MEMORANDUM

TO: Council, SSC and AP Members

FROM: Clarence G. Pautzke
Executive Director

DATE: May 31, 1994

SUBJECT: Groundfish Management

ESTIMATED TIME
3 HOURS

ACTION REQUIRED

(d) Review the following salmon bycatch items:
1. Receive status report on emergency rule for bycatch cap of 42,000 other salmon in the CVOA, and associated closures.
2. Review of alternatives for salmon retention and delivery to food banks, and
3. Progress report on the Salmon Foundation.

(e) Receive IPHC report on sorting/survival experiment.

BACKGROUND

(d) Salmon Bycatch

1. Status Report on Salmon Bycatch Emergency Rule

During the 1993 BSAI pollock 'B' season fishery, a record 238,000 chum salmon were taken as bycatch. Although this bycatch may have had minimal impact on salmon returning to the Arctic-Yukon-Kuskokwim (AYK) Region in 1993, the Council remained concerned about the decline of the AYK chum salmon run and 'other' salmon bycatch (mostly chums) during the pollock 'B' season fishery.

In April, after reviewing analysis of time/area closures and observer coverage changes, the Council requested an emergency rule to allow implementation of a time area closure during the 1994 pollock "B" season trawl fishery. When the bycatch of 'other' salmon in the CVOA reaches 42,000, the Regional Director will close an area to all trawling for the duration of the pollock "B"season. This area encompasses five 30-mile-by-30 mile blocks within the CVOA, as described by Alternative 6 (Item D-2(d)(1)).

To effectively monitor salmon bycatch pursuant to the cap, NMFS is also requiring two observers and satellite communication capability for motherships operating in the CVOA during the 1994 pollock 'B' season. The additional observers would remain on motherships until either the 5-block area is closed, or NMFS determines that salmon bycatch rates are sufficiently low that daily reports are no longer needed. NMFS will report the emergency rule's status at this meeting.

2. Salmon Retention and Delivery to Food Banks

In September, the Council adopted a salmon bycatch control policy, which endorses the development of several initiatives to address salmon bycatch problems, including development of regulations requiring retention of salmon for processing and delivery to nonprofit foodbank organizations. As proposed, the groundfish plan amendments (BSAI Am. 26, GOA Am. 29) would authorize retention and processing of salmon taken as bycatch in trawl fisheries for donation to needy individuals. Alternatives considered in the analysis are:

> Alternative 1. Status quo. Salmon retained only until observer has determined the number of salmon and taken scientific samples as required. No other type of retention would be authorized, and salmon must be discarded at sea as PSC.
>
> Alternative 2. Mandatory retention and processing of salmon. All salmon taken as trawl bycatch would be required to be retained, processed for human consumption, and donated to foodbanks. This alternative was not fully evaluated, as NOAA GC has determined that NMFS lacks the statutory authority under the Magnuson Act to implement this alternative.
>
> Alternative 3. Voluntary retention and processing of salmon. All salmon taken as trawl bycatch could be voluntarily retained and processed for foodbanks. This alternative would require that permits be issued to those processing, possessing, or distributing these salmon.

In April, a draft analysis of allowing retention of salmon taken as bycatch in the Alaska trawl fisheries was available for Council review, but was not taken up by the Council due to time limitations. An executive summary of the analysis is attached as Item D-2(d)(2).

3. Progress of the Salmon Foundation

Among the provisions of the Council's salmon bycatch control policy is the endorsement of the Salmon Research Foundation, a non-profit corporation. The purpose of the Foundation is to use income generated from salmon bycatch assessment payments to develop a salmon bycatch avoidance program for the BSAI trawl fisheries, and to fund research on stock origin of salmon taken as bycatch. Recent regulatory changes allow the release of individual vessel bycatch data on a haul-by-haul basis, and require retention of salmon until examined by a NMFS certified observer. In April, John White, President of the Salmon Research Foundation, directors, and industry representatives reported on Foundation activities, including a review of the pollock "A" season salmon bycatch, the bycatch avoidance pilot program, in-season feedback of salmon bycatch information, status of its research plan for stock identification, and other developments to date. The Foundation will provide an update of its activities at this meeting.

(e) IPHC Report on Sorting/Survival Experiment

In October 1993, the International Pacific Halibut Commission (IPHC), Highliners Association, and the NMFS-AFSC conducted an experiment to evaluate methods of increasing survival of halibut taken as bycatch in bottom trawls. The experiment, conducted aboard the F/T Northern Glacier, involved sorting halibut from the groundfish catch more rapidly than currently practiced and evaluating subsequent changes in discard mortality rates. At this meeting, IPHC staff will report on results and implications of the study. Based on these results, the Council may consider initiating analysis of a regulatory amendment to improve survival of halibut discarded from bottom trawls.

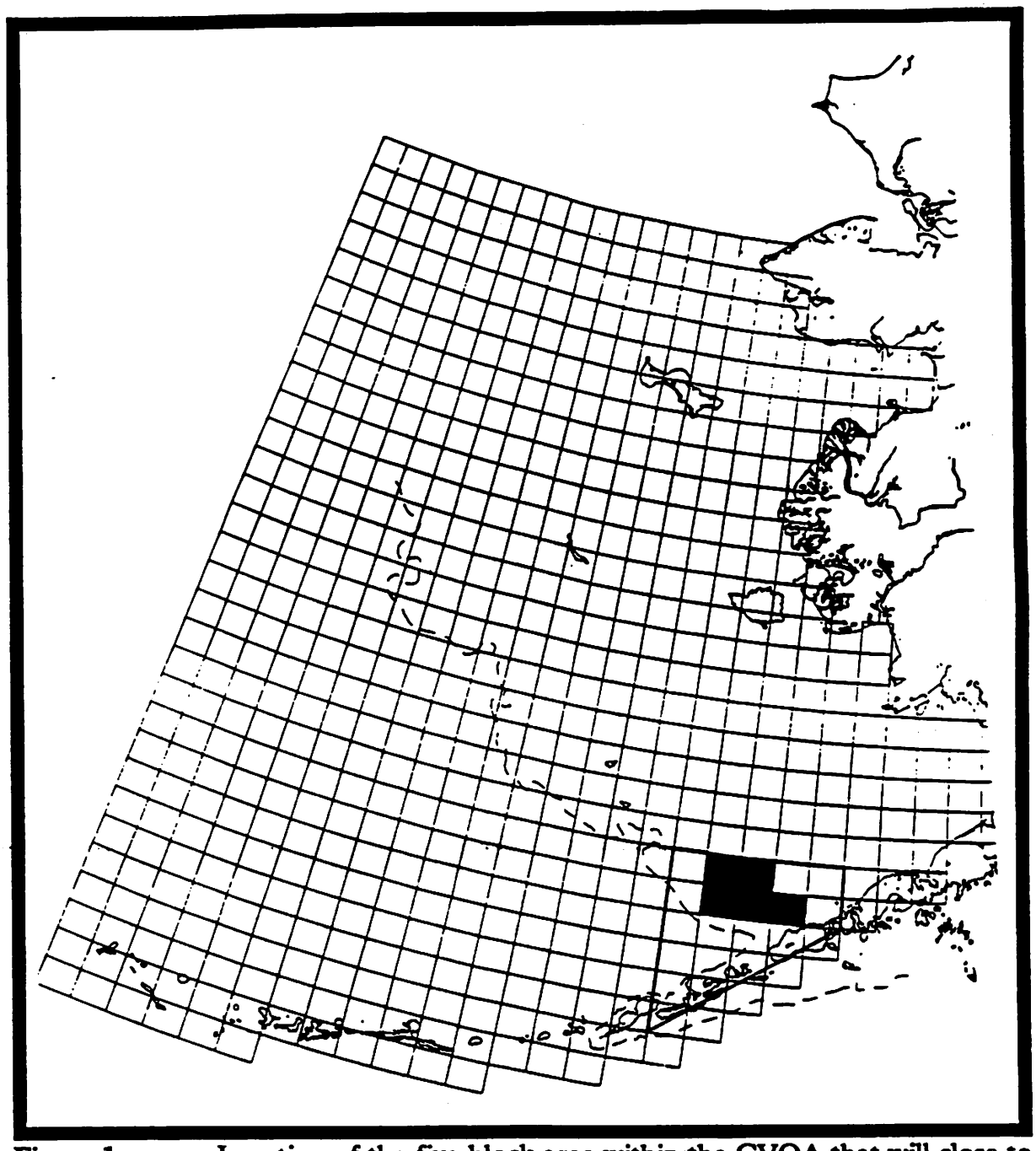

Figure 1. Location of the five-block area within the CVOA that will close to all trawling if high chum salmon bycatch is observed.

Executive Summary

Salmon are taken incidental to the Alaska groundfish trawl fisheries. These fish are dead when brought on board a vessel and must be returned to Federal waters as prohibited species once a NMFS-certified observer has determined the number of salmon and completed the collection of any biological or scientific data. At its September 1993 meeting, the Council adopted as a statement of intent a "Salmon Bycatch Control Policy." This policy endorsed the development of several different initiatives intended to address the salmon bycatch problem, including the development of regulations requiring retention of salmon for processing and delivery to nonprofit foodbank organizations. The Council's intent for these regulations was to reduce protein waste in the groundfish trawl fisheries, support separate industry initiatives to address the salmon bycatch problem by allowing for verification of the number of salmon taken as bycatch, provide additional opportunity to collect biological samples or scientific data, and potentially provide an incentive to vessel operators to take action to reduce salmon bycatch rates to avoid costs associated with retaining and processing salmon for human consumption.

The proposed action would authorize the retention and processing of salmon taken as bycatch in the Alaska trawl fisheries for donation to needy individuals. This action would be implemented under Amendment 26 to the Fishery Management Plan (FMP) for the Groundfish Fishery of the Bering Sea and Aleutian Islands Area and Amendment 29 to the FMP for Groundfish of the Gulf of Alaska. The following three alternatives are considered:

> Alternative 1 (Status quo). Under the status quo alternative, all bycaught salmon would be retained until a NMFS-certified observer has determined the number of salmon and collected any biological or scientific data. Salmon could not be retained for reasons other than the collection of biological or scientific data and ultimately must be discarded in Federal waters as a prohibited species.
>
> Alternative 2 (Mandatory retention and processing of salmon and delivery to a foodbank organization). Under Alternative 2, FMP amendments would be implemented that require every salmon taken in the Alaska groundfish trawl fisheries to be retained, processed for human consumption, and donated to a nonprofit foodbank organization. NMFS's authority under the Magnuson Act to directly regulate harvesting and processing fishery resources is limited to the EEZ. NOAA General Counsel has determined that NMFS lacks the statutory authority under the Magnuson Act to implement all three parts of Alternative 2, i.e., retention, processing and delivery of salmon to a nonprofit foodbank organization.

Given the lack of statutory authority to implement Alternative 2, this alternative is not developed further in this analysis except to provide a qualitative comparison with Alternatives 1 and 3.

Alternative 3: (Voluntary retention and processing of salmon for delivery to a foodbank organization). Under Alternative 3, FMP amendments would be implemented that authorize the voluntary retention and processing of salmon taken as bycatch in the Alaska trawl fisheries for donation to needy individuals. This alternative would require that permits be issued to persons authorized to distribute salmon to needy individuals and that vessels and processors be issued permits authorizing the possession of salmon for delivery to an authorized distributor.

Neither Alternatives 1 nor 3 would be expected to change fishing activities in a manner that would affect the amount of groundfish harvested or the amount of salmon taken as bycatch in the Alaska trawl fisheries. Notwithstanding the statutory limitations of Alternative 2, the potential exists that costs associated with mandatory retention and processing of salmon could provide an incentive to vessels operators to take action to attempt to reduce salmon bycatch rates and possibly reduce overall salmon bycatch amounts. None of the alternatives are likely to significantly affect the quality of the human environment, and the preparation of an environmental impact statement for the proposed action is not required by Section 102(2)(C) of the National Environmental Policy Act or its implementing regulations.

Based on the average number of salmon taken during the 1992 - 1993 trawl fisheries (242,000 fish) and assuming that all salmon are retained and processed for distribution to needy individuals under Alternative 2, the total burden to the Alaska trawl industry resulting from mandatory retention and processing of salmon is estimated at $312,180. Potential benefits to needy individuals resulting from salmon donated to foodbank organizations under Alternative 2 cannot be quantified. If the average number of salmon taken as bycatch in the 1992-93 trawl fisheries were all delivered to foodbank organizations and fit for human consumption, about 2 million meals could be provided to needy individuals. These meals likely would provide a healthy alternative to the diets of people who often only have access to meager and inadequate food.

Under Alternative 3, an unknown number of salmon could be voluntarily retained and processed by the groundfish trawl industry for donation to authorized distributors for nonprofit foodbank organizations. Potential costs to the groundfish industry are anticipated to be significantly lower relative to Alternative 2 given that vessel operators or processor mangers

would have no regulatory requirement to retain and process salmon if the costs of doing so are judged too high or have too great an impact on groundfish operations. The actual costs to vessel operators and shoreside processing operations would be relative to the amount of salmon retained and processed. These costs on a per salmon basis are estimated at $1.46 and $1.12 for shoreside and at-sea processing operations, respectively.

Although benefits to needy individuals resulting from salmon donated to foodbank organizations under Alternative 3 cannot be quantified, the number of salmon donated would be less than that under Alternative 2 and the potential benefit to needy individuals would decrease accordingly. Voluntary donation of salmon to needy individuals under this alternative would meet the Council's objective to reduce protein waste in the groundfish fisheries. However, because the salmon donation program is voluntary, Alternative 3 would provide no incentive to vessel operators to take action to avoid salmon to reduce costs associated with the mandatory retention and processing program proposed under Alternative 2. Therefore, Council objectives for the retention and processing salmon for human consumption only would be partially met under Alternative 3.

None of the alternatives considered is expected to result in a "significant regulatory action" as defined in E.O. 12866. NMFS does not anticipate that any vessel or processor that qualifies as a small entity for purposes of the Regulatory Flexibility Act would elect to participate in a voluntary salmon donation program if the costs of doing so reduce gross annual receipts by 5 percent or more. The impacts under Alternative 2, therefore, are not anticipated to result in a significant economic impact on a substantial number of small entities under the Regulatory Flexibility Act.

Salmon Research Foundation

Report to North Pacific Fishery Management Council
June 9, 1994

This report summarizes the Salmon Research Foundation's ("Foundation") activities since the last Council meeting. It is divided into three sections:

I. Fleet participation and assessment collection;

II. "B" Season bycatch avoidance activities; and

III. Program development.

I. Fleet Participation and Assessment Collection

A. Chinook Assessments. A condition of the Council's approval of the salmon bycatch initiative was that it be supported by a "critical mass" of the Bering Sea pollock and cod fleet, i.e., by vessels representing approximately 70% of that fleet's harvesting capacity.

On May 23, the Foundation received from ADF&G a list of the vessels shown in the ADF&G fish ticket data base as having pollock or cod landings in the 1994 "A" season. The Foundation has supplemented that list by adding the names of the factory trawlers believed to have participated in either of those fisheries. At this time, it appears that the 1994 "A" season pollock and cod fleet comprises approximately 135 vessels. As of this report, approximately 80% of the vessels on the list had signed letters of intent indicating a willingness to pay assessments, approximately 45% had signed assessment agreements that create a legal obligation to make such payments, and approximately 50% had made payments. (Some vessels have made payments without signing a letter of intent or Assessment Agreement.)

While the number of vessels making payments is less than 70% of the fleet, industry representatives believe that they represent a "critical mass" of the pollock and cod fleet's harvesting capacity. Nonetheless, the amount of assessment payments received to date is approximately $105,000.00, i.e., approximately 25% of the income the Foundation had projected based on NMFS 1993 chinook bycatch estimates.

There are legitimate reasons for this variance. There has been some confusion concerning who is responsible for generating the assessment calculations. Regulations requiring retention and counting of chinook and release to the public of bycatch amounts on a vessel by vessel basis were recommended by the Council as part of the initiative. Vessel operators anticipated that the Foundation would generate assessment invoices on the basis of the posted counts. However, because the retention regulations were

not in place for the "A" season, the Foundation was not able to do so. As a result, the Foundation has asked that companies calculate their own assessments. A number of the companies have experienced difficulties in this regard. This problem appears to be most significant for catcher vessels, because plant or mothership personnel may be primary sources of chinook counts for their deliveries. Catcher vessel operators do not have direct access to the information prepared by those personnel, nor do they have an independent means of verifying its accuracy.

The variance between projected and actual Foundation income also appears to be related to the significant difference between NMFS bycatch estimates and the numbers of chinook actually counted by plant and vessel personnel. We have compared the counts for one major Dutch Harbor shoreplant and four factory trawlers with the NMFS estimates for the same processors. The plant's chinook count was approximately 60% of the NMFS estimate; the vessels' counts were approximately 10% of the NMFS estimate. Our comparison was informal, and is not meant to provide definitive information concerning the amount of 1994 "A" season chinook bycatch. However, it reinforces concerns expressed by a number of parties, including NMFS, concerning the reliability of current salmon bycatch estimates.

Because NMFS estimates of salmon bycatch vary widely from the counts vessels experience, vessels are reluctant to pay assessments on the basis of the NMFS estimates. Vessels that have paid generally based assessments on the number of chinook that their vessel was actually observed to take (generated by the observer in cases of whole haul samples, or by their processing personnel otherwise), and those that have not had access to vessel specific counts have been understandably reluctant to pay at all.

Notwithstanding these issues, the Foundation believes that a significant number of vessels have the information necessary to calculate and make their assessment payments, but have chosen not to. To encourage these vessels to participate, the Foundation proposes to publish the list of vessels participating in the 1994 "A" season pollock and cod fishery, provided no confidentiality standard prevents it from doing so, and to identify on that list the vessels that have made assessment payments. To be fair to the vessels that may have had legitimate accounting or logistical problems associated with calculating their payments, the Foundation will send a final assessment payment request to all vessels that have not yet paid, and give them an opportunity to explain why they have not done so, before closing out and publishing the list. The Foundation asks that when the list has been prepared, NMFS post it on its electronic bulletin board (provided NMFS can do so within its regulatory authority).

B. Chum Assessments. As you know, the Alaska Board of Fisheries recommended that the Foundation adopt a chum salmon assessment. At its most recent meeting, the Foundation board discussed adopting a chum assessment to assist it in meeting its objectives, and decided to table this issue pending receipt and review of ADF&G and Board of Fisheries reports from the December and March Board of Fisheries meetings. This item is scheduled for Foundation board action within the next thirty days.

II. **"B" Season Bycatch Avoidance.** The Foundation is proceeding with development of a "B" season bycatch avoidance program that addresses the problems identified during "A" season. The Foundation's efforts are focused on (i) improving the quality and timeliness of bycatch "hot spot" information; (ii) distributing that information in a range of formats appropriate to vessels' varying capacities to receive that information, and (iii) assisting the fleet in applying peer pressure to encourage vessel operators to use the all available techniques to reduce salmon bycatch.

The Foundation has taken the following actions since the April meeting in connection with this effort.

A. The Foundation has contracted Sea State Inc. to (i) work with the Observer Program to eliminate the data transmission and translation problems identified during the "A" season; (ii) modify the "hot spot" identification software to make it easier for fishing companies to use it, (iii) provide training to vessel operations managers in its use, and (iv) develop and provide "hot spot" reports in a variety of forms (i.e., data files, graphic displays that can be transmitted by fax, and verbal summaries).

Sea State and the Observer Program have been working to eliminate data analysis and exchange problems since mid-May. We understand they have made significant progress in this regard. Modifications to the bycatch pattern plotter software were in the process of being completed last week, and Sea State will begin providing training within the next week.

In response to the survey conducted after the "A" season, Sea State is arranging to provide its reports to companies in the form they request. For companies not interested in using the plotter displays of haul-by-haul data, Sea State will provide graphic summaries by fax. For vessels not able to use the plotter program or receive faxes, narrative summaries of the daily reports will be prepared and provided to fleet representatives and shoreplants for transmission by radio.

B. The Foundation has contracted to have the Observer Program satellite communications software upgraded to transmit vessel-specific bycatch counts, and to eliminate defects that

impeded timely relay of haul-by-haul data during the "A" season. These modifications were completed last week, and the revised version of the software will be distributed between now and the beginning of the "B" season.

C. The Foundation, United Catcher Boats, the American Factory Trawler Association and several independent fishing companies are organizing an industry working group that will assist the Foundation and Sea State in promoting use of the "hot spot" information. John Gruver and Brent Paine, the President and Executive Director of United Catcher Boats, have assisted the Foundation in identifying vessel captains and operations managers who have a strong interest in promoting bycatch avoidance. This group will provide the Foundation with ongoing direction concerning the most effective methods of distributing "hot spot" information, and will provide the first level of peer pressure on vessels that are not exercising their best efforts to avoid salmon. The Foundation will assist the working group in promoting salmon avoidance prior to the season opening, and will assist in arranging a "skipper's workshop" close in time to the beginning of the season to make sure that vessel operators are informed and involved.

In addition to the Foundation activities described above, we understand that NMFS may take several management actions in connection with the "five block cap" adopted by the Council in April that should assist the Foundation in providing timely hot spot data. These include requiring dual observer coverage on motherships, and requiring that shoreplants and motherships file salmon bycatch data by satellite or modem.

The Foundation encourages the Council to support NMFS's efforts to improve the quality and timeliness of the haul-by-haul bycatch data, as it is essential to the initiative's success.

III. **Program Development.** The Foundation board is in the process of selecting its scientific advisory panel at this time. Dr. Mundy is directing the process. Over sixty individuals with recognized expertise in areas such as stock composition analysis, multi-species management, marine ecology, statistical analysis, salmon biology, etc. were recently asked if they would be willing to serve on the advisory panel, and approximately fifteen have agreed to do so as of this report. Upon completion of the selection process, the panel will be asked to assist Dr. Mundy in developing requests for proposals concerning the three major areas of Foundation activity, i.e., bycatch avoidance, salmon bycatch stock identification, and correlation of existing data bases with bycatch data developed under new salmon bycatch management regimes.

The board plans to meet within the next month to develop a comprehensive plan and budget for the remainder of 1994.

AGENDA D-2(e)
JUNE 1994
Supplemental

INTERNATIONAL PACIFIC HALIBUT COMMISSION

P.O. BOX 95009
SEATTLE, WA 98145-2009

TELEPHONE
(206) 634-1838

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(206) 632-2983

ESTABLISHED BY A CONVENTION BETWEEN CANADA
AND THE UNITED STATES OF AMERICA

May 26, 1994

Dr. Clarence Pautzke, Director
North Pacific Fishery Management Council
P.O. Box 103136
Anchorage, Alaska 99510

MAY

Dear Clarence:

The International Pacific Halibut Commission (IPHC), the National Marine Fisheries Service (NMFS), and the Highliners Association conducted an experiment in October 1993 to test the feasibility of sorting halibut bycatch from factory trawlers on deck, rather than below decks in the factory. We demonstrated that halibut survival greatly increased with on-deck sorting. After consultation with the trawl industry, we recommend that the Council approve preparation of a regulatory amendment (enclosed) to require that all groundfish catch on factory trawlers and catcher boats that dump directly to a hold be sorted through a grid over the hold, and halibut (and other prohibited species as appropriate) be removed and discarded immediately over the side.

The IPHC staff is currently completing analysis of the grid sorting experiment. Steve Hughes of Natural Resource Consultants (NRC) is collecting information to analyze the effects on the fleet of requiring grid sorting. The IPHC and NRC can complete the majority of the analysis required for the regulatory amendment, and will need only assistance from NMFS or the Council staff for the finishing touches. Our target is to complete the analysis in time for the amendment to take effect prior to the 1996 trawl season.

Steve Hughes and myself will be available at the June Council Meeting to present results to date of the grid sorting analysis and to answer questions on this proposal.

Sincerely yours,

Donald A. McCaughran
Director

DAM:gw

cc: Commissioners

GROUNDFISH FISHERY MANAGEMENT PLAN AMENDMENT PROPOSAL
North Pacific Fishery Management Council

Name of Proposer: Staff, IPHC **Date:** May 27, 1994

Address: International Pacific Halibut Commission
P.O. Box 95009
Seattle WA 98145

Telephone: (206) 634-1838

Fishery Management Plan: Regulatory amendment to BSAI and GOA Groundfish Plans

Brief Statement of Proposal: Require all groundfish trawl catch that would otherwise be dumped directly below decks to be sorted through a sorting grid over the hold, and halibut (and other prohibited species as appropriate) be discarded directly over the side. The requirement could apply to all fisheries, or only to fisheries with halibut size distribution suitable for sorting.

Objectives of Proposal: Survival of halibut bycatch discarded over board increases as the time on deck decreases. On-deck sorting of bycatch will get halibut back in the water in much short time with better condition factors than conventional handling, with resulting higher survival.

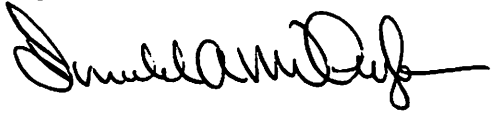
Need and Justification for Council Action: (Why can't the problem be resolved through other channels?) The Council has jurisdiction for bycatch regulations. Mandatory grid sorting, rather than a voluntary program, is necessary so that participating vessels are not at a competitive disadvantage compared to non-participating vessels.

Foreseeable Impacts of Proposal: Higher halibut survival allows more groundfish harvest and lower halibut bycatch mortality limits.

Are There Alternative Solutions? If so, what are they and why do you consider your proposal the best way of solving the problem? The best alternative is an effective in-season incentive program, which NMFS has identified as impractical at this time. In the absence of incentives, improved survival of discards is the approach with the best opportunity for lowering bycatch discard mortality.

Supportive Data & Other Information: What data are available and where can they be found? The IPHC, NMFS, and the Highliners Association conducted a research cruise in October 1993 to test grid sorting. We demonstrated higher survival from deck-sorted halibut. These data are available for analysis.

Signature:



Donald A. McCaughran, Director

DRAFT FOR COUNCIL REVIEW

ENVIRONMENTAL ASSESSMENT

and

REGULATORY IMPACT REVIEW

for a

PROPOSAL TO AUTHORIZE THE RETENTION AND PROCESSING OF SALMON TAKEN AS TRAWL BYCATCH FOR DONATION TO FOODBANKS

AMENDMENT 26 TO THE FISHERY MANAGEMENT PLAN FOR GROUNDFISH OF THE BERING SEA AND ALEUTIAN ISLANDS AREA

and

AMENDMENT 29 TO THE FISHERY MANAGEMENT PLAN FOR THE GROUNDFISH FISHERY OF THE GULF OF ALASKA

Prepared by

National Marine Fisheries Service
Alaska Region

April 12, 1994

DRAFT FOR COUNCIL REVIEW

ENVIRONMENTAL ASSESSMENT

and

REGULATORY IMPACT REVIEW

FOR

AMENDMENT 26 TO THE FISHERY MANAGEMENT PLAN FOR GROUNDFISH OF THE BERING SEA AND ALEUTIAN ISLANDS AREA

AND

AMENDMENT 29 TO THE FISHERY MANAGEMENT PLAN FOR THE GROUNDFISH FISHERY OF THE GULF OF ALASKA

Prepared by

National Marine Fisheries Service
Alaska Region

April 12, 1994

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Executive Summary

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Given the lack of statutory authority to implement Alternative 2, this alternative is not developed further in this analysis except to provide a qualitative comparison with Alternatives 1 and 3.

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None of the alternatives considered is expected to result in a "significant regulatory action" as defined in E.O. 12866. NMFS does not anticipate that any vessel or processor that qualifies as a small entity for purposes of the Regulatory Flexibility Act would elect to participate in a voluntary salmon donation program if the costs of doing so reduce gross annual receipts by 5 percent or more. The impacts under Alternative 2, therefore, are not anticipated to result in a significant economic impact on a substantial number of small entities under the Regulatory Flexibility Act.

1.0 INTRODUCTION

The groundfish fisheries in the Exclusive Economic Zone (EEZ) (3 to 200 miles offshore) off Alaska are managed under the Fishery Management Plan (FMP) for the Groundfish Fishery of the Gulf of Alaska (GOA) and the FMP for Groundfish of the Bering Sea and Aleutian Islands Area. Both FMPs were developed by the North Pacific Fishery Management Council (Council) under the Magnuson Fishery Conservation and Management Act (Magnuson Act). The GOA FMP was approved by the Secretary of Commerce and become effective in 1978 and the BSAI FMP become effective in 1982.

Actions taken to amend FMPs or implement other regulations governing the groundfish fisheries must meet the requirements of Federal laws and regulations. In addition to the Magnuson Act, the most important of these are the National Environmental Policy Act (NEPA), the Endangered Species Act (ESA), the Marine Mammal Protection Act (MMPA), Executive Order (E.O.) 12866, and the Regulatory Flexibility Act (RFA).

NEPA, E.O. 12866 and the RFA require a description of the purpose and need for the proposed action as well as a description of alternative actions which may address the problem. This information is included in Section 1 of this document. Section 2 contains information on the biological and environmental impacts of the alternatives as required by NEPA. Impacts on endangered species and marine mammals also are addressed in this section. Section 3 contains a Regulatory Impact Review (RIR) which addresses the requirements of both E.O. 12866 and the RFA that economic impacts of the alternatives be considered. Section 4 contains the Initial Regulatory Flexibility Analysis (IRFA) required by the RFA which specifically addresses the impacts of the proposed action on small businesses.

This Environmental Assessment/Regulatory Impact Review (EA/RIR) addresses proposed amendments to the FMPs which would allow the retention of salmon taken as bycatch in the Alaska groundfish fisheries for the purpose of donation, through charitable organizations, to needy individuals. Salmon taken as bycatch in the Alaska groundfish trawl fisheries experience 100 percent mortality. The intended effect of the proposed measure is to provide an opportunity to the groundfish industry to reduce the protein waste of bycaught salmon that would otherwise be brought onboard a vessel and subsequently returned dead to Federal waters as prohibited species.

1.1 Purpose of and Need for the Action

Salmon are taken incidental to the Alaska groundfish trawl fisheries. These fish are dead when brought on board a vessel

and must be returned to Federal waters as prohibited species once a NMFS-certified observer has determined the number of salmon and completed the collection of any biological or scientific data. The proposed action would authorized the retention and processing of salmon taken as bycatch in the Alaska trawl fisheries for donation to needy individuals. The intent of this action is to reduce protein waste and potentially provide the opportunity to collect additional data that would support a more long-term solution to the salmon bycatch problem.

1.2 Alternatives Considered

1.2.1 Alternative 1: Status quo. Under the status quo alternative, all bycaught salmon would be retained until a NMFS-certified observer has determined the number of salmon and collected any biological or scientific data. Salmon could not be retained for reasons other than the collection of biological or scientific data and ultimately must be discarded in Federal waters as a prohibited species.

1.2.2 Alternative 2: Mandatory retention and processing of salmon and delivery to a foodbank organization.

Under Alternative 2, FMP amendments would be implemented that require every salmon taken in the Alaska groundfish trawl fisheries to be retained, processed for human consumption, and donated to a nonprofit foodbank organization. NMFS's authority under the Magnuson Act to directly regulate harvesting and processing fishery resources is limited to the EEZ. NOAA General Counsel has determined that NMFS lacks the statutory authority under the Magnuson Act to implement all three parts of Alternative 2, i.e., retention, processing and delivery of salmon to a nonprofit foodbank organization. Given the lack of statutory authority to implement Alternative 2, this alternative is not developed further in this analysis except to provide a qualitative comparison with Alternatives 1 and 3.

1.2.3 Alternative 3: Voluntary retention and processing of salmon and delivery to a foodbank organization.

Under Alternative 3, FMP amendments would be implemented that authorize the voluntary retention and processing of salmon taken as bycatch in the Alaska trawl fisheries for donation to needy individuals.

- Any salmon retained for other than the collection of biological or scientific data by a NMFS-certified observer must be delivered to a person authorized by the Director, Alaska Region, NMFS (Regional Director) to take possession of salmon for distribution to

nonprofit foodbank organizations (authorized distributor). Salmon retained under the voluntary program may not be sold or bartered.

- Only vessels and shoreside processing operations that are issued a Federal permit to deliver salmon to an authorized distributor may retain salmon for this purpose.

- Vessels permitted to retain salmon under this program for delivery to an authorized distributor must offload retained salmon at one of the following designated ports: Dutch Harbor, Kodiak, or Seattle.

1.3 Background

The Alaska groundfish fisheries result in incidental fishing mortality of Pacific salmon. Vessel operators participating in these fisheries typically use trawl, hook-and-line, or pot gear. Trawl gear operations account for most of the groundfish catch, harvesting 92 percent and 94 percent of the groundfish catch during 1992 and 1993, respectively. Trawl gear fisheries for Alaska groundfish also account for more than 99 percent of the salmon bycatch experienced by the Alaska groundfish fisheries. Tables 1 and 2 summarize bycatch amounts of chinook salmon and other salmon species combined associated with the 1992 and 1993. Chum salmon comprise most of the number of other salmon species taken as bycatch.

The salmon discard mortality rate experienced in the groundfish fisheries is assumed to be 100 percent. The incidental salmon fishing mortality experienced in the groundfish fisheries is one of several competing uses of the fully utilized salmon resource. Salmon also are used as catch and bycatch in directed commercial, subsistence, and sport salmon fisheries and as bycatch in other non-salmon and non-groundfish fisheries. Salmon used as bycatch in the groundfish fisheries and in other fisheries can exacerbate the management problem associated with the allocation of salmon among escapement goals set by Alaska State management policy and the terminal salmon fisheries. The groundfish fisheries may result in reduced escapement or harvest in the salmon fisheries, thereby imposing a cost on other salmon users.

In general, no information exists to indicate that the current level of salmon bycatch in the Alaska trawl fisheries presents critical conservation issues; however, low salmon returns for some Western Alaska stocks indicate that the potential exists for conservation concerns. Although a mixed stock bycatch of salmon in the trawl fisheries could disproportionately affect jeopardized stocks, insufficient information exists on the ocean distribution of individual stocks to specifically manage for a

desired escapement goal through the establishment of a salmon bycatch limit for the BSAI trawl fleet.

Table 1. Number of chinook salmon and other salmon taken as bycatch in the 1992, 1993, and 1994 Alaska groundfish fisheries. Metric tons of groundfish harvested[1] also are listed. The 1994 salmon bycatch and groundfish harvest amounts are estimated through March 19, 1994.

Fishery	1992	1993	1994
BSAI trawl			
Groundfish harvested	1,836,668	1,771,776	745,282
Chinook salmon	41,903	46,484	30,285
Other salmon	41,345	245,096	4,317
BSAI nontrawl			
Groundfish harvested	126,855	82,785	35,170
Chinook salmon	52	50	0
Other salmon	104	6	0
GOA trawl			
Groundfish harvested	218,784	202,379	71,834
Chinook salmon	16,778	24,465	1,736
Other salmon	11,093	56,388	0
GOA nontrawl			
Groundfish harvested	51,013	45,403	15,234
Chinook salmon	16	67	0
Other salmon	123	253	0

[1] Estimates of groundfish catch are based on blended data from the NMFS observer program and industry reported catch. Estimates of salmon bycatch amounts are based on estimated groundfish catch and observer data on salmon bycatch rates from sampled catch.

Conservation and management concerns arising from salmon bycatch in the Alaska trawl fisheries have escalated during recent years. These concerns are due not only to the declining status of some Western Alaska salmon runs, but also to the alarmingly high bycatch of chum salmon during the 1993 BSAI pollock 'B' season. During the 1993 pollock 'B' season, bycatch amounts of chum salmon reflected a 5-fold increase over the 1993 bycatch level. At this time, however, no information exists to determine what percentage of the 1993 chum salmon bycatch in the 'B' season pollock fishery was comprised of Western Alaska fish.

The Council has considered several approaches to address the salmon bycatch problem in the BSAI groundfish trawl fisheries.

Interest also exists to develop a salmon bycatch management program for the GOA trawl fisheries. Management measures considered by the Council include a chinook salmon bycatch limit for the BSAI trawl fisheries (North Pacific Fishery Management Council 1993), vessel incentive programs to reduce the bycatch rates of chinook salmon and other salmon species (NMFS 1993a and 1993b), and several independent initiatives developed by the trawl industry and Western Alaska interest groups to address the salmon bycatch problem.

The Council recognized that lack of information on salmon bycatch inhibited the development and implementation of effective management measures to address the salmon bycatch problem. At its September 1993 meeting, therefore, the Council requested NMFS to implement measures that would allow for the collection of additional data on salmon bycatch and facilitate the use of this information by the industry to reduce salmon bycatch amounts. NMFS subsequently approved rulemaking that (1) prohibits the discard of salmon in the BSAI trawl fisheries until a NMFS-certified observer has determined the number of salmon and completed the collection of any scientific data or biological samples, and (2) authorizes the public release of observer data on salmon and other prohibited species bycatch in the BSAI and GOA groundfish fisheries to support separate industry initiatives to address the salmon bycatch problem and provide vessel operators with information that could be used to take action to reduce salmon bycatch rates. The proposed rule to implement the Council's recommended actions was published in the Federal Register January 19, 1994 (59 F 2817). The public comment period on this action closed February 28, 1994. NMFS anticipates that a final rule will be effective by June 1994.

At its September 1993 meeting, the Council also adopted as a statement of intent a "Salmon Bycatch Control Policy." This policy endorsed the development of several different initiatives intended to address the salmon bycatch problem, including the development of regulations requiring retention of salmon for processing and delivery to nonprofit foodbank organizations. The Council's intent for these regulations was to reduce protein waste in the groundfish trawl fisheries, support separate industry initiatives to address the salmon bycatch problem by allowing for verification of the number of salmon taken as bycatch, provide additional opportunity to collect biological samples or scientific data, and potentially provide an incentive to vessel operators to take action to reduce salmon bycatch rates to avoid costs associated with retaining and processing salmon for human consumption.

The Council's request to NMFS to develop regulations requiring retention and processing of salmon for delivery to nonprofit foodbank organizations was based upon the results of an experiment conducted by Terra Marine Research and Education

(Terra Marine) under a 1993 experimental fishing permit (EFP) issued by NMFS. Approximately 20 vessels and shoreside processing facilities participated under the Terra Marine EFP during the 1993 pollock 'B' season, the 1994 pollock 'A' season, and the 1994 BSAI Pacific cod fishery. Under the EFP, the participants were required to retain and process all salmon taken as bycatch and deliver processed salmon to Terra Marine for distribution to foodbank organizations. Although insufficient information exists to judge whether this program provided an incentive to reduce salmon bycatch rates, Terra Marine successfully showed that salmon retained and processed for human consumption could be distributed to needy individuals in the manner intended. Under the EFP, nearly 50,000 pounds of headed and gutted salmon were donated to a foodbank network organization for distribution to needy individuals (Terra Marine Research and Education, 1993).

2.0 NEPA REQUIREMENTS: ENVIRONMENTAL IMPACTS OF THE ALTERNATIVES

An environmental assessment (EA) is required by the National Environmental Policy Act of 1969 (NEPA) to determine whether the action considered will result in significant impact on the human environment. The environmental analysis in the EA provides the basis for this determination and must analyze the intensity or severity of the impact of an action and the significance of an action with respect to society as a whole, the affected region and interests, and the locality. If the action is determined not to be significant based on an analysis of relevant considerations, the EA and resulting finding of no significant impact (FONSI) would be the final environmental documents required by NEPA. An environmental impact study (EIS) must be prepared for major Federal actions significantly affecting the human environment.

An EA must include a brief discussion of the need for the proposal, the alternatives considered, the environmental impacts of the proposed action and the alternatives, and a list of document preparers. The purpose and alternatives were discussed in Sections 1.1 and 1.2, and the list of preparers is in Section 8. This section contains the discussion of the environmental impacts of the alternatives including impacts on threatened and endangered species and marine mammals.

2.1 Environmental Impacts of the Alternatives

The environmental impacts generally associated with fishery management actions are effects resulting from 1) harvest of fish stocks which may result in changes in food availability to predators, changes in the population structure of target fish

stocks, and changes in community structure; 2) changes in the physical and biological structure of the benthic environment as a result of fishing practices, e.g., effects of gear use and fish processing discards; and 3) entanglement/entrapment of non-target organisms in active or inactive fishing gear. A summary of the effects of the 1994 groundfish total allowable catch amounts on the biological environment and associated impacts on marine mammals, seabirds, and other threatened or endangered species are discussed in the final environmental assessment for the 1994 groundfish total allowable catch specifications (NMFS 1994a).

Neither Alternatives 1 nor 3 would be expected to change fishing activities in a manner that would affect the amount of groundfish harvested or the amount of salmon taken as bycatch in the Alaska trawl fisheries. Notwithstanding the statutory limitations of Alternative 2, the potential exists that costs associated with mandatory retention and processing of salmon could provide an incentive to vessels operators to take action to attempt to reduce salmon bycatch rates and possibly reduce overall salmon bycatch amounts. Relative to the status quo alternative, Alternatives 2 and 3 could reduce the number of salmon discarded in Federal waters to the extent that bycaught salmon are diverted to nonprofit foodbank organizations. Any affect on the biological or physical environment resulting from a reduction in salmon discard amounts would be insignificant relative to overall discard amounts of fish or fish parts associated with groundfish harvesting and processing operations.

2.2 Impacts on Endangered, Threatened or Candidate Species

Listed and candidate species that may be present in the GOA and BSAI are discussed in detail in the EA/RIR/IRFAs conducted on the annual total allowable catch specifications. Species that are listed, or proposed to be listed, under the Endangered Species Act that may occur in the GOA or BSAI include: the endangered fin whale (Balaenoptera physalus), sei whale (Balaenoptera borealis), humpback whale (Megaptera novaeangliae), sperm whale (Physeter catodon) and short-tailed albatross (Diomedea albatrus); the threatened Steller sea lions (Eumetopias jubatus), and Snake River fall chinook salmon (Oncorhynchus tshawytscha); and the proposed as threatened spectacled eider (Somateria fischeri).

Listed species of salmon, including the Sacramento River winter-run chinook salmon and Snake River sockeye salmon, fall chinook and spring/summer chinook salmon may be present in the GOA and BSAI. Consultation conducted under section 7 of the ESA on effects of the GOA and BSAI groundfish fisheries concluded that the continued operation of these fisheries would not adversely affect listed species of salmon (NMFS, 1994b)

Endangered, threatened, proposed and candidate species of seabirds that may be found within the regions of the GOA and BSAI where the groundfish fisheries operate, and potential impacts of the groundfish fisheries on these species are discussed in the Environmental Assessment prepared for the TAC specifications. The U.S. Fish and Wildlife Service (USFWS), in the informal consultation on the 1994 specifications (February 14, 1994), concluded that groundfish operations are likely to result in an unquantified level of mortality to short-tailed albatrosses, a listed species, but will not jeopardize the continued existence of the population. The take level was not expected to exceed that authorized in the USFWS consultation conducted on the implementation of the Marine Mammal Exemption Program (1988). Neither Alternatives 1 nor 3 would affect the amount of groundfish harvested or the amount of salmon taken as bycatch in the Alaska groundfish fisheries. These alternatives, therefore, would not be expected to affect any proposed, candidate or listed seabirds in a manner not already authorized in previous consultations.

2.3 Impacts on Marine Mammals

Marine mammals not listed under the Endangered Species Act that may be present in the GOA and BSAI include cetaceans, [minke whale (Balaenoptera acutorostrata), killer whale (Orcinus orca), Dall's porpoise (Phocoenoides dalli), harbor porpoise (Phocoena phocoena), Pacific white-sided dolphin (Lagenorhynchus obliquidens), and the beaked whales (e.g., Berardius bairdii and Mesoplodon spp.)] as well as pinnipeds [northern fur seals (Callorhinus ursinus), and Pacific harbor seals (Phoca vitulina)] and the sea otter (Enhydra lutris).

Neither Alternatives 1 nor 2 would affect the amount of groundfish harvested or the amount of salmon taken as bycatch in the Alaska groundfish fisheries. These alternatives, therefore, would not be expected to affect any proposed, candidate or listed seabirds in a manner not already authorized in previous consultations.

2.4 Coastal Zone Management Act

Implementation of each of the alternatives considered would be conducted in a manner consistent, to the maximum extent practicable, with the Alaska Coastal Management Program within the meaning of Section 30(c)(1) of the Coastal Zone Management Act of 1972 and its implementing regulations.

2.5 Conclusions or Finding of No Significant Impact

None of the alternatives is likely to significantly affect the quality of the human environment, and the preparation of an environmental impact statement for the proposed action is not required by Section 102(2)(C) of the National Environmental Policy Act or its implementing regulations.

3.0 REGULATORY IMPACT REVIEW: ECONOMIC AND SOCIOECONOMIC IMPACTS OF THE ALTERNATIVES

This section provides information about the economic and socioeconomic impacts of the alternatives including identification of the individuals or groups that may be affected by the action, the nature of these impacts, quantification of the economic impacts if possible, and discussion of the trade offs between qualitative and quantitative benefits and costs.

The requirements for all regulatory actions specified in E.O. 12866 are summarized in the following statement from the order:

> In deciding whether and how to regulate, agencies should assess all costs and benefits of available regulatory alternatives, including the alternative of not regulating. Costs and benefits shall be understood to include both quantifiable measures (to the fullest extent that these can be usefully estimated) and qualitative measures of costs and benefits that are difficult to quantify, but nevertheless essential to consider. Further, in choosing among alternative regulatory approaches, agencies should select those approaches that maximize net benefits (including potential economic, environment, public health and safety, and other advantages; distributive impacts; and equity), unless a statute requires another regulatory approach.

Executive Order 12866 requires that the Office of Management and Budget review proposed regulatory programs that are considered to be "significant". A "significant regulatory action" is one that is likely to:

> (1) Have an annual effect on the economy of $100 million or more or adversely affect in a material way the economy, a sector of the economy, productivity, competition, jobs, the environment, public health or safety, or State, local, or tribal governments or communities;
>
> (2) Create a serious inconsistency or otherwise interfere with an action taken or planned by another agency;

(3) Materially alter the budgetary impact of entitlements, grants, user fees, or loan programs or the rights and obligations of recipients thereof; or

(4) Raise novel legal or policy issues arising out of legal mandates, the President's priorities, or the principles set forth in this Executive Order.

A regulatory program is "economically significant" if it is likely to result in the effects described above. The RIR is designed to provide information to determine whether the proposed regulation is likely to be "economically significant."

3.1 Alternative 1: Status Quo

Under Alternative 1, no salmon would be retained and processed for donation to needy individuals. Although the groundfish industry would not be burdened with costs associated with retaining and processing salmon for delivery to an authorized distributor, needy individual also would not be provided access to a protein source that otherwise will be discarded. A quantitative assessment of the foregone benefit to needy individuals is not possible. Assuming that amounts of salmon similar to that donated under the 1993 EFP issued to Terra Marine would not be retained and processed for human consumption, approximately 100,000 high protein meals to needy individuals would be foregone.

3.2 Alternative 2: Mandatory retention and processing of salmon and delivery to a foodbank organization.

At this time, no statutory authority exists to implement this alternative. However, a brief discussion of potential costs and benefits of this program is provided for purposes of assessing other alternatives considered. Under the terms and conditions of the 1993 EFP issued to Terra Marine Research and Education, Terra Marine prepared an annual report assessing feasibility of retaining bycaught salmon for distribution to needy individuals (Terra Marine and Research and Education, 1993). In the report, the following cost estimates are provided for shoreside and at-sea processing, storage, and delivery of salmon under the EFP:

Total direct production, support, and delivery costs

	Shoreside Processors	Processor Vessels
Total costs per salmon	$ 1.46	$ 1.12
Total costs per metric ton	$ 814	$ 625

Given these costs and the average number of salmon taken in the 1992 and 1993 Alaska groundfish fisheries, the total burden to the Alaska trawl industry resulting from mandatory retention and processing of salmon is estimated at $ 312,180.

Potential benefits to needy individuals resulting from salmon donated to foodbank organizations under Alternative 2 cannot be quantified. If the average number of salmon taken as bycatch in the 1992-93 trawl fisheries were all delivered to foodbank organizations and fit for human consumption, about 2 million meals could be provided to needy individuals. These meals likely would provide a healthy alternative to the diets of people who often only have access to meager and inadequate food..

3.3 Alternative 3: Voluntary retention and processing of salmon and delivery to a foodbank organization.

Under Alternative 3, an unknown number of salmon voluntarily could be retained and processed by the groundfish trawl industry for donation to authorized distributors for nonprofit foodbank organizations. Potential costs to the groundfish industry are anticipated to be significantly lower relative to Alternative 2 given that vessel operators or processor mangers would have no regulatory requirement to retain and process salmon if the costs of doing so are judged too high or have too great an impact on groundfish operations. The actual costs to vessel operators and shoreside processing operations would be relative to the amount of salmon retained and processed. These costs on a per salmon basis likely would be similar to those experienced by participants in the Terra Marine EFP and are presented under Alternative 2.

Although benefits to needy individuals resulting from salmon donated to foodbank organizations under Alternative 3 cannot be quantified, the number of salmon donated likely will be less than that under Alternative 2 and the potential benefit to needy individuals would decrease accordingly.

Voluntary donation of salmon to needy individuals under this alternative would meet the Council's objective to reduce protein waste in the groundfish fisheries. However, because the salmon donation program is voluntary, Alternative 3 would provide no incentive to vessel operators to take action to avoid salmon to reduce costs associated with the mandatory retention and processing program proposed under Alternative 2. Therefore, Council objectives for the retention and processing salmon for human consumption only are partially met.

3.4 Reporting Costs

Alternative 3 would require that permits authorizing the retention of salmon for donation to nonprofit organizations be issued to authorized distributors and to vessels and processors identified as participants under each authorized distributorship. Permits would be issued free of charge and would not involve a significant reporting burden to other than applicants for an authorized distributorship. An application for an authorized distributorship would be required annually and would include the following information:

1. The applicant's name, mailing address, telephone and FAX numbers;
2. Identification of all coordinating parties engaged in the applicants retention and distribution of salmon, including the identification of each vessel, processor, and charitable organization receiving salmon from the applicant for distribution to nonprofit foodbanks; and
3. Information about the transfer of salmon from port of landing to a charitable organization.

Upon receiving salmon under the voluntary donation program, an authorized distributor would be required to provide a receipt that shows the number and weight of salmon received from each vessel and shoreside processing operation, the permit numbers of the vessels and processors that delivered salmon to the authorized distributor, the permit number of the authorized distributor, and the date of receipt. A copy of the receipt must be provided to the Regional director.

Reporting costs to authorized distributors would include the time required to comply with reporting requirements and the cost of submitting required reports to the Regional Director. Costs associated with completing and submitting the permit application for an authorized distributorship would be incurred annually. A person issued a Federal permit for an authorized distributorship must submit an amended permit application if any information on the permit application changes, including the identification of the vessels, processors, or other coordinating parties engaged under the authorized distributor's permit to possess and distribute salmon.

Copies of receipts of delivery of salmon from vessels and processors would be submitted by the authorized distributor to the Regional Director on a weekly basis. Costs associated with this reporting requirement would be proportional to the amount of salmon received from different vessels and processors.

Vessels and processors approved by the Regional Director as participants under a permit application for an authorized

distributorship will be issued a permit by the Regional Director to possess salmon for delivery to the authorized distributor. No reporting costs or burden would be associated with these permits except those insignificant costs associated with a requirement to have the permit onboard the vessel or at the shoreside processing operations at all times.

3.5 Administrative, Enforcement and Information Costs

NMFS would require additional staff resources to administer, monitor, and enforce the voluntary salmon donation program proposed under Alternative 2. The amount of administrative support would depend on how many permits are issued for authorized distributorships and for vessel or processor participation under these authorized distributorships. At this time, NMFS estimates that one part-time position would be required to administer this program and an additional part-time position would be required to monitor and enforce it. NMFS does not anticipate that funding will be available to hire additional personnel and staff necessary to administer, monitor, and enforce the voluntary salmon donation program under Alternative 2. This program, therefore, only can be implemented with existing staff resources at the expense of other ongoing programs NMFS is required to administer, monitor, and enforce.

4.0 INITIAL REGULATORY FLEXIBILITY ANALYSIS

The objective of the Regulatory Flexibility Act is to require consideration of the capacity of those affected by regulations to bear the direct and indirect costs of regulation. If an action will have a significant impact on a substantial number of small entities an Initial Regulatory Flexibility Analysis (IRFA) must be prepared to identify the need for the action, alternatives, potential costs and benefits of the action, the distribution of these impacts, and a determination of net benefits.

NMFS has defined all fish-harvesting or hatchery businesses that are independently owned and operated, not dominant in their field of operation, with annual receipts not in excess of $2,000,000 as small businesses. In addition, seafood processors with 500 employees or fewer, wholesale industry members with 100 employees or fewer, not-for-profit enterprises, and government jurisdictions with a population of 50,000 or less are considered small entities. A "substantial number" of small entities would generally be 20% of the total universe of small entities affected by the regulation. A regulation would have a "significant impact" on these small entities if it reduced annual gross revenues by more than 5 percent, increased total costs of production by more than 5 percent, or resulted in compliance costs for small entities that are at least 10 percent higher than compliance costs as a percent of sales for large entities.

If an action is determined to affect a substantial number of small entities, the analysis must include:

> (1) a description and estimate of the number of small entities and total number of entities in a particular affected sector, and total number of small entities affected; and
>
> (2) analysis of economic impact on small entities, including direct and indirect compliance costs, burden of completing paperwork or recordkeeping requirements, effect on the competitive position of small entities, effect on the small entity's cashflow and liquidity, and ability of small entities to remain in the market.

4.1 Economic Impact on Small Entities

Any vessel or processor may participate in a voluntary salmon donation program authorized under Alternative 2 if the vessel is permitted by the Regional Director to do so. NMFS does not anticipate that any vessel or processor that qualifies as a small entity would elect to participate in the voluntary program if the costs of doing so reduces gross annual receipts by 5 percent or more. The impacts under Alternative 2, therefore, are not anticipated to result in a significant economic impact on a substantial number of small entities under the Regulatory Flexibility Act.

The number of persons that would submit an application for an authorized distributorship is unknown. NMFS anticipates the number would range between one and five and would depend on the expressed interest of vessel operators to participate in a voluntary donation program, the number of salmon retained and processed for human consumption, the cost of delivering salmon to foodbank organizations. Authorized distributors would be non-profit companies and not subject to consideration as small business entities for purposes of the Regulatory Flexibility Act.

5.0 SUMMARY AND CONCLUSIONS

Salmon are taken incidental to the Alaska groundfish trawl fisheries. These fish are dead when brought on board a vessel and must be returned to Federal waters as prohibited species once a NMFS-certified observer has determined the number of salmon and completed the collection of any biological or scientific data. At its September 1993 meeting, the Council adopted as a statement of intent a "Salmon Bycatch Control Policy." This policy endorsed the development of several different initiatives intended to address the salmon bycatch problem, including the development of regulations requiring retention of salmon for processing and delivery to nonprofit foodbank organizations. The

Council's intent for these regulations was to reduce protein waste in the groundfish trawl fisheries, support separate industry initiatives to address the salmon bycatch problem by allowing for verification of the number of salmon taken as bycatch, provide additional opportunity to collect biological samples or scientific data, and potentially provide an incentive to vessel operators to take action to reduce salmon bycatch rates to avoid costs associated with retaining and processing salmon for human consumption.

The proposed action would authorize the retention and processing of salmon taken as bycatch in the Alaska trawl fisheries for donation to needy individuals. This action would be implemented under Amendment 26 to the Fishery Management Plan (FMP) for the Groundfish Fishery of the Bering Sea and Aleutian Islands Area and Amendment 29 to the FMP for Groundfish of the Gulf of Alaska. The following three alternatives are considered: the status quo alternative (Alternative 1), mandatory retention and processing of salmon and delivery to a foodbank organization(Alternative 2), and voluntary retention and processing of salmon for delivery to a foodbank organization (Alternative 3).

Neither Alternatives 1 nor 3 would be expected to change fishing activities in a manner that would affect the amount of groundfish harvested or the amount of salmon taken as bycatch in the Alaska trawl fisheries. Notwithstanding the statutory limitations of Alternative 2, the potential exists that costs associated with mandatory retention and processing of salmon could provide an incentive to vessels operators to take action to attempt to reduce salmon bycatch rates and possibly reduce overall salmon bycatch amounts. None of the alternatives is likely to significantly affect the quality of the human environment, and the preparation of an environmental impact statement for the proposed action is not required by Section 102(2)(C) of the National Environmental Policy Act or its implementing regulations.

Based on the average number of salmon taken during the 1992 - 1993 trawl fisheries (242,000 fish) and assuming that all salmon are retained and processed for distribution to needy individuals under Alternative 2, the total burden to the Alaska trawl industry resulting from mandatory retention and processing of salmon is estimated at $312,180. Potential benefits to needy individuals resulting from salmon donated to foodbank organizations under Alternative 2 cannot be quantified. If the average number of salmon taken as bycatch in the 1992-93 trawl fisheries were all delivered to foodbank organizations and fit for human consumption, about 2 million meals could be provided to needy individuals. These meals likely would provide a healthy alternative to the diets of people who often only have access to meager and inadequate food.

Under Alternative 3, an unknown number of salmon could be voluntarily retained and processed by the groundfish trawl industry for donation to authorized distributors for nonprofit foodbank organizations. Potential costs to the groundfish industry are anticipated to be significantly lower relative to Alternative 2 given that vessel operators or processor mangers would have no regulatory requirement to retain and process salmon if the costs of doing so are judged too high or have too great an impact on groundfish operations. The actual costs to vessel operators and shoreside processing operations would be relative to the amount of salmon retained and processed. These costs on a per salmon basis are estimated to range between $1.46 and $1.12 for shoreside and at-sea processing operations, respectively.

Although benefits to needy individuals resulting from salmon donated to foodbank organizations under Alternative 3 cannot be quantified, the number of salmon donated would be less than that under Alternative 2 and the potential benefit to needy individuals would decrease accordingly. Voluntary donation of salmon to needy individuals under this alternative would meet the Council's objective to reduce protein waste in the groundfish fisheries. However, because the salmon donation program is voluntary, Alternative 3 would provide no incentive to vessel operators to take action to avoid salmon to reduce costs associated with the mandatory retention and processing program proposed under Alternative 2. Therefore, Council objectives for the retention and processing salmon for human consumption only would be partially met under Alternative 3.

None of the alternatives considered is expected to result in a "significant regulatory action" as defined in E.O. 12866. NMFS does not anticipate that any vessel or processor that qualifies as a small entity for purposes of the Regulatory Flexibility Act would elect to participate in a voluntary salmon donation program if the costs of doing so reduce gross annual receipts by 5 percent or more. The impacts under Alternative 2, therefore, are not anticipated to result in a significant economic impact on a substantial number of small entities under the Regulatory Flexibility Act.

6.0 REFERENCES

National Marine Fisheries Service (NMFS). 1993a. Draft environmental assessment/regulatory impact review/initial regulatory flexibility analysis for a fishery management plan amendment to implement a vessel incentive program to reduce salmon bycatch rates in the Bering Sea and Aleutian Islands Area trawl fisheries. April 15, 1993. National Marine Fisheries Service, P.O. Box 21668, Juneau AK 99802-1668.

National Marine Fisheries Service (NMFS). 1993b. Addendum to the public review draft of the environmental assessment/regulatory impact review/initial regulatory flexibility analysis for a fishery management plan amendment to implement a vessel incentive program to reduce salmon bycatch rates in the Bering Sea and Aleutian Islands Area trawl fisheries. June 15, 1993. NMFS, P.O. Box 21668, Juneau AK 99802-1668.

National Marine Fisheries Service (NMFS). 1994a. Final environmental assessment for 1994 Groundfish Total Allowable Catch Specifications. NMFS, P.O. Box 21668, Juneau, AK 99802-1668

National Marine Fisheries Service (NMFS). 1994b. Biological opinion on the effects of the North Pacific Groundfish Fisheries on Salmon. January 19, 1994. 28 p.

North Pacific Fishery Management Council. 1993. Draft environmental assessment/regulatory impact review/initial regulatory flexibility analysis for Amendment 21b (Salmon Bycatch Management) to the fishery management plan for the Groundfish Fishery of the Bering Sea and Aleutian Islands Area. March 18, 1993. North Pacific Fishery Management Council, P.O. Box 103136, Anchorage, Alaska 99510.

Terra Marine Research and Education. 1993. Annual Report. Bering Sea and Aleutian Islands Groundfish Fishery Experimental Fishing Permit - Feasibility of Retaining Salmon Caught As Bycatch for the Purposes of Distribution to Economically Disadvantaged Individuals, Permit # 93-2. December 31, 1993. National Marine Fisheries Service, P.O. Box 21668, Juneau, AK 99802-1668.

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ESTABLISHED BY A CONVENTION BETWEEN CANADA

AND THE UNITED STATES OF AMERICA

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Methods to Improve Survival of Pacific Halibut Bycatch Discarded From a Factory Trawler

By

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International Pacific Halibut Commission

A Report to the North Pacific Fishery Management Council

May 27, 1994

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May 27, 1994

INTRODUCTION

The International Pacific Halibut Commission (IPHC), the Highliners Association (with Natural Resource Consultants), and the National Marine Fisheries Service Alaska Fishery Science Center (AFSC) conducted an experiment to evaluate methods of increasing survival of discarded halibut bycatch from bottom trawls. The experiment involved sorting and discarding halibut from the groundfish catch more rapidly than is now current practice, and estimating the savings in halibut discard mortality rates. The experiment took place aboard the F/T *Northern Glacier* from October 6 through 29, 1993.

Halibut are caught as bycatch by most gear types used in North Pacific groundfish fisheries, but the majority are taken by trawls, especially those targeting on Pacific cod. Bycatch mortality could be reduced by improving survival and several methods have been suggested to accomplish this goal. One way would be to sort the halibut from the catch on deck, before groundfish and halibut are dumped into the below-deck holding tanks. A screen or grid has been suggested as a means of filtering halibut, particularly larger halibut, from the catch. Another possibility is to improve the sorting methods used in the factory, in a manner that returns halibut to the sea more quickly than is currently practiced. Termed Enhanced sorting, this practice could improve survival for the smaller fish that had previously passed through the grid. This experiment was designed to address these issues.

OBJECTIVES

The experiment involved sorting and discarding halibut from the groundfish catch more rapidly than is now current practice, and estimating the savings in halibut discard mortality rates.

The experiment addressed the following questions:

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[1]This is the first of two reports presenting analytical results. The second report, containing results of additional, more extensive analysis, will be completed and available in the fall of 1994.

1) What percent of the total halibut bycatch can be screened by the grid?

2) What percent of the total halibut bycatch can be sorted during the period of Enhanced sorting?

3) What is the survival rate of halibut discarded from the grid screening and the Enhanced sorting, compared to normal discards?

4) How much additional operating time accrues from the sorting procedures?

5) Will grid screening or Enhanced sorting increase overall survival of halibut bycatch from trawls?

Specific objectives were:

1) Determine the sorting capability of a grid or screen placed over the deck opening to the factory holding tanks.

2) Determine if overall halibut mortality is reduced by sorting large halibut out on deck and immediately returning them to the sea.

3) Determine if halibut mortality is reduced by "speed sorting" of bycatch from the groundfish in the factory.

EXPERIMENTAL DESIGN

The vessel targeted Pacific cod in a normal commercial manner over the full 24-hour period. The experiment focused on the bottom trawl Pacific cod fishery because it is allotted the greatest portion of halibut bycatch in the Bering Sea trawl fisheries. The vessel operated primarily in the Bering Sea (NMFS areas 517 and 521) and, to a lesser extent, on Sanak Bank in the Gulf of Alaska. Considerable exploratory fishing occurred in an attempt to find areas of good groundfish fishing with moderate amounts of halibut bycatch. Two NMFS observers, one supplied by the vessel and one by the AFSC, determined halibut viability from each haul and sampled the groundfish catch on most hauls.

Two specific experiments were conducted. The first experiment (the Grid Sorting Experiment) evaluated two improved methods of sorting halibut from groundfish against a Control method. For many factory layouts, halibut and other prohibited species and discards transit a series of conveyor belts to reach the exit chute. In some cases, 45 minutes or more may elapse for the discards to move from the hold to the exit chute. We considered this procedure for handling discards to be the Control method. The second experiment (Live Tank Holding) examined the relative survival of halibut within the established condition categories of excellent, poor, and dead.

For the Grid Sorting Experiment, three treatments were performed: (1) deck sorting with

a grid; (2) enhanced sorting of the catch in the factory; and (3) normal sorting in the factory (the control). On the *Northern Glacier*, a single, short conveyor led from the hold to the exit chute. Retained fish were selected from the conveyor, and all else remained on the belt to be discarded. The regular procedure on the *Northern Glacier* was designated the Enhanced treatment, while the control treatment was simulated by delaying processing for 45 minutes. Thirty hauls for each treatment were conducted, for a total of 90 hauls. We randomized the order of treatments. Other factors monitored were tow duration, haul size, time on deck, and fish size.

The Live Tank Holding Experiment was conducted to test relative differences in survival of the three condition categories. Halibut sorted from the catch on deck and in the factory were placed in holding tanks with running seawater for 72 hours until near the end of the trip, when holding time was reduced to about 12 hours. Approximately 20 halibut at a time were selected for placement into a tank.

The first four hauls on the first fishing day were used to set up specific sampling procedures, and the first haul tested appropriate grid dimensions. The two grids examined (Figure 1) were (1) 9 inches by 11 inches and (2) 11 inches by 14 inches. These were based on an even division of the deck opening, the first yielding a grid 3 openings deep and 6 wide. The second provided 2 openings deep by 6 wide. The vessel had on-board welding equipment to modify the grid dimensions, which proved to be unnecessary.

Tow duration was not predetermined, but two duration strata of $\geq$ 3 hr and < 3 hr were established. The distribution of tow times was adjusted so that equal numbers of short and long hauls occurred for each treatment.

While no limit was set on the catch of groundfish or halibut, the following quantities of fish were anticipated to be caught:

Pacific cod	1,500 mt
Groundfish other than Pacific cod	700 mt
Pacific halibut	less than 50 mt

The vessel was allowed to retain, process, and sell the groundfish caught. Only the traditional prohibited species (crabs, salmon, halibut, herring) were required to be discarded.

DATA COLLECTION

Grid Sorting Experiment

During this experiment, data on length (cm), condition factor (excellent, poor, or dead) observations, and time of observation from the net coming on board were collected from each halibut encountered. NMFS observers conducted basket sampling to define the groundfish catch and determined halibut condition, so that these data are consistent with data collected in commercial fishery situations. During the second half of the cruise, the amount of time required to empty the codend of fish ("dumping time") was also recorded.

A schedule of the treatment for each haul alerted the bridge and the factory so that hauls

could be made with factory processing capacity available. As each codend came on board, a biologist started a stopwatch; time of each halibut was recorded to the nearest minute. The observer and the skipper each estimated the groundfish catch. For grid sort treatments, the grid was placed over the hold, the deck crew grabbed halibut prior to the hatch and on the grid, and passed them to biologists for measurement and viability determination by the observer. When deck sampling was completed, the biological team moved to the factory where length, viability and time data were collected for all remaining halibut. For enhanced and control treatments, the sampling process started in the factory. Enhanced treatments started processing groundfish and sorting halibut quickly after dumping to the hold, while control treatments started processing 45 minutes after dumping to simulate the time needed for halibut to transit the factory to the exit chute typical of most trawl vessel factory layouts.

Live Tank Holding

Three specially-constructed deck-mounted holding tanks, each about 80 square feet by 36 inches high, with seawater circulation, an inside lip, dump door, and water overflow sump were used for holding halibut. Originally, only halibut sorted on deck were scheduled for these tanks, but halibut sorted out from the factory were also placed in these tanks when the factory tanks proved impractical. Initially, halibut collected from the factory were held in one or two 4'x4'x15' holding bins fed with circulating water. Water flow rates exchanged bin volumes about once per hour. Unfortunately, water jets in the holding bins, designed to lubricate large volumes of dead fish flowing to an exit, churned the water significantly, greatly diminishing survival. Halibut from the factory were carried as quickly as possible to the holding tanks on deck.

When a fish was selected for holding, a round, uniquely-numbered ID tag was placed on the tail using a nylon electrical tie. Selected fish were measured, condition factor assessed, and ID number noted on a form. Halibut were released after three days, and date and time of release, ID number, and condition noted on a separate form.

RESULTS

Groundfish and Halibut Catch

Ninety five hauls made during the experiment included four test hauls, one invalid haul caused by a ripped net, and the ninety hauls specified in the experimental design (Appendix Table 1). Catch weight ranged from about 5 mt to 35 mt per haul, but most were in the 10 to 15 mt range. The experimental hauls were divided into 30 hauls for each treatment, and the hauls of each treatment partitioned equally among < 3 hr and ≥ 3 hr tows. Groundfish harvest totalled 1,189 mt, of which the retained portion was 243 mt of Pacific cod and 496 mt of pollock. The remaining 450 mt, mostly arrowtooth flounder, other flatfish, and Atka mackerel, were discarded. The total catch of Pacific cod was significantly below the anticipated catch of 1,500 mt, but pollock and discarded groundfish somewhat exceeded the 700 mt anticipated for other groundfish.

The number of halibut caught reached 13,887, at an estimated weight of 38,000 kg (2.75 kg/halibut). Approximately equal numbers of halibut were caught in each of the three treatments, with 4,714 in the grid sorting, 4,244 in the control sorting, and 4,903 in the Enhanced sorting (Table 1). The halibut bycatch rate was 32 kg/mt. Bycatch rates in numbers of fish were higher than expected, but the total quantity of halibut bycatch was less than the anticipated maximum of 50 mt. Had the anticipated 2,200 mt of groundfish been harvested, halibut catch would have reached approximately 70 mt.

Deck Sorting of Halibut Bycatch

In the grid sorting, 1,927 halibut (41%) were collected on deck. The larger sizes of halibut sorted on deck put the proportion of deck-sorted halibut at 52% by weight. At levels of 100 halibut or higher per tow, the sorting proportion remained about 40%, while sorting proportions were highly variable at lower numbers (Figure 2).

The grid selected for use, although the smaller of the two available, did not directly filter out many of the halibut. The high proportion of deck-sorted halibut was due to the slower rate of dumping catch from the cod end to the hold, and the opportunity for the deck crew to sort out halibut pouring from the cod end to the hatch. Sorting efficiency by the deck crew increased as the cod end was placed further forward from the hold. About 3 to 4 m seemed an efficient distance, as halibut passed too quickly past the sorters at shorter distances. Time required to dump a cod end after the net came on board normally ranged from about 90 seconds to 2½ minutes, while a grid sort took about 7 to 15 minutes to dump. Dumping time tended to increase with increased catch (Figure 3), but the relationship was stronger with grid-sorted catches (r^2=0.67) than for catches not sorted through the grid (r^2=0.30). The deck crew would slow down dumping if more halibut appeared, but let the fish pour across the deck if halibut were not visible.

The ability to sort halibut on deck is dependant upon being able to find the halibut as the catch is being dumped. Larger halibut are more easily spotted and captured than small halibut (Figure 4). For example, only 15% of the halibut less than 39 cm (0.6 kg, or 1-pound fish) were sorted on deck. The proportion at 50% or greater was not reached until roughly 65-70 cm (3-4 kg).

The size distribution of halibut in the bycatch has implications on the effectiveness of grid sorting requirements for various fisheries. Those fisheries with small (<50-60 cm) halibut may not gain much halibut survival by grid sorting, unless slower dumping speeds or smaller grid dimensions are practical to reach the level of deck sorting experienced in the experiment. The size distribution of halibut bycatch varies substantially by fishery (Figure 5) and the size distribution of the sorted halibut (Figure 6) only slightly overlaps the observed size distribution for several of the fisheries.

Halibut Viability

All halibut caught were examined for condition (excellent, poor, or dead) by one of two NMFS observers, using the same criteria as employed by NMFS fishery observers.

The number of halibut by condition category and calculated discard mortality rate for each

treatment is summarized in Table 2. Halibut were in the best overall condition when sorted on deck, as was expected, with the percentage of halibut judged to be in excellent and poor condition similar. Halibut in dead condition were infrequently seen. Condition factor (Figure 7) and calculated survival of halibut sorted on deck were improved over the values from observer data in the 1992 Pacific cod trawl fishery in the Bering Sea. Once the fish were dumped below deck, the condition worsened considerably. The calculated discard mortality rates for halibut sorted in the factory were higher than the 60% rate used by NMFS in the Bering Sea/Aleutian Islands bottom trawl pollock and cod fisheries, and the combined deck mortality and factory mortality of the grid sorted halibut were comparable to the NMFS rate.

Only 9% of the halibut caught in enhanced sort tows were in excellent condition, much lower than the grid sort tows. This was much lower than expected, considering that sorting and discard began as soon as the catch was below deck. Halibut in control sort tows were in worse condition yet, illustrating the benefits that can be gained by sorting and discarding the catch as soon as is possible, rather than letting the catch sit in holding tanks or spend time travelling through the factory. In this experiment, enhanced sort and control sort tows had discard mortality rates 15% and 30% higher, respectively, than the grid sort tows.

For enhanced sorting or grid sorting in the factory, the majority of the halibut were in poor condition for about the first 40-50 minutes after the net came on board (Figure 8). Only a few excellent and dead halibut were noted. For control sorting and for enhanced or grid sorting after about 40-50 minutes, nearly all halibut were in dead condition, with occasional poor and the rare excellent halibut.

Live Tank Holding Experiment

Holding tank experiments did not provide as much useable data as anticipated, because of situations with high mortality of halibut in the tanks. Bleeding tanks in the factory did not work because the water flow system churned the water and severly disturbing the halibut. A sloped floor in the bleeding tanks that prevented halibut from resting without piling up may have also contributed to the mortality. Of three tanks on deck, only one provided consistent data. The best tank was nearly square, while the other two were long and narrow. Vessel movement caused traveling waves in the narrow tanks that disrupted the halibut. In cases of prolonged rough weather, nearly all halibut died, regardless of initial condition factor.

A total of 281 halibut from 17 hauls were placed in the live tanks for the standard three day holding period. Seventy-nine more from four hauls were held for 12 hours. Nine hauls of the long holding period were from grid sort hauls, three from control sort hauls, and five from Enhanced sort hauls. Three hauls from the short holding period were grid sort, and one was an Enhanced sort. Good to moderate weather occurred during the three-day holding period for 9 of the tows, representing 134 halibut. Of the total excellent, poor, and dead condition halibut placed in the tank for the longer holding period, 77%, 43%, and 3%, respectively, survived[2]. Of the halibut held during good or moderate weather, the comparable survival values were 93%,

[2]In this case, "survival" is defined as being in *either* excellent or poor condition at the end of the holding period.

67%, and 4%, respectively.

DISCUSSION

The experiment aboard the *Northern Glacier* was designed to simulate as close as possible the fishing practices of the bottom trawl fishery for Pacific cod. For the most part, this effort seemed very successful. However, several differences occurred. The experiment occurred in October, a time period that has not been fished for Pacific cod in many years. The location of fishing may not have been where a commercial fishery would operate at that time, in spite of extensive exploration of the grounds in the Bering Sea and Gulf of Alaska. The crew was very aware of the nature of the operations and the emphasis on improving survival of discarded halibut. We could not evaluate if the crew acted in different manner than would have occurred in the absence of the scientific party. The experimental design had originally intended for the treatment order to be unknown to the Captain prior to haulback, but this was abandoned. It was necessary to coordinate with the factory to keep product available, but without overwhelming the holding capacity. Observers collected data from the start to the finish of every haul, and condition factor was collected for each halibut. As a result, the distribution of halibut conditions factors during the experiment may be somewhat different from the distribution collected periodically through the haul.

The overall discard mortality rate of 66% for the grid sorting is about the same as the discard mortality rate currently used by NMFS for the Bering Sea Pacific cod fishery. There is no clear explanation for this difference. However, the relative rates for the three experimental treatments, and the pattern of mortality over time demonstrate the advantage of quickly returning halibut to the sea. While these results may not be directly applicable to the normal Pacific cod or bottom trawl pollock fishery, we conclude that discard mortality rates in these fisheries will decline 25-50% on factory trawlers that practice grid sorting. Experience and learning through continued use of grid sorting may well enable the deck crew to sort out a higher proportion of halibut than was the case for the crew of the *Northern Glacier.*

The holding experiment provided less information than expected, but did demonstrate that survival of halibut in the dead condition is possible. In addition, the survival of halibut held during all weather conditions was similar to the survival rates used by IPHC to determine discard mortality rates (80% for halibut in excellent condition, 45% for poor, and 10% for dead), but we consider the number of halibut to be minimal at best. The number of halibut held during periods of good and moderate weather was too low to draw quantitative conclusions on survival for condition factors, but clearly indicate the importance of research to improve the definition of condition factors and to develop new methods of estimating discard mortality rates.

SUMMARY

Ninety hauls equally divided among three sorting treatments provided 13,861 halibut for which condition factor, length, and time on deck were collected. On-deck sorting provided the highest survival, and control sorting caused the most mortality. Pollock and Pacific cod made up the retained catch. About 62% of the total groundfish catch was retained, and the remaining

38% was discarded. At 32 kg/mt, the halibut bycatch rate was higher than expected.

Each of the experimental treatments increased halibut survival compared to the control. Deck sorting with the grid resulted in the best survival. Halibut sorted and discarded from the deck had an estimated discard mortality rate of about 40%. The over all grid sort discard mortality, including halibut discarded from the factory, was 66%. Enhanced sorting had a mortality of 76% compared to the control rate of 87%.

Holding tank experiments were less successful than anticipated. Tanks in the factory could not be used because of excessive mortality caused by tank design, and periods of rough weather caused mortality not related to condition factor in two of the three deck tanks. Periods of good weather during several holding periods permitted useable data from several hauls. The limited useable data suggested that survival of halibut in the dead condition is possible. In addition, the limited results closely resembled the survival rates used by IPHC in discard mortality rate studies.

Table 1. **Preliminary catch totals of Pacific halibut during the 1993 Bycatch Sorting Experiment.**

Treatment/ Location	Numbers of halibut		Weight of halibut		Average Weight (kg)
	No.	%	kg	%	
Grid Sort					
Deck	1,926	40.5	5,988	52.0	3.11
Factory	2,828	59.5	5,521	48.0	1.95
Overall	4,754	34.3	11,509	34.3	2.42
Enhanced Sort	4,903	35.3	12,437	37.1	2.54
Control Sort	4,214	30.4	9,575	28.6	2.27
Total	13,871	100.0	33,521	100.0	2.42

Table 2. **Summary of halibut viability by sorting method, and calculated discard mortality rate.**

Treatment/ Location	No. of halibut	% Exc	% Poor	% Dead	Calculated Disc. Mort. Rate (%)
Grid Sort					
Deck	1,926	45	48	7	42
Factory	2,828	3	14	83	83
Overall	4,754	20	28	52	66
Enhanced Sort	4,903	9	22	69	76
Control Sort	4,213	1	7	91	87

Appendix Table 1. **Preliminary catch totals during 1993 Halibut Bycatch Survival/Sorting Study. Codes for treatment are CL=Control, ES=Enhanced Sort, and GS=Grid Sort. Haul 590 was considered invalid.**

Date	Haul No.	Treatment	Number of Halibut			Cumul. Total	Live Tank	Cumul. Total
			Deck	Factory	Total			
07-Oct	567	Test	20	n/a	20	20	-	-
	568	Test	88	173	261	281	-	-
	569	Test	105	n/a	105	386	-	-
	570	Test	66	n/a	66	452	-	-
08-Oct	571	GS	182	178	360	360	0	0
	572	CL	0	37	37	397	0	0
	573	ES	0	9	9	406	0	0
09-Oct	574	CL	0	13	13	419	0	0
	575	ES	0	57	57	476	0	0
	576	GS	94	38	132	608	14	14
	577	GS	41	23	64	672	7	21
	578	CL	0	68	68	740	4	25
10-Oct	579	ES	0	58	58	798	0	25
	580	CL	0	53	53	851	0	25
	581	GS	24	4	28	879	6	31
	582	ES	0	64	64	943	0	31
11-Oct	583	GS	60	14	74	1,017	0	31
	584	ES	0	8	8	1,025	0	31
	585	CL	0	29	29	1,054	0	31
12-Oct	586	ES	0	65	65	1,119	0	31
	587	CL	0	6	6	1,125	0	31
	588	GS	12	4	16	1,141	3	34
	589	CL	0	55	55	1,196	0	34
13-Oct	590							
	591	GS	53	9	62	1,258	15	46
	592	ES	0	69	69	1,327	13	59
	593	GS	2	37	39	1,366	0	59
14-Oct	594	ES	0	96	96	1,462	0	59
	595	CL	0	79	79	1,541	0	59
	596	ES	0	50	50	1,591	0	59
15-Oct	597	CL	0	2	2	1,593	0	59
	598	GS	4	6	10	1,603	0	59
	599	CL	0	54	54	1,657	0	59
	600	GS	2	25	27	1,684	0	59
	601	ES	0	52	52	1,736	0	59
16-Oct	602	GS	45	55	100	1,836	22	81
	603	ES	0	85	85	1,921	19	100

Table 1. (continued)

Date	Haul No.	Treatment	Number of Halibut			Cumul. Total	Live Tank	Cumul. Total
			Deck	Factory	Total			
17-Oct	604	CL	0	145	145	2,066	21	121
	605	ES	0	143	143	2,209	0	121
	606	CL	0	123	123	2,332	0	121
18-Oct	607	GS	32	109	141	2,473	0	121
	608	CL	0	27	27	2,500	0	121
	609	GS	111	116	227	2,727	0	121
	610	ES	0	479	479	3,206	0	121
	611	CL	0	172	172	3,378	0	121
	612	ES	0	196	196	3,574	0	121
19-Oct	613	GS	107	242	349	3,923	0	121
	614	ES	0	160	160	4,083	0	121
	615	GS	72	122	194	4,276	47	168
20-Oct	616	CL	0	118	118	4,394	0	168
	617	CL	0	149	149	4,543	19	187
	618	GS	52	113	165	4,708	0	217
21-Oct	619	ES	0	87	87	4,795	23	210
	620	GS	54	93	147	4,942	0	210
	621	CL	0	519	519	5,461	0	210
22-Oct	622	ES	0	107	107	5,568	0	210
	623	ES	0	119	119	5,687	0	210
	624	CL	0	272	272	5,959	0	210
	625	GS	68	125	193	6,152	15	225
	626	CL	0	191	191	6,343	0	225
	627	GS	19	13	32	6,375	0	225
23-Oct	628	ES	0	252	252	6,627	0	225
	629	GS	74	109	183	6,810	0	225
	630	ES	0	139	139	6,949	0	225
	631	CL	0	134	134	7,083	0	225
	632	ES	0	136	136	7,219	17	242
24-Oct	633	CL	0	214	214	7,433	0	242
	634	GS	139	227	366	7,799	0	242
	635	CL	0	201	201	8,000	0	242
	636	GS	80	144	224	8,224	0	242
	637	ES	0	221	221	8,445	19	261
	638	GS	82	186	268	8,713	0	261
25-Oct	639	ES	0	313	313	9,026	0	261
	640	CL	0	255	255	9,281	0	261
	641	ES	0	232	232	9,513	0	261
	642	CL	0	108	108	9,621	0	261
	643	GS	43	68	111	9,732	19	280
	644	CL	0	263	263	9,995	0	280

Table 1. (concluded)

Date	Haul No.	Treatment	Number of Halibut			Cumul. Total	Live Tank	Cumul. Total
			Deck	Factory	Total			
26-Oct	645	GS	97	174	271	10,266	0	280
	646	ES	0	273	273	10,539	0	280
	647	GS	37	107	144	10,683	0	280
	648	CL	0	187	187	10,870	0	280
	649	ES	0	163	163	11,033	0	280
27-Oct	650	ES	0	260	260	11,293	0	280
	651	CL	0	158	158	11,451	0	280
	652	GS	146	167	313	11,764	18	298
	653	CL	0	44	44	11,808	0	298
	654	GS	42	75	117	11,925	0	298
	655	ES	0	99	99	12,024	0	298
	656	GS	51	61	112	12,136	19	317
28-Oct	657	ES	0	281	281	12,417	0	317
	658	CL	0	351	351	12,768	0	317
	659	CL	0	207	207	12,975	0	317
	660	ES	0	630	630	13,605	22	339
	661	GS	99	183	282	13,887	20	359

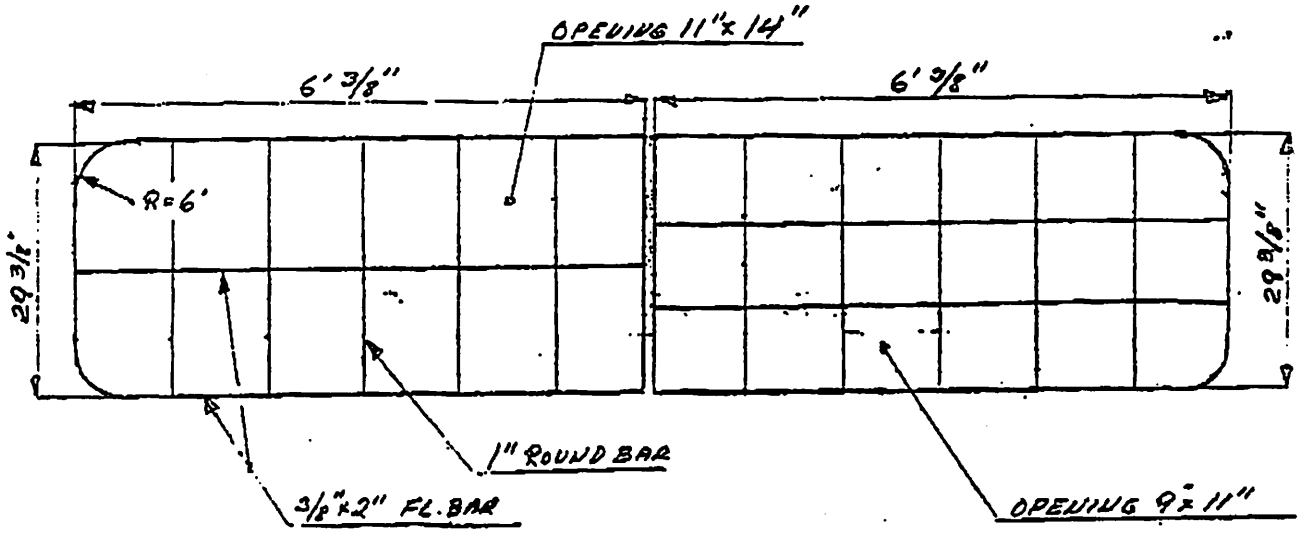


Figure 1. **Artist's drawing of sorting grids used in the Grid Sorting Experiment. The grid on the right side proved to be the most appropriate.**

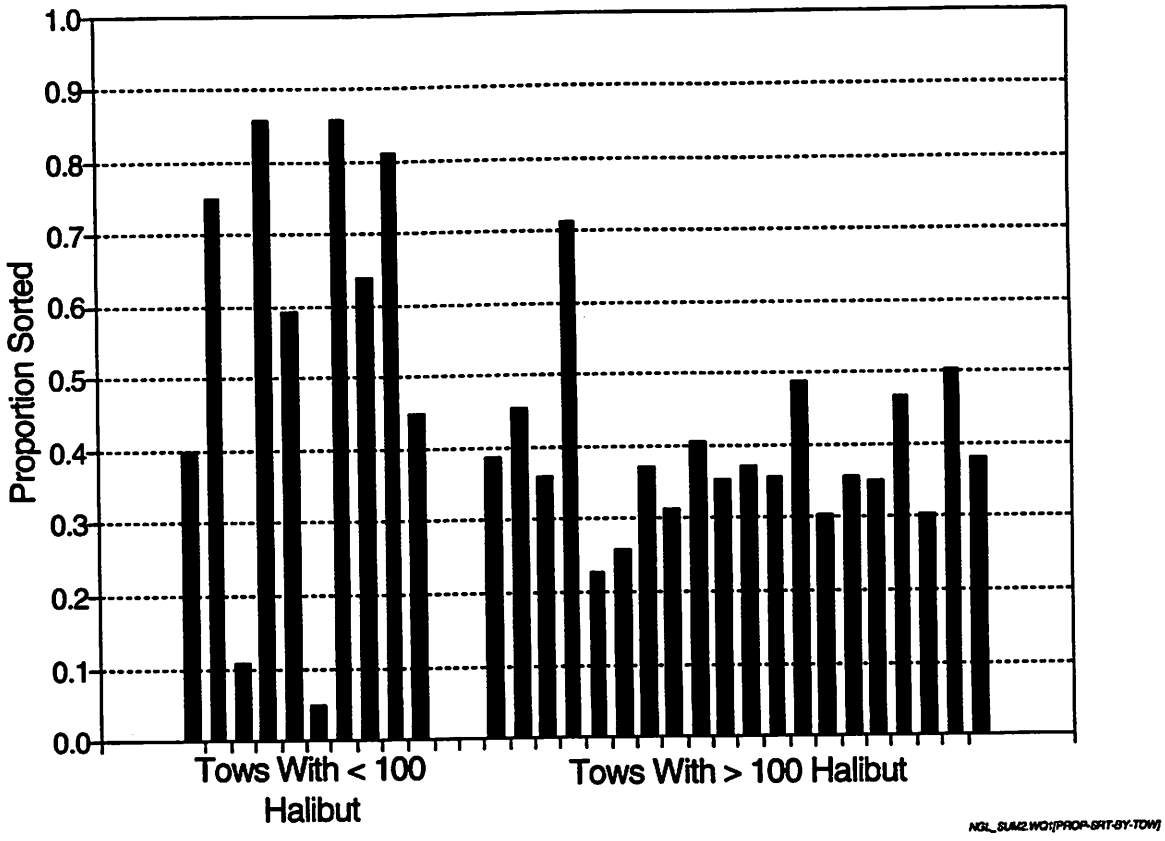


Figure 2. **Proportion of halibut sorted on deck in tows with less than 100 halibut (left side of figure) and in tows with more than 100 halibut (right side).**

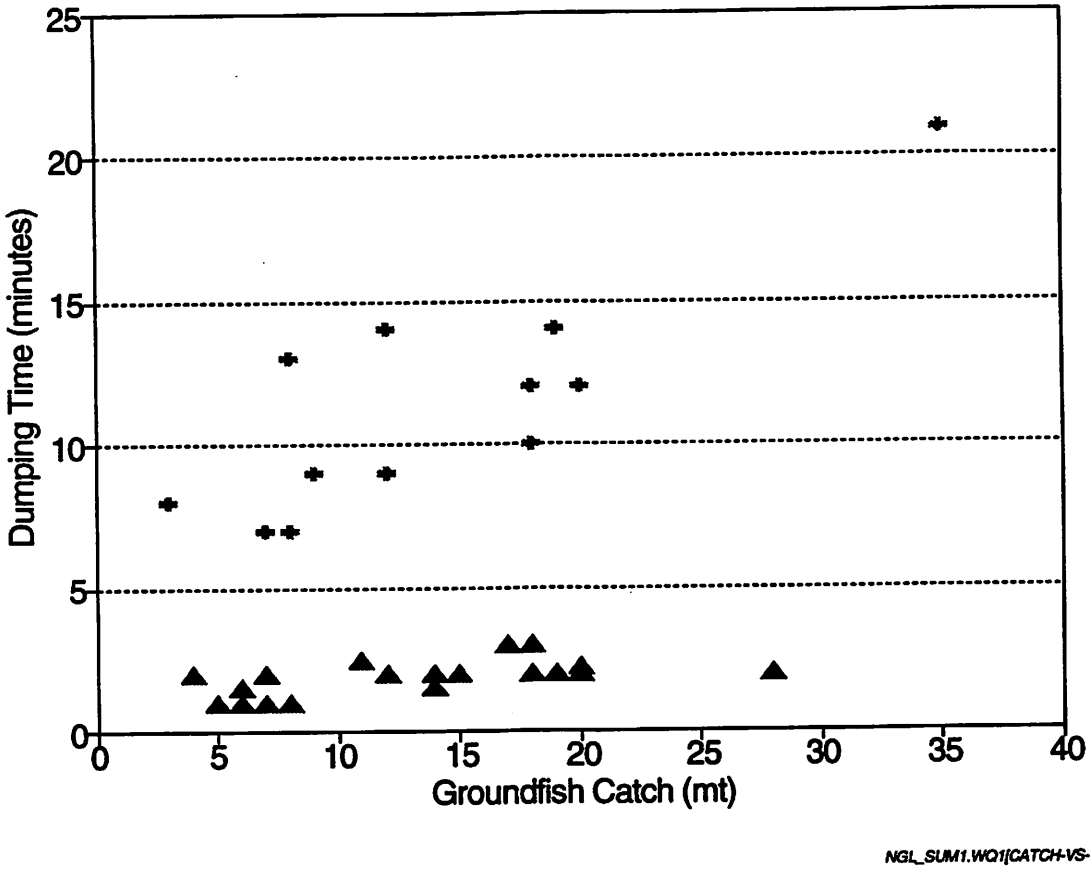


Figure 3. **Comparison of the amount of time required to dump the codend when the catch was deck-sorted (denoted by a "+") versus dumping the catch directly below deck ("▲").**

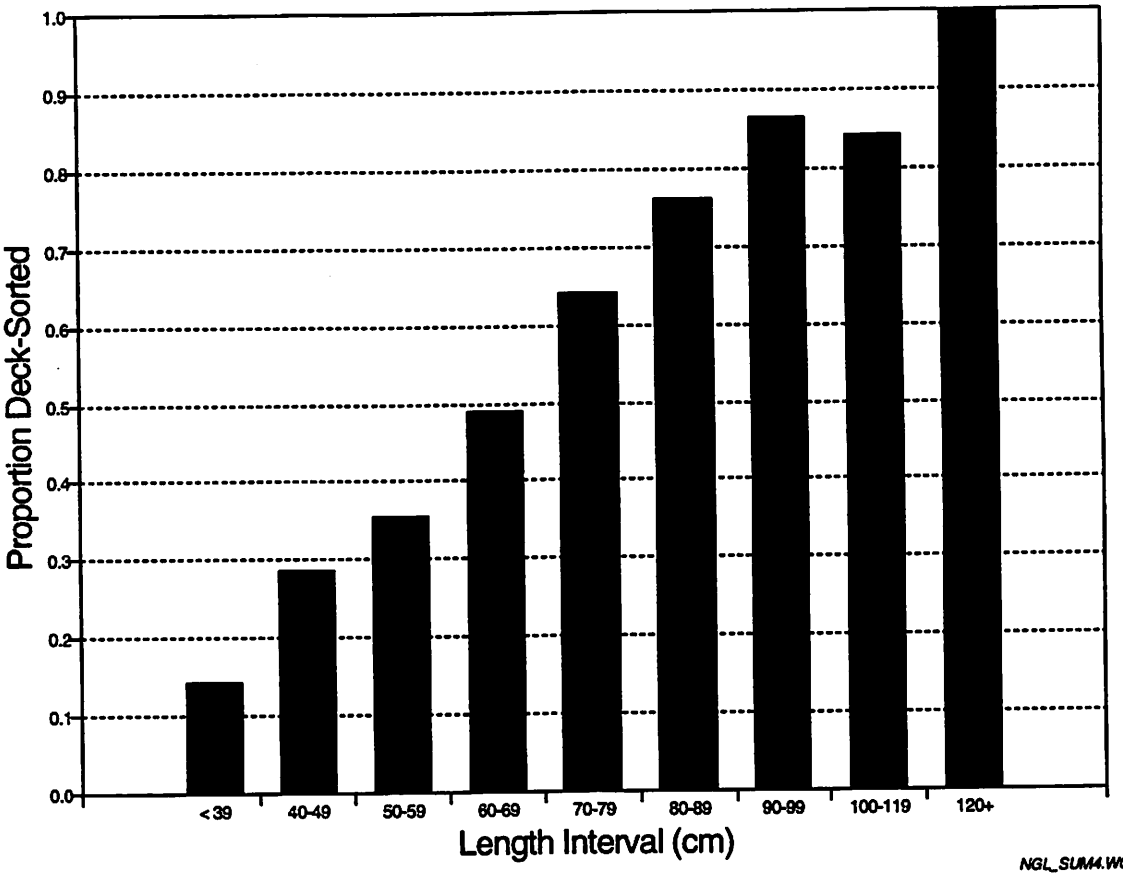


Figure 4. **Proportion of halibut sorted on deck by 10-cm length interval. From Grid Sort tows only.**

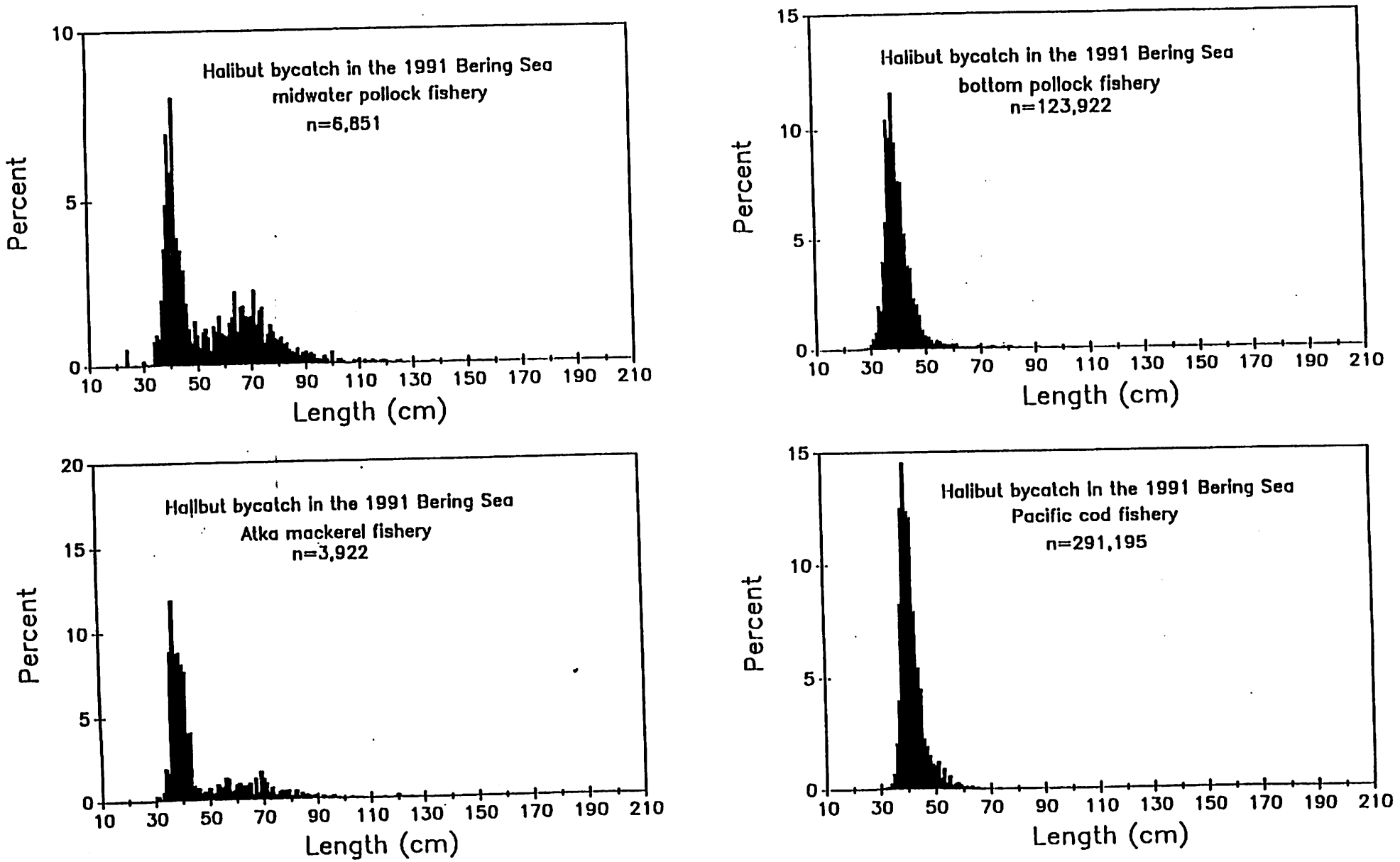
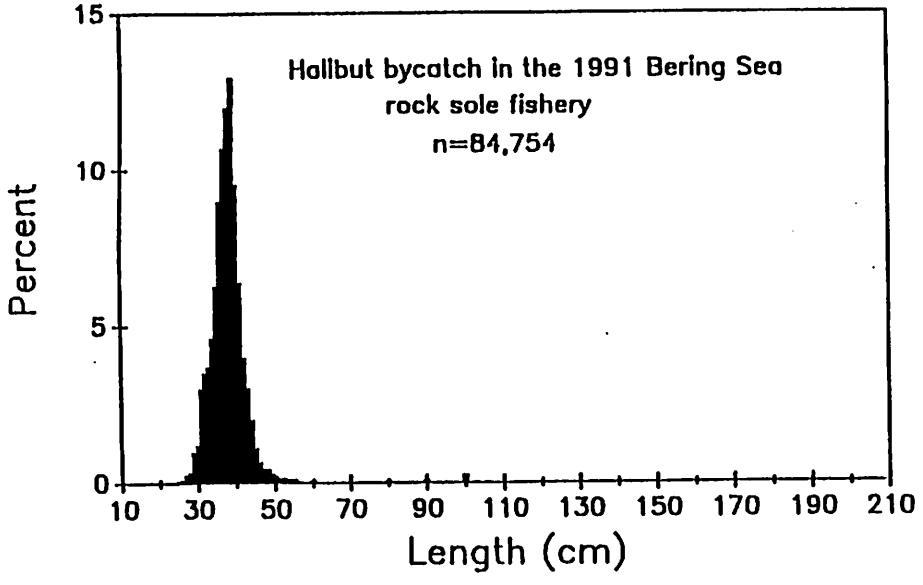
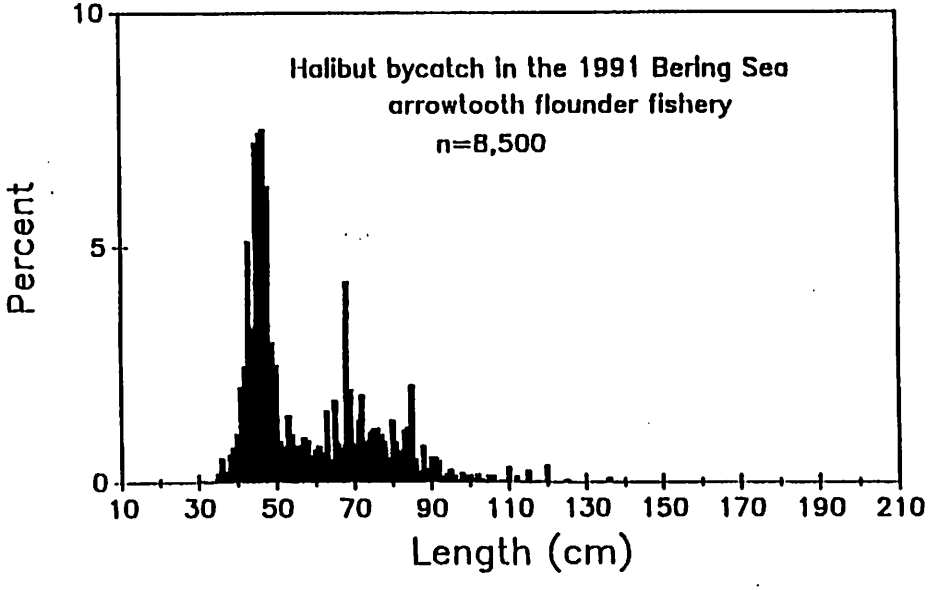
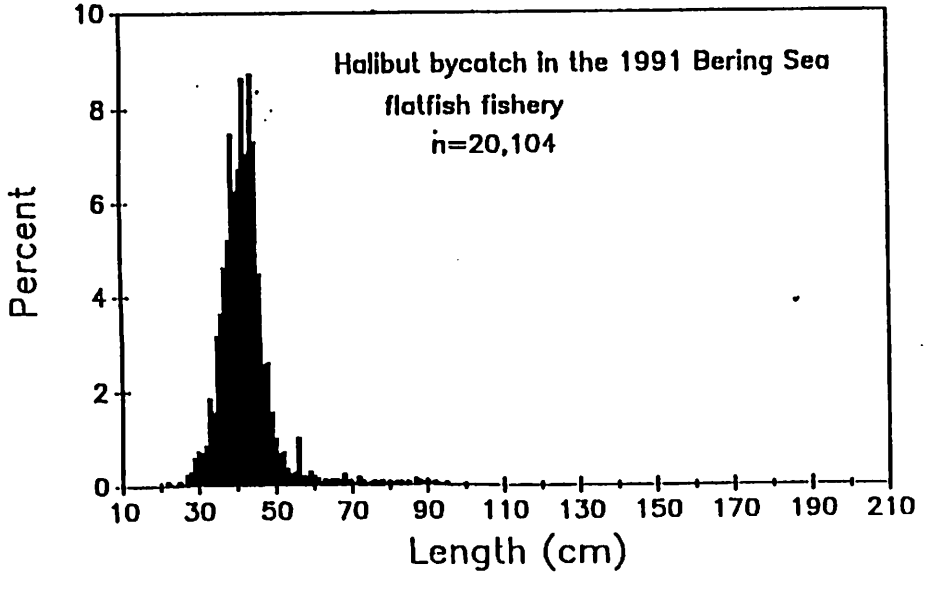


Figure 5. Pacific halibut length frequencies for 1991 Bering Sea/Aleutian trawl fisheries.







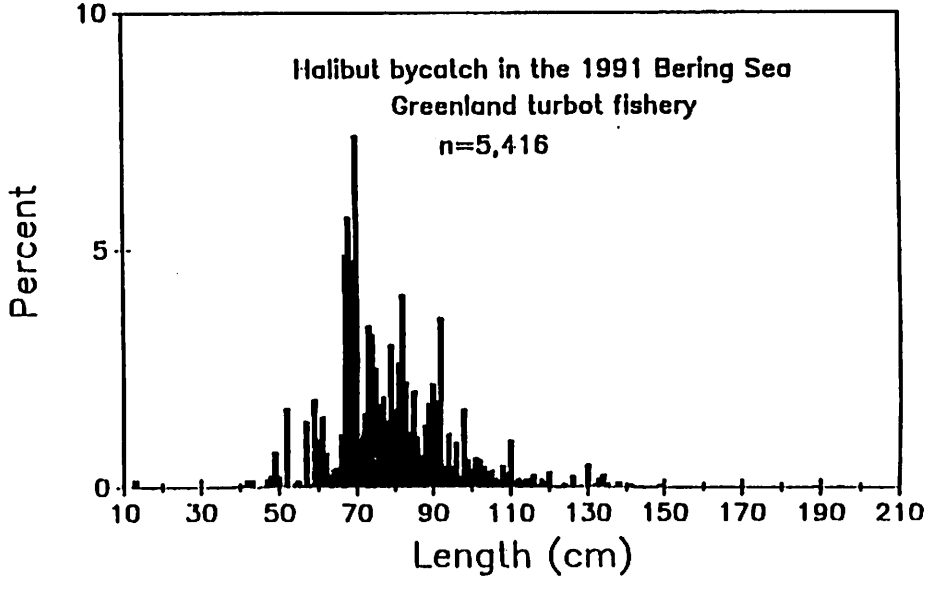


Figure 5 (continued). Pacific halibut length frequencies for 1991 Bering Sea/Aleutian trawl fisheries.

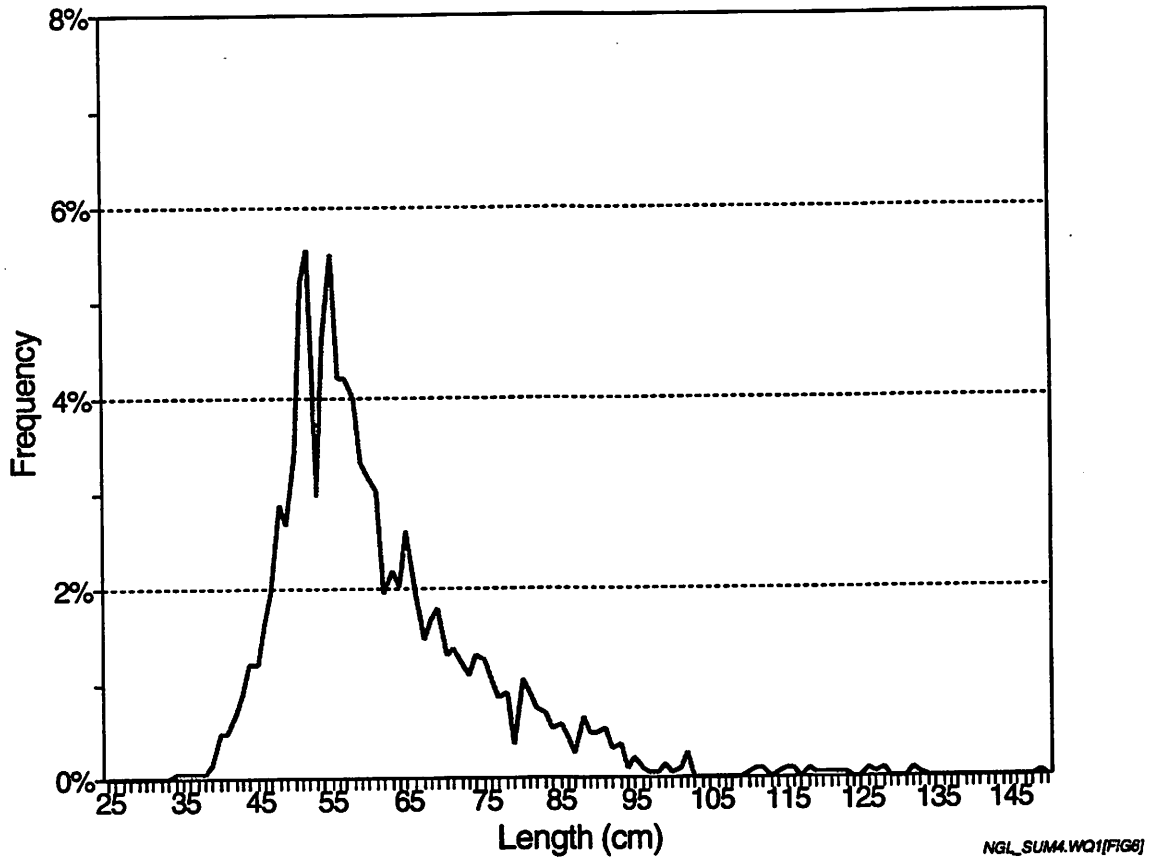


Figure 6. **Length frequency of halibut sorted on deck in the 1993 Grid Sorting Experiment.**

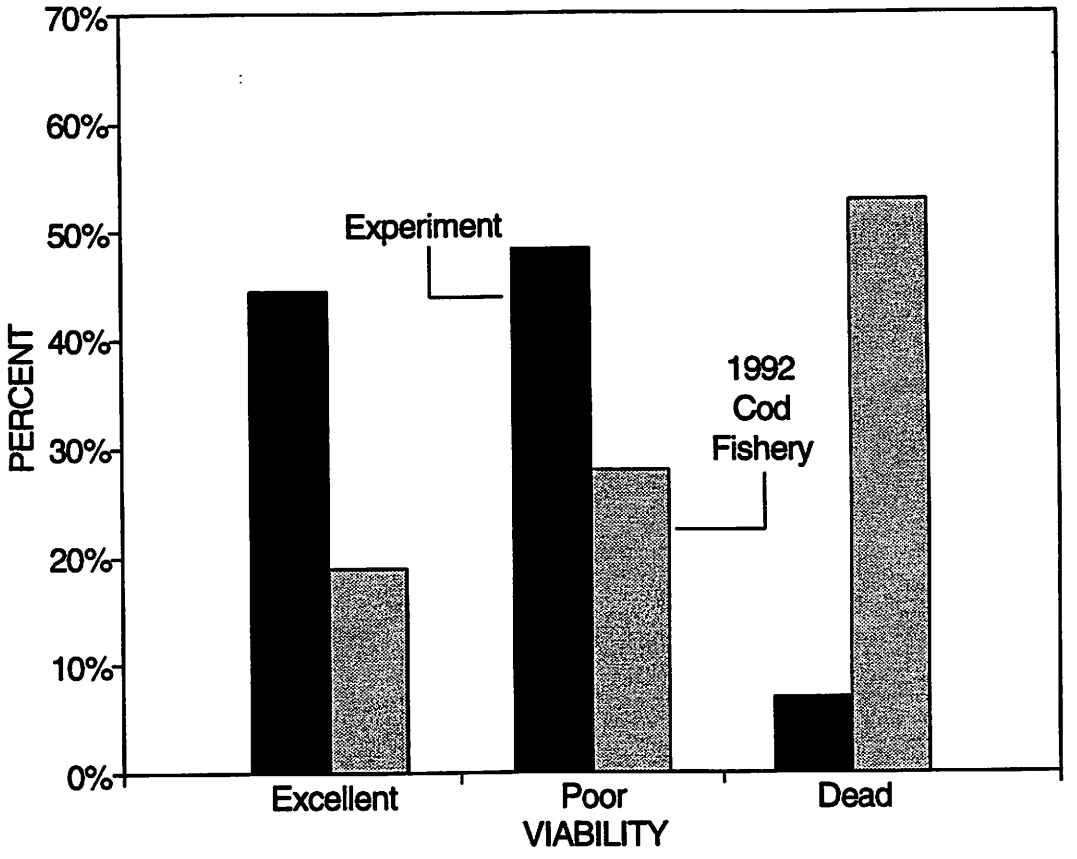
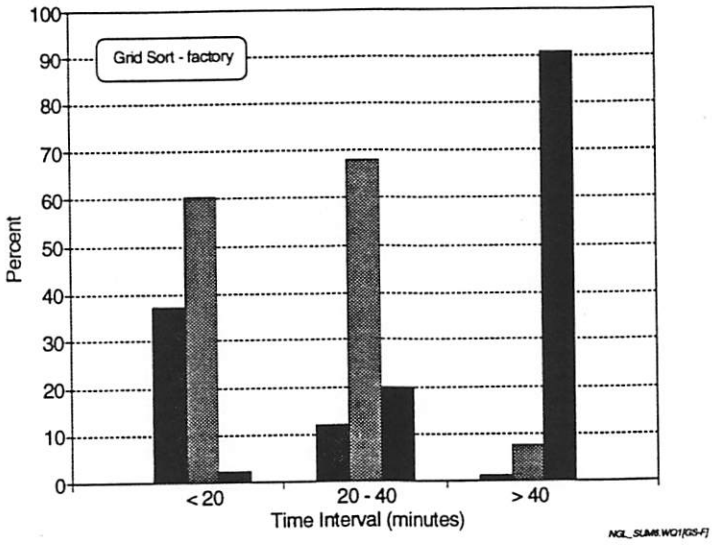
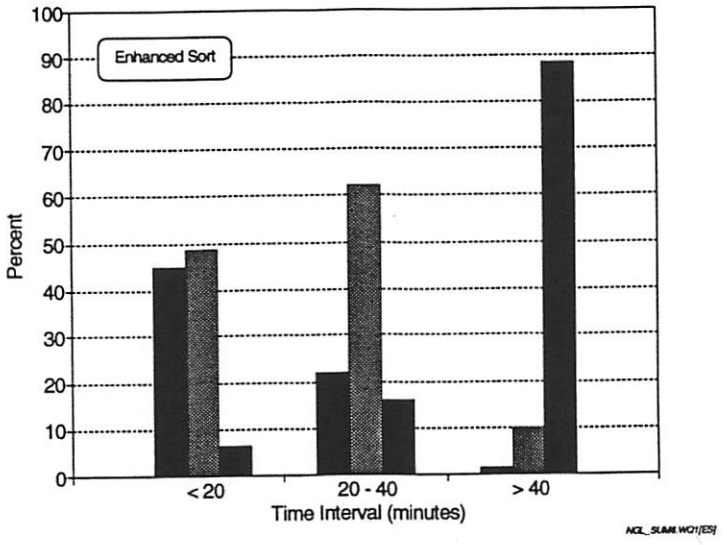


Figure 7. **Pacific halibut viability achieved through deck sorting during 1993 Sorting Experiment compared to viability recorded by observers in 1992 Bering Sea Pacific cod trawl fishery.**





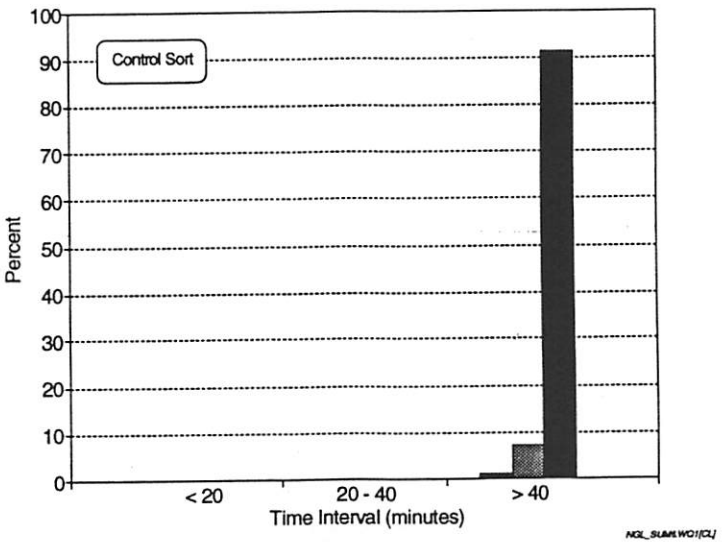


Figure 8. Condition of halibut during three time intervals for all sort treatments.