MEMORANDUM

TO: Council, SSC and AP Members

FROM: Clarence G. Pautzke
Executive Director

DATE: September 20, 1994

ESTIMATED TIME
4 HOURS

SUBJECT: Groundfish Regulatory Amendments

ACTION REQUIRED

(a) Review Analysis of Total Weight Measurement - final action.

(b) Review Analysis of Mesh Regulations and Separate Rock Sole VIP Rates.

BACKGROUND

Total Weight Measurement

In June, the Council reviewed a draft analysis for a proposed regulatory amendment to improve total catch weight estimates in the groundfish fisheries. Based on Council recommendations, the analysis was revised to include other approved procedures for determining total weight, and released for public review on September 6, 1994. Five alternatives were analyzed and briefly these are:

Alternative 1: status quo.

Alternative 2: standardize and improve current methods of total catch estimation for trawl catcher/processors and mothership processor vessels (by using certified bins).

Alternative 3: the total weight of all catch harvested or processed by processors with 100 percent observer coverage must be assessed (using scales or other approved procedures) prior to discard or processing.

Alternative 4: the total weight of all catch harvested or processed by all processors must be assessed (using scales or other approved procedures) prior to discard or processing.

Alternative 5: the total weight of all catch in the groundfish fisheries must be assessed (using scales or other approved procedures) prior to discard or processing.

An executive summary for the analysis is attached as agenda item D-4(a)(1). If the Council takes final action at this meeting, regulations could be published in early 1995. Because additional time may be necessary for all vessels to comply (depending on which alternative is recommended), the Council may recommend to NMFS that implementation of regulations be delayed, perhaps until the 1996 fishing year or some other date.

Mesh Regulations and Rock Sole VIP Rates

In June 1994, based on recommendations by the AP and public comment, the Council adopted for analysis minimum mesh sizes for top quarter panels of trawl codends for the Pacific cod, walleye pollock, and rock sole fisheries. Specifically, the Council recommended analysis of codend mesh regulations for the BSAI rock sole fishery (6" diamond), BSAI cod fishery (8" diamond), GOA cod fishery (6" diamond), and GOA and BSAI pollock fisheries (4" square). In order to provide flexibility during the semi-annual setting of VIP guidelines, the Council also initiated analysis of a regulatory amendment to separate rock sole from the other flatfish category, as part of this package. The Council also formed an ad-hoc committee to fine-tune codend mesh recommendations. The committee met on June 28, 1994 and recommended additional codend configurations to be analyzed (Item D-4(b)(1)). A draft EA/RIR analysis was prepared and reviewed by the groundfish plan teams in August. A revised draft was released for Council and public review on September 7, 1994. Three alternatives were examined, and briefly these were:

Alternative 1. Status quo. Codends used in North Pacific trawl fisheries would not require minimum mesh size or configuration.

Alternative 2. Under this alternative, regulations would require codends to have a single layer top panel with the following minimum mesh sizes in the trawl fisheries specified:

- BSAI rock sole and GOA Pacific cod, 6 inch minimum diamond mesh;
- BSAI Pacific cod, 8 inch diamond mesh;
- GOA and BSAI pollock, 4 inch square mesh;

To accommodate changes in bycatch rates that would likely be caused by a mesh regulation of the BSAI rock sole fishery, rock sole would be separated out from the other trawl category in the Vessel Incentive Program and assigned a maximum allowable rate.

Option: Set mesh regulations for only the rock sole, Pacific cod, or pollock fishery.

Alternative 3. Similar to Alternative 2, except mesh would be square configuration, and of slightly smaller size. Under this alternative, regulations would require codends to have a single layer top panel with the following minimum mesh sizes in the trawl fisheries specified:

- BSAI rock sole and BSAI and GOA Pacific cod, 6 inch square mesh;
- GOA and BSAI pollock, 3.25 inch square mesh;

To accommodate changes in bycatch rates that would likely be caused by a mesh regulation of the BSAI rock sole fishery, rock sole would be separated out from the other trawl category in the Vessel Incentive Program and assigned a maximum allowable rate.

Option 1: Set mesh regulations for only the rock sole, Pacific cod, or pollock fishery.
Option 2: Entire codends, rather than just the top panel, could be made of single layer diamond mesh with the same BK size as specified above.

An executive summary for the analysis is attached as agenda item D-4(b)(2). If the Council takes final action at this meeting, regulations may be published in early 1995.

After the draft EA/RIR was released for review, NMFS staff and the Fisheries Research Institute (FRI) jointly revised the analysis of potential changes in yield and discarding. Revisions were made using empirical data from recent mesh selectivity studies for BSAI pollock, and a different theoretical model based on morphology. The analysis suggests that the proposed alternatives may result in less retention of juvenile pollock (hence, lower discard) than reported in the draft EA/RIR. Dr. Ellen Pikitch (FRI) has requested an opportunity to report on these results.

DRAFT FOR PUBLIC AND COUNCIL REVIEW

ENVIRONMENTAL ASSESSMENT and REGULATORY IMPACT REVIEW/INITIAL REGULATORY FLEXIBILITY ANALYSIS FOR A PROPOSED REGULATORY AMENDMENT TO IMPROVE TOTAL CATCH WEIGHT ESTIMATES IN THE GROUNDFISH FISHERIES OFF ALASKA

Prepared by

National Marine Fisheries Service
Juneau, Alaska

September 6, 1994

Executive Summary

The National Marine Fisheries Service (NMFS) has the responsibility to provide information to the Council on groundfish stock status; to manage the commercial fisheries within catch, prohibited species bycatch, and overfishing limits established by NMFS in consultation with the Council; and to consider the impact of commercial fishing activities on other non-targeted marine life. NMFS needs accurate estimates of total catch weight and the species composition of the catch to fulfill these responsibilities.

Purpose of and need for the action

The purpose of this analysis is to examine current methods of estimating total catch weight in the groundfish fisheries, to assess the need for improved equipment and procedures for making these estimates, and to analyze the impact of various alternatives to improve total catch weight estimates.

Current methods for estimating total catch weight for each species or species group managed under a total allowable catch (TAC) level differ among the various processor and vessel types. Processor vessels are required to report processed product weight and the estimated weight of discards by species or species group; shoreside processors are required to report the landed weight of groundfish; and catcher vessels are required to estimate the weight of discards at sea by species or species group. In addition, observers report estimates of catch and discard based on a combination of independent observations and vessel or processor logbook data.

NMFS does not know whether the methods currently used provide a reasonably accurate estimate of catch weight or whether there is substantial error in these estimates. In general, problems associated with catch estimation procedures have to do with either the uncertainty associated with making estimates of the catch weight by species or species group or with monitoring the equipment or procedures used to estimate catch weight. Some of the problems apply to all processor and vessel types and others apply to specific operations. These problems are discussed in Section 1.3 and can be summarized in the following five categories:

1. problems evaluating current methods to estimate total catch weight;
2. problems estimating the catch weight of groundfish retained on processor vessels;
3. problems estimating at-sea discards from processor and catcher vessels;
4. problems with observers' estimates of catch weight by species or species group; and
5. problems with catch estimates for unobserved processors and catcher vessels.

Alternatives

Five alternatives are analyzed:

Alternative 1: status quo.

Alternative 2: standardize and improve current methods of catch estimation for trawl catcher/processors and mothership processor vessels.

Trawl catcher/processors and mothership processors must have marked, measured, and certified fish receiving bins in which all catch is placed for volumetric estimates of the total catch weight prior to discard or processing.

Alternative 3: the total weight of all catch harvested or processed by processors with 100 percent observer coverage must be assessed using either Option A or B prior to discard or processing.

Alternative 4: the total weight of all catch harvested or processed by all processors must be assessed using either Option A or B prior to discard or processing.

Alternative 5: the total weight of all catch in the groundfish fisheries must be assessed prior to discard or processing.

All catch estimates or measurements made at sea must be on a vessel with an observer onboard.

Vessels without an observer onboard must retain all catch until it can be weighed or the weight estimated onboard a vessel or in a shoreside processing plant with an observer.

Option A or B must be specified under Alternatives 3, 4, or 5

Option A: Scales

The weight of all catch must be determined by weighing on a scale that meets specific performance standards.

Option B: Approved procedures

The weight of all catch must be determined within a specified range of accuracy by any approved procedure as long as such methods are verified by weight.

Impacts of the alternatives

The alternatives are described in Section 1.4 and the economic impacts of the alternatives are discussed in Section 3.2. Conclusions are summarized below.

Alternative 2, the requirement for certified fish receiving bins on all trawl catcher/processors and mothership processors, would improve several elements in the procedure to estimate the total catch weight using volumetric methods, namely the ability of the observer to estimate the volume of fish in the bin. In addition, bin sensors could be used to assist the observer in determining the level of fish in the bin. However, Alternative 2 will not improve the observers' ability to estimate density factors which are used to convert the estimate of volume of fish in the bins into a total catch weight estimate. In all fisheries except the pelagic pollock fishery, observers will probably have to continue to sample for the density of as many hauls as possible under difficult sampling conditions. In terms of the problems listed above, Alternative 2 would improve the estimation of total catch weight on trawl catcher/processors and mothership processors but not on any other vessels or processors such as HAL or pot catcher/processors, catcher vessels, or shoreside processing plants. In addition, problems associated with estimates of total catch weight by species group or estimates on unobserved vessels would not be addressed by Alternative 2.

Certified bins are estimated to cost between $3,000 and $5,000 for processor vessels that do not have to make substantial modifications to make their bins visually accessible. If enforcement concerns about the use of bin sensors can be resolved, these units could be purchased and installed for about $12,000 for a vessel with two fish bins. The equipment for additional bins would be about $2,000 per bin.

Alternatives 3 and 4 would require that all catch harvested by or delivered to processors be assessed using either marine scales (Option A) or some other approved procedure (Option B). Alternative 3 applies to all processors with 100 percent observer coverage and Alternative 4 applies to all processor vessels regardless of observer coverage level. As discussed in Section 1.4.1, there are limited means through which volumetric estimates could be "verified by weight" and, therefore, Alternative 2 was added to provide the option of volumetrics as an approved catch estimation procedure with no requirement for a performance standard. Any technology developed in the future for measuring fish weight at sea could be evaluated against the same performance and use standards developed for marine scales.

Marine scales under either Alternative 3 or 4 would address several of the problems listed above, including improved ability to evaluate methods for estimating total catch weight, improved catch weight estimates on processor vessels, and improved estimates of at-sea discards from processor vessels. Marine scales would provide the equipment necessary for both processors and observers to weigh total catch rather than to estimate weight.

Although properly designed and maintained marine scale systems provide the equipment necessary to accurately account for fish harvested by any vessel or processor type, there are no security or monitoring systems that can guarantee that all fish will be weighed or that information from the scales will be accurately reported to NMFS. The observer can provide an important compliance monitoring role but, even with 100 percent observer coverage, compliance cannot be assured. Observers can periodically test the accuracy of the scale and monitor use of the scale when they are on duty, but all activities on vessels which operate round the clock cannot be monitored by one person. Scales could

provide the equipment necessary for vessels with no observer onboard to accurately report their harvests, but monitoring of scale use on these vessels would be limited to spot checks during vessel boardings and audits of catch reports.

Marine scales are costly to purchase and install. NMFS estimates that each processor vessel will pay between $20,000 and $50,000 for each marine scale and from $5,000 to $25,000 to install the scale. Installation costs will vary depending on the modifications necessary to accommodate the scale and the changes in the sorting and discarding operations. These costs could be substantially more than $25,000 for vessels with already very crowded factories. Some vessels may choose to install more than one scale due to their inability to modify their vessel or factory to weigh all groundfish at a single point.

A variety of other costs are associated with a requirement for vessels to install marine scales including the cost of reduced efficiency as a result of changes in procedures for harvesting, sorting, discarding, or processing groundfish. For example, sorting space will be reduced and processing equipment will have to be moved to accommodate the scale, reducing the efficiency of the factory. These costs also will vary among the vessels depending on factory configuration. Additional crew time will be required to monitor and record information from the scale and to test, maintain, and repair the scale. Finally, vessel operators may choose to purchase spare parts or a back-up scale depending on the amount of fishing time that could be lost if the scales break down.

Requiring hook-and-line vessels to bring all fish, except halibut, onboard the vessel to be weighed prior to discard would increase the mortality rate for any bycatch species that currently survive the process of being hooked, brought to the surface, and released. Although no research has been done on the hook and release mortality of most groundfish species in commercial longline fisheries, NMFS believes that many of the discarded groundfish have high mortality rates. Rockfish and, depending on the depth of the gear, Pacific cod, experience high mortality as a result of being brought to the surface on the longline gear. The survival of other species such as halibut, sablefish, and other flatfish depend primarily on how carefully they are released from the hook.

An estimated 18 percent of 1993 groundfish harvests, by hook-and-line catcher/processors were reported to be discards. Almost half of these discards were identified as unspecified other groundfish, about a quarter were Pacific cod, ten percent were arrowtooth flounder, and two percent were rockfish.

Alternative 5 would apply to all catcher/processors, mothership processors, catcher vessels, and shoreside processing plants. Vessels would have the option to have an observer and weigh any fish processed or discarded at sea or to retain all catch until it could be weighed on an observed vessel or in an observed plant. All shoreside processing plants would be required to have observer coverage when groundfish are landed. Successful implementation of Alternative 5 would address most of the problems listed above including improved ability to evaluate methods for estimating total catch weight, improved catch weight estimates on processor vessels, and improved estimates of at-sea discards from processors and vessels with observers. However, evaluation of species composition sampling would continue to be needed and compliance with a full retention regulation on unobserved vessels would not be assured.

Alternative 5 has several important impacts in addition to those also covered by Alternatives 3 and 4. They are: (1) assessment of at-sea discards on catcher vessels, (2) the question of full retention, and (3) the impact of increases in observer coverage.

At-sea discards on catcher vessels: Catcher vessels differ from processor vessels in several ways that are relevant in terms of evaluating catch estimation procedures. First, observers on catcher vessels are not responsible for total catch weight estimation, but rather for estimating the weight and species composition of discards; almost all discarding can be observed by one observer on the catcher vessels; and retained catch is sorted and weighed by species group at the shoreside processing plant.

Currently, NMFS expands information about the weight and species composition of at-sea discards on observed vessels to the unobserved vessels in a particular target fishery (See Table 2). The accuracy of this method of estimating total at-sea discards is unknown. Evaluation of or improvements to these methods could be accomplished by either improving equipment available to observers to estimate at-sea discards, by increasing observer coverage, or both. As discussed below, increases in observer coverage for 30 percent observed catcher vessels would be expensive. Scales on observed catcher vessels could improve the accuracy of estimates of that portion of discards that come onboard the vessel. The purchase and installation costs for marine scales to weigh at sea discards from catcher vessels would range from $15,000 to over $50,000 per vessel, depending on the characteristics of the discarding operation and the scale.

Full retention: Alternative 5 was added to the analysis in June, 1994 leaving insufficient time to fully analyze the impacts of some aspects of this alternative, specifically, the requirement that all catcher vessels have either observer coverage and a marine scale or retain all catch until it is weighed at an observed processing plant or on an observed vessel. Specifically, NMFS believes that many unobserved catcher vessels would choose full retention rather than an observer and a scale. The economic impact of this choice on these catcher vessels and the shoreside processing plants to which they deliver will be addressed in a future analysis of full retention scheduled for completion in Spring, 1995.

Increased observer coverage: Substantial increases in observer coverage such as increased coverage for 30 percent observed vessels or two observers on all processor vessels would require a Magnuson Act amendment to increase the allowable fee assessment from the current 2 percent (see Table 9). Less substantial increases in observer coverage that would fall within the budget of the current Observer Plan (Research Plan) could be considered now, or in the future through the Observer Oversight Committee.

DRAFT DRAFT

MEMORANDUM

DATE: July 12, 1994

TO: Dave Witherell, NPFMC

FROM: Mesh Size Regulation Committee

Spike Jones	Snowking, Inc.
Steve Hughes	NRC/UCB
Mike Zebko	F/T Arica and Cape Horn
Rex Estes	Gourock
Lee Alverson	NRC/Highliners
Dave Benson	Arctic Alaska
Al Burch	Alaska Draggers Assn.
Mike Szymanski	Fishing Company of Alaska
Walter T. Hunnings	U.S.C.G. D.17 Juneau
Lori Swanson	Net Systems
Glen Kramer	Net Systems
John Henderschedt	Golden Age Fisheries

SUBJECT: Recommended Mesh Size Regulations

The ad-hoc mesh size regulation committee, with the above individuals in attendance, met in Seattle on June 28,1994, between 9:00 a.m. - 12:00 noon (Attachment 1) and formulated the following recommendations:

1. All industry members present believe that mesh size regulations are a high priority and that adequate information and experience exists upon which to make substantial improvements over the current (no mesh size) management practices. We also realize that refinements will likely be needed in future years as more experience is gained. Accordingly, a regulatory framework is recommended which will be "tune up" friendly.

2. We recommend that codend mesh size regulations apply to the top quarter panel only, for the entire codend length except as later noted for a small linear and chafing gear under lifting straps.

3. We recommend that the codend's top quarter panel measure no less than 3' between top quarter panel riblines for codends deployed aboard vessels less than 125' LOA, and no less than 4' if deployed aboard vessels 125' LOA and greater.

4. We recommend that the top quarter panel in all instances be constructed of single layer, square mesh.

5. For Bering Sea/Aleutian Islands cod, rocksole and Gulf of Alaska cod we recommend the following codend mesh size regulations.

   - top quarter panel of codends be constructed of 6" BK square mesh, single layer, no less than 12 bars wide for vessels less than 125' LOA and no less than 16 bars for vessels 125' or LOA or greater

   - a maximum of the AFT 3' of codends measured along riblines may be equipped with a codend liner of any size mesh

   - codend's top panel may be equipped with a maximum of 6' in width of double web for chafing gear under the lifting straps

6. For Bering Sea/Aleutian Islands and Gulf of Alaska pollock we recommend the following codend mesh size regulations apply to both bottom and pelagic trawls

   - top quarter panel of codends be constructed of 3 1/4" (82.5 mm) BK square mesh, single layer, no less than 18 bars wide for vessels less than 125' LOA and no less than 24 bars in width for vessels 125' LOA or greater

   - a maximum of the aft 3' of codend measured along riblines may be equipped with a codend liner of any size mesh

   - codends top panel may be equipped with a maximum of 9' in width measured along the riblines of double web for chafing gear under the lifting straps

These recommendations and particularly where they differ from specifications previously given to the Council, stem primarily from enforcement concerns, availability of webbing materials and net builders inputs to the committee.

Limiting regulations to two codend sizes will simplify enforcement as will the use of only square mesh in the top panel. We feel this also addresses the fact that cod in the Gulf are somewhat smaller than in the Bering Sea and vessels commonly fish both areas. Square mesh avoids the complication of hanging ratio descriptions for diamond mesh and simplifies enforcement to simply counting bars in the top panel and measuring chafing gear under splitting straps and the linear with a tape measure. These aspects, we believe, will be both easily understood by the industry and enforcement, as well as easily and quickly checked by U.S.C.G. boarding parties. Further, all mesh size tests will be conducted by a calibrated pass through wedge using a standardized weight.

We hope these comments are useful and we can reconvene to discuss additional details if the Council believes beneficial.

DRAFT FOR COUNCIL and PUBLIC REVIEW

ENVIRONMENTAL ASSESSMENT/REGULATORY IMPACT REVIEW/
INITIAL REGULATORY FLEXIBILITY ANALYSIS
of a

REGULATORY AMENDMENT

TO REQUIRE MINIMUM MESH SIZES

for codends used in the directed
Pacific cod, rock sole, and pollock fisheries
in the
Bering Sea and Aleutian Islands and
Gulf of Alaska Management Areas

AND
TO SEPARATE ROCK SOLE FROM THE OTHER TRAWL CATEGORY

for vessel incentive program bycatch rates
in the
Bering Sea and Aleutian Islands Area

Prepared by Staffs of the

North Pacific Fishery Management Council
Alaska Fisheries Science Center, National Marine Fisheries Service
Alaska Region Office, National Marine Fisheries Service

September 7, 1994

EXECUTIVE SUMMARY

Discarding of fish in the North Pacific is a growing public concern. Bycatch of non-target species or unwanted fish occurs with all gear types, including trawl gear. Approximately 4-8% of the pollock (Theragra chalcogramma) and 3-13% of the Pacific cod (Gadus macrocephalus) harvested by trawl gear in the 1992 and 1993 BSAI and GOA directed fisheries were discarded. A higher percentage (50-58%) of rock sole (Pleuronectes bilineatus) were discarded, perhaps due to the fishery targeting on the larger roe-bearing females. These species are also captured in other target fisheries, and may be discarded. Overall discards of Pacific cod from 1992 and 1993 trawl fisheries were 7% - 15% in the GOA, and 29%-37% in the BSAI. Overall discards of pollock from 1992 and 1993 fisheries (primarily trawl gear) were 8%- 18% in the GOA and 9% - 10% in the BSAI. Discard rates of rock sole were 63% in 1992 and 67% in the 1993 BSAI fisheries (all gears).

Gear can be modified to catch larger fish, and thus gear regulations may have some potential to reduce discarding. For trawl gear, one such modification is to increase the size of the holes in the net, allowing smaller fish to pass through and not be retained. The purpose of the proposed alternatives to the status quo is to allow the escapement of juvenile pollock, Pacific cod, and rock sole, resulting in fewer discards and a higher percentage of larger fish.

At the present time, groundfish regulations do not require a minimum mesh size or a particular design configuration for codends used in the North Pacific trawl fisheries. Although fishermen could voluntarily increase their mesh size used in codends (and some have), many have not done so because of limited TAC, and the resulting race for fish. Currently, codend mesh used in these trawl fisheries is diamond or square mesh, with sizes ranging from 1.2" to 8" (30 mm - 203 mm) stretched measure. Codend designs currently in use include either single, double, or triple layer mesh, zero to four rigid riblines, and knot or knotless mesh. The three Alternatives examined were:

Alternative 1. Status quo. Codends used in North Pacific trawl fisheries would not require minimum mesh size or configuration.

Alternative 2. Under this alternative, regulations would require codends used in listed trawl fisheries to be constructed with the following specifications:

- for the BSAI rock sole fishery and GOA Pacific cod fishery, a minimum of 155 mm (6 inch) stretched measure diamond mesh (between knot measure), single layer mesh top panel;
- for the BSAI Pacific cod fishery, a minimum of 203 mm (8 inch) stretched measure diamond mesh (between knot measure), single layer mesh top panel;
- for the GOA and BSAI pollock fisheries, a minimum of 102 mm (4 inch) stretched measure square mesh (between knot measure), single layer mesh top panel;

In addition, codends for the above pollock, rock sole, and Pacific cod fisheries would require the following:

- at least four riblines made of material having little elasticity;
- diamond mesh used in the codend top panels must be hung in at least 7%;
- chafing gear and other accessories be confined to the lower half of the codend.

To accommodate changes in bycatch rates that would likely be caused by a mesh regulation of the BSAI rock sole fishery, rock sole would separated out from the other trawl category in the Vessel Incentive Program and assigned a maximum allowable rate.

Option: Set mesh regulations for only the rock sole, Pacific cod, or pollock fishery.

Alternative 3. Similar to Alternative 2, except mesh would be square configuration, and of slightly smaller size. Under this alternative, regulations would require codends used in listed trawl fisheries to be constructed with the following specifications:

- for the BSAI rock sole fishery, and the BSAI and GOA Pacific cod fisheries, a minimum of 155 mm (6 inch) stretched measure (between knot measure), single layer square mesh top panel;

- for the GOA and BSAI pollock fisheries, a minimum of 82.5 mm (3.25 inch) stretched measure square mesh (between knot measure), single layer square mesh top panel;

In addition, codends for the above pollock, rock sole, and Pacific cod fisheries would require the following:

- codend top quarter panel measure no less than 3 feet between top riblines (no less than 12 bars wide of 6" mesh, or no less than 18 bars wide of 3.25" mesh) for vessels less than 125' LOA; and no less than 4 feet in width (no less than 16 bars in width of 6" mesh or no less than 24 bars in width of 3.25" mesh) if deployed aboard vessels 125' LOA and greater;
- a maximum of the aft 3 feet of codends measured along riblines may be equipped with a codend liner of any mesh size;
- the codend's top panel may be equipped with a maximum of 6 feet in width of double web for chafing gear under the lifting straps for Pacific cod and rocksole fisheries, and a maximum of 9' in width measured along the riblines of double web for chafing gear under the lifting straps for pollock fisheries.

To accommodate changes in bycatch rates that would likely be caused by a mesh regulation of the BSAI rock sole fishery, rock sole would separated out from the other trawl category in the Vessel Incentive Program and assigned a maximum allowable rate.

Option 1: Set mesh regulations for only the rock sole, Pacific cod, or pollock fishery.
Option 2: Entire codends, rather than just the top panel, could be made of single layer diamond mesh with the same BK size as specified above.

Potential Impacts on Discards and Bycatch

Potential impacts of a trawl mesh regulation in the North Pacific groundfish fisheries are difficult to estimate given available information and the complex nature of these fisheries. Mesh selectivity studies are generally specific to species, area, and fishery, and mesh selectivity studies of North Pacific groundfish species are very limited. The multi-species nature of many North Pacific trawl fisheries further exacerbates the difficulties associated with estimating impacts of proposed mesh regulations. While this analysis provides some information to assist in determining relative impacts between the two alternatives and the status quo, absolute impacts of these alternatives cannot be assessed given available information.

Yield-per-recruit models failed to provide quantitative estimates of potential changes in discarding of pollock under Alternative 2 or 3. Alternative 3 (3.25" mesh) may result in a size composition of pollock to be about the same as in the current fishery. Alternative 2 (4" mesh), however, may perform somewhat better and reduce the numbers of pollock taken by about 5%. Because these reductions would consist mostly of small fish, reductions in discarding of pollock in the directed fishery may be significant assuming that discards consist primarily of small fish. These results were consistent with previous analysis of similar mesh size codends (3.5" and 4.25" square mesh top panel) for the pollock fishery (NPFMC 1993). That analysis indicated that 4.25" square mesh may result in catches of pollock consisting of less than 1% of pollock under 35 cm (14").

In the rock sole fishery, discarding may be reduced under Alternatives 2 and 3, but may occur at some level, regardless of mesh size used. A large part of the bycatch has been rock sole males and other flatfish species which may continue to be captured and discarded because of lower economic value. Proposed alternatives to the status quo may be expected to reduce catch of small rock sole (particularly males less than 12"), but the extent of these reductions is difficult to quantify. Nevertheless, under the assumptions of the analysis, catch per effort for rock sole would be reduced, indicating a reduced catch (and potential discard) of small rock sole.

For Pacific cod, the analysis using selectivity curves generated from Atlantic cod suggests that discarding could be greatly reduced under either Alternative 2 or 3. Under Alternative 2 (8" mesh), half of all cod 81 cm (32") might escape, and very few cod under marketable size should be captured. The analysis suggests that Alternative 3 may also reduce discarding, as the 50% selection size for 6" square mesh is 65 cm. However, analysis using selectivity of Pacific cod based on morphology suggested that a 6" mesh may result in discard rates no different from the status quo. On the other hand, 6" single layer mesh has larger holes in the web than currently in use, and one would expect a reduction in discards under this alternative.

One factor not incorporated into the models was the amount of escapement mortality which may occur to small fish after they have been filtered through the codends. Fish escaping from codends may undergo stress, scale loss, or contusions resulting in delayed mortality, and therefore have a potentially high escapement mortality rate. Although escapement mortality may occur at some level in the current fisheries, an increase in mesh size, combined with increased effort, may filter more small fish through codends. Escapement mortality may offset any potential gains in yield and spawning biomass-per-recruit, and increase the odds of exceeding ABCs.

To accommodate changes in bycatch rates that may be caused by a mesh regulation of the BSAI rock sole fishery, rock sole would separated out from the other trawl category in the Vessel Incentive Program and assigned a maximum allowable rate. Because CPUE for rock sole may decrease by about 27%-55% under Alternatives 2 and 3, a bycatch rate standard for rock sole fisheries for the VIP program may need to be in the order of 46.5 kg of halibut and 3.9 crab per metric ton of groundfish. The other trawl category could remain at 30 kg of halibut and 2.5 crab per metric ton of groundfish, however this rate may need to be adjusted to accommodate potential changes in CPUE for Pacific cod under proposed alternatives.

Potential Costs and Benefits

There may be costs and benefits associated with each alternative. By staying with the status quo, fishermen may neither incur additional monetary costs nor accrue additional benefits. Status quo, however, may perpetuate discarding of juvenile fish that are taken as bycatch. In the current situation for the race for fish, fishermen may not be inclined to voluntarily increase mesh size, as this may reduce their catch per unit effort, and hence revenues. Direct costs may outweigh benefits to fishermen for both

Alternative 2 and 3. This is because regulations proposed under alternatives 2 and 3 may have some costs to fishermen in the form of purchasing new codends, increased effort required to catch target fish, and lower total yield given halibut and crab PSC caps.

Cost to replace codend top panels, including labor, is about $570 for knotted diamond mesh top panel codends (Alternative 2) and $1,475 for knotless square mesh top panel codends (Alternative 3) proposed for the rock sole and Pacific cod fisheries. For the pollock fisheries, an average cost of $2,935 is estimated for each codend top panel replacement under either Alternative 2 or 3, assuming knotless polyethylene mesh is used. Costs would be higher if vessels use netting made from material stronger than polyethylene, and lower if vessels used knotted polyethylene. Vessels may use between three and five codends per year in these fisheries.

Costs may also result from lost yield and increased effort required to catch fish, as projected under Alternatives 2 and 3 for Pacific cod and rock sole and Alternative 2 for pollock. For example, more than twice the current effort may be required to take the BSAI trawl TAC for Pacific cod under Alternatives 2 and 3. In addition, the ABC (and hence TAC) might be reduced by 25%. However, PSC caps may shut down the fishery (due to increased effort) prior to even this lower TAC being taken by trawl gear. This is likely because the catch-per-unit-effort (CPUE) for cod may be reduced by about 50% under Alternative 3 analysis, but the CPUE for PSC halibut is unlikely to be much reduced. Recall that the Pacific cod trawl fishery was constrained in the BSAI in 1994 due to halibut PSC. It may be reasonable to assume that under Alternative 3, if cod CPUE is reduced 50%, then catch in the directed fishery may also be reduced about 50%. Alternative 2 may further reduce catch by the BSAI Pacific cod trawl fishery because the CPUE for cod might be even lower. Under this scenario, the trawl fishery would then be unlikely to take its apportionment of the quota. Other gear components may also be affected, as the analysis projects that overall ABC may need to be reduced by 25% in the first year because of a higher fishing mortality.

Costs will also be associated with management and enforcement of mesh regulations. Potential problems encountered include: 1) how the mesh is measured, 2) definition of a codend, 3) requirements of mesh configuration, 4) at-sea enforcement. Mesh measurements can be defined by the stretched measure, bar measure, or between knot (BK) measure. Defining the various parts of a trawl and regulating mesh configuration can also be problematic, as these regulations often contain loopholes. Methods to restrict mesh openings in the codend are numerous; codend liners, twisted meshes, tight hang-in of meshes, net strengtheners and other methods may be used to circumvent mesh regulations if there is incentive to do so. Because there may be additional time and gear required to enforce mesh sizes, the proposed alternatives to the status quo may result in higher enforcement costs. Management costs will be incurred each time an adjustment is made to the regulations in order to "fine-tune" codend specifications.

Benefits may accrue to fishermen in the form of less sorting time required, and capture of larger, more valuable fish. The proportion of usable size fish in each haul may increase under larger mesh size, and this may offset some of costs associated with catching fewer fish. Benefits may also accrue due to the non-capture of small fish, resulting in more fish made available to all fisheries in future years. For example, in 1993 27,620 mt of pollock were caught and subsequently discarded in the BSAI cod trawl fishery. Presumably, a portion of these pollock would neither be caught nor discarded under the alternative mesh sizes proposed for the cod fisheries. Reductions in discarding of non-target species may occur in fisheries that mesh size is regulated. In turn, these fish would be available immediately to other fisheries or components of the ecosystem, and also may contribute to future catches or spawning stocks. There may also be benefits to the trawl fishery associated with addressing public concerns about discarding. Several trawl industry representatives have testified that they are requesting mesh regulations to address this concern.

In summary, it is difficult to reach a scientific conclusion regarding this amendment proposal. In terms of discards, mandating codend minimum mesh sizes that on average are larger than currently exist in the fisheries could potentially reduce discarding. However, variations in year-class strength will affect discard rates, and regulating mesh size may eliminate some flexibility fishermen currently have in selecting an optimal mesh size. Benefits and costs of the proposal are difficult to quantify given available information.

Testimony of
North Pacific Fishing Inc.
Pathfinder USA, Inc.
4039, 21st Avenue West, #201, Seattle, WA 98199

RE: Total Weight Measurement, Agenda Item D-4(a)

Mr. Chairman:

My name is Rob Gudmundson. I represent the catcher/processor vessels F/V AMERICAN NO. 1 and F/V PATHFINDER which participate in the groundfish fisheries of the North Pacific. One of these vessels is a trawler; the other is a longliner. We are concerned with the total weight measurement proposal which is now before you. It appears to be a blank check that will cost our vessels hundreds of thousands of dollars in modifications and lost efficiency with no clear gain in conserving the fisheries resources.

The following are specific concerns and comments that we would like to raise based on the analysis:

1. The draft analysis prepared by the National Marine Fisheries Service (NMFS) implies that NMFS does not know how accurate the current system is for measuring the total weight of groundfish harvest is, but believes that it is unsatisfactory. Pages 1 and 2 of the analysis state that, "NMFS cannot quantify the accuracy of current catch estimates..."

It is unclear why, in the absence of an ability to assess the accuracy of the current system, a new system must be put into place. It is even more unclear why no studies can be performed to determine the accuracy of the current system prior to mandating a new one.

While page 10 of the analysis states that research necessary to determine the accuracy of current catch estimation would be costly and time consuming, the analysis also states that NMFS has several ongoing projects, including:

a) Testing motion-compensated platform scales as a replacement for the current hanging scales used by observers, and

b) a comparison of codend volume estimates, volumetric estimates, and in-line scale weights on the one catcher/processor that has all three methods of sampling available to it (Draft EA/RIR, page 22).

While these studies may not answer every concern NMFS has, the results would certainly provide the Council with more concrete data with which to analyze the total weight measurement proposal without going to any additional expense or utilizing any additional staff time.

2. There seem to be several different assumptions that NMFS is using in the current analysis. For instance, in analyzing option A: Marine scales, on page 19, the analysis states that:

> **"Scales used in shoreside processing plants...usually have to meet accuracy standards of less than 0.10 percent."**

However, page 9 of the NMFS analysis also states that while certified scales are required to be used by shoreside processing plants:

> **"...due to limited resources...only scales in major ports are certified. Many scales in processing plants have never been inspected or certified....There are few shoreplants in Alaska in which all scales pass annual performance tests....independent, licensed, and bonded repair services do not exist in Alaska."**

The NMFS analysis indicates the difficulties that shore-based processing plants are experiencing in maintaining accurate scales. Since many plants do not possess properly inspected scales, it is difficult to conclude that catcher/processor vessels will have more success in meeting new scale requirements.

4. While increased observer coverage under Alternative 5 would provide better monitoring of catch, there is no analysis of the cost of providing observer coverage at all shore plants to monitor 100% of offloads and compare fish ticket weights with observed weights using the existing scales.

3. Another point of concern is the portion of the analysis on page iv that states:

> **"Requiring hook-and-line vessels to bring all fish, except halibut, onboard the vessel to be weighed prior to discard would increase the mortality rate for any bycatch....Although no research has been done ... NMFS believes that many of the discarded groundfish have high mortality rates."**

This seems to be saying that NMFS would rather see an uncertain increase in the accuracy of harvest weight and is not concerned with the resulting definite increase in the mortality of fish that we bring onboard. New policies that increase the mortality of fish by requiring that they be killed in order to assure their accurate weight assessment could be counterproductive to the conservation and management of the resource.

4. The analysis gives several different estimates for the cost of placing scales onboard vessels but never attempts to assess the total cost to the nation in any of the proposals. The analysis also does not attempt to estimate the opportunity costs in lost sorting and processing space.

5. The analysis points out that headed and gutted product (H&G) vessels have higher product recovery rates than surimi vessels, causing the catch weight estimates on H&G vessels to be much more accurate than those on surimi vessels. We therefore recommend that the Council analyze the effect of requiring in-line scales only on surimi vessels and not H&G vessels. This may be particularly important since the analysis concludes that the cost of modifying vessels to handle in-line scales would be most expensive on vessels that are already crowded (Draft EA/RIR, page 37).

6. While a new system of measurement may be necessary in order to implement individual fishing quotas, it seems clear that this question of applying greater precision to catch estimates with the precision in the range of three percent becomes a question that should be included in the analysis of the costs, benefits, and implementation of an individual quota system, not as a separate issue.

7. Given the uncertainty of accuracy for both the current and proposed weight measurement systems, and the lack of completed studies to assess this uncertainty, the Council does not have available to it any data on which to base a cost benefit analysis of changing the current catch weight measurement system. The Council therefore has no information with which to assess the value of a new system. We recommend that the Council ask the following questions:

a) What specifically is the accuracy of the current system compared to the accuracy of the proposed system(s)?

b) Given that commercial catcher vessels, which presumably are not equipped with scales to measure total harvest weight, are used to survey the stocks, what accuracy exists in the total stock assessment from a lack of scales, and how does this compare to the accuracy of NMFS harvest calculations?

c) If a new system is put into place, how much will it improve stock assessment and management compared to the cost?

d) What would the economic or environmental gain or loss to the nation be from implementing a scale system for total weight measurement?

As members of the industry that will be required to pay for any modifications in harvest assessment, we urge NMFS to utilize its resources to study the accuracy of the new and proposed measurement systems before the Council mandates the industry's expenditure of tens of millions of dollars or more in order to eliminate what has been termed an unknown but "controllable source of error." (SSC minutes, page 5, April 1994.)

Robert Gudmundson

Trawl Mesh Analysis Summary

Purpose and Need = reduce discarding and increase proportion of usable TAC
Proposed Regulation = specify trawl gear configuration to filter out small fish in the pollock, Pacific cod, and rock sole fisheries

* Alternative 1: status quo
* Alternative 2: **diamond** mesh top panel codends
  4" for pollock in GOA and BSAI
  6" for rock sole in BSAI
  8" for BSAI cod
* Alternative 3: **square** mesh top panel codends
  3.25" for pollock in GOA and BSAI
  6" for rock sole in BSAI
  6" for Pacific cod in BSAI and GOA

  * option 1: set mesh regulations for only one or two fisheries
  * option 2: require single layer mesh on entire codends

  * VIP change: rock sole separated from "other trawl" category

Methods: Yield per recruit analysis using Bublitz's morphometric based mesh selectivity curves (pollock and cod), and selectivity experiments on Atlantic cod and yellowtail flounder as a proxy for Pacific cod and rock sole, respectively.

Assumptions:
0% escapement mortality
knife-edge selectivity
theoretical morphometric selectivity and proxy selectivity
all escapement will occur through top panel
vessels will use minimum mesh as regulated

Results: Reductions in discarding are difficult to quantify given available information. However, single layer mesh consisting of larger mesh sizes than currently used may lower catch of small fish. Lengths at 50% retention (L_{50} in cm) provide relative selectivity between alternatives:

Alternative	pollock	rock sole	P. cod
1	L_{100} =27.0	L_{50}=29.0	L_{50}=53.0
2	L_{100}=34.0	L_{50}=32.2	L_{50}=81.3 (61.3 GOA)
3	L_{100}=29.0	L_{50}=31.0	L_{50}=65.0

VIP standards: CPUE for rock sole is projected to decrease by 27-55% under alternatives 2 and 3, bycatch rate standards may need to be increased up to 46.5 kg of halibut and 3.9 crab per mt of groundfish.

Costs:

codend top panel replacement
- rock sole and P. cod ($570 - 1,475 for each codend)
- pollock ($2,935 for each codend)

lost yield
- lower ABC in first year
- PSC limits may shut down fisheries before TAC taken.

increased effort (tow hours) required to catch fish.

management and enforcement

Benefits:

less sorting time

larger fish for processing

discarding reduced
- leaves more fish for ecosystem and fisheries
- addresses public concern about discards

Pollock yield-per-recruit

Richard Methot
Alaska Fisheries Science Center
September 29, 1994

Bublitz(1993) conducted a morphometric analysis designed to calculate mesh retention of pollock from measurement of body girth. Pollock selectivity curves used in the draft EA were based on one scenario in Bublitz's work. Further review of this work indicates that it is more appropriate to use an alternative scenario that assumes active escape behavior and that incorporates the variability in girth for fish of a given length. These changes substantially increase the estimated body length at 50% selectivity (L50). For a 4.75" square mesh (BK bar length = 60.5 mm) the estimated L50 increases from 41 cm to 49.2 cm. For 4.00" square mesh the L50 increases from 35 cm to 48.8 cm. These changes probably overestimate the actual L50 because the calculations assume that any fish that could escape will find a mesh hole and try to escape; this may not always occur with a top panel used in actual fishing conditions.

Preliminary results of field studies utilizing square mesh of 75 mm, 95 mm, and 108 mm became available following preparation of the draft EA. A regression of L50 on mesh size allows interpolation of the L50 for the mesh sizes considered in the EA:

mesh	3.25"	4.00"	4.75"
L50	38.3cm	43.7cm	49.2cm.

The range of measured selectivity for each mesh size was approximately 35 to 50 cm, which indicates variability between vessels and between fishing conditions for each vessels.

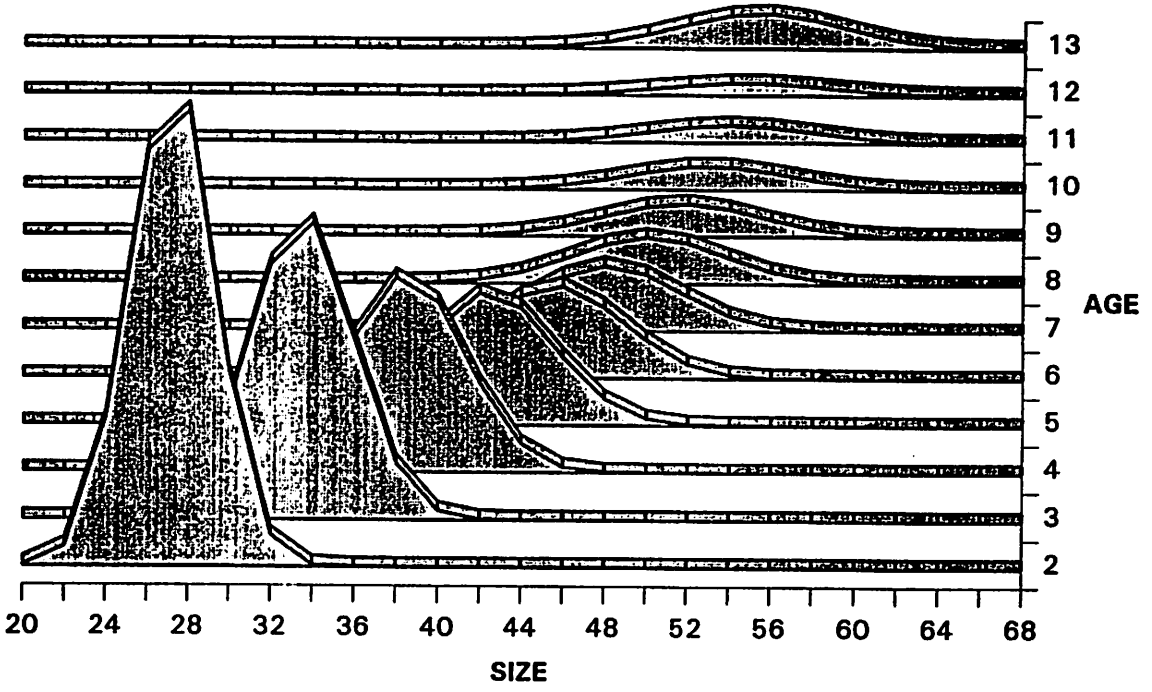
Estimates of L50 for the current fishery lie within the above range. Comparison of the 1991 fishery to the 1991 survey indicates an L50 of 46.7 cm, and the age-selectivity pattern reported in the 1993 SAFE implies an L50 of about 41 cm. These "whole-population" estimates of selectivity take into account more than the contribution of mesh selectivity.

The L50 values from the field experiments were used in a yield-per-recruit analysis. This analysis explicitly accounted for the distribution of size-at-age, rather than convert the size selectivities into equivalent age-selectivities and conduct the Y/R analysis with ages only.

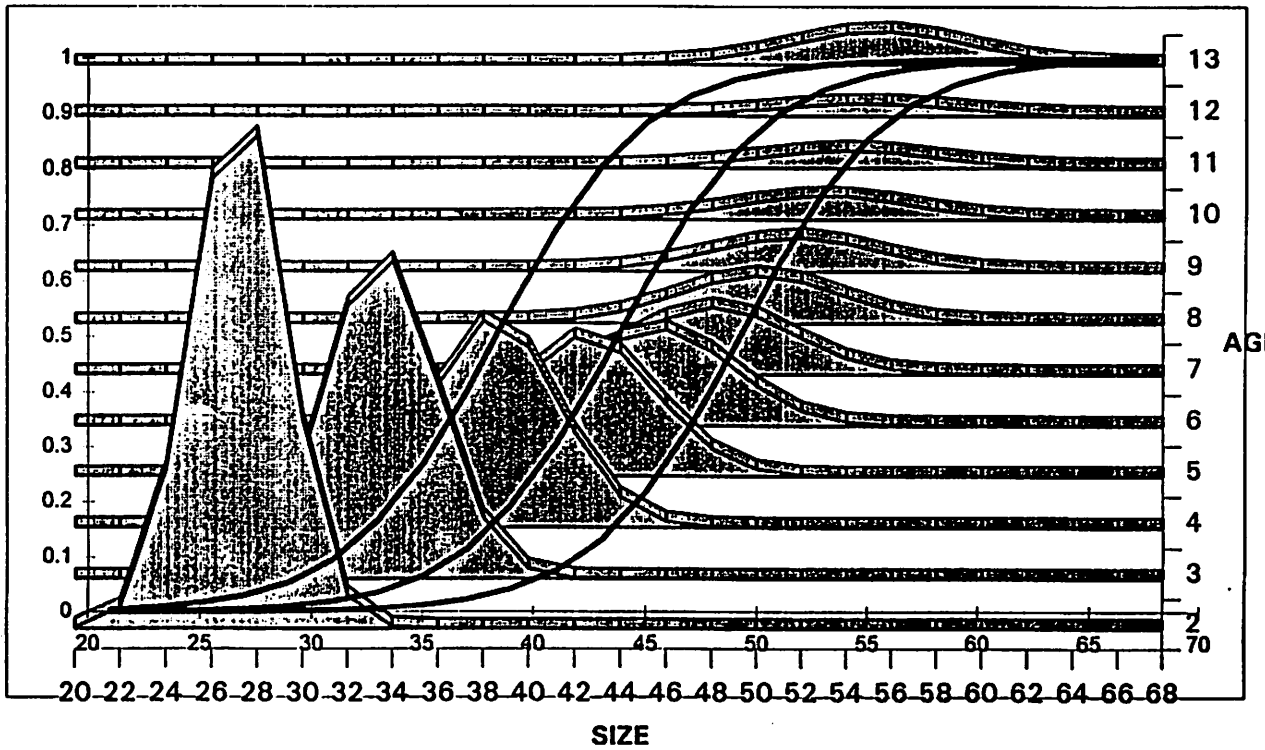
SUMMARY OF REVISED YIELD PER RECRUIT ANALYSIS FOR BERING SEA POLLOCK. NOTE THAT F=0.38 IS THE FISHING MORTALITY RATE ESTIMATED IN MOST RECENT AGE-BASED ASSESSMENT TO PRODUCE %S.P.R. = 35%.

		AT F=0.38		AT SPR=35%		
MESH	L50	YIELD	%SPR	YIELD	F	%Y<40cm
3.25"	38.3	1.04	39%	1.09	0.44	24%
CURRENT	41.0	1.00	45%	1.13	0.58	18%
4.00"	43.7	0.94	51%	1.18	0.83	13%
4.75"	49.2	0.75	65%	1.26	2.20	7%

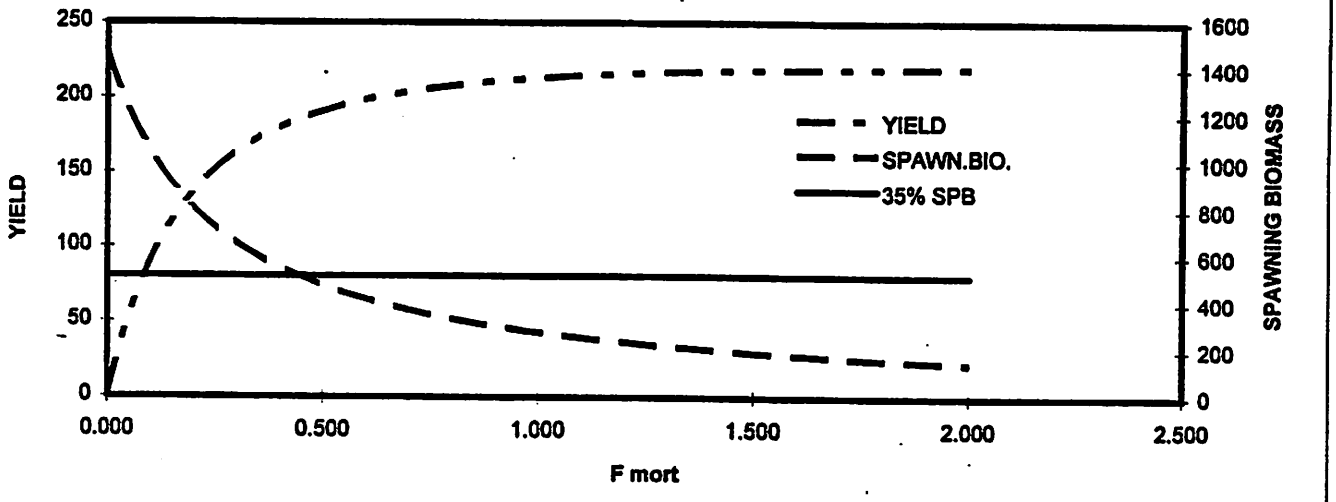
BERING SEA POLLOCK
SIZE-AT-AGE

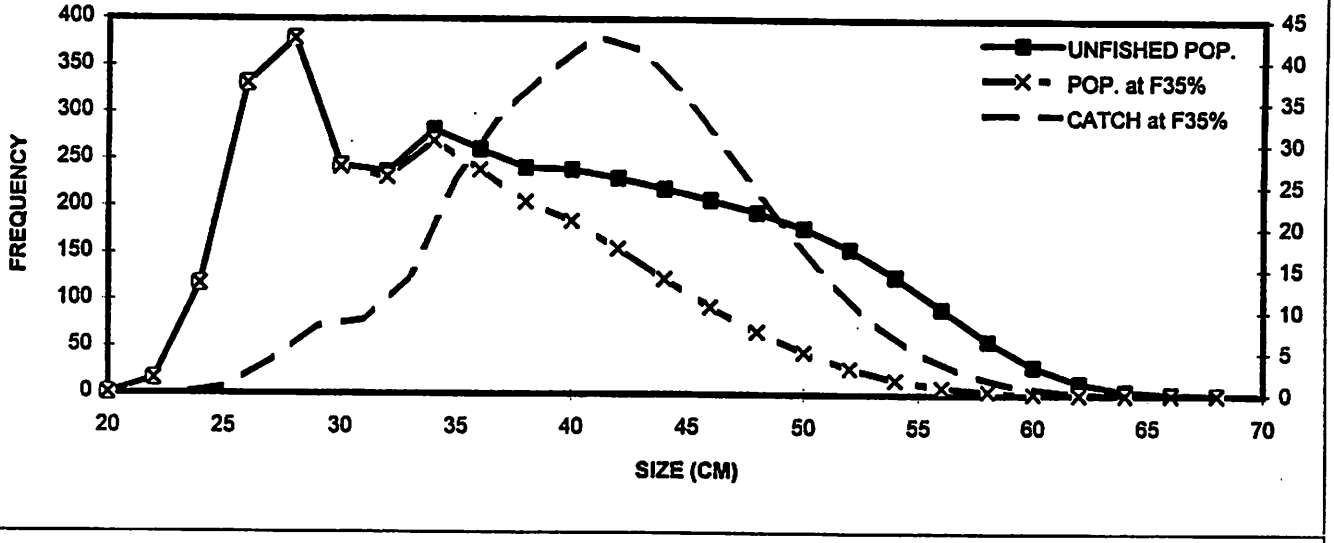


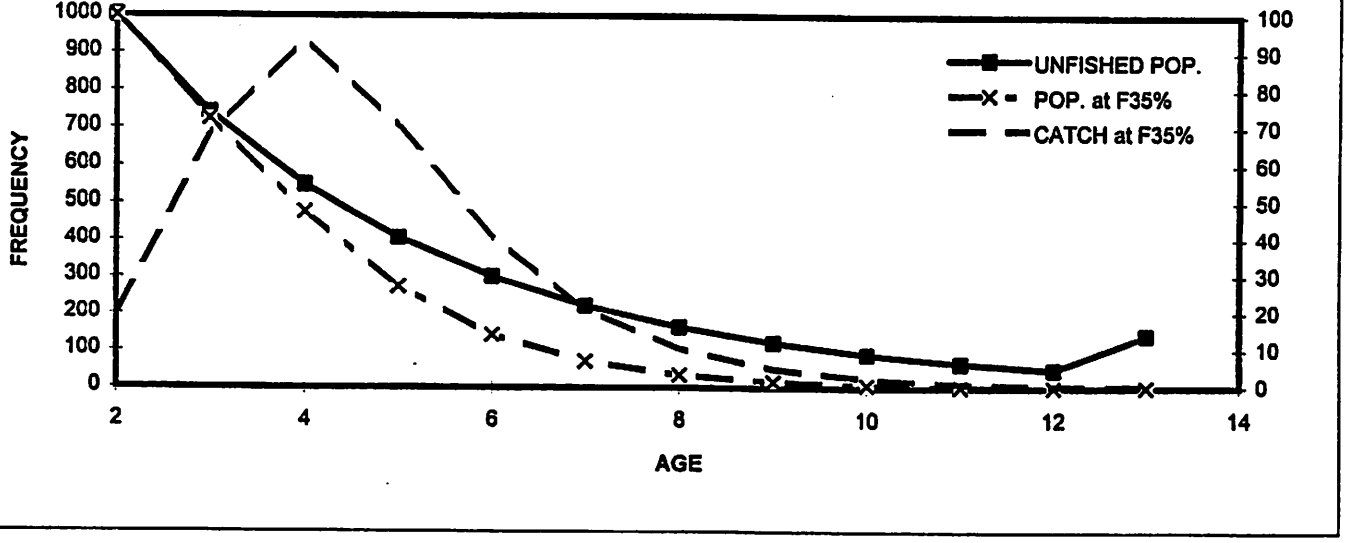
BERING SEA POLLOCK
SIZE-AT-AGE



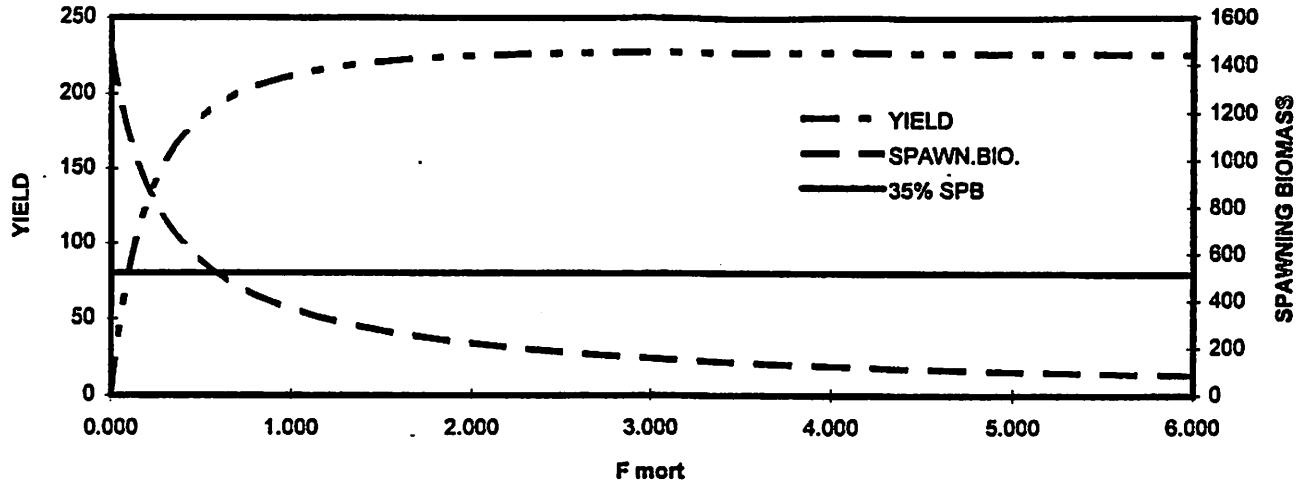
MEAN SEL. = 38.3cm, F35%=.44, YIELD =185

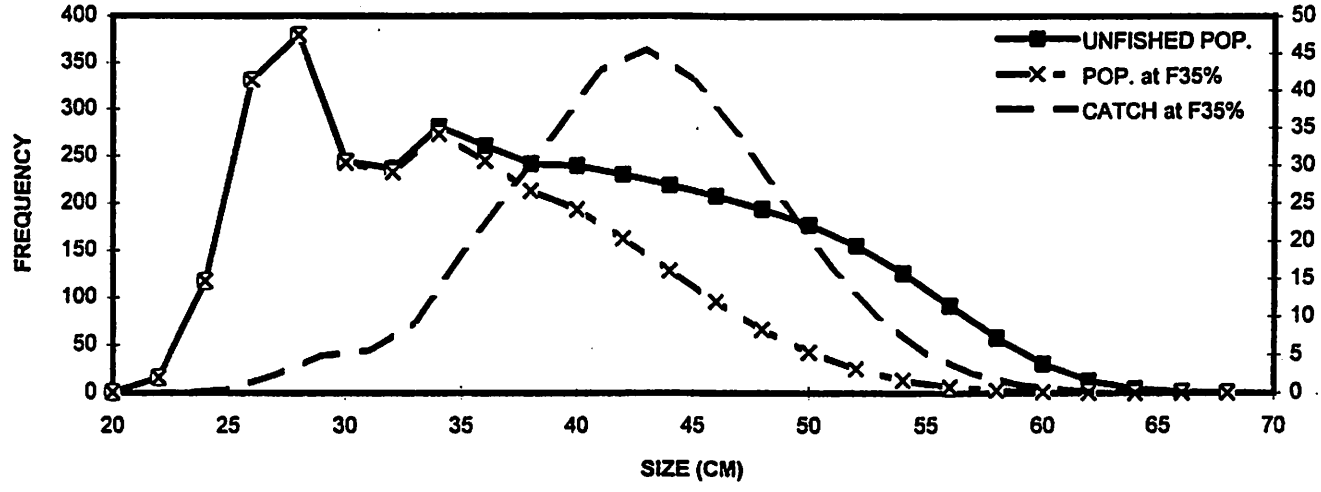


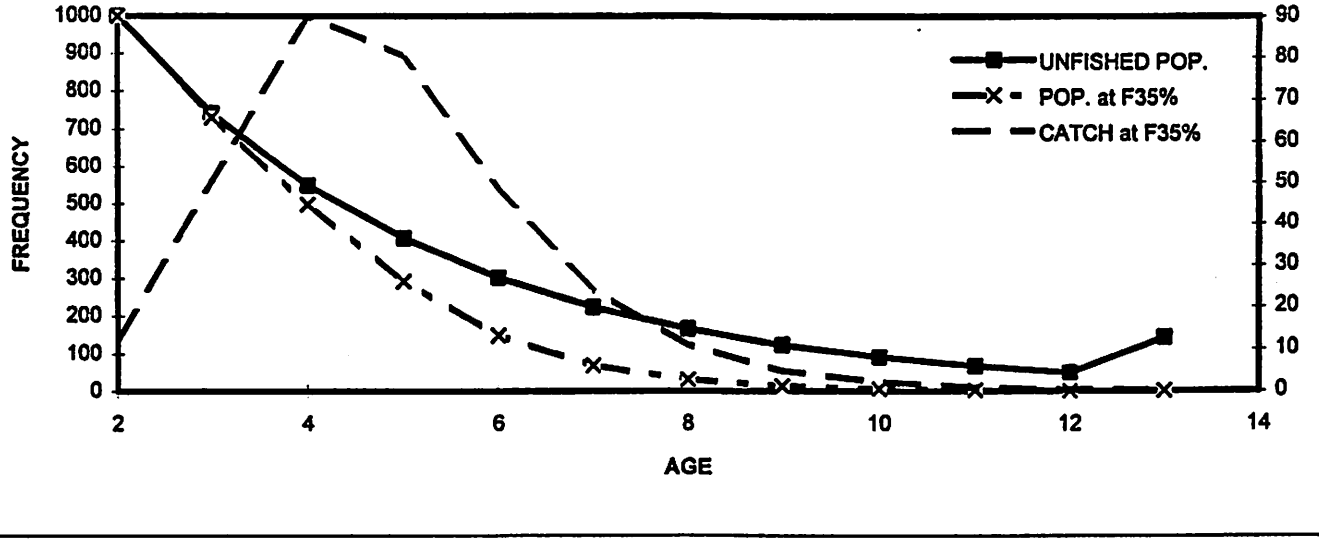




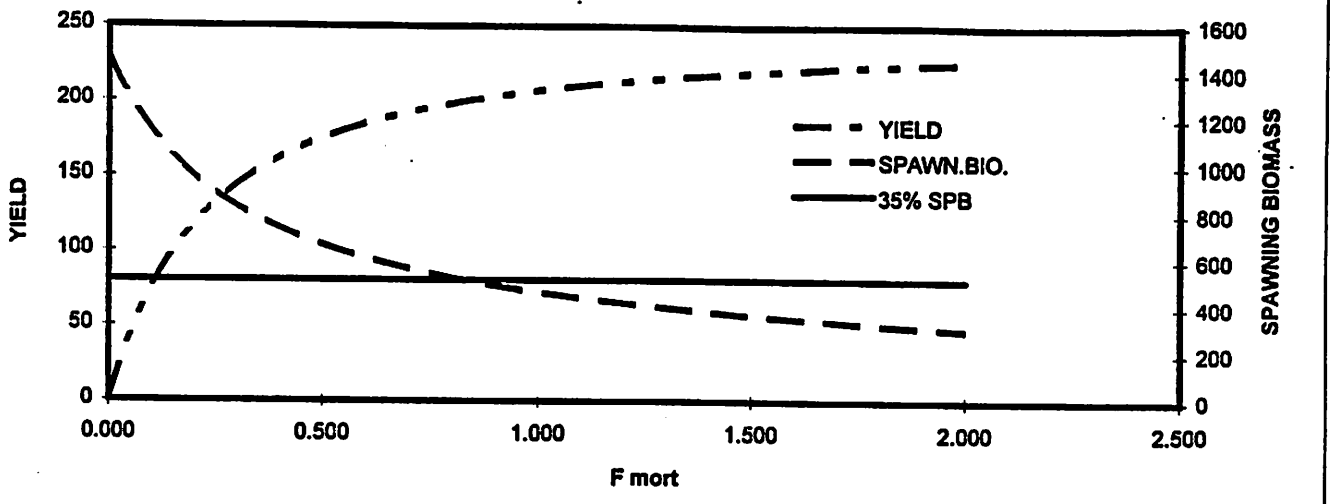
MEAN SEL. = 41.cm, F35%=.58, YIELD =192

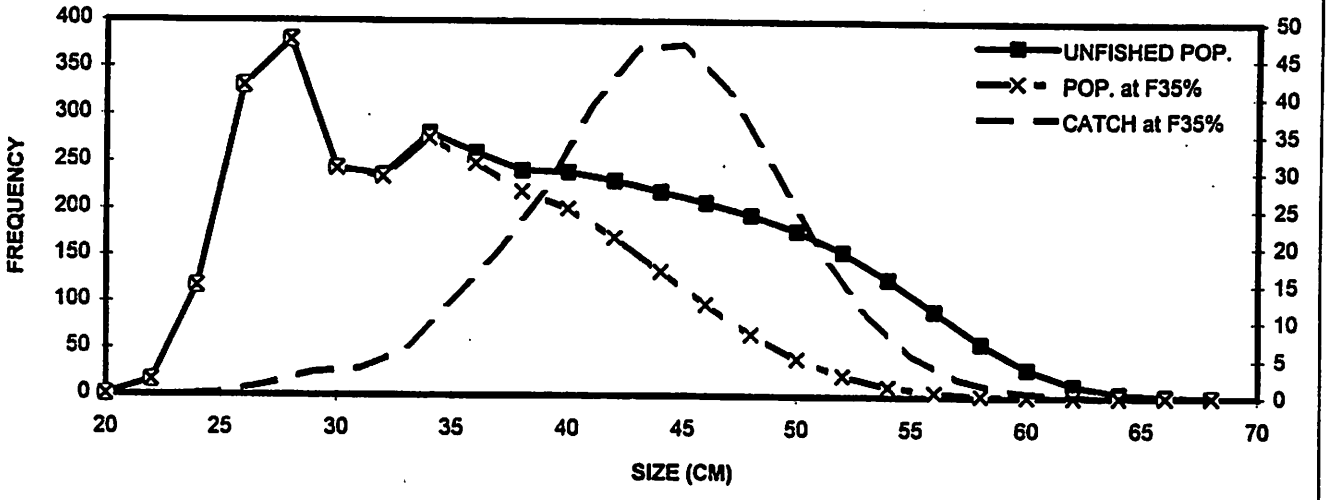


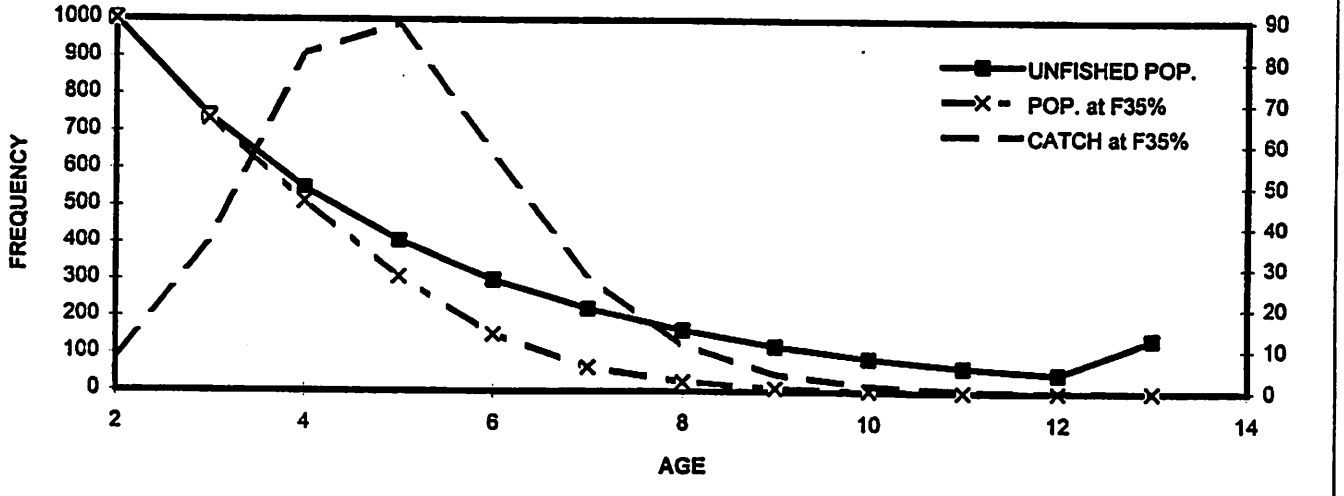




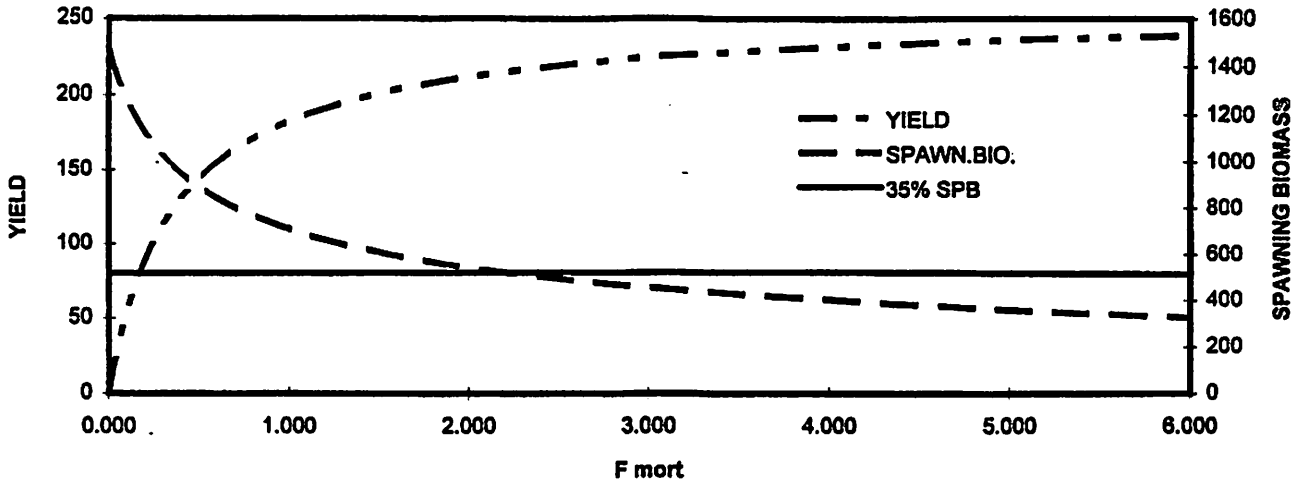
MEAN SEL. = 43.7cm, F35%=.83, YIELD =200

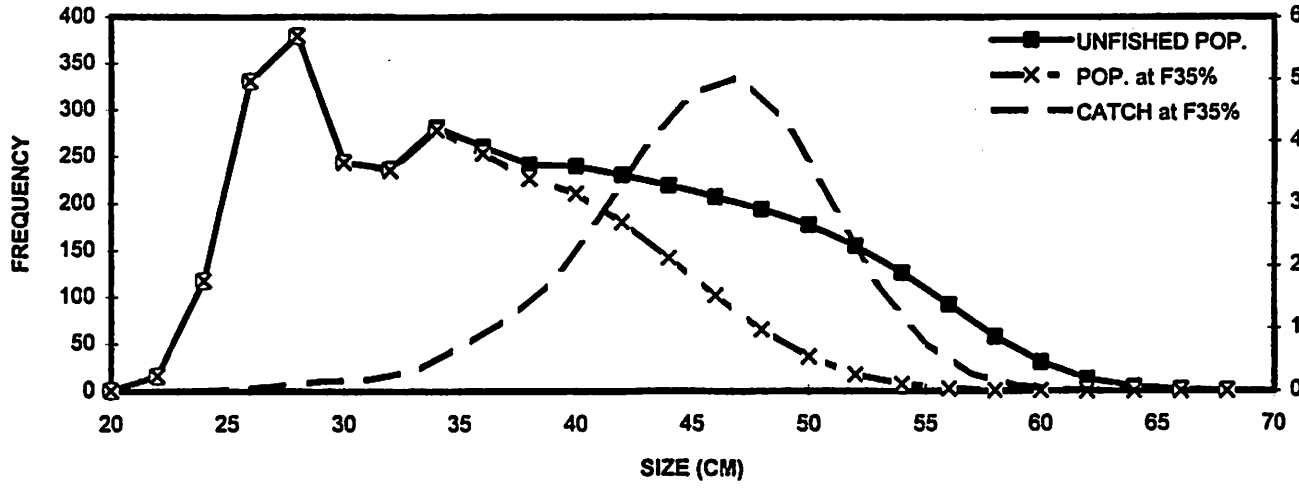


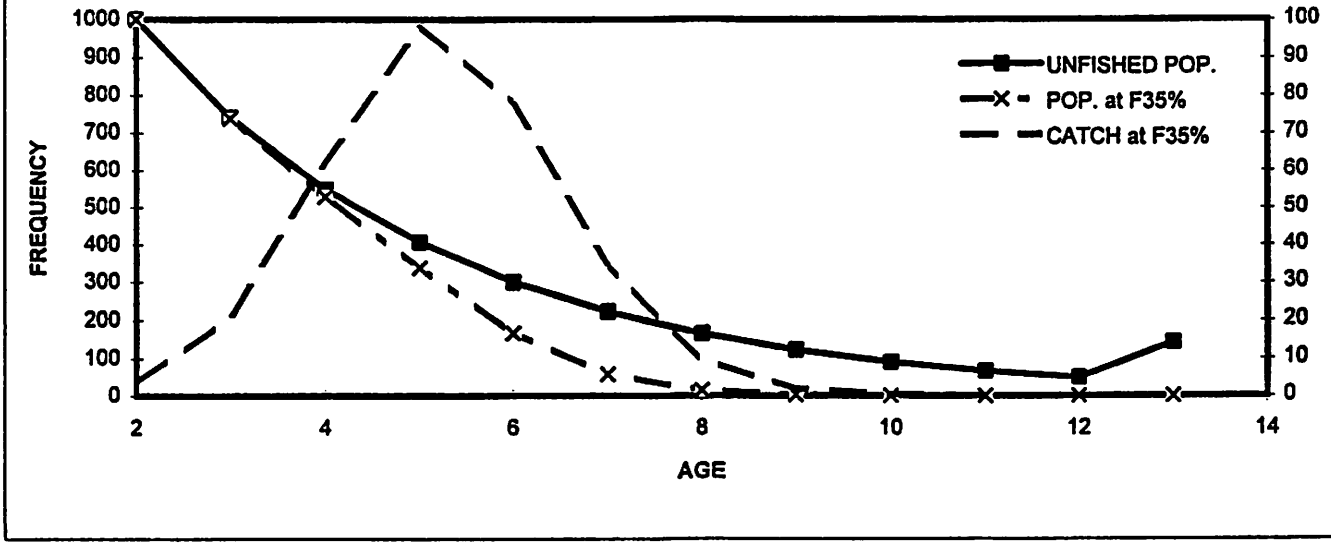


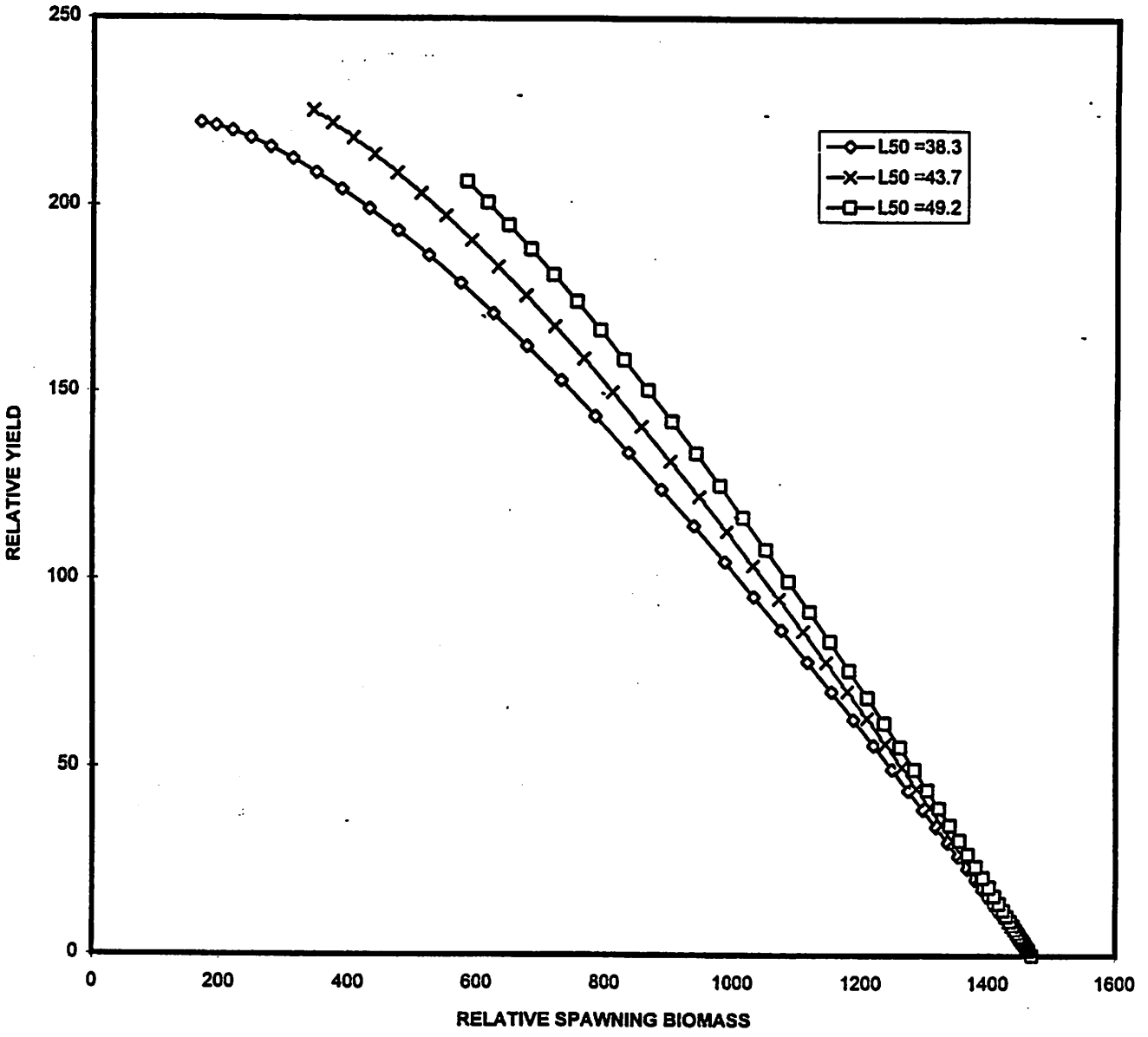


MEAN SEL. = 49.2cm, F35%=2.2, YIELD =215









Relationship between Yield and Spawning biomass at 50 levels of fishing mortality for three levels of mean selectivity.

ADELAIDE • AMSTERDAM • ANCHORAGE • AUCKLAND • BOSTON • BRUSSELS • BUENOS AIRES • CHICAGO • COPENHAGEN • DUBLIN
FORT LAUDERDALE • GOTHENBERG • HAMBURG • LEWES — U.K. • LONDON • LUXEMBOURG • MADRID • MONTREAL • OSLO • PALMA DE MALLORCA
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Greenpeace • 4649 Sunnyside Ave N • Seattle WA 98103 • Tel (206) 632-4326
• Fax (206) 632-6122 •

October 3, 1994

Richard Lauber, Chairman
North Pacific Fishery Management Council
P.O. Box 103136
Anchorage, AK
99510

Mr. Chairman and members of the Council:

On behalf of Greenpeace and its approximately 1.8 million supporters here in the United States, I would like to comment on the Environmental Assessment and Regulatory Impact Review/ Initial Regulatory Flexibility Analysis for a proposed Regulatory Amendment to improve total catch weight estimates in the groundfish fisheries off Alaska. Greenpeace urges the Council to adopt Alternative 4, Option A in the analysis. This alternative would require that all catch harvested by or delivered to processors use marine scales to determine total catch weight.

We recommend that this alternative be adopted and implemented and we recognize that proper modifications will need to be made to "processors" in order to facilitate this requirement. However, this new requirement will have minimal impact on the fishing industry compared to gains made in resource conservation. Further, this alternative will allow fair application of user-fees as proposed in the North Pacific Fisheries Research Plan.

INTRODUCTION

Since 1990, Greenpeace has advocated improving the methods for accurately accounting all groundfish harvests in the North Pacific. The installation of a system for accurately weighing all catches and discards would greatly reduce errors in estimated fish removals from the environment and reduce risks of resource overfishing.

The present method of using Product Recovery Rates (PRRs) and back calculating to obtain the original landed harvest weight is subject to a wide margin of error. The accuracy of observer or processor estimates of total catch currently used in fisheries management is not verified against actual total catch as measured by a registered scale. Actual weighing of catches will provide more accurate numbers and therefore serve as a more reliable indicator of total removals.

The user-fee program as outlined in the North Pacific Fisheries Research Plan assures continued financing and operation of the observer program. A fair application of user-fees requires an accurate accounting of catches and discards by all vessels. The North Pacific Fishery Management Council's (NPFMC) Data Committee recommended to the Council in its report of 6 June 1991 that the current report requirement system be reviewed (NPFMC 1991). Furthermore, the Scientific and Statistical Committee (SSC) has expressed a need for accurate estimates of the weight of all fish removals (SSC, 1991). These improvements have also been suggested by the Advisory Panel (AP) in 1991, 1992, 1993 and again 1994.

SUPPORTIVE INFORMATION FOR TOTAL WEIGHT MEASUREMENT

There are National Marine Fisheries Service observer data to support the fact the PRRs are highly variable and inaccurate, depending on the processing vessel and fishing season. PRRs for each product type and species vary by size, weight, and condition of the fish and by season, area, and boat type (Berger and Hare, 1988), as well as by catch volume and product-quality requirements of the processor (Low et al., 1989). Thus, for fillet products from walleye pollock, recovery rates range typically over 5 percentage points above and below a mean rate. (cf. Tables 5-8 in Berger and Hare, 1988). Likewise, the PRRs for pollock vary over a greater range (Low et al., 1989), while a fixed standard PRR is used for calculating landed pollock catches from surimi production reports.

Given the large volume of pollock and other species currently harvested and processed at sea in Alaska waters, even relatively small errors in the determination of the "standard" PRRs will greatly affect the final estimate of retained catch. Thus, in 1990, each one-percent increase of the PRR for pollock surimi corresponded to an underestimation of approximately 53,000 mt of pollock landings (Fox, 1990; Matthews and Hartmann, 1990).

The current "best blend" system of utilizing observer and industry data in quota monitoring is an improvement, yet continues to rely too heavily on PRR back calculations. If within 5% of the observer estimate, the processor report is used to determine the total catch. This 5% figure was only recently (1993 pollock "A" season) reduced from its previous 10% level, and still allows a wide margin of error. Using processor reports based on an industry-wide PRR that may not reflect the true product recovery for each vessel exacerbates the divergence between observer and processor data, and leads to even larger discrepancies in actual versus reported quota harvesting. In the 1991 Gulf of Alaska pelagic trawl fishery alone, observer reports of total catch exceeded catcher-processor vessel reports by 16.1% (Berger, 1993). If individual boats are granted the benefit of the doubt for only a 5% difference on a weekly basis, the combined total of unreported harvested fish of the fleet is still sufficient to cause a significant quota overage.

CONCLUSION AND RECOMMENDATIONS

Requiring actual weighing of all catch with certified scales will remove the potential for systematic under-reporting of fishery removals. In order to improve fisheries management in the North Pacific, the method of accounting for total fishery removals must also improve. Ultimately, the entire fishery will benefit in that more reliable numbers of catches will serve as more reliable indicators of harvest levels, alleviating the danger of overshooting total allowable catches (TACs), prohibited species catch (PSC) limits and ultimately, the risks of overfishing.

In our view, the implementation of Alternative 4 , Option A will greatly improve the ability of NMFS to effectively manage fisheries within the fishing seasons. By requiring that all fishery removals by processors are weighed on certified scales, catch estimates will improve. Improved estimates of fishery removals are important to a variety of fishery management issues currently under consideration by the Council including the North Pacific Fisheries Research Plan, Harvest Priority, Full Utilization and Individual Transferable Quotas. Regardless of the management system, more accurate estimates of total removals from ~~of~~ the ocean are needed to improve NMFS' ability to prudently conserve the resource.

Thank you for considering Greenpeace's views.

Sincerely,

Penny Pagels
Fisheries Campaigner

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