MEMORANDUM

TO: Council, SSC and AP Members

FROM: Clarence G. Pautzke
Executive Director

DATE: September 20, 1995

ESTIMATED TIME
8 Hours
(all D-3 items)

SUBJECT: Initial Gulf of Alaska Groundfish Specifications for 1996

ACTION REQUIRED

(c) Review Preliminary 1996 Stock Assessment and Fishery Evaluation (SAFE) report for Gulf of Alaska (GOA) groundfish fisheries for 1996.

(d) Set Initial 1996 Acceptable Biological Catch (ABC) limits and Total Allowable Catch (TAC) limits for GOA groundfish, and set PSC specifications and apportionments for halibut.

(e) Recommend bycatch rate standards for the Vessel Incentive Program.

(f) Recommend preliminary discard mortality rates for halibut in the groundfish fisheries.

BACKGROUND

At this meeting, the Council begins the annual groundfish cycle in which it adopts proposed specifications of groundfish quotas and bycatch allowances. The preliminary SAFE report, groundfish specifications, and bycatch allowances need to be adopted and made available for public review. Twenty-five percent of the initial specifications will go forward as interim specifications for management of the 1996 groundfish fisheries until superseded by publication of the Council's final specifications. On the basis of public comment and new information, the Council will adopt final recommendations for the 1996 fishing year at its December 1995 meeting.

Approve GOA SAFE Document for Public Review

The Gulf of Alaska (GOA) Groundfish Plan Team met September 5-8, 1995 in Seattle to prepare the preliminary 1996 SAFE documents provided at this meeting for Council review. The minutes of the Gulf Team meeting are included as Item D-3-(c)(1). The SAFE forms the basis for the preliminary groundfish specifications for 1996. The preliminary SAFE contains the Plan Team's estimates of biomass and ABCs for all groundfish species covered under the FMP and information concerning halibut bycatch to provide guidance to the Council in establishing PSC apportionments. Tables 1, 2, and 3 from the SAFE summary chapter (Items D-3(c)(2), D-3(c)(3), and D-3(c)(4)) list the 1995 ABCs, TACs, and catches through August 1995, and the Plan Team's recommended 1996 ABCs and corresponding overfishing levels for each of the species or species complexes. None of the Plan Team's recommended ABCs exceeds its corresponding overfishing level.

Initial ABCs, TACs, and Apportionments for the 1996 GOA Fisheries

The SSC and AP recommendations will be provided to the Council during the week of the Council meeting.

Tables 1 - 3 provide the biomass, ABC, overfishing level and stock status of 16 GOA groundfish management groups compared to 1995. The Plan Team's range of recommended ABCs for 1996 is 561,440-685,240 mt. The sum of 1995 ABCs was 535,140 mt and TACs were set at 279,463 mt. Groundfish catch through August 19, 1995 totaled 172,190 mt.

Set Initial PSC Limits for Halibut

The PSC limits for halibut in the Gulf of Alaska are set by gear type and may be apportioned seasonally over the fishing year (Amendment 21). In recommending any seasonal allocations, the Council will consider its objective to promote harvest of as much of the groundfish optimum yield as possible with a given amount of halibut PSC.

During 1995, halibut PSC mortality applied only to the bottom trawl fisheries and to the hook-and-line fisheries. The sablefish hook-and-line fishery was exempted from halibut PSC with implementation of the sablefish IFQ fishery. The midwater trawl fishery (targeting on pollock) has been exempt from bycatch-related closures. The pot fishery (primarily for Pacific cod), was again exempted from the 1995 fixed gear PSC limit due to minimal bycatch mortality in that fishery.

For 1995, the Council recommended the following halibut PSC apportionments for the Gulf of Alaska groundfish fisheries, dependent upon approval of an exemption for the sablefish fishery:

Trawl gear			**Hook and Line***		
1st quarter	600 mt	(30%)	1st trimester	80 mt	(26.7%)
2nd quarter	400 mt	(20%)	2nd trimester	200 mt	(66.7%)
3rd quarter	600 mt	(30%)	3rd trimester	20 mt	(6.7%)
4th quarter	400 mt	(20%)			
	2000 mt			300 mt	

*includes 10 mt for demersal shelf rockfish

Beginning in 1994, PSC limits for trawl gear were further apportioned by specific fishery. The Council may apportion PSC limits by fishery during the annual specification process. Apportionments of the overall cap may be made to a 'Shallow water complex' and a 'Deep water complex.' Species in the shallow water complex are: pollock, Pacific cod, shallow water flatfish, Atka mackerel, and other species. Deep water complex species include: deep water flatfish, rockfish, flathead sole, sablefish, and arrowtooth flounder. The following apportionments were made for 1995:

Quarter	Shallow water Complex	Deep water Complex	Total
1	500 mt	100 mt	600 mt
2	100 mt	300 mt	400 mt
3	200 mt	400 mt	600 mt
4	No apportionment between shallow and deep for the 4th quarter.		

Bycatch rate standards for the Vessel Incentive Program

The Vessel Incentive Program (VIP) rate for halibut and crab Prohibited Species Catch (PSC) includes all trawl fisheries in both the BSAI and GOA. The grouping for VIP fishing categories is:

	Fishery	PSC Species
BSAI	midwater pollock	halibut*
BSAI	bottom pollock	halibut
BSAI	yellowfin sole	halibut; red king crab**
BSAI	other trawl	halibut; red king crab
GOA	midwater pollock	halibut
GOA	other trawl	halibut

* % of groundfish
**number of crabs per ton of groundfish

Note that regulations specify that the vessel incentive program for the midwater pollock fishery becomes effective after the directed fishery for pollock by trawl vessels using non-pelagic gear is closed.

Item D-3(e)(1) contains the VIP rate standards used in 1995 and catch rates observed during the past three years for these fishery categories. The Council will need to recommend to the Regional Director the bycatch rate standards for these categories for the first two quarters of the 1996 fishery.

Discard Mortality Rates

Pacific halibut bycatch discard mortality rates in the Alaskan groundfish fisheries are routinely estimated from viability data collected by NMFS observers. These data are analyzed by staff of the International Pacific Halibut Commission (IPHC) and the National Marine Fisheries Service (NMFS), which results in recommendations to the Council for managing halibut bycatch in the upcoming season.

Discard mortality rates are determined from the release condition of halibut caught as bycatch. The criteria are different for trawls, pots, and hook & line bycatch. In 1993, the Council recommended that the average of the two most recent years be used to determine the following year's discard mortality rate. To obtain the rate for 1996, rates from 1993 and 1994 would be averaged. In 1994, the Council recommended two changes to the IPHC in determining the 1995 discard mortality rates: (1) separate rates for at-sea and shore-based vessels in the bottom trawl pollock fishery and a single rate for GOA shallow water flatfish; and (2) a single rate for observed and unobserved hook-and-line vessels. These recommendations were also incorporated in determining the 1996 rates.

Item D-3(f)(1) contains an analysis of data collected from the 1994 fishery. Table 4 lists the recommendations for setting discard mortality rates for the 1996 fishery. The IPHC report was not available in time to be reviewed by the Plan Teams at their September meeting. IPHC staff reported that data necessary for the analysis did not become available until very late in August, delaying completion of the report following the Team meeting. IPHC is anticipating additional analysis following the September Council meeting, which could take in account comments received at the meeting. A final report with 1996 recommendations will be available in early November and presented at the December Council meeting.

GULF OF ALASKA PLAN TEAM MEETING
SEPTEMBER 5 - 8, 1995

PLAN TEAM MEMBERS

Sandra Lowe, chairman
Kaja Brix
Jeff Fujioka
Jim Hastie
Jim Ianelli
Farron Wallace
Gregg Williams
Jane DiCosimo, plan coordinator
Rich Ferrero
Lew Haldorsen
Jon Heifetz
Tory O'Connell (for Barry Bracken)
Bill Bechtol (nominated for Team)

The GOA Plan Team met on Tuesday afternoon to review the GOA stock assessments. New member Farron Wallace was welcomed to the Team. Tory O'Connell and Bill Bechtol participated as ADF&G representatives.

Three chapters were unchanged since the November 1994 SAFE: sablefish, demersal shelf rockfish, and flatfish. A **sablefish** assessment update will not be completed until after completion of the annual longline surveys which was still underway in September, but will be provided to the team in November 1995. A preliminary analysis indicates that the 1996 ABC may be reduced to 18,700 mt, down from 21,500 mt in 1995. The Team briefly discussed a draft analysis by Mike Sigler, which presented further work on an age-structured model applied to sablefish. His results indicate that estimation of survey catchability with an age-structured model has been demonstrated for sablefish and west coast widow rockfish, and that if successfully applied for other groundfish species then the assumption that survey trawl catchability is known could be dropped. While the Plan Team supports the exploration of alternative assumptions about the catchability coefficient (other than one), they noted that in the case of sablefish there are yearly longline surveys, whereas for most other Gulf groundfish there are triennial trawl surveys. The exploration of the catchability coefficient may not be as straightforward with few data points. The sablefish stock assessment author has concluded that the new age-structured assessment method for sablefish does not indicate any substantial changes in the results from the current assessment methods, thus there will no direct use of age-structured results in the determination of ABC.

The 1995 line transect survey for **demersal shelf rockfish** was conducted in the East Yakutat subdistrict and the Central Southeast Outside subdistrict of the Southeast Outside area in June 1995. Tory O'Connell reported that the new assessment would be available for review for the November Plan Team meeting. In the interim the Team proposed using the 1995 ABC of 580 mt as the preliminary 1996 ABC. She provided a revised Table 7.2 that includes 1995 catch estimates. Catch to date is significantly lower than in past years because the directed DSR fishery was closed during the IFQ halibut season. Only half of the Area 2C halibut allocation has been taken to date and the directed fishery will likely be reopened once the halibut season is closed, with the entire TAC likely to be taken by the end of the year. In addition to the 168 mt of landed DSR, the authors estimate that there has been an additional 82 mt of unreported mortality associated with the halibut fishery.

Flatfish ABCs were rolled over for the September SAFE. There will be no new information (other than catch data) for 1995. The Gulf triennial survey will be conducted in 1996.

Atka Mackerel Sandra Lowe presented the Atka mackerel assessment. The biomass estimate of 21,600 mt from the 1993 survey, along with 1994 catch data and maturity at length/age data not previously incorporated in the assessment, was used to calculate ABC. The authors provided an estimate of 4,300 mt, based on 1995 SSC's phase-in rate of a 20% exploitation rate. The 1996 rate would be 25%. The Team decided to use the full rate of 30%, as they did in 1994, to calculate an ABC of 6,480 mt.

Most fishing occurred in the Shumagin area and no season opener occurred in the Central Gulf in 1995. The Team also considered preliminary genetic results that did not support stock separation for Atka mackerel. The Team concurred with the authors' comments regarding ecosystem concerns and their support for a lower TAC to allow for the collection of biological data. The Team is concerned about the high levels of fishery removals in the last three years (80-99%) that have occurred within 20 nm of important Steller sea lion habitat. Most removals have occurred from November to March, a sensitive period for juveniles and recently weaned pups. Increases in Atka mackerel harvests have occurred during a period of decreasing pollock abundance in the GOA which could exacerbate efforts to recover the Steller sea lion population.

Thornyheads Jim Ianelli described the new information that was incorporated into the thornyhead assessment. The catch is lower than in 1994 due to delayed bycatch in the sablefish fishery. Fourth quarter landings should show an increase. The authors' ABC recommendation of 1,560 mt is down from 1,899 in 1994 and is attributed to including a revision in the size at maturity, slower growth estimates used in the model, new data for 1982 and 1983, and correcting 1978 and 1979 data that were previously specified as from trawl gear when, in fact, it was from longline gear. The Team concurred with using $F_{40\%}$.

The Team recognized that setting ABC and overfishing levels using SPR rates (i.e., $F_{40\%}$ and $F_{30\%}$), for fisheries on thornyheads can be difficult when the future distribution of harvests between gears with different selectivities is unknown. The Team discussed Table 8.7 and recommended that relative harvests between gear types and processes that may affect catch distribution be examined to improve future management. The Team continues to support their earlier recommendation that future trawl surveys sample deep water strata to adequately sample adult thornyhead rockfish and other deep-water species.

Pelagic Shelf Rockfish

Jon Heifetz identified the changes to the 1995 assessment. Additional information on the black rockfish jig fishery, and new information about maximum age, natural mortality, and year class strength of black rockfish were added to support the Team's previous recommendation to separate black rockfish from the assemblage. Tory O'Connell described the small fishery off Sitka and indicated that biological information was available to monitor a black rockfish ABC.

The Team also discussed misidentification problems with light dusky rockfish, dark dusky rockfish, and black rockfish and recommended that dusky rockfish be given a separate ABC and TAC from the other species in the pelagic shelf assemblage. The current ABC and TAC is derived almost entirely from trawl survey data for dusky rockfish; abundance of black rockfish and other species in the assemblage is not taken into account. The Team decided it was inappropriate to include dusky rockfish in the same assemblage as these species because adults generally reside in different habitats. Adult dusky rockfish are commonly found on deeper offshore banks with smooth bottoms and are caught in trawl fisheries whereas most other rockfish in the assemblage inhabit shallow, rocky, nearshore areas and are usually taken in jig fisheries.

The Team noted that localized over-exploitation of black rockfish and other near-shore species continues to be a potential problem in the Central area as a result of the rockfish jig fishery in that region. Most of this fishery's

catch in 1995 has been concentrated off the south shore of the Kenai Peninsula. State waters there have been closed to commercial rockfish fishing since May, when the annual guideline harvest level was exceeded. Following such closures, jig fishing has shifted farther offshore to the Federal zone. The fishery for black rockfish in Federal waters is essentially unrestricted because its catches comprise part of the relatively large and under-utilized TAC for pelagic shelf rockfish in the Central area. The Team requested that the SAFE authors determine an ABC for dusky rockfish separate from the other species in the assemblage in time for the November Plan Team meeting. Farron Wallace will provide information on habitat estimates for Washington black rockfish populations for the Team's use in breaking out dusky rockfish from the PSR assemblage. The Team has also submitted an amendment proposal to recommend alternative management for the nearshore component of the assemblage.

Pacific cod Grant Thompson described the changes to the Pacific cod model that were requested by the Plan Team and SSC, including separating the catch and size composition data into different fishery categories (e.g., trawl, longline and pot gear), the use of mean size-at-age data, and sensitivity analysis of different natural mortality rates. The Team also requested clarification on how discards from the halibut fishery were incorporated.

The Team discussed a number of complicating factors with the assessment. The potential impacts of emigration was discussed on the calculated mortality rate of 0.5. Bering Sea and Canadian estimates of M are 0.37 and 0.65, respectively. The Team also discussed survey selectivity and the model's lack of fit when survey selectivity is constrained to be asymptotic. The Team noted that the recommended F is a lot higher than the historical average. The doubling of F, along with a declining stock and low recruitment indicates a high level of removals relative to stock size.

The Team recognized that the current stock size estimate appears to be about 50% of the value expected under average conditions with no fishing. The magnitude of stock decline may be due to higher than normal abundance levels observed during the mid-1980's. Due to uncertainties in model specifications, the Team decided that a lower harvest level would be prudent because of a continuing decline in stock abundance below any level previously estimated and because recent recruitment levels appear to be below normal. To arrive at a preliminary range of ABC values, the Team selected the value corresponding to the maximum likelihood estimate and the lower 95% confidence bound. The lower 95% confidence bound was estimated by assuming that the log-likelihood values are true likelihoods and using the principle that the log-likelihood values are distributed as chi-squared. The Team decided on a preliminary recommendation of ABC values between 65,000-110,000 mt (4,000 mt of which is anticipated as bycatch in the halibut fishery).

For the November meeting, the Team requested analyses of alternative catchabilities for the trawl survey coupled with the profile of natural mortality (as in table 2A.1). Alternative catchabilities for the survey that were mentioned included Q=(0.75, 1.5, 2.0). For ease of implementation, the Team indicated that a coarser grid of fixed natural mortality rates would be acceptable for the profile. Other issues that might improve future assessments include: 1) analyses or examination of ADF&G data (as was done for pollock) to see if large Pacific cod are common in near-shore areas (they are largely absent from NMFS trawl surveys); 2) investigations of changes in growth over time (as has been noted for Pacific halibut which are found in similar habitats); 3) possible differences in growth by sex; and 4) analyses on the impact migration may have on fishery dynamics.

Slope Rockfish

Pacific Ocean Perch Jon Heifetz presented the Pacific ocean perch stock assessment. The Team briefly discussed the ADF&G 1995 POP recommendations, the NMFS interim report on the status of the POP stock, and the Council's interest in revising the rebuilding plan.

As in last year's assessment, the optimal $F_{44\%}$ rate adjusted by the ratio of current female spawning biomass (125,704 mt) to target spawning biomass level of 150,000 mt was used by the authors to determine their ABC recommendation of 10,165 mt. The current $F_{44\%}$ rate is estimated to be 0.078. The Plan Team applied a buffer for reducing ABC below OFL by the proportion of $F_{35\%}/F_{30\%}$. Using these guidelines results in a Plan Team recommended F rate of 0.052 and an ABC of 8,060 mt.

The Team employed a method of apportionment used for the 1995 fishery, weighting prior surveys based on the relative proportion of variability attributed to survey error. It was assumed that survey error contributes 2/3 of the total variability in predicting the distribution of biomass. Thus, the weight of a prior survey should be 2/3 the weight of the preceding survey. This results in weighting of 4:6:9 for the 1987, 90, and 93 surveys, respectively and apportionments of 18.1% for the Western area, 47.9% for the Central area, and 34.0% for the Eastern area. The recommended ABCs are 1,460 mt for the Western area, 3,860 mt for the Central area, and 2,740 mt for the Eastern area.

The TAC for Pacific ocean perch is determined from the rebuilding plan in the GOA FMP. The plan recommends the use of the fishing mortality rate halfway between the optimum fishing mortality rate and the fishing mortality rate estimated to be sufficient to supply unavoidable bycatch of Pacific ocean perch in the Gulf of Alaska based on 1992 bycatch rates. The fishing rate from this computation corresponds to the $F_{55\%}$ rate. This rate is adjusted downward by the ratio of current female spawning biomass to target female spawning biomass. The Team used the currently adjusted $F_{55\%}$ rate to compute a TAC consistent with the rebuilding plan. The adjusted $F_{55\%}$ rate of 0.044 results in a TAC for Pacific ocean perch for the 1995 fishery of 6,960 mt with apportionments of 1,260 for the Western area, 3,335 in the Central area, and 2,365 in the Eastern area.

The Team discussed the implications of a preliminary analysis presented on the use of alternative age of maturity, alternative measures of reproductive value, and updated stock-recruitment data. The effect of using a higher age of maturity (POP in British Columbia attain 50% maturity between ages 7-11), fecundity instead of spawner biomass, or updated stock- recruitment data is a greater estimated resiliency of the stock to a reduction in reproductive potential than was previously estimated. This result is because good recruitment arose from relatively fewer units of reproductive output than originally estimated and the relatively strong recent recruitment levels. An additional effect is a shift in current levels of reproductive value relative to a target level. The Team agreed with the SAFE authors that determination of ABC based on this preliminary analysis is not appropriate at this time. Updated age of maturity data currently being collected at UAF and further verification of the strength of recent recruitment will help resolve whether a different F level should be used to determine ABC and TAC.

Jon continued his briefing for shortraker/rougheye, northern rockfish, and other slope rockfish. The Team noted that the small ABC in the Eastern area was possibly causing a high proportion of discards of northern rockfish. The possibility of combining northern rockfish with other rockfish in the Eastern area was discussed as a possible way to reduce discards. Removal of northern rockfish from the other slope rockfish group in 1993 has resulted in a substantial increase in the catch of sharpchin, redstripe, harlequin, silvergrey, and yellowmouth rockfish. These species are of higher commercial value than the other species because of their larger size.

The Team noted that the proportion of catch of slope rockfish that is discarded has apparently dropped considerably since 1994 for all subgroups except other slope rockfish. For example, the discard of POP, which averaged 19% during 1991-92, averaged 70% during 1993-94, and has dropped to 21% thus far in 1995. One reason the POP discard rate has dropped is that there was a directed fishery for POP during 1995. Restrictions placed on retention of POP during 1993-94 were the result of "bycatch only" status during much of this time period. For other slope rockfish, discard rates have remained high (66%), since northern rockfish were removed from the group. Many of the remaining species in this group, such as harlequin and sharpchin rockfish, are small in size and of lower economic value, and there may be less incentive for fishermen to retain these fish. As long as these fish are being accurately accounted for, this discard does not represent a conservation problem. However, the Team is concerned that some of the larger sized species in the subgroup (i.e., silvergrey and yellowmouth rockfish) may be caught disproportionately to their estimated abundance.

Pollock Chris Wilson, NMFS, discussed the 1995 Shelikof Strait echo integration trawl survey. The 1995 survey again utilized the new system with improved detectability of pollock in low density situations and improved measurements from the near-bottom region. The 1995 Shelikof Strait biomass estimate based on the new system is 712,000 mt (compared to the estimate of 467,300 mt from the 1994 survey). These values were adjusted in the stock assessment to be comparable to previous estimates to provide a time series of a relative abundance index. Length frequency data from the 1990 to 1995 hydroacoustic surveys show the progression of the strong 1988 year class through the population. In the 1995 survey, 14% of the biomass was less than 18 cm (age 1, 1994 year class). Chris reported that this is the largest number of 1 year olds ever observed in the surveys. For the years when data were available, the average contribution of age 1 fish has been less than 1%. He reported that Shumagin pollock spawned much earlier than Shelikof fish, possibly indicating a lack of mixing between areas.

Anne Hollowed, NMFS - Seattle, presented the pollock stock assessment.

The biomass estimate for the Western/Central area from the 1993 bottom trawl survey is 760,800 mt, similar in magnitude to previous survey biomass levels. The age compositions from the 1993 bottom trawl survey revealed strong 1988 and 1989 year classes. The 1989 year class in the Bering Sea has been shown to be strong. The presence of the strong 1989 year class found in the Shumagin, Chirikof and Kodiak areas might suggest that there may be widespread mixing of pollock stocks between the Bering Sea and the Gulf of Alaska. Alternatively, 1989 oceanic conditions may have favored recruitment in the western Gulf of Alaska more than the central portion.

The 1995 FOCI recruitment prediction was based on three quantitative and four qualitative sources of information. Predictions from the various sources of information were weighted and a combined prediction was calculated. The combined prediction for 1995 is: 1995 year class as average to strong. A revision of the 1994 year class prediction, from average-strong to strong, was obtained by including two additional data sources (1995 hydroacoustic survey 1-year-old abundance and larval abundance from tufted puffin diet data).

The Team evaluated the four stock synthesis models examined by the authors. Based on the exploratory runs and the data presented to the Team, the Team agreed that Model C was more appropriate.

In order to estimate an optimal fishing mortality rate, the tradeoffs between increased yield and the risk of falling below the threshold were evaluated. The optimal fishing mortality rate that simultaneously maximized yield and minimized risk was determined to be 0.3 (full selection value). This fishing mortality rate was associated with a yield of 50,000 mt which is the stock assessment authors' recommended ABC.

In 1993 and 1994, the Plan Team requested additional exploitation strategies be explored and recommended an ABC based on the fishing mortality rate that produced a minimal (5%) probability of falling below the threshold

spawner biomass level in the long-term (F=0.2). The yield associated with an F of 0.2 is 34,000 mt. The Team also requested that alternative short-term strategies be explored that take the current stock conditions into account. Specifically, for November 1995, the Team is requesting that the stock assessment authors provide short-term stock projections out to the year 2000, initialized with the current age composition and then random recruitment selected from the range of values of the 1982-1993 year classes. The Team requested projections assuming an average as well as a strong 1994 year class. The Team noted that while fairly strong evidence exists from the hydroacoustic survey of a strong 1994 year class, it is only one source of information which has not yet been corroborated by other data sources, e.g., FOCI larval survey data. The Team requested projections made for fishing mortality rates other than 0.2 and 0.3, with the goal of evaluating potentially revised optimal and minimal probability rates. Also, if time permits, the Team expressed interest in an evaluation of uncertainty in current stock size. Until the results of the additional runs can be evaluated, the Plan Team is recommending a range of ABC from 34,000 mt (based on the minimal probability rate) to 50,000 mt (based on the estimated optimal rate).

The Plan Team recommended that the ABC be apportioned according to the most recent distribution of biomass from the 1993 bottom trawl survey: 49% in the Shumagin area (16,660-24,500 mt), 24.7% in the Chirikof area (8,400-12,350 mt), and 26.3% in the Kodiak area (8,900-13,150 mt). The Team noted that the current distribution has shifted relative to the 1990 distribution, in which most of the biomass was found in the Kodiak area, and that the increase in Shumagin biomass may be due to the presence of Bering Sea fish. However, until the degree of mixing and the regularity with which this occurs can be determined, the Team felt it most appropriate to apportion ABC according to the most recent distribution of survey biomass.

The Team noted the lack of any new information with which to set an ABC for the Eastern Gulf. Lack of adequate age composition data has precluded any age-structured analysis similar to that conducted for the W/C areas. However, analysis of Eastern Gulf length frequency data show that recruitment patterns appear similar to that observed in the W/C Gulf. Thus, the Team agreed that it would be appropriate to apply the ratio of current ABC to 1993 W/C survey biomass to the Eastern Gulf 1993 biomass estimate. The recommended Eastern Gulf ABC ranges from 1,800-2,700 mt. Similarly, the overfishing level for the Eastern Gulf is 4,300 mt.

Anne also presented preliminary results from a stock synthesis model with predators included. The Plan Team expressed interest in further explorations of the preliminary predation model, particularly in light of initial indications of a higher natural mortality on older fish than is currently assumed. We concur with the authors on the very preliminary nature of these types of simulations and the need for additional years of data.

Bill Bechtol presented an ADF&G report on hydroacoustic survey estimates of Prince William Sound pollock on which there is a developing State waters fishery. The relationship of this spawning aggregation of pollock to Gulf pollock is unknown. The Plan Team recommends that the accounting of these fish be clarified, as they were counted against the Eastern Gulf TAC in 1995. The Team recommends that the State of Alaska conduct further studies in cooperation with NMFS to determine the relationship of these pollock to Gulf pollock as assessed in NMFS surveys.

Adjourn The Gulf of Alaska Groundfish Plan Team meeting was adjourned on Thursday, September 7, 1995 at approximately 3 p.m.

Table 1. Gulf of Alaska groundfish 1995 and 1996 ABCs, 1995 TACs, and 1995 catches reported through August 19, 1995. MSY is unknown for all species.

Species		ABC (mt)		1995	1995
	1995	1995	1996	TAC	Catch
Pollock[1]	W(61)	30,380	16,700-24,500	30,380	22,238
	C(62)	15,310	8,500-12,500	15,310	11,928
	C(63)	16,310	8,800-13,000	16,310	12,265
	E	3,360	1,800-2,700	3,360	3,352
	Total	65,360	35,800-52,700	65,360	49,783
Pacific cod	W	20,100	18,850-31,900	20,100	22,203
	C	45,650	42,900-72,600	45,650	40,683
	E	3,450	3,250-5,500	3,450	1,121
	Total	69,200	65,000-110,000	69,200	64,007
Deepwater flatfish[2]	W	670	670	460	47
	C	8,150	8,150	7,500	1,712
	E	5,770	5,770	3,120	189
	Total	14,590	14,590	11,080	1,948
Rex sole[2]	W	1,350	1,350	800	217
	C	7,050	7,050	7,050	3,311
	E	2,810	2,810	1,840	121
	Total	11,210	11,210	9,690	3,649
Shallow water flatfish[3]	W	26,280	26,280	4,500	336
	C	23,140	23,140	12,950	3,377
	E	2,850	2,850	1,180	3
	Total	52,270	52,270	18,630	3,716
Flathead sole	W	8,880	8,880	2,000	569
	C	17,170	17,170	5,000	1,267
	E	2,740	2,740	2,740	12
	Total	28,790	28,790	9,740	1,848
Arrowtooth flounder	W	28,400	28,400	5,000	1,344
	C	141,290	141,290	25,000	12,527
	E	28,440	28,440	5,000	670
	Total	198,130	198,130	35,000	14,541
Sablefish	W	2,600	2,240	2,600	1,308
	C	8,600	7,480	8,600	6,125
	WY	4,100	3,550	4,100	3,148
	SEO	6,200	5,430	6,200	3,872
	Total	21,500	18,700	21,500	14,453
Other Slope rockfish	W	180	180	55	28
	C	1,170	1,170	370	563
	E	5,760	5,760	1,810	369
	Total	7,100	7,100	2,235	960

(continued on next page)

Table 1. (continued)

Species	1995	ABC (mt) 1995	1996	1995 TAC	1995 Catch
Northern rockfish	W	640	640	640	111
	C	4,610	4,610	4,610	3,746
	E	20	20	20	32
	Total	5,270	5,270	5,270	3,889
Pacific ocean perch	W	1,180	1,460	1,014	1,420
	C	3,130	3,860	2,702	2,433
	E	2,220	2,740	1,914	966
	Total	6,530	8,060	5,630	4,819
Shortraker/rougheye	W	170	170	170	196
	C	1,210	1,210	1,210	1,161
	E	530	530	530	507
	Total	1,910	1,910	1,910	1,864
Pelagic shelf rockfish	W	910	910	910	66
	C	3,200	3,200	3,200	1,573
	E	1,080	1,080	1,080	356
	Total	5,190	5,190	5,190	1,995
Demersal shelf rockfish	SEO	580	580	580	168
Atka mackerel	W		4,600	2,310	320
	C		1,875	925	85
	E		5	5	0
	TOTAL	3,240	6,480	3,240	405
Thornyhead rockfish	GW	1,900	1,560	1,900	905
Other species	GW		NA	13,308	3,240
Total		535,140	561,440-685,240	279,463	172,190

1/ Shelikof Strait pollock is included within the W/C ABC range.
2/ "Deep water flatfish" means rex sole, Dover sole, and Greenland turbot in 1993. In 1994 rex sole is a separate target category.
3/ "Shallow water flatfish" means rock sole, yellowfin sole, butter sole, starry flounder, and other flatfish not specifically defined.
4/ Demersal shelf rockfish catch incudes 82 mt of unreported mortality from halibut fisheries.

NOTE: ABCs and TACs are rounded to nearest 10, except for Pacific ocean perch.
GW means Gulfwide.
Catch data source: NMFS Blend Reports.
Northern rockfish were separated from Slope rockfish in 1993.
Atka mackerel was separated from "other species" in 1994.
Redbanded rockfish was removed from DSR and combined with other slope rockfish in 1995.

Table 2. Gulf of Alaska exploitable biomasses, 1996 ABCs, and estimated trends and abundances for Western, Central, Eastern, Gulfwide, West Yakutat, and Southeast Outside regulatory areas.

Species	Exploitable Biomass (mt)		1996 ABC	1996 Overfishing Level	1996 Abundance,[2] Trend
Pollock[1]	551,000-559,000-	{ W(61)	16,700-24,500}		Below, declining
		{ C(62)	8,500-12,500}	79,000	
		{ C(63)	8,800-13,000}		
		E	1,800-2,700	4,300	
		Total	35,800-52,700	83,000	
Pacific cod	314,000-557,000	W	18,850-31,900		Above, declining
		C	42,900-72,600		
		E	3,250-5,500		
		Total	65,000-110,000	149,000	
Deep water flatfish	116,574	W	670		Unknown, Unknown
		C	8,150		
		E	5,770		
		Total	14,590	17,040	
Rex sole	89,665	W	1,350		Unknown,[3] Stable
		C	7,050		
		E	2,810		
		Total	11,210	13,091	
Shallow water flatfish	355,590	W	26,280		Unknown,[3] increasing
		C	23,140		
		E	2,850		
		Total	52,270	60,262	
Flathead sole	198,470	W	8,880		Unknown,[3] stable
		C	17,170		
		E	2,740		
		Total	28,790	31,557	
Arrowtooth flounder	1,585,040	W	28,400		Above, stable
		C	141,290		
		E	28,440		
		Total	198,130	231,416	
Sablefish	210,000	W	2,240		Near, stable
		C	7,480		
		WYK	3,550		
		SEO	5,430		
		Total	18,700	22,400	
Other Slope rockfish	112,812	W	180		Unknown, Unknown
		C	1,170		
		E	5,760		
		Total	7,100	8,395	

(continued next page)

Table 2. (continued)

Species	Exploitable Biomass (mt)		1996 ABC	1996 Overfishing Level	1996 Abundance, Trend
Northern rockfish	87,845	W	640		Unknown, Unknown
		C	4,610		
		E	20		
		Total	5,270	9,926	
Pacific ocean perch	163,219	W	1,460	1,840	Below, increasing
		C	3,860	4,870	
		E	2,740	3,455	
		Total	8,060	10,165	
Shortraker/ Rougheye	71,811	W	170		Unknown, Unknown
		C	1,210		
		E	530		
		Total	1,910	2,925	
Pelagic shelf rockfish[2]	57,644	W	910		Unknown, Unknown
		C	3,200		
		E	1,080		
		Total	5,190	8,704	
Demersal shelf rockfish	26,093	SEO	580	1,044	Unknown, Unknown
Atka mackerel	21,600	GW	6,480	9,800	Unknown, Unknown
Thornyhead rockfish	26,244	GW	1,560	2,220	Unknown, Stable
Other species	NA	W	NA		TAC = 5% of the sum of TACs
		C	NA		
		E	NA		

1/ Biomass estimates includes only Western and Central Gulf areas.
2/ Abundance relative to target stock size as specified in SAFE documents.
3/ Historically lightly exploited therefore expected to be above the specified reference point.

Note: ABCs are rounded to nearest 10.
Overfishing is defined Gulf-wide, except for pollock and POP.
Northern rockfish were separated from slope rockfish in 1993.
Rex sole was part of deepwater flatfish until 1994.
Redbanded rockfish removed from DSR for 1995 and combined with other slope rockfish.

Table 3. Summary of fishing mortality rates for the Gulf of Alaska, 1995.

Species	ABC Rate[1]	FABC[2]	OFL Rate[3]	F_{OFL}
Pollock	0.200-0.30	F_{ABC}	0.50	$F_{30\%}$
Pacific cod	0.40-0.42	$F_{40\%}$	0.57	$F_{30\%}$
Deepwater flatfish	0.125	$F_{35\%}$	0.146	$F_{30\%}$
Rex sole	0.125	$F_{35\%}$	0.146	$F_{30\%}$
Flathead sole	0.145	$F_{35\%}$	0.159	$F_{30\%}$
Shallow water flatfish	0.145-0.149[5]	$F_{35\%}$	0.159-0.175[6]	$F_{30\%}$
Arrowtooth	0.125	$F_{35\%}$	0.146	$F_{30\%}$
Sablefish	0.116	$F_{35\%}$[4]	0.141	$F_{30\%}$
Pacific ocean perch	0.052	$F_{44\%}$	0.065	F_{MSY}
Shortraker/rougheye	0.03/0.025	F=M	0.03/0.046	F_{max}[7]
Rockfish (other slope)	0.04-0.10	F=M	0.04-0.10	F_{max}[8]
Northern rockfish	0.060	F=M	0.113	$F_{30\%}$
Rockfish (pelagic shelf)	0.090	F=M	0.151	$F_{30\%}$
Demersal Shelf Rockfish	0.020	F=M	0.040	$F_{30\%}$
Thornyhead rockfish	.06	$F_{40\%}$	0.09	$F_{30\%}$
Atka mackerel	0.30	F=M	0.45	$F_{30\%}$

1/ Maximum 1993 catch level allowable under overfishing definition.
2/ Fishing mortality rate corresponding to acceptable biological catch.
3/ Maximum fishing mortality rate allowable under overfishing definition.
4/ Adjusted by current biomass.
5/ Shallow water flatfish; yellowfin sole 0.149, rocksole 0.147, others 0.145.
6/ Shallow water flatfish; yellowfin sole 0.175, rocksole 0.172, others 0.159.
7/ $F_{30\%}$ for rougheye, F=M for shortraker.
8/ $F_{30\%}$ for sharpchin, F=M for other species.

UNITED STATES DEPARTMENT OF COMMERC
National Oceanic and Atmospheric Administration
National Marine Fisheries Service
P.O. Box 21668
Juneau, Alaska 99802-1668

AGENDA D-3(e)(1)
SEPTEMBER 1995

September 19, 1995

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

Dear Rick,

Standard bycatch rate standards for trawl fisheries under the Pacific halibut and red king crab vessel incentive program during the first half of 1996 are scheduled to be published in the Federal Register by January 1, 1996. A summary of 1992 - 1995 observer data on fishery bycatch rates is listed in the attached table. Also attached are graphics showing 1994 and 1995 observer data on vessel bycatch rates, by month and fishery, relative to specified bycatch rate standards. The Council may wish to review these data when recommending halibut and red king crab bycatch rate standards for the first half of 1996.

Sincerely,

for Steven Pennoyer
Director, Alaska Region

Attachments

1992 - 1995 (through August) observed bycatch rates, by quarter, of halibut and red king crab in the fishery categories included in the vessel incentive program. Also listed are the bycatch rate standards established for 1995.

Halibut Bycatch (Kilograms Halibut/ MT Allocated Groundfish Catch

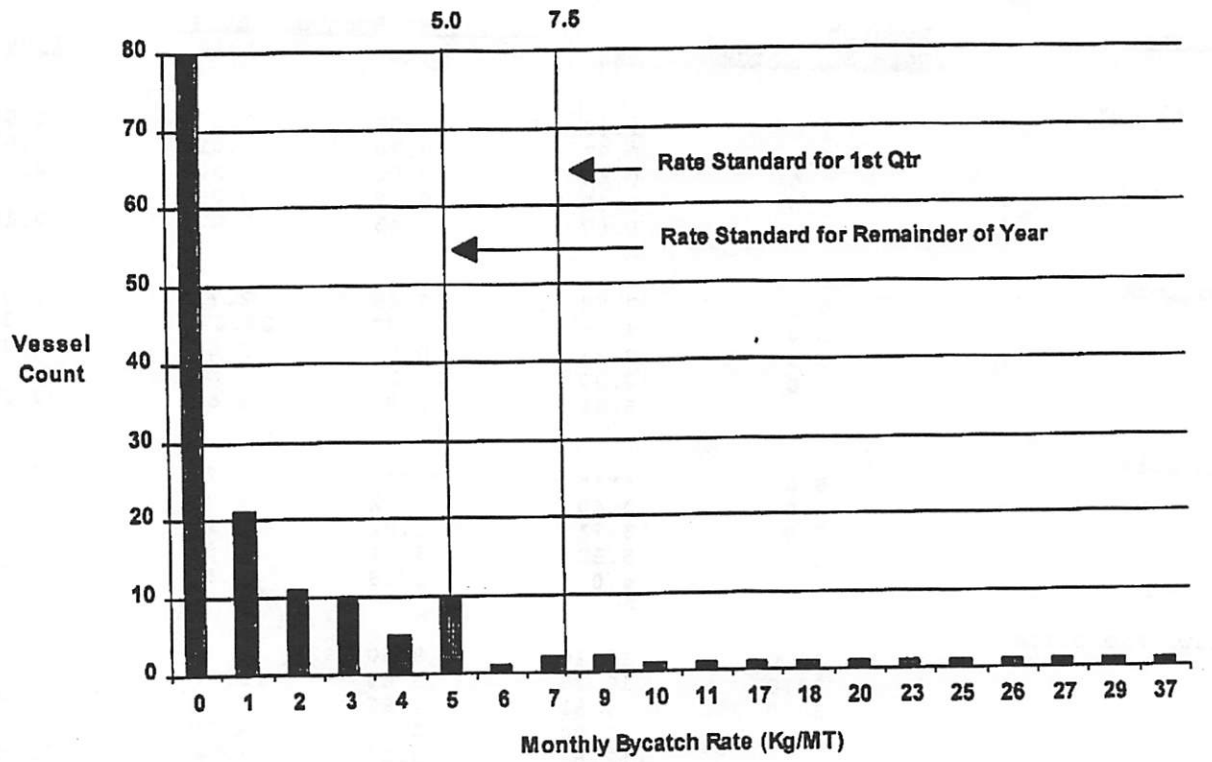
Fishery and quarter	Bycatch Rate Standards	Observed Bycatch Rates 1992	1993	1994	1995
BSAI Midwater Pollock					
QT 1	1.0	1.40	0.95	0.17	0.05
QT 2	1.0	0.73	0.20	0.01	0.07
QT 3	1.0	0.50	0.06	0.30	0.18
QT 4	1.0	0.40	0.12	0.06	
Year to date		0.87	0.43	0.22	0.10
BSAI Bottom Pollock					
QT 1	7.5	7.58	7.49	2.71	1.95
QT 2	5.0	4.34	2.72	29.67	6.82
QT 3	5.0	2.31	0.84	2.61	2.37
QT 4	5.0	0.29	25.28	0.38	
Year to date		5.64	6.86	2.66	2.09
BSAI Yellowfin sole					
QT 1	5.0	****	****	2.70	3.67
QT 2	5.0	3.40	13.02	5.93	4.00
QT 3	5.0	3.71	1.82	1.15	3.39
QT 4	5.0	5.52	3.34	4.57	
Year to date		4.02	6.18	3.92	3.71
BSAI Other Trawl Fisheries					
QT 1	30.0	12.20	8.80	9.02	11.16
QT 2	30.0	16.25	13.69	19.94	16.92
QT 3	30.0	4.81	4.66	3.30	10.60
QT 4	30.0	0.94	3.91	4.00	
Year to date		12.83	9.25	12.04	12.86
GOA Midwater Pollock					
QT 1	1.0	0.11	0.01	0.06	0.34
QT 2	1.0	0.06	0.02	0.07	0.05
QT 3	1.0	0.03	0.03	0.55	0.48
QT 4.	1.0	0.35	0.05	0.04	
Year to date		0.11	0.03	0.17	0.27
GOA Other Trawl fisheries					
QT 1	40.0	19.75	34.49	19.97	16.55
QT 2	40.0	22.08	26.80	42.78	64.31
QT 3	40.0	24.14	33.90	26.49	18.43
QT 4	40.0	26.85	37.81	43.76	
Year to date		21.95	33.04	29.91	24.37

Zone 1 Red King Crab Bycatch Rates
(number of crab/mt of allocated groundfish

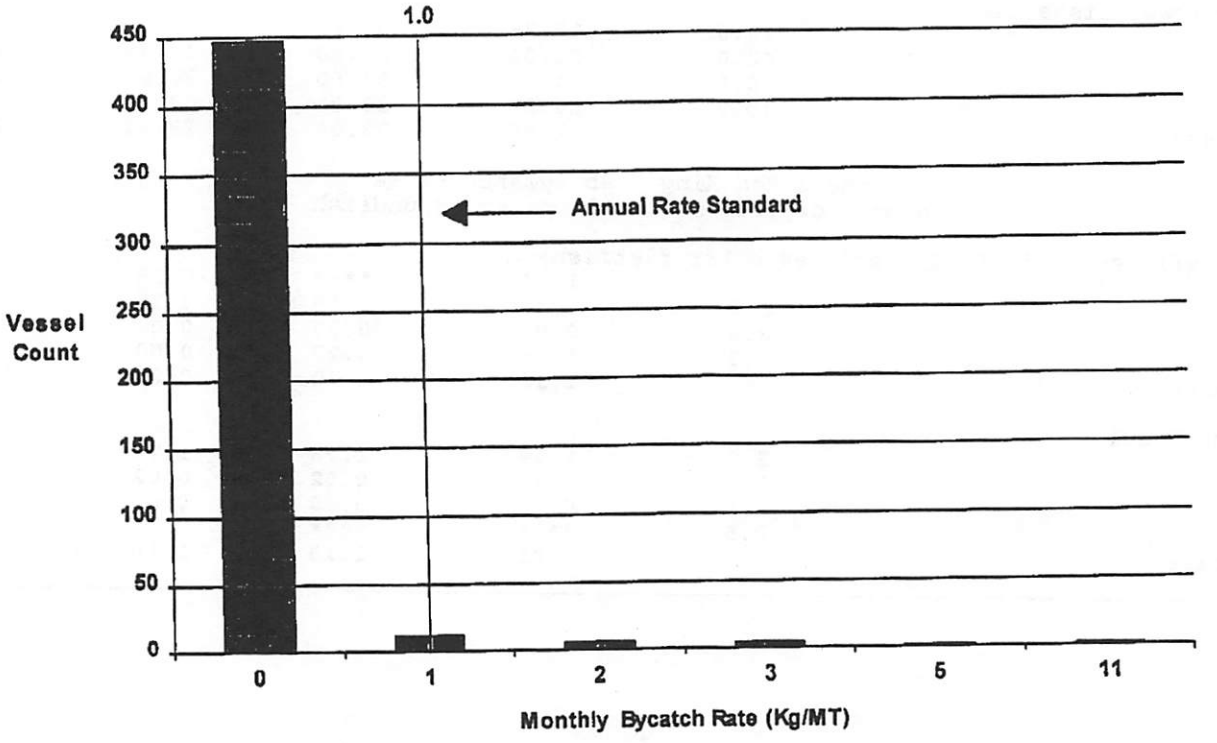
BSAI yellowfin sole (in 1992, includes other flatfish)					
QT 1	2.5	1.19	****	0.68	0.30
QT 2	2.5	1.34	2.19	0.23	0.02
QT 3	2.5	0.00	0.00	0.00	0.00
QT 4	2.5	****	0.27	0.00	
Year to date		1.34	1.30	0.33	0.19
BSAI Other Trawl					
QT 1	2.5	1.19	1.78	1.78	0.32
QT 2	2.5	1.72	0.02	0.02	0.00
QT 3	2.5	0.00	0.00	0.00	0.00
QT 4	2.5	****	****		
Year to date		1.21	1.18	1.18	0.30

1994 HALIBUT BYCATCH - BERING SEA AND ALEUTIAN ISLANDS

Bottom Pollock Fishery

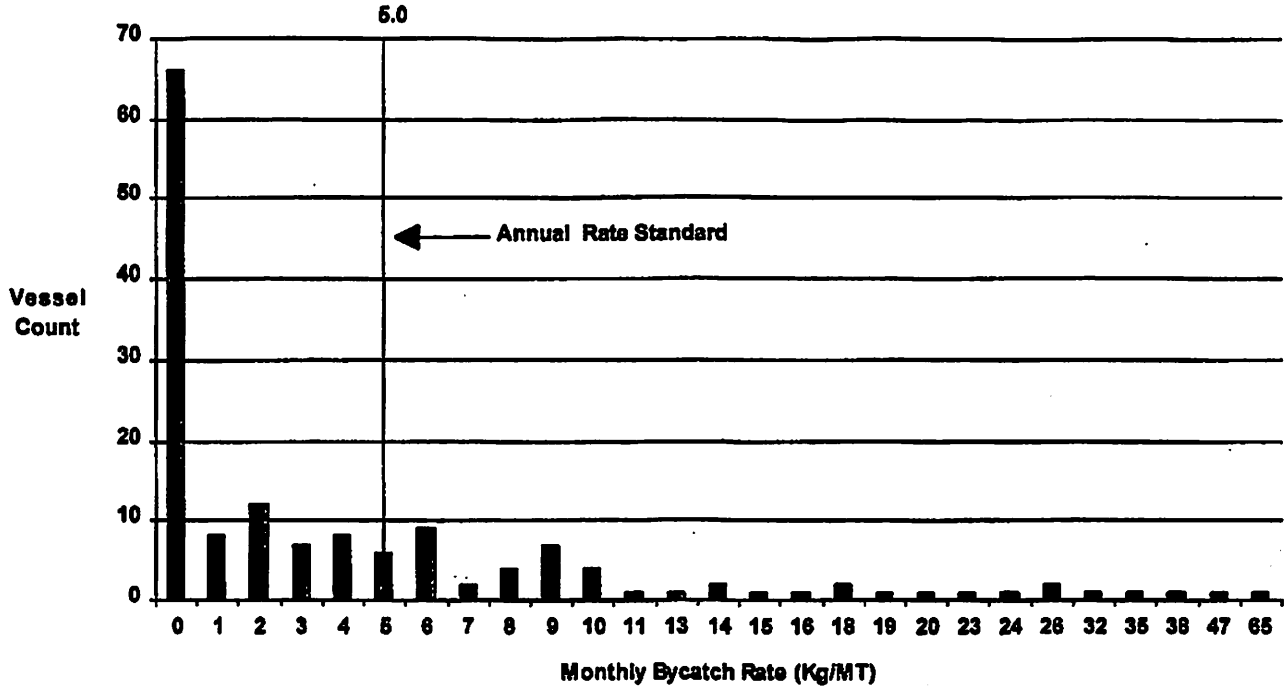


Midwater Pollock Fishery

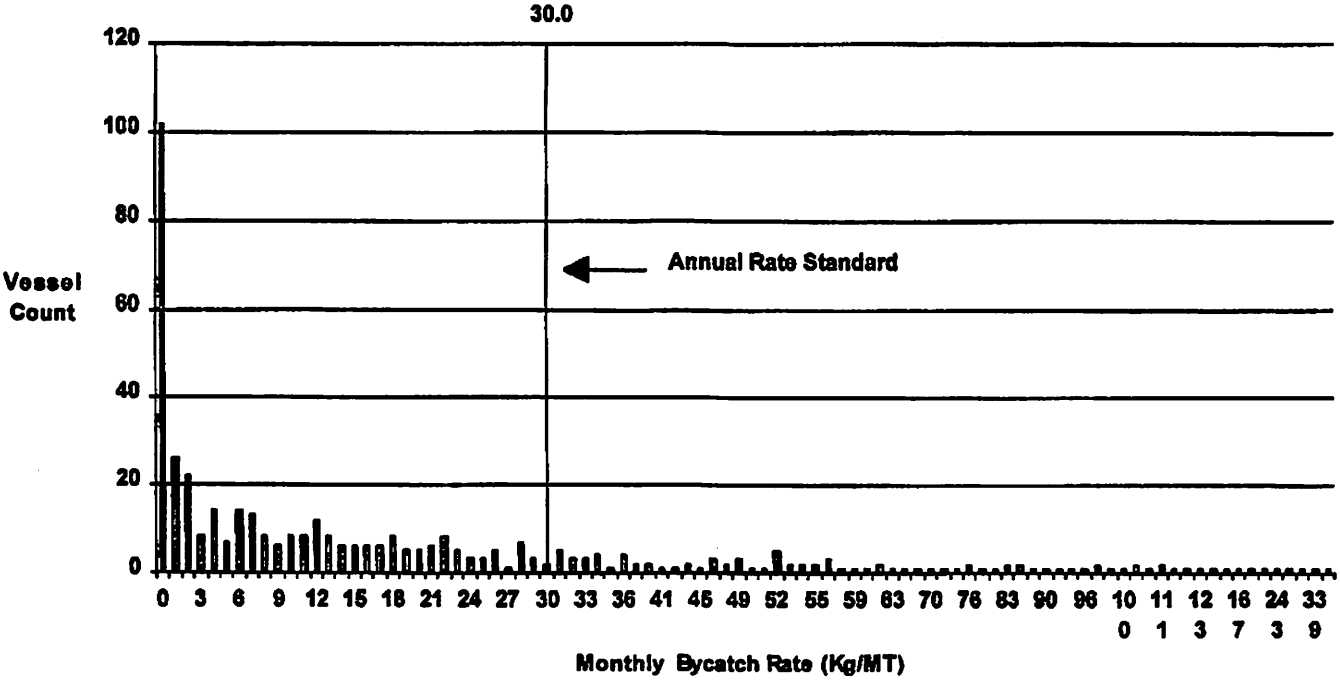


1994 HALIBUT BYCATCH - BERING SEA AND ALEUTIAN ISLANDS

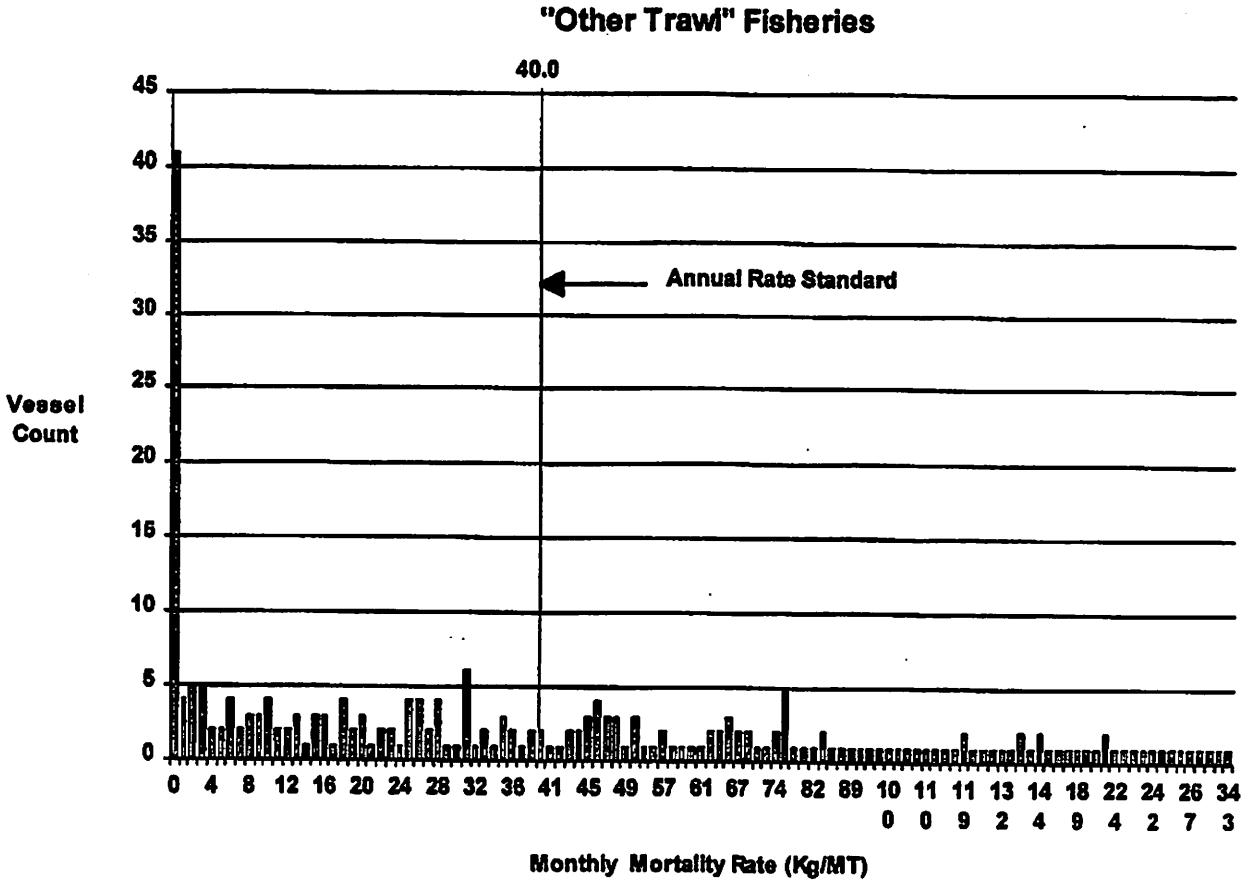
Yellowfin Sole Fishery



"Other Trawl" Fisheries

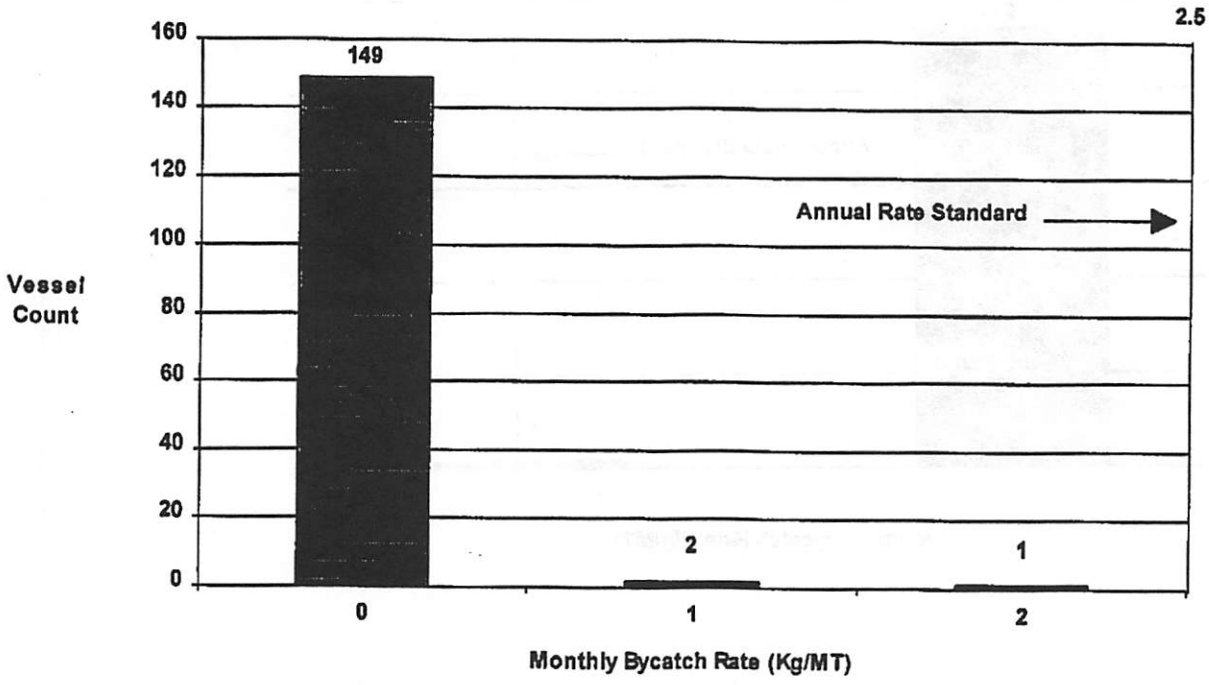


1994 HALIBUT BYCATCH - GULF OF ALASKA



1994 RED KING CRAB BYCATCH - BERING SEA AND ALEUTIAN ISLANDS

Yellowfin Sole Fishery



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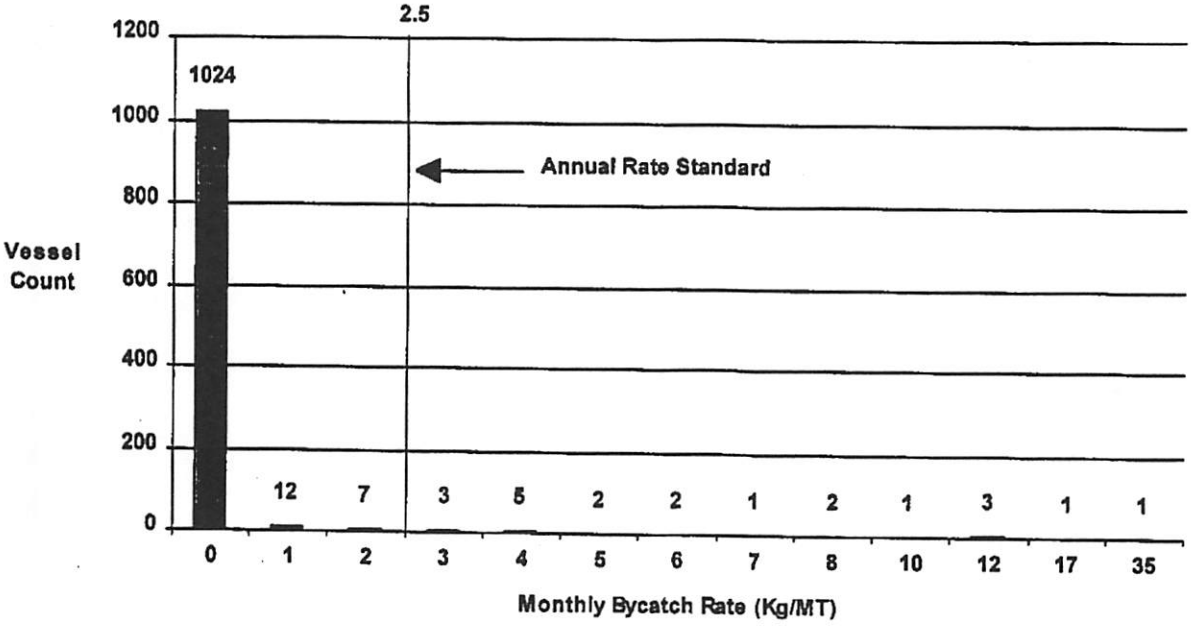
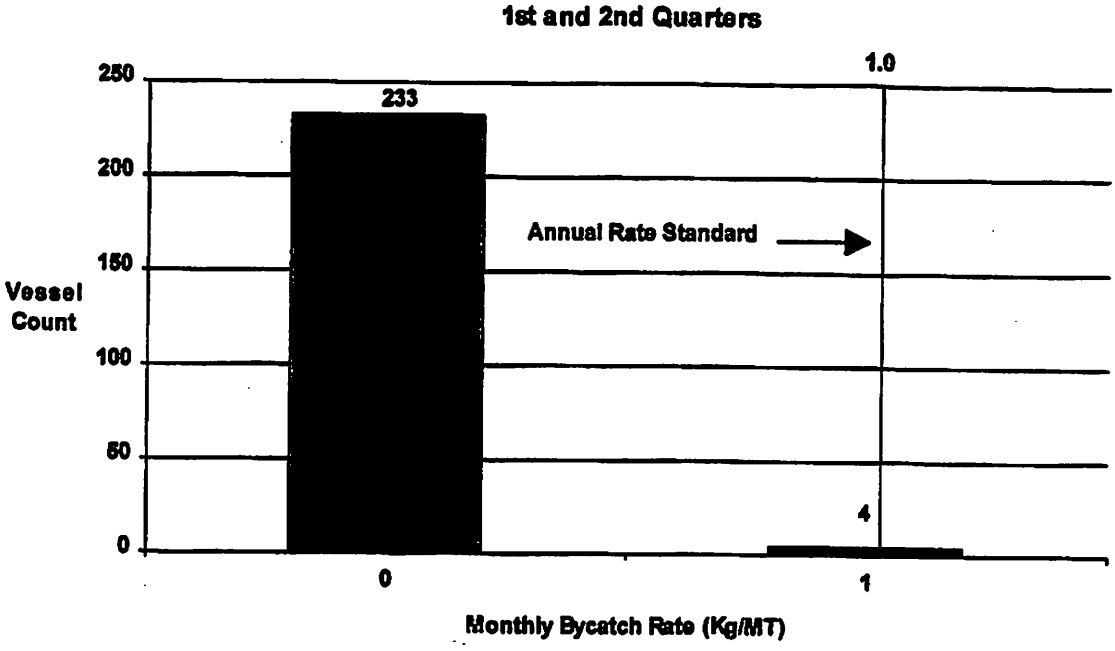
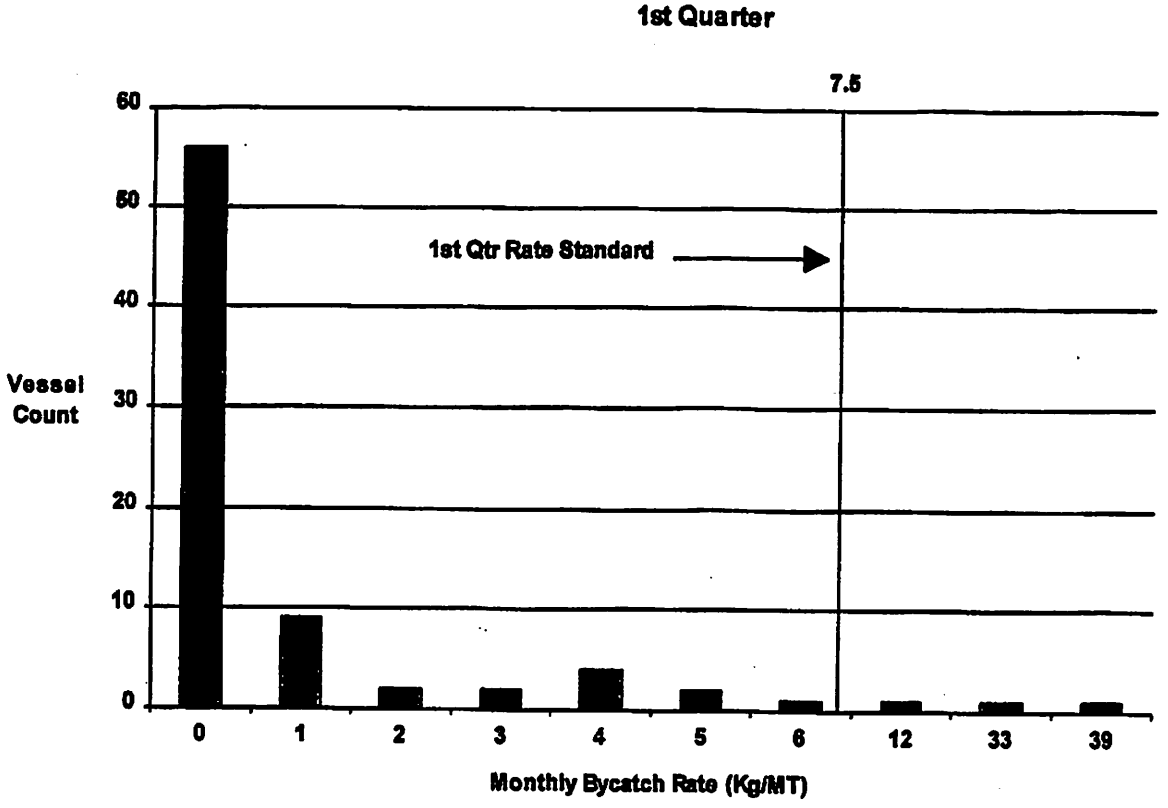
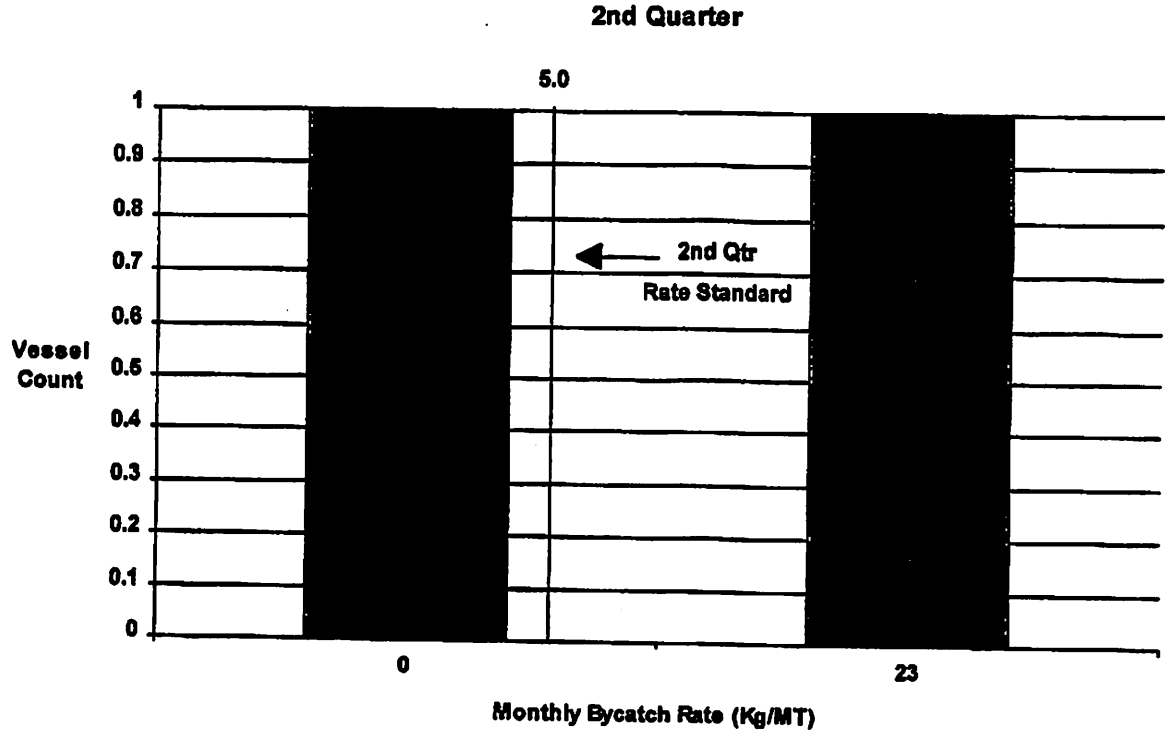


1995 BSAI HALIBUT BYCATCH - MIDWATER POLLOCK



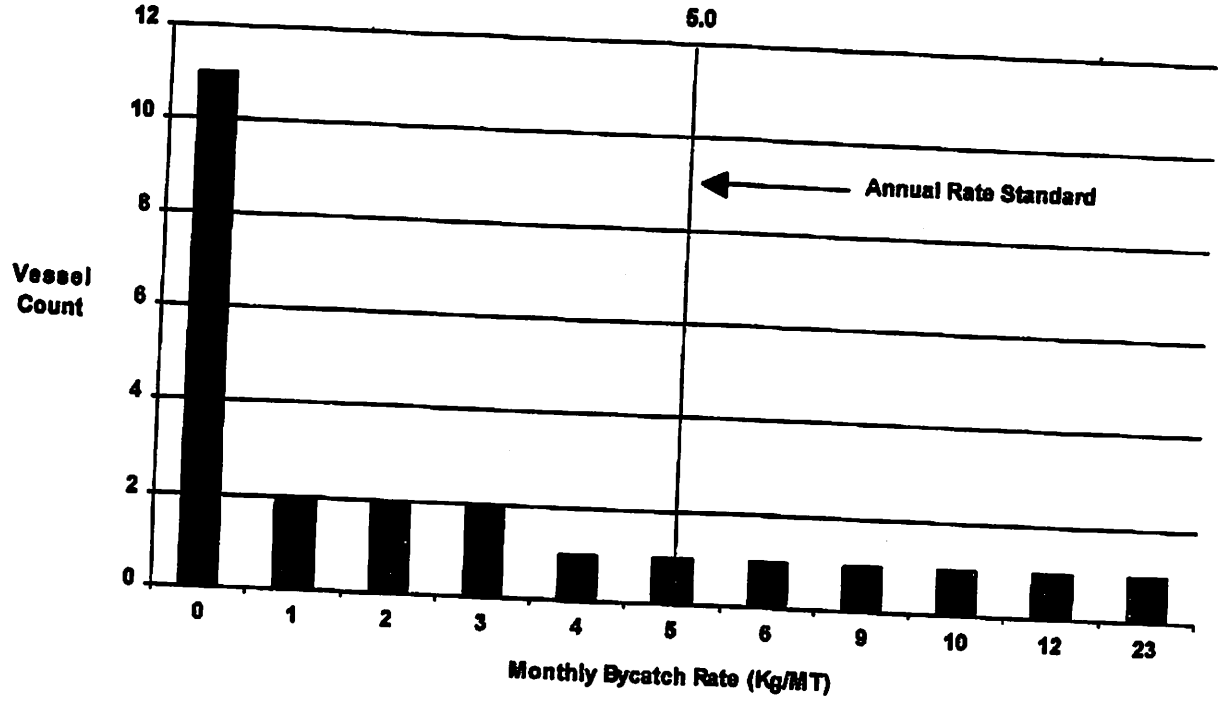
1995 BSAI HALIBUT BYCATCH - BOTTOM POLLOCK



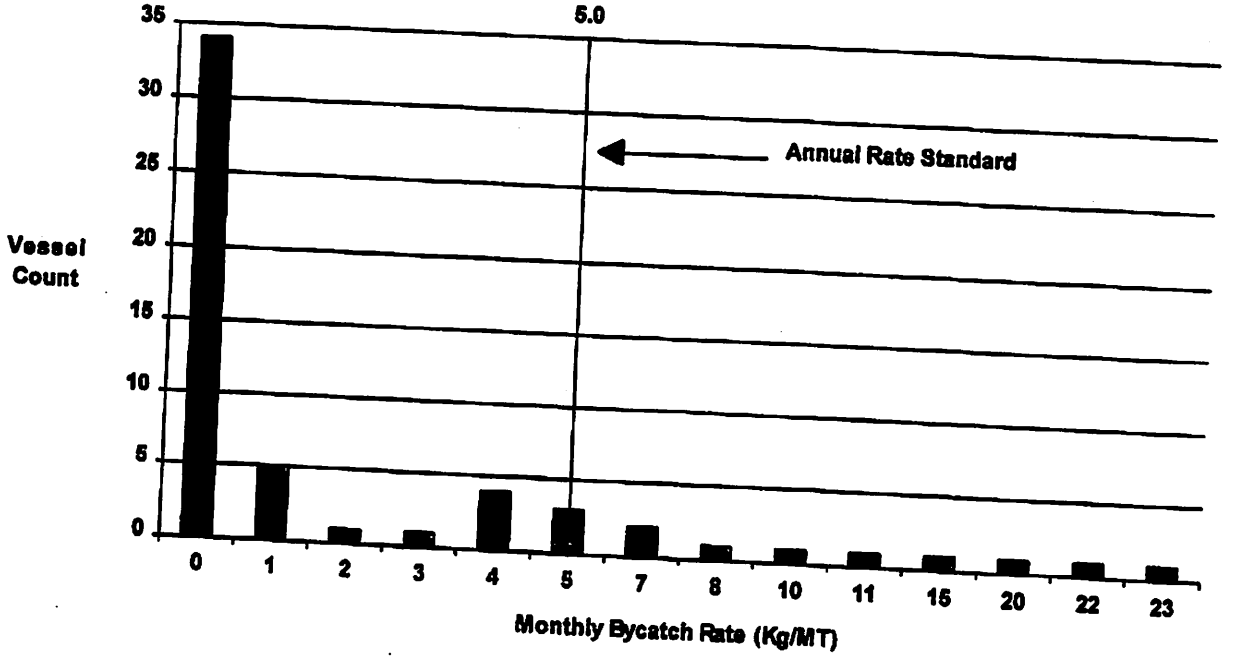


1995 BSAI HALIBUT BYCATCH - YELLOWFIN SOLE

1st Quarter

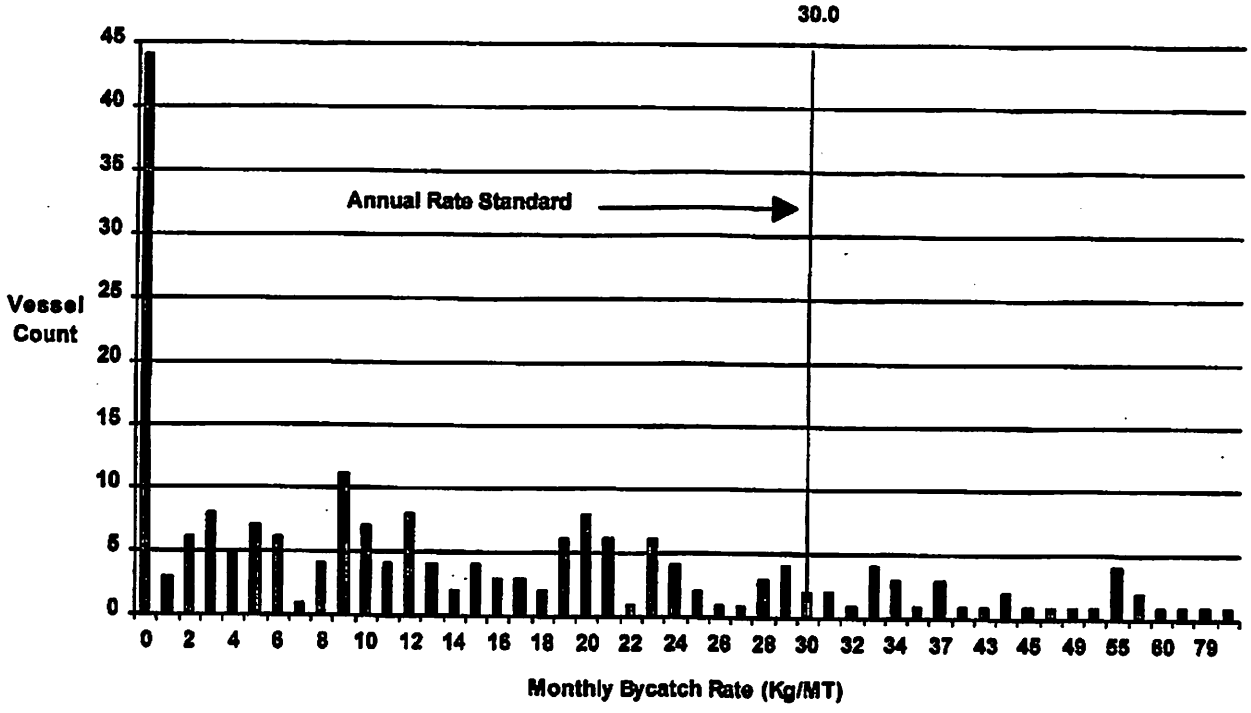


2nd Quarter



1995 BSAI HALIBUT BYCATCH - "OTHER TRAWL"

1st Quarter



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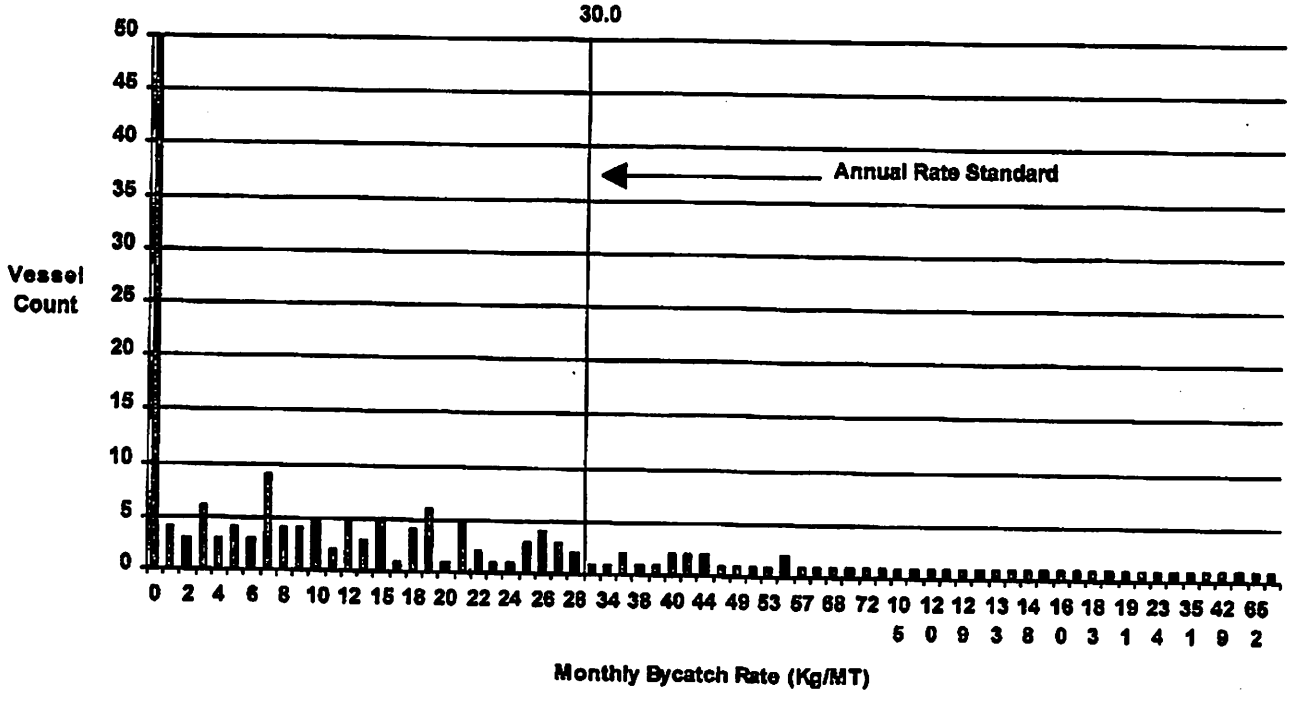
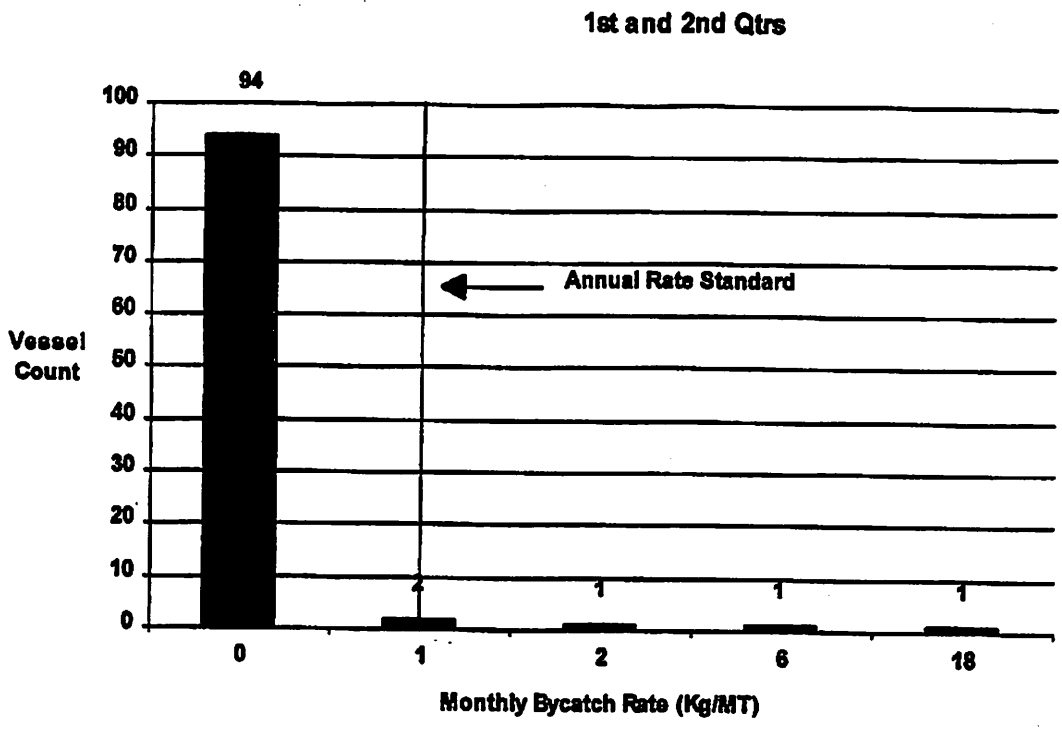
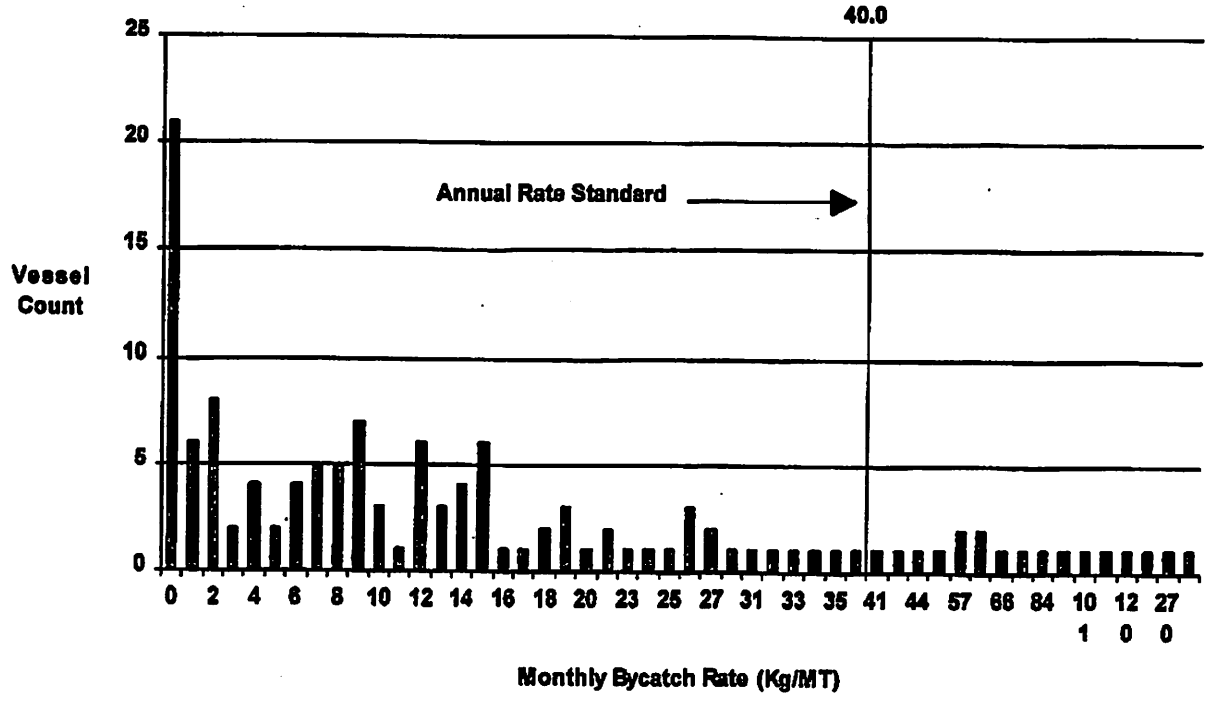


1995 GOA HALIBUT BYCATCH - MIDWATER POLLOCK



1995 GOA HALIBUT BYCATCH - "OTHER TRAWL"

1st Quarter



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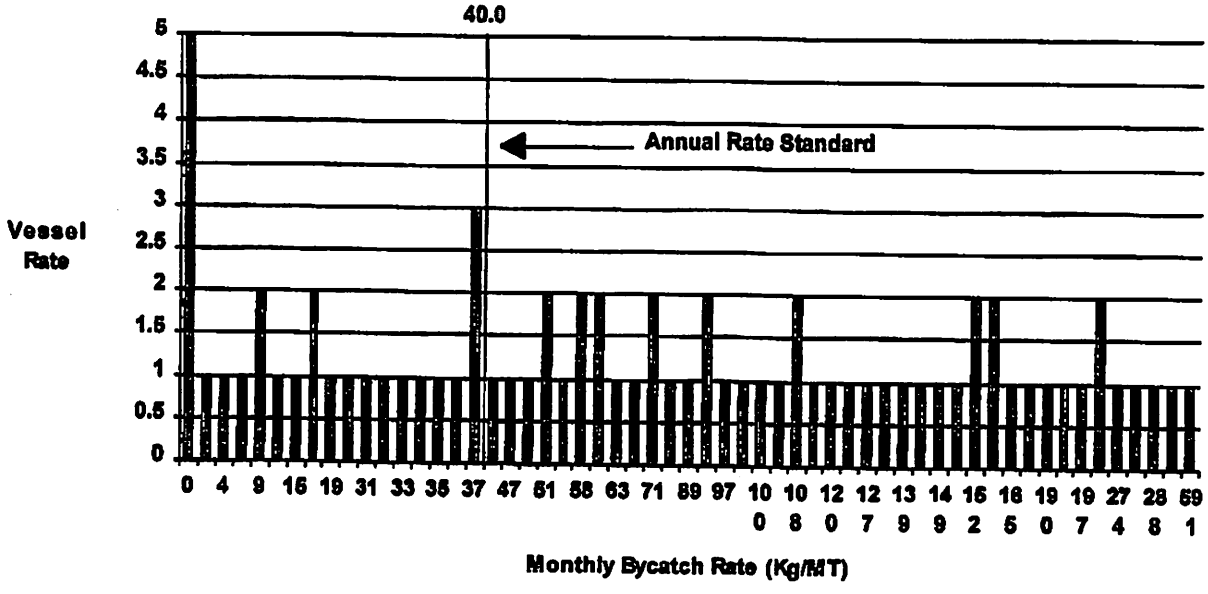
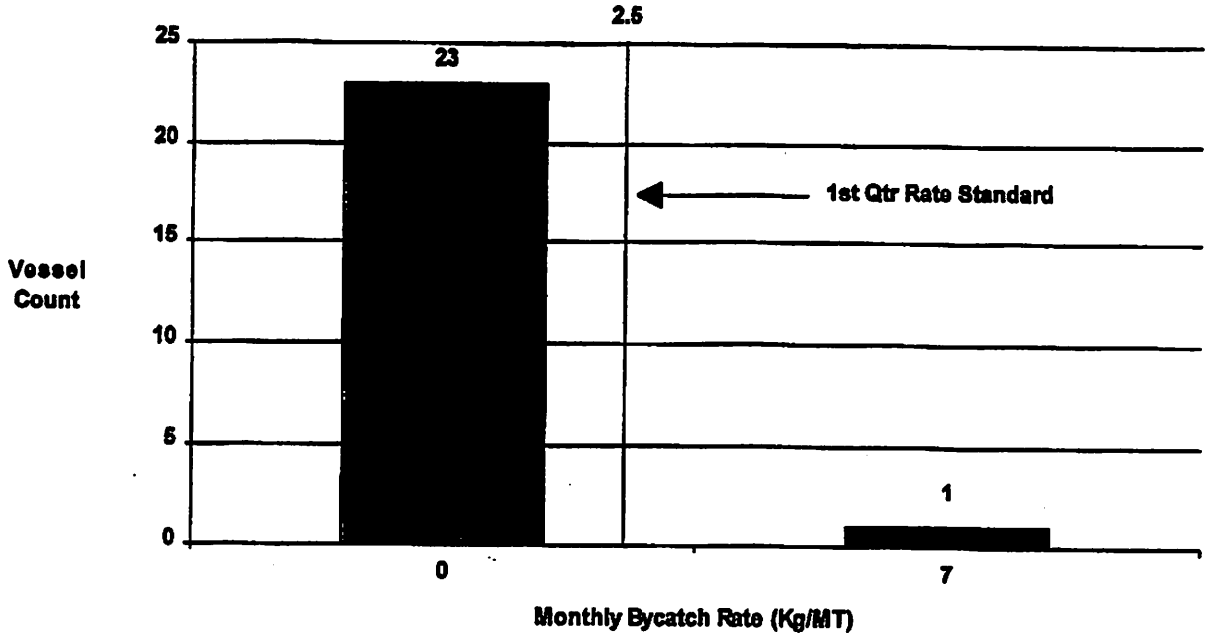


1995 BSAI RED KING CRAB BYCATCH - YELLOWFIN SOLE

1st Quarter



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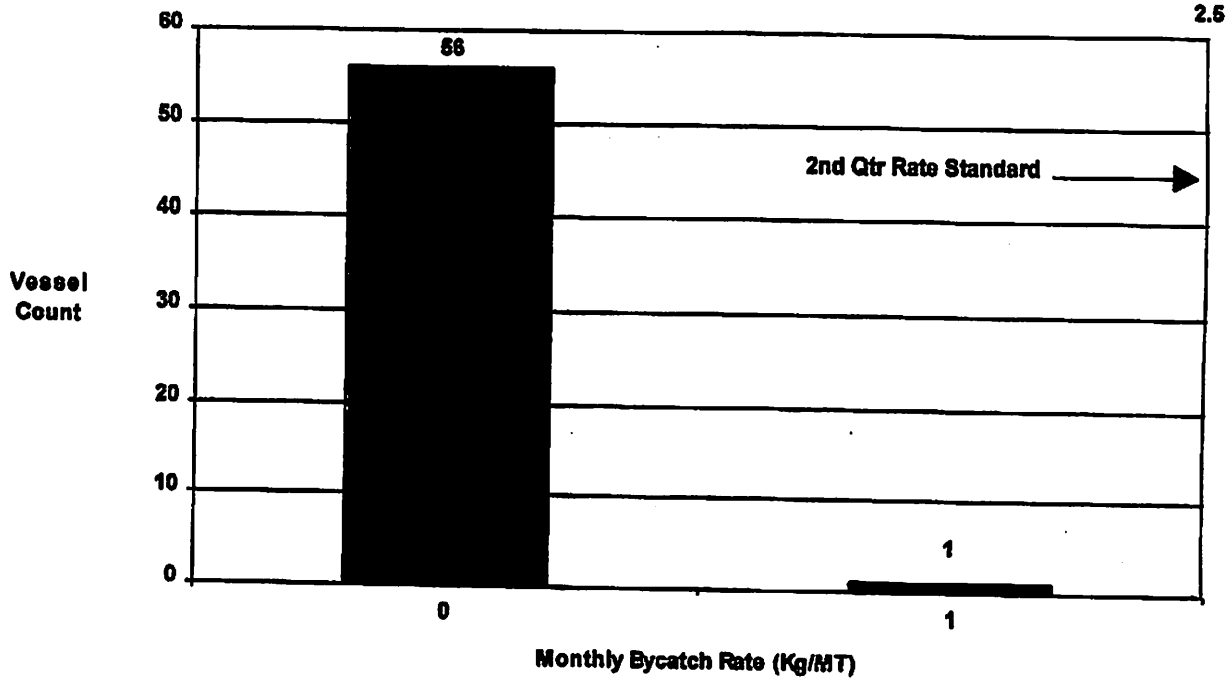
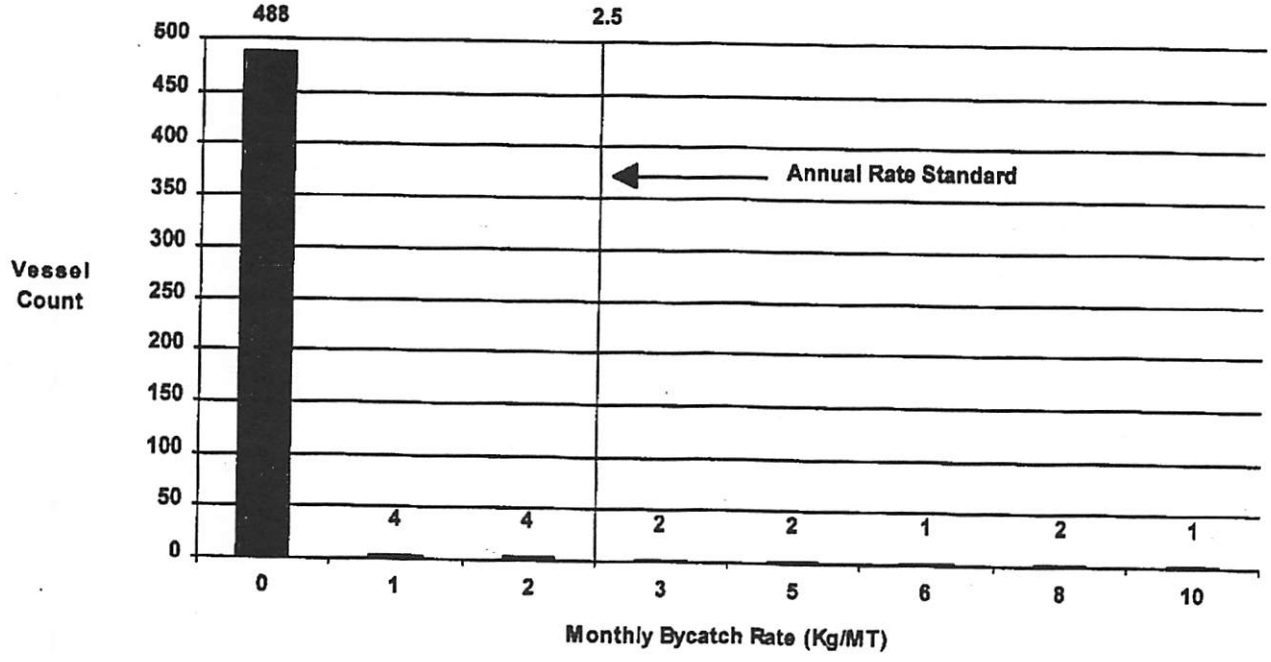


1995 BSAI RED KING CRAB BYCATCH - "OTHER" TRAWL

1st Quarter



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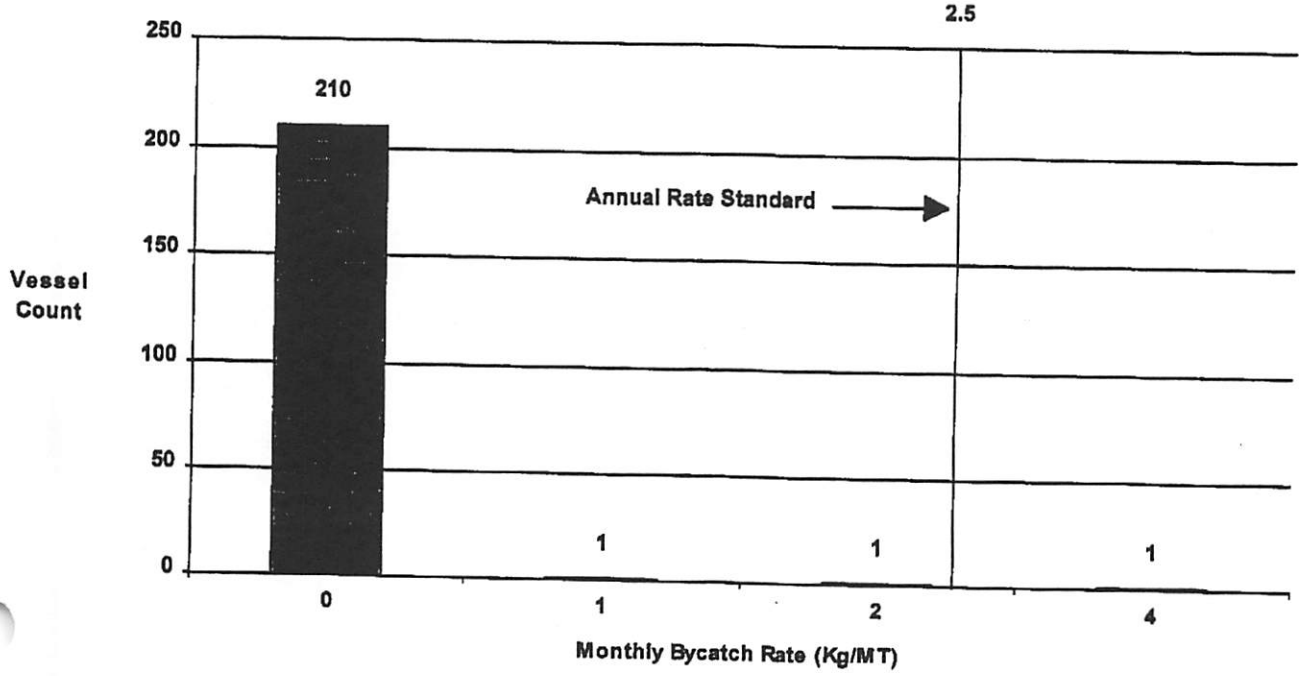

PRELIMINARY RESULTS

PACIFIC HALIBUT DISCARD MORTALITY RATES IN THE 1994 ALASKAN GROUNDFISH FISHERIES, WITH RECOMMENDATIONS FOR MONITORING IN 1996

by

Gregg H. Williams
September 14, 1995

INTRODUCTION

Pacific halibut bycatch discard mortality rates (DMRs) in the Alaskan groundfish fisheries are estimated from viability data collected by NMFS observers. Data analysis by staff of the International Pacific Halibut Commission (IPHC) results in recommendations to the North Pacific Fishery Management Council (NPFMC) for managing halibut bycatch in the upcoming season. This paper describes the results from an analysis of data collected from the 1994 fishery. The data were obtained from the NMFS Domestic Observer Program in late August, 1995, and are not considered final at this time. Consequently, the results presented here are subject to change. **Preliminary** recommendations for preseason assumed DMRs for 1996 are included. A final report will be distributed in early November.

SUMMARY OF DATA COLLECTED DURING 1994

The species composition of a vessel's weekly catch (reporting week) was used as the basis for determining target fishery (Table 1). These criteria were the same as those used by NMFS during 1990-91 monitoring of fishery catches and PSC bycatches, and have been used since 1990 in IPHC's analyses of halibut DMRs. Fishery definitions currently used by NMFS are based on retained catch, which cannot be estimated from the NORPAC data set.

Fishery targets which are designated as "bycatch-only", or targets which were artifacts of the target classification process, were excluded. This included a trawl fishery for sablefish in the GOA, and hook and line fisheries for pollock, arrowtooth flounder, and deep water flatfish. In most cases, the number of hauls for these categories was less than 10.

DMRs are determined from the distribution of the release condition of halibut caught as bycatch. Condition, or viability, was determined by the observer on the basis of a physical examination of the fish against certain criteria which focus on body and opercular movements and extent of external injuries (Table 2). The criteria are different for trawls and hook & line bycatch. In all cases, observers are instructed to collect condition data just prior to the fish being returned to the sea.

Data on groundfish catches, halibut bycatch, and the release condition data by fishery are summarized in Table 3. In 1994, observers examined 92,423 bycaught halibut for discard condition: 46,449 from trawlers, 43,849 from hook & line vessels, and 2,125 from vessels fishing groundfish pots. Sample size was quite large for most fisheries: the number of halibut examined in each trawl fishery usually exceeded 500 fish in the BSA

and the GOA. Sample sizes in the hook and line fisheries were large in the major fisheries, but somewhat lower in minor fisheries. This is probably a reflection of the relatively small size of certain fisheries and the lack of observer coverage on the smaller vessels.

ESTIMATION METHODOLOGY

Trawls

The baseline study which provides mortality rates by release condition was conducted by Hoag (1975). This experiment, using shore-based Canadian and U.S. trawlers fishing off Canada in 1970, used the recovery rates from more than 2,000 tagged halibut to estimate the mortality that occurs during trawl-capture and release. Observers on commercial vessels noted the condition of each halibut prior to release.

Clark et al. (1992) reviewed Hoag's results and recommended revising the survival rates to the following: 80% for excellent condition fish, 45% for poor fish, and 10% for dead or likely-to-die fish. These rates have been used since 1992 and are used in this paper. Clark et al. (1992) observed that a fourth category with zero survival may be necessary for large volume trawl fisheries that display lag periods before halibut are discarded.

The DMR for a particular fishery is calculated by applying the mortality rate by condition category to the proportion of fish in that category, shown in Table 3, and summing the products across all categories.

Hook & Line

For hook & line gear, studies of discard mortality comparable to Hoag's (1975) trawl analysis have not been completed. However, data are available from other IPHC studies which suggest that (1) handling mortality of hook & line caught halibut in excellent condition ranges from 2 to 5% (Peltonen 1969), and (2) survival of poor condition fish is approximately half that of fish in excellent condition (Myhre 1974). Additionally, it is assumed that (1) all fish judged as dead actually die and (2) all fish judged as excellent survive, except for those killed through handling mortality (2% to 5%). Using these relationships, mortality rates were 3.5% for excellent condition fish, 52% for poor fish, and 100% for dead or likely-to-die fish.

Pots

There is no information on the mortality of pot-captured halibut occurring from release. Causes of mortality have been suggested, such as size of catch, pot soak time, and the presence of certain species, particularly those with spines (e.g., rockfish or crabs). But it is unknown how much mortality these sources may create.

From our understanding of halibut in excellent, poor, and dead condition in other gear types, it is likely that some fraction of the excellent and poor fish die from capture-related injuries following release and that some small fraction of the dead fish probably survive. Although it is unknown what fraction actually survive in each category, the following assumptions have been made: (1) all excellent fish survive (0% mortality); and (2) all poor and dead/likely-to-die fish die (100% mortality).

This may over-estimate the actual mortality, because some of the poor fish may survive even though it is assumed all die. However, it is also likely that a small fraction of the excellent condition fish die and that a small fraction of the dead/likely-to-die fish survive. There is currently no way to quantify these errors, but they have only a small effect on the overall estimate of discard mortality given the high proportion of fish that are in excellent condition. Consequently, this approach is conservative, but is reasonable until data can be obtained on post-release mortality.

RESULTS

For BSA trawl fisheries, the DMRs ranged from a high of 82% in the midwater (MWT) pollock fishery to a low of 63% for the turbot fishery (Table 3). Fisheries for rockfish, bottom trawl (BT) pollock, and flatfish exhibited nearly equal DMRs, following into the 73%-75% range. The Pacific cod and atka mackerel fisheries were at a lower level of 64%-66%.

For GOA trawl fisheries the range was narrower, from a high of 72% for MWT pollock to 52% for deepwater flatfish fishery (Table 3). Fisheries for shallow water flatfish were next highest (62%), followed by Pacific cod and BT pollock, at 58% and 57% respectively. The rockfish fishery was almost as low as the deepwater flatfish fishery, at 53%.

The major hook and line fisheries for GOA cod and sablefish and BSA cod and turbot had large number of halibut examined, over 1,000 fish in three of four fisheries. As with the trawl fisheries, condition factor distributions differed among target fisheries. The proportion of halibut in excellent condition was high, generally 70% to 90%. The proportion of halibut classified as dead or likely-to-die was low, roughly 10% or less.

DMRs in hook and line fisheries ranged from a low of 14% to a high of 39% (Table 3). In four of the six fisheries examined, DMRs ranged from 14%-17%, about what has been noted in earlier years. The GOA sablefish fishery remained higher than most fisheries, at 21%, but was lower than 1993 (Table 4). The BSA sablefish fishery was extremely high, more than double what was seen in 1993. Additional work is planned to investigate this higher-than-expected DMR.

Halibut DMRs in the 1995 BSA Pacific cod fishery were determined in-season by Williams and Sadorus (1995). Their results, presented at the June, 1995 NPFMC meeting, are attached as Table 5. This is the only 1995 fishery that has been examined.

Results for GOA and BSA pot fisheries are shown in Table 3. Catching halibut in groundfish pots inflicts little damage or injuries, and the proportion of excellent condition fish is usually quite high. For 1994, halibut were in better condition, and DMRs lowest, in the BSA fishery: 9%, compared to 15% for the GOA fishery. In the GOA fishery, a greater share of the halibut were judged as dead than in the BSA fishery, which lead to the higher DMR. The GOA fishery has generally exhibited a higher rate than the BSA fishery since data collection began in 1990. This appears to be caused by longer soaks in the GOA fishery. Long soaks lead to higher mortality through sand flea predation.

PRELIMINARY RECOMMENDATIONS FOR 1996 PRESEASON ASSUMED RATES

Table 4 shows annual DMRs by target fishery and gear since 1990. Many fisheries exhibited only minor variation during the four year period, although a few do show some wide swings (e.g., GOA pot cod, GOA hook & line cod, BSA BT pollock). These swings may have been caused by several factors, such as changes in fishery regulations, manner in which the gear is fished, or low levels of effort or observer coverage.

In 1993, a two-year averaging procedure for determining an appropriate DMR to use during the upcoming season was adopted. In this case, rates from 1993 and 1994 would be averaged to obtain a preseason assumed rate for use in 1996. Table 4 shows the 1993-94 averages, which have been carried over as **preliminary** recommendations for 1996 halibut bycatch monitoring. Rates for 1993 and 1994 were lacking for some fisheries so rates from 1991 were used, as these were the most recent year's available.

The analysis of the 1995 BSA cod hook-&-line fishery provided more current DMR information than for other fisheries. Consequently, I used the average of the 1995 and 1994 DMRs to determine the preseason asssumed DMR for 1996.

ADDITIONAL ANALYSES TO BE CONDUCTED

This anaylsis was conducted on a preliminary data set provided by the NMFS Observer Program. A final data set is expected to be available in late September, which will allow refinement of this analysis, as well as additional analyses to be done. Specific work includes: (1) examination of data from GOA atka mackerel fishery; (2) separating GOA BT pollock into at-sea and shoreside delivery modes; (3) separate analysis GOA rex sole and flathead sole fisheries; and (4) a closer examination of data from the BSA hook-&-line sablefish fishery.

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Table 1. **Target fishery definitions based on total catch excluding prohibited species, non-allocated species, and arrowtooth flounder for Gulf of Alaska targets.**

Bering Sea/Aleutians

Greenland Turbot: ≥ 35%
Pacific cod: ≥ 45%
Rock sole & Other Flatfish: if (rock sole + yellowfin sole + other flats) ≥ 40% *and*
rock sole > (yellowfin sole + other flats)
Yellowfin sole: (yellowfin sole + rock sole + other flats) ≥ 40%
Arrowtooth flounder: ≥ 20%
Rockfish: ≥ 20%
Atka mackerel: ≥ 20%
Midwater trawl pollock: ≥ 95%
Bottom trawl pollock: ≥ 20%
Other: anything else

Gulf of Alaska

Pacific cod: ≥ 45%
Rockfish: ≥ 30%
Shallow water flatfish: rock sole + yellowfin sole ≥ 20%
Deep water flatfish: greenland turbot + other flatfish ≥ 20%
Midwater trawl pollock: ≥ 95%
Bottom trawl pollock: ≥ 20%
Other: anything else

Table 2. Halibut viability criteria used by NMFS observers. The criteria listed below are in priority order.

TRAWLS AND POTS

Excellent: No sign of stress

1. Fish closes operculum (gill cover) tightly for at least 5-10 seconds.
2. Muscle tone or physical activity is strong, jaw may be tightly clenched.
3. Injuries, if any, are minor: hemorrhaging on white side 5-10%; minor fin fraying; superficial nicks or cuts.
4. Gills are deep red.

Poor: Alive, but showing signs of stress

1. Moderate injuries maybe present: hemorrhaging on white side approximately 25%; severe fin fraying; slight bleeding from fin edges; moderate abrasions or cuts.
2. Fish closes operculum weakly and not sustained.
3. Muscle tone or physical activity is weak: intermittent movement; may respond if stimulated; body appears limp.
4. Gills are deep to bright red.

Dead: No sign of life or, if alive, likely to die from severe injuries or suffocation

1. Vital organs may be damaged: body or body cavity may be ripped open; severe skin lacerations; sediment in mouth, hemorrhaging on white side 50% or more.
2. Fish does not close operculum; jaw may be open.
3. No sign of muscle tone; physical activity absent or limited to fin ripples or twitches; little, if any, response to stimuli.
3. Severe bleeding may be occurring.
4. Gills may be red, pink, or white.

HOOK & LINE

Excellent: No sign of stress

1. Hook injuries are minor (limited to the hook entrance/exit hole, torn lip) and located in the jaw or cheek.
2. Bleeding, if present, is minor and limited to jaw area.
3. No penetration of the body by sand fleas (check eyes, fins, anus).
4. Muscle tone or physical activity is strong.
5. Gills are deep red.

Poor: Alive but showing signs of stress

1. Hook injuries may be severe: broken jaw; punctured eye.
2. Vital organs are not injured.
3. Bleeding may be moderate but not from gills.
4. No penetration of the body by sand fleas (check eyes, fins, anus).
5. Muscle tone or physical movement may be weak or intermittent; little, if any, response to stimuli.
6. Gills are red.

Dead: No sign of life or, if alive, likely to die from severe injuries

1. Vital organs may be damaged: torn gills; gaff wound to head or body; jig injury to viscera; side of face torn loose or missing jaw.
2. Sand fleas have penetrated the body (they usually attack the eyes first, but also fins and anus).
3. Severe bleeding may occur, especially from the gills.
4. No sign of muscle tone; physical activity absent or limited to fin ripples or twitches.
5. Gills may be red, pink, or white.

Table 3. Summary of 1994 halibut bycatch and viability information. Groundfish catch and halibut bycatch figures from NMFS/AKR Bulletin Board reports; viability data from NMFS observer haul-by-haul database (NORPAC).

Fishery	Groundfish Catch (mt)	Halibut Bycatch (mt)	Avg. Wgt. (kg, rd wt)	Viability Subsample						Discard Mortality Rate (%)
				No. of Boats	No. Hauls Sampled[1]	No. Halibut Examined	% Excellent	% Poor	% Dead	
BSA TRAWL										
MWT Pollock	1,216,318	603	5.4	113	1,079	3,736	6	11	83	82
Atka mackerel	82,460	246	17.1	22	89	256	19	32	49	66
Rock sole/O. Flats	101,618	1,154	1.7	31	589	2,233	12	19	69	75
Pacific cod	96,747	2,098	1.8	105	2,273	16,421	20	35	45	64
BT Pollock	139,557	350	2.6	87	988	8,022	11	19	70	76
Rockfish	15,403	74	7.9	13	63	195	10	24	66	75
Turbot	7,113	925	8.8	24	103	270	22	33	45	63
Yellowfin sole	209,701	832	4.1	67	1,014	3,754	15	20	65	73
GOA TRAWL										
Atka mackerel	2,095	23	-	-	-	-	-	-	-	-
MWT Pollock	95,648	19	6.6	46	110	386	13	25	62	72
Rockfish	14,240	204	8.2	40	280	1,978	36	33	31	53
BT Pollock	13,652	78	2.6	16	75	837	22	50	27	57
Shallwtr. flats[2]	9,153	567	2.9	11	49	463	33	15	52	62
Pacific cod	37,682	1,148	2.7	59	232	2,532	27	39	34	58
Deepwtr. flats[3]	26,157	1,729	5.1	51	661	5,366	40	29	31	52
BSA H&L										
Pacific cod	103,770	7,073	4.0	45	2,401	39,835	82	13	5	15
Sablefish	4,495	282	17.6	7	21	95	44	38	18	39
Grnld. turbot	1,677	328	14.1	20	68	709	82	14	4	14
GOA H&L										
Pacific cod	6,860	1,004	4.7	20	144	1,901	82	11	7	16
Rockfish	1,255	773	14.1	4	11	134	75	22	3	17
Sablefish	24,336	3,734	9.3	18	100	1,175	75	14	11	21
BSA POT										
Pacific cod	8,449	52	3.7	25	543	1,757	91	7	2	9
GOA POT										
Pacific cod	9,228	84	4.2	8	114	368	85	8	7	15

[1]Sets where halibut were examined for release condition. Data were not collected from every tow or set.
[2]Includes flathead sole target.
[3]Includes rex sole target.

Table 4. **Trend in halibut discard mortality rates during 1990 through 1994, and *preliminary* recommendations for discard mortality rates to use in monitoring halibut bycatch mortality in 1996.**

Region/Target	1990	1991	1992	1993	1994	1995	1993-94 Average	Used in 1995	Recommendation for 1996
BSAI TRAWL									
MWT Pollock	81	81	87	90	82	n.a.	86	89	86
Atka mackerel	69	73	62	56	66	n.a.	61	59	61
Rock sole/Oflats[1]	58	68	78	72	75	n.a.	74	75	74
Pacific cod	68	60	67	62	64	n.a.	63	65	63
BT Pollock	65	59	76	78	76	n.a.	77	77	77
Rockfish	62	54	59	78	75	n.a.	77	69	77
Yellowfin sole[1]	73	74	77	75	73	n.a.	74	76	74
Arrowtooth	57	41	-	-	-	n.a.	49	49[2]	49
Grnld. turbot	58	38	-	-	63	n.a.	51	48[2]	51
GOA TRAWL									
MWT Pollock	63	74	69	63	72	n.a.	68	66	68
Rockfish	61	65	69	62	53	n.a.	58	66	58
BT Poll. at-sea	65	56	67	81	(57)[3]	n.a.	-	74	-
BT Poll. shoreside	65	56	72	54	(57)[3]	n.a.	-	63	-
Shallwtr. flatfish	62	61	62	66	62	n.a.	64	64	64
Pacific cod	61	55	59	56	58	n.a.	57	58	57
Deepwtr. flatfish	57	52	59	59	52	n.a.	56	59	56
BSAI H&L									
Pacific cod	17	21	18	18	15	11.5[4]	13	11.5	13
Sablefish	13	18	19	14	39	n.a.	27	17	27
Rockfish	18	29	-	-	-	n.a.	24	24[2]	24
Grnld. turbot	-	-	17	21	14	n.a.	18	19	18
GOA H&L									
Pacific cod	13	17	30	9	16	n.a.	13	20	13
Sablefish	11	28	23	26	21	n.a.	24	25	24
Rockfish	15	20	-	-	17	n.a.	19	18[2]	19
BSAI POT									
Pacific cod	7	3	12	4	9	n.a.	7	8	7
GOA POT									
Pacific cod	10	5	16	20	15	n.a.	18	18	18

[1]During 1990 and 1991, "Other flatfish" was grouped with yellowfin sole. Since 1992, the target has been grouped with rock sole.
[2]Average of 1990 and 1991, the two most recent years.
[3]The DMR of 57% shown for GOA BT pollock represents the entire fishery. Additional analyses will develop the split between at-sea and shoreside deliveries and will be distributed in November.
[4]From Williams and Sadorus (1995).

Table 4. **Trend in halibut discard mortality rates during 1990 through 1994, and *preliminary* recommendations for discard mortality rates to use in monitoring halibut bycatch mortality in 1996.**

Region/Target	1990	1991	1992	1993	1994	1995	1993-94 Average	Used in 1995	Recommendation for 1996
BSAI TRAWL									
MWT Pollock	81	81	87	90	82	n.a.	86	89	86
Atka mackerel	69	73	62	56	66	n.a.	61	59	61
Rock sole/Oflats[1]	58	68	78	72	75	n.a.	74	75	74
Pacific cod	68	60	67	62	64	n.a.	63	65	63
BT Pollock	65	59	76	78	76	n.a.	77	77	77
Rockfish	62	54	59	78	75	n.a.	77	69	77
Yellowfin sole[1]	73	74	77	75	73	n.a.	74	76	74
Arrowtooth	57	41	-	-	-	n.a.	49	49[2]	49
Grnld. turbot	58	38	-	-	63	n.a.	51	48[2]	51
GOA TRAWL									
MWT Pollock	63	74	69	63	72	n.a.	68	66	68
Rockfish	61	65	69	62	53	n.a.	58	66	58
BT Poll. at-sea	65	56	67	81	(57)[3]	n.a.	-	74	-
BT Poll. shoreside	65	56	72	54	(57)[3]	n.a.	-	63	-
Shallwtr. flatfish	62	61	62	66	62	n.a.	64	64	64
Pacific cod	61	55	59	56	58	n.a.	57	58	57
Deepwtr. flatfish	57	52	59	59	52	n.a.	56	59	56
BSAI H&L									
Pacific cod	17	21	18	18	15	11.5[4]	13	11.5	13
Sablefish	13	18	19	14	39	n.a.	27	17	27
Rockfish	18	29	-	-	-	n.a.	24	24[2]	24
Grnld. turbot	-	-	17	21	14	n.a.	18	19	18
GOA H&L									
Pacific cod	13	17	30	9	16	n.a.	13	20	13
Sablefish	11	28	23	26	21	n.a.	24	25	24
Rockfish	15	20	-	-	17	n.a.	19	18[2]	19
BSAI POT									
Pacific cod	7	3	12	4	9	n.a.	7	8	7
GOA POT									
Pacific cod	10	5	16	20	15	n.a.	18	18	18

[1]During 1990 and 1991, "Other flatfish" was grouped with yellowfin sole. Since 1992, the target has been grouped with rock sole.
[2]Average of 1990 and 1991, the two most recent years.
[3]The DMR of 57% shown for GOA BT pollock represents the entire fishery. Additional analyses will develop the split between at-sea and shoreside deliveries and will be distributed in November.
[4]From Williams and Sadorus (1995).

Table 5. Summary of fishery and observer viability data for the 1995 BSA hook-&-line Pacific cod fishery. From Williams and Sadorus (1995).

	1995 FISHERY			VIABILITY SUBSAMPLE								
Week Ending Date	No. of FRZR/LL[1]	Groundfish Catch (mt)	Halibut Bycatch (mt)	No. of Boats	No. of Obsvrs.	Groundfish Catch (mt)	Halibut Bycatch (mt)	# Halibut Examined	% Exc	% Poor	% Dead	Discard Mort. Rate
1/07	26	4,499	239	15	15	3,087	195	1,041	75	13	12	21.1
1/14	28	4,915	216	16	16	3,518	149	1,043	86	10	4	12.1
1/21	26	3,500	164	14	14	2,311	122	1,059	83	14	3	12.8
1/28	27	3,885	156	14	14	2,206	103	678	86	12	2	11.7
2/04	28	3,462	164	17	17	2,602	121	1,242	88	9	3	11.0
2/11	30	6,101	175	17	17	4,665	132	1,266	86	12	2	11.4
2/18	28	4,569	165	19	19	3,374	128	1,110	87	11	2	11.0
2/25	27	4,552	131	18	19	3,431	108	1,404	87	10	3	10.8
3/04	28	4,901	181	19	20	3,982	150	1,438	84	12	4	12.8
3/11	30	4,453	187	20	20	3,442	147	1,498	84	13	3	12.9
3/18	31	5,545	165	22	22	3,824	132	1,389	81	14	5	15.2
3/25	34	4,624	158	19	19	3,001	115	1,051	86	11	3	12.0
4/01	32	4,391	166	13	13	2,123	107	942	91	7	2	8.9
4/08	33	4,816	208	12	12	1,971	132	752	94	5	1	7.1
4/15	32	4,592	200	10	10	1,380	114	917	92	7	1	7.5
4/22	33	4,956	251	9	9	1,583	119	1,062	93	6	1	6.9
4/29	35	4,787	220	8	8	1,429	97	743	91	8	1	8.5
5/06	30	4,716	266	8	8	1,712	96	628	94	5	1	6.8
OVERALL	42	83,264	3,412	26	32	49,641	2,267	19,263	87	10	3	11.5

[1]**No. of FRZR/LL** represents the number of freezer longliners and does not include the number of catcher vessels delivering to shore plants. As the amount of groundfish catch delivered to shore plants was less than 1% of the total groundfish caught in this fishery, the number of catcher vessels was probably quite low.