by the NPFMC to interested public (in the same manner as occurred with Groundfish Forum's previous EFPs).

Process and timing of tasks associated with the experiment

1. Excluder design and construction (January 2000)
2. Tests aboard F/T Katie Ann (non quantitative) (February 2000)
3. Completion of EFP approval process
4. Development, distribution and collection of performance requirements and applications for Part A. (Spring 2000)
5. Selection of vessel for Part A (Summer 2000)
6. Part A tests - (7 - 10 days, September 2000)
7. Part B tests - (7 - 10 days, March 2001)
8. Analysis, report preparation and presentations.

Requirements for applicants and participants

NMFS

In addition to its role as EFP reviewer, NMFS personnel involved with the technical guidance and oversight of the EFP will:

1. Assist Groundfish Forum and At-Sea Processors in experimental and technical design elements and logistics of the experimental fishing activities.
2. Assist Groundfish Forum and At-Sea Processors in designing the excluder, outlining construction specifications and developing cost estimates for the excluder.
3. Provide technical assistance for analysis of EFP data and preparation of a report of EFP findings
4. Select NMFS and other qualified reviewers for the review of Part A applications
5. The NMFS RACE division will be consulted to determine the level of observer coverage needed for the field experiment, review the adequacy of sampling procedures and proposed observer sampling stations, and provide any available information on applicants' expected cooperation level based on their past performance.

Groundfish Forum and At-Sea Processors Association

Because of the value of the EFP study to industry and resource managers, Groundfish Forum and At-Sea Processors propose to be joint investigators on this EFP. Groundfish Forum and At-Sea

Processors will:

1. Prepare written materials describing the purpose of the EFP project and the elements needed for incorporation into applications.
2. Set deadlines for and collect all application materials, including informing applicants of the completeness of their application (provided materials are received in a timely manner).
3. Provide NMFS reviewers with copies of completed applications.
4. Provide informational assistance before and during review of applications.
5. Provide at least one Groundfish Forum and/or At-Sea Processors appointed project manager/field chief on participant vessel during each part of the EFP field work.
6. Provide paper and electronic forms as necessary for collection of data during field work.
7. Transcribe EFP data to electronic format, create working data set for the analysis, perform spot checks and run standard diagnostics to locate "outliers" in data to check for data entry errors. Assist in technical analysis, where possible, and prepare draft EFP report.
8. Revise report after initial SSC and any other technical review and present findings to NPFMC.

Participating vessels in EFP Parts A and B

1. Prepare an application that details vessel facilities and crewing available for EFP field study. Applications must describe their vessel's facilities (including observer sampling station), and demonstrate that the deck space is adequate for testing the device and deck sorting halibut.
2. If selected for the EFP, agree to follow all procedures and requirements of the field experiment including installation and use of an excluder built to the specification of the selected design and installation and use of a recapture codend at the location of the excluder's "escape chute", keeping catches from the main and recapture codends separate, and any necessary adjustments to these procedures due to unanticipated factors, unless released from these responsibilities by Groundfish Forum, At-Sea Processors, and NMFS.
3. Provide up to three NMFS-certified observers for the duration of the EFP (final decision on number of observers is to be made by NMFS). The vessel's fishing plan during the EFP may require that more than one observer be employed on the vessel during the EFP. The participating vessel will be required to take, at its own cost, the number of observers required to meet the sampling requirements of the EFP under the proposed fishing plan.
4. Agree to provide all catch data needed for the analysis including case counts and other information on retained and discarded catch that are collected in fulfillment of the EFP objectives. Participant must also agree to make all data from the EFP available to Groundfish Forum, At-Sea Processors Association, and NMFS personnel associated with this project.
5. Stay within the catch and bycatch limitations of the EFP as closely as possible and agree to keep catches as close as possible to the target quantity of catch per tow so that the limits on catch and bycatch are not met or exceeded prior to accomplishing the numbers of tows required for the experimental design.
6. Applications will describe the configuration and composition of the net they will use for the EFP, including the size and shape of net meshes and the expected effects of net design on the composition of catch and performance of halibut excluder.

7. Perform deck sorting of halibut to achieve an accurate estimate of halibut catches and to reduce mortality. The requirements to deck sort halibut are expected to create a significant amount of additional work for deck crews. Applicants will have to recognize that if deck crews normally perform other duties between tows (such as sorting or helping process fish in the factory), this practice will likely be impossible under the increased workload for the experiment.
8. Perform periodic tests to verify flow scale performance, as per the direction of NMFS scientists involved with the EFP.
9. Applicants may sell all fish which would be legally retainable under the directed fishing standards for this experiment, retaining all cod and pollock but not exceeding MRB amounts for all other groundfish species using Pacific cod as the basis species. Adherence to the directed fishing standards includes discard of any species on PSC status at the time of the field experiment.

Responsibilities of NMFS-trained observers participating in EFP

Once the participating vessels are selected, Groundfish Forum will contact observer contractors for the participating companies. Observers will have to be in Kodiak (Part A) or Dutch Harbor (Part B) at least two days before the experiment for a briefing to explain the modifications to observer priorities.

1. NMFS observers hired for the EFP must agree to sample according to the direction of the EFP design.
2. Observers must agree to conduct species composition sampling and other assigned duties in an accurate and expeditious manner, record data, and agree to request assistance from, provide basic training to (if necessary), and work in conjunction with whatever crew resources are necessary to accomplish the sampling, species and size composition analysis, and paperwork duties associated with this EFP.
3. Observers will be expected to adhere as closely as possible to the anticipated workload per tow or per day for the EFP field work. Should this prove impossible, observers must inform Groundfish Forum and/or At-Sea Processors, and NMFS personnel on the vessel during the EFP of obstacles to accomplishing sampling and other tasks within the allotted (or anticipated) time, including suggesting alternative procedures and modifications to procedures as necessary.
4. Observers will be expected to work on a rotation that makes best use of the observer resources on the vessel during the EFP. If three observers are used for the EFP, observers may have to follow "swing" rotations that alternate their duties depending on the progress of the experiment and the relative amount of work needed during the experiment.

Sample Size Calculations

Because this study would be done with a recapture net, each trawl tow will provide an estimate of the retention percentage. The principal source of variation in these estimates will be the binomial

process of fish either passing through the excluder to the main codend or exiting the net to the 'escape' codend. This variation will also be affected by tow-to-tow differences in the number and size composition of each subject species, as well as operational and sampling factors. One characteristic of binomial variation is that estimates of proportions near 50% have higher variability than those near the extremes of 0 and 100%. An arcsine transformation ($y=2*\arcsine(\text{square root}(x))$) can be used to correct such data to approximate a normal distribution.

In considering the power of alternative experimental designs, a consequence of the above is that any target standard error or confidence interval for the transformed estimates will result in a range of confidence intervals, depending on the estimate itself, when the values are untransformed. The first panel of Figure 1 (attached) illustrates this phenomenon. Each of two sizes (A, +/- 0.2 and B, +/- 0.3) of confidence intervals on arcsine-transformed data result in patterns of untransformed confidence intervals that are wider for estimated proportions near 50 % and narrower near 0 or 100%. With a transformed confidence interval of +/- 0.3 (A) the confidence intervals around the actual estimates (untransformed) vary from +/- 15 % at an estimate of 50% to +/- 3% at 0 and 100%. The corresponding values with a transformed CONFIDENCE INTERVAL of 0.2 (B) are +/- 10% and +/- 2%. The following power analyses were done to estimate the probabilities of achieving transformed confidence intervals of +/- 0.3 or +/- 0.2 and hence uncertainty patterns A or B.

For the power analyses, data were used from tests of three similar halibut excluders on the Gulf of Alaska deep-water complex. These tests used a recapture net and the standard deviations of arcsine-transformed retention percentages were compiled for a range of species. Rex sole, flathead sole and Pacific Ocean perch had standard deviation's near 0.2; Pacific halibut, arrowtooth flounder and Dover sole had standard deviation's near 0.3 and Pacific cod, walleye pollock, sablefish and thornyheads had standard deviation's near 0.4. Pacific halibut were a consistent component of the catches in the tests and were a high priority in the catch sampling; so, 0.3 is considered a good estimate for the power calculations. On the other hand, Pacific cod were a minor catch component and had low priority for sampling. Therefore, the standard deviation estimate of 0.4 may be different than what will actually be encountered in the tests proposed here, where cod will be the main target species and a high priority for sampling.

The power curves for standard deviation values from 0.2 to 0.4 are presented in the lower two panels of Figure x. These represent the probabilities of achieving confidence intervals equal to or smaller than those indicated in uncertainty patterns A or B at a confidence level of 95%. The halibut estimates are not the limiting factor, since only 20 tows would be needed to have an 80% probability of achieving confidence intervals no larger than 10% (pattern B). A similar probability would take slightly more than 30 tows for Pacific cod, based on the standard deviation estimate of 0.4. Given the uncertainty in the estimate of the cod standard deviation, a sample size of 30 tows is proposed for this excluder evaluation.

Target and PSC mortality needed to support the EFP

Information regarding catch rates of target species as well as bycatch of other groundfish and prohibited species was compiled by the applicants with assistance from Seastate and member companies of At-Sea Processors Association and Groundfish Forum.

For part A, the observed catch composition from three catcher-processors that participated in the October, 1999 Pacific cod fishery in the Central Gulf of Alaska was used to calculate the expected groundfish and PSC catch. Observer and logbook information from the same vessels and fishery was used to estimate the average tow size for the September, 2000 EFP.

Part B catch and bycatch estimates are based on Seastate data for several at-sea pollock and cod processors in the 1995 through 1998 Bering Sea cod fishery in reporting areas 509, 517, 521, and 524. The same data were used to estimate the average total catch weight per tow.

The following is based on 30 tows for Part A of the experiment and 30 tows for Part B and the expected significance levels described above. The expected catch of groundfish from 30 tows in Part A would be 360 MT, based on an average of 12 MT of groundfish per tow, and 540 MT in Part B assuming an average of 18 MT per tow. Based on expected frequency that clogging and debris jams will occur, and estimated the number of test tows needed for the vessels fishing in Parts A and B in the experiment, the overall groundfish catch is not expected to exceed 396 MT in the Gulf of Alaska and 594 MT in the Bering Sea.

Based on data obtained at-sea vessels in the Gulf of Alaska trawl cod fishery, the expected species composition (principle components) of that catch is: Pacific cod – 75%; arrowtooth flounder – 14%; rex sole – 2%; sablefish – 2%; combined rockfish species – 1%; skates – 1%; rock sole – 1%; flathead sole – 1%; pollock – 1%; dover sole – 1%; other species – 1%.

Based on data obtained from at-sea vessels in the Bering Sea trawl cod fishery, the expected species composition (principle components) of that catch is: Pacific cod – 68%; pollock – 13%; rock sole – 6%; other species – 4%; flathead sole – 3%; arrowtooth flounder – 3%; yellowfin sole – 1%; other flatfish – 1%; combined rockfish species – 1%.

Estimating halibut mortality from the experiment

Using the Council's recommended 2000 NMFS halibut mortality rates for the Gulf of Alaska cod fishery (63%) and the Bering Sea cod fishery (66%), the experiment would result in an estimated halibut mortality of 27 MT in the Gulf of Alaska and 7 MT in the Bering Sea.

Taking into account halibut mortality needed to carry out the experiment and the additional halibut mortality from the test tows and tows that possibly cannot be counted for the number of tows needed for the experiment because of debris jams etc., the overall

halibut mortality from the experiment is expected to be between 27 MT and 30 MT in the Gulf of Alaska and 7 MT and 8 MT in the Bering Sea.

Enumeration of the halibut catch will be done through a deck sorting protocol which can be expected to improve the accuracy of halibut catch and mortality estimates over basket sampling. Additionally, deck sorting procedures employed during previous Groundfish Forum EFPs appeared to be very successful at returning halibut to the sea rapidly and with a high degree of viability. Thus, Groundfish Forum believes that the actual mortality from the experiment in both the Bering Sea and Gulf of Alaska will be much lower than the estimated rate for the open-access fisheries (66% and 63%, respectively).

Figure 1

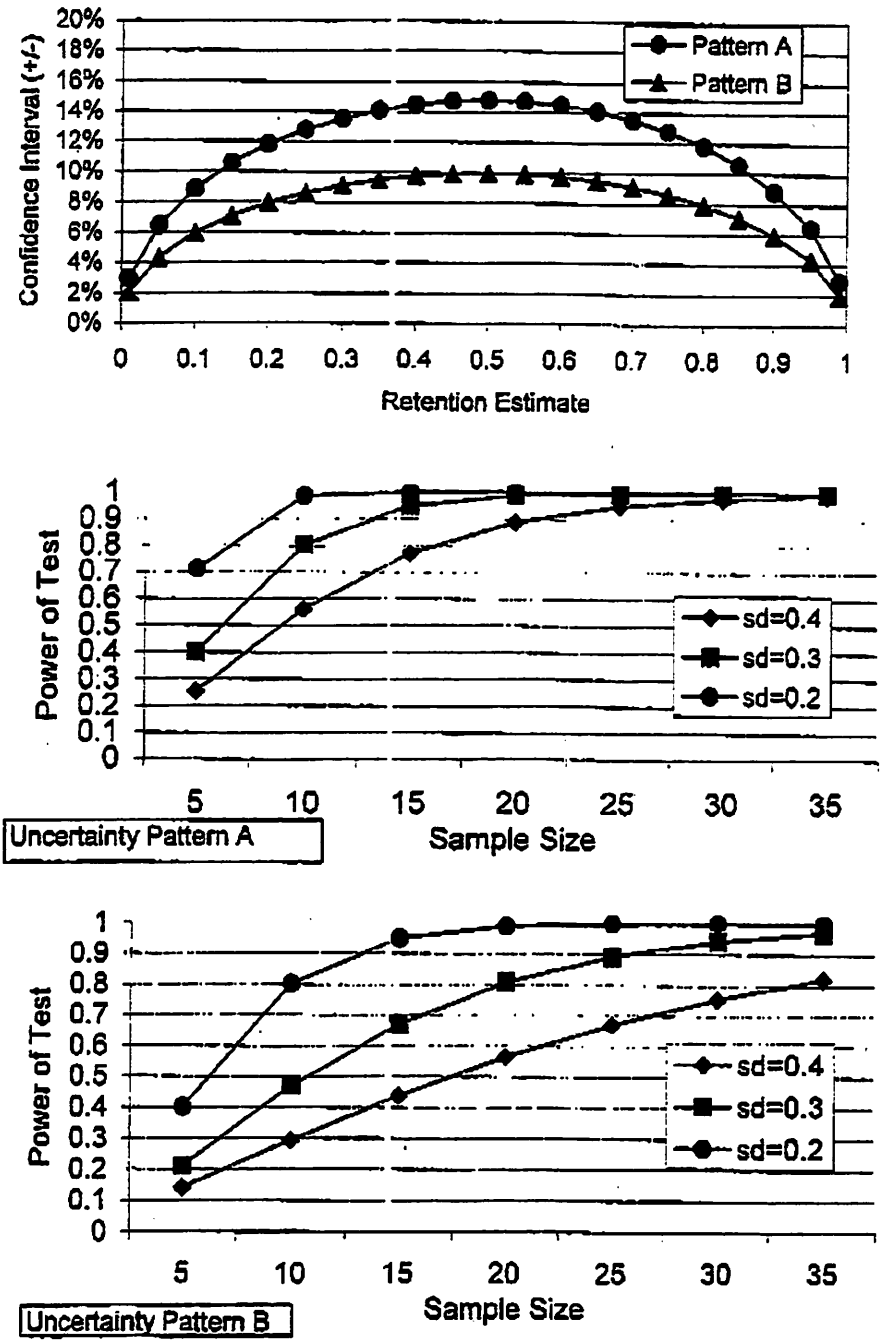


Figure - Sample size calculations (Power Curves) for halibut excluder tests

Attachment 1

Exempted Fishing Permit Application May 1998: Groundfish Forum's test of a halibut excluder device for flatfish trawls

Part One: Introduction

Purpose and need for an EFP for a halibut excluder device

Groundfish Forum believes the halibut mortality attributable to trawl fisheries can be significantly reduced. A multi-faceted approach will achieve the best success: 1) rapid identification and avoidance of areas with high bycatch rates; 2) excluders to minimize bycatch in the areas selected for fishing; 3) a system to return captured halibut to the sea rapidly; and finally, 4) an system that holds fishermen accountable for their individual bycatch. Groundfish Forum believes that individual accountability would ensure that all fishermen diligently employ the first three elements above.

Industry programs have already started to reduce halibut bycatch and mortality effectively. These programs, when used in conjunction with effective halibut excluders, will enable managers to reduce the quantity of halibut needed to conduct trawl fisheries without compromising utilization and optimum yield objectives.

Summary of current and proposed projects to reduce halibut bycatch and mortality

Sea State:

In 1994, H&G companies fishing flatfish pioneered the use of Sea State to rapidly identify crab and halibut bycatch hotspots. Daily, NMFS observer data is electronically transmitted to Sea State where it is analyzed and sent back to fishermen in the form of charts indicating where high bycatch rates occur. Since 1997, Sea State has also included a list of vessels' specific daily bycatch rates for each PSC species to help vessel owners recognize and reduce bycatch problems. Sea State is now used for all Bering Sea flatfish fisheries, Pacific cod fisheries in Alaska, and whiting fisheries off the coast of Washington.

Since Sea State's inception, participants in the rock sole fishery have lowered their red king crab and halibut bycatch even when the species are found in unexpected areas or at odd times. Furthermore, for the first time ever, yellowfin sole fishermen took 93% of the TAC and stopped fishing due to market conditions and rough weather in December instead of halibut bycatch.

Halibut Mortality Avoidance Program (HMAP)

Last year, Groundfish Forum proposed a system to allow for deck sorting of halibut. Currently, halibut are placed in fish tanks until observers can sample the catch. If HMAP is approved participating trawlers will be able to return halibut to the sea more rapidly which will decrease mortality. HMAP will place limits on the duration and tonnage of hauls. Crew members will be required to spill codends gradually into fish tanks while

removing halibut. Observers will monitor deck sorting and enumerate the halibut before they are released. Estimates of halibut bycatch will be more accurate than with basket sampling under the VIP program.

In February, the North Pacific Council selected the HMAP program for analysis and formed a committee to iron out the details. This spring, the Council and NMFS will review the program and (hopefully) approve regulations to implement the program in 1999 or 2000.

VBA's:

A system of individual accountability would increase incentives for fishermen to utilize other programs such as Sea State and HMAP. Under a fleet-wide PSC cap, a few fishermen have been able to thwart industry efforts to reduce bycatch. Under a VBA system, those unwilling to lower PSC bycatch will be only impacting their own success. The Council has formed a committee to work out a proposal for analysis. If consensus is reached on the program, it could be implemented as early as 1999.

Development of an effective halibut excluder device:

Avoidance programs fall short when halibut are not concentrated into identifiable areas or there is insufficient data to project bycatch rates. In such cases, an excluder is a more effective method of reducing halibut bycatch.

Trawl skippers have informally developed and tested halibut excluders for years, but there have been no systematic tests of these devices. Informal experimentation often does not include control observations to account for variability of catch and bycatch rates. In addition, informal testing during an open access fishery frequently leads to early abandonment of the device because the vessel is at a competitive disadvantage. The benefits of formal testing with a rigorous experimental design can not be understated. For instance, in Groundfish Forum's experimental fishery last summer, we noted that a careful statistical analysis of the data revealed quite different results than those informally observed by skippers and deck crew in the field.

This experiment will utilize both strong statistical methods as well as the experience and innovation of the industry. A Request for Proposal (RFP) process will challenge the industry to come forward with their most promising excluder designs. The experiment will use a review panel will select a prototype device that appears to have the greatest promise based on available evidence.

D-1(b)

ALTERNATIVES FOR A PROPOSED REVISION OF THE ANNUAL GROUND FISH HARVEST SPECIFICATION PROCESS

Discussion Paper

Prepared by Sue Salveson, NMFS
April 6, 2000

The current total allowable catch (TAC) specification process has been in place, with various modifications, since implementation of the Alaska groundfish fishery management plans (FMPs) about 20 years ago. This process currently includes three publications in the Federal Register for each of the Bering Sea/Aleutian Islands and Gulf of Alaska FMPS, for a total of 6 Federal Register publications: (1) proposed specifications, (2) interim specifications, and (3) final specifications. Proposed and interim specifications must be published each year before updated stock assessment information is available. As a result, NMFS, the North Pacific Fishery Management Council (Council), industry, and members of the public have raised concerns about the utility of these two publications and other issues concerning the adequacy of the current process in meeting various statute mandates.

In response, the Council initiated the development of Amendments 48/48 to the groundfish fishery management plans at its December 1996 meeting. The intent of these amendments was to streamline the Council's annual groundfish harvest specification process by (1) rolling over final harvest specifications established for one year into the following year to serve as preliminary specifications and eliminate the need to publish interim specifications, (2) relying on public testimony at Plan Team meetings and during the December Council meeting to satisfy Administrative Procedure Act (APA) standards for prior public review and input, and (3) issuing annual specifications through a single Federal Register document which would be published after the December Council meeting.

Amendments 48/48 were adopted by the Council in April 1998. NMFS subsequently identified various concerns with Amendments 48/48 as proposed. These concerns stemmed largely from the concept of "rolling over" TAC amounts from one year to the next relative to compliance guidelines for the National Environmental Policy Act (NEPA), APA, Regulatory Flexibility Act (RFA), and Endangered Species Act (ESA). NMFS raised these issues with the Council in mid-1999 and, with concurrence by the

Council (Staff), tabled further development of a preferred alternative while other higher priority management issues were addressed.

Notwithstanding these problems, NMFS recognizes that the existing TAC specification process must be revised to respond more effectively to the following objectives:

1. Manage fisheries based on the best available information;
2. Make adjustments to TAC amounts to respond to new information or conservation concerns;
3. Comply with NEPA, ESA, and RFA provisions while minimizing unnecessary disruption to fisheries;
4. Provide adequate opportunity for public review and comment on new information leading to annual TAC recommendations; and
5. Promote administrative efficiency while minimizing public confusion regarding proposed and interim specifications.

This discussion paper briefly reviews the current specification process and issues that necessitate its revision. A review of several options is presented as well as a discussion of a new concept that, while not fully developed, may hold the most promise for resolution of issues associated with the current specification process.

ISSUES ASSOCIATED WITH THE CURRENT SPECIFICATION PROCESS

Proposed Specifications. Under the current system, the proposed specifications published in the Federal Register are based largely on the preliminary Stock Assessment and Fishery Evaluation (SAFE) reports prepared by the GOA and BSAI Plan Teams during their September meetings. After the Council has reviewed the preliminary SAFE reports and has solicited public comment during its fall meeting, the Council adopts proposed TAC and prohibited species catch (PSC) recommendations that, after review and approval by NMFS, are published in the Federal Register as soon as possible after the fall meeting.

The proposed specifications are updated after the final SAFE documents are produced by the Plan Teams in November, and after the public has had opportunity to comment before and during the December Council meeting. The final specifications are adopted by the Council at its December meeting, submitted to NMFS for review and approval, and become effective when filed with the Office of the Federal Register, usually by mid to late February of each year.

The problem with the existing process of publishing proposed specifications for public comment is that, in many instances, the proposed TACs are outdated by the time they are published. This situation occurs because, under the current system, the Council must adopt proposed specifications before the current year's stock assessment and analysis work is completed. The current year's stock assessment survey work, data compilation, and population modeling cannot be completed prior to the Council's fall meeting. As a result, the Council does not have updated stock assessment information available when it adopts recommendations for proposed specifications.

Interim Specifications. The interim specifications are published annually at approximately the same time as the proposed specifications. Current regulations at § 679.20(a) establish interim specifications equal to one-fourth of the proposed initial TAC (with the exception of the first seasonal allowance of pollock and Atka mackerel) for groundfish and one-fourth of the PSC amounts. The interim specifications are intended to allow the groundfish fisheries to begin in an orderly manner on January 1 of each year and remain in effect until superseded by the filing of the final specifications with the Office of the Federal Register. Because the interim specifications are based on the proposed specifications, they do not take into account the recommendations contained in the Plan Team's final SAFE documents or the recommendations coming from public testimony, the Scientific and Statistical Committee (SSC), Advisory Panel (AP), and Council at its December meeting. In addition, one-fourth of the initial TAC and PSC amounts has been found to be an inadequate amount for those fisheries that attract the greatest amount of effort at the beginning of the fishing year before the final specifications can be filed with the Office of the Federal Register.

Revised Plan Team procedures

Since development of the draft EA/RIR/IRFA for Amendments 48/48 and the Council adoption of the proposed draft revisions to the groundfish fishery management plans in April 1998, the Plan Teams have revised their own preparation and review process of the stock assessment chapters that comprise the SAFE reports. Beginning in 1998, the NMFS Alaska Fisheries Science Center (AFSC) and Plan Teams streamlined the preparation of the Preliminary SAFE report at the September Plan Team meeting by focusing efforts on preparing new stock assessments where either new data or a new model was available for review. As a result, the SSC in October has focused its review efforts on new stock assessment modeling approaches. Because little new information on

status of stocks is available to the Council at its October meetings, it recently has adopted the concept of a streamlined approach for the proposed and interim TAC specifications by essentially "rolling over" the current year's final ABCs and TACs as proposed and interim specifications for the upcoming year. Plan Team, SCC, Advisory Panel, and Council efforts to develop, assess, and recommend harvest specifications for an upcoming year occurs in November-December after analysis of recent resource surveys is complete.

ALTERNATIVES FOR REVISION TO THE ANNUAL HARVEST SPECIFICATION PROCESS

Several alternatives to accommodate concerns about the existing TAC specification process have been explored in the past. Some of the alternatives have difficulties or deficiencies that preclude their further development. Other alternatives require further development to fully assess their feasibility and effectiveness in addressing identified issues. All these alternatives are summarized below, with emphasis on Alternative 4, which seems to hold the most promise for further development.

Options that have been explored, but not pursued for further development

Alternative 1. Adjust the annual harvest specification process so that Council recommendations occur earlier in the year.

Under this option, Council and Plan Team meetings focusing on the annual TAC specifications would occur earlier in the year to allow more time to publish proposed and final specifications by January 1 of each year so that interim specifications would be unnecessary. The limiting factor to the Alaska groundfish specification process, however, is the time needed by the Plan Teams to analyze data and produce final SAFE reports. Summer survey data are not available until late summer or early fall. A minimum of two weeks is needed between the November Plan Team meeting and the next Council meeting for the SAFE reports to be finalized and distributed to the Council family and public. Further, the SSC has expressed its support for additional review time. It is practicable, therefore, for the specification process to occur any earlier in the year based on current year survey results.

A meaningful schedule change would require that survey data be made available in early summer. However, NMFS trawl assessment

surveys of the BSAI and GOA fishery resources could not be conducted in late winter or early spring for the following reasons:

- a. Poor weather conditions would pose safety concerns;
- b. Weather conditions could limit survey activity due to ice conditions or poor sea conditions that could negatively impact the ability to conduct bottom trawl or hydroacoustic surveys;
- b. Commercial fishing vessels would not be as readily available to serve as contracted survey platforms; and
- c. Historical data series based on summer surveys would be disrupted.

Alternative 2. Alter the Fishing Calendar Year, e.g., April 1 to March 31

This alternative would change the 12-month fishing year from a January to an April or May start date so that proposed and final specifications could be published and effective by the start of the fishing year, thus eliminating the need for interim specifications. This change in the fishing year could also benefit the Plan Teams if they were allowed more time to analyze fishery data. However, the following reasons have been identified to keep the fishing year in synchrony with the calendar year:

- a. The last quarter of the fishing year (January - March) would be conducted based on information collected nearly 15-18 months earlier. Thus, this option could preclude fishery specifications and management based on other than the best information available. However, an option to implement pre-year adjustments of ABCs/TACs to accommodate new information on status of stocks is explored below under Alternative 4. This issue alone, therefore, may not preclude a change in fishing year;
- b. NMFS biologists believe that the calendar year is the best time period in which to manage temperate species because they reproduce early in the spring and recruitment can be measured during the summer, allowing scientists time to do stock assessments in September and October;
- c. Given the complex models that are used to estimate biomass of fish stocks, any change in the fishing year could drastically affect model structure and require manipulations to both the models and historic data;

- d. Coordination with State-managed groundfish fisheries, which operate on the calendar year would be difficult;
- e. NMFS is obligated to provide annual statistics to other organizations, such as the United Nations Food and Agriculture Organization; and
- f. If the fishing year were changed, fish year classes may be split into different years, complicating the determination of recruitment, growth, and mortality.

Notwithstanding the above issues, NMFS notes that while the fishing year has always been the same as the calendar year in the BSAI groundfish fishery, the fishing year for the Gulf of Alaska groundfish fishery, originally was from November 1 through October 31 [Amendment 1 (1978)]. It was changed to the calendar year in Amendment 8 (1980), so that both of the Alaska groundfish fisheries would be operating under the same cycle.

Alternative 3. Rollover harvest specifications from one year to the next until superceded by new harvest specifications.

This option was presented to the Council under Amendments 48/48. Under this option, the Federal Register publication of proposed and interim specifications would be eliminated. Public review and comment on the annual specification recommendations would occur verbally at the plan team meetings and at the December Council meeting. The TAC and PSC specifications would be published once each year and would remain in effect, i.e., "rolled over" into the subsequent year, until superceded by the filing of the annual harvest specifications for the subsequent year with the Office of the Federal Register. NMFS would accept public comment on the final annual specifications after they were published in the Federal Register. If, based on public comment, any harvest specification were found to be incorrectly specified, NMFS would make an inseason adjustment using existing regulatory authority at 50 CFR 679.25.

This option presents concerns about complying with NEPA, ESA, and RFA to the extent rolled over specifications are not based on best available information or are outside the scope of NEPA, ESA, or RFA analyses prepared each year to support annual harvest specifications. Concerns also exist whether reliance on public testimony during Plan Team and Council meetings provides sufficient opportunity for public review and comment on the annual specification process, and that it would be preferable that the public be afforded the opportunity to submit written comments on proposed specifications published in the *Federal*

Register. These comments should be considered by the agency prior to approval of the final annual specifications. Based on these concerns, NMFS recommended to the Council that this alternative not be pursued.

AN OPTION THAT HOLDS PROMISE FOR FURTHER DEVELOPMENT

Alternative 4. Develop a nondiscretionary procedure for issuing interim specifications by inseason notice after the December Council meeting that is based on the best available information on status of stocks. Proposed specifications would be published after the December Council meeting for public review and comment. Final annual specifications would be published by May 1.

The Plan Team and Council process for annual OFL/ABC/TAC recommendations would continue to focus on the December Council meeting for the development of final recommended specifications. NMFS would publish the proposed specifications after the December Council meeting for public review and comment. Final specifications for a fishing year would be published by May 1 that respond to comments received on Council recommended specifications.

Interim specifications would be effective for the period extending from January 1 until superceded by final specifications or May 1, whichever occurs earlier. Interim specifications would be derived by nondiscretionary formulas that incorporate the best available information on status of stocks that comes from the November/December Plan Team, SSC, and Council deliberations. These formulas would result in a range of ABC and TAC for each species that would be considered in the annual NEPA, ESA, and RFA assessments, consultations, and analyses on annual specifications that extend in scope for a 16-month period (January through April of the following year). Nondiscretionary adjustments at the beginning of a year to accommodate new information on status of stocks must be within the scope of these consultations and assessments. Any preseason adjustment that would result in a TAC outside the scope of these documents would require emergency rulemaking.

A proposed formula for the derivation of interim TACs still needs to be developed in coordination with stock assessment scientists for review by Plan Team and SSC members. Conceptually, however, a preseason TAC adjustment for a species could be based on the existing TAC modified by a ratio of the recommended ABC coming out of the December Council meeting to the current year ABC. For example, if the BSAI Pacific cod ABC in 2000 equals 279,200 mt

and is proposed by the Council at its December 2000 meeting to be adjusted downward in 2001 to 240,000 mt, and the TAC in 2000 is 193,000 mt, the interim TAC for the first 3 or 4 months of 2001 would be calculated as follows:

$$\frac{(ABC_{2001})}{(ABC_{2000})} \times TAC_{2000} = \text{Interim TAC}_{2001} \text{ or } \frac{(240,000)}{(279,200)} \times 193,000 = 165,903 \text{ mt}$$

Under this simple formula, interim TACs would be proportionately adjusted up or down with changes to recommended ABCs.

Some "rules" likely would be developed to guide these inseason adjustments. Examples of rules that might be considered follow:

1. Any Council ABC recommendation that results in less than a 5 percent difference between the current and subsequent year's ABCs would not result in an interim adjustment of TAC. Instead, the revised TAC, if approved by NMFS, would be implemented upon the effective date of the final specifications for a new year.
2. Any adjusted TAC at the beginning of a year would be further apportioned into gear, season, sector, or area allowances that are established in regulations. For example, if a 10 percent increase in Bering Sea pollock TAC were implemented by inseason adjustment, the amount available to the AFA sectors (CDQ, catcher/processor, mothership, and inshore) during first quarter of the year would be limited by the Steller sea lion protection measures, or 40 percent of each sector allocation.
3. A limit in the preseason upward adjustment of TAC should be considered so that adjustments beyond a specified percentage of current-year TAC would have to be accomplished by emergency rule or delayed until the effective date of the final specifications. This rule likely is necessary for several reasons. First, all automatic adjustments must be within the scope of ESA, NEPA, and RFA analyses prepared the previous year. The range of ABCs/TACs considered by these documents necessarily will be limited to reasonable levels that could vary for species with different stock dynamics. Significant changes to ABC amounts due to resource assessment survey results or to changes to stock assessment models should be moderated under the interim specifications until such time public review and comment can be accommodated within the final specifications approved by NMFS. Second, interim TAC amounts cannot result in annual harvest amounts that exceed the optimum yield. Species-specific inseason adjustments should be moderated to prevent

this situation from occurring. This consideration becomes important if nondiscretionary interim TAC adjustments are based on ABC changes rather than socioeconomic considerations, particularly given the Council's inclination in recent years to recommend TACs that total the maximum OY level of 2.0 million mt.

The upper bound limit to interim TAC adjustments could be based upon some agreed upon, reasonable upper limit percentage derived in consideration of stock-specific dynamics, historic annual variability of ABCs, and/or conservation and management considerations.

4. Downward interim TAC adjustments beyond a minimum amount discussed under item 1, should be implemented in full, given the ABC-based nature of these adjustments.

Interim specifications for prohibited species catch amounts may be less flexible to accommodate new Council recommendations on fishery or seasonal apportionments given the socioeconomic nature of fishery bycatch allowances. Overall PSC limits either are set in regulations (Pacific halibut and salmon) or are established annually through frameworked regulations that take into account updated information on status of stocks (crab and herring). These frameworked limits should be able to be accommodated within the interim TAC process envisioned. However, Council recommendations for fishery or seasonal apportionments of halibut and crab PSCs are subject to annual changes to meet various socioeconomic objectives that focus on optimizing groundfish harvest under different PSC restrictions. Interim adjustments of seasonal or fishery bycatch apportionments will be more difficult to accommodate because of the difficulty in establishing nondiscretionary algorithms to accommodate the considerations leading to Council PSC apportionment recommendations. At this time, therefore, NMFS suspects that interim PSC apportionments would have to reflect those in place the first quarter of the previous year until superceded by final specifications for the new year.

A draft time line of activities support the revised TAC specification process is presented in Table 1.

NMFS staff will work with NMFS scientists to more fully assess the feasibility of a formula-driven interim specification process. A public meeting of NMFS stock assessment scientists and interested Plan Team members will be scheduled in late April 2000 after the Council meeting. Assuming that this meeting will result in consensus on a proposed formulaic procedure for calculating inseason adjustments to TACs prior to the start of a

fishing year, NMFS would host a public meeting in Seattle in early May 2000, to discuss and solicit input on potential ramifications of the proposed TAC specification procedure on public involvement in the annual specification process, industry planning and operations, and overall management of the fisheries. Pending ability of staff to adequately address issues raised in the May public meeting, a draft analysis would be prepared for Council consideration at its June 2000 meeting.

Table 1. Proposed activity schedule for annual harvest specification process under Alternative 4.

Annual Specifications effective from filing until December 31

September:

- Plan team meeting
- begin SAFE/EA/IRFA
- initiate any necessary consultation under the ESA

November:

- Plan Team meeting
- finalize draft SAFE/EA
- begin IRFA based on final Plan Team ABC amounts

December:

- draft SAFE/EA/IRFA available for public review and comment
- Council recommendations for final harvest specifications for the upcoming year
- Inseason adjustment notice filed with the Office of Federal Register that establishes adjustments to TACs prior to January 1. TAC modifications are nondiscretionary and can be up or down

January:

- Proposed specifications prepared and reviewed by NMFS.
- Proposed specifications published in the *Federal Register* for a 15-day comment period.

February:

- NMFS prepares notice of final specifications that responds to written public comments received on the proposed specifications.

March:

- NMFS/NOAA-GC reviews final specifications,
- Final SAFE/EA/IRFA FONSI is signed, if appropriate.
- NMFS approves/disapproves Council harvest specifications and files the final specifications with the Office of the Federal Register
- Final specifications effective upon date of filing.

Draft

Preliminary findings and recommendations from Groundfish Forum's 1999 EFP to test observer sampling techniques in mixed species trawl fisheries

Stratification by species

Stratification certainly occurred for many species in the catch. For the fishing done for the EFP, the magnitude and direction were not necessarily as industry expected.

Our experimental design was adequate for detecting stratification, even if the degree of stratification was not very large for most species.

Stratification was certainly not the only source of variance affecting estimation of species composition in mixed species trawl tows.

Precision of species composition sampling in general

Sampling, as conducted in the EFP, did an excellent job of describing the vessel's catch of target and non-target species over the time interval of the EFP work on species composition (14 days), and even over as short a time period as a week for nearly all species.

Sampling, as conducted in the EFP, reasonably approximated catch on a haul by haul basis for the target species (flathead sole) and to a lesser extent for other "major" species of catch for the hauls where those "major" species were major components of the haul (cod, yellowfin).

Variance around tow-specific estimates of minor components of individual hauls are very large. This means that sampling as conducted in the EFP is not very good at estimating catch of minor species on a haul by haul basis.

Sample size: analysis of how sampling, as conducted in the EFP, would have performed with 300 KG total sample weight indicates precision is not markedly reduced.

Our findings indicate that sampling a subset of hauls versus all hauls would have reduced precision of estimates to some degree. The effect of this depends on the management purpose of the data (e.g. used to track individual vessel catch on day/week/trip or track all the vessels fishing in the target fishery on a daily/weekly basis).

Caveat for all of the above: Results need to be understood in the context of the limitations of the EFP and the preliminary level of analysis.

Volume to weight estimation: Using an assumed density of 0.96, and standard techniques for calculating codend volume, volume to weight estimates were generally accurate. Weight estimates calculated from measurement of the codend proved useful for determining intervals for drawing samples at weight intervals throughout the fish comprising a haul (see below).

Weight based sampling intervals: Stratified random sampling based on weight intervals worked well for this project and appears to be very useful for insuring that samples are drawn at stratified random intervals (where a flow scale or other certified scale is available). Under the conditions of the EFP, this method for drawing samples performed better than sampling at time intervals because it served to spread samples out more consistently and virtually guaranteed that the target number of samples would be drawn from the tow.

EFP as vehicle for applied research on species composition sampling and other issues relating to estimation:

Using the EFP model for this type of research worked reasonably well. Cooperation was very good and the limitations of the data from the EFP are due more to limitations of the experimental design, the inherent difficulty of this type of field work, and a the failure to anticipate the magnitude of some "real world" sources of variance. The level of the cooperation by the crew and the project management resources that were brought to bear for this work provided a good opportunity to learn about sampling precision and other related issues. The EFP provided a very close simulation of sampling under "real fishing conditions" and reasonable means of funding important research that would have been expensive to fund in a "research charter" mode.

Preliminary recommendations:

Sampling techniques need to take stratification into account.

Increasing the number of random sampling taken at intervals throughout the fish comprising a haul (even if this means reducing quantity of fish taken at each individual sample) appears to reduce the effects of stratification on species composition estimation and likely increases precision.

Some issues worth thinking about:

Management programs "dependent" on haul by haul estimation of catch and particularly catch of minor species should be evaluated in the light of these (preliminary) findings. Current basket sampling techniques were not designed for haul by haul estimation.

The following alternatives could be evaluated as potential means of avoiding problems of estimation and feasibility of management for fisheries "dependent" on individual catch accounting:

- Conduct in-season management of catch of minor species in units of catch greater than a single haul for an individual vessel, or track catch of minor species across a group of vessels.
- Evaluate the use of moving averages or similar statistical approaches for species composition estimation on a boat by boat basis over brief period of time (catch coming from the same area)
- Evaluate of the precision of "whole haul" or "partial haul" sampling on a species by species basis. Our results suggest that for some minor species, sampling may be more accurate and less problematic. Also, whole or partial hauling techniques may introduce other types of errors or may be confounded when the expected minor species turns out to be a larger than expected component of the catch comprising a given haul.

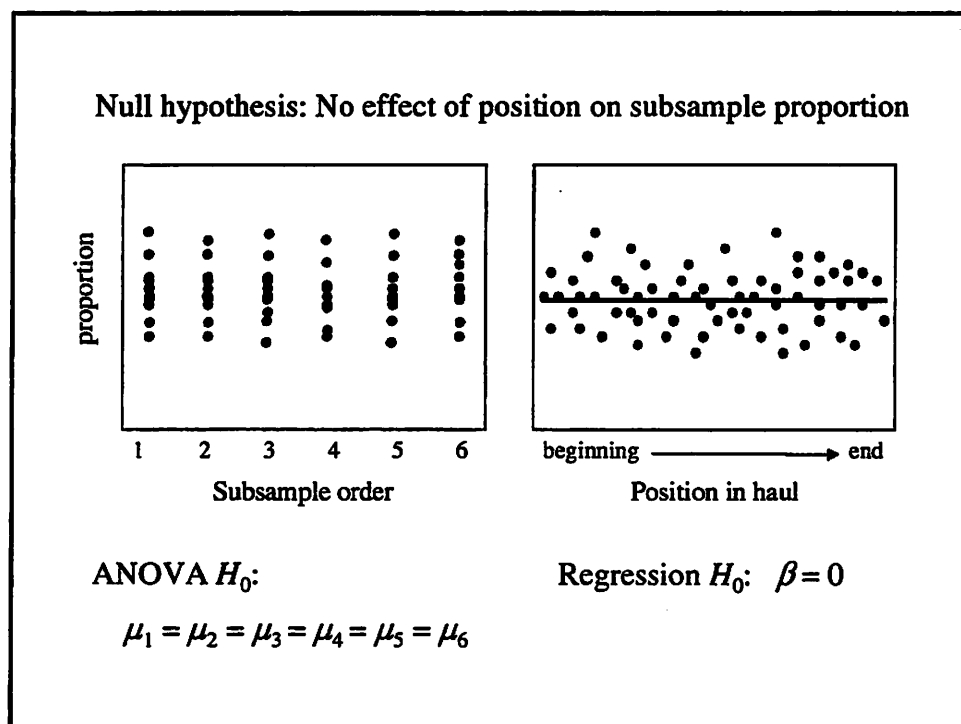
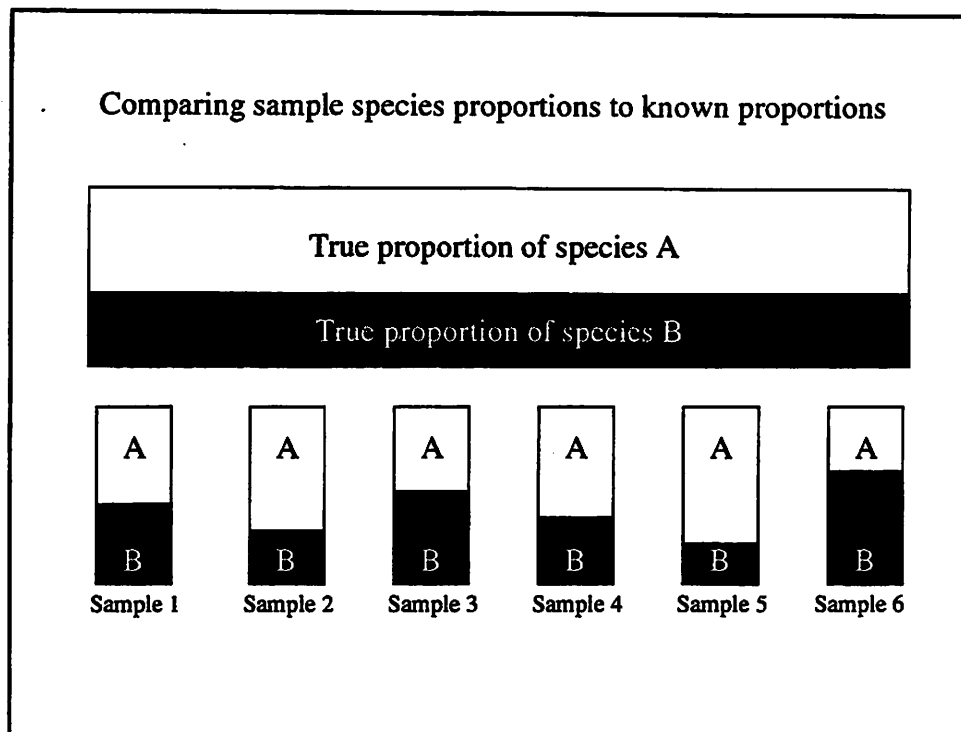
Additional research in sampling estimation in mixed trawl fisheries is warranted and other fisheries may want to undertake similar work. The EFP approach to field research is very useful for this important investigation and industry cooperation and experience can be used to help solve problems with sampling and estimation.

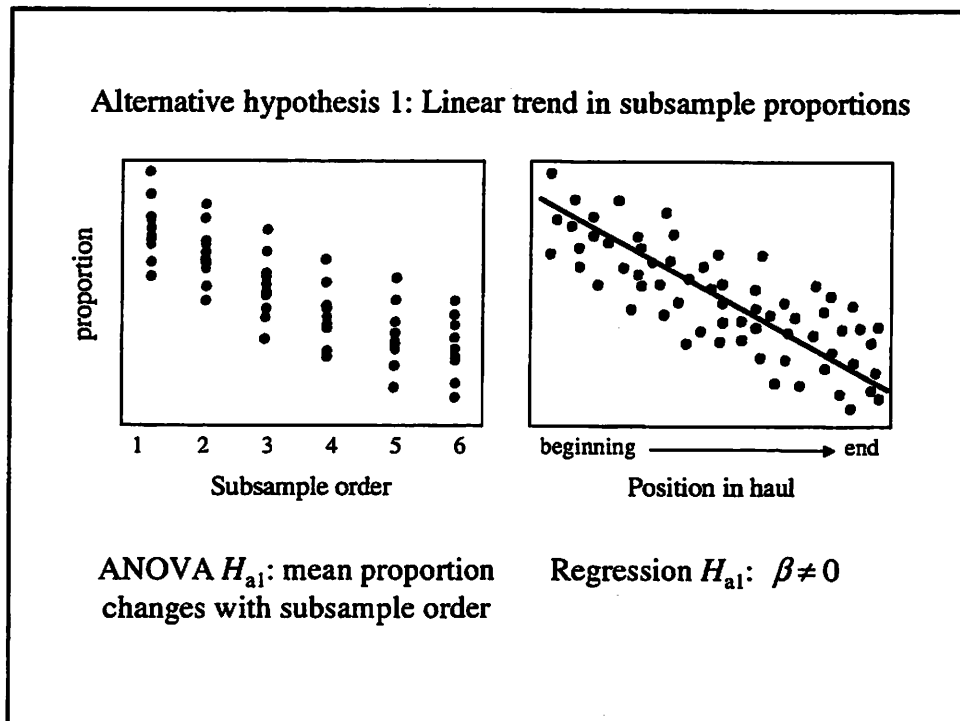
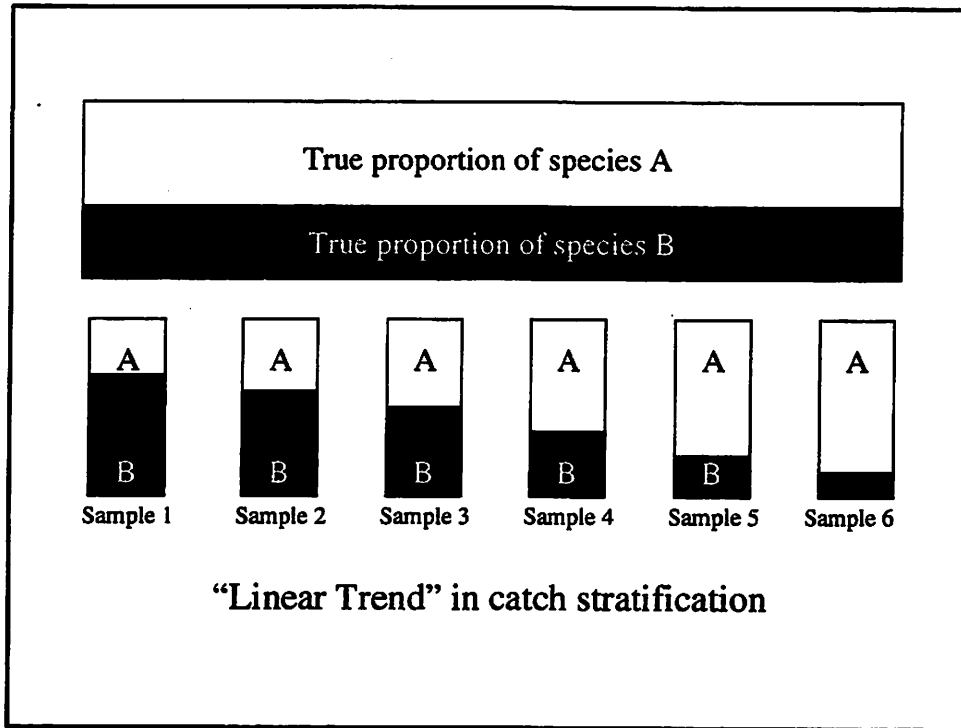
Organization

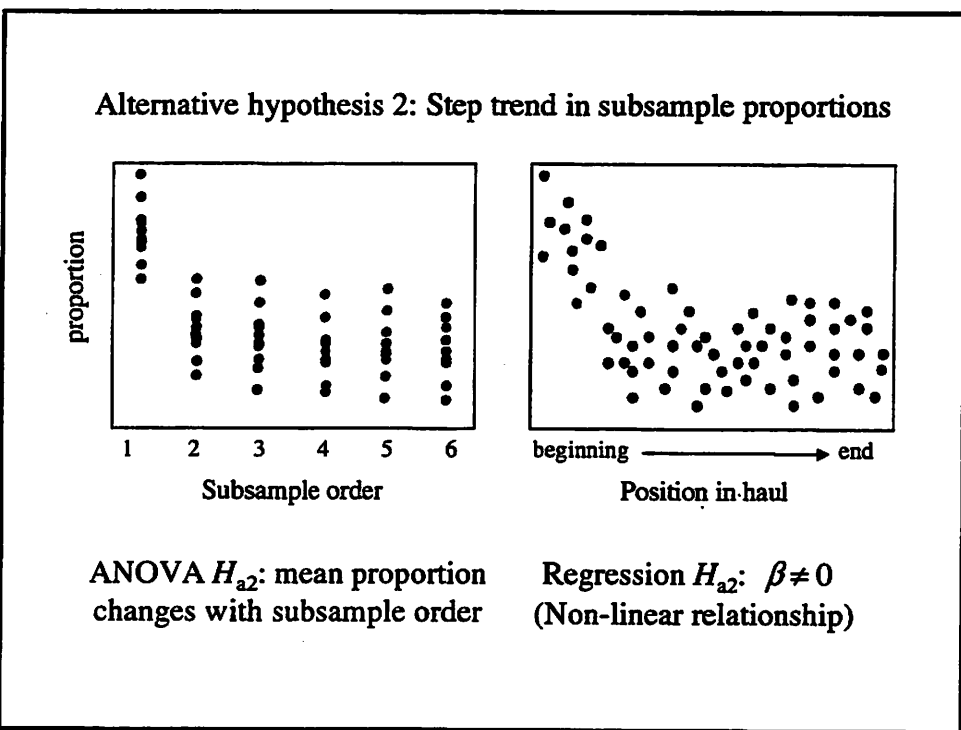
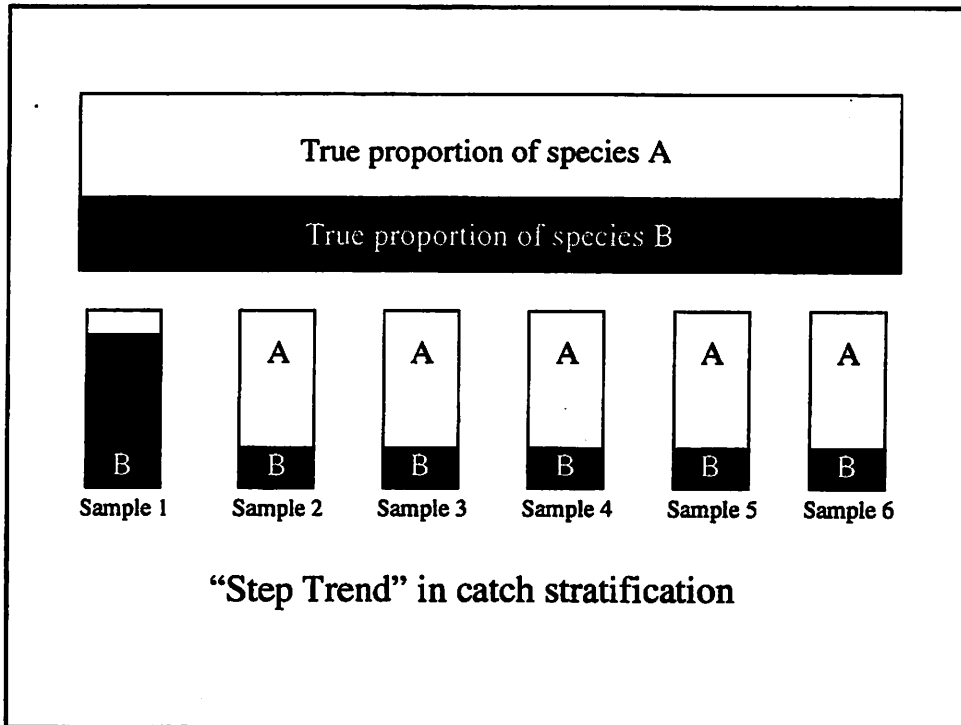
- **Catch stratification**
 - Does it exist? Describe for this vessel
 - What effect does it have on estimates of species total catch?
- **Variance in species catch estimates**
 - Describe the variability in species catch estimates
 - Compare estimates for hauls, days, weeks, and entire cruise
- **Sample-based estimates vs. alternative estimates of catch or "Accuracy of basket sampling"**
 - Bycatch species sample estimates vs. whole haul estimates
 - Target species sample estimates vs. production + discard estimates
 - Comparisons within hauls to entire cruise

Analytical methods: "Catch stratification"

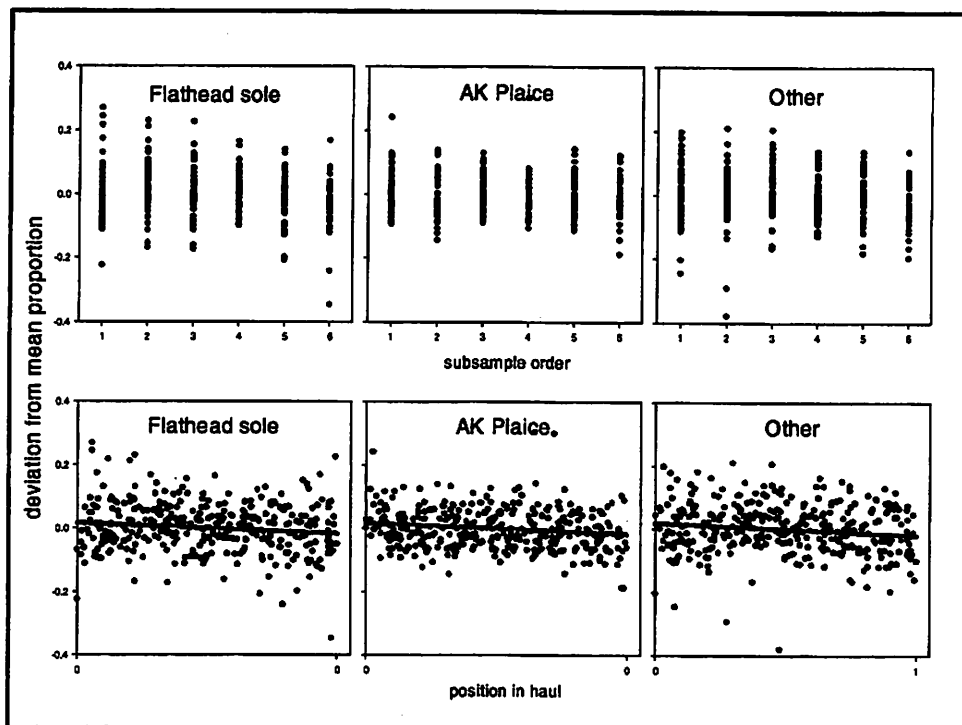
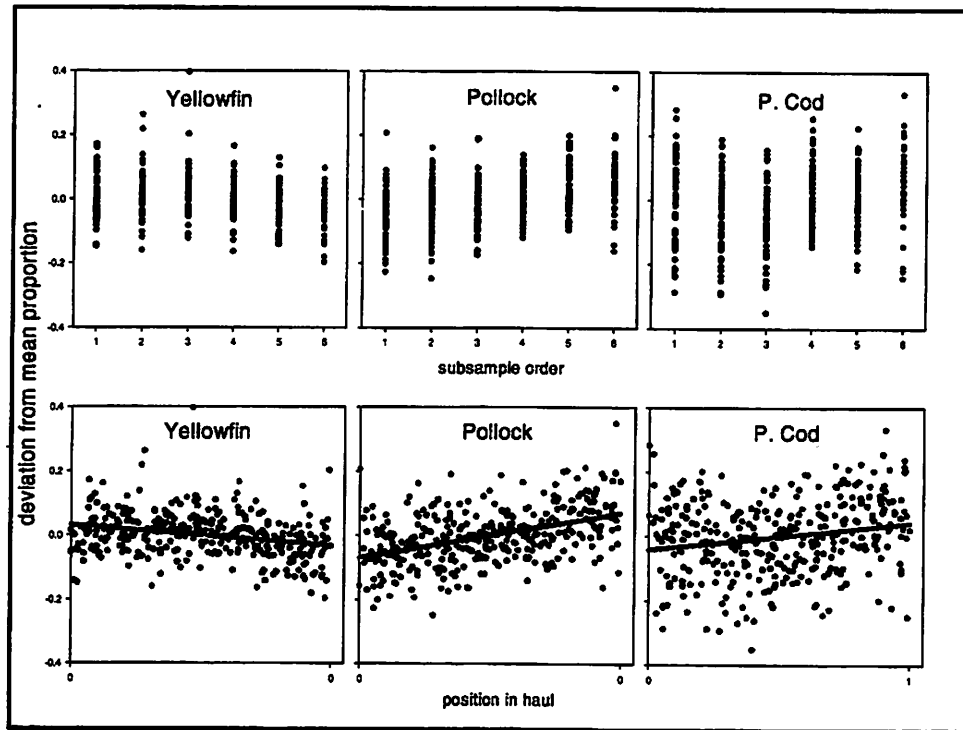
- **Do samples taken from certain positions in a haul consistently deviate from the true proportion of species in the haul?**
 - Convert each subsample species weight to proportion (arcsin transform)
 - Eliminate between-haul variation using either of two methods:
 - Use haul as a blocking factor in the ANOVA (subtracting estimated haul mean proportion from each subsample proportion)
 - Subtract known species proportion in the haul from each subsample proportion from that haul prior to analysis; measures subsample deviation from known haul proportion.
 - ANOVA testing for differences between subsample mean proportions
 - Planned contrasts between first, middle, and last "thirds" of the haul
 - Examine functional relationship(s) between haul position and deviation from known proportion using regression.







Analytical methods for Groundfish Forum Sampling EFP



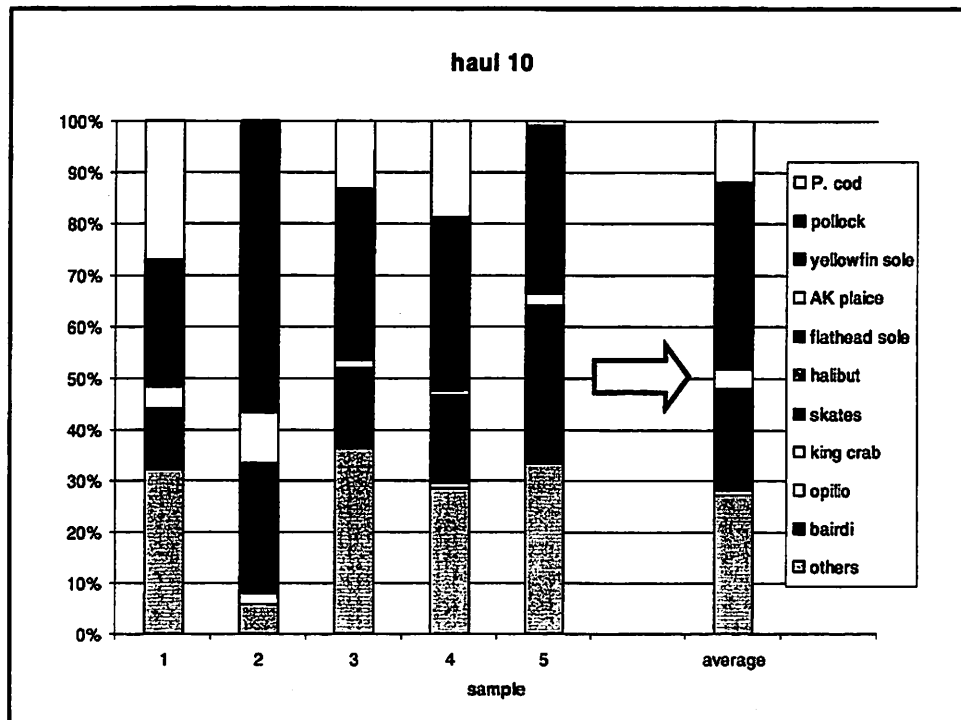
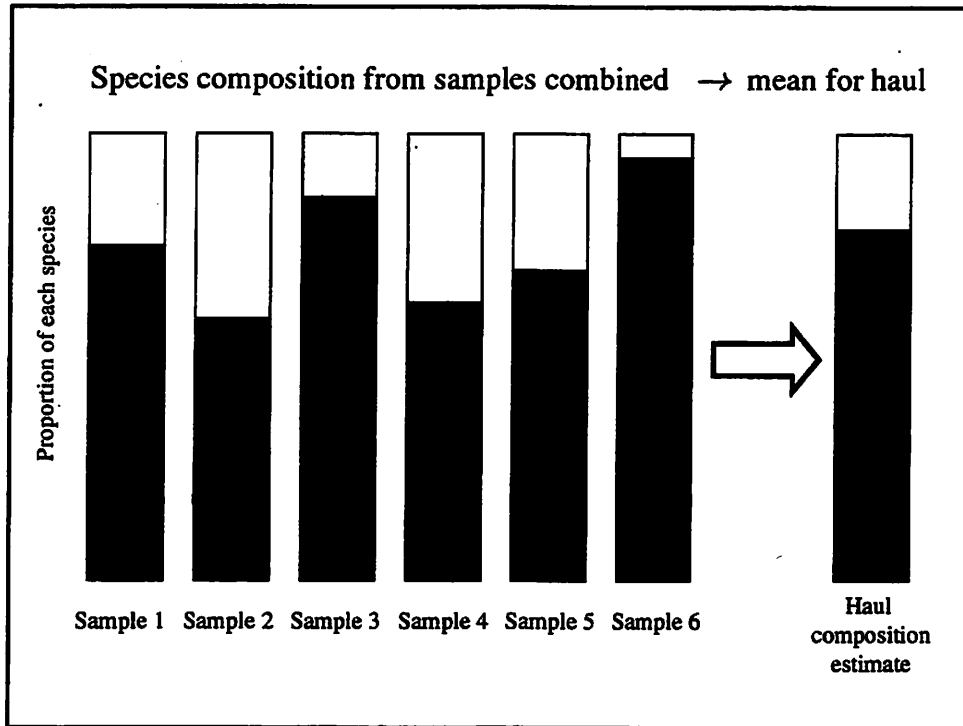
Catch stratification -- results

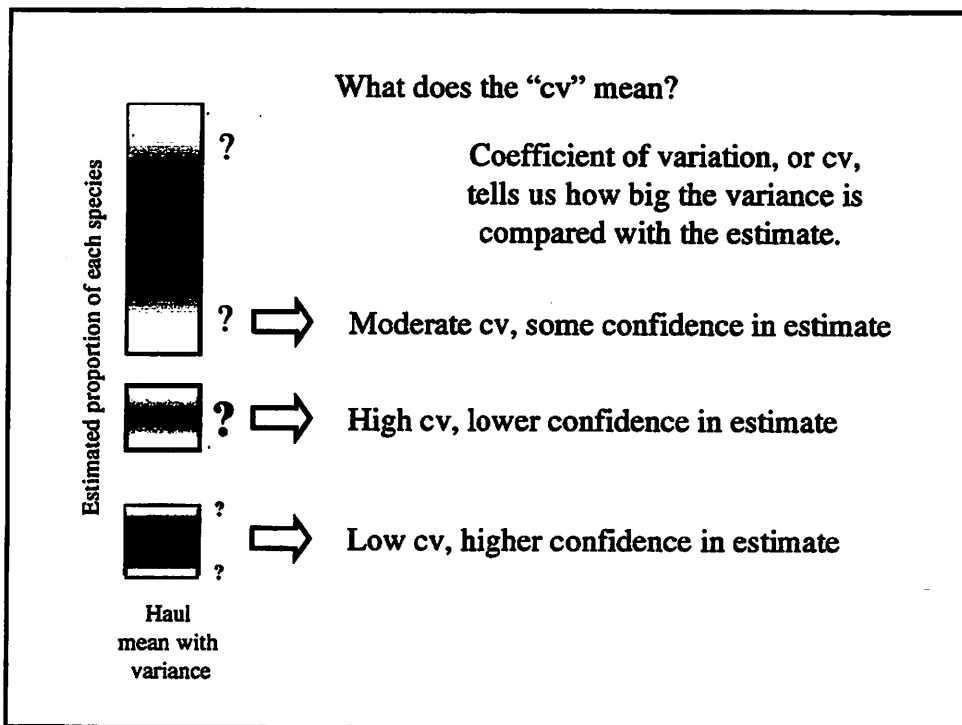
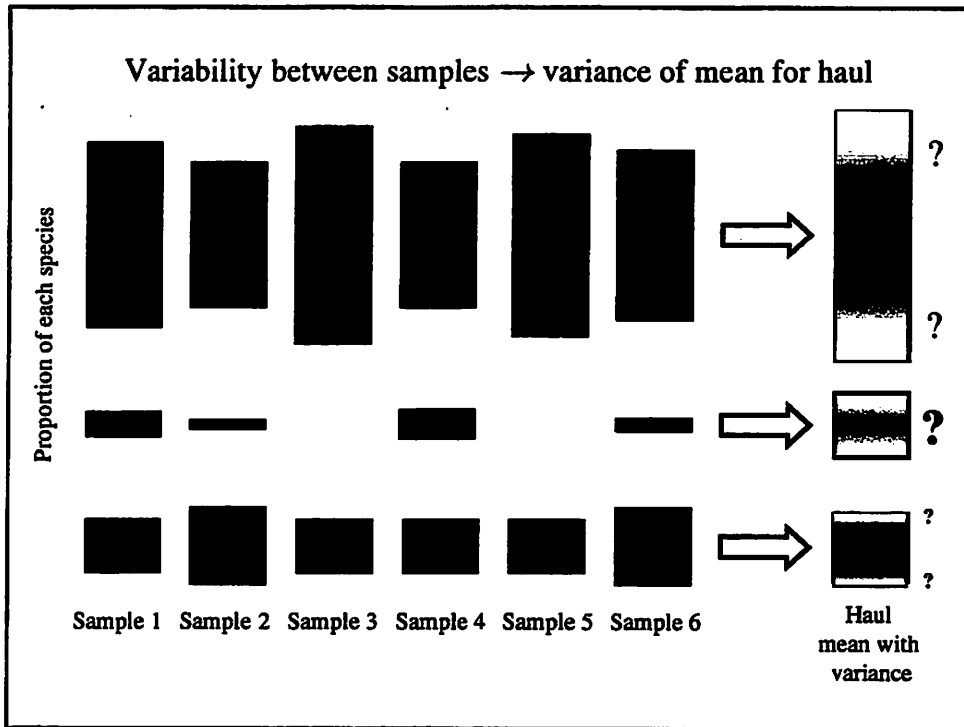
- Does catch stratification exist?
 - YES!
 - Strongest on this cruise for pollock, yellowfin sole and Pacific cod
 - Weaker relationship for Alaska plaice, flathead sole and "others"
 - No stratification detected for crabs; too few skate and halibut to analyze
- How much does it affect variability in catch estimates?
 - Pollock stratification could account for ~20% of pollock variability
 - Stratification, though significant, explained less than 5% of variability observed for all of the other species. Linear model may not be ideal.
- We expect these results to be very vessel-specific!

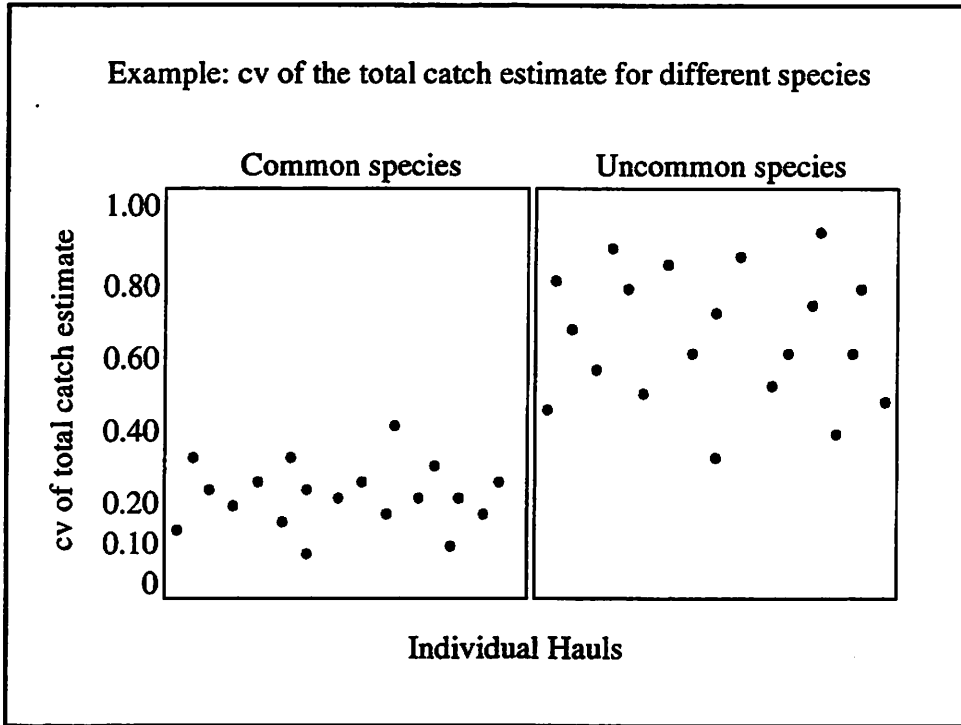
Analytical methods: "Variance in species catch"

- How variable are sample-based estimates of species total catch?
 - Estimate total and variance of total species weight for each haul
 - Ratio estimator: closest to current estimation, samples are summed over haul
 - Simple mean per unit estimator: an alternative requiring separation of samples
 - Estimate total and variance of total species weight for each day and week
 - Use two-stage sampling estimator
 - Primary units are hauls (N=62, all hauls were sampled)
 - Secondary units are 100 kg units ("baskets") within hauls (m=6)
 - Simulate different levels of within- and between-haul sampling
 - Two-stage bootstrap estimates from original data
 - Examine tradeoffs between sample size within hauls and number of hauls sampled in the species total catch estimates for the cruise

Analytical methods for Groundfish Forum Sampling EFP







Can have more confidence (less variance) in our estimates?

Estimated proportion of each species

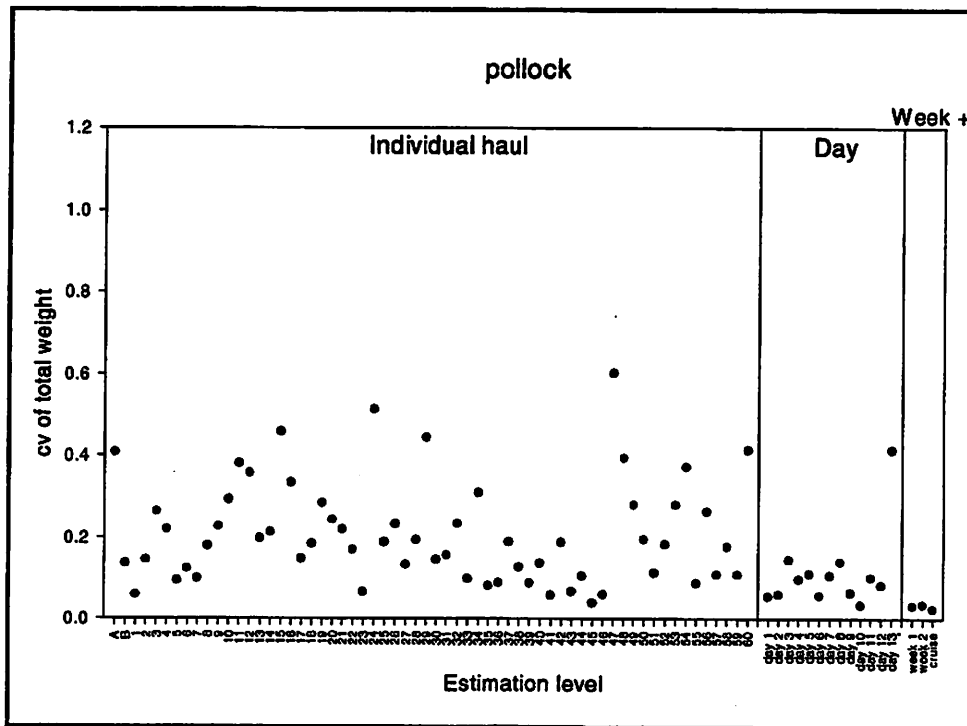
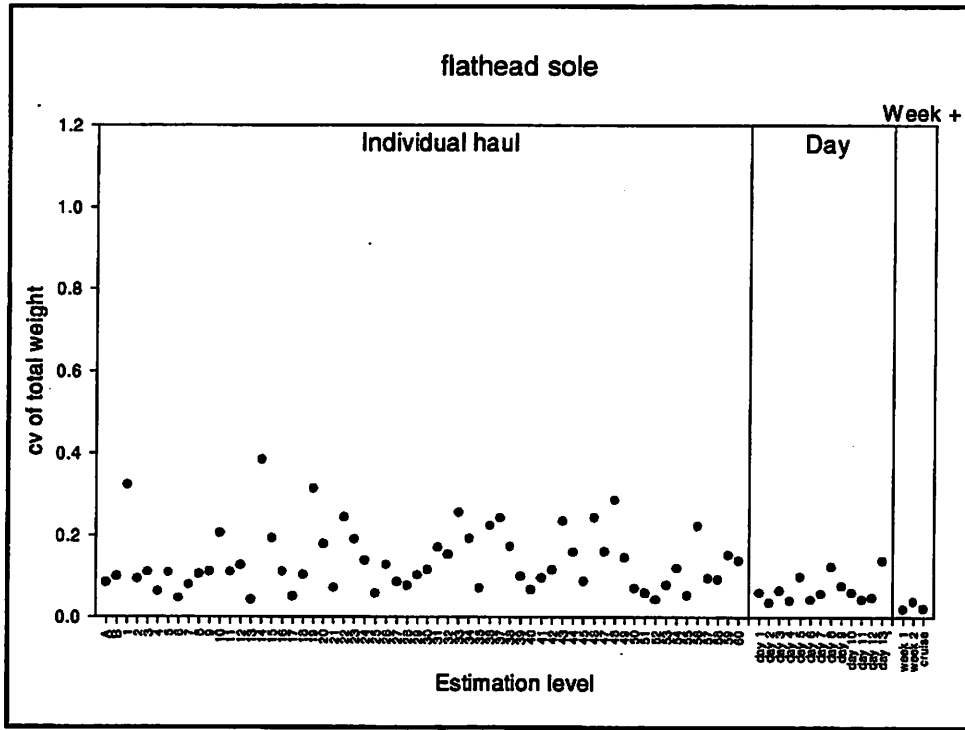
For some estimates, we are already confident:
Common target species.

For other estimates, we can increase confidence by adding more information. We have high confidence in estimates of species catch calculated over a week, or even a day, on a single vessel.

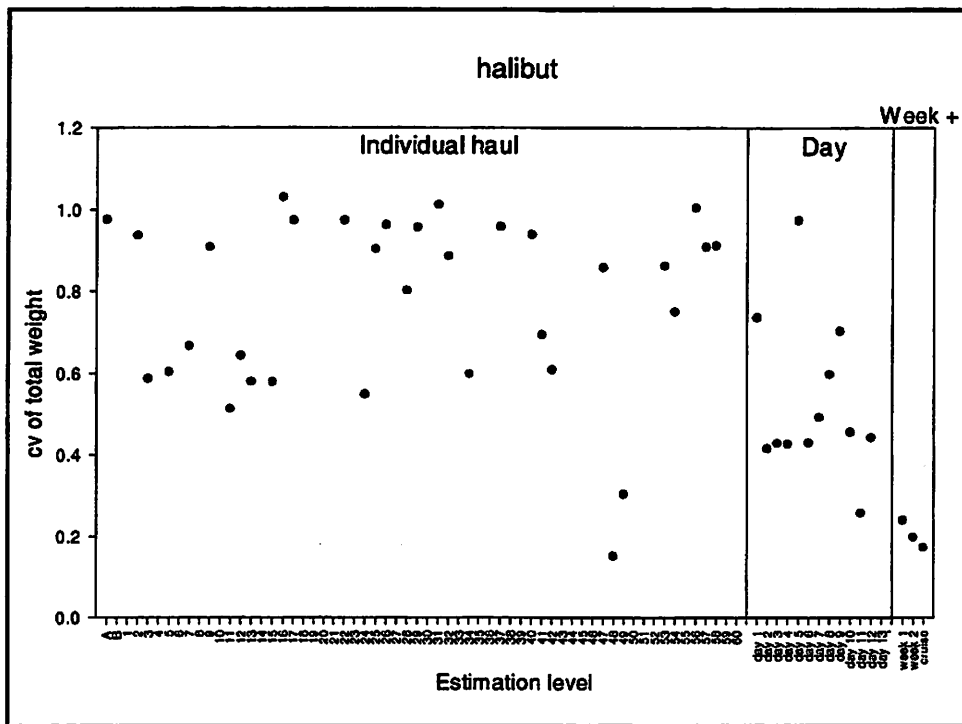
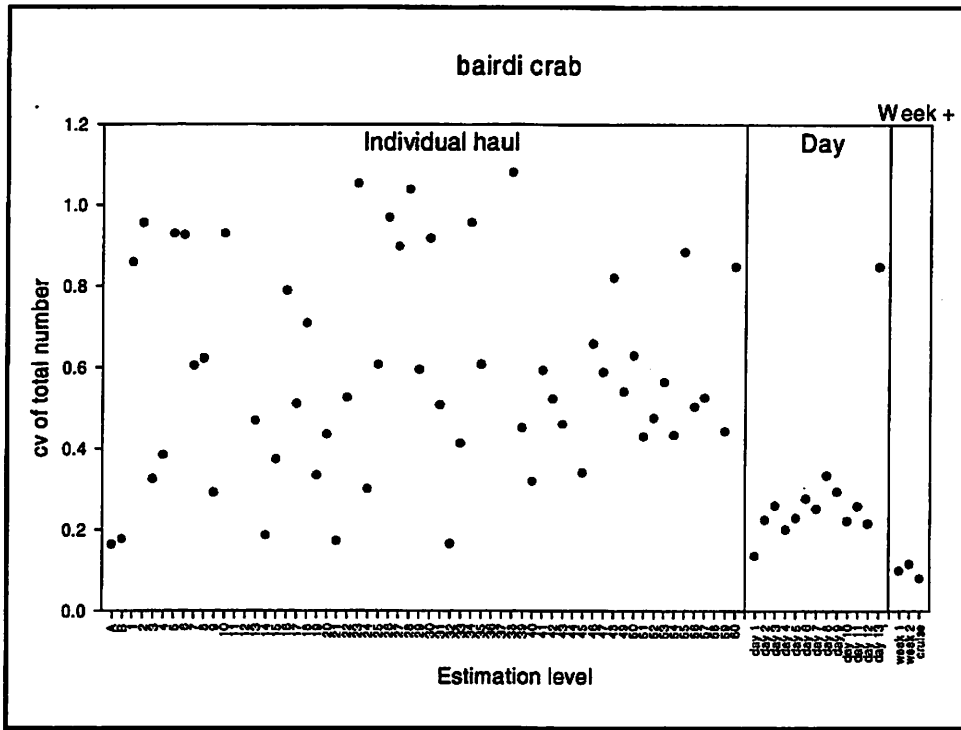
We may always have lower confidence in estimates of catch for very rare species.

Haul mean with variance

Analytical methods for Groundfish Forum Sampling EFP



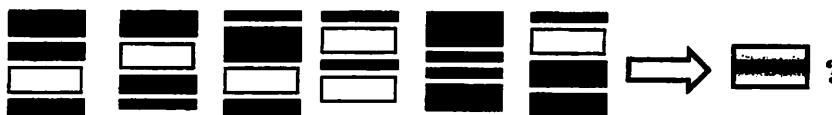
Analytical methods for Groundfish Forum Sampling EFP



Relationship between sample size and variance of estimates



As sample size increases, variance decreases.
However, variability is not directly related to sample size.
It is related to the square root of sample size.



This means if you want to cut within-haul variability in half,
you must quadruple the within-haul sample size.

If you want to cut variability to 25% of its current level,
you must increase sampling to sixteen times its current level.

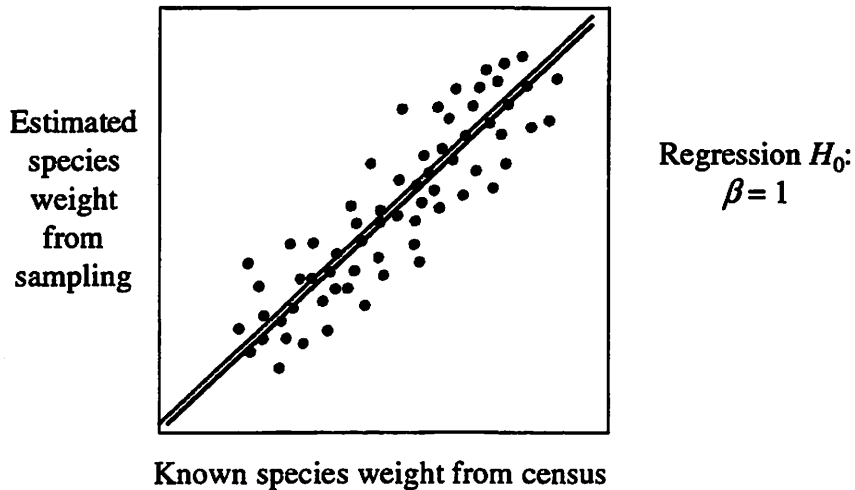
Variance in species catch estimates -- results

- **Description of variability in catch estimates**
 - Target species (flathead sole) had relatively low variability within hauls
 - More variability for stratified species (yellowfin, pollock, cod)
 - Alaska plaice, crabs, skates, and halibut were extremely variable by haul
- **How does variability change with higher-level estimates?**
 - Confidence in estimates improves for all species when estimates of catch are made at the day, week and cruise level
 - Improvements are most dramatic for non-target species
- **These results apply when all hauls are sampled**
 - Additional preliminary analyses suggested better improvements in catch estimates for flathead sole and pollock by sampling a higher proportion of hauls, rather than a higher proportion of catch within hauls.

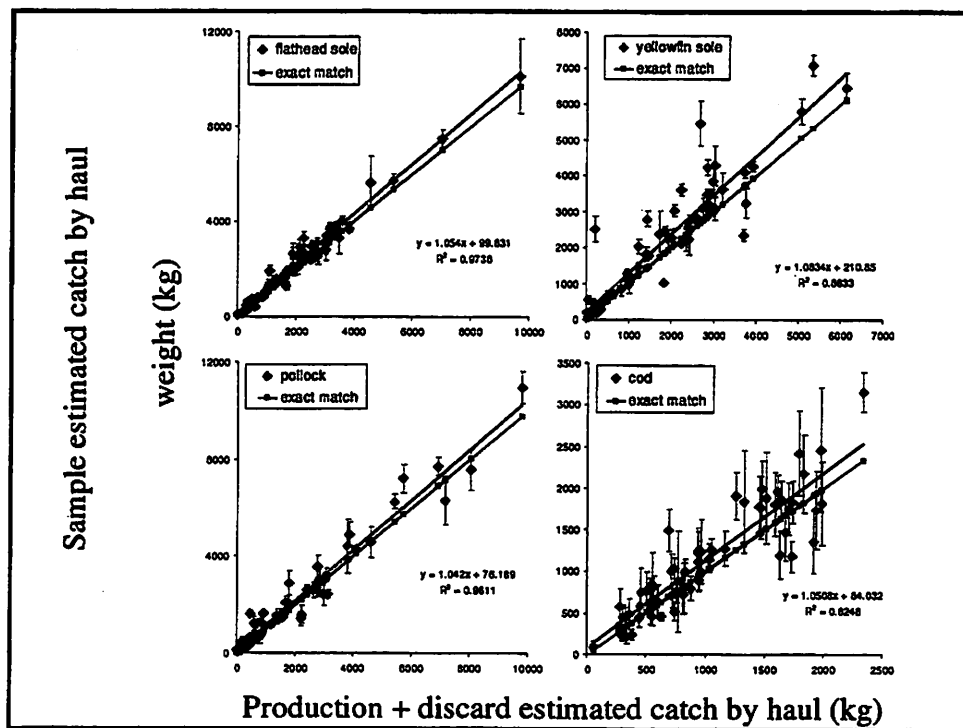
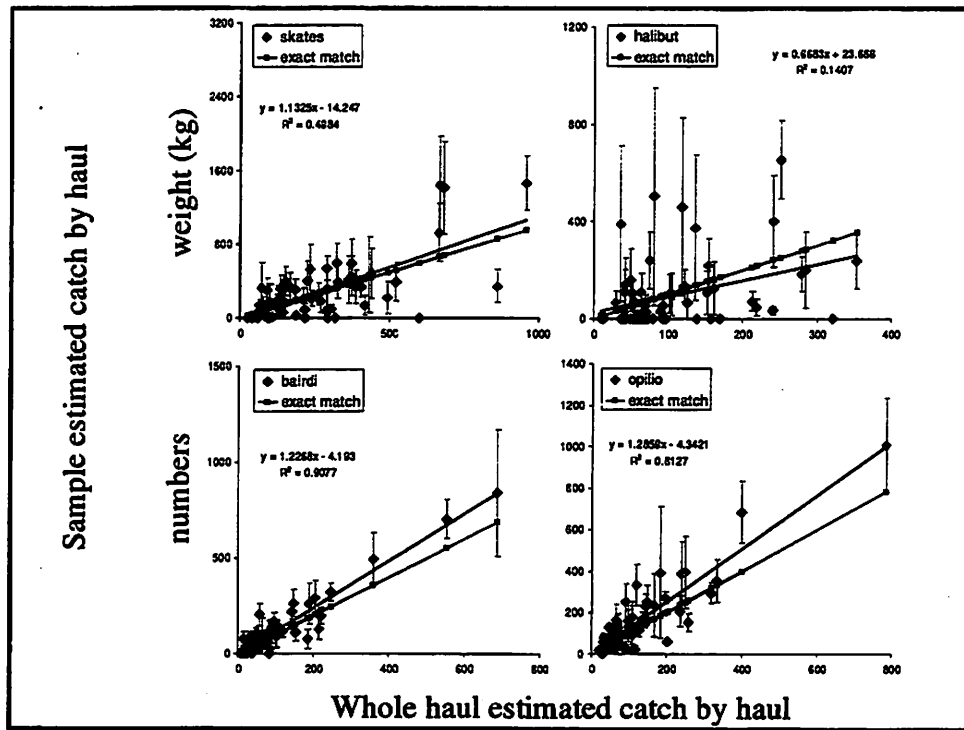
Analytical methods: Accuracy of “basket sampling”

- How do sample-estimated weights to compare to whole-haul estimated weights for bycatch species?
 - Estimate total catch weight of skate and halibut using ratio estimate
 - Estimate total catch numbers of bairdi & opilio crabs by ratio est.
 - Linear regression of estimated catch on whole haul catch by haul
 - Compare estimates vs. whole hauls at day, week, and cruise levels
- How do sample-estimated weights to compare to production-estimated weights for target species?
 - Use mean estimates of PRR and case weight for each species to convert case counts to retained round weight, add weight of discards
 - Plot estimated catch weight vs. production weight by species
 - Compare at haul and cruise levels for entire species composition

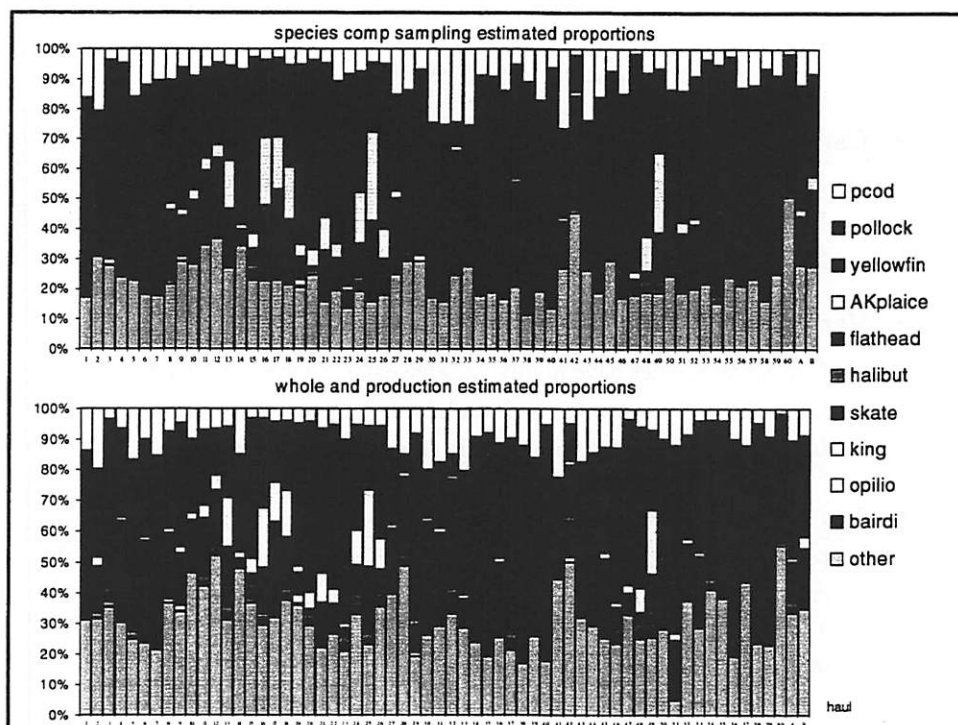
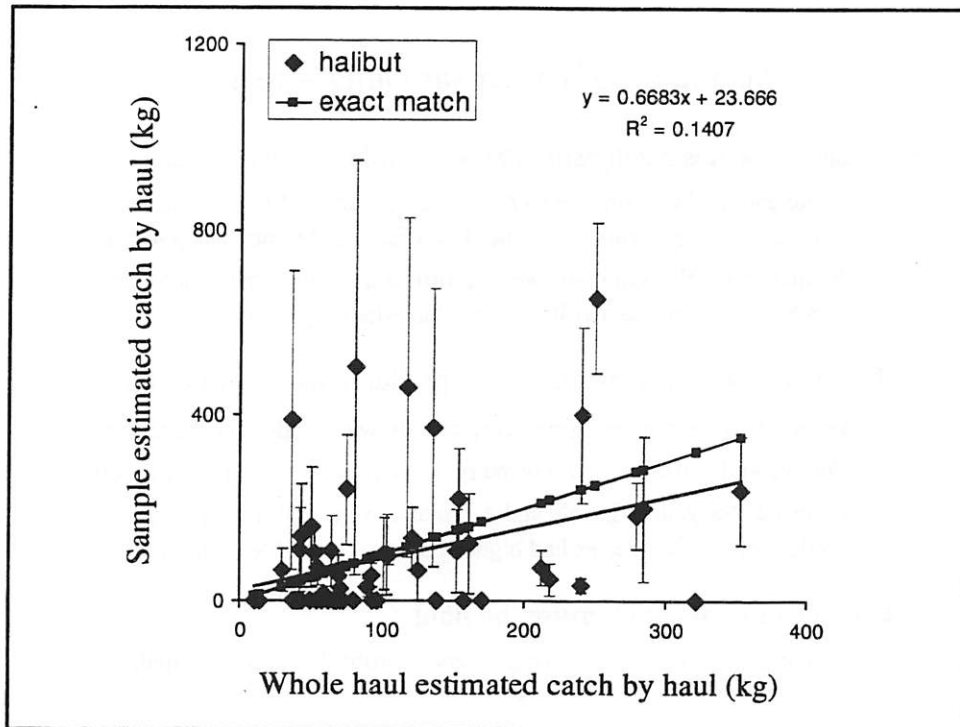
Null hypothesis: Estimated weights and known weights agree



Analytical methods for Groundfish Forum Sampling EFP



Analytical methods for Groundfish Forum Sampling EFP



“Accuracy” of basket sampling -- results

- **Bycatch species catch estimates vs. whole haul estimates**
 - Skate and halibut estimates were not significantly different from whole haul for the entire cruise; but could be widely different for a given haul
 - Estimated numbers of crabs were significantly higher than whole haul numbers, perhaps due to difficulties whole-hauling crabs
- **Target species catch estimates vs. production+discard estimates**
 - Flathead sole estimates agreed very closely with production + discard
 - Pollock and cod estimates showed more variation, but still agreed well
 - Estimates for yellowfin sole and AK plaice were slightly higher than production; these species had higher potential error due to discards
- **Composition of entire cruise, by haul**
 - Remarkably similar considering potential problems with both methods

Discussion of results

- **Catch stratification**
 - Stratification contributes to variability in catch estimates
 - Stratification may be considerably more significant on other boats
 - Sampling throughout each haul mitigates stratification effects
- **Variability in species catch estimates**
 - Non-target species have highly variable catch estimates by haul
 - Catch estimates at the day and week level are much less variable
 - Increasing sample size within hauls gives limited improvement
- **Accuracy of basket sampling**
 - For rare bycatch species, estimates of catch were adequate for the cruise, but could be under- or overestimates for individual hauls
 - The species composition for the cruise was similar whether based on sampling or production + discard data