PUBLIC REVIEW DRAFT

Environmental Assessment/Regulatory Impact Review/ Initial Regulatory Flexibility Analysis to Revise Halibut Prohibited Species Catch Limits

Amendment 95 to the Gulf of Alaska Groundfish Fishery Management Plan

Date:	May 11, 2012
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Abstract: This analysis examines proposed changes to the management of commercial groundfish fisheries in the Gulf of Alaska (GOA) that would occur through an amendment to the GOA Groundfish Fishery Management Plan. Prohibited species catch (PSC) limits on removals of Pacific halibut can limit fishing activity on targeted groundfish fisheries or affect fishing practices. The fisheries that result in the highest halibut PSC in the GOA are the 1) Pacific cod trawl and longline fisheries, 2) shallow-water flatfish complex and arrowtooth flounder trawl fisheries, and 3) rockfish trawl fishery. In some target fisheries, PSC limits are not typically fully utilized, while other fisheries are 'typically' closed prior to attainment of the target TAC because they have fully utilizing its PSC allowance.

Current halibut PSC limits concern the Council because these limits have remained unchanged since their implementation in 1986 for trawl fisheries and revision in 1995 for fixed gear fisheries. Recent declines in halibut exploitable biomass, particularly in the GOA, have exacerbated concerns about levels of PSC in groundfish fisheries because of the potential effect of halibut PSC on other user groups.

In April 2011, the Council adopted a range of proposed reductions for analysis that were intended to be implemented through the GOA groundfish harvest specifications process for 2012/2013 after scoping the issue through a number of discussion papers in 2012 and 2011. In addition to the No Action Alternative, the proposed alternative (Alternative 2) included options for reductions of a) 5 percent, b) 10 percent, and c) 15% of the 2,000 mt halibut PSC limit on trawlers and 300 mt halibut PSC limit on fixed gear groundfish operations. Two suboptions addressed effects on trawl PSC limit apportionments. In June 2011, the Council reviewed the suite of alternatives for analysis and reorganized the suboptions.

In October 2011, the Council initiated a new action to remove GOA halibut PSC limits from the annual harvest specifications process through an amendment to the GOA Groundfish FMP and set halibut PSC limits in federal regulation. Such an action would mirror the process for setting halibut PSC limits in BSAI groundfish fisheries. The Council modified the options under the proposed alternative for revising GOA halibut PSC limits at initial review during their October 2011 meeting. At its February 2012 meeting, the Council deleted a suboption to apply all trawl PSC reductions to the fifth season and added two additional suboptions. The Council also scheduled final action for June 2012, with the intention that federal regulations to implement the Council's preferred alternative would be in effect by the start of the year in 2014.

Executive Summary

This analysis examines proposed changes to the management of commercial groundfish fisheries in the Gulf of Alaska (GOA) that would occur through an amendment to the GOA Groundfish Fishery Management Plan. Prohibited species catch (PSC) limits on removals of Pacific halibut can limit fishing activity on targeted groundfish fisheries or affect fishing practices. The fisheries that result in the highest halibut PSC in the GOA are the 1) Pacific cod trawl and longline fisheries, 2) shallow-water flatfish complex and arrowtooth flounder trawl fisheries, and 3) rockfish trawl fishery. In some target fisheries, PSC limits are not typically fully utilized, while other fisheries are 'typically' closed prior to attainment of the target TAC because they have fully utilizing its PSC allowance.

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This analysis includes an Environmental Assessment/ Regulatory Impact Review/ Initial Regulatory Flexibility Analysis (EA/ RIR/IRFA). The EA is intended to implement an amendment to the GOA Groundfish Fishery Management Plan. The RIR and IRFA are intended to support federal rulemaking.

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Environmental Assessment

Purpose and Need

Decreases in the amount of Pacific halibut (*Hippoglossus stenolepis*) available to the directed Gulf of Alaska (GOA) halibut fisheries focused public awareness of halibut prohibited species catch (PSC) usage by both the trawl and hook-and-line sectors. In Area 2C, the commercial IFQ sectors have experienced substantial decreases in their allowable harvest since 2007 (e.g., Charter halibut harvests have declined as a result of reductions in bag limits and size limits since 2009 (See Section 4.5.1). Declines in commercial halibut catch limits and charter guideline harvest levels (GHL) reportedly have decreased profitability, or, in some cases, resulted in economic losses. Participants in directed halibut fisheries often site halibut PSC usage as an area that should be examined as a way to reduce halibut removals. The International Pacific Halibut Commission (IPHC) has indicated that future fishery CEYs in Area 3A could decline substantially. If those declines occur, the directed halibut fisheries in Area 3A may face economic conditions similar to those experienced in Area 2C.

The proposed action would reduce one or more of the halibut PSC limits that have been established for the GOA. Halibut savings would then accrue to the directed fisheries in both the near term and long term. Near term benefits would result from the PSC reductions of halibut that are over 26 inches in length (O26). The legal-size limit for the commercial halibut fishery is 32 inches or greater. The removals of halibut 32 inches or over in total length are known as O32, and removals of halibut under 32 inches in total length are U32. The minimum size limit in the commercial halibut fishery means the O26 component of halibut PSC O32 would be available to the IFQ fishery the year the PSC is foregone, or when the fish reach the 32 inch limit. Longer term benefits in the directed fisheries would accrue from under 26 inches (U26) halibut PSC. Benefits from these smaller halibut would occur as they recruit into the directed fishery.

The purpose of halibut prohibited species catch management in the GOA is to minimize halibut removals when taken in the groundfish fisheries to the extent practicable, while achieving optimum yield. Minimizing halibut PSC while achieving optimum yield is necessary to maintain a healthy marine ecosystem ensure long-term conservation and abundance of halibut, provide maximum benefit to fishermen and communities that depend on halibut and groundfish resources, as well as U.S. consumers, and comply with the Magnuson-Stevens Act and other applicable federal law. National Standard 9 of the Magnuson-Stevens Act requires that conservation and management measures shall, to the extent practicable, minimize bycatch. National Standard 1 of the Magnuson-Stevens Act requires that conservation and management measures prevent overfishing while achieving, on a continuing basis, the optimum yield from each fishery for the United States fishing industry.

The proposed action would modify the GOA PSC limits and the process by which they are set. Currently the PSC limits are set as part of the annual specifications process. Implementing this proposed amendment to the GOA Groundfish Fishery Management Plan (FMP) would establish the PSC limits for the trawl and fixed gear sectors in regulation. GOA PSC limits then could be modified only through an amendment to those regulations. Seasonal and gear apportionments of halibut PSC limits would continue to set through the annual GOA groundfish harvest specifications process.

Council Objective

The Council has long been cognizant of and continues to recognize the extreme importance of halibut to all resource user groups. The Council also acknowledges that, for a wide variety of reasons, the dynamics of the directed and non-directed halibut fisheries have changed significantly since halibut PSC limits were first established. Given concerns with the current halibut PSC limits in the GOA, and the effect this bycatch has on both directed fishing opportunities and productivity of the stock, there is a need to evaluate existing halibut PSC limits and the way in which these limits are established.

The objective of the proposed action is to reduce halibut PSC limits for the GOA groundfish fisheries. Reductions in the PSC limit will generate halibut savings in years of relatively high halibut PSC. In years of low PSC usage, the PSC limit reduction may not be a constraint. Those years the groundfish sectors would be affected by the proposed changes. In years that halibut PSC savings occur, they will benefit the halibut resource and the directed halibut fisheries dependent on the GOA halibut resource. Conversely, groundfish harvesters will have their harvest constrained those years. The reductions in harvest will impact revenue generated from the fisheries. The magnitude of the revenue change will depend on the quantity of groundfish harvest foregone and the price flexibility of those groundfish species.

Problem Statement

The Council has long been cognizant of and continues to recognize the extreme importance of halibut to all resource user groups. The Council also acknowledges that, for a wide variety of reasons, the dynamics of the directed and non-directed halibut fisheries have changed significantly since halibut PSC limits were first established. Given concerns with the current halibut PSC limits in the GOA, and the effect this bycatch has on both directed fishing opportunities and productivity of the stock, there is a need to evaluate existing halibut PSC limits and the way in which these limits are established.

> *Currently, the GOA Groundfish harvest specifications annually establish a 2,000 mt halibut Prohibited Species Catch (PSC) limit for trawl gear and a 300 mt halibut PSC limit for hook and line gear. The GOA Groundfish FMP authorizes the Council to recommend, and NMFS to approve, annual halibut mortality limits as a component of the proposed and final groundfish harvest specifications. Halibut PSC limits are set separately for trawl and fixed gear, which may be further apportioned by season, regulatory area, and/or PSC fishery category.*

The Council is concerned about the feasibility of revising GOA halibut PSC limits through groundfish harvest specifications and recognizes that addressing halibut PSC limits in this manner on an annual basis is not in the best interest of the Council's deliberative process in the long run.

With the exception of PSC limit reductions in the IFQ sablefish fishery and the Rockfish Pilot Program, the current PSC limits have not been revised since 1989 for trawl gear and 1995 for hook and line gear. Since that time there have been significant changes in groundfish and halibut management programs and fishing patterns, environmental conditions, fishing technology, and knowledge of halibut and groundfish stocks. Halibut is fully utilized in the directed sport, subsistence, and commercial fisheries and is of significant social, cultural, and economic importance to communities throughout the geographical range of the resource. Halibut PSC limits are also critical to the prosecution of many groundfish fisheries operating in the GOA.

Since the existing GOA halibut PSC limits were established, the total biomass and abundance of Pacific halibut has varied and in recent years the stock has experienced an ongoing decline in size at age for all ages in all areas. Exploitable biomass has decreased 50% over the past decade. In recent years, the directed halibut catch limits in regulatory areas 2C, 3A and 3B have declined steadily. From 2002 to 2011 the catch limit for the combined areas 2C, 3A and 3B declined by almost 50% and the Guideline Harvest Level (GHL) to the charter halibut sector in Area 2C has been reduced by a similar percentage.

While the IPHC accounts for bycatch mortality when establishing catch limits for the directed fisheries in order to maintain the halibut stock's productivity, it is the Council's responsibility to manage halibut PSC limits and meet the requirements of National Standard 9 to minimize bycatch.

Alternatives

The Council adopted the following alternatives, options, and suboptions for analysis in October 2011.

Alternative 1. (Status quo). Retain the process for changing GOA halibut PSC limits through the annual groundfish harvest specifications process.

Alternative 2. Amend the GOA Groundfish FMP to remove setting GOA halibut PSC limits from the annual harvest specifications process. GOA halibut PSC limits would be established (and amended) in federal regulation.

Option 1 (Status quo). Retain the existing 2,000 mt trawl and 300 mt hook and line halibut PSC limits and write them into regulation.

Option 2. Revise the current GOA halibut PSC limits and write the new limits into regulation.

Suboption 1. Reduce the halibut PSC limit for hook and line gear CP sector by:

a) 5 percent
b) 10 percent
c) 15 percent

Suboption 2. Reduce the halibut PSC limit for hook and line gear CV sector by:

a) 5 percent
b) 10 percent
c) 15 percent

Suboption 3. Reduce the halibut PSC limit for trawl gear by:

a) 5 percent
b) 10 percent
c) 15 percent

Suboption 3.1. AFA/Amendment 80/Rockfish Program sideboard limits will be:

a) Applied as percentage against the GOA halibut PSC limit (Status quo)
b) Redefined in mt, calculated against the status quo GOA halibut PSC limits

Suboption 3.2. Allow the Amendment 80 sector to roll unused halibut PSC from one season to the subsequent season (similar to the non-Amendment 80 sectors).

Suboption 3.3. Allow available trawl halibut PSC in the second season deep water and shallow water complexes to be aggregated and made available for use in either complex from May 15th through June 30th. Halibut PSC sideboards for the Amendment 80 and AFA sectors would continue to be defined as deep water and shallow water complexes in the second season.

Groundfish

Under the status quo, no groundfish stock has been determined to be overfished or approaching an overfished condition. Annual catch limits (ACLs) and total allowable catches (TACs) generally have been increasing since 2009, and the most recent stock assessments (2011) indicate that the trend is expected to continue into the immediate future. Many groundfish quotas are apportioned spatially and temporally to reduce potential impact on Steller sea lions, and this proposed action would not affect this apportionment. Under Alternative 2, lower PSC limits may result in certain groundfish fisheries closing before the respective TACs or apportionments are reached or the fleets would have to engage in fishing activity to minimize unintended harvests of halibut, while a higher PSC limit would allow for target groundfish fishing at current (or near current) levels, and impacts would likely be similar to the status quo fishery. If groundfish TACs are not fully harvested, fishing would have less impact on the stocks, and there would be no adverse impact on groundfish stocks from the fisheries. Any changes in fishing patterns that may result from the alternatives, however, would be monitored and updated in future stock assessments.

Pacific halibut (Source: IPHC)[1]

The GOA groundfish fishery has an adverse impact on Pacific halibut through direct mortality due to prohibited species catch. Under the status quo, Pacific halibut are a prohibited species and it is incumbent upon fishermen, under the regulations, to avoid catching them. The Groundfish Programmatic EIS considered impacts of the fisheries on the halibut population, reproductive success, and habitat, and concluded that it is unlikely that groundfish fishing has indirect impacts on these aspects of Pacific halibut sustainability. The groundfish fisheries also incidentally catches halibut prey species, including euphausiids, herring, sand lance, capelin, smelt, pollock, sablefish, cod, rockfishes, octopus, crabs, and clams, however the catches of these prey species are very small relative to the overall populations of these species. Thus, groundfish fishing activities are considered to have minimal and temporary effects on prey availability for halibut.

Coastwide exploitable biomass (EBio) of Pacific halibut at the beginning of 2011 is estimated to be 318 M lb. Female spawning biomass (SBio) is estimated at 350 M lb at the start of 2011. This is an increase of nearly 6% over the beginning of 2010 estimate of 331 M lb. Estimated exploitable biomass is down by about 5% from the beginning of year 2010, while SBio is a bit over 6% higher than the 2010 beginning of year value estimated in 2009. Exploitable biomass and SBio are both estimated to have declined continuously between 1998 and 2007. EBio continued to decline until 2009, the model estimates that both are now on the increase, with SBio bottoming out in 2007 and EBio bottoming out in 2009. Recruitment (measured as age-eight fish in the year of assessment) has varied between 7 and 33 million halibut since the 1988 year class, with a mean of 17.9 million. The 1989 to 1997 year classes, presently 14 to 22 years old and the main target of the commercial fishery for the past several years, are all estimated to have been below average, several of the year classes substantially below average.

The sharply declining exploitable biomass over the past decade has resulted from these small year classes, in combination with reduced growth rates, replacing earlier year classes that were much larger, especially the 1987 and 1988 year classes. The projected increase in 2011 total biomass can be attributed, in large part, to the incoming 1998 through 2003 year classes that are estimated to be well above average, particularly the

[1] New information on the status of the Pacific halibut stock, which will be released after this draft is distributed to the Council, will be incorporated into the next draft of this analysis.

1999 and 2000 year classes. The extent to which these year classes will contribute to EBio over the next few years depends on the growth rate which continues to decline.

Projections based on the currently estimated age compositions suggest that both exploitable and spawning biomass will increase over the next several years as these strong year classes recruit to the fishable and spawning components of the population. Projected increases are tempered both by potential ongoing decreases in size-at-age, as well as realized harvest rates which continue to be above target in several regulatory areas. Trawl estimates of abundance are similar to assessment estimates in most areas, and also provide evidence of very large numbers of small halibut. The coastwide exploitable biomass was apportioned among regulatory areas in accordance with survey estimates of relative abundance, modified by adjustments for hook competition and survey timing.

The halibut stock has declined due to natural declines in recruitment, lower growth rates, and higher than target harvest rates in most. Catch limits adopted for 2011 were lower in the central regions of the stock (Areas 2C and 3) but significant recent reductions in catch limits for the eastern most portion (Areas 2A and 2B) of the stock appear to have resulted in improvements to stock condition in those areas.

The time series of abundance illustrates the strength of the celebrated 1987, and to a lesser extent 1988, year classes. As was true last year, the current assessment suggests that three large year classes – 1998, 1999, and 2000 – are poised to enter the exploitable biomass over the next few years. Presently, both year classes look to be larger – in terms of numbers – than the 1987 and 1988 year classes. However, it is important to note that size at age is much smaller now than it was 20 years ago. This has two important ramifications – first it means that the three strong year classes are only just beginning to reach the exploitable size range and, therefore, their true numbers in the population are still quite uncertain. Secondly, it also means that for a given number of halibut, their collective biomass will be lower.

Currently, a large fraction of males never reach the minimum size limit and thus never enter the EBio. It remains to be seen just how these year classes will develop into the exploitable component of the stock. If size at age remains at current values, then the projections for both the EBio and SBio are optimistic and indicate that the declines over the past decade are on the verge of reversing.

The impacts of reducing halibut PSC limits for groundfish target fisheries does not simply reallocate that reduced halibut mortality amounts to directed fishery halibut users. While halibut PSC limits are often closely approached in the GOA groundfish fisheries, these removals are known imprecisely. While all halibut mortality sources are taken into account when commercial IFQ catch limits (and combined catch limits under the proposed Halibut Catch Sharing Plan (CSP)) are set, the negative impacts of these removals on lost spawning biomass and lost yield are not prevented. Incidental catches of halibut result in a decline in the halibut standing stock biomass, reduced reproductive potential of the halibut stock, and reduced short- and long-term halibut yields to the directed hook-and-line fisheries and the guided sport sector in Area 2C and 3A under the proposed CSP.

Other resource components

Under the status quo, marine mammal and seabird disturbance and incidental take are at low levels and are mitigated by current spatial restrictions on the GOA groundfish fisheries. Under either of the alternatives, disturbance or incidental take is not expected to increase to a level that would result in population level effects on marine mammals or seabirds. Additionally, marine mammals and seabirds may be affected by changes in prey availability or prey density due to fishing, or benthic habitat alteration under the status quo or proposed options under Alternative 2. In years where proposed reductions in halibut PSC limit constrains fishing, Alternative 2 may reduce the potential effects of the groundfish fishery on prey availability. If the fleet spends longer time fishing in areas with low groundfish catch rates to avoid halibut, there may be some increase to benthic habitat impacts and potential removals of marine mammal and seabird prey. However, this increase is unlikely to result in population level effects.

Previous analyses have found no substantial adverse effects to habitat in the GOA caused by fishing activities. Alternative 2 may reduce any effects on habitat that are occurring under the status quo. The potential effects on an area would be constrained by the amount of the groundfish TACs and by the existing habitat conservation and protection measures. Overall, the combination of the direct, indirect, and cumulative effects on habitat complexity for both living and non-living substrates, benthic biodiversity, and habitat suitability is not likely to be significant under any of the alternatives.

Regulatory Impact Review

The RIR considers the impact of reducing the amount of halibut PSC available to the GOA groundfish fisheries by 5 percent, 10 percent, and 15 percent. Impacts are positive for sectors that rely on halibut IFQ and the guided sport fleet and their clients[2]. Negative impacts are realized by the groundfish fleets and the industry sectors and consumers that rely on GOA groundfish harvests.

To describe the impacts, changes in gross revenue are compared to the status quo to determine how reductions in PSC limits impact various sectors. The analysis acknowledges that comparing changes in gross revenue does not provide information on the profitability of firms or net benefits to the Nation. However, additional data on the costs incurred by the firms that rely on halibut and groundfish from the North Pacific and consumer surplus of U.S. residents that consume these products are needed to generate those estimates. That information is currently unavailable for all sectors that harvest, process, provide support, and consume halibut and groundfish in the Gulf of Alaska.

Proposed halibut PSC reductions may be applied to the trawl, fixed gear, or both fisheries. Currently only the hook-and-line vessels in the fixed gear fishery are operating under halibut PSC limits. Different PSC reductions could be selected for the catcher vessel and catcher processor sectors. It is assumed that the Council has the authority and information, based on this analysis, to select any percentage in the range it considered for any sector.

The retrospective analyses in this document assume that the Status Quo would not cause any change. Therefore, all reductions for the options considered, deduct any change estimated to be contributed by the Status Quo.

Direct comparisons are not made between gross revenue increases in the directed halibut fisheries and the gross revenue foregone in the groundfish fisheries. Estimates for the two sectors were made using different methodologies and assumptions. Direct comparisons may generate misleading results in terms of changes in gross revenue gained or foregone by this action.

The estimates of gross revenue changes assume no modification of fleet behavior as a result of implementing the halibut PSC reductions. If harvesters are able to reduce the halibut PSC rates in the various fisheries considered, the estimates will exceed those that would have actually occurred. Conversely, the analysis assumes the TAC in place historically will not change for the years considered. Stock assessment models and forecasts discussed in the GOA SAFE Report indicate that TACs are projected to increase for Pacific cod and other valuable GOA species. If the TACs increase, and halibut PSC rates do not change, the amount of first wholesale gross revenue foregone will be underestimated. Ex-vessel and first wholesale prices are assumed not to change if the quantity of fish harvested is increased or reduced. These species are sold in a world market for groundfish and the changes in quantities delivered are not expected to influence the world market prices.

Directed Halibut Fishery Impacts

The analysis estimates the increase in pounds of halibut available to the guided sport sector and the commercial IFQ sector, by IPHC area, under each alternative considered by the Council (using tier 1 and tier 2 of the CSP and using the GHL). All halibut projections assumed that the halibut PSC limit change is equivalent to the reduction in halibut PSC taken by the trawl and hook-and-line sectors. Reductions in halibut PSC by the trawl and hook-and-line sectors would reduce the amount of “bycatch” deducted from the total CEY in proportion to the percentage of the total PSC reduction that is assumed to be over 26 inch. For example, if half of the PSC taken in an IPHC area is over 26 inch, half of the PSC taken in that area would be deducted from the total CEY. The over 26 inch “bycatch” is the only component, that is deducted from the

[2] Benefits to personal and subsistence users are neutral as those halibut harvests are not limited by other removals.

total CEY to estimate the fishery CEY, that is assumed to change in this analysis. Finally, benefits that are estimated to accrue to the directed halibut fisheries are for the first year of PSC reductions. Benefits to these sectors will increase over time as U26" halibut recruit into the directed fishery.

HOW TO INTERPRET THE FOLLOWING TABLES

The tables below are provided as an example of how to interpret the data presented in the halibut impact sections. Proposed trawl PSC limits (in mt on the left and 1,000 lb on the right) head columns across the top of each table and proposed hook-and-line PSC limits (in 1,000 lb) head each rows to the left of the same table. The pounds of PSC are converted from metric tons using the following formula: PSC (mt) ÷ 604.7898 ×1000. For example, the 2,000 mt of halibut PSC is equivalent to 3,307 thousand pounds (or 3.3 million pounds) of halibut PSC mortality of fish over 26 inches. These sample tables demonstrate which proposed options for halibut PSC reductions (0/5/10/15 percent) are associated with each proposed PSC limit (in mt and thousand lb).

The matrix of cells represents the increase in halibut available to the guided sport and commercial IFQ sectors under each option. Using the bookends of results from the above table on the right as an example of how to interpret the tables, maintaining the status quo trawl PSC limit (e.g., 0% reduction) and reducing the hook-and-line limit under Alternative 2 Option 1 (e.g., 5%), results in an estimated 18,600 lb increase in the amount of halibut available to the guided sport and commercial IFQ sectors. If both the trawl and hook-and-line sector's PSC limit is reduced under Alternative 2, Option 3 (e.g., 15%), an additional 366,000 lb of halibut is estimated to be available for the guided sport and commercial IFQ sectors.

		Trawl PSC (mt)			
GOA		2,000 (0%)	1,900 (5%)	1,800 (10%)	1,700 (15%)
HAL PSC (mt)	300 (0%)	All combinations of PSC reductions, some tables report weight others report revenue changes			
	285 (5%)				
	270 (10%)				
	255 (15%)				

		Trawl PSC (1000 lb)			
GOA		3307 (0%)	3142 (5%)	2976 (10%)	2811 (15%)
HAL PSC (1000 lbs)	496 (0%)	0.0	103.4	206.7	310.1
	471 (5%)	18.6	122.0	225.4	328.7
	446 (10%)	37.3	140.7	244.0	347.4
	422 (15%)	55.9	159.3	262.7	366.0

The GOA-wide increase in the amount of halibut available to the guided sport sector, during the first year of PSC reductions, will depend on future management of this fishery. Currently the fishery is managed under the GHL. Under the GHL the charter sector will only operate under a larger catch limit if the PSC savings trigger movement to a higher harvest tier. Given the estimated savings, it was unlikely that the Total CEY would increase enough to move the charter sector to a higher tier. Therefore, most years under the GHL, all of benefits from the PSC savings during the first year would be projected to accrue to the commercial IFQ fishery. If the charter sector is managed under a modified catch sharing plan in the future, the charter sector is more likely to receive a higher catch limit. Because it is not possible to project with certainty how the charter sector would be managed under a modified catch sharing plan, the estimates in this analysis are based on the old catch sharing plan split of the combined commercial and charter catch limit. Based on current actions by the Council, the estimates provided in the executive summary of this analysis are likely too low for the charter sector and too high for the commercial IFQ sector. To provide some information on the magnitude of the change, the current CSP percentages[3] would increase the charter allocation by a range of 0 lb under the status quo to 38,700 lb under a 15% PSC mortality reduction applied to both the hook-and-line and trawl sectors (Table ES-1). The vast majority of the increase is projected to occur in Area 3A. In Area 2C, the increase ranges from 0 lb to under 100 lb, depending on the option selected. Applying tier 2 of the

[3] Those approved by the Council, but currently being reconsidered.

CSP to the halibut available for use by the guided sport sector and the commercial IFQ sector would slightly decrease the amount of halibut allocated to the guided sport sector. The amount of the decrease is equal to the increase by the commercial IFQ sector, because the CSP percentage that divides the available halibut between the two sectors changes.

Estimates for Area 2C may be underestimates of that expected to occur because the model does not account for halibut migration patterns. If it were possible to include those patterns and the general pattern was movement from west to east, the estimates for Areas 3B and 3A may be too high and the estimate for Area 2C may be too low. However, because the majority of the halibut PSC is taken in Areas 3A and 3B, the greatest impact would be expected there even if migration patterns were included.

Table ES- 1 Increases in halibut (in 1,000 lb net weight) available to the guided sport sector in Areas 2C and 3A, under tier 1 of the current CSP. (Source: IPHC estimates of change in fishery CEY)

		Trawl PSC (1000 lbs)			
GOA		3,307	3,142	2,976	2,811
HAL PSC (1000 lbs)	496	0.0	12.0	24.1	36.1
	471	0.9	12.9	24.9	37.0
	446	1.7	13.8	25.8	37.8
	422	2.6	14.6	26.7	38.7

		Trawl PSC (1000 lbs)			
3A		3,307	3,142	2,976	2,811
HAL PSC (1000 lbs)	496	0.0	12.0	24.1	36.1
	471	0.8	12.9	24.9	36.9
	446	1.7	13.7	25.7	37.8
	422	2.5	14.5	26.6	38.6

		Trawl PSC (1000 lbs)			
2C		3,307	3,142	2,976	2,811
HAL PSC (1000 lbs)	496	0.0	0.0	0.0	0.0
	471	0.0	0.0	0.0	0.0
	446	0.1	0.1	0.1	0.1
	422	0.1	0.1	0.1	0.1

		Trawl PSC (1000 lbs)			
3B		3,307	3,142	2,976	2,811
HAL PSC (1000 lbs)	496	0.0	0.0	0.0	0.0
	471	0.0	0.0	0.0	0.0
	446	0.0	0.0	0.0	0.0
	422	0.0	0.0	0.0	0.0

Note: The Council's proposed changes to the CSP would result in more halibut available to the charter sector. The actual amount cannot be estimated until the Council makes a final decision on the program.

Converting the estimated additional pounds of halibut available to increased gross revenue was done by dividing the increase in halibut to the charter sector by the average weight of halibut harvested per angler. The resulting amount was multiplied by an estimated cost of a charter trip. Based on these assumptions the charter sector was estimated to generate an additional $0 to $290,000 depending on the CSP tier and PSC reduction. Almost all of the benefits would be generated by vessels in Area 3A. These estimates also assume precise management of charter effort, which is unlikely given the current management tools.

Table ES- 2 Estimated GOA wide increase in charter gross revenue under the catch sharing plan.

CSP Step 1		Trawl PSC (1000 lbs)			
GOA		3,307	3,142	2,976	2,811
HAL PSC (1000 lbs)	496	$ -	$ 90,238	$180,475	$270,713
	471	$ 6,279	$ 96,516	$186,754	$276,991
	446	$ 12,557	$102,795	$193,032	$283,270
	422	$ 18,836	$109,074	$199,311	$289,549

CSP Step 2		Trawl PSC (1000 lbs)			
GOA		3,307	3,142	2,976	2,811
HAL PSC (1000 lbs)	496	$ -	$ 82,034	$164,068	$246,102
	471	$ 5,708	$ 87,742	$169,776	$251,810
	446	$ 11,416	$ 93,450	$175,484	$257,518
	422	$ 17,124	$ 99,158	$181,192	$263,226

In the IFQ fishery, estimates of the change in catch were similar, but slightly larger when the GHL method was used versus the CSP. The difference is a result of the entire change in available halibut being assigned to the IFQ sector under the GHL. However, the change would have been greater if the increase in halibut available resulted in moving from one GHL tier to another.

Based on the GHL, each 5 percent decrease in the hook-and-line PSC limit is estimated to increase the IFQ available in the GOA by about 18,600 lb. A five percent reduction in the trawl PSC limit (applied to 2,000 mt) is projected to increase the amount of IFQ halibut by about 103,400 lb (Table ES-3). IFQ pounds are estimated to increase in Area 2C by about 150 lb for each five percent reduction in the hook-and-line PSC limit. The trawl PSC limit did not impact the estimated IFQ lb that would be available in Area 2C, because of the amount of halibut PSC taken by trawl gear in that area. Estimated increases in IFQ lb ranged from 0 lb under the status quo to 400 lb under a 15 percent reduction to both the hook-and-line and trawl sectors. Halibut IFQ in Area 3A is projected to increase by about 6,900 lb for each five percent reduction in the hook-and-line PSC limit. Each five percent reduction in the trawl PSC limit is projected to increase the amount of halibut IFQ available by 76,700 lb. In Area 3B, a five percent reduction in the amount of hook-and-line halibut PSC is projected to increase halibut IFQ by about 11,600 lb.; and each five percent reduction in the trawl PSC limit is projected to increase the amount of IFQ available by a total of about 26,700 lb. If the estimates were based on the CSP they would be slightly lower.

Table ES- 3 Projected increases in commercial IFQ pounds under each option to reduce the PSC mortality limit (using the GHL).

		Trawl PSC (1000 lbs)			
GOA		3307	3142	2976	2811
HAL PSC (1000 lbs)	496	0.0	103.4	206.7	310.1
	471	18.6	122.0	225.4	328.7
	446	37.3	140.7	244.0	347.4
	422	55.9	159.3	262.7	366.0

		Trawl PSC (1000 lbs)			
3A		3307	3142	2976	2811
HAL PSC (1000 lbs)	496	0.0	76.7	153.4	230.0
	471	6.9	83.6	160.2	236.9
	446	13.8	90.4	167.1	243.8
	422	20.6	97.3	174.0	250.7

		Trawl PSC (1000 lbs)			
2C		3307	3142	2976	2811
HAL PSC (1000 lbs)	496	0.0	0.0	0.0	0.0
	471	0.1	0.1	0.1	0.1
	446	0.3	0.3	0.3	0.3
	422	0.4	0.4	0.4	0.4

		Trawl PSC (1000 lbs)			
3B		3307	3142	2976	2811
HAL PSC (1000 lbs)	496	0.0	26.7	53.4	80.1
	471	11.6	38.3	65.0	91.7
	446	23.2	49.9	76.6	103.3
	422	34.8	61.5	88.2	114.9

Source: IPHC

The analysis multiplied the increases in IFQ pounds by a range of first wholesale values based on the area of harvest. First wholesale prices were derived from COAR data based on the range reported from 2003 through 2010. The prices per pound used for Area 2C were $3.64 and $6.32; for Area 3A they were $3.52 and $6.65; and for Area 3A they were $4.13 and $8.15. Because most of the increase in IFQ pounds was projected to be in Area 3A and Area 3B, most the increase in gross first wholesale revenue was also projected to accrue to QS holders in those areas.

Insufficient data are available to estimate the impacts of reducing the halibut PSC limit for the Southeast Outside District (SEO) demersal shelf rockfish (DSR) fishery on directed commercial harvesters, processors, communities, and consumers. It is not possible to determine historic halibut PSC usage in that fishery, due to low observer coverage. Restructuring the observer program will allow NOAA Fisheries to deploy observers in the SEO DSR fishery. Groundfish observers will collect information on halibut PSC as part of their normal duties. That information, collected over time, will provide better estimates of halibut taken in the directed DSR fishery and their survival rates. NOAA Fisheries would then have the information necessary to estimate halibut mortality, and would determine if the 10 mt limit (under the status quo or a 5 percent reduction) or the 9 mt limit (under a 10 percent or 15 percent reduction) is exceeded. Until that information is available, impacts on the SEO DSR cannot be generated.

DSR taken incidentally to the halibut IFQ fishery will not be affected by changes in the halibut PSC limit. Harvesters have historically utilized much of the DSR fishery as incidental catch in the IFQ fishery. At the current low Area 2C IFQ catch limit (2,330,000 lb or about 1,057 mt), the 10 percent DSR incidental catch rate would allow up to 105 mt of DSR to be taken. Additional DSR may be taken above the incidental catch limit, but it may not be sold. Currently most of the DSR taken above the incidental catch limit is for personal use.

Options considered by the Council would decrease the halibut PSC limit for the groundfish hook-and-line sector (other than SEO DSR and sablefish) to the amounts listed below in metric tons. Table ES-4 assumes that the current seasonal allowances will continue into the future and the catcher vessel and catcher processor split will also continue.

Table ES- 4. Estimated increased halibut IFQ first wholesale gross revenue under each option, based on high and low IFQ prices (under charter GHL)

GOA		Trawl PSC (1000 lbs)			
		3307	3142	2976	2811
HAL PSC (1000 lbs)	496	$ -	$ 389	$ 779	$ 1,168
	471	$ 74	$ 463	$ 852	$ 1,241
	446	$ 147	$ 536	$ 926	$ 1,315
	422	$ 221	$ 610	$ 999	$ 1,389

3A		Trawl PSC (1000 lbs)			
		3307	3142	2976	2811
HAL PSC (1000 lbs)	496	$ -	$ 279	$ 558	$ 837
	471	$ 25	$ 304	$ 583	$ 862
	446	$ 50	$ 329	$ 608	$ 887
	422	$ 75	$ 354	$ 633	$ 912

2C		Trawl PSC (1000 lbs)			
		3307	3142	2976	2811
HAL PSC (1000 lbs)	496	$ -	$ -	$ -	$ -
	471	$ 1	$ 1	$ 1	$ 1
	446	$ 1	$ 1	$ 1	$ 1
	422	$ 2	$ 2	$ 2	$ 2

3B		Trawl PSC (1000 lbs)			
		3307	3142	2976	2811
HAL PSC (1000 lbs)	496	$ -	$ 110	$ 221	$ 331
	471	$ 48	$ 158	$ 269	$ 379
	446	$ 96	$ 206	$ 317	$ 427
	422	$ 144	$ 254	$ 365	$ 475

GHL: IFQ first wholesale higher value

GOA		Trawl PSC (1000 lbs)			
		3307	3142	2976	2811
HAL PSC (1000 lbs)	496	$ -	$ 727	$ 1,454	$ 2,182
	471	$ 141	$ 869	$ 1,596	$ 2,323
	446	$ 283	$ 1,010	$ 1,737	$ 2,464
	422	$ 424	$ 1,151	$ 1,879	$ 2,606

3A		Trawl PSC (1000 lbs)			
		3307	3142	2976	2811
HAL PSC (1000 lbs)	496	$ -	$ 510	$1,019	$1,529
	471	$ 46	$ 555	$1,065	$1,575
	446	$ 92	$ 601	$1,111	$1,621
	422	$ 137	$ 647	$1,157	$1,666

2C		Trawl PSC (1000 lbs)			
		3307	3142	2976	2811
HAL PSC (1000 lbs)	496	$ -	$ -	$ -	$ -
	471	$ 1	$ 1	$ 1	$ 1
	446	$ 2	$ 2	$ 2	$ 2
	422	$ 3	$ 3	$ 3	$ 3

3B		Trawl PSC (1000 lbs)			
		3307	3142	2976	2811
HAL PSC (1000 lbs)	496	$ -	$ 218	$ 435	$ 653
	471	$ 95	$ 312	$ 530	$ 747
	446	$ 189	$ 407	$ 624	$ 842
	422	$ 284	$ 501	$ 719	$ 936

Based on these PSC limits and historic usage, estimates of the amount of first wholesale gross revenue foregone under each option was estimated. Data from 2003 through 2010 was used to estimate changes in ex-vessel revenue and first wholesale gross revenue foregone under each option. A five percent reduction in the halibut PSC limit reduced ex-vessel gross revenue for the catcher vessel sector by $120,000 and $50,000 for the catcher processors (2003 through 2010 average). Reducing the non-DSR hook-and-line PSC limit by 10 percent decreased the average catcher processor estimated ex-vessel gross revenue by an average of $150,000 per year and the catcher vessel sector by $240,000 per year. The catcher processor's foregone ex-vessel gross revenue was reduced by $200,000 per year when the PSC limit was reduced by 15 percent. However, the catcher vessel sectors first wholesale revenue was reduced by about $440,000 per year.

Table ES- 5. Seasonal allowances of halibut PSC limits under proposed options.

	Total Allocation	1st season 86 percent (January 1 to June 10)	2nd season 2 percent (June 10 to September 1)	3rd season 12 percent (September 1 to End of Year)
All fisheries except demersal shelf rockfish				
Status quo - both operation types	290	250	5	35
Catcher processor (40.3% of total)				
Status quo	117	101	2	14
Option 1 - 5 % reduction	111	96	2	13
Option 2 - 10% reduction	105	91	2	13
Option 3 - 15% reduction	100	86	2	12
Catcher vessel (59.7% of total)				
Status quo	173	149	3	21
Option 1 - 5 % reduction	165	142	3	20
Option 2 - 10% reduction	156	134	3	19
Option 3 - 15% reduction	148	127	3	18
Demersal Shelf Rockfish				
Status quo	10	(no seasonal distribution)		
Option 1 - 5 % reduction	10			
Option 2 - 10% reduction	9			
Option 3 - 15% reduction	9			
All values are metric tons.				

Table ES- 6 Estimated gross revenue foregone by hook-and-line vessels under proposed options.

Year	Status Quo	5%	10%	15%
	Percentage reductions			
	Ex-vessel			
Catcher Processor	$0.00	$0.05	$0.15	$0.20
Catcher Vessel	$0.00	$0.12	$0.24	$0.44
	First Wholesale			
Catcher Processor	$0.00	$0.12	$0.32	$0.43
Catcher Vessel	$0.00	$0.22	$0.46	$0.84

A five percent reduction in the halibut PSC limit reduced ex-vessel gross revenue by $50,000 for catcher processors and $120,000 for catcher vessels. First wholesale gross revenue for the catcher processors was reduced by $120,000 and catcher vessel sector by $220,000 (2003 through 2010 average). Reducing the non-DSR hook-and-line PSC limit by 10 percent decreased the average catcher processor first wholesale gross revenue by an average of $320,000 ($150,000 ex-vessel) per year and the catcher vessel sector by $460,000 ($240,000 ex-vessel) per year. The catcher processor's foregone first wholesale gross revenue was reduced by $430,000 per year ($200,000 ex-vessel) when the PSC limit was reduced by 15 percent. However, the catcher vessel sectors first wholesale gross revenue was reduced by about $840,000 per year ($440,000 ex-vessel).

Treatment of the Central Gulf of Alaska Rockfish Program halibut Prohibited Species Catch limit reductions for the trawl sector under the Council's June 2012 proposed action

Summary The Central Gulf of Alaska Rockfish Program was implemented in 2012. A direct apportionment of 191.4 mt of halibut prohibited species catch (PSC) limit was allocated to Rockfish Program participants for use in this trawl fishery from May 1 through November 15. The third seasonal allowance to the deep-water species fishery was reduced by 1) 191.4 mt to fund the rockfish program apportionment and 2) 27.4 mt which may not be used as PSC limit by any sector. However, the 2,000 mt trawl halibut PSC limit was not reduced to reflect the 27.4 mt PSC limit reduction. It was "left in the water" and subject to reallocation to the directed halibut IFQ fixed gear fishery by the International Pacific Halibut Commission. Therefore, the trawl halibut PSC limit is now 1,972.6 mt (2,000 mt – 27.4 mt). And the portion of the halibut PSC limit *outside of the Rockfish Program is reduced by 191.4 mt to 1,781.2 mt to fund the halibut PSC needs of the Rockfish Program.* This amount will be increased if any of the 191.4 mt PSC limit is unused on November 15th. By regulation 55 percent of the unused amount of trawl halibut PSC limit of the 191.4 mt is added to the fifth season unspecified halibut PSC limit total. The remaining 45 percent of the unused amount is not available for use by any sector, effectively reducing the overall trawl PSC limit that year.

The Council analysis assumes, based on the Council's June 2011 motion[4], to exclude the Rockfish Program from any further proposed reductions (i.e., beyond the 27.4 mt PSC limit reduction that was made in 2012, which results in a total of 191.4 mt of PSC limit allocated to the CGOA Rockfish Program). The effect is that the proposed percentage reductions of 5%, 10%, or 15% would be applied to the amount of halibut PSC limit available to all trawl sectors except for the GOA Rockfish Program (2,000 mt – (27.4 mt + 191.4 mt) = 1,781.2 mt). This would result in PSC limit reductions, in addition to those already established in the new Rockfish Program[5], of: a) 89 mt (5%); b) 178 mt (10%); or c) 267 mt (15%). To achieve reduction equal to 5/10/15 percent of the 2,000 mt PSC limit (100/200/300 mt) would require applying a larger percentage reduction to GOA trawl fisheries outside of the Rockfish Program (see more detail below). Note that the Council could select any amount of halibut PSC limit reduction within the range analyzed (0 mt to 267 mt).

The analysts provide an example to illustrate the impacts of halibut PSC limit reductions on trawl fisheries not exempted from the proposed action. At the June 2011 Council meeting the Council indicated that when the proposed reductions would be applied, the CGOA Rockfish Program trawl halibut PSC limit apportionments were to be exempt from the proposed reductions of 5/10/15 percent. The Council's rationale was that the Rockfish Program participants already had their halibut PSC limit apportionment reduced by 27.4 mt and the roll-over of the unused portion of the 191.4 mt would be reduced by 45 percent. In 2011 about 65 percent of the 208 mt halibut PSC limit apportionment to the Rockfish Pilot Program was unused. The Rockfish Pilot Program sunset at the end of 2011 and was replaced by the revised CGOA Rockfish Program in 2012. For example, if half the 191.4 mt apportionment is not used in the future, a 45 percent reduction applied to the roll-over of the unused portion to the unspecified trawl halibut PSC limit would equal 43 mt, or a 22.5 percent reduction of the Rockfish Program apportionment. In June 2011 the Council stated its intent that the 27.4 mt and 191.4 mt of rockfish program halibut PSC limit were not subject to the proposed PSC limit reduction. Therefore, all of the tables in the analysis reflect the removal of the 27.4 mt (halibut PSC limit savings left 'in the water') and the 191.4 mt Rockfish Program apportionment from the third season deep-water species fishery allowance before the proposed 5/10/15 reductions are applied. Alternatively, if the Council intent was to apply the proposed percentage reductions to the entire historic 2,000 mt PSC limit (not reducing the Rockfish Program apportionment, but taking additional reductions from the non-Rockfish apportionment to compensate for keeping the current Rockfish Program allocation), the overall

[4] http://www.alaskafisheries.noaa.gov/npfmc/PDFdocuments/halibut/GOAHalibutPSC_Motion.pdf

PSC limit reduction would increase by the amounts shown below and would increase the effect on trawl vessels when not operating in the CGOA Rockfish Program. The impact on the trawl fleets depend on how the reductions associated with the Rockfish Program halibut PSC limits are distributed among the rest of the fleet.

Table ES- 7 Additional halibut PSC limit reduction in metric tons if the reduction was also applied to the Rockfish Program

	Reduction also applied to		
% Reduction	191.4 mt	27.4 mt	Both
5%	9.6	1.4	10.9
10%	19.1	2.7	21.9
15%	28.7	4.1	32.8

Note: It is assumed that the intent was not to reduce the 27.4 mt set aside that is not available for use as PSC limit. It was included for completeness to compare to the 2,000 mt halibut PSC limit.

Because the Council's proposed alternatives and options do not further reduce the Rockfish Program halibut PSC limits beyond how its apportionments were reduced when the program was restructured, applying the above reductions to the other fleets reduces their PSC limits by more than 5 percent, 10 percent, or 15 percent. In order to exempt the Rockfish Program and achieve a full 5/10/15 percent reduction of the current 2,000 mt limit, the reductions applied to halibut PSC limits on trawl sectors not in the Rockfish Program would need to be 5.5 percent, 11.1 percent, or 16.6 percent. Depending on how the reductions to the CGOA rockfish program halibut PSC limit are applied, they will change the PSC limit available by species fishery and season.

If the Council intent is different from that outlined in the summary above, and the 5%, 10%, or 15% halibut PSC limit reduction instead is applied to the current trawl halibut PSC limit, while not affecting the CGOA Rockfish Program halibut PSC limit apportionment of 191.4 mt, the Council should indicate how it intends to distribute the additional reduction associated with the 191.4 mt (and the 27.4 mt if the reduction is also applied to halibut PSC limit no longer available for use) to the non-Rockfish Program trawl sectors. If the Council clarifies in June 2012 that its intent is different than that assumed by staff in the public review draft analysis, staff can provide additional analysis in a subsequent draft.

The analysts seek Council clarification that the Council intent is to reduce the overall 2,000 mt GOA trawl halibut PSC limit to the new limit set at final action. For example, under Alternative 2, option 1 (5 percent reduction) the new limit would be set in federal regulations at 1,911 mt (or 1,884 mt if the 27.4 mt is removed from the overall limit and the percentage allocated to the third season is adjusted, 2,000 mt – 27.4 – 89 mt = 1,884 mt), recognizing that an additional reduction in halibut PSC limit could occur that would equal 45 percent of any unused amount of the 191.4 mt roll-over.

Because federal regulations that implement the Rockfish Program halibut PSC limit apportionments reference the 2,000 mt halibut PSC limit as the basis for the halibut PSC limit apportionments, *the analysts also seek clarification that the Council intent is to revise the percentages that establish the halibut PSC limit apportionments in regulation using the GOA trawl halibut PSC limit that is selected at final action in order to leave their PSC limit apportionment unchanged and to reflect the new (reduced) limit. For example, a new trawl halibut PSC limit would be 1,911 mt if the Council adopts a 5 percent reduction under the proposed action (2,000 mt – 89 mt = 1,911 mt). The 27.4 mt would continue to be removed from the third season before the allowance is released and would not be subject to the proposed percentage reductions.*

The proposed trawl halibut PSC limits for the options considered are presented in Table ES-8. For the analysis it is assumed that the same seasonal and complex percentages of the overall limit will continue in the future.

Table ES- 8 Trawl halibut PSC limits under the proposed options

	Total allowance	1st season January 20 to April 1	2nd season April 1 to July 1	3rd season* July 1 to September 1	4th season September 1 to October 1	5th season October 1 through December 31
Total Allowance						
seasonal share		27.5 percent	20 percent	30 percent**	7.5 percent	15 percent
Status quo	2000^	550	400	381	150	300
Deep-water complex						
seasonal share		12.5 percent	37.5 percent	50 percent**	0 percent	NA
Status quo	773	100	300	181	0	
Option 1 - 5 % reduction	734	95	285	172		
Option 2 - 10% reduction	695	90	270	163		
Option 3 - 15% reduction	657	85	255	154		
Shallow-water complex						
seasonal share		50 percent	11.1 percent	22.2 percent	16.7 percent	NA
Status quo	900	450	100	200	150	
Option 1 - 5 % reduction	855	428	95	190	143	
Option 2 - 10% reduction	810	405	90	180	135	
Option 3 - 15% reduction	765	383	85	170	128	
Undesignated						
seasonal share						100 percent
Status quo	300	NA				300
Option 1 - 5 % reduction	285					285
Option 2 - 10% reduction	270					270
Option 3 - 15% reduction	255					255
All values are metric tons, except where noted as percentages.						
* Excludes 191.4 metric ton rockfish program halibut PSC allowance and 27.4 metric ton reduction from Rockfish pilot program						
** Includes rockfish program allocations in the percentage.						
^Only 1,973 metric tons are available for the fleet to harvest						

On average (from 2003 through 2010) the first wholesale gross revenue from trawl gear vessels in the deep-water complex was estimated to decrease by $730,000, $2.49 million, and $3.35 million under a 5 percent, 10 percent, and 15 percent reduction in the deep-water trawl PSC limit, respectively. Average reductions in first wholesale gross revenue for trawl gear vessels in the shallow-water complex were estimated to be $1.02 million, $2.74 million, and $5.10 million, under a 5 percent, 10 percent, and 15 percent reduction in the PSC limit, respectively. Summing these reductions in estimated first wholesale gross revenue yields the estimates in Table ES- 9. Each cell in the matrix of Table ES- 9 shows the estimated average reduction in first wholesale gross revenue to the groundfish industry for an option considered by the Council. Placing the results in the matrix format allows each of the combinations considered by the Council to be easily compared. The smallest reduction ($330,000), other than the Status Quo, results from a 5 percent halibut PSC reduction applied to the catcher vessels and catcher processors in the hook-and-line fleet. Hook-and-line first wholesale revenue reductions are greatest when the halibut PSC limit is reduced by 15 percent ($1.26 million). Adding those values to the first wholesale gross revenue reductions from the trawl fleet provides the remaining estimates. So, a 5 percent decrease in the trawl halibut PSC limit was estimated to reduce the first wholesale gross revenue from the trawl fishery by $1.75 million. Adding that value to the first wholesale gross revenue reduction estimated for a 10 percent halibut PSC reduction to the hook-and-line fleet ($790,000), yields the $2.54 million estimate in that cell of the matrix (where the hook-and-line and trawl reductions intersect). The greatest annual reduction was estimated to be $9.71 million when a 15 percent reduction was applied to both the trawl and hook-and-line PSC limits.

Table ES- 9 Estimated annual average first wholesale gross revenue foregone in groundfish fisheries ($million)

		Trawl PSC Reductions			
		Status Quo	5%	10%	15%
Hook-and-Line Reductions	Status Quo	0	$ 1.75	$ 5.23	$ 8.45
	5%	$0.33	$ 2.08	$ 5.56	$ 8.78
	10%	$0.79	$ 2.54	$ 6.02	$ 9.24
	15%	$1.26	$ 3.01	$ 6.49	$ 9.71

Source: AKFIN summaries of NOAA Fisheries catch accounting and COAR data, 2003-2010

The Council requested in February that staff also provide estimates of the gross revenue foregone at the ex-vessel level. Table ES- 10 is a summary of the gross ex-vessel foregone under each option. Ex-vessel gross revenue reductions range from $0 under the status quo to $4.15 million when both hook-and-line sectors and the trawl sector's PSC allocation are reduced under the 15 percent option.

Table ES- 10 Estimated annual average ex-vessel gross revenue foregone in groundfish fisheries ($million)

		Trawl PSC Reductions			
		Status Quo	5%	10%	15%
Hook-and-Line Reductions	Status Quo	$ -	$ 1.57	$ 2.34	$ 3.51
	5%	$0.17	$ 1.74	$ 2.51	$ 3.68
	10%	$0.39	$ 1.97	$ 2.73	$ 3.90
	15%	$0.64	$ 2.21	$ 2.98	$ 4.15

Source: AKFIN summaries of NOAA Fisheries catch accounting and COAR data, 2003-2010

The estimates are intended to provide information on the amount of first wholesale revenue that would have been foregone if the halibut PSC reductions had been in place from 2003 through 2010. Actual reductions in revenue that occur in the future will differ from these estimates as halibut PSC rates and TACs change. Given all the factors that contribute to those changes, projecting revenue changes for future fishing years would generate estimates with sizable levels of uncertainty. Therefore, those estimates are not provided in this analysis.

Even if the analysts were able to accurately estimate the amount of revenue that would be foregone in the future, it is currently not possible to determine how individual firms would be affected by the changes. These estimates are fleet-wide averages of changes in gross revenue. Information is currently unavailable to determine the effect that reductions in gross revenue have on the net revenue of firms. It is the overall profitability of the firms and net benefits to the Nation that are of greatest interest for the RIR, because they indicate whether individual firms will remain viable in the long run, if revenues decline, and whether the Nation generates positive economic benefits from the proposed action. That information is not currently being collected for all industry sectors included in this analysis.

Halibut PSC Sideboard Limits

Sideboards have been implemented limiting the amount of the GOA trawl halibut PSC available to participants in the rockfish program, Amendment 80 program, and non-exempt AFA catcher vessels. These sideboards were adopted as part of catch share programs to limit program participants from fully using the flexibility provided by catch share allocations to increase their harvests in other fisheries.

NOAA Fisheries manages fleets to maintain their catches below the proscribed sideboard limits. The management approach differs with the sizes of the sideboard amount and the subject fleet, as well as the fleet's fishing practices. In fisheries with small sideboard limits that are deemed unmanageable, given the size of the sideboarded fleet, NOAA Fisheries may choose not to open the fishery. Fisheries that are never opened are listed in Table ES- 11.

Table ES- 11 GOA groundfish fisheries that are not opened to directed fishing.

AFA	Amendment 80	Rockfish Program*
Eastern Pacific cod (inshore and offshore)	No directed fishing closures	CV Western pelagic shelf rockfish
Western deep-water flatfish		CV Western Pacific ocean perch
Eastern and Western rex sole		CV Western northern rockfish
Eastern and Western arrowtooth flounder		CV deep-water complex fisheries
Eastern and Western flathead sole		CP shallow-water complex fisheries
Western Pacific ocean perch		
Western Northern rockfish		
Entire GOA pelagic shelf rockfish		
SEO District demersal shelf rockfish		
Entire GOA sculpins		
Entire GOA squids		
* For the month of July		

Proposed halibut PSC reductions would not affect the fisheries that are never opened to directed fishing. Fisheries with sideboard limits that can be managed by NOAA Fisheries will be permitted to target groundfish in the open fisheries. Members of these fleets, through cooperative agreements, may also be required to monitor their catches to stay within their sideboard limits. AFA non-exempt catcher vessels are most active in the shallow-water complex, particularly the first, third, and fourth seasons. The fleet is also active in the fifth season, but the halibut PSC sideboard limit is undesignated during the fifth season and therefore not apportioned between the deep-water and shallow-water complex fisheries. Only three times during 2003 through 2010 did seasonal halibut usage exceed the current seasonal sideboard limit. Those three cases were all in the deep-water complex and would have exceeded any of the proposed limits. Given that halibut PSC sideboard usage by the AFA non-exempt catcher vessel fleet is, in most cases, well below the applicable current sideboard limits, the halibut PSC reduction options would appear to minimally constrain the fleet, assuming current fishing practices continue.

Amendment 80 vessels are most active in the deep-water complex, which includes the rockfish and flatfish fisheries (e.g., rex sole, arrowtooth flounder). The third season has the largest number of participating Amendment 80 vessels. Most of these vessels are also qualified for the rockfish program in the Central Gulf. Participation in the shallow-water complex by the Amendment 80 sector is far more limited with only one to three vessels targeting these fisheries. When looking at the impacts of applying the entire halibut PSC reduction in the fifth season, the Amendment 80 fleet could be constrained more by the reduction in the overall halibut PSC limit than by the reduction in its sideboard limit, depending on the percentage reduction selected. The relatively small halibut PSC limit is likely insufficient to support opening a fifth season fishery (for details see Section 4.6.3.5).

The prohibition on sideboard rollovers from season-to-season for the Amendment 80 sector will increase the potential for the deep-water complex and shallow-water complex fisheries to close to Amendment 80 vessels as a result of the sideboards prior to the end of a season, especially the deep-water complex during the second and third season. If the deep-water species TACs were to increase significantly in the future, there is the possibility that the sector may have an insufficient halibut PSC sideboard limit to harvest the deep-water complex TACs. In the shallow-water complex, historical halibut PSC usage by the Amendment 80 sector indicates the first season could be constrained by the halibut PSC sideboard limit in the future.

With the exception of apportionment of halibut PSC to the Rockfish Program, trawl halibut PSC in the GOA is not apportioned between the different sectors. Given that halibut PSC is shared by all trawlers, the Amendment 80 sector is often racing other trawlers in their GOA groundfish fisheries. In general, the proposed reductions of halibut PSC limits will likely increase the race for fish in the GOA amongst all the trawlers.

Catcher processor fleet vessels participating in the Central GOA rockfish program will be limited in their catch of deep-water and shallow-water halibut PSC under a sideboard limit that is intended to constrain harvests from fisheries that are typically halibut constrained. This sideboard limit applies only during the month of July. Effort by the GOA Rockfish Program catcher processors during the month of July is centered on the deep-water complex with the number of vessels ranging from 6 in 2010 to 11 vessels in 2009. Halibut PSC usage by these vessels has ranged from 30 mt in 2010 to 67 mt in 2008. The rockfish program vessels, operating under sideboard limits, focus most of its effort during the month of July on Western GOA and West Yakutat rockfish with some effort in the rex sole fishery. By comparison, effort by the Rockfish Program catcher processors in the shallow-water complex during the month of July is nearly non-existent. One catcher processor participated in the shallow-water complex in 2009.

During 2007, 2008 and 2009 halibut PSC usage by the catcher processors exceeded the 50 mt halibut PSC sideboard limit under the new Rockfish Program and therefore would have triggered a premature closure in the deep-water complex fisheries under all of the halibut PSC sideboard limit reduction options. Given that deep-water halibut PSC sideboard usage exceeded the status quo three times in the last four years, there is a high likelihood that the deep-water complex fisheries will be constrained by a reduced halibut PSC sideboard limit during the month of July. Catcher processors who are limited by the Rockfish Program halibut PSC sideboard limit race other trawlers before a halibut PSC forced shut down occurs during the month of July. A reduction of the halibut PSC will only increase this race for fish during the third season, and would likely result in a shortened third season in most years.

Suboption 3.2 was added to the list of proposed options at the February 2012 Council meeting. This suboption proposes treating the Amendment 80 sector like all other sectors, in that their unused halibut PSC sideboards could roll-over to the next season. The Amendment 80 sector would still be subject to deep-water and shallow-water sideboard designations.

Amendment 80 GOA groundfish sideboard limits are set for pollock (seasonal), Pacific cod (seasonal), Pacific ocean perch (annual), Northern rockfish (annual), and pelagic shelf rockfish (annual). However, the GOA flatfish fisheries are not subject to Amendment 80 sideboard limits, since those fisheries are traditionally limited by the halibut PSC. Because flatfish in the deep-water complex are primarily fished during the second and fifth seasons, the greatest benefit of roll-overs would likely be derived in the fifth season. Increased flexibility of halibut PSC usage will become more important as PSC limits are reduced.

In summary, roll-over privileges would provide the Amendment 80 sector the ability to take advantage of excess halibut from previous seasons. It would also treat the Amendment 80 sector like all other sectors, in terms of roll-overs. If the Amendment 80 sector were able to modify their fishing patterns by delaying deep-water fisheries until later in April or May PSC rates could be reduced (e.g., fishing deep-water species after halibut migrate to shallower water). This is currently unlikely as a result of the competition between the catcher vessels and the Amendment 80 fleet for deep-water halibut during the second season. Reducing PSC usage rates may result in more target groundfish species catches for the Amendment 80 sector and potentially for the overall trawl fleet. Increased harvesting flexibility may provide some opportunity for the Amendment 80 sector to increase their fishing activity in the GOA, particularly in the fifth season, which could result in less halibut PSC available for other participants.

Potential risks to other sectors are decreased by not altering the deep-water and shallow-water complex structure for the five seasonal sideboards. Increased flexibility of rolling Amendment 80 sideboards may also help that sector respond more efficiently to recent changes to GOA groundfish management that includes GOA cod sector splits, the Central Gulf rockfish program, Chinook salmon PSC limits, and potentially reduced halibut PSC limits. Likewise, it may also help the sector respond to changes in BSAI management.

Suboption 3.3 allows available trawl halibut PSC in the second season deep water and shallow water complexes to be aggregated and made available for use in either complex from May 15th through June 30th. Halibut PSC sideboards for the Amendment 80 and AFA sectors would continue to be defined as deep water and shallow water complexes for the entire second season. **The Council must also select a method for determining how to account for unused halibut after the second season.** From May 15 through the end of June, the deduction for halibut PSC could either be from:

1) the species fishery where it was used, or
2) the species fishery where it was initially available.

NOAA Fisheries staff has indicated that Option 1 is the only method that would not require the agency to revise their catch accounting system. Revising the catch accounting system would require funds that are currently not budgeted for that purpose. Given the budget constraints that the agency is currently operating under, they have indicated a preference that Option 1 be selected. Depending on the method selected, an overage of the second season PSC limits could significantly decrease the amount available for the third season and later fisheries. An example of the halibut PSC deducted from the species fishery where it was used (option 1) would be if the deep-water fisheries close on their second season halibut PSC limit, 400 mt in 2012, prior to May 15. As of May 15, the shallow-water fisheries have 100 mt of halibut PSC limit remaining. The trawl fleet starts fishing deep-water species on May 15 instead of waiting until the third season halibut PSC allocation becomes available July 1[6]. All 100 mt remaining in the shallow-water fisheries PSC limit is caught by participants targeting deep-water fisheries. This would reduce the third season deep-water fishery halibut PSC limit by 100 mt to 81 mt instead of 181 mt (400 mt minus 191.4 mt allocation and 27.4 mt set-aside for the Rockfish Program). For this example, no programming changes would be necessary in the catch accounting system.

Applying the example above to option 2 would reduce the third season shallow-water fishery halibut PSC limit by 100 mt (even though it was used in deep-water complex targets). For this example, programming changes would be necessary in the catch accounting system to deduct the May 15 to July 1 halibut PSC from the shallow-water species fishery instead of the deep-water fishery where it was actually caught.

In conclusion, the halibut PSC during May 15 to July 1 must accrue to either the deep-water species fishery or the shallow water species fishery since NMFS must continue to manage the halibut PSC limits by these species fisheries from July 1 to October 1. Any underage or overage for the second season would need to be added or subtracted from the species fishery where it was used or initially available. Depending on where it is deducted it will impact the amount of halibut available for use in that complex in the 3rd (rockfish fisheries in the deep-water complex) and 4th season (primarily when shallow-water fisheries occur for Pacific cod and pollock).

Selecting suboption 3.3 would give members of the trawl industry increased flexibility to utilize their halibut PSC during the second season. Increased flexibility could provide some sectors with the ability to reduce halibut PSC rates by fishing target fisheries at times of year when the PSC rates are lower and halibut PSC is not available. The deep-water complex is typically closed because the halibut PSC limit in late April. The shallow-water complex typically does not close during the second season. Because the shallow-water complex has remained open after May 15th, halibut PSC assigned to the shallow-water complex could be used by vessels to target species in the deep-water complex.

Because of when the deep-water complex closes, there are no recent data on halibut PSC usage rates in the GOA deep-water trawl flatfish fisheries in May or June. Since quantitative data are unavailable, the analysis of this option is primarily based on qualitative information. Adult halibut are thought to migrate annually from shallow summer feeding grounds to deeper areas to spawn from November to March (St-Pierre, 1984). Halibut movement into shallow-water during warmer months may result in lower halibut usage in the deep-water complex after May 15th. At a minimum, having both the shallow-water complex and deep-water complex either open or closed during the second half of May and June provides the trawl fleet's greater flexibility regarding the best use of the limited halibut PSC.

A retrospective analysis of the amount of shallow-water complex halibut PSC available under each of the options indicates that from 2009 forward, between 126 mt and 330 mt of shallow-water complex halibut was estimated to be available on May 15th, depending on the year used and the option selected. Even after all the shallow-water complex used in the second season is considered, at minimum of 34 mt remained unused in 2010 and 173 mt was unused in 2011.

Selecting May 15th as the date to remove the deep-water and shallow-water halibut PSC restrictions allows a cooling-off period before the deep-water complex is anticipated to reopen. The time between closing and

[6] Except Central GOA Rockfish Program participants who would be utilizing their halibut PSC allocation.

reopening the fisheries is estimated to be between three and four weeks, using historic data. For vessels that are not dependent on flatfish or local to the GOA, this gap in fishing opportunities may cause the vessels to leave for other fisheries or ports. It was also suggested that closing the flatfish grounds may have the beneficial effect of allowing flatfish to reaggregate.

Fleets operating under sideboards will continue to be constrained by their deep-water and shallow water sideboard limits for the entire second season. Amendment 80 catcher processors and non-exempt AFA catcher vessels will benefit from the undesignated halibut PSC in that they may utilize any unused PSC after May 15th to harvest deep-water species if they have room under their deep-water sideboard limit.

Implementation

Table ES- 12 depicts the most likely timeline for implementation of the Council's preferred alternative, now that final action is anticipated to occur in either April 2012 or June 2012. This time line suggests that mid-2013 implementation of revised PSC limits under Alternative 2 is unlikely.

Table ES- 12 Schedule for analytical, GOA FMP, and harvest specification revision process necessary to support change to the GOA halibut PSC limits mid-season.
(Source: NMFS AKRO SF)

Action	Jan-2012	Feb - May	June	Jul – Mar 2013	Apr - Oct
Initial review of FMP amendment to set GOA Halibut PSC and Council selects preliminary preferred alternative (January 2012)					
Final action of FMP amendment to set GOA Halibut PSC					
NMFS prepares and publishes proposed rule					
NMFS prepares and publishes file rule and revised harvest specifications for PSC limit apportionments					

Industry Tools to Reduce PSC and Fleet Responses

The analysis provides a discussion of the recent Council actions taken and the industry programs that have to been used to limit halibut PSC. Members of industry have provided public testimony that they are currently developing or have tried to utilize the tools available to them to reduce halibut PSC. They indicated that some efforts were unsuccessful because of the race for halibut PSC that occurs in the GOA fisheries and their inability to control the behavior of individuals unwilling to comply with the proposed tools (e.g., stand downs). Efforts to refine other tools are still underway but will require additional time and expense to determine if they can be effective solutions. They have stressed that there are no simple measures that they are aware of that have not been considered or tried.

Halibut avoidance measures and their effects will differ across gear and operation types. The analysis considered both the potential for measures to be effective in the various area and target fisheries and the potential for interactions between those fisheries to affect the propensity of participants to adopt avoidance measures.

Hook and line catcher processors

Under the recent action dividing the GOA Pacific cod TAC among different gear and operation types, the catcher processor longline sector and catcher vessel longline sector each receives not only a portion of the Pacific cod TAC, but also an apportionment of halibut PSC. Because of the almost complete overlap of the sector's participants in the BSAI with participants in the GOA Pacific cod fisheries and the relatively few participants in the sector – fewer than 20 vessels participate each year, members of the catcher processor sector have been able to extend their cooperative agreement from the BSAI fishery to a less formal agreement in the GOA fisheries. Despite the lack of a sector allocation, the sector agreed to a variety of measures intended to reduce the chance that its halibut PSC results in a fishery closure. Beginning in 2012, the sector will receive an allocation of Pacific cod and a halibut PSC limit that are not accessible to any other sector. Under its agreement, the hook and line catcher processor sector has agreed to individual limits on halibut PSC. These contractual limits operate as an additional constraint on cooperative members, who also must stop fishing any time regulators announce a fishery closure based on its determination that a hook and line halibut PSC limit will be reached, regardless of whether a member's cooperative limit is reached. Since these non-member vessels are not limited by the agreement, the cooperative must assume those vessels could take a disproportionate share of the available PSC, effectively imposing a disproportionate cost of the PSC limit on the cooperative's members. In practice, participants in the cooperative have historically consolidated their cooperative limits on few vessels that have prosecuted the GOA Pacific cod fishery.

In addition to establishment of member PSC limits based on the current total hook and line halibut PSC limit, the cooperative has also adopted a variety of other measures to reduce halibut mortality. In general, these efforts are focused on avoiding fishing in areas and at times of relatively high mortality rates. Information pooled under this effort is used to manage the cooperative limits, but also result in some degree of peer pressure for vessels with high rates. The fleet is also using informal, on-the-grounds communication among captains. Also under the terms of the agreement, vessels moving into a new area are limited in the amount of gear that may be set, until it is determined that halibut rates are below an acceptable level. The effectiveness of these measures to further reduce PSC is uncertain, as the fleet already uses a variety of measures to reduce halibut mortality.

Hook and line catcher vessels

The GOA hook and line catcher vessel sector uses halibut PSC primarily in the target Pacific cod fishery, along with some catches in the rockfish target fisheries. The hook and line catcher vessel sector has many more participants than the hook and line catcher processor sector, with hundreds of vessels participating annually. A core group of approximately 100 vessels make up the primary fleet, with most of the other vessels making only a few trips in a target fishery subject to the halibut PSC limits. Organization of such a large fleet to divide the PSC limit is unlikely, as vessels may perceive an opportunity to gain an advantage by remaining outside of the agreement. Despite this potential advantage, some catcher vessels currently undertake efforts to avoid halibut through informal arrangements. Under these arrangements vessels share on the grounds information concerning halibut mortality rates, helping vessels to avoid areas with relatively high halibut rates. Measures adopted by the hook and line catcher vessels are unlikely to extend beyond these informal arrangements (or to more costly measures, such as stand downs that delay fishing) under any of the proposed reductions, because of the potential for persons outside the agreement to realize gains by increasing their share of total halibut mortality.

Trawl vessels

The shared seasonal apportionments of the halibut PSC limits may affect the propensity of a vessel operator to avoid halibut, since the usage of halibut mortality is shared with a large fleet (including both catcher vessels and catcher processors) fishing in multiple target fisheries and over a large area (including multiple management areas). These conditions can be a barrier to formation of agreements among participants to address halibut mortality, as participants may have a variety of competing interests and little historical relationship. In addition, policing any agreement would be complicated by the diversity of the fleets and the geographic distribution of their activities. Despite these circumstances, in some cases agreements have been reached and practices adopted to avoid halibut mortality among segments of the fleets.

Section 4.6.6.3.2 provides a more detailed breakdown the catcher vessel sector. Information in that section describes the AFA catcher vessels and non-AFA catcher vessels. It also provides a discussion of catcher vessels by community where deliveries are made. Additional information on catcher vessels by owner's reported residence is provided in Appendix 7.

Trawl catcher processors

Most of the trawl catcher processors that fish in the GOA are also qualified for the Amendment 80 program. All but one of these Amendment 80 vessels is limited by sideboards. Amendment 80 cooperative members communicate halibut mortality rates to cooperative managers. These reports are compiled by the cooperative manager and reported to the fleet on a weekly basis. Occasionally, halibut mortality hot spots are identified through these reports. In addition, cooperative members may use small tows when beginning fishing in a new location to assess whether halibut rates are acceptably low and will move from areas of relatively high halibut rates. Most of the vessels in the Amendment 80 fleet that fish in the GOA flatfish and Pacific cod fisheries use halibut excluders originally developed for the fleet's use in the Bering Sea. These excluders are believed to be more effective in the GOA, as halibut tend to be larger there than in the Bering Sea. Excluders, however, are not believed to be fully effective and are not used on all vessels at all times. In addition, the effectiveness of the excluder will depend on fishing practices, which may reduce target species catch rates. The incentive to adopt practices reducing the effectiveness of an excluder is likely greatest when the vessel operator believes the fleet is approaching a halibut prohibited species catch limit that will inevitably close the fishery.

Some trawl catcher processors would prefer to delay targeting of certain species during periods of known relatively high halibut mortality rates. These delays would likely result only in forgone catches of the target species, as other vessels (including those in other targets) may continue to fish. At times, Amendment 80 participants are likely to have an additional incentive to fish during periods of high halibut mortality rates, as Amendment 80 halibut PSC sideboard limits that are unused in a season do not rollover to the next season.

Given the number of vessels eligible for GOA trawl fisheries, the adoption of halibut avoidance measures (which often reduce target catch rates) are likely to reduce a vessel's revenues from the fisheries. The proposed PSC limit reductions alone are unlikely to induce any notable additional halibut avoidance by trawl catcher processors. Most vessels participating in an Amendment 80 cooperative are likely to continue to communicate with other members of that cooperative concerning halibut mortality rates and continue to use informal arrangements to reduce halibut mortality. These measures are instigated largely by the Amendment 80 sideboards, rather than halibut PSC limits that apply to the trawl fleet, as a whole.

Trawl catcher vessels

Trawl catcher vessels also face substantial competition for the available halibut PSC limits for prosecuting their target fisheries. While this competition creates a disincentive for the adoption of halibut avoidance measures, catcher vessels have adopted a variety of such measures in recent years. These measures are generally adopted at the prompting of NOAA Fisheries, who are likely unable to manage the fleet effort to remain within the halibut prohibited species catch limit in the absences of the measures.

The Pacific cod fisheries (in the Central GOA and Western Gulf) are the fisheries of the greatest value that are likely to be subject to closures because of the halibut PSC limit being reached. As may be expected, these fisheries also draw substantial numbers of the eligible participants. In the mid-2000s, managers had difficulty managing halibut PSC during the Pacific cod B season, primarily because of the rate at which the fleet prosecuted the fishery and the delay in processing observer data reports. To address this difficulty, managers moved to a system of short openings (of 12 hours and 24 hours), after each of which halibut PSC data would be processed and reviewed. If halibut PSC remained available an additional opening would be announced. This change successfully addressed the immediate problem of managing halibut PSC. Yet, short openings, several days apart made fishing less efficient for participants. To address this loss of efficiency, the fleet has worked with NOAA Fisheries managers to develop several measures to avoid halibut and improve the timeliness of observer data coming available to managers. These efforts have allowed managers to extend the B season Pacific cod openers to a few days.

In addition, participants in the Pacific cod fishery worked to develop a halibut excluder that can be used on the smaller trawl vessels that participate in the GOA fisheries. Although the excluder tests had mixed results, some participants believe it effectively reduces halibut prohibited species catch without unacceptable decreases in target catch (particularly in the Pacific cod fishery). Currently, the Central GOA trawl catcher vessel fleet shares halibut PSC information that is used both for identifying hot spots and for releasing weekly reports of halibut mortality by vessel. Reports identifying vessels with high PSC may create peer pressure to reduce their rates.

In the Western Gulf, halibut avoidance is less well coordinated in the fleet. A few factors likely contribute to this difference. The Western GOA fleet primarily delivers into two locations, Sand Point and King Cove; whereas, the Central GOA fleet delivers almost exclusively into Kodiak. In addition, the Western GOA fleet tends to be smaller vessels than Central gulf vessels and operate with a greater degree of independence. Few of the Western GOA participants have any experience with cooperative programs. Halibut avoidance in the Western GOA has generally consisted of moving from areas of high halibut mortality. To some degree, vessels exchange information concerning areas of high mortality to aid in these efforts. While these practices are likely to continue, the potential for substantially greater effort to avoid halibut arising from this action is limited. It is possible that this action together with other aspects of the trawl catcher vessel fisheries and their management may collectively lead to more coordinated efforts to limit halibut mortality and achieve greater returns from the fisheries.

Community Analysis

For the purposes of community analysis, a two-pronged approach to analyzing the community or regional components of changes associated with the implementation of proposed Gulf halibut PSC revisions was utilized. First, tables based on existing quantitative fishery information for the period 2003-2010 (inclusive) were developed to identify patterns of participation, by community, in the various components of the relevant fisheries. There are, however, substantial limitations on the data that can be utilized for these purposes, based on confidentiality restrictions. The second approach involved selecting a subset of Alaska communities shown in the data as most heavily engaged in the relevant Gulf groundfish fisheries for characterization to describe the range, direction, and order of magnitude of social- and community-level engagement and dependency on those fisheries, and a series of profiles were compiled for those communities, which included Anchorage, Chignik Lagoon, Homer, Juneau, King Cove, Kodiak, Petersburg, Sitka, and Sand Point. A number of other Alaska communities are substantially engaged in the potentially affected Gulf groundfish fisheries, but none have the range and/or level of engagement of the communities profiled, particularly in terms of steady local fleet participation, especially in the last few years, although Cordova, Akutan, and Unalaska/Dutch Harbor shore-based processors have been steadily engaged in Gulf groundfish processing over the 2003-2010 period. The locally owned fleet of Chignik was identified as relatively dependent on hook-and-line Gulf groundfish fisheries participation compared to other Alaska communities not included in the series of community profiles; no Alaska community outside of those profiled was identified as substantially engaged in the relevant Gulf groundfish fisheries through trawl participation on the part of the locally owned fleet.

In general, it is not possible to quantitatively differentiate potential impacts of the different Gulf halibut PSC reduction alternatives on an individual community basis. Qualitatively, however, it is possible to anticipate the communities where adverse impacts, if any, would most likely take place, along with the nature, direction, and at least rough order of magnitude of those impacts. Adverse impacts would likely be felt at the individual operation level for at least a few vessels in a number of Alaska communities due to increased costs and/or a drop in revenues associated with either changing fishing patterns and/or practices to reduce halibut bycatch or because of season-ending closures based on a particular gear- or species-based sector hitting a (revised) halibut PSC limit earlier in the season than would have been the case under previous/existing (higher) halibut PSC thresholds. Additionally, recent community and social impact assessments for North Pacific fishery management actions suggest that as locally operating vessels experience adverse impacts, indirect impacts are also soon felt by at least some local support service providers to the degree that those individual enterprises are dependent upon customers who participate in the specific fishery or fisheries affected (and the relative dependence of those customers on those specifically affected fisheries). Given the scope of overall impacts anticipated to result from any of the management alternatives assessed for the proposed Gulf halibut PSC revisions, however, community-level impacts would likely not be discernible for most of the engaged communities. The three communities where community-level impacts are a greater possibility are King Cove, Sand Point, and Kodiak, based on the relative involvement with the trawl sector, both on a local fleet and processing basis.

Potential mitigating factors for possible adverse impacts in King Cove and Sand Point, however, include the specific gear, species, and seasonal nature of the Gulf groundfish trawl-related efforts in those communities, such that any Gulf halibut PSC revisions that affected any season other than the cod “A” season (January 1 through June 9) in the Western Gulf would have minimal impacts to King Cove and Sand Point.

Kodiak, however, is substantially engaged in a wide range of Gulf groundfish fisheries in terms of spatial and seasonal distribution of effort, species targeted, and gear types utilized with respect to its local fleet, and Kodiak processing operations are very much the center of Gulf groundfish shore-based processing. Kodiak would be especially more likely to experience any adverse impacts related to Gulf groundfish trawl fisheries in the later part of the year, particularly with respect to flatfish-related operations. A potential mitigating factor for adverse community-level impacts in Kodiak is that the community is substantially engaged in and dependent upon a wide range of fisheries, not just the Gulf groundfish fisheries, and multiple gear types within the Gulf groundfish fisheries. For the local Gulf groundfish fleet, exvessel gross revenues are roughly comparable for the fixed gear and trawl segments of the fleet. For processing operations, a lack of flatfish toward the end of the year in particular could create a range of challenges with respect to continuity of operations and processing labor issues. For Kodiak shore-based processors, flatfish (year-round) accounted for roughly 10 percent of combined flatfish and other groundfish first wholesale gross revenues on an annual average basis in recent years and roughly 5 percent of first wholesale gross revenues for all species combined.

In general, adverse community-level impacts are not likely to be significant for any of the involved communities and the sustained participation of these fishing communities would not be put at risk by any of the proposed Gulf halibut PSC revision alternatives being considered. For some individual operations, however, especially within the Gulf groundfish trawl sector in Kodiak and those processing operations in Kodiak substantially dependent upon Gulf groundfish trawl deliveries of flatfish in particular, adverse impacts may be felt at the operational level, particularly if the fleet cannot effectively modify behavior to reduce historical halibut PSC rates.

Additionally, there is the potential for community-level beneficial impacts to result from the proposed Gulf halibut PSC reductions. Within the community analysis, it is assumed that direct halibut fisheries would potentially benefit from the proposed Gulf halibut PSC revisions relative to the degree that the Gulf halibut stock itself would potentially benefit from these proposed actions. In both the quantitative indicators and community profile summaries, information is presented on community engagement in the commercial halibut, sport halibut, and subsistence halibut fisheries. The communities profiled as most heavily engaged in the relevant Gulf groundfish fisheries, however, are not always the communities most centrally engaged in/dependent upon the various Gulf halibut fisheries; therefore, the individual communities that have the potential to experience the greatest adverse impacts to the groundfish fisheries may or may not be the same communities as those that have the potential to experience the greatest beneficial impacts to the halibut fisheries. In general, the potential beneficial impacts to the various halibut fisheries, especially the commercial and subsistence halibut fisheries, would be more widespread among communities than the potential adverse impacts to the groundfish fisheries, although potential beneficial impacts to individual halibut fishery participants may be modest compared to potential negative impacts to individual groundfish fishery participants likely to be directly affected by the proposed Gulf halibut PSC reductions. This potential differential distribution of adverse and beneficial impacts among communities is primarily addressed in the quantitative indicators discussion, but engagement in the different halibut fisheries is also discussed in each of the community profiles, where potential negatively affected and positively affected populations are most likely to overlap.

Raw Fish Taxes

There are three fisheries taxes that are levied on GOA groundfish catch/landings by the State of Alaska. A Fisheries Business Tax is levied on persons who process or export fisheries resources from Alaska. The tax is based on the price paid to commercial fishers or fair market value when there is not an arms-length transaction. The tax rate varies by the type of processor and whether the species being delivered is classified as established or developing. A Fishery Resource Landing Tax is levied on fishery resources processed outside the 3-mile limit and first landed in Alaska or any processed fishery resource subject to sec. 210(f) of the American Fisheries Act. The tax is based on the unprocessed value of the resource, which is determined by multiplying a statewide average price (determined by the Alaska Department of Fish and Game (ADF&G) data) by the unprocessed weight. The Fishery Resource Landing Tax is collected primarily from factory trawlers and floating processors which process fishery resources outside of the state's 3-mile limit and bring their products into Alaska for transshipment. The tax rate is 3% for established species and 1% for developing species (as designated by ADF&G). A Seafood Marketing Assessment is levied at a rate of 0.5% of the value of seafood products processed first landed in, or exported from Alaska.

The statewide tax foregone by reductions in groundfish harvests and tax increases from halibut harvests were calculated. The two estimates are not directly comparable because of the different methodologies used to calculate revenue foregone in the groundfish fishery and increase in revenue in the guided sport and commercial IFQ fishery. Alaska statewide average prices used to determine tax liability (2010) were used for both halibut and groundfish. Under Alternative 2 Option 1 (a 5 percent reduction in halibut PSC), the 2010 tax revenues were projected to increase by the amount of the tax applied to halibut landings. This is due to the fact that under the 5 percent reduction in halibut PSC, the groundfish fishery was estimated not to forego any revenue in 2010 (2010 was a low halibut PSC year). No ex-vessel revenues foregone in the groundfish fishery and $30,000 increase in halibut tax revenues were estimated under the 5 percent reduction. When the PSC limit was reduced by 10 percent the state tax was estimated to have increased by $59,000 from halibut landings. The linear calculation for the change in halibut tax liability resulted in an increase of $89,000 in taxes at when the 15 percent reduction to the PSC limit was applied. Statewide taxes forgone from groundfish were estimated to be $17,000 (10 percent reduction in PSC) and $114,000 (15 percent reduction in the PSC limit).

Community level taxes are also impacted by changes in landings. King Cove was the only city to charge a Fisheries Impact Tax which is set at a flat rate of $100,000. The Fisheries Impact Tax is levied against the local processor to help pay for city resources used by the plant. The cities of King Cove, False Pass, and Sand Point impose a 2% fish tax in addition to the 2% fish tax imposed by the Aleutians East Borough. Chignik imposes a 2% fish tax on vessels and a 1% fish tax on processors. Unalaska imposes a 2% fish tax. Estimates of the city fish taxes cannot be reported because less than three groundfish processors are located in each community. Several communities where GOA groundfish are landed do not charge a raw fish tax.

Instead of a raw fish tax, the Kodiak Borough imposed a severance tax of 1.05% on harvested natural resources, including commercial fishing, timber sales, sand or gravel extraction, and mining activities that was in place during 2010. In June 2011, Kodiak lawmakers increased the Borough’s severance tax rate to 1.25%. In general, the reductions in raw fish taxes assessed by municipalities would, potentially, have the greatest impact on the community of Kodiak. Under this proposed action, their groundfish tax revenues would be reduced by changes in the halibut PSC limit. Increases in halibut tax revenue may partially or completely offset these decreases.

ROADMAP TO THE DOCUMENT

The document begins by describing the purpose for this proposed action (Section 1.1) and a description of the alternatives considered (Section 2.1). Section 3 contains the Environmental Assessment. Section 3.2.1 describes the Pacific halibut resource and fisheries and the biological impacts analysis of proposed alternatives on halibut. Section 3.3 describes the groundfish resources and fisheries and the biological impacts analysis of proposed alternatives on groundfish. It describes how fleet behavior may change as a result of the alternatives. Status of, and effects of the proposed action on, marine mammals (Section 3.4), seabirds (Section 3.5), habitat (Section 3.6) and the ecosystem (Section 3.7) are addressed. The cumulative effects section is provided under Section 3.8. The NEPA summary is provided under Section 3.8.5.Section 4 contains the Regulatory Impact Review, which evaluates the economic and socioeconomic impacts of the proposed action. It summarizes information on potential effects of the proposed action on GOA coastal communities, which is included in greater detail under Appendix 7. The community impact analysis was expanded through field work conducted in early 2012, based on recommendations by the Council which incorporated comments by the Scientific and Statistical Committee, Advisory Panel, and public testimony. The Initial Regulatory Flexibility Analysis evaluates the impact of the action on small businesses. Section 6 reviews the alternatives with respect to the requirements of the Magnuson-Stevens Act and other analytical considerations. Section 5 presents the IRFA. Section 6 covers FMP and MSA requirements, including the National Standards. Section 7 discusses the environmental impacts of the proposed action and alternatives. Section 8 contains a list of contributors to this analysis.

Modifications have been made throughout the EA and RIR to reflect changes in the proposed alternatives being considered by the Council since it was reviewed in February 2012. Editorial changes, clarifications, and corrections have also been made.

Major revisions to the EA since February 2012 include the following:

- Information already included in the Initial Review Draft of the EA was reorganized to strengthen sections addressing the Purpose and Need and Cumulative Effects;
- The suite of alternatives and option was revised to reflect Council action;
- The timeline for implementation was revised to no sooner than 2014;
- New IPHC bluebook information and CEY from the 2012 annual IPHC meeting, including expanded discussion on a) the methods and assumptions used in the lost yield and migration models that are briefly described within the analysis; and b) the methods used by IPHC staff to apportion bycatch among the U26, O26-U32, and O32" size categories; and
- Joint NPFMC/IPHC Halibut Bycatch Workshop description and agenda was included. The meeting summary will be provided to the Council separately.

Major revisions to the RIR since February 2012 include the following:

- New information on the status of the Pacific halibut stock;
- Removing the suboption to take the entire trawl halibut PSC reduction from the fifth season;
- Add suboption 3.2 to allow the Amendment 80 sector to roll unused halibut PSC from one season to the subsequent season (similar to the non-Amendment 80 sectors). See Section 4.6.3.6.6;
- Add Suboption 3.3 to allow available trawl halibut PSC in the second season deep water and shallow water complexes to be aggregated and made available for use in either complex from May 15th through June 30th. Halibut PSC sideboards for the Amendment 80 and AFA sectors would continue to be defined as deep water and shallow water complexes in the second season. See section 4.6.3.6.7.
- Revise the hook-and-line sector PSC limits that were implemented under the GOA Pacific cod sector splits (see Section 4.6.3.2);
- A more detailed discussion of the treatment of the CG Rockfish Program halibut program allocation was included (see executive summary);
- Provide additional information on the estimated gross revenue reductions at the ex-vessel level.
- Additional analysis of the trawl catcher vessel fleet. (see Section 4.6.6.3.2)
- The community impacts section was updated to reflect additional information requested by the Council (Appendix 7), including the addition of a Kodiak field methodology discussion and an expansion of the Kodiak processing labor discussion. Appendix 7 was also updated to include data for 2010 for shore-based groundfish processing, halibut sport charter permits and harvests, and halibut subsistence fishery participation and harvest levels.

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1 INTRODUCTION AND PURPOSE

1.1 Purpose and Need

Decreases in the amount of Pacific halibut (*Hippoglossus stenolepis*) available to the directed Gulf of Alaska (GOA) halibut fisheries focused public awareness of halibut prohibited species catch (PSC) usage by both the trawl and hook-and-line sectors. In Area 2C, the commercial IFQ sectors have experienced substantial decreases in their allowable harvest since 2007 (e.g., Charter halibut harvests have declined as a result of reductions in bag limits and size limits since 2009 (See Section 4.5.1). Declines in commercial halibut catch limits and charter guideline harvest levels (GHL) reportedly have decreased profitability, or, in some cases, resulted in economic losses. Participants in directed halibut fisheries often site halibut PSC usage as an area that should be examined as a way to reduce halibut removals. The International Pacific Halibut Commission (IPHC) has indicated that future fishery CEYs in Area 3A could decline substantially. If those declines occur, the directed halibut fisheries in Area 3A may face economic conditions similar to those experienced in Area 2C.

The proposed action would reduce one or more of the halibut PSC limits that have been established for the GOA. Halibut savings would then accrue to the directed fisheries in both the near term and long term. Near term benefits would result from the PSC reductions of halibut that are over 26 inches in length (O26). The legal-size limit for the commercial halibut fishery is 32 inches or greater. The removals of halibut 32 inches or over in total length are known as O32, and removals of halibut under 32 inches in total length are U32. The minimum size limit in the commercial halibut fishery means the O26 component of halibut PSC O32 would be available to the IFQ fishery the year the PSC is foregone, or when the fish reach the 32 inch limit. Longer term benefits in the directed fisheries would accrue from under 26 inches (U26) halibut PSC. Benefits from these smaller halibut would occur as they recruit into the directed fishery.

The purpose of halibut prohibited species catch management in the GOA is to minimize halibut removals when taken in the groundfish fisheries to the extent practicable, while achieving optimum yield. Minimizing halibut PSC while achieving optimum yield is necessary to maintain a healthy marine ecosystem ensure long-term conservation and abundance of halibut, provide maximum benefit to fishermen and communities that depend on halibut and groundfish resources, as well as U.S. consumers, and comply with the Magnuson-Stevens Act and other applicable federal law. National Standard 9 of the Magnuson-Stevens Act requires that conservation and management measures shall, to the extent practicable, minimize bycatch. National Standard 1 of the Magnuson-Stevens Act requires that conservation and management measures prevent overfishing while achieving, on a continuing basis, the optimum yield from each fishery for the United States fishing industry.

The proposed action would modify the GOA PSC limits and the process by which they are set. Currently the PSC limits are set as part of the annual specifications process. Implementing this proposed amendment to the GOA Groundfish Fishery Management Plan (FMP) would establish the PSC limits for the trawl and fixed gear sectors in regulation. GOA PSC limits then could be modified only through an amendment to those regulations. Seasonal and gear apportionments of halibut PSC limits would continue to set through the annual GOA groundfish harvest specifications process.

1.2 Council Objective

The Council has long been cognizant of and continues to recognize the extreme importance of halibut to all resource user groups. The Council also acknowledges that, for a wide variety of reasons, the dynamics of the directed and non-directed halibut fisheries have changed significantly since halibut PSC limits were first established. Given concerns with the current halibut PSC limits in the GOA, and the effect this bycatch has on both directed fishing opportunities and productivity of the stock, there is a need to evaluate existing halibut PSC limits and the way in which these limits are established.

The objective of the proposed action is to reduce halibut PSC limits for the GOA groundfish fisheries. Reductions in the PSC limit will generate halibut savings in years of relatively high halibut PSC. In years of low PSC usage, the PSC limit reduction may not be a constraint. Those years the groundfish sectors would be affected by the proposed changes. In years that halibut PSC savings occur, they will benefit the halibut resource and the directed halibut fisheries dependent on the GOA halibut resource. Conversely, groundfish harvesters will have their harvest constrained those years. The reductions in harvest will impact revenue generated from the fisheries. The magnitude of the revenue change will depend on the quantity of groundfish harvest foregone and the price flexibility of those groundfish species.

1.3 Council Problem Statement

The Council adopted the following problem statement in April 2011.

> *The GOA Groundfish FMP and NMFS rule making establish a 2,000 mt halibut PSC limit for trawl gear and a 300mt halibut PSC limit for hook and line gear. The FMP authorizes the Council to recommend, and NMFS to approve, annual halibut mortality limits as a component of the proposed and final groundfish harvest specifications. Halibut PSC limits are set separately for trawl and fixed gear, which may be further apportioned by season, regulatory area, and/or target fishery.*
>
> *Since the existing GOA halibut PSC caps were established, the total biomass and abundance of Pacific halibut has varied and in recent years the stock has experienced an ongoing decline in size at age for all ages in all areas. Exploitable biomass has decreased 50 percent over the past decade. In recent years, the directed halibut catch limits in the GOA regulatory areas 2C, 3A and 3B have declined steadily. From 2002 to 2011 the catch limit for the combined areas 2C, 3A, and 3B declined by almost 50 percent. While total biomass estimates are high, much of this biomass is made up of smaller fish that are more vulnerable than larger fish to trawl gear.*
>
> *With the exception of bycatch reductions in the IFQ sablefish fishery, and the Rockfish Pilot Program, the current mortality limits have not been revised since 1989 (Amendment 18). Since that time there have been significant changes in groundfish and halibut management programs and fishing patterns, environmental conditions, fishing technology, and our knowledge of halibut and groundfish stocks. Halibut is fully utilized in the directed sport, subsistence and commercial fisheries and is of significant social, cultural and economic importance to communities throughout the geographical range of the resource. Halibut PSC allowances are also critical to the prosecution of many groundfish fisheries operating in the GOA.*
>
> *The GHL for the charter sector in 2C has declined from 1,432,000 to 788,000 net pounds in the last 5 years, and progressively restrictive management measures have been implemented to keep this sector within its GHL.*
>
> *Recognizing the significant decline in exploitable biomass, the uncertainties about current halibut stock dynamics and the effect of current bycatch levels on the halibut catch limits and biomass and all user groups, the Council acknowledges a need to evaluate existing halibut PSC limits and consider reductions.*

In the May 22, 2011 draft Action Plan that was adopted by the Council in June 2011, staff recommended minor edits to the above problem statement for consistency with the GOA Groundfish Fishery Management Plans (FMP) and federal law.

> *The GOA Groundfish harvest specifications annually establish a 2,000mt halibut Prohibited Species Catch (PSC) limit for trawl gear and a 300mt halibut PSC limit for hook and line gear. The FMP authorizes the Council to recommend, and NMFS to approve, annual halibut mortality limits as a component of the proposed and final groundfish harvest specifications. Halibut PSC limits are set separately for trawl and fixed gear, which may be further apportioned by season, regulatory area, and/or PSC fishery category.*
>
> *Since the existing GOA halibut PSC limits were established, the total biomass and abundance of Pacific halibut has varied and, in recent years, the stock has experienced an ongoing decline in size at age for all ages in all areas. Exploitable biomass has decreased 50 percent over the past decade. In recent years, the directed halibut catch limits in the GOA regulatory areas 2C, 3A, and 3B have declined steadily. From 2002 to 2011, the catch limit for the combined areas 2C, 3A, and 3B declined by almost*

50 percent. While total biomass is high, much of this biomass is made up of smaller fish that are more vulnerable than larger fish to trawl gear.

With the exception of PSC limit reductions in the IFQ sablefish fishery, and the Rockfish Pilot Program, the current PSC limits have not been revised since 1989 for trawl gear and 1995 for hook and line gear. Since that time there have been significant changes in groundfish and halibut management programs and fishing patterns, environmental conditions, fishing technology, and our knowledge of halibut and groundfish stocks. Halibut is fully utilized in the directed commercial, subsistence, and sport fisheries, and is of significant social, cultural, and economic importance to communities throughout the geographical range of the resource. Halibut PSC limits are also critical to the prosecution of many groundfish fisheries operating in the GOA.

The Guideline Harvest Level (GHL) for the charter sector in Area 2C has declined from 1,432,000 net pounds to 788,000 net pounds in the last 5 years, and progressively more restrictive management measures have been implemented to keep this sector within its GHL.

Recognizing the significant decline in exploitable biomass, the uncertainties about current halibut stock dynamics and the effect of current PSC limits on the halibut biomass, catch, and all user groups, the Council acknowledges a need to evaluate existing halibut PSC limits and consider reductions.

The Council revised the problem statement again during its review of the draft analysis in October 2011, as it changed the proposed action from occurring within the annual specifications process to amending the FMP and setting the caps in regulation. This proposed action, which would mirror the process for BSAI groundfish fisheries, is outlined in the problem statement that was adopted by the Council in October 2011, as follows.

Currently, the GOA Groundfish harvest specifications annually establish a 2,000 mt halibut Prohibited Species Catch (PSC) limit for trawl gear and a 300 mt halibut PSC limit for hook and line gear. The GOA Groundfish FMP authorizes the Council to recommend, and NMFS to approve, annual halibut mortality limits as a component of the proposed and final groundfish harvest specifications. Halibut PSC limits are set separately for trawl and fixed gear, which may be further apportioned by season, regulatory area, and/or PSC fishery category.

The Council is concerned about the feasibility of revising GOA halibut PSC limits through groundfish harvest specifications and recognizes that addressing halibut PSC limits in this manner on an annual basis is not in the best interest of the Council's deliberative process in the long run.

With the exception of PSC limit reductions in the IFQ sablefish fishery and the Rockfish Pilot Program, the current PSC limits have not been revised since 1989 for trawl gear and 1995 for hook and line gear. Since that time there have been significant changes in groundfish and halibut management programs and fishing patterns, environmental conditions, fishing technology, and knowledge of halibut and groundfish stocks. Halibut is fully utilized in the directed sport, subsistence, and commercial fisheries and is of significant social, cultural, and economic importance to communities throughout the geographical range of the resource. Halibut PSC limits are also critical to the prosecution of many groundfish fisheries operating in the GOA.

Since the existing GOA halibut PSC limits were established, the total biomass and abundance of Pacific halibut has varied and in recent years the stock has experienced an ongoing decline in size at age for all ages in all areas. Exploitable biomass has decreased 50 percent over the past decade. In recent years, the directed halibut catch limits in regulatory areas 2C, 3A and 3B have declined steadily. From 2002 to 2011 the catch limit for the combined areas 2C, 3A and 3B declined by almost 50 percent and the Guideline Harvest Level (GHL) to the charter halibut sector in Area 2C has been reduced by a similar percentage.

While the IPHC accounts for bycatch mortality when establishing catch limits for the directed fisheries in order to maintain the halibut stock's productivity, it is the Council's responsibility to manage halibut PSC limits and meet the requirements of National Standard 9 to minimize bycatch.

1.4 Action Area

The proposed action would be implemented through an amendment to the GOA Groundfish FMP and through rulemaking. Generally, the GOA groundfish regulatory areas (Figure 1-1) overlap IPHC regulatory areas 2C, 3A, and 3B (Figure **1-2**). The Council manages Pacific halibut allocations in federal regulations under separate authority of the North Pacific Halibut Act.

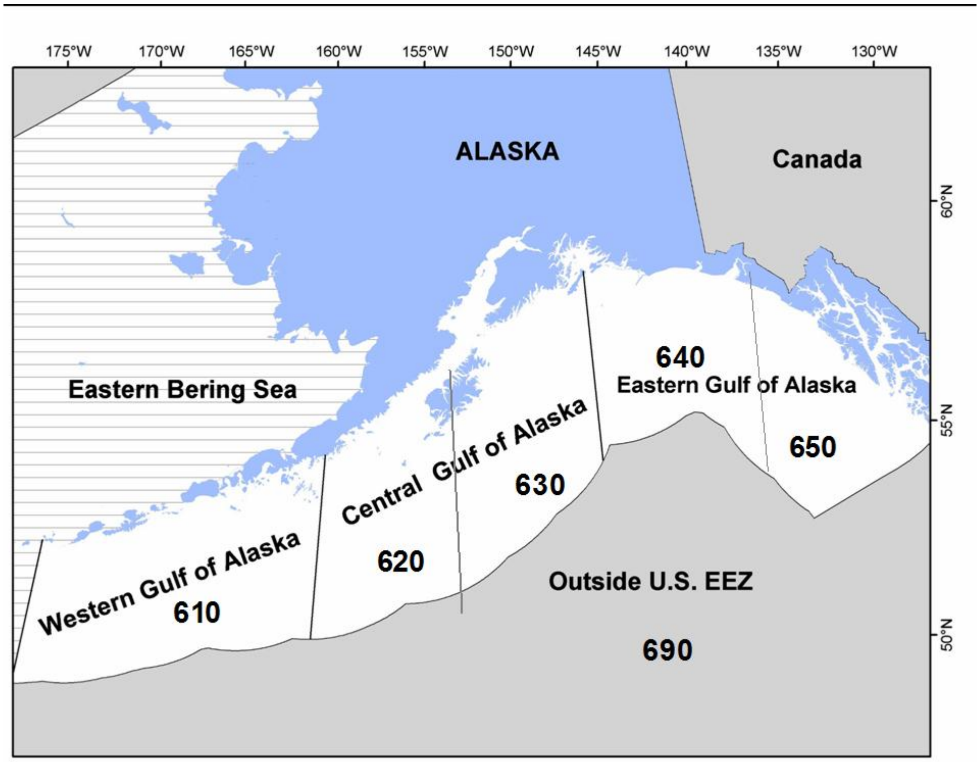

Figure 1-1 NMFS regulatory and reporting areas in the GOA for groundfish.

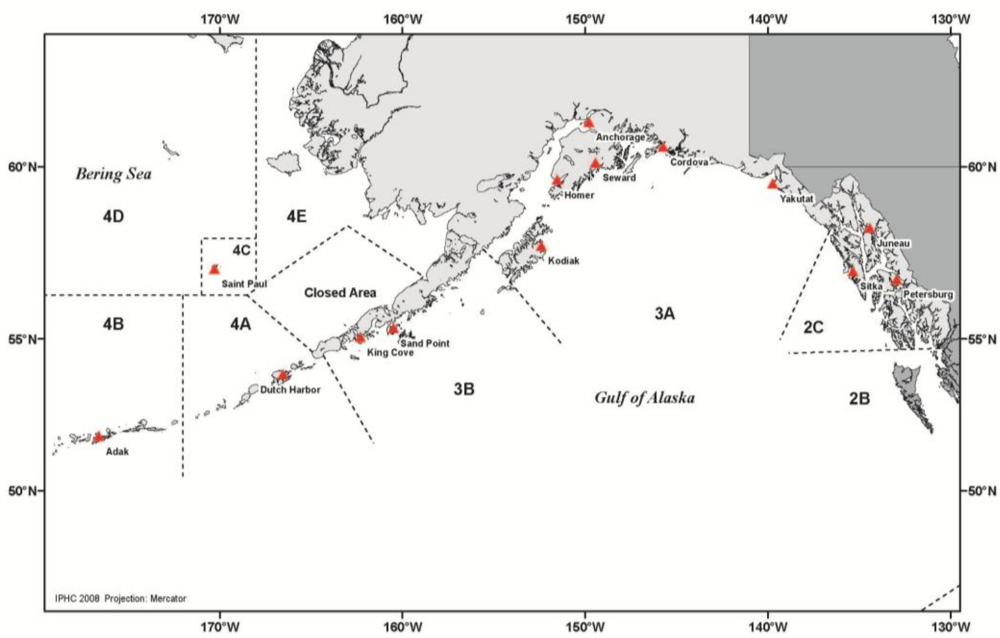

Figure 1-2 IPHC regulatory areas for Pacific halibut.

1.5 Background

Bycatch, as defined by the Magnuson-Stevens Fishery Conservation and Management Act (MSFCMA) (16 U.S.C. § 1802 (2)), "means fish which are harvested in a fishery, but which are not sold or kept for personal use, and includes economic discards and regulatory discards. The term does not include fish released alive under a recreational catch and release fishery management program." "Economic discards are fish which are the target of a fishery, but which are not retained because of an undesirable size, sex, or quality, or other economic reason." The term "regulatory discards" means "fish harvested in a fishery which fishermen are required by regulation to discard whenever caught, or are required by regulation to retain, but not sell."

The Council is guided by ten national standards (See Section 6.1) under the MSFCMA for management of groundfish; the Council applies these standards to its management of Pacific halibut even though it is not required by statute. The Council often balances competing standards in developing its fishery management policies. In managing North Pacific groundfish fisheries to achieve their optimal yields (OY) (National Standard 1), the Council also strives to provide for the sustained participation and to minimize adverse economic impacts on fishing communities (National Standard 8) and to minimize bycatch, and the mortality associated with such bycatch (National Standard 9).

National Standard 9 requires that "conservation and management measures shall, to the extent practicable, (A) minimize bycatch and (B) to the extent bycatch cannot be avoided, minimize the mortality of such bycatch" (16 U.S.C. § 1851(9)). Sec. 303 of the MSFCMA expands on this requirement somewhat, stating that fishery management plans are required to "establish a standardized reporting methodology to assess the amount and type of bycatch occurring in the fishery, and include conservation and management measures that, to the extent practicable and in the following priority (A) minimize bycatch and (B) minimize the mortality of bycatch which cannot be avoided" (16 U.S.C. § 1853(11)).

"Bycatch" in the parlance of the International Pacific Halibut Commission (IPHC) refers to the mortality of Pacific halibut occurring in commercial fisheries that target other species; "wastage" refers to halibut killed, but not landed in the commercial halibut Individual Fishing Quota (IFQ) fishery (due to lost gear, capture of undersized fish, etc.). The GOA Groundfish FMP also makes numerous references to "bycatch" and "bycatch limits." This analysis refers to "PSC" in the context of the proposed action, except where unavoidable to describe IPHC research or stock assessment information.

In the case of the Groundfish FMP for the GOA Management Area (and for the Bering Sea/Aleutian Islands Management Area FMP), several economically, ecologically, and/or culturally important fish species are identified in law, and their capture to be minimized and retention prohibited. These Prohibited Species include all five species of Pacific salmon, Pacific herring, several economically important king crab and Tanner crab species, and Pacific halibut, The Secretary, upon the recommendation of the Council, determined that sufficiently compelling need existed within the management contexts of the groundfish FMPs, to specifically differentiate prohibited species catch (PSC), from incidental removals of other fish species (i.e., bycatch). These two distinct categories of unintended removals are separately monitor and control under the Groundfish FMPs.

The record shows that the Council designated these several fully utilized species, including Pacific halibut, as prohibited species upon implementation of its GOA groundfish FMP over 30 years ago. The FMP has been amended several times since implementation, with several of the amendments containing provisions expressly addressing halibut PSC limits.

1.6 History of this Action

1.6.1 Prior to the MSFCMA[7]

Incidental halibut removals were recorded in the late 1950s and early 1960s, with expansion of foreign fishing (primarily U.S.S.R. and Japan targeting flounders) off Alaska after World War II. Halibut removals increased further with the expansion of foreign fishing by Korea, China, East Germany, and Poland in the 1970s. During the late 1960s and early 1970s, regulation of foreign fishing fleets resulted from bilateral agreements between the United States and the national government of the foreign fleet, e.g., Japan, U.S.S.R., etc. The agreements identified specific areas and time periods when the foreign fishery was not allowed to operate. This often resulted in a “patchwork” of areas within the GOA and the BSAI closed to groundfish fishing at various times of the year. Agreements formulated in the late 1960s were directed at reducing gear conflicts between the North American halibut longline fishery and foreign trawl operations. Typically, foreign trawling was prohibited during the 5 to 15 day period surrounding the halibut fishing seasons established by IPHC (Fredin 1987). Time/area closures, another tool used by the U.S., may have provided some unintended, but minor, reduction in the halibut removals by foreign fisheries.

The first direct attempt to control incidental halibut removals in a foreign fishery began in 1973, when the IPHC proposed to its member governments that foreign trawling be prohibited in certain areas of the Bering Sea when the incidence of halibut was high (Skud 1977). Japan responded by voluntarily refraining from trawling in certain areas within the eastern Bering Sea from December 1, 1973 through November 31, 1974, in an effort to reduce the removals of halibut. These time/area closures, and similar measures for the GOA, were part of subsequent bilateral agreements between the U.S. and Japan, the U.S.S.R., the Republic of Korea, and Poland, during 1975 and 1976 (Fredin 1987).

Up to this point, only time/area closures were used to control incidental halibut removals. Limits were not part of the measures employed, probably because of the lack of a comprehensive observer program which is needed to monitor compliance. A few observers had been placed on foreign vessels as part of a joint program by IPHC, NMFS, and the International North Pacific Fisheries Commission (INPFC) to obtain better information on the magnitude of halibut removals (Hoag and French 1976), but coverage was limited. Managing these removals with limits would have been considered to be impractical at that time.

As described above, Pacific halibut removals in the groundfish fisheries were believed to be negligible until the development of large-scale trawling for groundfish resources in the late 1950s. As domestic groundfish fisheries developed and foreign fishing was phased out in the 1980s, federal regulations were implemented to limit removals of halibut, so as to minimize impacts on the domestic halibut fisheries. Halibut removals often occur in trawl fisheries targeting groundfish species (such as pollock, Pacific cod, and flathead sole). Incidental catch of halibut also occurs in groundfish hook and line and pot fisheries. Certain species, including Pacific halibut, were designated as ‘prohibited’ in the GOA Groundfish FMP, as it is the target of a domestic commercial fishery that predates the FMP. Since the FMP became effective on December 11, 1978, it has contained halibut PSC (the FMP refers to “prohibited species bycatch”) limits for the fully domestic groundfish fishery. Regulations also require that all halibut caught incidentally must be discarded, regardless of whether the fish is living or dead.

Since implementation of halibut PSC limits, the mortality of Pacific halibut in non-directed groundfish fisheries has constituted a major source of mortality to the coastwide population, averaging about 14 M lb (6,350 mt) per year in all regulatory areas. In 2010, the total exploitable halibut biomass estimate for IPHC convention waters was 334 M lb (151,500 mt).

Under PSC limits, the Council’s intent is to control the catch of halibut taken incidentally in groundfish fisheries. These PSC limits are intended to optimize total groundfish harvest under established PSC limits, taking into consideration the anticipated amounts of incidental halibut catch in each directed fishery. The halibut PSC allowances are apportioned by target fishery, gear type, and season. Essentially, these PSC limits

[7] Source: http://www.iphc.washington.edu/halcom/pubs/techrep/tech0025.pdf and http://www.iphc.washington.edu/halcom/research/sa/BycatchWorkshop/Bycatch%20History.pdf

direct fisheries, by area or time, to regions where the highest volume or highest value target species may be harvested with reduced halibut PSC. When any fishery exceeds its seasonal TAC limit, directed fishing for that species must stop, and the species may only be retained up to the "maximum retainable amount" (MRA) when incidentally caught in other directed fisheries. All other users and gear remain unaffected. Reaching a PSC limit, however, results in closure of an area or a groundfish directed fishery, even if some of the groundfish TAC for that fishery remains unharvested.

Halibut PSC limits in the GOA FMP and federal regulations are specified at 2,300 mt. The total is apportioned: a) 2,000 mt (or 3.3 million lb net wgt.) to trawl gear (implemented in 1985) and b) 300 mt (or 500,000 lb net wgt) to fixed gear (implemented in 1990; revised in 1995). The FMP originally apportioned 750 mt (or 1.2 million lb net wgt.) to fixed gear, but this was reduced as a result of implementation of the halibut and sablefish IFQ programs in 1995.

Groundfish pot gear is exempted from halibut PSC limits because: (l) halibut discard mortality rate (DMR) and total mortality associated with this gear type is relatively low; and (2) existing pot gear restrictions are intended to further reduce halibut PSC mortality. Halibut PSC limits in this fishery are for dead fish only. Most halibut taken as PSC are juveniles, so the loss is viewed not only as immediate, but also as fish that would have grown larger and recruited into the directed halibut fisheries.

1.6.2 Since MSFCMA

The proposed rule for GOA FMP Amendment 21 summarizes the issue of non-target halibut removals in the groundfish fishery in 1990; which, to some degree, is still applicable more than 20 years later. It states,

"*The use of trawl, hook-and-line, and pot gear in the groundfish fisheries are to varying degrees non-selective harvesting techniques in that incidental (bycatch) species, including crabs and halibut, are taken in addition to target groundfish species. A conflict occurs when the bycatch in one fishery measurably or potentially impacts the level of resource available to another fishery. Bycatch management is an attempt to balance the effects of various fisheries on each other. It is a particularly contentious allocative issue because groundfish fishermen value the use of crabs and halibut very differently than do crab and halibut fishermen. . . . The prohibition on retention of prohibited species or the establishment of PSC limits eliminates the incentive that the groundfish fleets might otherwise have to target on crabs and halibut, but this prohibition does not provide a substantial incentive for them to avoid or control bycatch.*"

Alaska Sea Grant sponsored a 3-day national workshop in 1995[8] to review developments in bycatch reduction and promote dialogue on research and policy goals for the future.[9] A number of papers remain relevant to the Council's future considerations of ecological and economic implications of allocation decisions, observer requirements for the GOA groundfish and halibut fleets, and innovative gear to reduce halibut PSC. One of the conclusions of the proceedings stated, "regulatory schemes that encourage innovation and responsibility through incentives for bycatch reduction, and discourage those who jeopardize personal and collective fishing opportunities through disincentives, must be implemented." To that end, the Council has adopted catch share programs in the GOA that include elements to reduce incidental removals of halibut (sablefish IFQ program, GOA rockfish program). The commercial groundfish industry has responded to known ecological impacts, and public perception of non-target removals of prohibited species through cooperative research with NMFS on gear modifications for reducing removals of halibut, salmon, and crab. These efforts are detailed further in Section 4.6.5.

During the last several annual groundfish specification cycles, the Council has discussed the procedure for setting (i.e., revising) halibut PSC limits in the GOA. Staffs of the NMFS Sustainable Fisheries Division and Council presented discussion papers that were requested by the Council, beginning in February 2010 and continuing through June 2011. The findings of those papers are addressed briefly in this section and are

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[8] A 1992 work shop identified and defined the problems of bycatch: Proceedings of the National Industry Bycatch Workshop, Feb 4-6, 1992, Newport, OR. Natural Resources Consultants, Inc. Seattle, WA

[9] Solving Bycatch: Considerations for Today and Tomorrow. Alaska Sea grant College Program report No. 96-03, University of Alaska Fairbanks

incorporated into other sections of this analysis. A history of FMP amendments that addressed incidental removals of halibut in the GOA groundfish fisheries is provided in Appendix 3.

In February 2010, the Council reviewed a NMFS discussion paper[10] that identified the different procedures for setting halibut PSC limits under each FMP. While BSAI halibut PSC limits are set in federal regulation, GOA PSC limits are set under the authority of the GOA Groundfish FMP in rulemaking for the annual harvest specifications process. Therefore, the Council was presented with the choice to: 1) take no action; 2) initiate an amendment (EA) to change the GOA Groundfish FMP to mirror the process for BSAI groundfish fisheries, whereby halibut PSC limits may be revised through subsequent regulatory amendments; 3) continue to use annual groundfish harvest specification process to revise halibut PSC limits for 2012/2013 by initiating an EA to supplement the 2007 harvest specification EIS; or 4) include an analysis of halibut PSC limits in a future harvest specifications EIS. The Council requested additional background information.

During its review of the NMFS paper, the Council requested that its staff prepare a discussion paper for review in June 2010, which would address the criteria required by the GOA FMP for setting halibut PSC limits; that paper was seen as the first step in preparing the Council to revise (lower) the GOA halibut PSC limits under either pathway (annual specifications of FMP/regulatory amendments). The June 2010 paper addressed the FMP criteria (Section 1.5) for revising GOA PSC limits (http://www.alaskafisheries.noaa.gov/npfmc/ current_issues/ halibut_issues/HalibutPSC_510.pdf); this information has been expanded in this analysis.

After reviewing this information, the Council requested additional information. A supplement that briefly addressed numerous issues was reviewed in December 2010 (http://www.alaskafisheries.noaa.gov/npfmc/current_issues/halibut_issues/GOAHalibutPSC_1210.pdf). The Council also reviewed data summaries in successively greater amounts of detail regarding the fisheries sources of GOA halibut PSC for the year 2000 through 2009; this information has been updated and included in this analysis. In December 2010, the Council reviewed the actions and timelines required for the different pathways for taking action to reduce GOA halibut PSC limits. The Council did not identify the problem in the fishery or initiate any action at that time. To continue scoping this issue the Council also requested three reports from the IPHC staff (http://www.alaskafisheries.noaa.gov/npfmc/current_issues/halibut_issues/IPHC_PSCdiscpaper311.pdf) and a fourth report on the potential impacts of reduced halibut PSC limits on pending rationalization programs for the GOA in 2012 (e.g., Rockfish Program, Pacific cod sector allocations), which was provided by NMFS staff. In April 2011, the Council reviewed these reports, adopted a problem statement and suite of alternatives for analysis, and identified the proposed process for implementation in 2012. In June 2011, the Council revised its problem statement and suite of alternatives.

1.6.3 Current

Several NMFS and Council discussion papers and a draft EA/RIR dated September 2011[11] identified implementation and timing issues associated with revising halibut PSC limits through the annual harvest specification process:

- Implementation would occur after the start of the fishing year; therefore, at least the first seasonal allocation would be based on the previous year's PSC limit;
- Debating the appropriate annual PSC limit during the specifications process may make the TAC and PSC setting process more contentious;
- Modifying the annual PSC limit could complicate the analytical package needed to implement the annual specifications;
- A less thorough analysis might be provided on the impacts of changing the PSC limits as a result of the timeline for implementing the annual specifications.

The Council reviewed the September 2011 analysis and recommendations from its Scientific and Statistical Committee (SSC), Advisory Panel (AP), and the public during its October 2011 meeting on the difficulties associated with implementing its objectives through the annual harvest specification process and identified a

[10] http://www.alaskafisheries.noaa.gov/npfmc/analyses/ GOAHalibutPSCmod210.pdf

[11] http://www.alaskafisheries.noaa.gov/npfmc/PDFdocuments/halibut/HalibutPSCLimit911.pdf

new management approach. The Council then initiated a new action to remove GOA halibut PSC limits from the annual harvest specifications process through an amendment to the GOA Groundfish FMP and set halibut PSC limits in federal regulation. Such an action would mirror the process for setting halibut PSC limits in BSAI groundfish fisheries. The Council also adopted options for analysis for how those reductions may apply to sideboard PSC limits in rationalized fisheries. In October 2011 the Council added options to separately revise halibut PSC limits assigned to the hook and line gear (catcher processor) sector and hook and line gear (catcher vessel) CV sector. The Council scheduled initial review of the new action for February 2012.

This draft incorporates and expands the previous initial review analysis[12] to address action by the Council in February 2012, based on recommendations provided by SSC, AP, public, and internal review upon review of the initial review draft analysis dated January 2012. Final action is scheduled for June 2012), with the intention that federal regulations to implement the Council's preferred alternative would be in effect as soon as possible; the Council was informed in February 2012 that implementation by mid-2013 was unlikely.

1.7 Proposed Action

The proposed action would 1) amend the GOA Groundfish FMP in order to set halibut PSC limits in federal regulations and 2) set GOA halibut PSC limits a) at the current levels or b) reduce them by 5%, 10%, or 15% for both trawl and hook-and-line (HAL) PSC limits, and by HAL sector (i.e., CP and/or CV). The Council has included some possible exceptions to proposed PSC limits for trawl and longline fisheries that have recently reduced their halibut PSC usage either by FMP amendment (Central GOA Rockfish Program under Amendment 88 and a voluntary cooperative for the Pacific cod freezer longline sector).

1.8 FMP Requirements

Section 3.6.2.1.1 of the GOA Groundfish FMP requires that "apportionments of PSC limits, and seasonal allocations thereof, will be determined annually by the Secretary of Commerce in consultation with the Council. Separate PSC limits may be established for specific gear. The Groundfish FMP states:

"PSC limits, apportionments, and seasonal allocations will be determined using the following procedure:

1. Prior to the October Council meeting. The GOA Groundfish Plan Team will provide the Council the best available information on estimated halibut bycatch and mortality rates in the target groundfish fisheries.
2. October Council meeting. While developing proposed groundfish harvest levels under Section 3.2.3, the Council will also review the need to control the bycatch of halibut and will, if necessary, recommend proposed halibut PSC mortality limits and apportionments thereof. The Council will also review the need for seasonal allocations of the halibut PSC.

The Council will make proposed recommendations to the Secretary about some or all of the following:

a. the regulatory areas and districts for which PSC mortality limits might be established;
b. PSC for particular target fisheries and gear types;
c. seasonal allocations by target fisheries, gear types, and/or regulatory areas and district;
d. PSC allocations to individual operations; and
e. types of gear or modes of fishing operations that might be prohibited once a PSC is reached.

The Council will consider the best available information in doing so. Types of information that the Council will consider relevant to recommending proposed PSCs include:

a. estimated change in biomass and stock condition of halibut;
b. potential impact on halibut stocks;
c. potential impacts on the halibut fisheries;
d. estimated bycatch in years prior to that for which the halibut PSC mortality limit is being established;

[12] http://www.fakr.noaa.gov/npfmc/public-meetings/PDFdocuments/halibut/HalibutPSCLimit911.pdf

e. expected change in target groundfish catch;
f. estimated change in target groundfish biomass;
g. methods available to reduce halibut bycatch;
h. the cost of reducing halibut bycatch; and
i. other biological and socioeconomic factors that affect the appropriateness of specific bycatch measures in terms of objectives.

Types of information that the Council will consider in recommending seasonal allocations of halibut include:

a. seasonal distribution of halibut;
b. seasonal distribution of target groundfish species relative to halibut distribution;
c. expected halibut bycatch needs on a seasonal basis relevant to changes in halibut biomass and expected catches of target groundfish species;
d. expected bycatch rates on a seasonal basis;
e. expected changes in directed groundfish fishing seasons;
f. expected start of fishing effort; and
g. economic effects of establishing seasonal halibut allocations on segments of the target groundfish industry.

3. As soon as practicable after the Council's October meeting, the Secretary will publish the Council's recommendations as a notice in the *Federal Register*. Information on which the recommendations are based will also be published in the *Federal Register* or otherwise made available by the Council. Public comments will be invited by means specified in regulations implementing the FMP for a minimum of 15 days.

4. Prior to the December Council meeting. The Plan Team will prepare for the Council a final Stock Assessment and Fishery Evaluation (SAFE) report under Section 3.2.3 which provides the best available information on estimated halibut bycatch rates in the target groundfish fisheries and recommendations for halibut PSCs. If the Council requests, the Plan Team also may provide PSC apportionments and allocations thereof among target fisheries and gear types, and an economic analysis of the effects of the apportionments.

5. December Council meeting. While recommending final groundfish harvest levels, the Council reviews public comments, takes public testimony, and makes final decisions on annual halibut PSC limits and seasonal apportionments, using the factors set forth under (2) above relevant to proposed PSC limits, and concerning seasonal allocations of PSC limits. The Council will provide recommendations, including no change for the new fishing year, to the Secretary of Commerce for review and implementation.

As soon as practicable after the Council's December meeting, the Secretary will publish the Council's final recommendations as a notice of final harvest specifications in the *Federal Register*. Information on which the final harvest specifications are based will also be published in the *Federal Register* or otherwise made available by the Council."

This analysis contains the information required by the FMP as noted adjacent to each item.

a.	estimated change in biomass and stock condition of halibut	[Section 3.2.4]
b.	potential impact on halibut stocks	[Section 3.2.8.1.1]
c.	potential impacts on the halibut fisheries	[Section 3.2.8.1.1]
d.	estimated bycatch in years prior to that for which the halibut PSC mortality limit is being established	[Section 3.2.3.1];
e.	expected change in target groundfish catch	[Section 3.3.4]
f.	estimated change in target groundfish biomass	[Section 3.3.4]
g.	methods available to reduce halibut bycatch	[Section 4.6.5]
h.	the cost of reducing halibut bycatch	[Section 4.6.3]
i.	other biological and socioeconomic factors that affect the appropriateness of specific bycatch measures in terms of objectives	

2 DESCRIPTION OF ALTERNATIVES

Managing Pacific halibut PSC in the GOA groundfish trawl and longline fisheries presents a complex problem for the Council. The GOA groundfish fisheries are second in volume only to the BSAI groundfish fisheries in the world and the Council must balance trade-offs between the potential effects of reduced groundfish harvests (National Standard 1) or increased costs associated with the fleets' responses to reduced bycatch limits (National Standard 9) and making more halibut available to other users. In October 2011, the Council initiated this analysis to consider a reduction in GOA halibut PSC limits through implementation in federal regulations, which mirrors the Council process for setting halibut PSC limits in the BSAI. The proposed action requires an amendment to the GOA Groundfish FMP, as halibut PSC limits currently are set in the annual harvest specifications process that is authorized under the FMP.

Section 3.6.2.1.1 of the GOA Groundfish FMP requires an examination of the effects of modifying halibut PSC limits. In addition, this analysis examines the effect of changing GOA PSC limits on the applicable allocations and sideboard limits under the AFA, Amendment 80, and the proposed Rockfish Program. The alternatives also address potential reductions in halibut PSC limits that were set in the Rockfish Program, but not removed from the 2,000 mt PSC cap, and on AFA sideboards and Amendment 80 sideboards. The Council also directed that the analysis should examine the implications of Pacific cod sector splits on halibut PSC limits.

Since initiation of this analysis the Council has modified the suite of alternatives and options; the final suite was adopted by the Council in February 2012.

2.1 Alternatives

Alternative 1 (Status quo)*. Retain the process for changing GOA halibut PSC limits through the annual groundfish harvest specifications process.*

Alternative 2*. Amend the GOA Groundfish FMP to remove setting GOA halibut PSC limits from the annual harvest specifications process. GOA halibut PSC limits would be established (and amended) in federal regulation.*

Option 1 (Status quo)*. Retain the existing 2,000 mt trawl and 300 mt hook and line halibut PSC limits and write them into regulation.*

Option 2*. Revise the current GOA halibut PSC limits and write the new limits into regulation.*

Suboption 1*. Reduce the halibut PSC limit for hook and line gear CP sector by:*

a) 5 percent
b) 10 percent
c) 15 percent

Suboption 2*. Reduce the halibut PSC limit for hook and line gear CV sector by:*

a) 5 percent
b) 10 percent
c) 15 percent

Suboption 3*. Reduce the halibut PSC limit for trawl gear by:*

a) 5 percent
b) 10 percent
c) 15 percent

Suboption 3.1*. AFA/Amendment 80/Rockfish Program sideboard limits will be:*

a) Applied as percentage against the GOA halibut PSC limit (Status quo)
b) Redefined in mt, calculated against the status quo GOA halibut PSC limits

__Suboption 3.2.__ Allow the Amendment 80 sector to roll unused halibut PSC from one season to the subsequent season (similar to the non-Amendment 80 sectors).

__Suboption 3.3.__ Allow available trawl halibut PSC in the 2nd season deep water and shallow water complexes to be aggregated and made available for use in either complex from May 15th through June 30th. Halibut PSC sideboards for the Amendment 80 and AFA sectors would continue to be defined as deep water and shallow water complexes in the second season.

2.1.1 Alternative 1

Under the No Action or status quo alternative, halibut PSC limits in the GOA Groundfish FMP are specified at 2,300 mt. The total is apportioned: 2,000 mt to trawl gear and 300 mt to fixed gear. It is still incumbent upon fishermen to avoid catching Pacific halibut to the extent practicable (National Standard 9). This National Standard applies to both the fishery under the status quo, as well as any alternatives that modify fishery regulations.

If the Council retains the status quo under the proposed action, the analysts seek clarification whether the current GOA halibut PSC limit should reflect the 27.4 mt reduction already achieved under GOA Amendment 88 (i.e., be set equal to 1,972.6 mt (or rounded to 1,973 mt) or remain at 2,000 mt. Federal regulations implementing the Central GOA Rockfish Program would need to be revised if the Council clarifies that its intent is that the GOA halibut PSC cap is 1,973 mt.

2.1.2 Alternative 2

Alternative 2 would amend the FMP and set GOA halibut PSC limits in regulation. The proposed alternative includes three suboptions, reducing the respective PSC apportionments to either or both trawl gear and hook-and-line gear (by HAL sector) by 5%, 10%, or 15%. Alternative 2, Option 2, Suboption 3 (for trawl gear only) also includes a suboption (3.1) to apply the full percent reduction to the 5th season. It also includes a second suboption (3.2) that includes a decision point as to whether the three identified rationalized fisheries are, a) subject to the proposed reductions (i.e., by leaving the sideboards expressed as a percentage of the total amount of PSC for the trawl sector) or b) exempted from further reductions, as their apportionments were determined by the Council to be unaffected by further reductions.

Because the Council record does not address whether the 2,000 mt GOA halibut PSC limit was intended to be reduced to 1,973 mt to account for a reduction in total halibut PSC limit apportionments to the trawl sector. Lack of clarity whether the basis for proposed reductions under Alternative 2 apply to the 2,000 mt trawl halibut PSC limit or to the already reduced de facto limit of 1,973 mt has led the public to be confused by the proposed action. This confusion led the analysts to request, and the Council to provide, clarity in June 2011 that the Central GOA Rockfish Program are exempted from proposed reductions; this includes the 27.4 mt reduction in halibut PSC apportionment and the 191.4 mt transferred to the program from the third seasonal allowance to the deepwater complex.

3 ENVIRONMENTAL ASSESSMENT

There are four required components for an environmental assessment. The need for the proposal is described in Section 1.1, and the alternatives in Section 2.1. This section addresses the probable environmental impacts of the proposed action and alternatives. A list of agencies and persons consulted is included in Section 8.

3.1 Methodology for impacts analysis

This document analyzes proposed Pacific halibut PSC control measures for the GOA directed groundfish fisheries under two proposed alternatives. Alternative 1 is the No Action alternative. Alternative 2 proposes reductions of 5, 10, or 15 percent in those PSC limits for both the trawl and hook-and-line groundfish fisheries. The proposed action affects vessels fishing in the Federal groundfish fisheries in the GOA. In this section, the impacts of the alternatives and proposed options on three rationalized fisheries on the various environmental components are evaluated. Section 4 contains the Regulatory Impact Review, which includes a description of the existing conditions in the fisheries, analysis of the economics and socioeconomic effects of the alternatives and options. Section 5 contains the Regulatory Flexibility Analysis. Section 6 contains a brief discussion of the MSA National Standards and a fishery impact statement.

The documents listed below contain information about the fishery management areas, fisheries, marine resources, ecosystem, social, and economic elements of the GOA groundfish fisheries, and are referenced in the analysis of impacts in this chapter.

Alaska Groundfish Harvest Specifications Final Environmental Impact Statement (NMFS 2007a).

This EIS provides decision makers and the public an evaluation of the environmental, social, and economic effects of alternative harvest strategies for the Federally-managed groundfish fisheries in the GOA and the BSAI management areas. The EIS examines alternative harvest strategies that comply with Federal regulations, the GOA FMP, and the Magnuson-Stevens Fishery Conservation and Management Act (Magnuson-Stevens Act). These strategies are applied to the best available scientific information to derive the total allowable catch estimates for the groundfish fisheries. The EIS evaluates the effects of different alternatives on target species, non-specified species, forage species, prohibited species, marine mammals, seabirds, essential fish habitat, ecosystem relationships, and economic aspects of the GOA fisheries.

Stock Assessment and Fishery Evaluation (SAFE) Report for the Groundfish Resources of the GOA (NPFMC 2010).

Annual SAFE reports review recent research and provide estimates of the biomass of each species and other biological parameters. The SAFE report includes the acceptable biological catch (ABC) specifications used by NMFS in the annual harvest specifications. The SAFE report also summarizes available information on the GOA ecosystem and the economic condition of the groundfish fisheries off Alaska. This document is available from: http://www.afsc.noaa.gov/refm/stocks/assessments.htm.

Analysis of the potential cumulative effects of a proposed action and its alternatives is a requirement of NEPA. An environmental assessment or environmental impact statement must consider cumulative effects when determining whether an action significantly affects environmental quality. The Council on Environmental Quality (CEQ) regulations for implementing NEPA defines cumulative effects as:

"the impact on the environment, which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (Federal or non-Federal) or person undertakes such other actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time" (40 CFR 1508.7).

For the most part, the discussion of past and present cumulative effects is addressed with the analysis of direct and indirect impacts for each resource component below. The cumulative impact of reasonably foreseeable future actions is addressed in Section 3.2.8.

Section 4.7 addresses the management and enforcement considerations of the proposed alternatives and options.

The criteria listed in **Table 3-1** are used to evaluate the significance of impacts. If significant impacts are likely to occur, preparation of an Environmental Impact Statement (EIS) is required. Although economic and socioeconomic impacts must be evaluated, such impacts by themselves are not sufficient to require the preparation of an EIS (see 40 CFR 1508.14).

Table 3-1 Criteria used to evaluate the alternatives

Component	Criteria
Fish species	An effect is considered to be significant if it can be reasonably expected to jeopardize the sustainability of the species or species group.
Habitat	An effect is considered to be significant if it exceeds a threshold of more than minimal and not temporary disturbance to habitat.
Seabirds and marine mammals	An effect is considered to be significant if it can be reasonably expected to alter the population trend outside the range of natural variation.
Ecosystem	An effect is considered to be significant if it produces population-level impacts for marine species, or changes community- or ecosystem-level attributes beyond the range of natural variability for the ecosystem.

Along with FMP requirements to be addressed a number of key questions have been posed by the Council during the scoping process for this action. IPHC staff responded to the following three issues in April 2011 (http://www.alaskafisheries.noaa.gov/ npfmc/current_issues/halibut_issues/IPHC_PSCdiscpaper311 .pdf); along with other information from IPHC sources in Section 3.2.

- Effect of reducing PSC limits in the GOA on the halibut exploitable biomass and spawning potential, including downstream effects from halibut migration
- Recent changes in stock assessment methods, harvest policies, and catch limit setting
- Possible causes of low growth rates and the effects on future exploitable biomass and spawning biomass

Section 3.2.8 and Section 3.3.4 analyzes the potential effects (both short term and long term) of proposed reductions in the trawl and longline halibut PSC limits on the halibut stock, halibut fisheries, and groundfish fisheries.

These questions address the potential effects of reduced halibut PSC in GOA groundfish trawl and halibut longline fisheries on directed GOA halibut commercial, sport, and subsistence fisheries. The Council's problem statement posits that the status of the halibut stock has changed (e.g., total biomass and abundance varied, exploitable biomass and size at age declined), commercial halibut IFQ catch limits have declined, charter halibut GHL and bag limits have declined, and halibut are less available for subsistence users. The Council stated that more numerous, smaller halibut are more vulnerable than larger halibut to trawl gear. It acknowledges that halibut PSC are critical to the prosecution of many groundfish fisheries; it also states that GOA halibut PSC limits have remained static while the above changes occurred in the halibut stock, environmental conditions changed, and numerous GOA commercial fisheries were rationalized, and fisheries technology has advanced to allow for halibut PSC avoidance. The proposed action to reduce halibut PSC is intended to increase catches in directed halibut fisheries and the biomass of the halibut spawning stock.

3.2 Pacific halibut

Pacific halibut is one of the largest species of fish in the world, with many individuals growing to over eight feet in length and over 500 lb. The range of Pacific halibut that the IPHC manages covers the continental shelf from northern California to the Aleutian Islands (AI) and throughout the Bering Sea (BS). Pacific halibut are also found along the western north Pacific continental shelf of Russia, Japan, and Korea.

The depth range for halibut is up to 250 fathoms (460 m) for most of the year and up to 500 fathoms (920 m) during the winter spawning months. During the winter, the eggs are released, move up in the water column, and are caught by ocean currents. Prevailing currents carry the eggs north and west. The young fish settle to the bottom in bays and inlets. Research has shown that the halibut then begin what can be called a journey back. This movement runs counter to the currents that carried them away from the spawning grounds and has been documented at over 1,000 miles for some fish. Pacific halibut are generally pre-teens (8 to 12 years old) when they are large enough to meet the minimum size limit for the commercial fishery of 32 inches.

How Are Halibut Catch Limits Determined?

A fishery catch limit is the result of a multi-step process which has the objective of determining how much can be harvested by the directed fishery, given the IPHC's goals for stock conservation. The process starts with the IPHC staff determining the size of the coastwide exploitable biomass (Ebio) and then apportioning it into regulatory area Ebio using objective scientific procedures. Ebio is defined as the fraction of the total biomass, or Tbio, which is catchable by hook and line gear. Generally, this is composed of fish > 32 inches.

Next, the amount of yield available for harvest is calculated by applying the IPHC's target harvest rate to the Ebio estimate. This resulting yield is referred to as the Total Constant Exploitation Yield, or TCEY (Ebio times target harvest rate). The target harvest rate differs between Areas 2A-3A and Areas 3B-4, with the latter being lower. In addition, any given harvest rate responds to two stock reference points, the threshold and limit reference points. Harvest rates are constant above the threshold reference point (30% of estimated unfished spawning biomass) and decrease linearly to zero if the spawning biomass decreases to the limit reference point (20% of estimated unfished spawning biomass).

The third step is to subtract Other Removals from TCEY in order to determine the Fishery CEY or FCEY. The FCEY forms the basis of the directed fishery catch limits. Other Removals include catches which either have no explicit limits on the amount of harvest, or catches which IPHC has no authority to manage. The former category includes sport and subsistence/personal use harvest, and wastage from the commercial halibut fishery; the latter includes bycatch mortality. Exceptions occur for Areas 2A and 2B because of the allocation plans among fishery sectors in those areas. Additionally, for bycatch and wastage, only that portion of the catch which is > 26 inches is included in this step, because of the impact those sizes have on the removals from the stock, which essentially equal removals > 32 inches.

The next step is for the IPHC staff to determine its recommendation for an area's catch limit, i.e., Catch Limit Recommendation (CLR), based on the current year's FCEY and the trajectory of the stock since the preceding year. Within its Harvest Policy, the IPHC' has a harvest control rule termed Slow Up/Full Down (SUFullD). It works in the following manner: if the current FCEY is greater than the previous year's catch limit, the staff's CLR would be the previous year's Catch Limit PLUS one third of the difference between the two; if the Fishery CEY is less than the previous year's Catch Limit, then the CLR is equal to the Fishery CEY.

The IPHC' staff distributes its CLRs in advance of the IPHC Annual Meeting, allowing the halibut industry to discuss and provide comment back to the IPHC. Once the Annual Meeting commences, the Conference Board and Processor Advisory Group further discuss the CLRs, which results in formal recommendations to the IPHC. The IPHC'considers all of the input – public comments, recommendations from its advisory bodies, and staff CLRs – and then adopts fishery catch limits and other measures which seek to balance the advice it has received, with stock conservation being the primary consideration.

3.2.1 North Pacific Halibut Treaty[13]

The IPHC was established in 1923 by a Convention between the governments of Canada and the United States of America. Its mandate is research on and management of the stocks of Pacific halibut within the Convention waters of both nations. The IPHC consists of three government-appointed commissioners for each country who serve their terms at the pleasure of the President of the United States and the Canadian government respectively.

The IPHC, an international fisheries organization, receives monies from both the U.S. and Canadian governments to support a director and staff. Annually, the IPHC meets to conduct the business of the IPHC. At this annual meeting the budgets, research plans, biomass estimates, catch recommendations, as well as regulatory proposals are discussed and approved then forwarded to the respective governments for implementation.

The IPHC conducts numerous projects annually to support both major mandates: stock assessment and basic halibut biology. Current projects include standardized stock assessment fishing surveys from northern California to the end of the AI, as well as field sampling in major fishing ports to collect scientific information from the halibut fleet. In conjunction with these ongoing programs, the IPHC conducts numerous biological and scientific experiments to further the understanding and information about Pacific halibut.

The Halibut Convention between Canada and the United States has been revised several times to extend the IPHC's authority and meet new conditions in the fishery (Bell, 1969). The most recent change occurred in 1979 and involved an amendment to the 1953 Halibut Convention. The amendment, termed a "protocol", was precipitated in 1976 by Canada and the United States extending their jurisdiction of fisheries resources to 200 miles. The 1979 Protocol, along with the U.S. legislation that gave effect to the Protocol (Northern Pacific Halibut Act of 1982), has affected the way the fishery is conducted and redefined the role of IPHC in the management of the fishery since its adoption.

[13] Source: **http://www.iphc.int/about-iphc.html**

Should fishing be reduced on older female halibut?

Allowing a higher harvest on small fish would increase the mortality rate on young females and potentially reduce their ability to contribute to the spawning biomass. At young ages, gains from growth are greater than losses to natural mortality thus leaving them in the ocean results in larger spawning biomass levels. The bulk of the female spawning biomass is comprised of ages 10 through 15 and an increase in harvest would decrease the number of females attaining that age. Conversely, older larger females contribute very little in terms of spawning biomass, though their egg contribution is more substantial due to their size, and the IPHC currently estimates that female halibut older than 20 years comprise just 5% by weight of the spawning biomass.

Reducing, or eliminating harvest on these older females would not appreciably affect the spawning biomass. Further, these older females have already contributed for many years to the spawning biomass thus ensuring their genetic contributions are preserved. The low growth rate, or small size at age, of halibut may be the result of density dependence from other flatfish besides halibut thus reducing the number of small halibut is no guarantee that growth rates would respond positively. Indeed, there is good reason to believe that such internal density dependence in that halibut stock is not the primary reason for the current small size of halibut at a given age. For example, in the mid-1980s, very large halibut cohorts recruited to the population – at a time when growth rates were very large compared to today.

3.2.2 Life History[14]

3.2.2.1 Reproduction and Development

Most male halibut are sexually mature by about 8 years of age, while half of the females are mature by about age 12. Most halibut spawn during the period November through March, at depths of 300 to 1,500 feet. Female halibut release a few thousand eggs to several million eggs, depending on the size of the fish. Eggs are fertilized externally by the males. About 15 days later, the eggs hatch and the larvae drift with deep ocean currents. As the larvae mature, they move higher in the water column and ride the surface currents to shallower, more nourishing coastal waters. In the GOA, the eggs and larvae are carried generally westward with the Alaska Coastal Current and may be transported hundreds of miles from the spawning ground.

Halibut larvae start life in an upright position like other fish, with an eye on each side of the head. The left eye moves to the right side of the head when the larvae are about one inch long. At the same time, the coloration on the left side of the body fades. The fish end up with both eyes on the pigmented (olive to dark brown), or right, or upper side of the body, while their underside is white. By the age of 6 months, young halibut settle to the bottom in shallow nearshore areas.

Halibut feed on plankton during their first year of life. Young halibut (1 to 3 years old) feed on euphausiids (small shrimp-like crustaceans) and small fish. As halibut grow, fish make up a larger part of their diet. Larger halibut eat other fish, such as herring, sand lance, capelin, smelt, pollock, sablefish, cod, and rockfish. They also consume octopus, crabs, and clams.

3.2.2.2 Growth

Female halibut grow faster and reach larger sizes than male halibut. The growth rate of halibut has changed over time. The growth rate was highest in the 1980s and lowest in the 1920s and 2000s. By the 2000s, 12-year-old halibut were about three-quarters the length and about one-half the weight they were in the 1980s. The growth rate is believed to decrease due to competition among halibut or between halibut and other species, such as arrowtooth flounder, that have a similar diet.

For at least the past 15 years, halibut growth rates have been depressed to levels that have not been seen since the 1920's. Both females and male halibut have the potential to grow rapidly until about age 10, about 2 inches per year for males and 2.5 inches for females. Thereafter, females have the potential to grow even faster, while males generally would slow down relative to female growth. Growth rates for these larger fish

[14] Source: http://www.adfg.alaska.gov/index.cfm?adfg=halibut.main

in the last 10 or so years are more on the order of one inch or less per year. This translates into a much smaller fish at any given age.

Why are halibut so much smaller now?

One or more of following:

- Density dependence (competition with halibut and other flatfish, especially arrowtooth flounder)
- Environmental changes – food, temperature
- Effects of size-selective fishing
  - Annual cropping of faster growing fish leaves smaller ones behind
  - Fishery induced evolution – genetic truncation
- Other unidentified processes
- Any/all of these may be working together

~ IPHC Staff

There was a dramatic increase in halibut growth rates in the middle of this century, especially in Alaska. Sometime around 1980, growth rates started to drop, and now Alaska halibut of a given age and sex are about the same size as they were in the 1920's. For example, in the northern GOA, an 11-year-old female halibut weighed about 20 pounds in the 1920's, nearly 50 pounds in the 1970's, and now again about 20 pounds. In the late 2000s, 15 year old female halibut in the central GOA have averaged 28 pounds – a decline of 70 percent in 30 years. Similar, though slightly smaller, declines have been noted in all areas. The declines in size at age occur at all ages and for both sexes; the declines increase markedly with age. The reasons for both the increase and the decrease are not yet known but may be tied to increased abundance of other species, such as arrowtooth flounder, and availability of food supply.

3.2.2.2.1 Possible causes of low growth rates and the effects on future exploitable biomass and spawning biomass

A number of hypotheses for the decline in halibut growth rates have been suggested[15]. The timing of the decline in size-at-age correlates very strongly with the increase in halibut numbers that began following the environmental regime shift of the late 1970s. By the mid-1980s, several strong year classes had increased the total number of halibut in the ocean by at least a factor of two. At the same time, increased numbers of other flatfish, in particular arrowtooth flounder (*Atherestes stomias*), also occurred in the GOA and BS. The most generally accepted cause of the decline in size-at-age has been a density-dependent decline in growth rate resulting from the greatly increased numbers, and biomass, of flatfish. It is worth noting here that, although exploitable biomass estimates of halibut have declined by 50 percent since the late 1990s, estimates of the total biomass of halibut have continued to increase. Additionally, the biomass of arrowtooth flounder estimated to be several times greater than the halibut biomass, has remained very high.

Other potential factors include: environmental effects (e.g., temperature, ocean current changes), diet changes, fishery induced evolution, and size-selective fishing. No strong environmental correlate has been found. The possibility of fishery induced evolution, i.e., that halibut capable of producing fast-growing progeny have been “fished out” of the population is both unlikely over such a short time frame and is also countered by the observation that the current halibut size-at-age is similar to that of the 1930s. In other words, a cycle of change from small to large size-at-age has already been observed, and the increase in size-at-age occurred at a time of very low halibut abundance. The change in halibut size-at-age could, theoretically, be produced by the effects of size-selective fishing and not by a change in growth rate. Since larger halibut are targeted, a progressively smaller size-at-age would result in a fishery that systematically removed the larger individuals. Such an effect however, would be expected in a fishery imposed on a previously unfished stock, which has not been the case for halibut in 80+ years. Additionally, halibut size-at-age increased greatly through the 1960s and 1970s, a time when the stock was (and long had been) fully exploited.

[15] This section is from a March 2011 response from IPHC staff to a December 2010 Council request for information on this topic http://www.alaskafisheries.noaa.gov/npfmc/current_issues/halibut_issues/IPHC_PSCdiscpaper311.pdf

The effects of reduced size-at-age are rather predictable. Given the 32-inch commercial size limit and selectivity of both the harvesters and the gear, a continued reduction in size-at-age leads to a lowered exploitable biomass (EBio) for a given number of halibut. It has been conclusively demonstrated that EBio is a function of halibut size, not halibut age. Female spawning biomass (FSBio), on the other hand, is a function of both age and size. Female spawning biomass has also declined over the past decade, but appears to have begun increasing starting in 2007-2008. This results from the several large year classes now entering the age at which a substantial fraction contribute to spawning (age of 50 percent maturity in halibut is around 12 years). Thus, the increase in biomass from addition of new (though small) mature females now outpaces the declines from losses due to fishing and natural mortality as well as the decrease in size-at-age.

3.2.2.3 Movements (Migration[16])

Juvenile and adult halibut migrate generally eastward and southward, into the GOA coastal current, countering the westward drift of eggs and larvae (**Figure 3-1**). Halibut tagged in the BS have been caught as far south as the coast of Oregon, a migration of over 2,000 miles. Because of the extensive movements of juvenile and adult halibut, the entire eastern Pacific population is treated as a single stock for purposes of assessment. Research is continuing to determine if there are spawning sub-stocks of varying productivity.

Halibut also move seasonally between shallow waters and deep waters. Mature fish move to deeper offshore areas in the fall to spawn, and return to nearshore feeding areas in early summer. It is not yet clear if fish return to the same areas to spawn or feed year after year.

There is a continuing and predominantly eastward migration of halibut from the west to east.

Halibut abundance changes along its geographic range, with the current center of abundance located around Kodiak Island (Area 3A) in the GOA. During summer, halibut are distributed on the continental shelf but during the winter mature halibut migrate to spawning grounds located in deeper waters. Recent archival tagging has identified winter spawning migrations as long as 1200 km as well as some degree of site fidelity to summer areas. After spawning, halibut eggs and larvae are carried by prevailing currents north and westward towards the western GOA and the BS. Juvenile halibut undertake an ontogenetic eastward-southward migration that counters the drift of eggs and larvae.

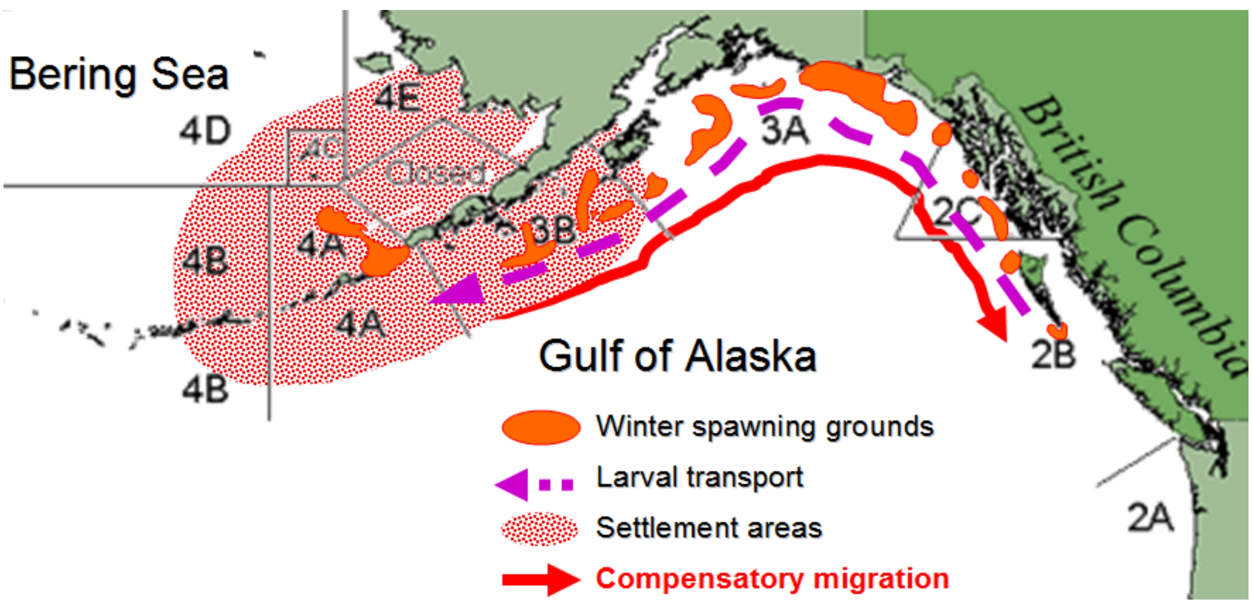

Figure 3-1 Conceptual model of Pacific halibut migration patterns (Source: IPHC)

[16] http://www.iphc.int/publications/rara/2010/2010.261.Evaluationoftheimpactofmigrationonlostyield.pdf

3.2.3 Removals

Total removals from the halibut population come from seven categories: commercial catch (IPHC survey catch is included in this category), sport catch, O32 (halibut over 32 inches in length) mortality (from a variety of fisheries targeting species other than halibut), personal use, O32 wastage from the commercial IFQ fishery, U32 (halibut under 32 inches in length) mortality from non-target fisheries, and U32 wastage from the commercial IFQ fishery.

Methods used by IPHC to apportion bycatch among the U26, O26-U32, and O32 size categories Beginning with the 2010 stock assessment, the IPHC split halibut "bycatch" among the U26 and O26 (i.e., O26/U32 + O32) size categories according to the halibut bycatch length composition data collected by observers. This procedure allows alternate treatments of U26 and O26 halibut in the determination of yield for the directed fishery, FCEY. Bycatch mortality that is larger than 26 inches, i.e., O26, is deducted from the total CEY in the area where the bycatch mortality occurred. This allows for similar treatment of commercial fishery wastage, and sport and subsistence harvests, based on their similar length compositions. The change was made to provide a consistent treatment of these mortalities in the fishery yield determination process. U26 bycatch mortality is accounted for with the harvest rate policy, whereby the harvest rate is adjusted downward in all areas to compensate for the loss of recruitment. This effectively distributes the effect of U26 bycatch mortality in relation to Ebio distribution. Details supporting this approach is in Hare (2011b).

The 2011 total removals by regulatory area are listed in Table 3-1 and illustrated in

Figure **3-2**, coastwide total removals from 1935 to 2011 are illustrated in Figure 3-3 through Figure 3-6, in increasing amounts of detail. Total removals by regulatory area for 1974-2011 are illustrated for the three GOA regulatory areas in (Area 2C), Figure 3-8 (Area 3A), Figure 3-9 (Area 3B). On a coastwide basis, total removals are at their lowest level since 1984 and commercial removals at their lowest point since 1983. For temporal context, total removals are about 40% below the peak of the 1990s and about double the lowest value seen in the late 1970s. The pattern of changes between the mid-1980s removals and 2011 removals has been quite different among regulatory areas, however. In 2011, the removals from all sources totaled 60.5 million pounds. Total removals have declined from 90-100 million lb, which occurred during 1998-2007, and are now at a level similar to the mid-1980s.

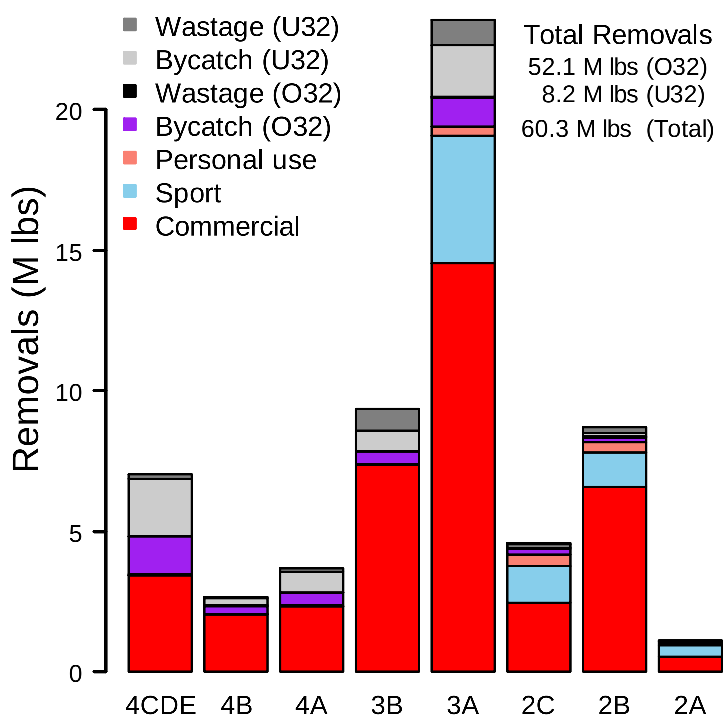

Figure 3-2 **Total halibut removals, 2011. (Source: IPHC)**

Table 3-2 The 2011 estimates of total removals, 2011 catch limits and catch of Pacific halibut by regulatory area, and 2011 sport guideline harvest level and sport harvest (thousands of pounds, net weight). (Source: IPHC)

Area	**2C**	**3A**	**3B**
Commercial	2,293	14,266	7,336
Sport	1,313	4,541	25
Bycatch Mortality:			
O32 fish	214	1,035	430
U32 fish	127	1,863	755
Breakdown of U32			
U32/O26	*88*	*846*	*402*
U26 fish	*39*	*1,017*	*353*
Personal Use[2]	425	313	23
Wastage Mortality:			
O32 fish	5	29	7
U32 fish	65	881	752
Breakdown of U32			
U32/O26	*61*	*840*	*678*
U26 fish	*4*	*41*	*74*
IPHC Research	91	291	102
Total Removals	4,533	23,219	9,430
2011 Catch Limits[5]	2,330	14,360	7,510
2011 Catch	2,293	14,266	7,236
2011 Sport GHL	788	3,650	
2011 guided harvest	388	2,837	

[1] Area 2A bycatch is the 2010 estimate as the 2011 estimate will not be available until 2012.
[2] Includes 2010 Alaskan subsistence harvest estimates.
[3] Treaty Indian ceremonial and subsistence fish authorized in the 2011 catch sharing plan.
[4] Includes 17,000 pounds of sublegal halibut retained in the 2011 Area 4DE Community Development Quota.
[5] Does not include poundage from the underage/overage programs in Area 2B or Alaska
[6] Includes commercial, sport, and treaty subsistence catch
[7] Includes commercial and sport catch

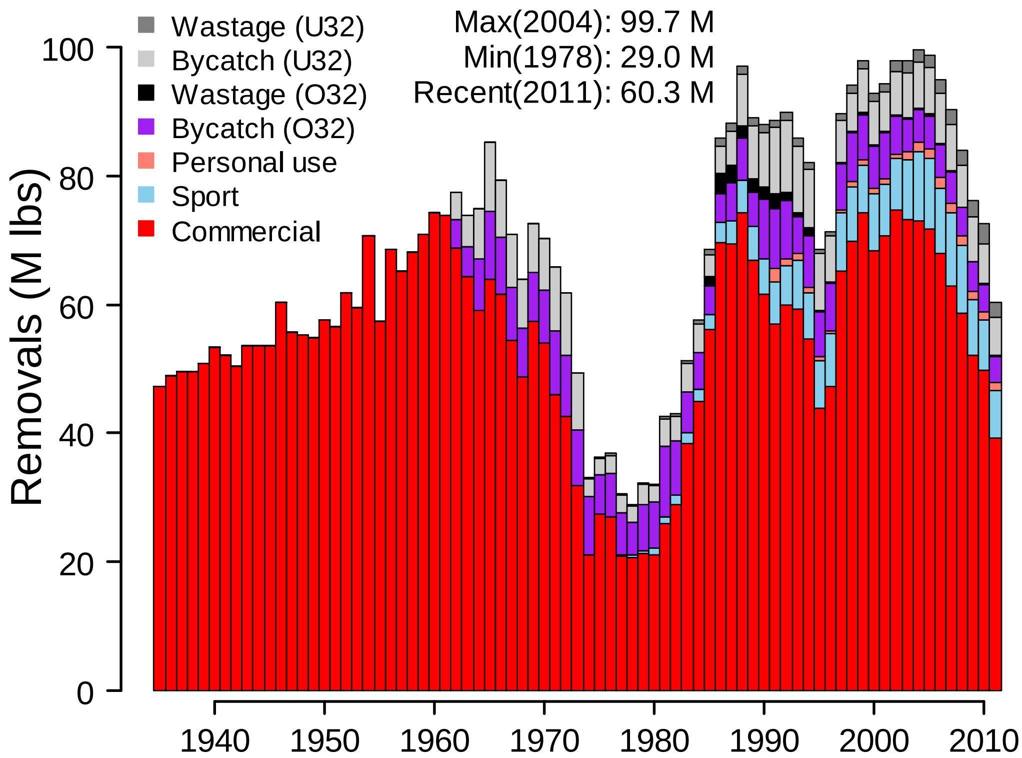

Figure 3-3 Total removals coastwide for the period 1935-2011. Year and amount of minimum, maximum, and most recent removals are also listed.

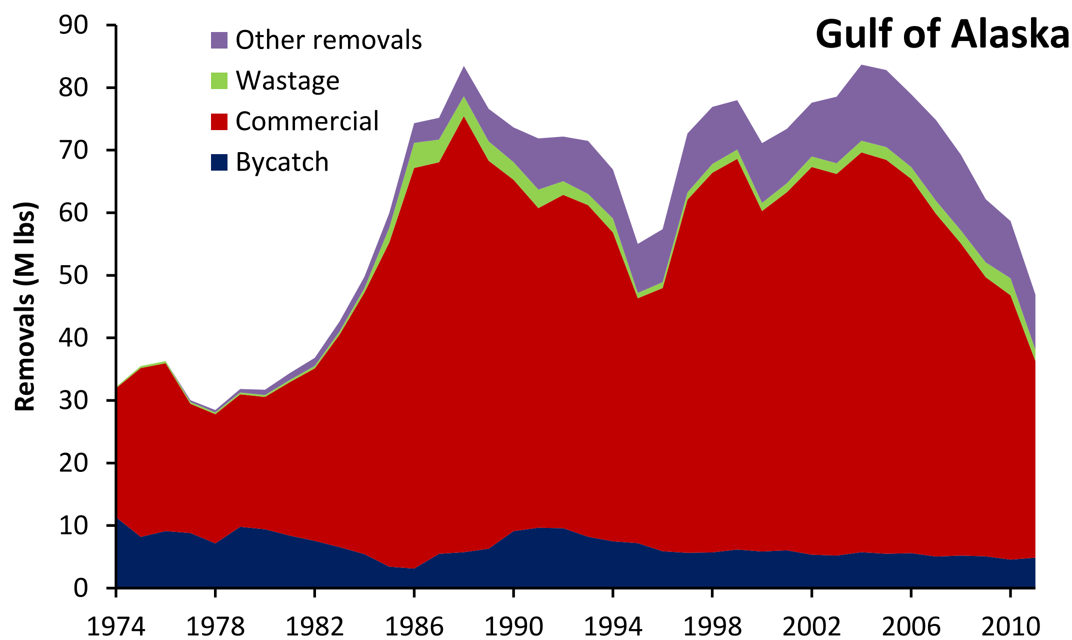

Figure 3-4 Total removals for the Gulf of Alaska, 1935-2011. (Source: IPHC)

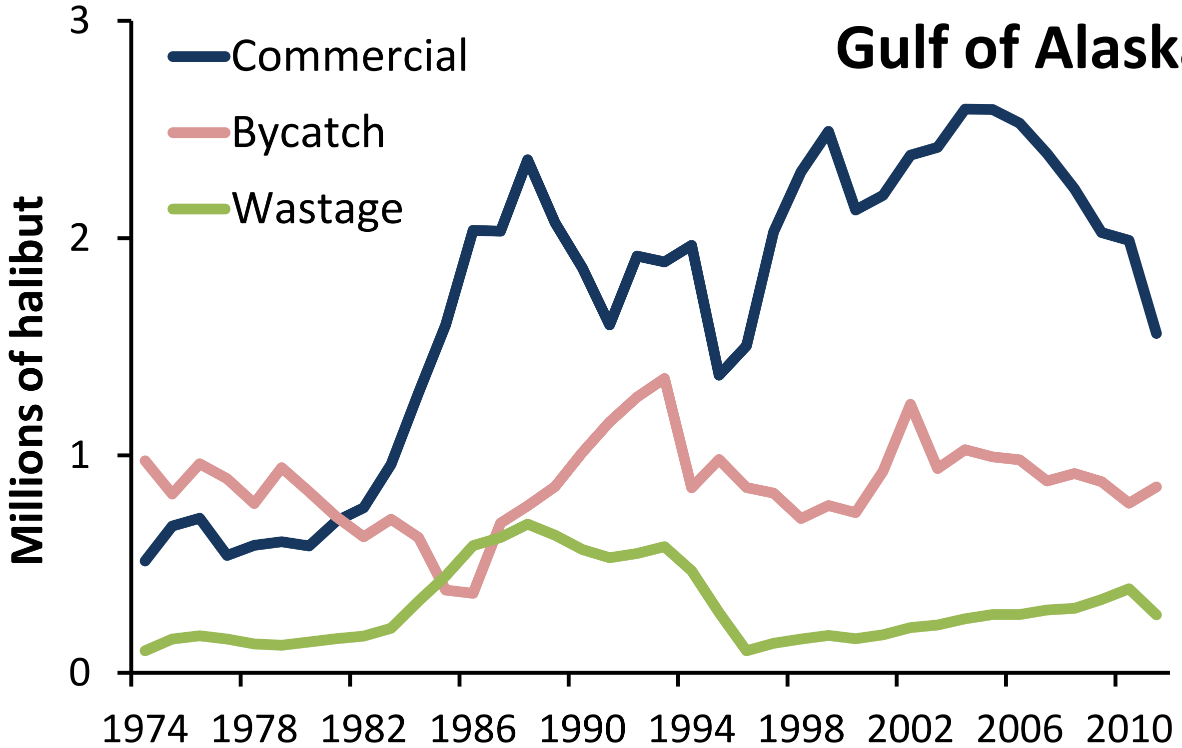

Figure 3-5 Total removals in numbers for the Gulf of Alaska, 1935-2011. (Source: IPHC)

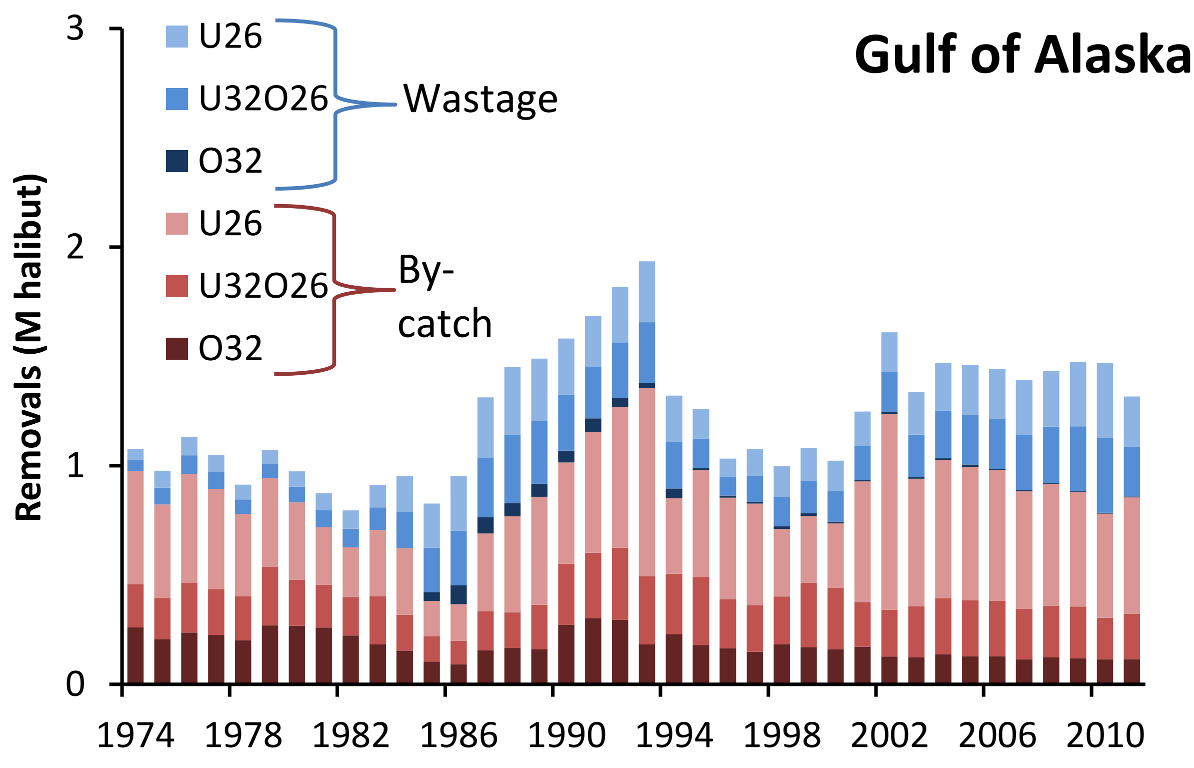

Figure 3-6 Total removals in numbers by size for the Gulf of Alaska, 1935-2011. (Source: IPHC)

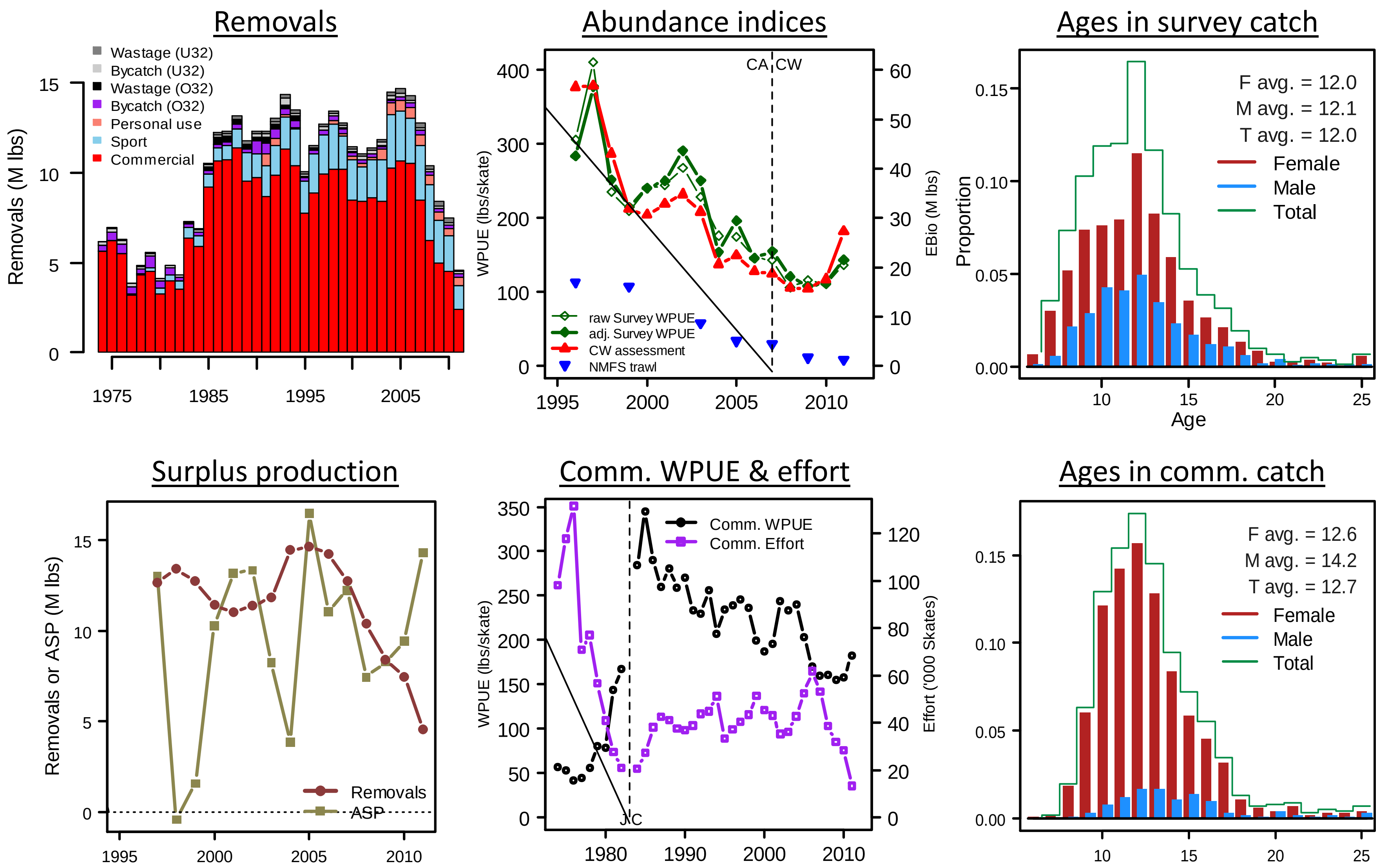

Figure 3-7 Summary of removals, abundance indices, age structures, surplus production, and commercial effort for Area 2C in 2011. (Source: IPHC)

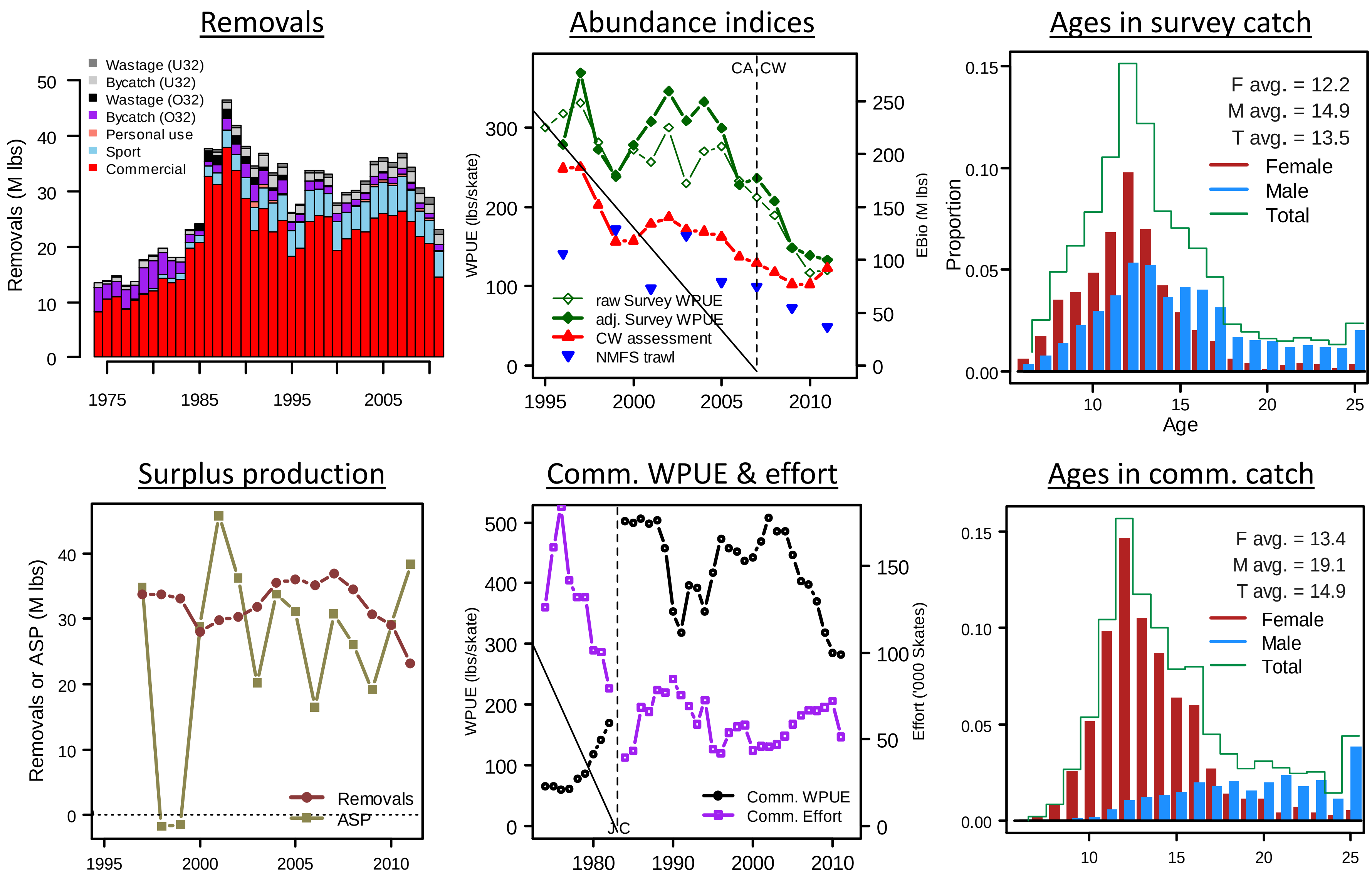

Figure 3-8 **Summary of removals, abundance indices, age structures, surplus production, and commercial effort for Area 3A in 2011. (Source: IPHC)**

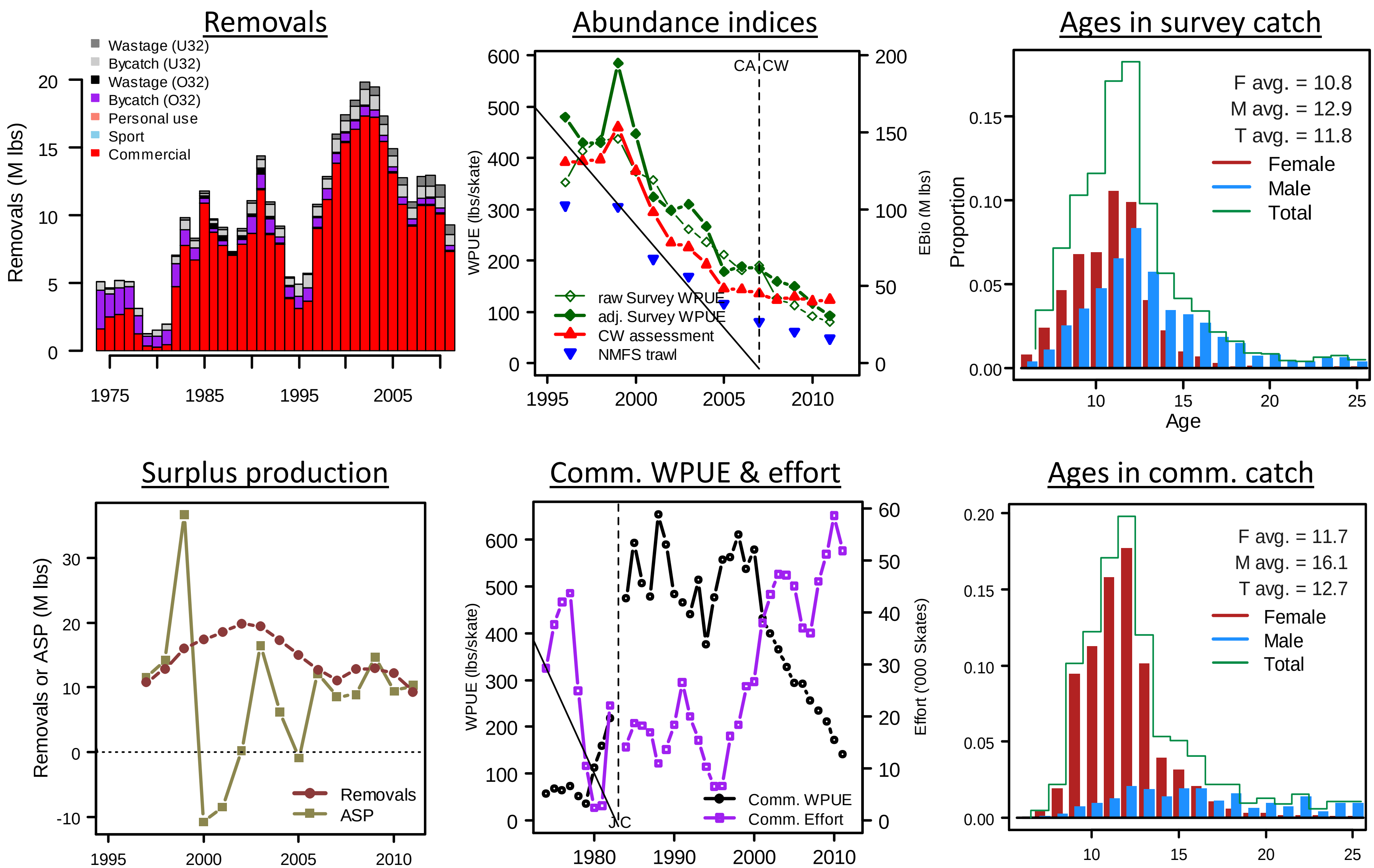

Figure 3-9 **Summary of removals, abundance indices, age structures, surplus production, and commercial effort for Area 3B in 2011. (Source: IPHC)**

TERMINOLOGY

“Bycatch” refers to the mortality of halibut occurring in fisheries targeting other species. The IPHC refers to “bycatch” to describe all sized halibut caught in the commercial fisheries for (hook & line) sablefish and Pacific cod, and (trawl) Pacific cod, pollock, flatfish, and rockfish, (pot) Pacific cod, and minor amounts in (trawl) shrimp and (pot) crab.

“Wastage” describes halibut killed but not landed by the commercial IFQ (hook & line) halibut fisheries, due to lost and abandoned gear, and mortality of released fish. IPHC splits wastage into two components: halibut ≥ 32 inches (O32) killed by lost and abandoned IFQ gear (0.82 in 2010), and the mortality of U32 halibut from lost gear and discards due to the minimum length regulation (3.0 in 2010). Wastage is not included in estimates of “bycatch.”

It is important to distinguish the two types of mortality addressed by the IPHC, as the proposed action ONLY addresses halibut PSC mortality in directed commercial groundfish fisheries (both trawl and hook-and-line). Therefore the focus of the following summary of IPHC source material will be streamlined to consider halibut PSC mortality (with comparisons to wastage mortality where relevant).

While not technically correct because all PSC is discouraged and their release (dead or alive (under mandatory careful release requirements to encourage survival) is required) this analysis continues to use those terms solely in the context of IPHC source material and endeavors to use “PSC” where it is most appropriate in the context of the proposed action. Use of the term “removal” is more appropriate (than catch or bycatch) in the context of prohibited species, except as where

3.2.3.1 Bycatch”[17] [18]

The manner in which mortality from non-target removals (both bycatch in groundfish fisheries and wastage in the IFQ fisheries) has been counted in Pacific halibut management has changed over time from different forms of explicit area-specific quota deductions to the implementation of the current method, which is based on a harvest rate adjustment. During the 1980s, catch limits were adjusted to compensate for lost yield; during the early 1990s compensation focused on lost egg production. Reductions were calculated as a coastwide total and deducted on a regulatory area basis in proportion to the estimated distribution of exploitable biomass.

From the late 1990s until 2011 halibut mortality under (U32) and over (O32) the 32-inch minimum commercial size, were treated differently. O32 mortality was treated the same as other area-specific O32 removals whereas U32 mortality was incorporated in the evaluation of the target harvest rate. At that time, migration modeling of U32 halibut indicated that the impacts of U32 mortality were largely confined to the area where the catch was taken. However, that approach assumed that ontogenetic halibut migration largely ceased by the time halibut became available to commercial gear, an assumption that has been refuted by a recent, extensive IPHC tagging program. In 2011 the IPHC developed a standardized approach to accounting for fish between 26 (O26) and 32 in caught in all types of fisheries (details below).

In 2009, a methodology was developed to estimate yield loss from halibut removals in the non-directed fisheries. These removals, which are unsexed but for which length samples are available, were partitioned into age and sex components and a life history simulation model then allowed an estimate of how much yield was lost to the directed commercial fishery, in units of pound of lost yield per pound of U32 removals. The yield loss ratio in general is around one pound per pound but varies by regulatory area, depending both on the size of the removals when taken as well as the size at age of halibut when taken in the commercial fishery. These calculations did not factor migration into the estimates, which has the effect of “spreading” the lost yield downstream from the area of mortality.

Exploitation rates were well above target level in Area 2 and a disproportionate share of the catches has been taken there.

[17] Source: http://www.iphc.int/papers/Mig_Bycatch_BB2010_web.pdf

[18] The proposed action addresses ONLY removals that the IPHC refers to as “bycatch.” Removals termed “wastage” are not part of proposed action; however, discussion of both is presented here because the Council, AP, and stakeholders have requested a detailed discussion of how the IPHC accounts for these two types of removals. IPHC documents frequently refer to (combined) “bycatch and wastage mortality” (BAWM).

The impact of U32 removals (and wastage) mortalities on lost yield (LY), lost spawning biomass (LSBio), and lost egg production (LE) have been recently revised in light of the improved understanding of halibut migration[14].

The information provided here represents one scenario investigated by IPHC staff and uses a combination of estimated migration rates for different size categories of halibut. Results indicate that total coastwide impacts of U32 mortality on LY, LSBio, and LE are similar with or without accounting for migration. However, area-specific impacts on LY vary by area when accounting for migration. The effect of migration is to decrease impacts of U32 mortality in Area 4 and to increase impacts in other areas, particularly Area 2. Much of the impact of U32 mortality is determined to be in areas outside of where the removals were taken (Figure 3-10), whereas U32 wastage mortality has a more local impact. In contrast, most of the impacts of U32 wastage mortality are estimated to be from local wastage (Figure 3-11). This contrast is attributable to the younger ages of the U32 removals compared to the ages of the U32 wastage (Figure 3-12).

The younger the age of mortality, the more migration and growth will occur before that component would have become available to the commercial halibut fishery downstream and therefore result in yield loss. The expected downstream distribution of yield losses due to U32 mortality is similar to the distribution of exploitable biomass of recent years for most areas. Areas 2A and 2B are estimated to suffer greater yield losses than their current proportion of exploitable biomass (Figure 3-14). Coastwide yield lost for 2011 resulting from the last eight years' U32 mortalities accounts for only 42% of the total 2011 yield loss (Figure 3-15). This is expected since most of the U32 mortality occurs on ages 6 and younger and it takes several years to reach ages that contribute most in terms of yield (ages 12-14). Extending the dataset to 1996 accounts for 87% of the lost yield for 2011 and by including mortality back to 1980, 100% of the lost yield is accounted for. Beyond 1980, cohorts that would have contributed to yield have exited the ages that contribute the most to yield. Varying the assumptions of removals before 1996 has almost no impact on the results for 2011 yield losses.

To put the magnitude of yield loss due to U32 mortality in context, the estimated yield loss due to historical and recent unbalanced harvest rates[19] was also calculated by IPHC staff. The estimated level of lost yield due to recent unbalanced harvest rates, as well as its level relative to the estimated lost yield to PSC removals, varies among areas and level of total CW yield. This comparison assumes that the reported PSC mortality levels are estimated with no error and the migration rates used in the simulation apply. Using Area 2C as an example, there is about 0.8 yield loss due to U32 mortality, compared to the 2009 Area 2C total yield of 7 . The estimated yield loss due to recent unbalanced harvest rates is approximately -9.3 for a scenario with coastwide total yield set to that of 2009 (65.8 , Figure 3-16 top), about 2.9 for a scenario of high coastwide total yield (90 , Figure 3-17 top) and -3.8 for a scenario of low coastwide total yield (30 , Figure 3-18 top). That is, the yield lost due to U32 mortality for Area 2C is approximately 11% of the current yield whereas the yield lost due to unbalanced harvest rates is from -55% to 36% of the current yield depending on the level of total CW total yield (Figure 3-16, Figure 3-17, Figure 3-18 bottom). The IPHC has taken significant action in restructuring area-specific harvest rates over the last several years to address the unbalanced harvest rates.

Previous bycatch-migration modeling indicated that the impact of U32 PSC mortality was largely confined to the area where the removals were taken. The above results indicate considerable impacts of out of area U32 mortality on areas eastward of where the catch occurs. This difference is attributable to the use of different assumptions on halibut migration between the modeling approaches. Current assumptions on migration are based on an improved knowledge from a 2010 PIT tag study. By incorporating migration of older ages, the out of area effects of U32 mortality are determined to be larger than previously reported.

Alternative scenarios result in different downstream/out of area effects of U32 mortality on lost yield, as well as a very different expected distribution of exploitable biomass (Figure) from current conditions, and hence the available yield by area when using the same harvest rate. The relative yield lost to removals in groundfish

[19] The calculation for estimating the lost yield due to unbalanced harvest rates is the difference between area specific current yield and the yield expected using the same harvest rate but a distribution of exploitable biomass resulting from balanced harvest rates among areas.

fisheries and unbalanced harvest rates vary among areas (Figure 3-10 for U32 "bycatch" and Figure 3-11 for U32 wastage (for comparison)) and it is noteworthy that the central portion of the stock would experience lower yields under the alternative biomass distribution. The results highlight the sensitivity of the conclusions on the impacts of halibut removals to the simulated long-term distribution of exploitable biomass. While there may be uncertainty about the earliest estimated distribution of biomass (showing a higher proportion in Area 2), results using migration rates derived from IPHC tagging experiments indicate that the historical distribution remains a relevant reference for the unfished distribution of halibut, as well as the expected distribution of exploitable biomass when using the same harvest rate across areas.

Starting in 2011, the IPHC adopted a standardized process for treatment of removals of U32/O26 halibut. This procedure accounted for direct deductions from Total CEY for all U32/O26 removals, regardless of which sector gave rise to them, with no negative impact on the current spawning biomass per recruit level. While the previous procedure of accounting for this BAWM through harvest rate reduction achieved the same goal, the revised procedure provides more transparent and consistent accounting for this BAWM.

The overall conclusions are that the effect of migration is to decrease the expected impacts of U32 bycatch mortality in Area 4 and to increase the impacts in all other areas. Much of the impact of U32 bycatch mortality is determined to be in areas outside of where the bycatch was taken. Conversely much of the impact of U32 wastage mortality is determined to originate from local U32 wastage. Our results suggest that the yield loss due to the long-term impact of unbalanced harvest rates is larger than the current impact of U32 bycatch mortalities for recent and high coastwide total yield levels. For lower coastwide total yields the relative impact of U32 bycatch mortalities is larger. Current yield losses due to U32 bycatch mortality hinder the achievement of optimizing yield to directed fisheries, irrespective of the distribution of harvest rates among areas and coastwide total yield levels.

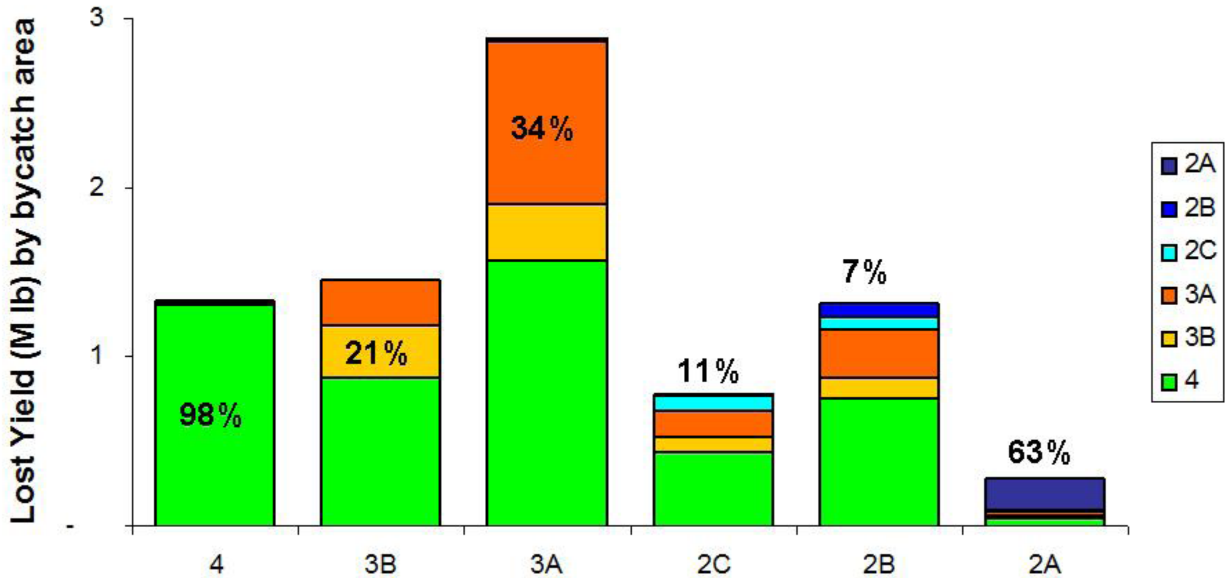

Figure 3-10. Estimated lost yield in millions of pounds in each area due to U32 mortalities. Colors represent the area where U32 mortality occurred and the percentage of local origin is shown.
Source: http://www.iphc.int/papers/Mig_Bycatch_BB2010_web.pdf

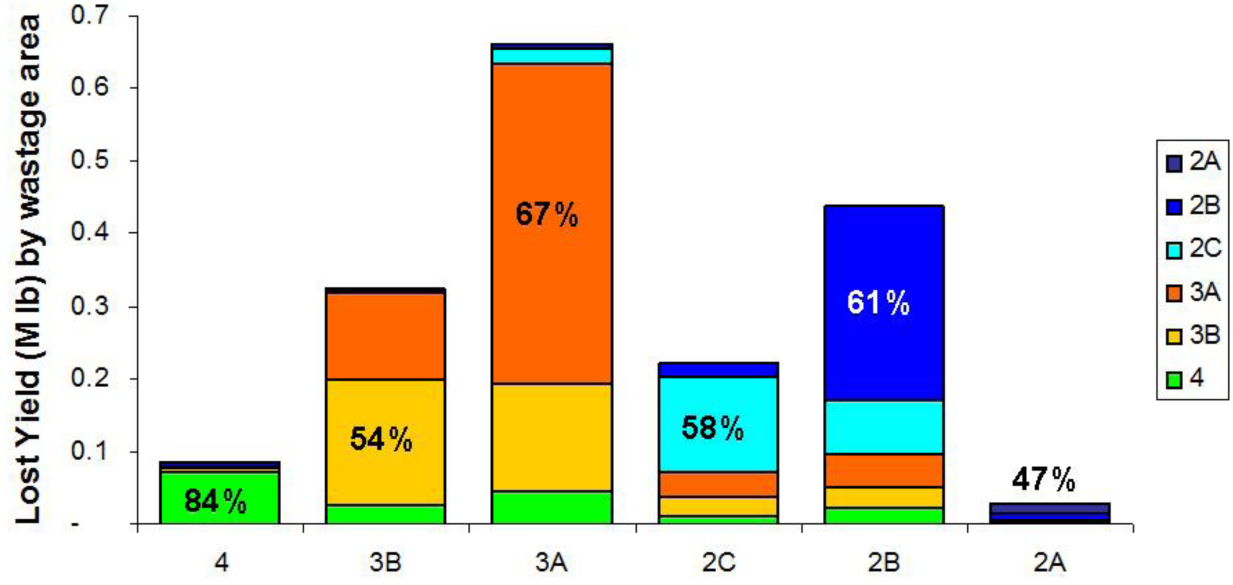

Figure 3-11. Estimated lost yield in millions of pounds in each area due to wastage mortalities. Colors represent the area where U32 mortality occurred and the percentage of local origin is shown. . **Source**: http://www.iphc.int/papers/Mig_Bycatch_BB2010_web.pdf

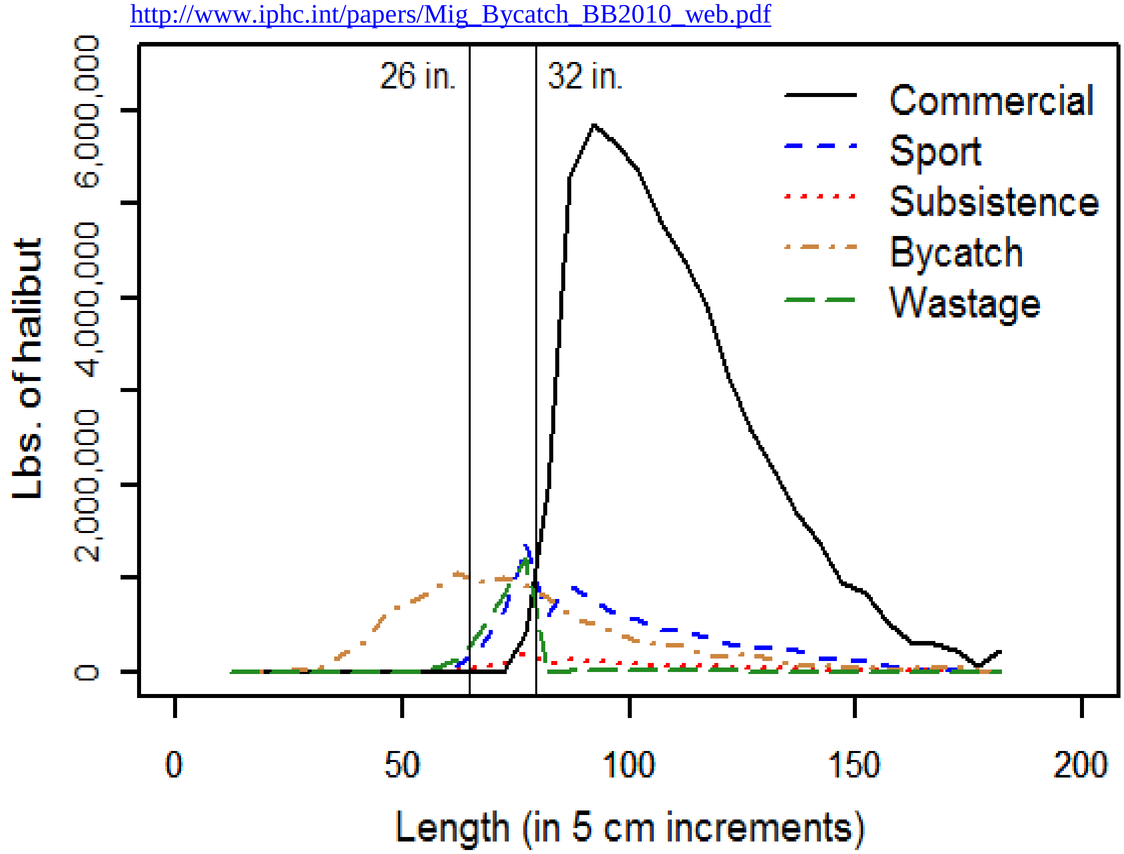

Figure 3-12 Age distributions of bycatch, wastage and commercial catch in pounds. Source:

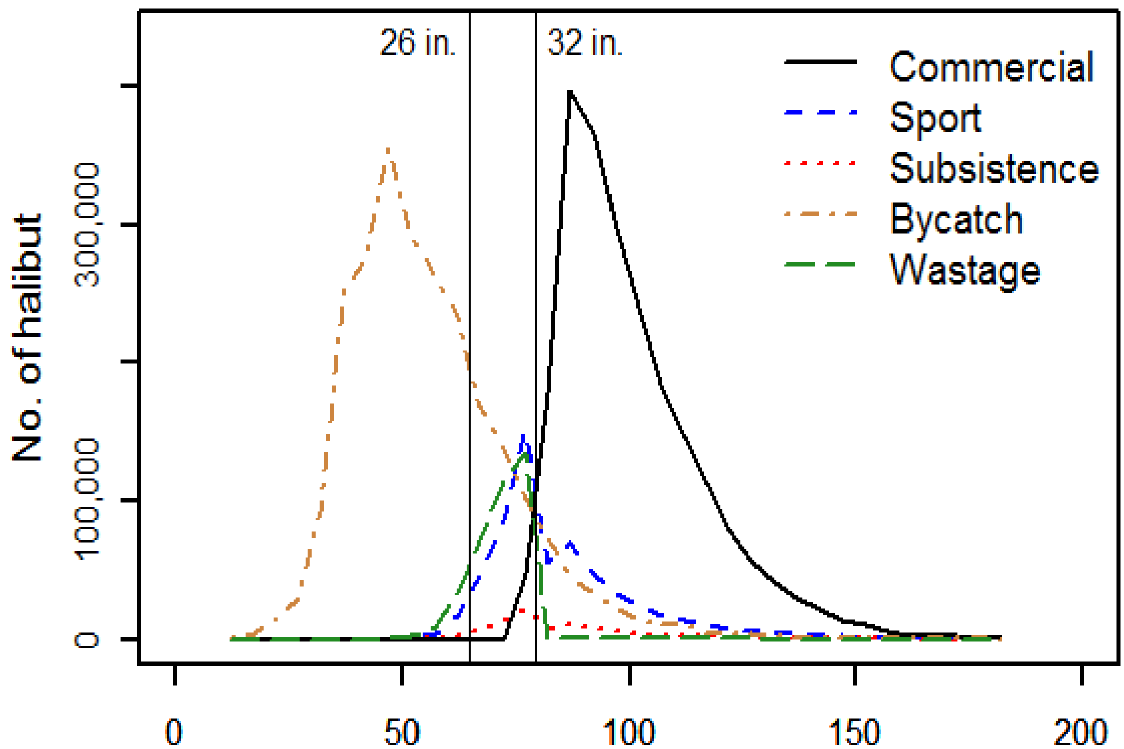

Figure 3-13 Age distributions of bycatch, wastage and commercial catch in numbers. Source:

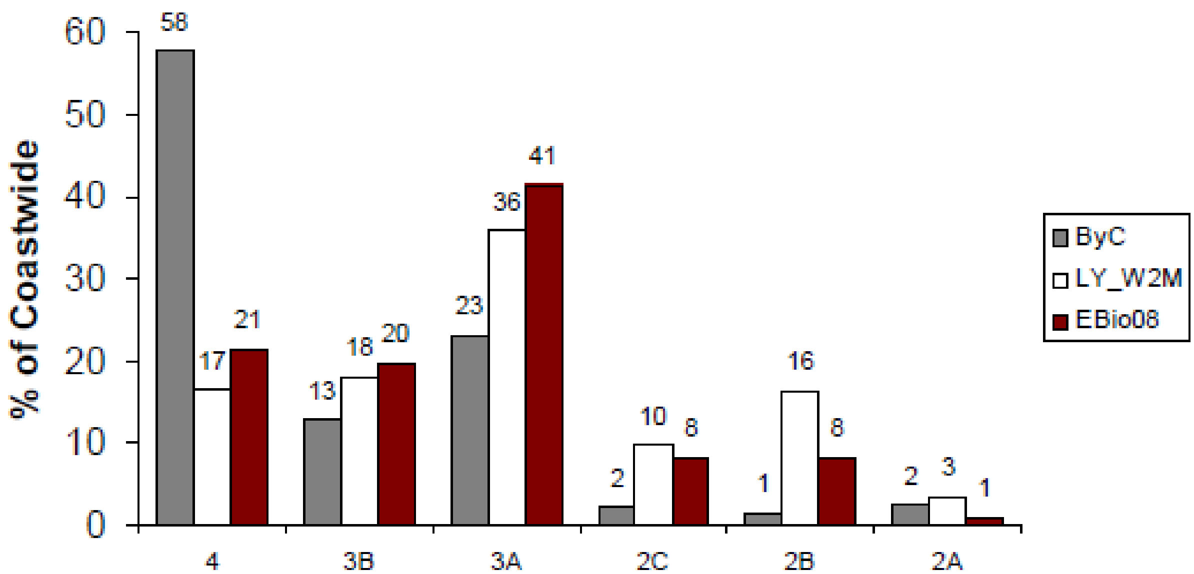

Figure 3-14. Percentage coastwide distribution of U32 mortality ("ByC"), estimated lost yield when accounting for migration according to fish size ("LY_W2M") and exploitable biomass ("EBio08").
Source: http://www.iphc.int/papers/Mig_Bycatch_BB2010_web.pdf

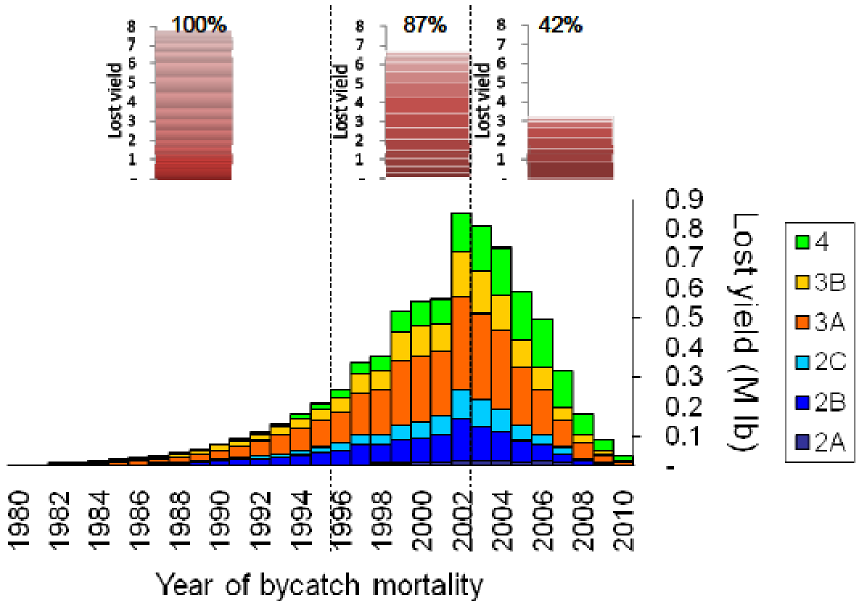

Figure 3-15. Coastwide estimated Lost Yield in 2011 due to U32 mortality by area and year where yield is lost. The stacked bar plots indicate the cumulative percentage for three periods: 2003-2010 (as requested from staff), 1996-2010 (years with data available) and 1980-2010 (assuming bycatch distribution unchanged prior to 1996). Source: http://www.iphc.int/papers/Mig_Bycatch_BB2010_web.pdf

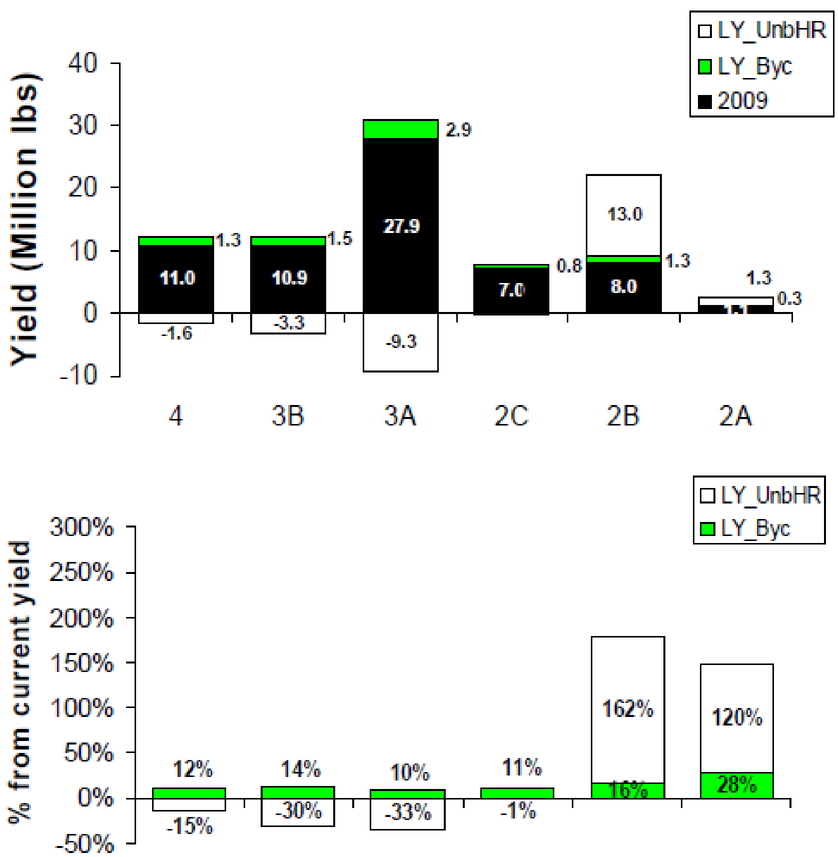

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Figure 3-16. Top: total yield by area for 2009, estimated lost yield due to U32 mortality ("LY_Byc") and estimated lost yield due to recent unbalanced harvest ("LY_UnbHR") assuming a total coastwide yield equal to that of 2009 (65.8). Bottom: estimated percentage change from 2009 total yield for each area due to U32 mortality ("LY_Byc") and recent unbalanced harvest rates ("LY_UnbHR"). Source: http://www.iphc.int/papers/Mig_Bycatch_BB2010_web.pdf

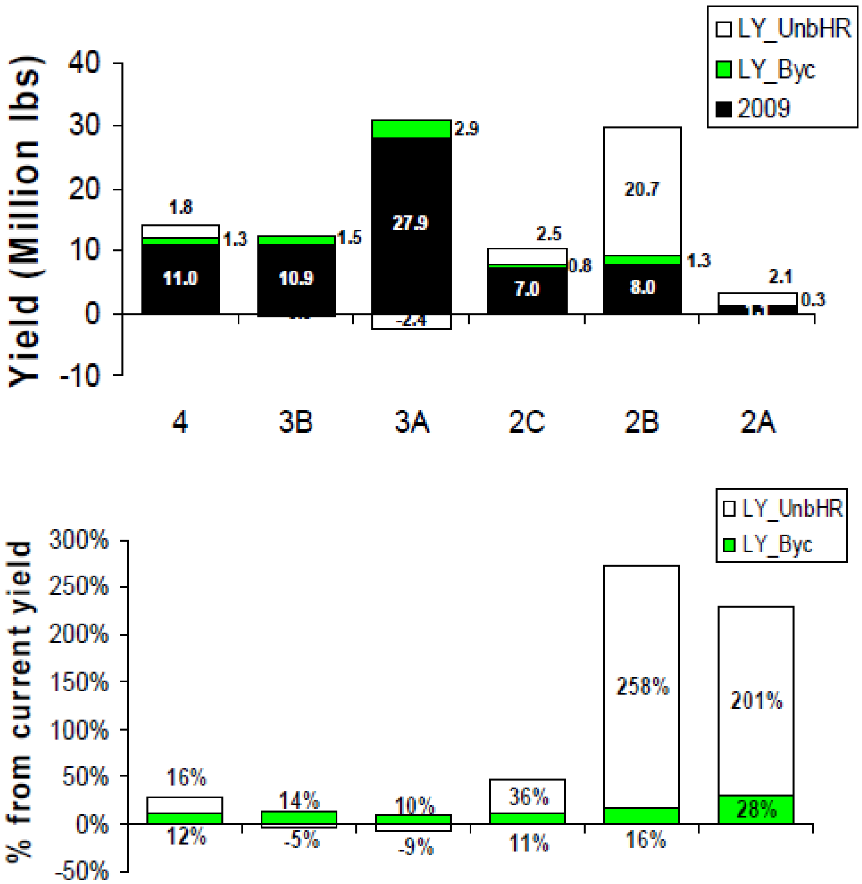


Figure 3-17. **Top: total yield by area for 2009, estimated lost yield due to U32 mortality ("LY_Byc") and estimated lost yield due to recent unbalanced harvest ("LY_UnbHR") assuming a total coastwide yield of 90 . Bottom: estimated percentage change from 2009 total yield for each area due to U32 mortality ("LY_Byc") and recent unbalanced harvest rates ("LY_UnbHR"). Source: http://www.iphc.int/papers/Mig_Bycatch_BB2010_web.pdf**

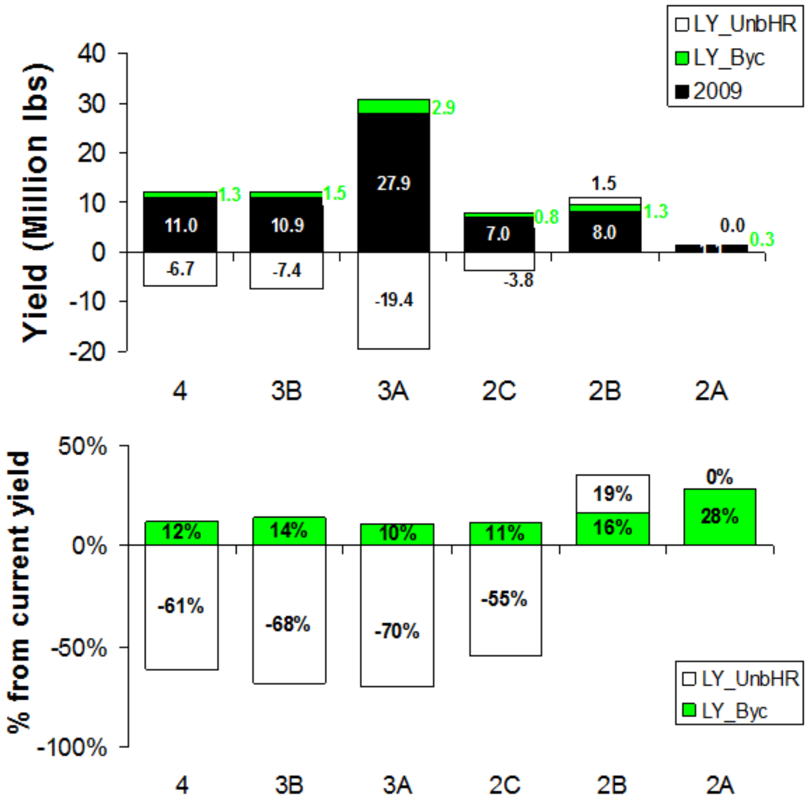


Figure 3-18. Top: total yield by area for 2009, estimated lost yield due to U32 mortality ("LY_Byc") and estimated lost yield due to recent unbalanced harvest ("LY_UnbHR") assuming a total coastwide yield equal to that of 2009 (65.8). Bottom: estimated percentage change from 2009 total yield for each area due to U32 mortality ("LY_Byc") and recent unbalanced harvest rates ("LY_UnbHR"). Source: http://www.iphc.int/papers/Mig_Bycatch_BB2010_web.pdf

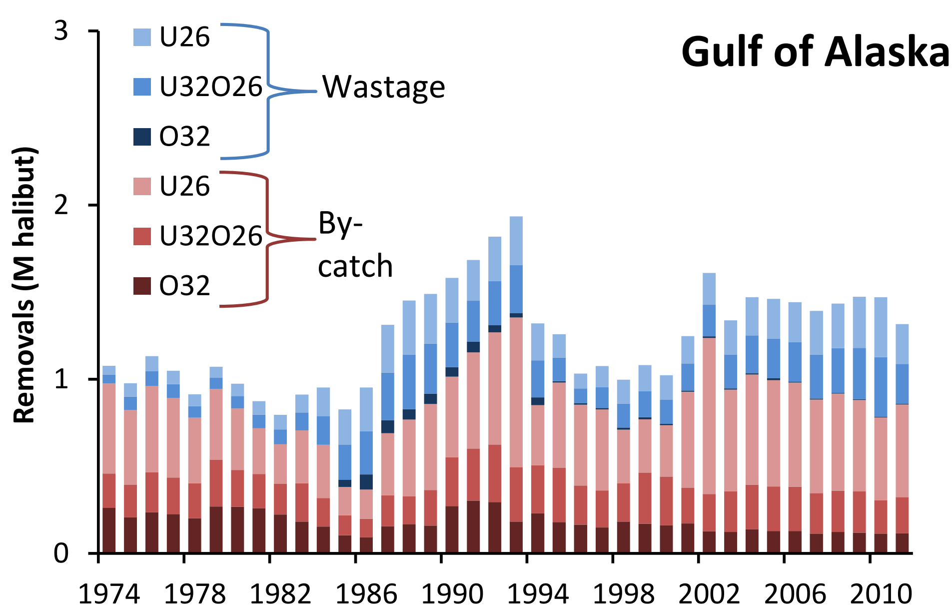
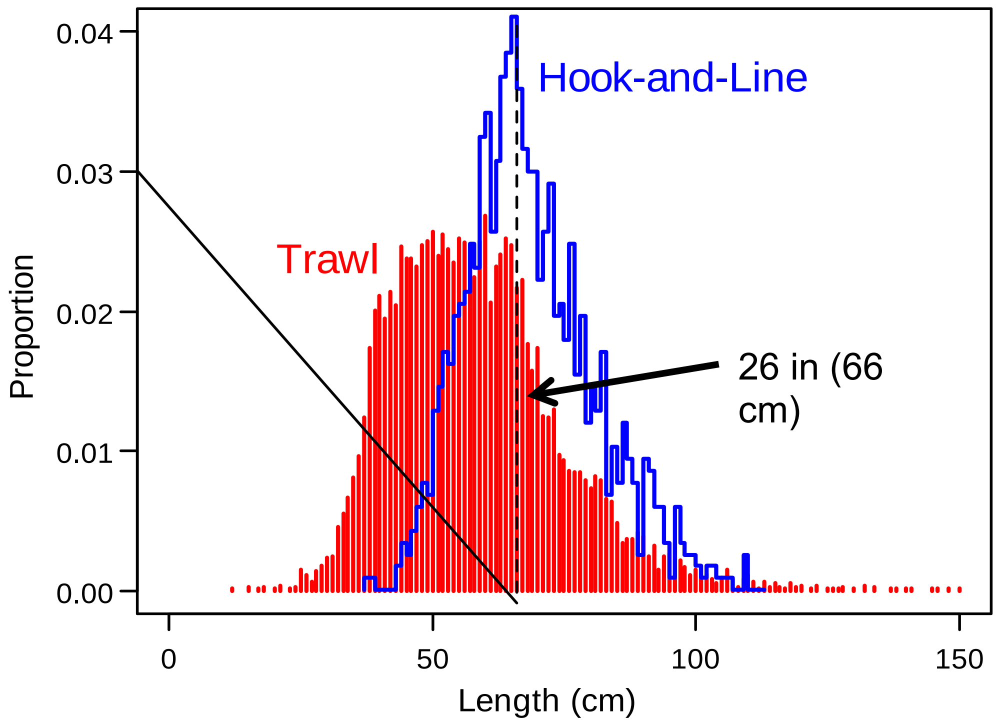


Figure 3-19 Data from NMFS observer-collected data from GOA 2008 trawl and hook-and-line groundfish fisheries shows the size distribution of halibut caught in different gears.



Percent (by number)		Percent (by weight)	
U26	O26	U26	O26
73.5%	26.5%	37.5%	62.5%
46.7%	53.3%	24.8%	75.2%

Figure 3-20 NMFS observer-collected data from GOA 2008 trawl and hook-and-line groundfish fisheries (Source: IPHC)

3.2.4 Resource

3.2.4.1 Harvest Policy[20]

One component of the IPHC harvest policy has been the use of a Slow Up – Fast Down (SUFastD) harvest control rule. This rule, in which 33 percent of increases or 50 percent of reductions in Fishery Constant Exploitation Yield (FCEY) are incorporated in the staff's catch limit recommendations, has been generally applied since 2001. Following the 2006 Center for Independent Expert (CIE) review, the SUFastD adjustment was formally investigated as part of the harvest policy and became official IPHC policy in 2008. The SUFastD was designed to avoid rapid increases or decreases in catch limits, which can arise from a variety of factors including true changes in stock level as well as perceived changes resulting from changes in the assessment model, as well as to apply a more precautionary approach to catch limit setting. The SUFastD approach is estimated to leave approximately 3 percent more stock biomass in the water, over the long term, than a straight FCEY approach to catch limit setting.

Over the past few years, however, as biomass declines have persisted, there has been a growing concern by the IPHC staff about continued use and application of the SUFastD adjustment because some of the current stock conditions were not included in the original evaluation of the SUFastD. The effect of its application on

[20] Source: IPHC

a declining stock is that the target harvest rate is never achieved. Instead, the procedure of taking only 50 percent of the identified reductions in FCEY has meant that the target harvest rate is consistently exceeded and the stock cannot realize the benefits of the harvest policy. The IPHC's adopted catch limits have often resulted in even greater departures from the target harvest rates.

Staff analysis of the effect of using SUFastD, when biomass is declining and when the policy is initiated at a harvest rate that is well above target, shows exaggerated biomass declines and realized harvest rates continuing to be above targets. This is the case for any combination of biological and management processes which results in removals exceeding surplus production. Considering the recent history of the stock, the application of the SUFastD harvest control rule and the subsequent IPHC decisions on catch limits has resulted in a failure to achieve the IPHC's stated harvest policy goals. For 2011, the IPHC staff recommended modifying the SUFastD policy to specify an adherence to the FCEY values for identified reductions in yield, i.e., a Slow Up – Full Down (SUFullD) policy. This means that 100 percent of any identified decreases in yield (i.e., when the current FCEY is lower than the previous year's catch limit) are recommended compared with only 50 percent of identified decreases under a SUFastD policy.

Beginning in 2011 the IPHC replaced the SUFastD catch limit adjustment with a "Slow Up Full Down" adjustment. In brief, the simulations that gave support to SUFastD did not capture the current conditions faced by the stock. Since implementation of the SUFastD adjustment, EBio has been in a constant downward trajectory. As removals have been in excess of 20% of EBio and each subsequent EBio estimate is lower than the previous year's estimate, the target harvest rate can never be met as only 50% of the intended reduction in removals is taken. Additionally, size-at-age of halibut has continued to decline and this always affects performance of the adjustment. Staff Catch Limit Recommendations (CLR) in 2011 were based on a "Slow Up Full Down" adjustment, i.e., one third of potential increases are taken and 100% of decreases are taken, but catch numbers are also present for the standard "Slow Up Fast Down" adjustment as well as an approach that suspends SUFD (i.e., CLR = fishery CEY).

3.2.4.2 Coastwide assessment

Since 2006, the IPHC stock assessment model has been fitted to a coastwide dataset to estimate total exploitable biomass. Coastwide exploitable biomass at the beginning of 2012 is estimated to be 260 M lbs, down from the end of 2010 estimate of 317 M lbs. The model variant chosen for the assessment this year differs from the production version of the past few years. Termed "WobbleSQ" (as opposed to the earlier "Trendless"), its treatment of survey q is the only difference between the two models. The downward revision reflects weaker recruitment of the 1989-1997 cohorts, revised WPUE indices based on late-season data in 2010, and the ongoing retrospective behavior shown in the model. Female spawning biomass is estimated at 319 million pounds at the start of 2012, a decline of nearly 9% over the beginning of 2011 estimate of 350 million pounds. The female spawning biomass shows somewhat lesser retrospective behavior, possibly lending credence to our belief that the ongoing declines in size at age, which strongly affect selectivity-at-age, is one of the root causes of the retrospective behavior. Trawl estimates of abundance are similar to assessment estimates in most areas, and also provide evidence that while exploitable biomass and numbers continue to decline, the total biomass and number of halibut remains level, or slightly increasing. The coastwide exploitable biomass was apportioned among regulatory areas in accordance with survey estimates of relative abundance, modified by adjustments for hook competition and survey timing. Weighting of the survey indices follows a Kalman filter analysis, resulting in weights of 75:20:5 for the last three years.

The IPHC has developed, refined, and utilized a constant harvest rate policy since the 1980's. Stated succinctly, the policy is to harvest 20% of the coastwide exploitable biomass when the spawning biomass is estimated to be above 30% of the unfished level. The harvest rate is linearly decreased towards a rate of zero as the spawning biomass approaches 20% of the unfished level. This combination of harvest rate and precautionary levels of biomass protection have, in simulation studies, provided a large fraction of maximum available yield while minimizing risk to the spawning biomass. Since the early 2000s, and similar to many fisheries management agencies, the harvest policy has incorporated a measure designed to avoid rapid increases or decreases in catch limits, which can arise from a variety of factors including true changes in stock level as well as perceived changes resulting from changes in the assessment model. The SUFastD adjustment is based on a target harvest rate but the realized rate usually a bit different (Figure 3-21). The SUFastD approach is somewhat different from similar phased-change policies of other agencies in that it is asymmetric around the target value, i.e., the catch limit responds more strongly to estimated decreases in biomass than to estimated increases. This occurs for two reasons: first, the assessment generally has a better information base for estimating decreasing biomass compared with increasing biomass; and second, such an asymmetric policy follows the Precautionary Approach.

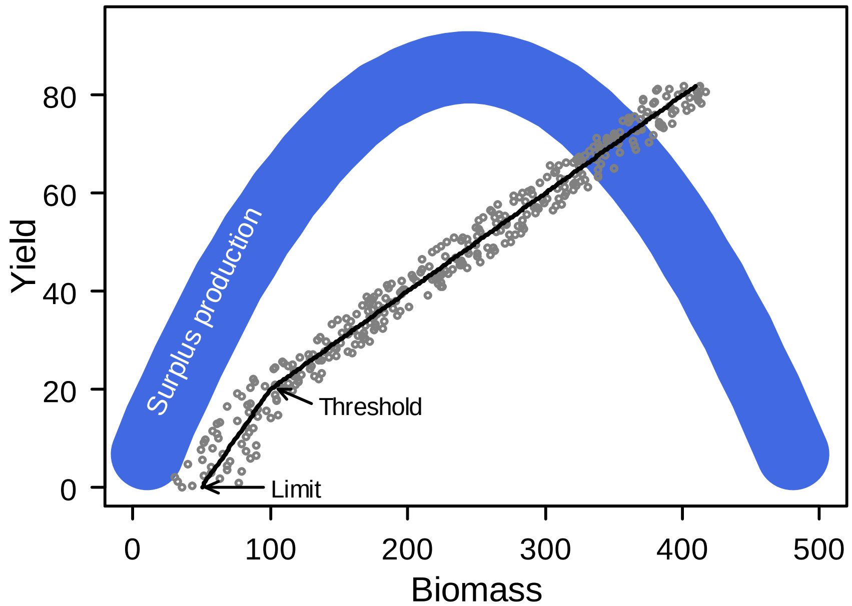


Figure 3-21 Representation of the IPHC harvest policy. The background curve illustrates theoretical relationship between biomass and surplus production, taken as yield. The slope of the straight line is a 20% harvest rate, and the harvest rate decreases linearly to zero as the biomass approaches established reference points, termed the female spawning biomass threshold and limit. The scatter about the harvest rate indicates the effect of the "Slow Up Fast Down" adjustment to catch limits in terms of realized harvest rate. (Source: IPHC)

The unfished female spawning biomass ($B_{unfished}$) is computed by multiplying spawning biomass per recruit (SBR, from an unproductive regime) and average coastwide age-six recruitment (from an unproductive regime). The recruitment scaling uses the ratio of high to low recruitments based on long term recruitment estimates from Areas 2B, 2C and 3A and applied to the current coastwide average recruitment (Clark and Hare 2006) which we believe to represent a productive regime. The SBR value, computed from Area 2B/2C/3A size at age data from the 1960s and 1970s is 118.5 lbs per age-six recruit. Average coastwide recruitment for the 1990-2002 year classes (computed at age-six) is 20.39 million, and the estimate of unproductive regime average recruitment is 6.48 million recruits. This gives a $B_{unfished}$ of 768 million pounds, a B_{20} of 154 million, a B_{30} of 230 million pounds, and the 2012 female spawning biomass value of 319 million pounds establishes $B_{current}$ as 42% of $B_{unfished}$ (Figure 3-22, left panel) down slightly from the 2011 beginning of year estimate of $B_{current}$ of 43%. The revised trajectory of SBio suggests that the female spawning biomass did drop below the B_{30} level between 2006 and 2009, which, had it been so estimated at the time, would have triggered a reduction in the harvest rate. On an annually estimated basis, however, the initially estimated stock size has not been that low; it is only retrospectively that the revised estimate of spawning biomass is estimated to have gone below to the reference point threshold. One problem with this method of establishing reference points is that the threshold and limit are dynamic, changing each year as the estimate of average recruitment changes.

In addition to monitoring the status of the female spawning biomass relative to reference points, success at achieving the harvest rate is also documented (Figure 3-22, right panel). The target harvest rate over the past decade for halibut has generally been 0.20. Exceptions include a briefly increased rate to 0.225 and 0.25 between 2004 and 2006, and a lowered rate of 0.15 in Areas 3B and 4. In 2011, the target harvest rates were

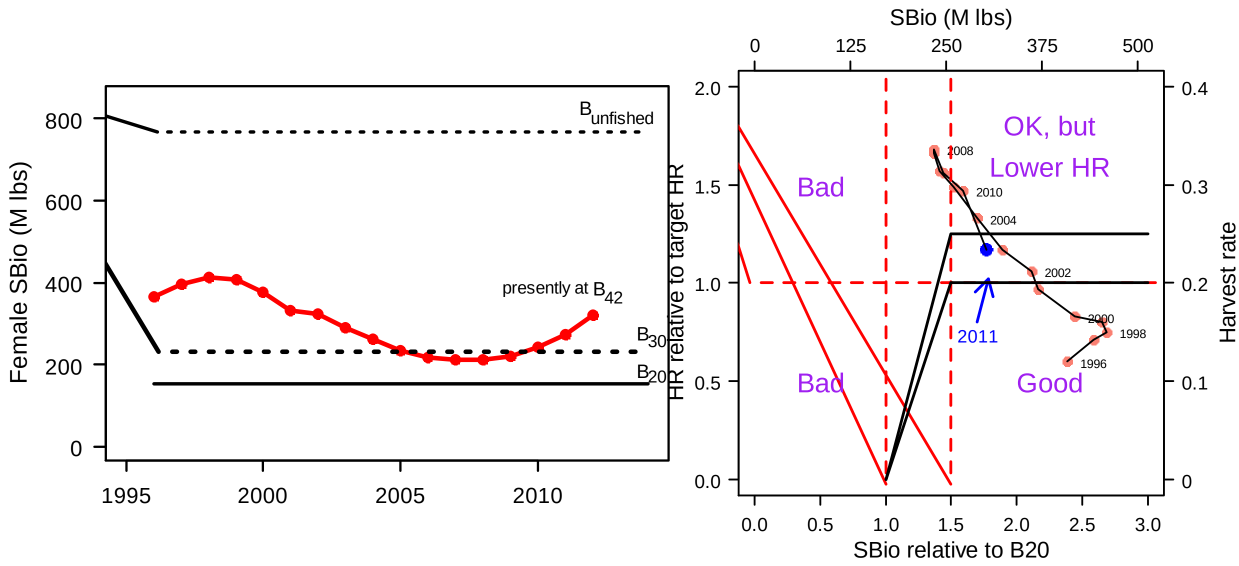


Figure 3-22 Pacific halibut stock report cards for 2011 (Source: IPHC)

set at 0.215 (Areas 2 and 3A) and 0.161 (Areas 3B and 4); however, it is important to note that these were not actual target harvest rate increases. These new rates reflected a change in the method by which O26U32 bycatch and wastage are accounted for in determining fishery CEY (Hare 2011a). On a coastwide basis, however, recent realized harvest rates have hovered around 0.25 (Figure 3-23). A sizable portion of this above-target harvest rate comes from the retrospective revision of exploitable biomass estimates. Thus, while the intended rate has been around 0.20, with staff recommended catch limits based on such a rate, a retrospective downwards revision of early exploitable biomass estimates, when combined with unchanged estimates of total removals generates higher realized harvest rates (Valero 2012b).

Estimates of realized harvest rate among individual regulatory areas require use of an apportionment method to calculate the underlying exploitable biomass. The apportionment method used by the staff uses survey timing and hook competition adjustments to the (0-400 fm) bottom area-weighted survey WPUE, which are then time-averaged using Kalman weights (discussed below) for apportionment purposes. The adjusted and Kalman-weighted WPUE time series is used in most of our data comparisons, e.g., WPUE trends over time, comparisons with trawl estimates of abundance, etc. The adjusted and Kalman-weighted survey WPUEs are used to apportion biomass to estimate recent realized harvest rates (described below). Realized harvest rates (Figure 3-23) tend to increase from west (below or at the target harvest rate during the last decade) to east (up to three times above target for a number of years during the last decade in Areas 2B and 2C) though the eastern area realized harvest rates have declined sharply towards the target harvest rate during the last few years, in part due to lower catch limits. Also, until last year, another portion of the above-target performance resulted from the SUFD adjustment which prevented catch limits dropping fully to the target level indicated by contemporary estimates of exploitable biomass, in those areas where declines in catch limits were proposed.

The time series of abundance shown in Figure 3-24 illustrates the strength of the celebrated 1987, and to a lesser extent 1988, year classes. As was the case year, the current assessment indicates that three large year classes – 1998, 1999, and 2000 – have entered the exploitable biomass and should be the largest contributors to the EBio and catch over the next few years. Presently, all three year classes are estimated to be larger – in terms of numbers – than the 1987 and 1988 year classes but their strength is not well determined and retrospective downward revisions of initial estimates are common to this class of models. However, size at age is much smaller now than it was 20 years ago. This has two important ramifications – first it means that the three strong year classes are only just beginning to reach the exploitable size range and, therefore, their true numbers in the population are still quite uncertain. Second, it also means that for a given number of halibut, their collective biomass will be far smaller than the 1987 and 1988 year classes (Figure 3-24, right panel). Currently, a large fraction of males never reach the minimum size limit and thus never enter the

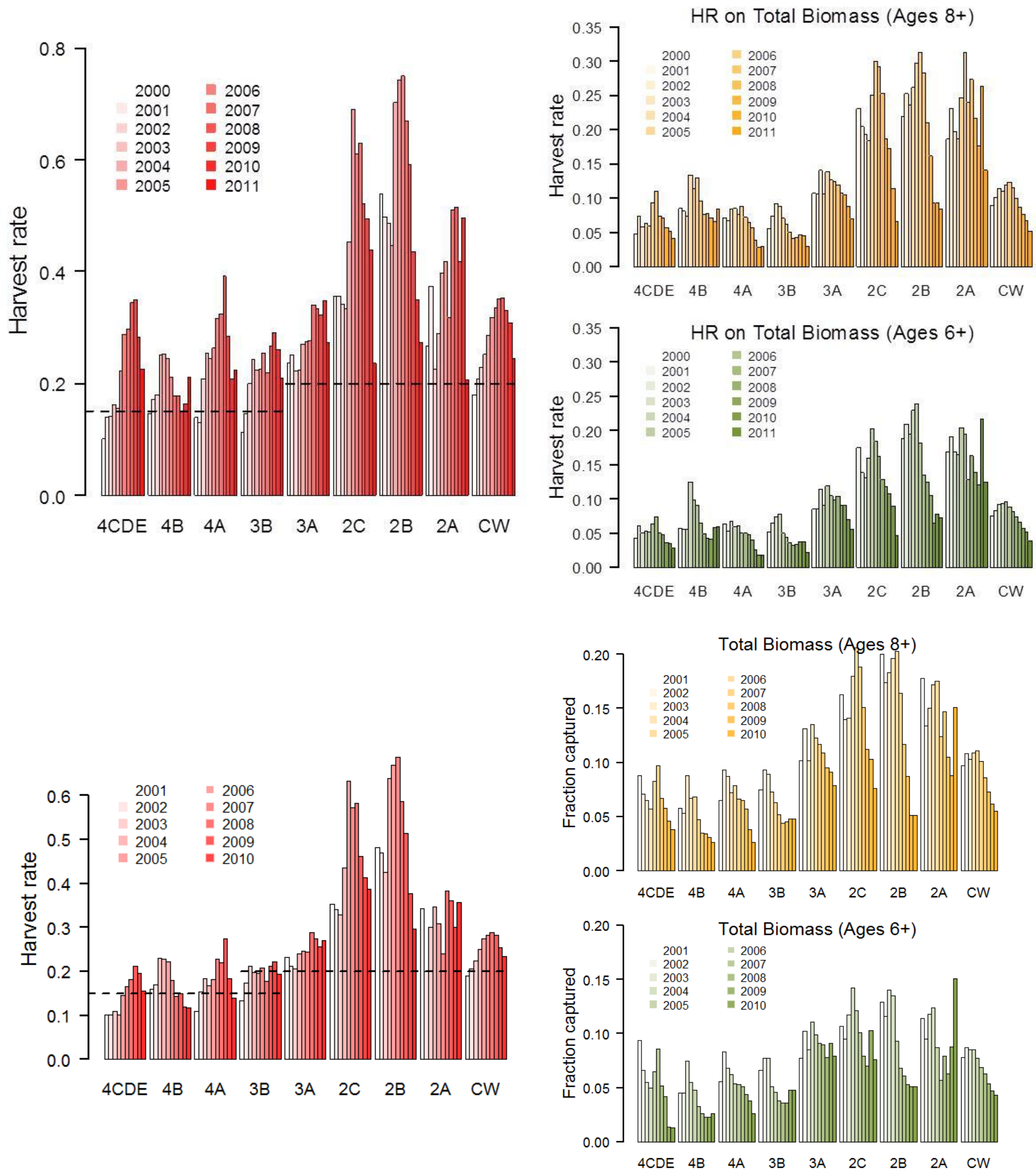


Figure 3-23 Harvest rates of halibut by area, 2001 - 2011 (Source: IPHC)

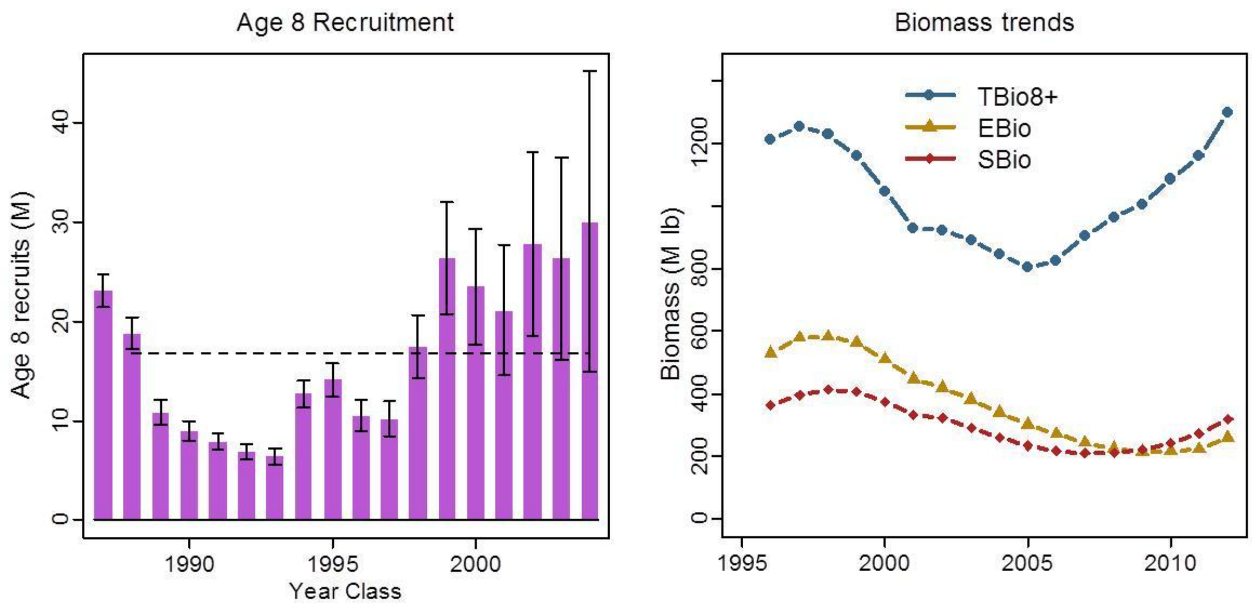
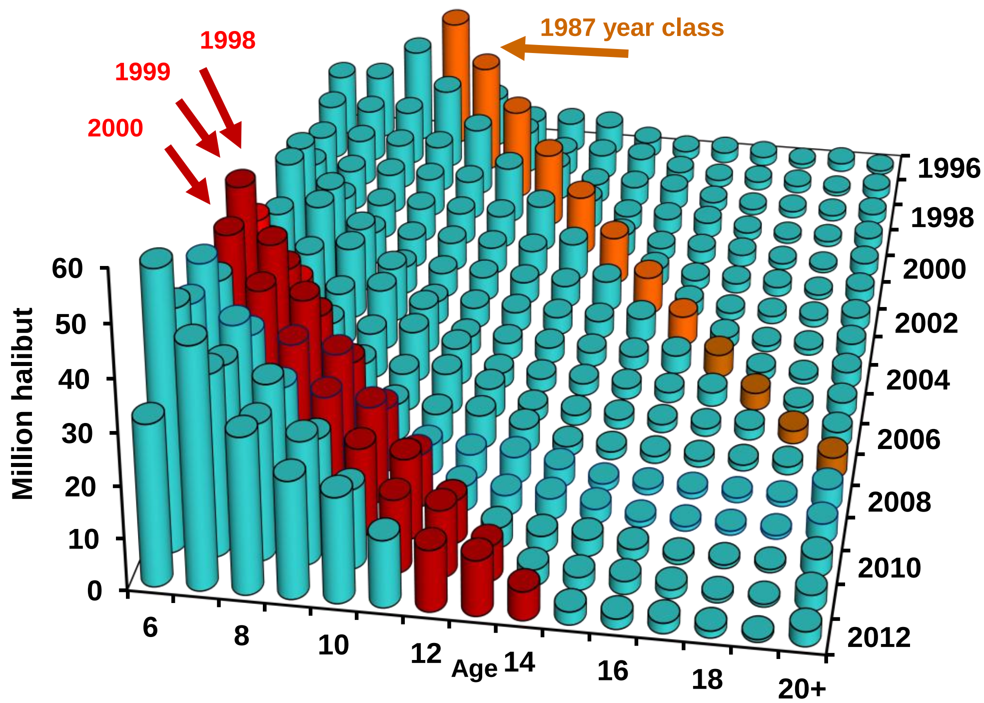


Figure 3-24 Recruitment and biomass estimated trends from 2011 IPHC stock assessment (Source: IPHC)

exploitable biomass. It remains to be seen just how these year classes will develop into the exploitable component of the stock.

The estimated age composition of the coastwide spawning biomass shows a broad range of ages including 4% females age 20 and older (Figure 3-25). While the age distribution is certainly truncated due to the size-selective effects of fishing, it is encouraging that production of eggs is not confined to a narrow range of ages and should ensure that adequate reproductive potential remains in the ocean for the foreseeable future. On an area-by-area basis, there are some departures from this pattern, particularly in Areas 2 and 3B which show a lower percentage of older females.

a) **Total numbers in the population**



b) **Exploitable biomass in the population**

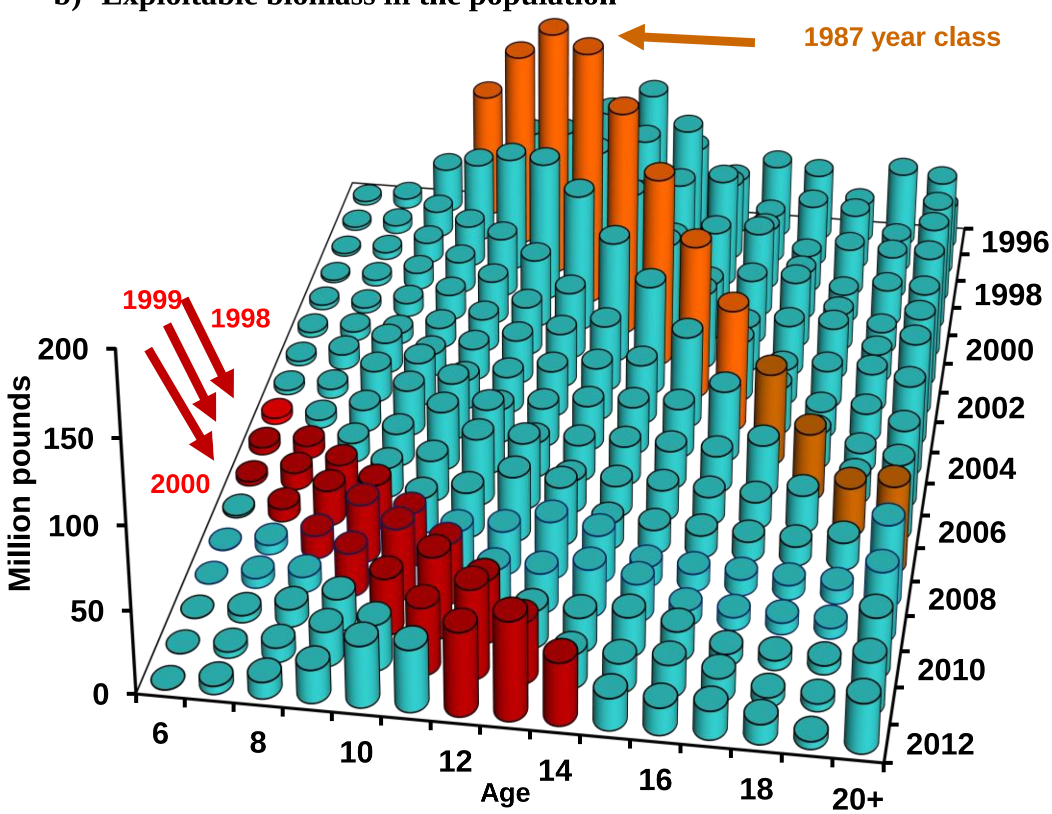


Figure 3-25 Coastwide population estimates in total numbers of halibut (panel a) and as EBio (panel b). Several large year classes are highlighted. (Source: IPHC)

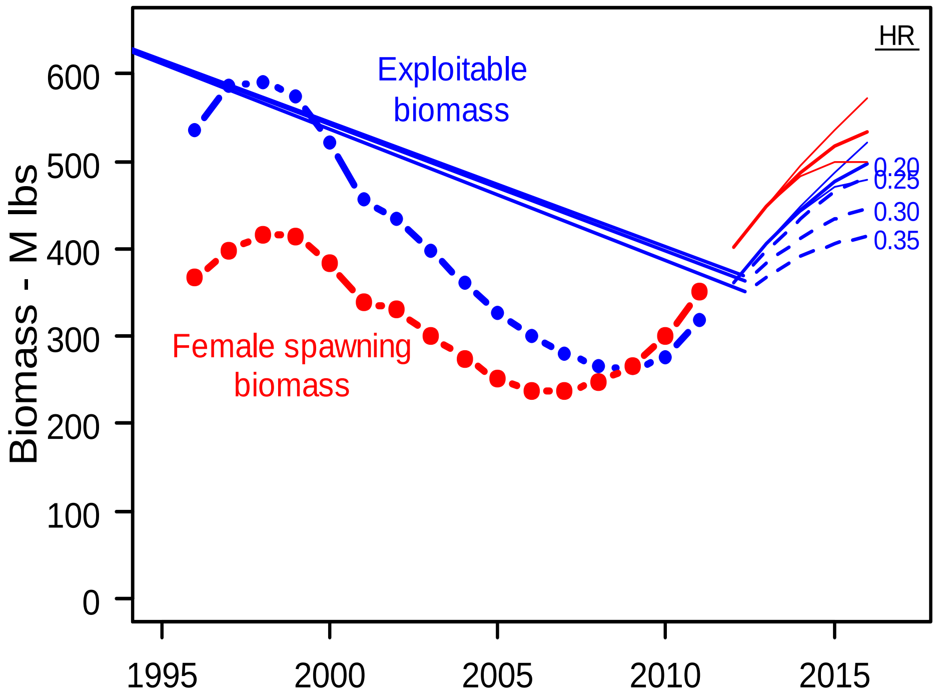


Figure 3-26 Coastwide halibut Ebio projections (Source: IPHC)

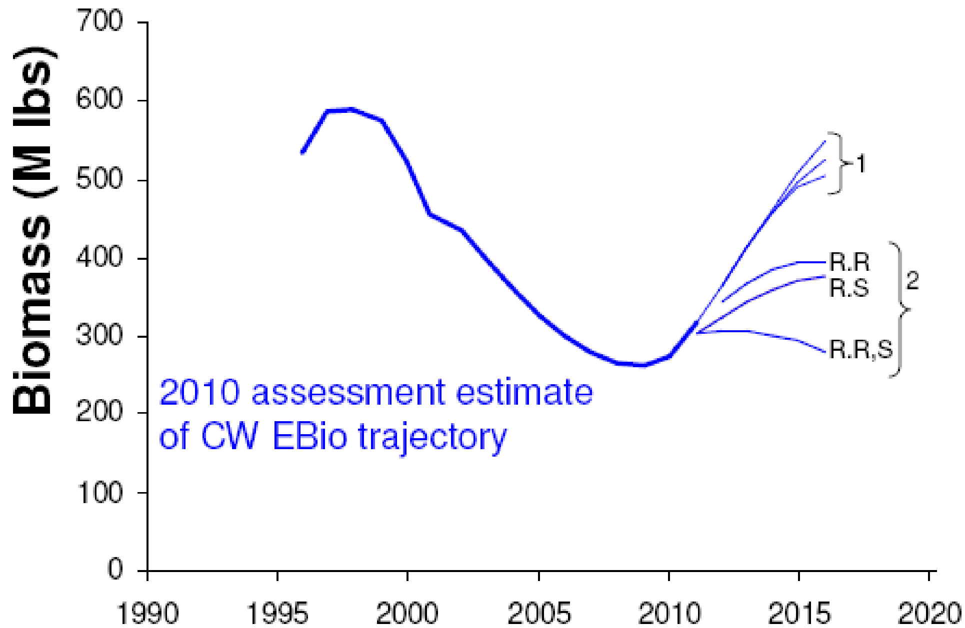


Figure 3-27 Coastwide halibut Ebio projections using alternative methods and assumptions. 1: Status quo method shown in Figure 3-20. 2: Downwards revisions of past recruitment estimates (R.R), reduced size at age (R.S) and both (R.R.S). These projections assume no uncertainty on 2011 initial numbers and a harvest rate of 0.2. Source: http://www.iphc.int/meetings/2011am/AltProjections_Juan_v4_web.pdf

3.2.4.3 Survey Weight Per Unit Effort Adjustments[21]

3.2.4.3.1 Hook competition (catchability)

The IPHC setline assessment survey extends from Oregon northward to British Columbia and west to the BS and out the AI chain. The survey catch of halibut is reduced by the number of baits taken by other species and regional differences in the strength of this effect would result in differences in survey catchability among areas. To determine the level of hook competition the fraction of baits returned on the survey in each regulatory area is used to compute an adjustment factor to the WPUE indices. If a smaller than average proportion of baits are returned, an area's WPUE index is adjusted upwards because higher competition for baits in that area would have had a negative effective on the halibut catch and therefore on that area's WPUE. Conversely, an area with more than the average rate of baits returned will have its WPUE index adjusted downwards. Calculation of the hook adjustment is done in the same manner each year, using the results from that year's survey.

3.2.4.3.2 Effect of survey timing

The amount of commercial catch taken prior to the IPHC setline survey varies with both regulatory area and time. It is plausible that survey WPUE is affected by the proportion of removals taken prior to the survey, as exploitable biomass is decreased by commercial and sport fishing and other forms of removals, leaving fewer fish for the survey to catch. In areas where removals are greater early in the season, survey WPUE could be expected to be lower on average than in areas where removals are spread evenly across the fishing season. Concern about the effect of commercial catch on survey WPUE is high in Area 2A, where typically over 80 percent of the catch is taken prior to the mean survey date, much higher than all other areas.

The IPHC staff's approach is to estimate what WPUE would have been for each area had 50 percent of removals been taken prior to the mean date of the setline survey in that area. Thus, for removals greater than 50 percent, survey WPUE is adjusted upwards; for removals less than 50 percent, survey WPUE is adjusted downwards.

3.2.4.3.3 Survey WPUE weighting

With the advent of the coastwide assessment approach, the IPHC has used the most recent three years' setline survey index values to apportion the estimated biomass among regulatory areas. The initial methodology employed an equal weighting of the three most recent years but the IPHC staff sought to develop a more statistically defensible approach.

Survey catch rates are more variable than commercial catch rates, for a number of reasons that may be unrelated to underlying stock abundance. While the surveys are spatially extensive, this variance is an inevitable consequence of the limited period in the year over which the surveys are conducted. To provide some stability to the mean catch rate index and make it less susceptible to sampling variance, the survey index can be, and has been for the past several years, averaged over the most recent three years in the data set. In 2010, the IPHC followed a staff recommendation to continue with a three-year simple average of adjusted survey WPUE until the staff completed a proper statistical analysis of the survey data, to determine a time-averaging procedure which is appropriate for these data. That analysis (Webster 2011), which examined several methods for weighting of survey WPUE over recent years, used a Kalman filter approach to develop a reverse-weighting procedure for survey data, wherein more recent data receives greater weight than older data. The weighting scheme adopted for 2011 used a 75:20:5 ratio for averaging the past three years' data, with the most recent year receiving the highest weight.

3.2.5 Commercial Halibut IFQ Hook-and-Line Fishery

Commercial fishing for Pacific halibut began in the late 1880s with the movement of the Atlantic halibut fleet to the Pacific to pursue the large stocks found along the coast of Washington and Vancouver Island.

[21]The following subsections include a March 2011 response from IPHC staff to a December 2010 Council request for information on recent changes in stock assessment methods, harvest policies, and catch limit setting. http://www.alaskafisheries.noaa.gov/npfmc/current_issues/halibut_issues/IPHC_PSCdiscpaper311.pdf

From a small fishery off Cape Flattery, WA and the southern end of Vancouver Island, B.C., it expanded rapidly in protected inside waters, and by 1910, extended some 700 miles northward to Cape Spencer in southeastern Alaska. Since the late 1950s, annual coastwide commercial removals ranged from about 20 (mid 1970s) to about 75 (late 1980s and early 2000s).

The Pacific halibut longline fishery was one of the first fully domestic fisheries to become established off Alaska. By 1990, the halibut and sablefish longline fisheries were exhibiting significant problems created by open access derby-style fisheries. With the constant influx of new entrants into the fishery, the fishing seasons had been reduced to several short seasons each year, with halibut seasons lasting only a day or two in some areas. The short seasons created a number of problems, including allocation conflicts, gear conflicts, dead loss from lost gear, increased halibut removals in non-directed fisheries and discard mortality, excess harvesting capacity, decrease in product wholesomeness, safety concerns, and economic instability in the fisheries and fishing communities.

The Council allocates Pacific halibut in Areas 2C, 3A, 3B (and Area 4) based on catch limits set by the IPHC. The Council adopted IFQ programs in 1992 for the Pacific halibut fixed gear fisheries, which were implemented in 1995. The IFQ system was put into place to end the "race for fish" caused by too many boats fishing during restricted seasons of a few days. The IFQ system has resulted in longer seasons, improved vessel safety, and fresh halibut being available about 8 months per year. The IFQ programs assign the privilege of harvesting a percentage of the sablefish and halibut quotas to specific individuals with a history of harvest in the fisheries. The fishing privileges assigned to each person are proportional to their fixed gear halibut and sablefish landings during the qualifying period and are represented as quota shares (QS). Only persons holding QS are allowed to make fixed gear landings of halibut and sablefish in the regulatory areas identified on the permits.

General Description of the IFQ Program As described in the 2011 NMFS Report to the Fleet[22], eligible persons under the IFQ Program were issued QS based on halibut and sablefish landings made aboard vessels that they owned or leased during 1988, 1989, or 1990. Applications for initial issuance of QS were received and processed by RAM. The application deadline was July 1994, and most applications were received in 1994. Issuance of QS to eligible applicants began in November of 1994.

To determine how many pounds of fish a QS holder may harvest during each year's fishing season (i.e., the person's annual IFQ), RAM first establishes the QS Pool (QSP) for each species and each regulatory area combination. There are eight halibut regulatory areas and six sablefish regulatory areas. The QSP is the sum of all the QS units that have been issued in a given area for each species. RAM calculates the QSP annually (on or about January 31), which may vary slightly from year to year due to administrative adjustments and civil penalties.

After fisheries managers determine what the annual Total Allowable Catch (TAC) will be, each QS holder's QS for the area is divided by that area's QSP and the resulting fraction is then multiplied by the area "IFQ TAC." This equation yields the number of pounds of IFQ that a QS holder may harvest that year, before adjustments for the previous year's fishing activity. Put simply, the above explanation can be expressed in this equation: $QS \div QSP \times TAC = IFQ$

The effect of implementation of the halibut and sablefish IFQ programs in 1995 was an immediate reduction in halibut PSC allowances to the hook-and-line sector of 400 mt, or 882,000 lb, each year. Instead of being caught and potentially discarded, these catches are retained using IFQs.

Note that although a person's QS remains the same, and the QSP may vary by a slight amount from year to year, the TAC may change significantly annually, depending on the condition of the stocks. As the TAC rises, so does each person's IFQ; as it declines, each person's IFQ likewise decreases.

[22] http://alaskafisheries.noaa.gov/ram/ifq/rtf11.pdf

In this manner, the total annual TAC is divided up; those to whom IFQ permits have been issued may then harvest their allocation at any time during the eight plus-month IFQ halibut and sablefish seasons. Those who do not hold QS are generally excluded from the fisheries, although the program contains several very limited provisions for "leasing" IFQ. Administrative actions provide for some limited adjustments to annual IFQ permit amounts resulting from underages or overages of IFQ the prior year; however, significant fishing in excess of an IFQ permit is a violation.

Other Significant Program Elements As noted above, the Council took steps to insure that QS would not eventually be consolidated into a very few hands. To accomplish this goal, strict limits on how much QS can be held by any person are imposed on QS holders (persons who received more than the "cap" by initial issuance were "grandfathered" in; however, they may not receive more QS by transfer). Caps on vessel use ensure continued participation by at least a minimum number of vessels. Catcher vessel QS categories help maintain the size stratification of the fleet. Refer to Section 1 in this report for a breakdown of the annual QS use and vessel IFQ caps.

In addition to the caps, the Council has provided for QS blocking provisions. Under this program element, QS that originally yielded less than 20,000 pounds of IFQ (using the 1994 QSPs and TACs) was issued as a block, and such blocks may not be subdivided upon transfer. Further, there is a limit on the number of blocks a person may hold for the same species in any regulatory area. In this way, smaller amounts (blocks) of QS will always be available for those who wish to enter the fishery by acquiring QS by transfer. Very small blocks may be "swept up" to result in one larger block up to a maximum size specified for each area. This promotes usefulness of small blocks otherwise uneconomic to fish.

To meet the goal of an owner-operated fleet, upon change of a QS-holding business, catcher vessel QS must be transferred only to individuals who must be aboard the vessel when the fish are harvested and landed. In recognition of historical fishing practices, initial recipients may hire skippers (with some exceptions) to fish their annual IFQ. Currently, the QS holder must demonstrate that she or he holds at least a 20 percent ownership interest in the vessel on which the IFQ is to be fished.

Leasing of catcher vessel IFQ is extremely limited. A Community Purchase Program allows authorized GOA communities to form nonprofit organizations that acquire and hold QS for use by community residents. A special "surviving heir" provision allows an immediate family member to receive QS on the death of an individual holder and to lease out the IFQ for three years. A medical transfer provision allows persons temporarily incapacitated to lease IFQ. Finally, members of the National Guard and military reserves who are mobilized to active duty may temporarily transfer their annual halibut and sable-fish IFQ to other eligible IFQ recipients.

Quota share and the annual IFQ that it yields are classified by species, regulatory area, vessel category, and whether it may be fished on a vessel in another size category ("fish up" or "fish down"). A variety of restrictions regarding harvesting, processing IFQ and non-IFQ species, landing, and reporting IFQ fish are also in place.

The commercial longline fishery accounts for the majority of halibut removals. Annual commercial catches coastwide rose to a peak of 69 in 1915, fell to 44 in 1931, increased to a second peak of over 70 in 1962, and then dropped to the historical low of around 21 during the 1970s (Figure 3-28). Commercial harvest then rose steadily and peaked at over 70 in the late 1980s, late 1990s, and early 2000s, and has declined since then. The total 2009 catch from the IFQ/CDQ halibut fishery for the waters off Alaska was 41.7 , 1% under the catch limit (not adjusted for IFQ overages/underages). For Area 2C, the commercial QS catch was within 1% (**Table 3-3**). For Areas 3A and 3B, the commercial QS catches were actually over the catch limits by less than one percent. However the catches in these areas were still within the adjusted catch limits.

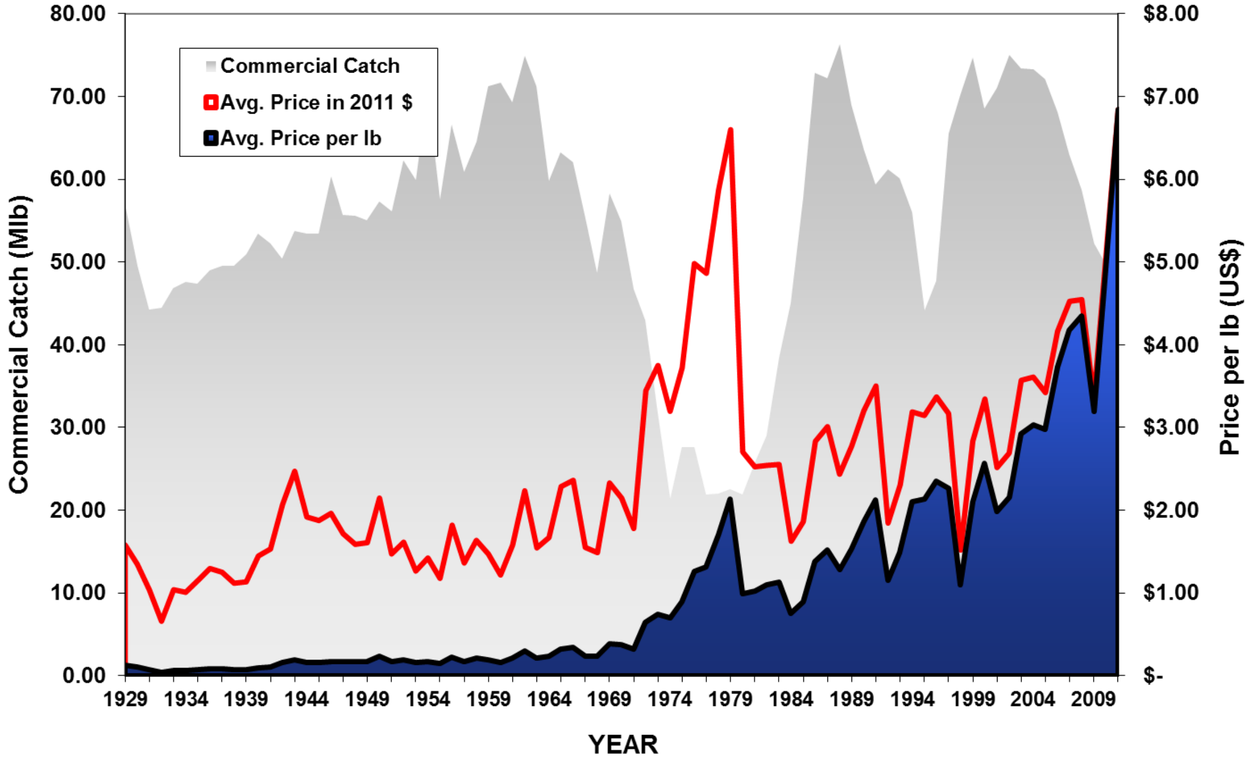


Figure 3-28 Commercial halibut catch and average price/lb, 1928 - 2011. (Source: IPHC).

The 2011 IFQ season opened at noon (ALT) on March 12 and ended at noon ALT on November 18. A total of 5,422 IFQ permits (as defined by unique combinations of species, areas, and vessel categories), including 3,903 halibut permits and 1,519 sablefish permits, were active as of year-end 2011.

When the season ended November 18, those permits had been used by IFQ holders to report 4,453 vessel landings of IFQ halibut and 1,838 of sablefish, for a total harvest of approximately 98 percent of the IFQ halibut TAC and 90 percent of the IFQ sablefish TAC. Table 3-3 displays landings by species, regulatory area, and IFQ pounds as reported by Registered Buyers.

Table 3-3 2011 IFQ halibut allocations and fixed-gear IFQ landings

Species/Area	Vessel Landings[a]	Area IFQ TAC[b]	Total Harvest	Percent Harvested[c,d]
Halibut 2C	1,292	2,330,000	2,292,926	98
3A	1,898	14,360,000	14,265,007	99
3B	758	7,510,000	7,336,170	98

[a] Vessel landings include the number of reported landings by participating vessels reported by IFQ regulatory area; each such landing may include harvests from multiple IFQ permit holders.
[b] Halibut weights are in net (headed and gutted) pounds.
[c] Due to over- or underharvest of TAC and rounding, percentages may not total 100 percent.
[d] Permit holders may fish IFQ designated for Area 4C in either Areas 4C or 4D. This resulted in an apparent, but allowable, "excessive harvest" in Area 4D.

Table 3-4 illustrates the transfer of QS/IFQ between Alaskans and Non-Alaskans. The distributive effects have not been dramatic (at least with respect to net gains and losses of QS/IFQ by Alaskans compared to Non-Alaskans).

Table 3-4 Halibut QS holdings at year-end 2011

Area	Alaskan		Non-Alaskan [a]	
	Number of persons	QS Units	Number of persons	QS Units
2C	925	48,987,507	205	10,564,532
3A	1,074	111,979,192	357	72,932,123
3B	337	27,900,110	157	26,303,066

[a] Designation of "Alaskan" or Non-Alaskan" is premised on self-reported business mailing address; NMFS/RAM makes no effort to verify residency. Changes over time between "Alaskan" and "Non-Alaskan" QS holdings result from QS transfers and QS holders' address changes. Persons with unknown addresses are excluded from this table.

Table 3-5 displays "Alaskan" and "Non-Alaskan" IFQ Crewmember holdings of QS at year-end 2011 (as expressed in 2011 IFQ pound equivalents and as a percentage of the 2011 area TACs). Over time more QS holders left than entered the halibut IFQ fisheries. As a result, QS has consolidated into the hands of fewer persons than the number that received QS by initial issuance. Table 3 6 and Table 3 7 display reductions in the numbers of QS holders and vessels participating in the halibut IFQ fisheries, compared with years just prior to program implementation. After an immediate steep decrease at the start of the IFQ Program, the numbers of vessels continue to decline slowly over time.

Table 3-5 Quota acquired by "IFQ Crewmembers" by species, area, and residence, year-end 2011[a]

Species/Area	Pounds	Area IFQ TAC[a]	Total Harvest	Percent Harvested
2C	683,830	217,051	900,881	38.7
3A	2,670,982	1,415,102	4,086,084	28.4
3B	1,419,305	1,006,940	2,426,245	32.3

Table 3-6 Consolidation of halibut QS, initial issuance through year-end 2011; numbers of persons holding halibut QS by area and size of holdings, expressed in 2009 IFQ pounds.

Area[a,b]	Size of IFQ Holdings ('09 IFQ Pounds)	Number Initial Recipients	Holders End of 1995[c]	Holders End of 1996	Holders End of 1997	Holders End of 1998	Holders End of 1999	Holders End of 2000	Holders End of 2001	Holders End of 2002	Holders End of 2003	Holders End of 2004	Holders End of 2005	Holders End of 2006	Holders End of 2007	Holders End of 2008	Holders End of 2009	Holders End of 2010	Holders End of 2011
2C	3,000 or less	1,830	1,581	1,350	1,186	1,135	1,068	1,029	984	964	918	861	824	792	732	667	651	906	867
	3,001-10,000	475	448	436	441	439	441	442	437	430	430	432	439	447	445	431	424	235	241
	10,001-25,000	82	94	105	109	105	108	104	107	109	110	112	113	115	117	118	120	21	22
	over 25,000	1	2	4	5	6	6	7	8	8	8	8	8	8	8	9	10		
	2C Total	***2,388***	***2,125***	***1,895***	***1,741***	***1,685***	***1,623***	***1,582***	***1,536***	***1,511***	***1,466***	***1,413***	***1,384***	***1,362***	***1,302***	***1,225***	***1,205***	***1,162***	***1,130***
3A	3,000 or less	1,839	1,617	1,424	1,254	1,164	1,087	1,032	984	958	907	847	794	750	634	536	494	567	541
	3,001-10,000	656	568	509	507	501	487	488	490	487	489	489	483	483	466	441	434	481	471
	10,001-25,000	338	324	334	326	328	325	323	320	319	318	313	320	316	322	321	324	264	269
	over 25,000	238	243	248	251	250	257	255	255	253	250	248	245	246	245	249	249	150	150
	3A Total	***3,071***	***2,752***	***2,515***	***2,338***	***2,243***	***2,156***	***2,098***	***2,049***	***2,017***	***1,964***	***1,897***	***1,842***	***1,795***	***1,667***	***1,547***	***1,501***	***1,462***	***1,431***
3B	3,000 or less	525	472	374	272	238	207	191	171	161	151	135	130	114	111	93	90	98	96
	3,001-10,000	255	213	180	162	148	136	133	131	127	136	131	124	123	124	114	114	161	166
	10,001-25,000	153	142	135	140	143	146	142	141	143	142	145	144	139	131	137	139	135	140
	over 25,000	123	128	135	135	137	141	143	143	146	148	146	148	150	153	151	150	95	92
	3B Total	***1,056***	***955***	***824***	***709***	***666***	***630***	***609***	***586***	***577***	***577***	***557***	***546***	***526***	***519***	***495***	***493***	***489***	***494***

Table 3-7 Number of vessels with IFQ halibut harvests by area and year, 1992–2011

Species/ Area	Pre-Program			IFQ Program																
Halibut	**1992**	**1993**	**1994**	**1995**	**1996**	**1997**	**1998**	**1999**	**2000**	**2001**	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**
2C	1,775	1,562	1,461	1,105	1,029	993	836	840	827	736	718	706	678	672	682	653	609	569	575	546
3A	1,924	1,529	1,712	1,145	1,104	1,076	899	892	842	806	750	712	696	670	644	623	600	576	549	551
3B	478	401	320	332	350	357	325	323	342	329	316	328	303	302	287	287	281	269	271	270

Table 3-8 lists the annual prices for halibut QS and IFQ transfers by area and year. Media reports prices have exceeded last year's high of $28 per pound for halibut QS. Area 2C and 3A halibut QS now range from $30 per pound to $36 per pound. For Area 3B, the price range is $19 per pound to $30 per pound.[23]

Table 3-8 Annual Prices for Halibut QS and IFQ Transfers by Area and Year

Area	Year	Mean Price $/IFQ	Stan Dev Price $/IFQ	Total IFQs Transferred Used for Pricing	Mean Price $/QS	Stan Dev Price $/QS	Total QS Transferred Used for Pricing	Number of Transactions Used for Pricing
2C	1995	7.58	1.21	996,874	1.14	0.18	6,629,554	315
	1996	9.13	2.71	681,056	1.37	0.41	4,539,813	289
	1997	11.37	2.53	517,715	1.92	0.43	3,057,477	211
	1998	10.14	2.11	220,894	1.79	0.37	1,253,771	106
	1999	NA	NA	NA	NA	NA	NA	NA
	2000	8.20	1.88	423,347	1.15	0.26	3,006,920	95
	2001	9.22	1.97	412,990	1.36	0.29	2,806,238	100
	2002	8.97	1.94	363,474	1.28	0.28	2,550,052	84
	2003	9.76	1.97	274,537	1.39	0.28	1,926,434	93
	2004	13.70	3.48	365,513	2.41	0.61	2,073,407	93
	2005	18.06	5.01	311,907	3.31	0.92	1,699,765	72
	2006	18.43	3.57	246,540	3.29	0.64	1,380,274	77
	2007	19.62	4.95	183,297	2.8	0.71	1,282,693	76
	2008	25.90	10.47	206,440	2.7	1.09	1,979,395	96
	2009	20.14	4.94	75,636	1.7	0.42	897,261	30
3A	1995	7.37	1.44	1,792,912	0.79	0.15	16,658,196	355
	1996	8.40	4.07	1,582,609	0.90	0.44	14,724,748	352
	1997	9.78	2.45	1,276,525	1.32	0.33	9,443,198	294
	1998	8.55	3.04	666,649	1.20	0.43	4,743,875	157
	1999	NA	NA	NA	NA	NA	NA	NA
	2000	7.94	1.64	614,960	0.79	0.17	6,212,009	120
	2001	8.63	2.79	771,815	1.02	0.33	6,519,428	145
	2002	8.35	1.94	711,255	1.02	0.24	5,810,732	124
	2003	9.81	2.56	565,653	1.20	0.31	4,629,364	126
	2004	13.88	4.22	875,829	1.88	0.57	6,463,336	157
	2005	18.07	4.83	385,893	2.49	0.66	2,803,054	96
	2006	18.09	3.14	586,035	2.46	0.43	4,301,567	116
	2007	20.53	6.72	814,949	2.91	0.95	5,750,520	169
	2008	26.83	8.06	498,864	3.51	1.06	3,808,709	126
	2009	25.52	8.34	183,766	3.00	0.98	1,565,934	71
3B	1995	6.53	1.40	225,912	0.44	0.10	3,323,670	88
	1996	7.88	2.30	323,160	0.53	0.16	4,760,536	165
	1997	8.58	2.53	605,744	1.43	0.42	3,634,335	157
	1998	7.92	1.78	169,833	1.62	0.36	832,225	49
	1999	NA	NA	NA	NA	NA	NA	NA
	2000	7.84	1.55	464,711	2.19	0.43	1,666,773	44
	2001	8.74	1.32	739,936	2.68	0.41	2,413,081	49
	2002	7.09	1.66	663,248	2.25	0.53	2,087,216	42
	2003	8.01	1.58	769,927	2.53	0.5	2,436,231	46
	2004	11.16	1.87	498,167	3.21	0.54	1,730,918	42
	2005	13.53	1.95	415,646	3.27	0.47	1,718,360	27
	2006	14.83	2.3	428,693	2.96	0.45	2,147,624	42
	2007	16.9	4.97	239,317	2.87	0.84	1,406,901	29
	2008	25.84	8.82	137,505	5.19	1.76	685,144	27
	2009	18.07	5.23	67,663	3.63	1.05	336,484	11

Table 3-9 displays the top ten Alaska ports in which IFQ halibut was landed. During 2011 the top four ports remained unchanged, while Sand Point rose from seventh to fifth port, pushing Sitka to sixth. Atkutan rose from tenth to seventh, and Juneau and Petersburg, respectively, slipped to eighth and ninth. Cordova ranked tenth, a position it also held in 2006 and 2007. The percentage of IFQ halibut landed outside Alaska has steadily decreased; primary "outside" ports include Seattle and Bellingham.

[23] http://www.alaskajournal.com/stories/080511/fis_pqpsl.shtml

Table 3-9 Top ten Alaska IFQ halibut ports in rank order for 2009 performance, 1995–2011

Port[a]	2011	2010	2009	2008	2007	2006	2005	2004	2003	2002	2001	2000	1999	1998	1997	1996	1995
Homer	18.91	1	1	1	1	1	1	1	1	1	1	1	1	1	3	2	2
Kodiak	18.76	2	2	2	2	2	2	2	2	2	2	2	2	2	1	1	1
Seward	3.99	3	3	3	3	3	3	3	3	3	4	4	3	3	4	3	5
Dutch/ Unalaska	9.31	4	4	4	5	5	4	4	4	4	3	3	4	4	2	4	4
Sitka	*	5	10	6	4	4	5	6	6	7	5	6	6	5	5	5	3
Juneau	0.04	6	5	8	7	6	6	7	7	6	6	5	5	7	8	8	13
Petersburg	*	7	8	7	6	7	7	8	8	8	7	7	7	6	6	6	6
Akutan	3.61	8	6	9	11	14	13	14	17	27	32	30	29	26	22	25	30
Yakutat	3.11	9	7	12	9	9	11	19	27	14	10	13	10	10	10	13	10
Sand Point	2.96	10	11	5	8	8	8	5	5	5	11	10	14	13	13	15	15
All ports			NA[e]														

[a] "All ports" includes all ports used by the fleet.
[b] Halibut weights are in net (headed and gutted) pounds.
[c] Asterisk represents confidential data.
[d] Sum includes all port data.
[e] NA = nonapplicable

As of 2010, the commercial halibut fishery had a gross ex-vessel value of $192 M (Figure 3-28). The fleet delivered to 34 different ports, Kodiak and Homer were the top two ports and received 33% of the landings. The average ex-vessel price per pound for halibut was $3.65, an increase of $1.26 from the prior year. Ex-vessel price per pound was highest for sablefish and halibut, and lower for Pacific cod, pollock, and other species landed by participating vessels. When extrapolated to a retail value the fishery increases to over $400 M in direct product value. As an integral component of the North Pacific fisheries landscape, the halibut industry provides significant employment aboard the vessels, in fishing plants, and within the related dockside industries. Alaska has recognized that the fishing industry is one of the top three employers for the entire state with employment numbers and related value lower than only the oil industry and government related activities. As a nearly nine-month long commercial fishery, the halibut industry provides opportunity for consistent employment as well as a continuous market supply of an excellent food product recognized world-wide.

3.2.6 Sport Halibut Fisheries[24]

The State of Alaska annually reports on unguided sport, guided sport, and subsistence halibut fisheries. Management of sport halibut fisheries is the responsibility of NMFS, though data collection, fishery sampling and harvest estimation is conducted by the ADF&G Division of Sport Fish. Final harvest estimates are based in part on the Statewide Mail Survey, but those estimates aren't available until September of the following year. ADF&G uses different methods to make preliminary projections of guided (charter) and private (unguided) halibut harvest estimates for the current year. Guided fishery harvests are projected using partial-year data reported by the ADF&G mandatory charter logbook program. The unguided (private) fishery harvest is projected using time series methods applied to estimates from the Statewide Harvest Survey (SWHS). Average weight data from creel sampling were then used to estimate the pounds caught in both sectors.

Final Sport Halibut Harvest Estimates are provided by ADF&G Sport Fish Division at each October or December Council meeting. The most recent complete data set available for this analysis was released in December 2011.

2010 Final estimates For Area 2C and Area 3A, sport fishery harvest (pounds net weight) was calculated separately for the charter and non-charter (unguided) fisheries as the product of the number of fish and

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[24] Source: ADF&G Sport Fish Division and IPHC

average weight of harvested halibut. Estimates of the number of fish harvested were provided by the ADF&G statewide harvest survey (SWHS). The SWHS is currently the preferred method for estimating charter harvest and the only method available for estimating non-charter harvest. Average net weight was estimated from length measurements of halibut harvested at representative ports in Areas 2C and 3A. Ports sampled in Area 2C in 2010 included Ketchikan, Craig, Klawock, Petersburg, Wrangell, Juneau, Sitka, Gustavus, and Elfin Cove. Ports sampled in Area 3A included Yakutat, Valdez, Whittier, Seward, Homer, Deep Creek, Anchor Point, and Kodiak. The estimate of charter average weight for Homer was stratified to account for differences in sizes of halibut cleaned at sea versus cleaned onshore. Bootstrapping was used to estimate standard errors of harvest (in number of fish) and average weight.

Area 2C The Area 2C overall sport harvest biomass (yield) in 2010 was estimated at 1.971 M lb (**Table 3-10**). The charter harvest estimate was 1.086 M lb and the non-charter harvest estimate was 0.885 M lb. Charter harvest accounted for 55% of the Area 2C sport harvest by weight. Average net weight was estimated at 26.4 lb in the charter harvest, 16.7 lb for the non-charter harvest, and 20.9 lb overall. Sample sizes for estimation of average weight were 3,291 and 3,047 for the charter and non-charter fisheries.

Table 3-10 Area 2C sport halibut harvest history.

	Charter				Non-Charter			Total Sport Harvest		
Year	No. Fish	Avg. Wt.	Yield (M lb)	GHL (M lb)	No. Fish	Avg. Wt.	Yield (M lb)	No. Fish	Avg. Wt.	Yield (M lb)
1995	49,615	19.9	0.986	No GHL	39,707	19.3	0.765	89,322	19.6	1.751
1996	53,590	22.1	1.187		41,307	22.8	0.943	94,897	22.4	2.129
1997	51,181	20.2	1.034		53,205	21.4	1.139	104,386	20.8	2.172
1998	54,364	29.1	1.584		42,580	21.5	0.917	96,944	25.8	2.501
1999	52,735	17.8	0.939		44,301	20.4	0.904	97,036	19.0	1.843
2000	57,208	19.7	1.130		54,432	20.6	1.121	111,640	20.2	2.251
2001	66,435	18.1	1.202		43,519	16.6	0.721	109,954	17.5	1.923
2002	64,614	19.7	1.275		40,199	20.3	0.814	104,813	19.9	2.090
2003	73,784	19.1	1.412	1.432	45,697	18.5	0.846	119,481	18.9	2.258
2004	84,327	20.7	1.750	1.432	62,989	18.8	1.187	147,316	19.9	2.937
2005	102,206	19.1	1.952	1.432	60,364	14.0	0.845	162,570	17.2	2.798
2006	90,471	19.9	1.804	1.432	50,520	14.3	0.723	140,991	17.9	2.526
2007	109,835	17.5	1.918	1.432	68,498	16.5	1.131	178,333	17.1	3.049
2008	102,965	19.4	1.999	0.931	66,296	19.1	1.265	169,261	19.3	3.264
2009	53,602	23.3	1.249	0.788	65,549	17.3	1.133	119,151	20.0	2.383
2010	41,202	26.4	1.086	0.788	52,896	16.7	0.885	94,098	20.9	1.971

The 2010 estimated charter yield in Area 2C was down 13 percent from 2009 (Table 3-10). Although the charter average weight increased 13%, the number of fish harvested decreased by 23%. The non-charter removal was down 22 percent, the result of a 3% drop in average weight combined with a 19% drop in the number of fish harvested (Figure 3-22). The reasons for the declines in harvest are unknown, but probably due mostly to the economic recession and a reduction in the bag limit from one halibut of any size for the charter fishery (in 2009 and 2010) to one fish ≤ 37 inches (Table 3-11) (along with longstanding prohibition on retention of halibut by skippers and crew and a limit on the number of lines to be actively fished at one time. Two fish of any size remained in place for the non-charter fishery. Charter captains and crew were not allowed to retain fish in Area 2C.

Table 3-12 provides sport halibut harvests in Area 2C by subarea.

Table 3-11Area 2C charter regulation history.

Year	Charter Regulations
1995-2005	Two-fish bag limit (no size restrictions), no limit on crew retention.
2006	Two-fish bag limit (no size limit), state EO prohibiting crew harvest 5/26-12/31.
2007	Two-fish bag limit (1 under 32 inch eff. 6/1), no crew retention 5/1-12/31 (State EO and Federal Rule).
2008	Two-fish bag limit (1 under 32 inch), except one-fish bag limit Jun 1-10 (halted by injunction).
2009	One fish (no size limit), no harvest by skipper & crew, line limit (effective June 5).
2010	One fish (no size limit), no harvest by skipper & crew, line limit.
2011	One fish <37 inches, no harvest by skipper & crew, line limit.

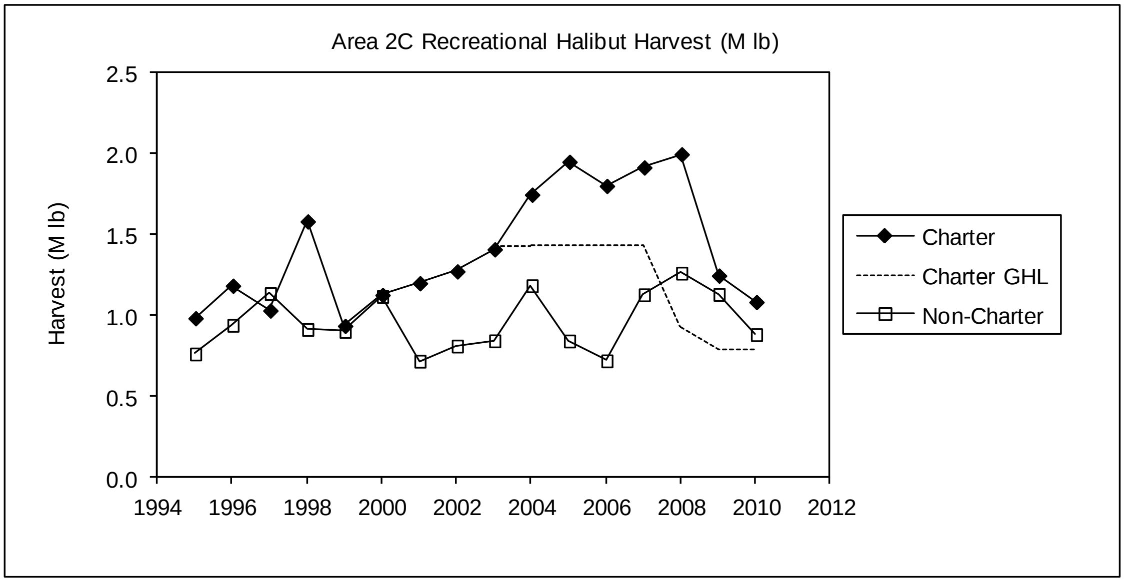

Figure 3-29 Area 2C charter and non-charter halibut harvests.

Table 3-12 Area 2C sport halibut harvest estimates by harvest survey area, 2009.

	Charter			Non-Charter		
Area	Avg. Wt (lb)[a]	No. Fish	Yield (lb)	MeanWt (lb)	No. Fish	Yield (lb)
Ketchikan	22.1	3,174	70,164	13.5	7,254	97,933
Prince of Wales Island	14.8	9,480	140,415	11.7	11,933	140,040
Petersburg/Wrangell	34.6	3,731	129,276	21.2	7,920	167,865
Sitka	25.3	14,762	373,855	20.7	4,162	86,321
Juneau	16.2	3,302	53,518	15.0	11,993	180,378
Haines/Skagway	16.2	51	827	15.0	704	10,588
Glacier Bay	47.4	6,702	317,984	22.6	8,930	201,547
Area 2C	26.4	41,202	**1,086,038**	16.7	52,896	**884,672**

[a] – Average net weight, rounded to the nearest 0.1 lb.

Area 3A The Area 3A sport harvest was estimated at 4.285 M lb. Charter harvest was estimated at 2.698 M lb and non-charter harvest at 1.587 M lb (**Table 3-13**). The charter fishery accounted for about 63% of the Area 3A sport harvest. Average net weight was estimated at 15.2 lb for the charter fishery, 12.8 lb for the non-charter fishery, and 14.2 lb overall. Average weight was estimated from samples of 3,391 charter halibut and 2,396 non-charter halibut.

Two fish of any size remained in place for both the charter fishery and the non-charter fishery (**Table 3-14**). While charter captains and crew were not allowed to retain fish for most of the season in Area 3A during 2007 through 2009, this ban was not in effect in 2010 or 2011.

The estimated Area 3A charter yield was down about 1% from 2009 (Table 3-13), the net result of a 1.1 lb decrease in average weight combined with a 6% increase in the number of fish harvested. The non-charter yield was down 22%. Average weight in the non-charter harvest declined only about 0.7 lb, but the number of fish harvested declined 17%. There were no regulation changes in 2010. The daily bag limit was two halibut of any size for all sport anglers.

The 2010 final harvest estimates were considerably lower than the projections made last year for the charter and non-charter fisheries in both areas (Table 3-13). Last year's projections were too high by about 18% for the 2C charter fishery, 43% for the 2C non-charter fishery, 11% for the 3A charter fishery, and 31% for the 3A non-charter fishery. The discrepancies in charter projections are explained largely by variation in the relationship between SWHS estimates and reported logbook harvest. The magnitude of projection errors for the non-charter fisheries is not surprising given the high variation in harvest from year to year.

Table 3-15 provides additional information regarding sport halibut harvests in Area 3A by subarea. Figure 3-30 depicts annual sport harvest relative to the GHL benchmark.

Table 3-13 Area 3A sport halibut harvest history.

	Charter				Non-Charter			Total Sport Harvest		
Year	No. Fish	Avg. Wt.	Yield (M lb)	GHL (M lb)	No. Fish	Avg. Wt.	Yield (M lb)	No. Fish	Avg. Wt.	Yield (M lb)
1995	137,843	20.6	2.845	No GHL	95,206	17.5	1.666	233,049	19.4	4.511
1996	142,957	19.7	2.822		108,812	17.6	1.918	251,769	18.8	4.740
1997	152,856	22.3	3.413		119,510	17.6	2.100	272,366	20.2	5.514
1998	143,368	20.8	2.985		105,876	16.2	1.717	249,244	18.9	4.702
1999	131,726	19.2	2.533		99,498	17.0	1.695	231,224	18.3	4.228
2000	159,609	19.7	3.140		128,427	16.9	2.165	288,036	18.4	5.305
2001	163,349	19.2	3.132		90,249	17.1	1.543	253,598	18.4	4.675
2002	149,608	18.2	2.724		93,240	15.9	1.478	242,848	17.3	4.202
2003	163,629	20.7	3.382	3.650	118,004	17.3	2.046	281,633	19.3	5.427
2004	197,208	18.6	3.668	3.650	134,960	14.4	1.937	332,168	16.9	5.606
2005	206,902	17.8	3.689	3.650	127,086	15.6	1.984	333,988	17.0	5.672
2006	204,115	17.9	3.664	3.650	114,887	14.6	1.674	319,002	16.7	5.337
2007	236,133	16.9	4.002	3.650	166,338	13.7	2.281	402,471	15.6	6.283
2008	198,108	17.0	3.378	3.650	145,286	13.4	1.942	343,394	15.5	5.320
2009	167,599	16.3	2.734	3.650	150,205	13.5	2.023	317,804	15.0	4.758
2010	177,460	15.2	2.698	3.650	124,088	12.8	1.587	301,548	14.2	4.285

Table 3-14 Area 3A charter regulation history.

Year	Charter Regulations
1995-2006	Two-fish bag limit (no size restrictions), no limit on crew retention
2007	Two-fish bag limit (no size restrictions), state EO prohibiting crew harvest 5/1-12/31.
2008	Two-fish bag limit (no size restrictions), state EO prohibiting crew harvest 5/24-9/1.
2009	Two-fish bag limit (no size restrictions), state EO prohibiting crew harvest 5/23-9/1.
2010	Two-fish bag limit (no size restrictions), no limit on crew retention
2011	Two-fish bag limit (no size restrictions), no limit on crew retention

Table 3-15 Area 3A sport halibut harvest estimates by harvest survey area, 2009.

Area	Charter			Non-Charter		
	Avg. Wt (lb)[a]	No. Fish	Yield (lb)	MeanWt (lb)	No. Fish	Yield (lb)
Central Cook Inlet	15.5	45,781	708,126	12.5	29,022	363,626
Lower Cook Inlet	15.0	63,629	952,877	11.9	54,271	646,582
Kodiak	14.9	13,381	199,489	19.1	9,682	185,132
North Gulf Coast	12.0	33,359	401,486	10.8	16,618	179,244
Eastern PWS	24.4	8,843	216,121	12.2	5,503	67,294
Western PWS	12.0	8,511	102,160	16.3	6,468	105,452
Yakutat	29.7	3,956	117,523	15.6	2,524	39,442
Area 3A	15.2	177,460	**2,697,783**	12.8	124,088	**1,586,772**

[a] – Average net weight, rounded to the nearest 0.1 lb.

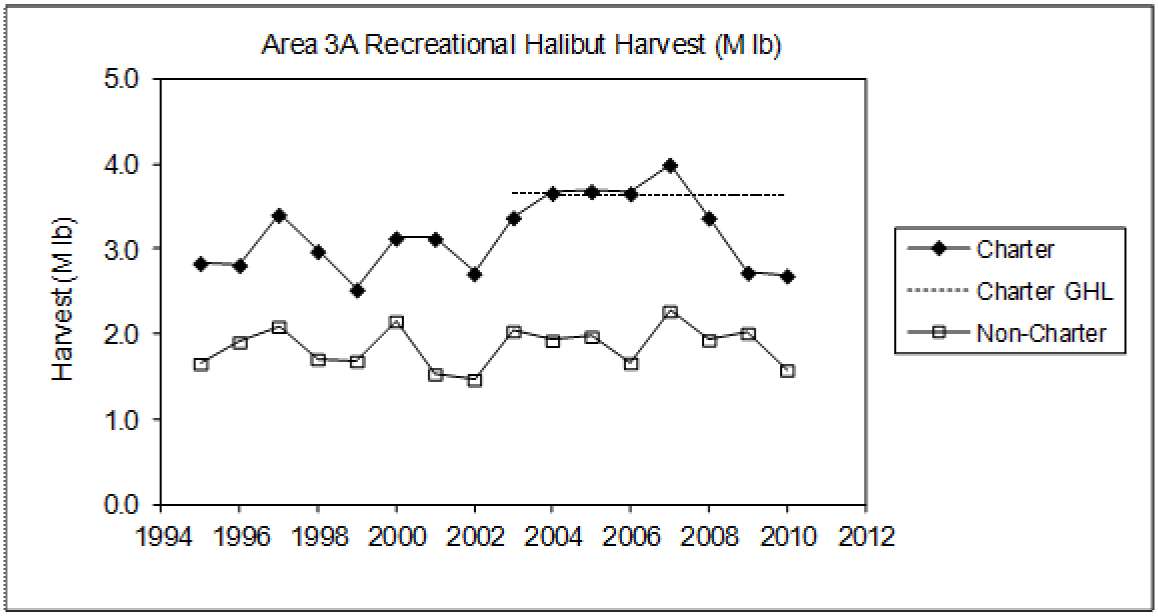

Figure 3-30. Area 3A charter and non-charter halibut harvests.

3.2.7 Subsistence Fisheries[25]

Halibut is a widely used subsistence resource in Alaskan coastal communities (NMFS 2007). Management of subsistence halibut fisheries is the responsibility of NMFS, but data collection and harvest estimation is performed by the ADF&G Division of Subsistence Fisheries under contract to NMFS. Halibut have been harvested for centuries by the indigenous coastal peoples of Southeast, Southcentral, and Western Alaska. Long ago, hooks were made of wood or bone, and often ornately carved with spirit figures to attract halibut. Lines were made of twisted fibers of cedar, animal sinew, or kelp. Halibut meat was preserved by drying or smoking.

Despite a long history of harvest, federal halibut fishing regulations did not officially recognize and authorize the subsistence fishery until 2003. Members of federally recognized tribes as well as residents of designated rural areas and communities are now eligible to obtain a Subsistence Halibut Registration Certificate (SHARC) in order to participate in this fishery. Special permits for community harvest, ceremonial, and educational purposes also are available to qualified Alaska communities and Alaska Native Tribes.

Subsistence harvest has been estimated in recent years using a survey of SHARC holders. The statewide subsistence harvest in recent years has averaged around 1 annually, with most of the harvest coming from Southeast and Southcentral Alaska.

[25] Source: ADF&G Subsistence Division and IPHC

Through a grant from NMFS, ADF&G Division of Subsistence conducted a study to estimate the subsistence harvests of Pacific halibut in Alaska in 2010. (http://www.alaskafisheries.noaa.gov/npfmc/PDFdocuments/halibut/Subsistence_report2010.pdf). Key points in the report include the following:

In May 2003, the NMFS published final federal regulations for a subsistence halibut fishery in Alaska. Residents of 118 rural communities and designated rural areas, and members of 123 tribes are eligible to participate. Fishers must obtain a subsistence halibut registration certificate (SHARC) from NMFS before fishing (www.fakr.noaa.gov/ram/subsistence/halibut.htm; 800-304-4846).

- 2010 was the eighth year in which subsistence halibut fishing took place under these regulations. Information about subsistence halibut harvests in 2003–2009 is reported in Division of Subsistence Technical Papers 288, 304, 320, 333, 342, 348, and 357, respectively.
- To estimate the 2010 harvests, a one-page survey form was mailed to SHARC holders in early 2011 or administered in person. After two mailings and community visits, 6,670 of 10,953 SHARC holders (61%) responded. Participation in the survey was voluntary.
- An estimated 4,991 individuals subsistence fished for halibut in 2010 (Figure 8).
- The estimated subsistence harvest was 43,332 halibut for 797,560 pounds net weight.
- Of this total, 77% was harvested with setline (stationary) gear (longline or skate) and 23% was harvested with hand-operated gear (handline or rod and reel).
- The largest subsistence harvests occurred in Southeast Alaska (Halibut Regulatory Area 2C), at 53% of the total, followed by Southcentral Alaska (Area 3A) at 39%. Table 6 and Figure 17 from the final report give more details on harvests by gear type and area.
- Based on place of residence of SHARC holders, communities with the largest subsistence halibut harvests in 2010 were Kodiak and Sitka (the largest eligible communities) (Figure 22).
- An estimated 12,851 rockfish were harvested by 1,322 fishers in the subsistence halibut fishery in 2010. Most (60%) were harvested in Southeast Alaska.
- An estimated 2,864 lingcod were harvested by 732 fishers in the subsistence halibut fishery in 2010. Most (63%) were harvested in Southeast Alaska.
- Based on preliminary data from the International Pacific Halibut Commission and this study, the estimated halibut removal in Alaska in 2010 was 63.773 million pounds, net weight. Subsistence harvests accounted for 1.3% of this total (Figure 33).
- The report concludes that the project was, overall, a success, with good response rates and a reliable estimate of subsistence halibut harvests. However, analysis suggests that a significant number of fishers may not have renewed their SHARCs. Additional outreach among eligible tribes and rural areas is necessary to maximize enrollment of fishers in the SHARC program.
- The report also recommends that monitoring of the Alaska subsistence halibut harvest continue in order to evaluate trends in the fishery.

Table 3-16–Estimated harvests of halibut in numbers of fish and pounds net (dressed, head-off) weight by regulatory area and subarea, 2010.

			Estimated subsistence harvest by gear type[a]											
			Set hook gear			Hook and line or handline			All gear			Estimated sport harvest		
Subarea	Regulatory area	Number of SHARCs subsistence fished[c]	Estimated number respondents fished	Estimated number halibut harvested	Estimated pounds halibut harvested[b]	Estimated number respondents fished	Estimated number halibut harvested	Estimated pounds halibut harvested[b]	Estimated number respondents fished	Estimated number halibut harvested	Estimated pounds halibut harvested[b]	Estimated number respondents fished	Estimated number halibut harvested	Estimated pounds halibut harvested[b]
Southern Southeast Alaska	2C	1,618	1,373	9,797	207,535	671	2,927	46,831	1,618	12,725	254,366	833	2,928	47,523
Sitka Lamp Area	2C	718	657	3,118	68,532	229	586	8,456	718	3,704	76,988	236	529	8,960
Northern Southeast Alaska	2C	776	686	4,084	77,223	263	1,007	16,241	776	5,091	93,464	296	855	14,880
Subtotal, Area 2C		**3,013**	**2,625**	**16,999**	**353,290**	**1,118**	**4,521**	**71,528**	**3,013**	**21,520**	**424,818**	**1,313**	**4,312**	**71,364**
Yakutat Area	3A	66	53	543	13,296	29	191	4,768	66	734	18,064	15	76	1,198
Prince William Sound	3A	291	260	1,767	35,004	143	364	7,274	291	2,132	42,279	139	361	7,905
Cook Inlet	3A	228	138	2,780	36,870	157	2,607	28,939	228	5,386	65,809	126	579	9,008
Kodiak Island road system	3A	687	564	4,429	82,139	315	1,146	20,928	687	5,575	103,066	450	1,871	35,599
Kodiak Island–Other	3A	592	466	2,854	56,642	285	1,346	26,790	592	4,201	83,432	310	1,055	18,534
Subtotal, Area 3A		**1,631**	**1,283**	**12,374**	**223,951**	**807**	**5,654**	**88,699**	**1,631**	**18,028**	**312,650**	**887**	**3,943**	**72,244**
Chignik Area	3B	42	20	132	2,912	35	183	2,945	42	315	5,857	5	6	103
Lower Alaska Peninsula	3B	130	65	696	8,845	96	514	8,306	130	1,210	17,152	51	143	2,248
Subtotal, Area 3B		**171**	**84**	**829**	**11,757**	**130**	**697**	**11,251**	**171**	**1,525**	**23,009**	**56**	**148**	**2,351**
Eastern Aleutians–East	4A	99	61	429	7,046	66	409	6,297	99	838	13,343	53	217	2,682
Eastern Aleutians–West	4A	8	7	32	665	3	22	540	8	55	1,205	6	8	132
Subtotal, Area 4A		**101**	**62**	**461**	**7,711**	**67**	**431**	**6,837**	**101**	**892**	**14,548**	**57**	**225**	**2,814**
Western Aleutians–East	4B	10	6	22	210	4	14	240	10	36	450	3	21	432
Western Aleutians–Other	4B	0												
Subtotal, Area 4B		**10**	**6**	**22**	**210**	**4**	**14**	**240**	**10**	**36**	**450**	**3**	**21**	**432**
St. George Island	4C	6	5	23	563	5	8	158	6	30	720	0	0	0
St. Paul Island	4C	19	13	468	9,555	6	16	584	19	485	10,139	0	0	0
Subtotal, Area 4C		**25**	**17**	**491**	**10,118**	**11**	**24**	**742**	**25**	**515**	**10,859**	**0**	**0**	**0**
St. Lawrence Island	4D	4	2	32	843	2	6	328	4	38	1,171	0	0	0
Area 4D–Other	4D	0												
Subtotal, Area 4D		**4**	**2**	**32**	**843**	**2**	**6**	**328**	**4**	**38**	**1,171**	**0**	**0**	**0**
Bristol Bay	4E	4	4	0	0	0	0	0	4	0	0	2	2	35
Yukon Delta	4E	60	15	170	2,542	56	571	6,942	60	741	9,484	0	0	0
Norton Sound	4E	6	6	38	571	0	0	0	6	38	571	0	0	0
Kotzebue Sound	4E	0												
Subtotal, Area 4E		**70**	**25**	**208**	**3,113**	**56**	**571**	**6,942**	**70**	**779**	**10,055**	**2**	**2**	**35**
Total, Alaska[c]		**4,991**	**4,071**	**31,416**	**610,992**	**2,183**	**11,916**	**186,567**	**4,991**	**43,332**	**797,560**	**2,297**	**8,651**	**149,241**

Source ADF&G Division of Subsistence, SHARC survey, 2011.

a. "Setline" = longline or skate. "Hand-operated gear" = rod and reel, or handline.

b. Weights given are "net weight." Pounds net (dressed, head off) weight = 75% of round (whole) weight.

c. Because fishers may fish in more than one area, subtotals for regulatory areas and the state total might exceed the sum of the subarea values. Includes subsistence and sport fishing.

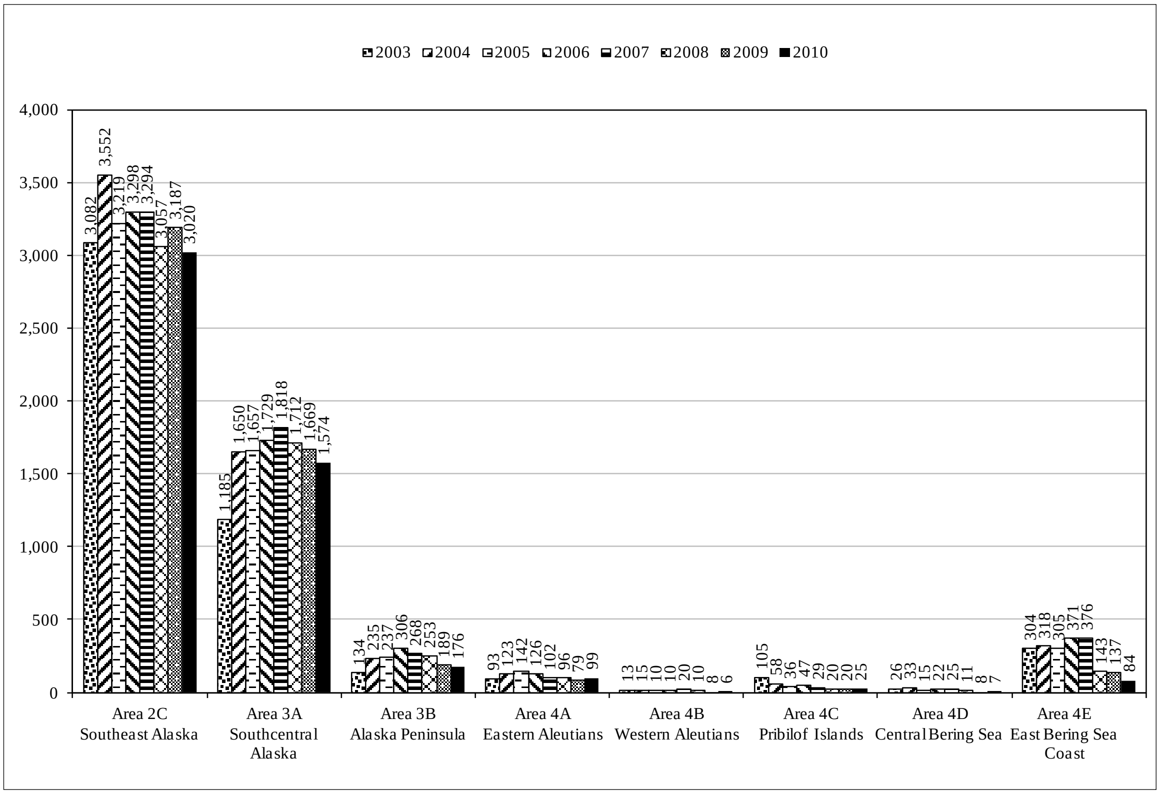

Figure 3-31 Estimated number of Alaska subsistence halibut fishers, 2003–2010 by regulatory area of tribe or rural community.

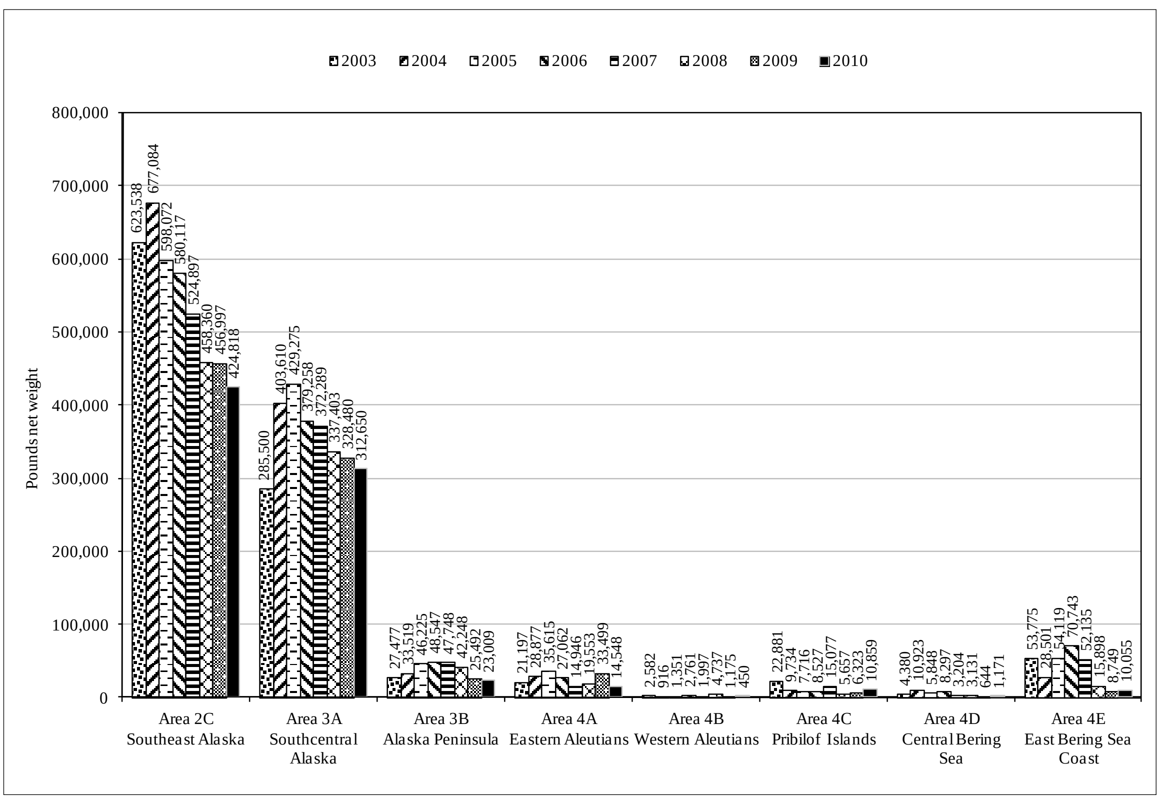

Figure 3-32 Estimated subsistence halibut harvests, pounds net weight, by regulatory area fished, 2003–2010.

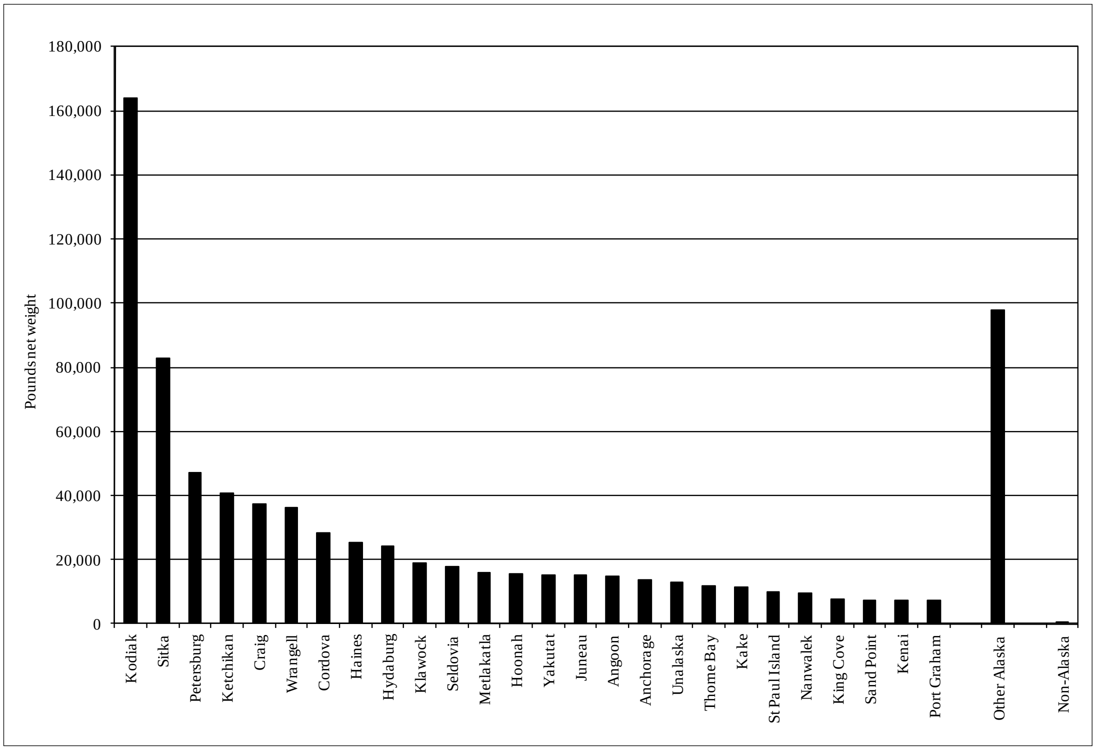

Figure 3-33 Alaska subsistence halibut harvests by place of residence, 2010.

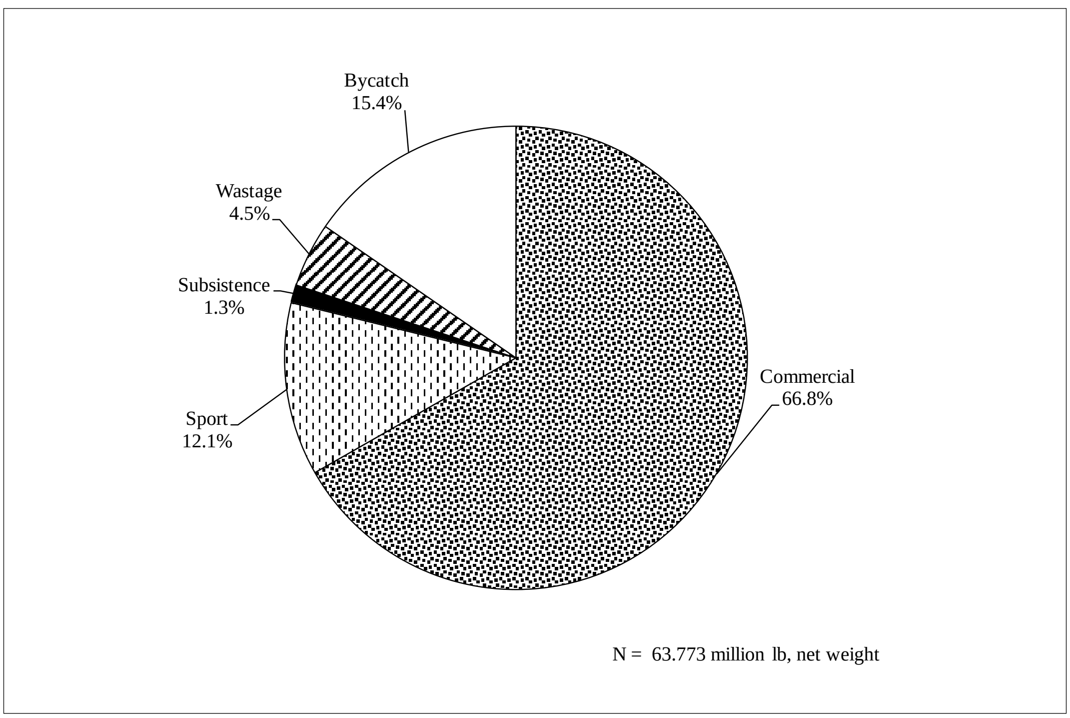

Figure 3-34 Halibut removals, Alaska, 2010.

3.2.8 Impacts of the Alternatives on Halibut and Halibut Fishery

3.2.8.1 Alternative 1: Status quo

3.2.8.1.1 Biological Impacts

> *Incidental catches of halibut result in a decline in the halibut standing stock biomass, reduced reproductive potential of the halibut stock, and reduced short- and long-term halibut yields to the directed hook-and-line fisheries.*
>
> *~ IPHC staff*

Incidental halibut catches in the groundfish fisheries, recreational and subsistence catches, and wastage in the commercial halibut fishery are all considered before the IPHC sets commercial halibut catch limits each year. Incomplete observer coverage of GOA groundfish fisheries results in imprecise understanding of actual catches in these fisheries. PSC limits on halibut are estimated to be approached often and these estimates are used by the IPHC when setting catch limits for halibut fisheries. IPHC catch limits are reduced in consideration of the estimated mortality in order to minimize the chances of the stock decreasing below harvest reference points. However, the halibut stock still suffers the impacts of these removals in the form of reduced yield available to harvesters and reduced spawning biomass.

> *While PSC limits on halibut are often closely approached in the GOA groundfish fisheries, these removals are known imprecisely. Halibut mortality in all non-halibut IFQ fisheries is taken into account when*
>
> *commercial IFQ catch limits are set, but the negative impacts of these removals on lost spawning biomass and lost yield are not prevented*
>
> *~ IPHC staff*

PSC mortality in the Alaska groundfish fisheries occurs for a range of halibut ages and sizes. Given the life history and population dynamics of the halibut stock, there are different ramifications to the stock and directed fisheries for different size categories of bycatch mortality. Halibut are defined by three different size categories:

1) over 32 inches in size (O32);
2) under 26 inches in size (U26); and
3) between 26 and 32 inches in size (U32O26).

The 32 inch category relates to the directed commercial IFQ fishery which has a 32 inch size limit. The 26-32 inch category is relatively new and was defined to allow for direct accounting of a large fraction of the directed sport and subsistence catch which are not constrained by a size limit (except for the Area 2C charter fishery). A sizable fraction of groundfish bycatch mortality is also in the U32O26 category. The U26 category contains almost exclusively bycatch fish as there is virtually no sport or subsistence catch smaller than 26 inches in length. In addition to the directed (commercial, sport, subsistence) fisheries, there is also the loss of halibut from prosecution of the directed commercial fishery, termed "wastage." Virtually all wastage is above 26 inches in length and is deducted in whole from the Total CEY.

Distinguishing between the over-26 (O26) inch and under-26 (U26) inch components is important. The O26 inch component taken as bycatch has approximately the same effect on the halibut stock as O26 directed catch, and is treated the same: it is directly deducted from the total CEY. Thus any reduction in the bycatch mortality of O26 halibut will accrue directly to the directed fisheries. Based on recent observer-collected length frequency samples, approximately 62.5% of trawl, and 75.2% of hook and line halibut bycatch mortality (by weight) is O26. As these reductions would be taken by the directed fisheries, the impact on directed yield is a gain of 0.625 pounds per pound of trawl bycatch reduction and .752 pounds of directed yield gain per pound of hook-and-line bycatch reduction.

The U26 component of ground fish bycatch, which is 37.5% of trawl bycatch and 24.8% of hook-and-line bycatch mortality is not transferred to the directed fisheries. The reason for this has to do with the small size and future potential of these fish. Future contributions from small (U26) halibut are much greater than their weight when taken as bycatch. At these small sizes, annual growth gains are much greater than losses from natural mortality or directed fisheries (which are essentially nil). The bycatch mortality of small halibut deprives the halibut population of between 2.2 pounds (for trawl bycatch) and 1.4 pounds (for hook-and-line bycatch) of female spawning biomass. Numerous IPHC studies have demonstrated that optimum yield – to all fisheries – occurs with a size limit at about 32 inches, which has been the commercial size limit since 1974. Removal of halibut smaller than 32 inches causes a steeper reduction in spawning biomass recruit. Consequently, a lower target harvest rate is required in order to “compensate” the stock in order to keep the spawning biomass per recruit at the target level. Further, there is a life history argument that supports reduction in the mortality of smaller, younger halibut. Female halibut do not begin contributing to the spawning biomass until eight years of age and the age at which 50% of the females contribute is around 13 years of age. Female halibut below 26 inches are almost entirely less than eight years of age hence never contribute to the spawning biomass. To the extent there are local spawner-recruit relationships, localized reductions of young female halibut can have potentially serious recruitment ramifications. Finally, there is reduction in future yield to the directed fisheries from U26 bycatch and this cumulatively totals about a pound of directed yield per pound of groundfish bycatch.

Taking no action would result in no change to the amount of halibut removals in the trawl and longline groundfish fisheries. These removals would continue to occur and result in reduced allocations to the directed halibut IFQ fisheries in Area 2C, Area 3A, and Area 3B; the charter halibut fisheries in Area 2C and Area 3A; and unguided sport and subsistence fisheries (which do not have caps on removals but could result in reduced abundance and local availability) in Area 2C, Area 3A, and Area 3B. These removals would impact the halibut stock as described above.

3.2.8.1.1.1 Area 2C

Area 2C indices are illustrated in . Between 1997 and 2006, total removals were stable, at 12.4 in Area 2C. Removals declined sharply between 2007 and 2010, in response to the change from closed-area to coastwide assessment and the resultant revised view of relative halibut abundance in Area 2. Prohibited species catch of U32 fish in Area 2, and subsequent lost yield to constant Exploitation Yield (CEY), is estimated to be rather low, however yield lost due to “upstream” PSC mortality of U32 halibut is estimated to be much greater than yield lost to “local” U32 mortality (Valero and Hare 2011). O32 PSC mortality in Area 2C is relatively low. Surplus production estimates suggest that removals exceeded surplus production in Area 2 for most of the past decade. In Area 2C commercial effort has steadily declined for the past four to five years.

The main indices of abundance all suggest a steady decline in exploitable biomass from the mid-1990s to the late 2000s. While it appears that Area 2C declines have been arrested, the stabilized level is the lowest on record and at least 60% lower than its highest level.

Survey partitioning of the coastwide biomass suggests that the beginning of year 2011 EBio is level in Area 2C with 2010 values. Generally much younger age structure of fish is caught in Area 2. Mean age is around 11 years of age, with little difference between males and females. In particular, the catch of females is concentrated on ages where maturity at age is low thus removing females from the population before many have the opportunity to contribute to the spawning biomass.

All the indices are consistent with a picture of a steadily declining exploitable biomass up to at least 2007. The reasons for the decline are likely twofold. The first is the passing through of the two very large year classes (i.e., 1987 and 1988). Every assessment over the past decade has shown that those two year classes were very strong in comparison to the surrounding year classes. Now that those two year classes are 20 years old, their contribution to the exploitable biomass and catches has sharply declined and the drop in exploitable biomass was to be expected as they are replaced by year classes of lesser magnitude. Secondly, realized harvest rates were substantially higher than the target rate of 20%, and for a few years were in excess of 50% of EBio. Harvest rates have been reduced in Area 2C in recent years.

Removals have been generally larger than surplus production and that stalled rebuilding of regulatory area stocks. The reduced removals now appear to have arrested decline of the regulatory area biomass. Area 2C appears stabilized but at a low level that limits available yield. There are multiple signs that two or three large year classes are set to enter the exploitable biomass, though this is dependent both on reducing harvest rates that are above target as well as on the growth rate. It is encouraging that removals have been brought down over the past few years. Realized harvest rates remain above target in all of Area 2 but are closer to target than at any time in the past decade.

3.2.8.1.1.2 Area 3

Areas 3A and 3B indices are illustrated in Figure 3-8 and Figure 3-9, respectively. While these two areas occupy the current central area of distribution of the halibut stock, they have substantially different exploitation and biomass histories over the past 10-20 years.

Area 3A removals, both the total as well as the individual components (commercial, sport, bycatch) have been relatively stable over the past 15 years. Commercial effort has also seen relatively little variation. During the past decade when IPHC setline survey catch rates (WPUE) indices were falling sharply coastwide, Area 3A generally showed the most stability. However, Area 3A survey WPUE has now shown five consecutive years of decline and the 2010 value of 117 lb/skate is by far the lowest on record and is about 40% of the level seen in the late 1990s. Commercial WPUE is also at its lowest point since the change from "J" to "C" hooks in 1984 and is at about 66% of its late 1990s level. Paralleling the declines in survey and commercial WPUE, EBio has declined steadily in Area 3A since 2005.

Area 3B saw a large increase in removals beginning in 1996 which peaked in 2002; removals have dropped sharply since. Commercial fishing effort more than tripled in the seven years after 1996 and then declined modestly over the past four years, before increasing again beginning in 2008 and continuing through 2010. Removals greatly exceeded surplus production between 1998 and at least 2007. Commercial and survey WPUE are at 31% and 21%, respectively, of their average level between 1997 and 1999. Area 3A has a much broader spectrum of ages in the population than is seen in Area 2. Average age for females in survey catches is 13 and for males is 16 years. Area 3B, however, is more similar to Area 2 in age distribution than to Area 3A.

For a long time, Area 3A had the appearance of being the most stable of the IPHC regulatory areas. The area has been fully exploited for many decades and there is a wealth of data detailing its population dynamics. The area also sits at the current center of halibut distribution and it appears that emigration is roughly equal to immigration. Like Area 2, Area 3A benefited from the very large year classes of 1987 and 1988 and the slow decline in exploitable biomass is the result of those year classes dying off. The exploitable biomass remains by far the largest of any of the regulatory areas however the sharp declines of the past several years are a sign that exploitation rates may be too high, though IPHC staff are not yet considering Area 3A as an area of particular concern. Should this trend not reverse soon, staff may reconsider applying that designation. Until the exploitable biomass decline has ended, recommended catch limits will trend downwards in Area 3A.

The situation in Area 3B is one that has caused concerned for several years. Area 3B was relatively lightly fished until the mid-1990s. With the introduction of a regular survey, quotas were incrementally increased from 4 to a high of 17. Predictably catch rates declined steadily. Area 3B was believed to have had an accumulated "surplus" biomass that could be (and was) taken but the level of catches was not sustainable. Removals were brought down to around 10 however the WPUE indices continue to drop sharply. The level of commercial effort expended to take the CEY is at an all-time high and increasing. The age distribution of the population is not broad and reflects one of an area fished at a much higher rate than is sustainable, or where both recruitment and emigration are also high. Like Area 4, Area 3B is a net (though smaller) exporter of halibut as emigration is larger than immigration. It is paramount that the ongoing decline in Area 3B be arrested - until that is accomplished, the true level of productivity in Area 3B cannot be estimated. Using a lower harvest rate in Area 3B is a precautionary move and one that has seen success in Area 4. While the recommended target harvest of 0.15 was accepted for Area 3B in 2010, application of the SUFD adjustment resulted in a realized harvest rate closer to 0.20.

3.2.8.1.2 Economic Impacts

It is assumed that maintaining the status quo will not by itself change the economic state of commercial halibut IFQ fishermen, guided sport businesses, the guided angler's consumer surplus, or the communities they impact. These entities will continue to harvest the halibut allocated to them under the current (and it is assumed in the future under the proposed catch sharing plan) regulations. While the amount of halibut available to these sectors has declined, especially in Area 2C, those declines are a result of factors other than changes in the overall hook-and-line and trawl PSC limits.

Despite the fact that the status quo has not directly impacted the amount of halibut available to the commercial IFQ and guided sport sectors, halibut PSC in the hook-and-line and trawl fisheries does reduce the amount of halibut they are allowed to harvest. Halibut PSC will continue to be deducted from the available halibut after all halibut user's needs, other than commercial IFQ and guided sport have been removed. Since the other sector s' usage is accounted for before the PSC is deducted, it is assumed that those sectors are not affected by the status quo or options that reduce the PSC limits.

Under the status quo, hook-and-line and trawl industry efforts to reduce halibut PSC taken in the prosecution of the groundfish fisheries may lower the amount of future removals the IPHC deducts from the fishery CEY. Any reductions in the amount of halibut PSC used should increase the amount available to the guided sport and commercial IFQ fishery in the future. Council discussions of reducing the halibut PSC limits have resulted, and will likely continue to result, in members of industry working to develop methods to reduce PSC rates. Those efforts are expected to be ongoing under the status quo. Whether future reductions in PSC rates are used to reduce the amount of PSC usage, more fully utilize TACs that are available, or a combination of the two will depend on several factors. Those factors include changes in groundfish TACs, cost of implementing the measures to reduce PSC, and external pressures applied to industry to reduce the amount of halibut PSC they use.

The economic impacts of taking no action are discussed in greater detail in the RIR.

3.2.8.2 Alternative 2: Reduce Halibut PSC Limits

3.2.8.2.1 Biological Impacts

The following section includes a March 2011 response from IPHC staff to a December 2010 Council general request for information on: Effect of reducing PSC limits in the Gulf of Alaska on the halibut exploitable biomass and spawning potential, including downstream effects from halibut migration[26]

The effects of maintaining the status quo halibut PSC limits in the GOA have been addressed by the IPHC generally (reported here) and specifically (reported under Section 3.3.4.1.2). Estimates of the lifetime lost yield to the halibut fishery and lost SSB arising from each pound of PSC mortality in the GOA vary, depending on the area of origin of the PSC. In addition to addressing the impact of halibut PSC on lost yield and lost SSB, Valero and Hare (2011) also estimated the effects of migration on the areas of impacts of U32 PSC mortality, with migration separated into two components – juvenile (U26) and adult (O26) migration. The effect of migration on the relative area-specific losses due to U32 PSC is not very sensitive to estimated rates of migration within each component, although the proportion of each component and the relative rates by each component are more sensitive input parameters.

In general, migration of halibut in the GOA occurs as a west-to-east process that diminishes with size and age. The major shift in treatment of halibut migration in recent years arose from the results of an IPHC halibut tag and recapture program from 2003-2009. Results indicated that halibut continue to migrate throughout their lives. Migration rates are estimated based on the return rate of tags, which vary by area, hence the precision with which migration rates are estimated also varies by area. However, the total impact of PSC mortality on the coastwide halibut stock is not subject to any of the concerns about migration rate estimation. Instead, the total losses in yield, SSB, or egg production can be estimated with confidence because they are functions of the size composition of the PSC and the known biological parameters of growth, mortality, and fecundity.

The average observed U32 size/age composition of 1996-2008 PSC, by area, and the target halibut fishery harvest rate were used to calculate the impacts of U32 PSC mortality on the coastwide halibut stock.

[26] http://www.alaskafisheries.noaa.gov/npfmc/current_issues/halibut_issues/IPHC_PSCdiscpaper311.pdf

Assuming that both juvenile and adult movement is considered, the cumulative lifetime estimated per pound impacts of U32 PSC mortality by area are as follows:

Area of One Pound of PSC Origin	Lost Yield	Lost Spawning Stock Biomass
Area 2C	1.1 lb	1.5 lb
Area 3A	1.1 lb	1.7 lb
Area 3B	0.9 lb	1.6 lb

Using the above matrix for lost yield and lost SSB by area, the impact of 2,000 mt of halibut PSC generally is between 1,800 mt and 2,200 mt of lost yield to the direct halibut fisheries and between 3,000 mt and 3,400 mt of lost SSB, depending on the spatial distribution of PSC removals.

The IPHC has identified the biological impacts of halibut PSC mortality to be: 1) reduced yield due to reduced recruitment and mortality of adults; 2) out of area or "downstream" impacts where halibut removals in one area reduce recruitment and yield in another area; 3) reduced spawning biomass and egg production. There is also uncertainty about the effects on the reproductivity of the stock that results from smaller females.

The loss of SSB has become a more significant portion of the impact of PSC mortality as halibut size at age has decreased over the past decade (Hare 2011). While smaller size at age means that yield loss per pound of PSC mortality is lower than in previous decades, this is not the case for losses to SSB. Even with smaller sizes at age, female halibut mature into the spawning biomass near the same ages as usual and while many fish may not be vulnerable to the fishery until older ages than in past decades, they still contribute to the spawning biomass from the age of first maturity (8-11 yr). This is why halibut SSB can increase even when the eBio may decrease. The harvest policy is based on conservation of SSB per recruit and the continued impact of PSC mortality on this metric is of great concern to the IPHC.

The variation in losses estimated for different areas of PSC origin is accounted for by both the sizes of halibut comprising the PSC and the differences in growth and mortality that would be experienced by halibut in those areas. The lifetime losses resulting from U32 PSC occur over an extensive time period, even with current exploitation rates. Valero and Hare (2011) estimated that *only about 42 percent of lost yield occurs during the first eight years following the PSC occurrence and about 87 percent after 16 years. The long period over which PSC impacts are manifested renders migration patterns of significance to the areas of impact, though not to the total coastwide impact on the stock.*

Halibut PSC limit reductions under Alternative 2 could be reallocated to other (commercial, recreational, and subsistence) directed halibut fishery users and would benefit the halibut stock as described under Section 3.2.8.1.1.

3.2.8.2.2 Economic Impacts

The economic impacts of reducing the halibut PSC limits are discussed in detail in Section 4. That analysis assumes that the benefits from decreasing the groundfish PSC limits will accrue to the commercial IFQ industry and guided sport industry. Other users will not be impacted because their halibut accounted for before PSC reductions are taken from the available halibut. The assumptions used to generate the change in first wholesale gross ex-vessels revenue are provided in Section 4.5.7.The analysis assumed that the entire PSC reduction would be the change in halibut PSC usage each year. Applying that assumption overestimates the total impact because the entire PSC has not been taken every year, historically. However, estimating the amount of PSC used each year in the future would require assumptions about changes in fleet behaviour that cannot be predicted. Therefore, the estimates of increased gross ex-vessel revenue for the guided sport and commercial IFQ should be considered maximums given biological assumptions in the model and holding prices within the range from 2003 through 2010.

Employing those assumptions results in the Area 2C IFQ fleet increasing gross revenue by about $1,000 for each five percent reduction in the hook-and-line PSC limit (300 mt). Because of the very small amount of halibut PSC usage by the trawl fleet in area 2C, a reduction to their limit did not change the ex-vessel gross revenue estimate. It should be noted that changes in gross revenue are not good indicators of changes in net benefits. However the lack of cost data and consumer surplus data for all sectors impacted by this action, makes generating those estimates beyond the scope of this analysis.

In Area 3A, the estimated increases in gross ex-vessel revenue for the IFQ fleet were about $40,000 for each five percent decrease in the hook-and-line PSC limit and $560,000 for the trawl sector (based on 2,000 mt PSC limit). In area 3B, the increased ex-vessel gross revenue was estimated to be about $25,000, per five percent decrease in the hook-and-line PSC limit. The increase was estimated to be $220,000, per five percent decrease in the trawl limit.

Changes in gross revenue for the guided sport fleet were very small in Area 2C. Only two halibut were estimated to be added to the guided sport limit for each five percent decrease in the PSC limit. This estimate excluded migration of halibut from the model, so the value may be underestimated. In Area 3A, the increase in gross revenue was estimated at about $10,000 for each five percent reduction to the hook-and-line PSC limit and $140,000 for each five percent reduction to the trawl PSC limit. No change was estimated for Area 3B, because of the limit guided sport fishery in that area.

3.3 Groundfish

3.3.1 Life History, Removals, Harvest Policy, Resource

The Council recommends annual catch limits and allocations for commercial groundfish fisheries for 121 species/complexes and 25 management categories in the GOA. Commercial groundfish quotas in the GOA are set at about 300,000 mt, or 660 million lb, each year. Some flatfish quotas are set well below the acceptable biological levels (ABCs) due to halibut PSC constraints.

The GOA groundfish harvest specification (target) categories are: walleye pollock, Pacific cod, sablefish, shallow-water flatfish, deep-water flatfish, rex sole, arrowtooth flounder, flathead sole, POP, northern rockfish, shortraker rockfish, other rockfish, PSR, rougheye and blackspotted rockfish, thornyhead rockfish, DSR, Atka mackerel, big skate, longnose skate, other skates, squids, sharks, octopuses, and sculpins (**Figure 3-35**).

The Harvest Specifications EA (NMFS 2007) reported that harvest control rules for pollock, Pacific cod, and Atka mackerel have been established so that fishing rates drop abruptly at low biomass levels, in order to account for Steller sea lion prey needs (NMFS 2007). TACs and harvests, especially in the GOA, are often set lower than they would be otherwise, in order to protect other species, especially halibut, which may be taken as incidental removals. Directed fishing for many species is frequently restricted before TACs are reached, in order to comply with PSC limits. Inseason management closes directed fisheries when TACs are harvested, and restricts fishing in other fisheries taking the species as incidental removals when OFLs are approached.

For the purpose of setting halibut PSC limits, the FMP sets separate PSC limits for trawl fisheries: 2,000 mt and hook-&-line (HAL) fisheries: 300 mt. The Pacific halibut PSC HAL limits are apportioned between demersal shelf rockfish (typically, 10 mt) and all species other than demersal shelf rockfish (typically, 290 mt).

The Pacific halibut PSC trawl limits are apportioned between the deep-water species complex and the shallow-water species complex. The deep-water species complex includes: sablefish, rockfish, deep-water flatfish, rex sole, and arrowtooth flounder. The shallow-water species complex includes: walleye pollock, Pacific cod, shallow-water flatfish, flathead sole, Atka mackerel, skates, and “other species” (which includes sharks, skates, squids, sculpins, and octopuses).

For the purpose of setting halibut PSC limits, the FMP identifies specific criteria to be considered by the Council [listed in Section 1.5]. The criteria include (e) expected change in target groundfish catch and (f) estimated change in target groundfish biomass. These issues are addressed in greater detail in the annual GOA Groundfish SAFE Report which will be considered by the Council during its December 2011 meeting for its determination of 2012 and 2013 harvest specifications. A summary of the 2010 status of individual groundfish stocks is presented in **Figure 3-36** and Appendix 4.

For the GOA specifications, NMFS conducted a summer bottom-trawl survey in 2011 thus full assessments were presented for all 22 stocks and stock complexes under the GOA FMP. The sum of the ABCs increased by 3% (15,927 t) compared with last year. This was primarily driven by increases in pollock 20,229 t (21%) and sablefish 1,670 t (15%). Based on projections, ABC levels for groundfish (pollock, Pacific cod, and sablefish) are up by 22,699 t (12%) whereas flatfish declined by 8,685 t (-3%). Rockfish ABCs increased 3% (1,197 t) and the largest percentage increase was seen for octopus at 53% (501 t). Combined, the skates ABC increased by 2% (149 t). The Prince William Sound pollock GHL was increased from 1,650 t to 2,770 t and this amount was deducted from the central and western pollock ABC prior to apportionments. Council recommendations for 2012/2013 harvest specifications for the GOA are attached under Appendix 6.

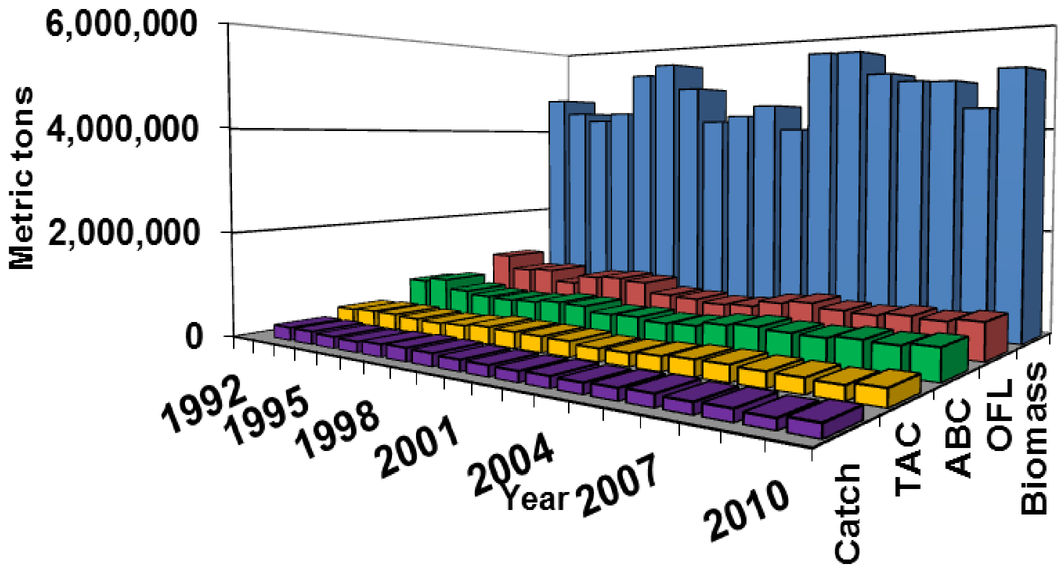

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Figure 3-35 GOA Groundfish Harvest Specifications, 1992-2010

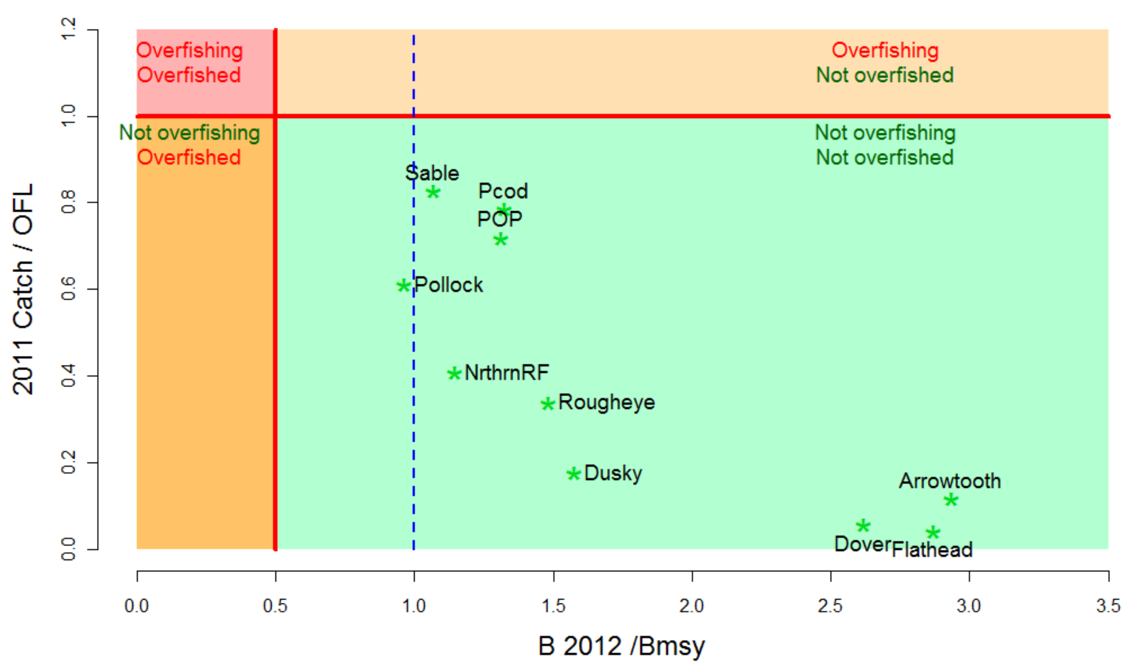

Figure 3-36 Summary status of age-structured GOA species relative to 2011 catch levels (vertical axis) and projected 2012 spawning biomass relative to Bmsy levels. Note that the 2010 MSY level is defined as the 2011 catch at FOFL.

3.3.2 Groundfish Fisheries Exempt from GOA halibut PSC Limits

As reported in the Federal Register for the 2011 groundfish specifications[27], the FMP authorizes the Council to exempt specific gear from the halibut PSC limits. NMFS, after consultation with the Council, exempts pot gear, jig gear, and the sablefish IFQ hook-and-line gear fishery from the non-trawl halibut limit. The Council recommended these exemptions because (1) the pot gear fisheries have low annual halibut mortality (averaging 19 mt annually from 2001 through 2010); (2) IFQ program regulations prohibit discard of halibut if any halibut IFQ permit holder on board a catcher vessel holds unused halibut IFQ (§ 679.7(f)(11)); sablefish IFQ fishermen typically hold halibut IFQ permits and are therefore required to retain the halibut they catch while fishing sablefish IFQ; and (3) NMFS estimates negligible halibut mortality for the jig gear fisheries. NMFS estimates that halibut mortality is negligible in the jig gear fisheries given the small amount of groundfish harvested by jig gear (averaging 275 mt annually from 2001 through 2010), the selective nature of jig gear, and the high survival rates of halibut caught (and subsequently released) with jig gear.

Vessels Fishing IFQ Sablefish

During 2009, a total of 299 catcher vessels and 13 catcher processors were reported to have harvested sablefish IFQ (2010 Economic SAFE). Since 2005 the number of catcher vessels has exhibited a downward trend. The number of catcher processors has varied from 11 to 16 over that period.

Vessels Using Pot Gear

Vessels using pot gear are exempt from the GOA halibut PSC limits. The 2010 Economic SAFE reports that 123 catcher vessels and two catcher processors fished for Pacific cod with pot gear in the Gulf, during 2009. Those vessels reportedly harvested about 11,000 mt of groundfish with an ex-vessel value of $7.2 million. More vessels fished using pot gear in the GOA from 2005 through 2008, than in 2009. The greatest number (151) fished in 2005. Fishing with pot gear may occur in Federal or State of Alaska waters.

Vessels Fishing with Jig Gear

A total of 13 vessels were reported to have harvested groundfish with jig gear (primarily Pacific cod) from the Western GOA during 2009. Those vessels harvested 157 mt of groundfish. In the Central GOA 13 vessels used jig gear to harvest 37 mt of groundfish (NPFMC, 2010)

3.3.3 State GHL Fisheries

Fisheries managed by the State of Alaska are not subject to the halibut PSC limits reductions being considered. State managed groundfish fisheries are discussed below. Most of the fisheries occur in state waters and use gear types that are not subject to halibut PSC limits in Federal fisheries.

The State of Alaska has separate groundfish fisheries for pollock, Pacific cod, and Southeast Inside District DSR. These fisheries are often referred to as guideline harvest level (GHL) fisheries. GHL fisheries for Pacific cod and pollock occur within 3 nm of shore. The state DSR fishery occurs in the Southeast Inside District. The state has full management authority extending throughout the EEZ for black rockfish (*Sebastes melanops*) and blue rockfish (*S. mystinus*) not covered by a federal FMP.

The GHL pollock fishery is located in Prince William Sound. The directed pelagic trawl season for the Prince William Sound (PWS) Management Area's Inside District typically opens January 20. In 2010, the guideline harvest level (GHL) was set at 3.64 million pounds. The Inside District is divided into three sections: Hinchinbrook, Knight Island, and Bainbridge with harvest from any section limited to 60% of the GHL. The Hinchinbrook Section closed February 25 with a harvest of 1.98 million lb or 54.5% of the GHL. The directed pelagic trawl pollock season in the Knight Island and Port Bainbridge Sections of the PWS Management Area were closed on March 3, 2010 for the remainder of the calendar year.

State-waters fisheries for Pacific cod began in 1997 in the Prince William Sound, Cook Inlet, Chignik, Kodiak, and the South Alaska Peninsula districts. Vessels participating in the South Alaska Peninsula and Chignik areas are limited to no more than 58 feet in length. Catches are allocated on a percentage basis to

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[27] Federal Register / Vol. 76, No. 40 / Tuesday, March 1, 2011

various gear types. Guideline harvest limits (GHLs) for each of the 5 state-waters district are set by ADF&G as a percentage (2.25% to 15%) of the GOA Pacific cod allowable biological catch (ABC) set by the NPFMC for federal fisheries. If the GHL is attained it may be increased in increments of the ABC in successive years. Pacific cod are also harvested under state regulations in Southeast Alaskan waters independent of the federal fishery.

The State of Alaska established Pacific cod GHL fisheries in 2011 for the Kodiak, Chignik, and South Alaska Peninsula areas. Legal gears in these fisheries are pot, mechanical jig, and hand troll gear. The Prince William Sound Pacific cod fishery allows pot, jig, and longline gear to be used. The State of Alaska also has management authority over Pacific cod in the state waters of Southeast Alaska.

In 1998 management jurisdiction for black and blue rockfish was transferred to the State of Alaska. In the pelagic shelf rockfish assemblage, management emphasis is placed on black rockfish as it is the only species in this group with directed fisheries in state waters.

Fisheries targeting black rockfish occur in Kodiak, Chignik and the South Alaska Peninsula in the Westward region, in Lower Cook Inlet in Central Region, and in Southeast Alaska. Pelagic shelf or black rockfish may be harvested with hand troll or mechanical jig in all regions, and in Southeast Alaska dingle bar is an additional legal gear type.

3.3.3.1 Halibut Discards in State-water, State-managed Fisheries

Summary of Groundfish Regulations Groundfish are defined in State of Alaska regulation as all marine finfish except halibut, osmerids, herring, and salmonids (5 AAC 39.975(21)). State regulations require all commercially harvested fish species that are landed and sold, or that are retained for personal use, be recorded on an Alaska Department of Fish & Game (ADF&G) fish ticket (5 AAC 39.130). In addition, each person that is the first purchaser of or that first processes raw groundfish or halibut shall comply with all record-keeping and electronic reporting requirements through the eLandings System, an interagency (ADF&G, NMFS, and IPHC) electronic catch reporting application. The basic data consistently collected through the above record-keeping and reporting devices includes: harvester, harvest location, species, delivery condition, number and/or weight, and product disposition.

Unlike the regulatory reporting requirements for all commercially landed or retained fish, the State of Alaska has no regulatory requirement that fish discarded at sea (including those species taken as bycatch) be reported on a fish ticket. With the exception of vessel trips that are observed, with the catch fully reported on an ADF&G fish ticket, and IPHC stock survey fish tickets, there are very limited data available to assess halibut discards in State-water, State-managed fisheries. Halibut harvested incidentally in directed groundfish fisheries may be legally retained if the operator or another individual aboard the fishing vessel possesses halibut IFQ. Other data sources that could potentially aid halibut discard accounting include logbook requirements, which may include specific bycatch reporting (currently there are no State of Alaska logbook regulations requiring the specific recording of halibut bycatch discarded at sea during directed groundfish fisheries), agency surveys, or other opportunistic onboard observation of fishing operations.

In an effort to roughly approximate the amount of halibut that may be taken and potentially discarded during State-water, State-managed directed groundfish fisheries, fishery-independent data from two State-water (Southeast Alaska and Prince William Sound) sablefish longline surveys are provided. Fishery-independent data from a single State-water sablefish pot survey are also provided. Fishery-dependent information is provided for the Prince William Sound pilot skate longline fishery, which occurred during 2009 and 2010. Finally, information is presented from a limited number of observed fishing trips that have occurred in State-water, State-managed fisheries.

Southeast Alaska Sablefish Longline Survey The ADF&G sablefish longline survey is an annual survey that occurs in both Clarence Strait and Chatham Strait. The survey is designed to provide information on the relative abundance of sablefish in inside waters and biological information (age, weight, length, maturity) about the exploitable sablefish population. While the number of halibut brought onboard the vessel is recorded during this survey, length and weight information is not recorded since halibut are not the target survey species. Progress towards standardizing the survey has occurred throughout the years; in 1997 fishing at all survey stations began to consistently use standard hook spacing, charter only commercial longline vessels, use squid bait, and employ a three hour minimum soak time.

In Chatham Strait, the survey occurs in July with three vessels fishing a total of 44 stations in three different sections of the Strait. Each vessel fishes for approximately five days with three sets made per day. In Clarence Strait, the longline survey typically occurs in mid-May. This survey consists of 37 stations split between two vessels, which set between three to four stations per day. This survey typically takes six days of fishing. All fish taken during the sablefish longline survey are sold either on ADF&G's test fish ticket, or on the ticket of a permit holder participating in the survey.

Table 3-17 and Table 3-18 and Figure 3-37 and Figure 3-38 below show the sablefish catch (in numbers) relative to the halibut bycatch (in numbers of fish) from the Southeast Alaska sablefish longline survey from 2002-2010. In addition,

Table 3-19 and Figure 3-39 show the halibut catch per unit effort (CPUE), measured as the number of fish per standardized hook, from both Clarence and Chatham Strait.

Table 3-17. Number of halibut and sablefish caught in Clarence Strait during the Southeast Alaska sablefish longline survey, 2002-2010.

Year	Halibut	Sablefish
2002	583	9,039
2003	447	9,810
2004	314	9,474
2006	467	8,405
2007	586	8,001
2008	558	7,626
2009	748	6,278
2010	616	6,053
Grand Total	4,319	64,686

Table 3-18. Number of halibut and sablefish caught in Chatham Strait during the Southeast Alaska sablefish longline survey, 2002-2010.

Year	Halibut	Sablefish
2002	165	15,003
2003	83	16,147
2004	94	14,905
2005	120	18,087
2006	175	14,990
2007	148	15,942
2008	197	15,991
2009	249	15,431
2010	185	15,481
Grand Total	1,416	141,977

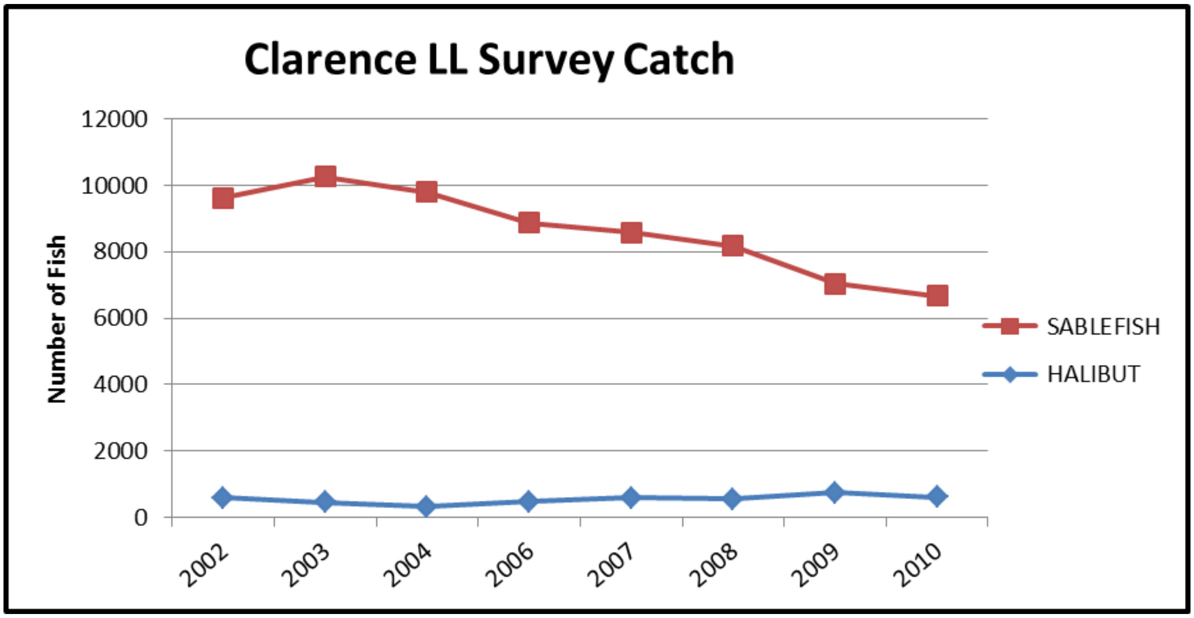

Figure 3-37 . Number of halibut and sablefish caught in Clarence Strait during the Southeast Alaska sablefish longline survey, 2002-2010.

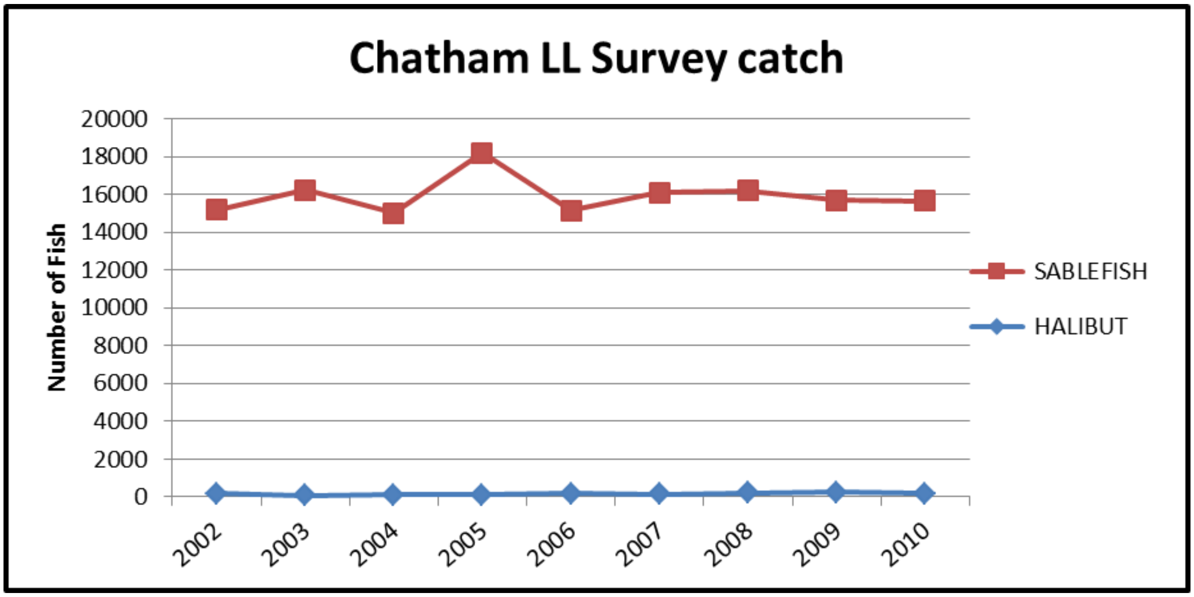

Figure 3-38. Number of halibut and sablefish caught in Chatham Strait during the Southeast Alaska sablefish longline survey, 2002-2010.

Table 3-19 Average halibut CPUE (number of fish per standardized hook) for the Southeast Alaska sablefish longline Survey, 2002-2010.

	Sablefish Longline Survey Halibut CPUE		
YEAR	Chatham	Clarence	Grand Total
2002	0.00337	0.01399	0.00827
2003	0.00169	0.01104	0.00598
2004	0.00192	0.00761	0.00452
2005	0.00248		0.00248
2006	0.00356	0.01127	0.00708
2007	0.00299	0.01422	0.00812
2008	0.00401	0.01360	0.00839
2009	0.00510	0.01807	0.01103
2010	0.00374	0.01500	0.00888
Grand Total	0.00321	0.01310	0.00745

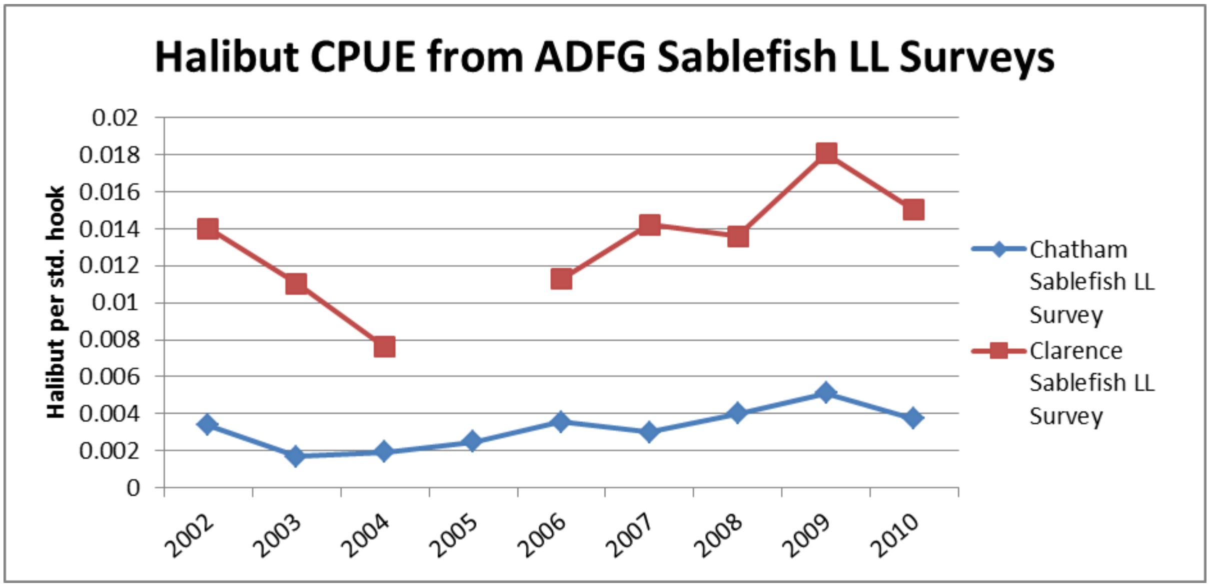

Figure 3-39. Average halibut CPUE (number of fish per standardized hook) for the Southeast Alaska sablefish longline survey, 2002-2010.

The halibut bycatch numbers provided above for the Southeast Alaska sablefish longline survey cannot be directly applied to the directed commercial sablefish fisheries in Chatham or Clarence Strait in order to arrive at a number of halibut discarded at sea in the State-water, State-managed commercial sablefish fishery due to a number of assumptions that would need to be made. These include:

- Halibut IFQ. Many State sablefish permit holders are also halibut IFQ holders and it is difficult to know when commercial sablefish fishers may have fully harvested their halibut IFQ. If fishermen have harvested their halibut quota before the Chatham/Clarence sablefish season opens, they may discard halibut; however, if they have halibut quota remaining, they may be making dual-target sablefish/halibut IFQ sets to retain halibut. The halibut IFQ season begins in March while the Chatham Strait longline season runs August 15-November 15 and the Clarence Strait longline season runs June 1 to August 15.
- Survey depth. The sablefish longline survey occurs in depths between approximately 200 fathoms and 400 fathoms. While overlap does occur, these depths are likely deeper than most halibut target depths.
- Location. The sablefish longline survey is designed to sample at fixed survey stations based on where the commercial sablefish catch occurs, not halibut catch.

Prince William Sound Sablefish Longline Survey While originally intended as an assessment survey, the Prince William Sound sablefish longline survey provided adequate information and data on ages, lengths and weights for sablefish in Prince William Sound. Central Region biologists from ADF&G plan to use this data in an age-structured model (along with other age data from fishery-dependent and fishery-independent sources and mark-recapture data).Because of issues related to funding and the fact that this longline survey was unable to be used for its intended assessment work, the Prince William Sound sablefish longline survey was discontinued after 2006.

The PWS sablefish longline survey area was divided into four quadrants. Stations within each quadrant were randomly sampled and stratified by depth. The northwest quadrant was sampled every year and therefore provides the best time series and most typifies where the commercial sablefish fishery occurred. Similar to the Southeast Alaska sablefish longline survey, halibut numbers (but not lengths and weights) were recorded during the time the Prince William Sound sablefish longline survey was conducted. All halibut caught during the survey were immediately returned to the water. Table 3-20 and Figure 3-40 summarize the total number of halibut and sablefish caught during the longline survey (all quadrants). Table 3-21 and Figure 3-41 summarize the catch and average CPUE for halibut and sablefish caught in the northwest quadrant.

Table 3-20. Number of halibut and sablefish caught during the Prince William Sound sablefish longline survey, 1998-2006.

Year	Halibut	Sablefish
1998	975	2,698
1999	783	2,460
2000	571	3,299
2001	379	2,739
2002	391	1,598
2003	338	1,973
2004	555	1,617
2005	563	1,177
2006	894	1,696
Grand Total	5,449	19,257

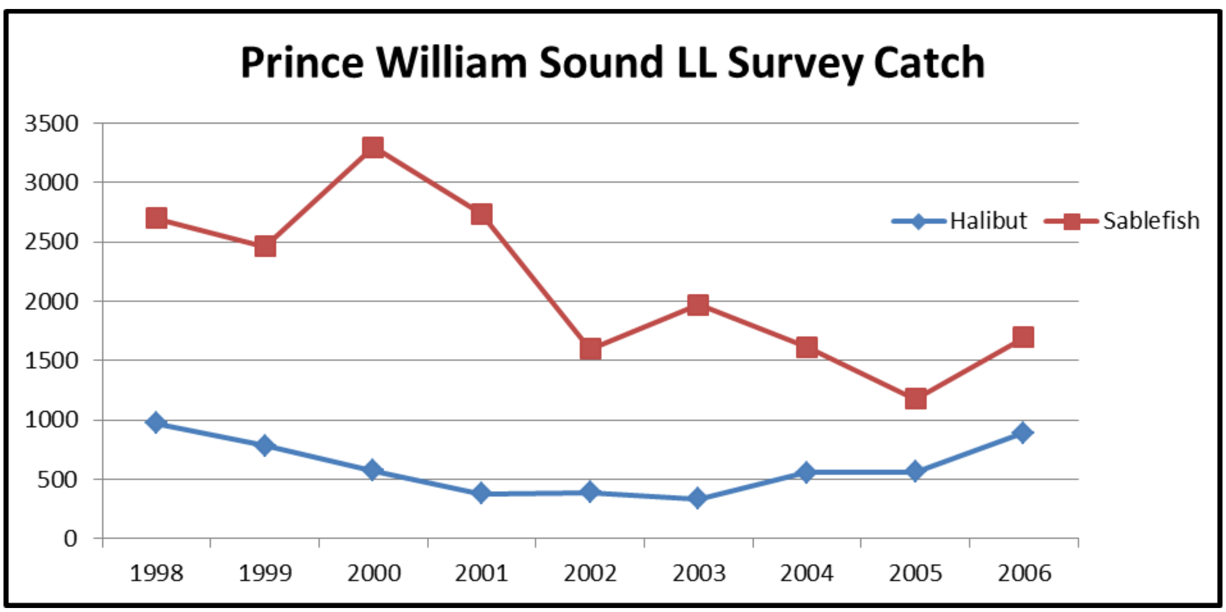

Figure 3-40. Number of halibut and sablefish caught during the Prince William Sound sablefish longline survey, 1998-2006.

Table 3-21 Catch and average CPUE for sablefish and halibut from the northwest quadrant during the Prince William Sound sablefish longline survey, 1998-2006.

Year	Sablefish Catch	Average Sablefish CPUE[a]	Halibut Catch	Average Halibut CPUE[a]
1998	1,473	4.05	487	1.33
1999	1,585	5.39	448	1.51
2000	2,057	6.12	204	0.61
2001	2,112	6.35	244	0.73
2002	1,227	3.23	328	0.87
2003	1,973	4.58	338	0.78
2004	1,617	4.34	555	1.33
2005	657	2.30	288	1.03
2006	846	3.75	472	2.08

[a] CPUE adjusted for the number of ineffective hooks.

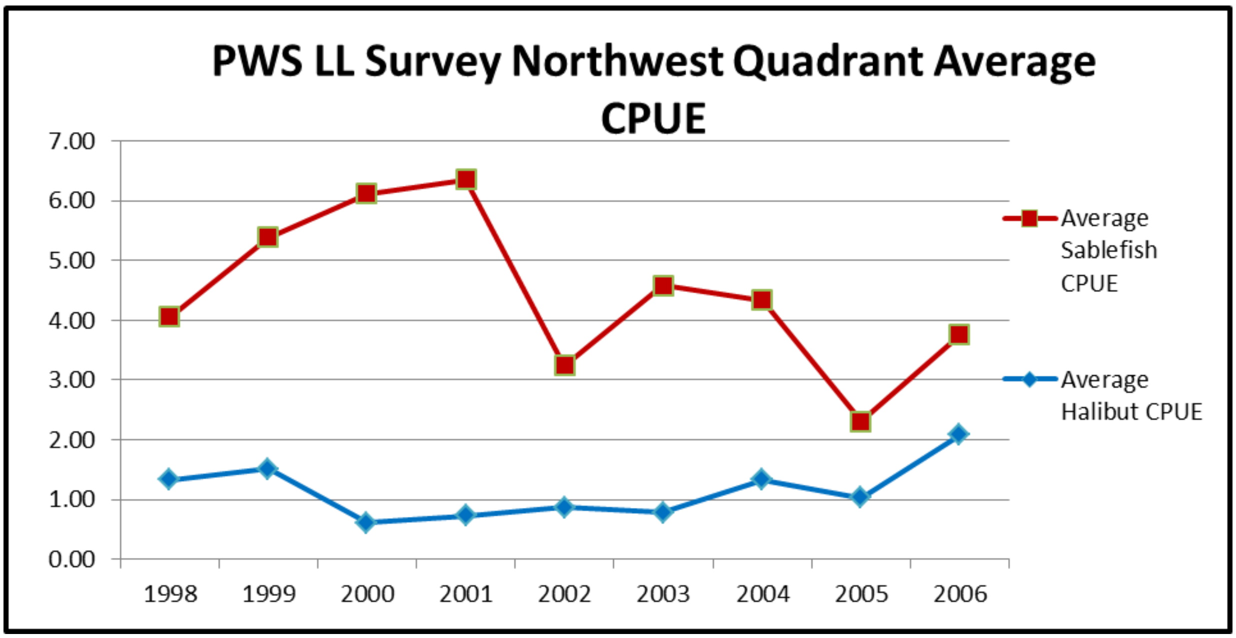

Figure 3-41. Average CPUE for sablefish and halibut caught in the northwest quadrant during the Prince William Sound sablefish longline survey, 1998-2006.

As with the Southeast Alaska sablefish longline survey, halibut catch numbers from the Prince William Sound sablefish longline survey cannot be directly applied to the directed sablefish fishery in Prince William Sound in order to estimate the number of halibut discarded at sea.

Prince William Sound Sablefish Pot Survey In 2011, a tagging mark-recapture project commenced in Prince William Sound with the goal of providing details on sablefish movement. Specifically, the project is being conducted to gather details on the emigration and immigration of sablefish and the extent of movement that occurs within Prince William Sound and between Prince William Sound and the outside waters of the Gulf of Alaska. If there is free and frequent movement of sablefish between Prince William Sound and the waters of the Gulf of Alaska, the federal stock assessment that occurs in the Gulf of Alaska and Bering Sea-Aleutian Islands may provide an adequate assessment of the Prince William Sound component of the population. However, if there is only minor and/or infrequent movement of sablefish between Prince William Sound and the Gulf of Alaska, a Prince William Sound-specific assessment may be warranted to adequately determine the status of sablefish in Prince William Sound.

Using baited longline pot gear aboard a chartered fishing vessel, the survey was conducted in March 2011 with a total of 1,203 sablefish tagged at 12 different locations throughout Prince William Sound. While this project focuses on tagging and documenting movement patterns of sablefish in Prince William Sound, the number of halibut caught incidentally during the survey was recorded. **Table 3-22** below provides a summary of this information. This was the first year of the Prince William Sound sablefish pot survey and it is hoped that this project will continue for the next two to three years so that tag-recapture information can be incorporated into an existing sablefish movement model. With this project, the ultimate goal is to follow the program for sablefish in Southeast Alaska where age-structured data can be combined with tag-recapture data to build a model appropriate for assessment purposes.

Table 3-22. Number of halibut caught during the Prince William Sound sablefish pot survey, 2011.

Number of Pots Deployed	Number of Halibut
22	5
15	1
22	3
22	4
39	2
32	7
32	4
14	0
18	0
24	0
38	0
32	0
Grand Total 310	26

Prince William Sound Pilot Skate Longline Fishery

In 2009 and 2010, a pilot skate longline fishery opened concurrent with the IFQ halibut fishery in Prince William Sound (March 21 in 2009 and March 6 in 2010). These seasons extended through April 30 unless closed by emergency order. Registration for this fishery occurred via a Commissioner's Permit. Management measures under this type of permit included logbooks, reporting requirements, and accommodation of department observers.

Guideline Harvest Levels (GHLs) for the pilot skate longline fishery were derived by applying the running five-year average exploitation rate from the federal skate assessment model in the Bering Sea to biomass results from data collected during the ADF&G multi-species trawl survey in Prince William Sound Inside District waters. Those biomass estimates were then expanded to the commercial fishing area of the Inside District and to the fishable waters of the Outside District. In 2010, a trip limit of 2,500 lbs of big skate per two consecutive day period was implemented to improve management of the fishery for the relatively low big skate GHLs.

In 2009, nine vessels participated in the directed skate fishery with 17 landings. In 2010, six vessels participated in the directed fishery with 16 landings. Vessel logbook data from the 2009 pilot skate fishery indicates that a total of 112 sets were made (combined Inside and Outside Districts). Department personnel observed the retrieval of 18 of these sets. Vessel logbook data from the 2010 pilot skate fishery indicates that a total of 93 sets were made (combined Inside and Outside Districts). Department personnel observed the retrieval of 52 of these sets. Table 3-23 provides a summary of the big skate, longnose skate, and halibut catch abundance during observed fishery sets. Table 3-24 provides a summary of the GHL and total skate harvest from the directed skate fishery area (includes skate bycatch to other directed fisheries) and the estimated halibut catch during this fishery using the number of halibut per pound derived in the previous table. In 2010, halibut were retained by participants with halibut IFQ.

Table 3-23. Total skate harvest, in pounds and numbers, and number of halibut caught as bycatch during observed sets of the Prince William Sound pilot skate longline fishery, 2009-2010.

		Skate Species[a]				Halibut		
	Number of	Big		Longnose		Number		Ratio to
Year	Hooks	Number	Pounds	Number	Pounds	Total	CPUE[b]	Skate (lb)[c]
2009	27,350	708	27,187	818	8,180	959	0.035	0.027
2010	66,347	1,503	52,304	1,755	17,532	2,428	0.037	0.035
Total	93,697	2,211	79,492	2,573	25,712	3,387	0.036	0.032

[a] Skate pounds were derived from the average weight of sampled skates.
[b] Catch per unit effort (CPUE) equals the number of halibut per hook.
[c] Ratio of the number of halibut to total pounds of skates.

Table 3-24. Total skate harvest (in pounds) and number of halibut caught as bycatch during the Prince William Sound pilot skate longline fishery, 2009-2010.

Year	Skate Species	Inside and Outside District Total GHL (lb)	Inside and Outside District Total Harvest (lb)	Combined Skate Harvest (lb)	Total Estimated # Halibut Caught
2009	Big	50,000	130,013	258,379	7,006
	Longnose	250,000	128,366		
2010	Big	50,000	26,572	104,510	3,633
	Longnose	265,000	77,938		
Grand Total		615,000	362,889		10,640

Observed Pacific Cod Fishing Trips Some ADF&G regulations provide the Commissioner with the authority to require observers for certain fisheries. In addition, ADF&G observers may be accommodated aboard vessels with the captain’s consent. ADF&G staff has observed Pacific cod fisheries in State waters, opportunistically and infrequently, to collect data on fishery location, fishing methods, CPUE, and catch composition (particularly Tanner crab bycatch). All catch is identified and enumerated, including Pacific halibut. Between 1997 and 2009, ADF&G observers were placed aboard vessels targeting Pacific cod with pot gear in the Cook Inlet area. A total of 21 fishing days were observed encompassing a total of 1,391 pot lifts. Within these pots, a total of 102 halibut were caught, equating to an average halibut CPUE of 0.05.

3.3.4 Impacts on Groundfish and Groundfish Fishery

3.3.4.1 Alternative 1: Status quo

3.3.4.1.1 Biological Impacts

No change in halibut PSC limits in the groundfish fisheries result in continued underages of certain groundfish TACs. As groundfish abundances increase, particularly for Pacific cod and flatfish species, these static levels do not allow attainment of OY for those stocks; however those underages contribute to the respective biomasses and potential increases in TACs. Appendix 4 considers the status of individual groundfish stocks in greater detail. Consideration of changes to groundfish TACs as a result of 2011 GOA groundfish trawl surveys will occur during Council deliberations of final GOA groundfish harvest specifications for 2012/2013.

3.3.4.1.2 *Economic Impacts*

The status quo halibut PSC management in the GOA currently sets limits for the SEO DSR fishery, hook-and-line vessels fishing for groundfish species other than DSR (sablefish is exempt), and vessels using trawl gear. Maintaining the status quo will not impose regulations or changes that will result in the groundfish fleet modifying their behavior, and changes in net benefits to the Nation cannot be attributed to maintaining the status quo.

Hook-and-line vessels fishing for DSR in the SEO District will be allowed to take 10 mt of halibut PSC. This limit has not been enforced because of unreliable PSC estimates in that fishery. Participants are expected to have increased observer coverage, if the restructured observer program is implemented in 2013. After observer coverage is increased and the data are verified, it is likely that NOAA Fisheries staff would have improved information which may allow them to enforce the 10 mt limit.

Data currently available do not allow reliable quantitative estimates of the economic impacts of enforcing the 10 mt PSC limit apportionment. However, in recent years the majority of the DSR catch has been taken incidentally in the halibut fishery. Those halibut landings do not accrue against the PSC limit. Reduced halibut IFQ available in Area 2C will reduce the amount of DSR that may be taken as incidental catch and sold. If the amount of DSR taken in the directed DSR fishery increases and the halibut PSC limit is enforced, it is possible that halibut PSC could be a constraint under the status quo in the future. Since the alternatives under consideration will reduce halibut PSC available to the DSR fishery by only 1 mt, the effect of this action on that fishery is expected to be small.

The non-DSR hook-and-line fishery participants primarily use their halibut PSC limit in the directed Pacific cod fishery. The 290 mt of halibut PSC available to the fishery has resulted is an early closure preventing the Pacific cod TAC from being taken in three of the eight years from 2003 through 2010. These closures generally occurred in the third season, in large part, because the 86 percent apportionment of the total PSC limit to the first season has been adequate to support fishing in the first and second seasons (since the first season surplus is rolled over to subsequent seasons). By the third season, halibut PSC by the sector may exceed the amount available, including both the third season apportionment and rollovers from previous seasons, in which case the fishery must be closed.

Pacific cod TAC increases expected in the near future may result in closures of the hook-and-line Pacific cod fisheries with TAC still available. The fleets' abilities to harvest the TACs will depend on their capacities to implement measures to reduce halibut PSC catch per metric ton of Pacific cod. In the catcher vessel fleet, the large number of current participants and latent groundfish licenses will make agreement on and adherence to measures virtually impossible. Catcher processors have already formed a cooperative among all but one eligible vessel. That cooperative structure has already allowed that fleet to implement measures that have reduced halibut discard mortality (both through decreasing the discard mortality rate and avoiding halibut catches). Implementing additional measures may be possible, but are likely to be challenging, as the low cost, more apparent halibut PSC saving measures are generally already in place.

The large majority of the overall GOA trawl halibut PSC limit (1,700 mt of 2,000 mt) is divided between the deep-water complex (800 mt)[28] and shallow water complex (900 mt) during the first four trawl seasons. The remaining 300 mt are released during the fifth season for use in either the shallow-water or deep-water complex. Both the deep-water complex and the shallow-water complex are often closed during the year as result of taking the available halibut PSC limit. Closures that occur before the TAC is taken result in reduction in gross revenue and likely net revenue for the fleets (and, for the catcher vessel fleet, their associated processors). Members of industry typically fish species with the greatest economic value first, in part, to ensure that halibut PSC is available. As the more valuable fisheries close, the fleet moves to other fisheries that may generate lower net revenues. In a typical fishing year, the fleet will begin the year fishing for Pacific cod. Increases in the Pacific cod TAC will require more of the halibut PSC limit to be used by the

[28] This limit will be reduced by 27.4 mt because of the proposed Rockfish Program. An additional 191.4 mt will only be available to Rockfish Program participants as a direct allocation. If any of the 191.4 mt is unused on November 15th, 55 percent of that amount is added to the fifth season total. The remaining 45 percent is not available for use.

inshore sector in the shallow-water complex, all else being equal, as that sector has been limited by halibut in the Pacific cod fishery the past. Less halibut will then be available later in the season (or year) for species like shallow-water flatfish (which is fished throughout the year) and arrowtooth flounder and rex sole (which is fished during the fifth season). It is assumed that all of the pollock TAC will continue to be harvested, as any pollock that remains unharvested after the halibut PSC limit is taken may be taken by the pelagic trawl fleet. Pollock is primarily taken by the inshore sector, because of inshore/offshore regulations.[29]Under the status quo, some members of the industry have attempted to implement measures that would reduce the halibut PSC. Their inability to control the actions of all participants has hindered their efforts. Other efforts to modify gear to reduce the amount of halibut caught with trawl gear are ongoing. Industry will need to incur additional expense and invest more time before it will be determined if those actions are successful.

Overall, it is expected that both the trawl and hook-and-line sectors will continue to use all or almost all of their halibut PSC limits. Removing that 2,273 mt of halibut from the GOA under the status quo will reduce the amount of halibut that is available to the IFQ halibut fleet and the charter halibut fishery. Other halibut users will be unaffected, as long as the reductions are absorbed by the IFQ and guided sport fleet. Most of the impacts will occur in Areas 3A and 3B, where the majority of the halibut PSC is taken. For further details on the economic impacts of the halibut resource see Section 4.6.2.

3.3.4.2 Alternative 2: Reduce Halibut PSC Limits

3.3.4.2.1 Biological Impacts

Reducing halibut PSC limits in the groundfish fisheries as proposed under Alternative 2 would result in potential increased underages of certain groundfish TACs. As noted above for static PSC limits the expected effect on the groundfish stocks of reduced PSC limits is further increase in groundfish biomasses and potentially on those respective TACs. Appendix 4 considers the status of individual groundfish stocks in greater detail. Consideration of changes in groundfish TACs as a result of 2011 GOA groundfish trawl surveys occurred during Council deliberations of final GOA groundfish harvest specifications for 2012/2013.

As reported by the NPRB[30], incidental catch of undesirable species leads to increased costs of fishing operations and decreases its sustainability. If this source of removals is not adequately monitored, it increases the uncertainty concerning total fishing-related mortality, which in turn makes it more difficult to assess the status of stocks. Also, concentrated discards can result in localized environmental degradation, and hampers growth of that stock and limits future catch. The problem is complex because actions taken to reduce the PSC of one species may increase that of another, and efforts to reduce mortality typically change the distribution of the net benefits from the fisheries.

The attainment of PSC limit apportionments in both trawl and longline directed groundfish fisheries have resulted in closures of these fisheries before TACs have been reached (the economic effects of such actions are addressed in Section 4.6.3). Because of these anticipated early closures the Council has a customary practice to set several GOA groundfish TACs at levels lower than their respective ABCs (also known as ACLs) would have allowed, principally for flatfish stocks (Appendix 4).[31]

In the GOA, the fisheries taking the most halibut PSC are the Pacific cod trawl and longline fisheries, the shallow-water flatfish complex and arrowtooth flounder trawl fisheries, and the rockfish trawl fishery. In some target fisheries, PSC allowances are not typically fully utilized while other fisheries are ‘typically’ closed prior to attainment of the target TAC (e.g., deep water flatfish, arrowtooth flounder), after fully

[29] In addition, the Central GOA rockfish fishery (which is not subject to this action) will likely continue to be able to harvest its entire allocation, given that the fishery is subject to a separate halibut PSC limit that is unlikely to constrain its harvests.

[30] http://www.nprb.org/documents/foundation/Part%20II/fish_inverts/Bycatch%20Reduction.pdf

[31] Note that the GOA Groundfish FMP (or Congressional statute) does not place a constraint on OY, as occurs under a 2,000 mt OY cap in the BSAI Groundfish FMP and federal law.

utilizing the PSC allocation. Therefore, fluctuations in groundfish TACs are not likely to result in fluctuations in halibut removals beyond these PSC limits.

GOA flathead sole, rex sole and deepwater flatfish stocks are fished very lightly, in part due to current halibut PSC limits. Reducing halibut PSC limits for these stocks under Alternative 2 likely would have minimal effect on the biomasses of these stocks. It would be hard to tell how much reduction in catch would occur because halibut PSC in the targeted fisheries does not appear to scale directly with catch (W. Stockhausen pers. commun.).

3.3.4.2.2 Economic Impacts[32]

Persons and businesses that rely on the SEO DSR fishery, hook-and-line fisheries targeting groundfish species other than DSR and sablefish (which is exempt), and trawl fisheries, which are currently limited by halibut PSC limits may experience reduced gross revenue and increased costs if halibut PSC limits are currently a constraint and they are decreased further. Negative economic impacts also would be realized by communities whose residents participate in fisheries affected by reductions in halibut PSC limits, and are the home port for harvesting vessels or fish processors. They also would be negatively affected if reduced groundfish catch causes state and local taxes in their community to decrease.

Decreasing the amount of halibut PSC in groundfish fisheries would have beneficial impacts on persons and businesses that harvest, process, or consume halibut, as well the halibut female spawning biomass. The discussion of the impacts will primarily focus on halibut harvested by two groups:

1) Guided sport that operate in Areas 2C and 3A
2) Commercial IFQ sectors that operate in Areas 2C, 3A, and 3B.

Other users of halibut are assumed to have minimal impacts given the range of the reductions considered (0 to 15 %) and the fact that projected O26 PSC, projected unguided sport catch, projected O26 commercial wastage, and projected personal use are deducted from the total CEY prior to the IPHC setting the (pending) combined charter and commercial catch limit (**Figure 3-42**). Deducting those removals prior to determining the combined catch limit means that any change in the total CEY will be divided among those two sectors. This assumes that no change in the projected unguided sport catch, projected O26 commercial wastage, and projected personal removals would occur as a result of the proposed action. For further details on the impacts of proposed action on the halibut fisheries see Section 4.6.2

A PSC limit in a fishery is essentially a common property quota. Although the purpose is to limit PSC, the effect of the cap is to create a quota that accommodates unavoidable incidental catches, but strictly forbids the retention of certain species by the participants in the target fishery. Access to a PSC limit is highly competitive. The PSC limit for a fishery can become an effective limit on the target fishery, and may prevent the TAC from being completely harvested. This situation sets up “perverse” economic incentives that encourage individual vessels to “race” to catch their intended target species before the fishery’s collective PSC limit is taken and the fishery closed. This race results in abnormally high capture rates, excessively rapid catch of PSC and the early closure that participants fear. PSC limits can quickly lead to numerous and expensive groundfish fishing closures. These closures have economic impacts on hook-and-line and non-pelagic trawl fisheries in the GOA. Closure of these fisheries has resulted in an economic loss estimated to be in the tens of millions of dollars in groundfish fishing revenues, based on the amount of groundfish TAC that remained unutilized.

[32] This section was adapted from NMFS (2008)

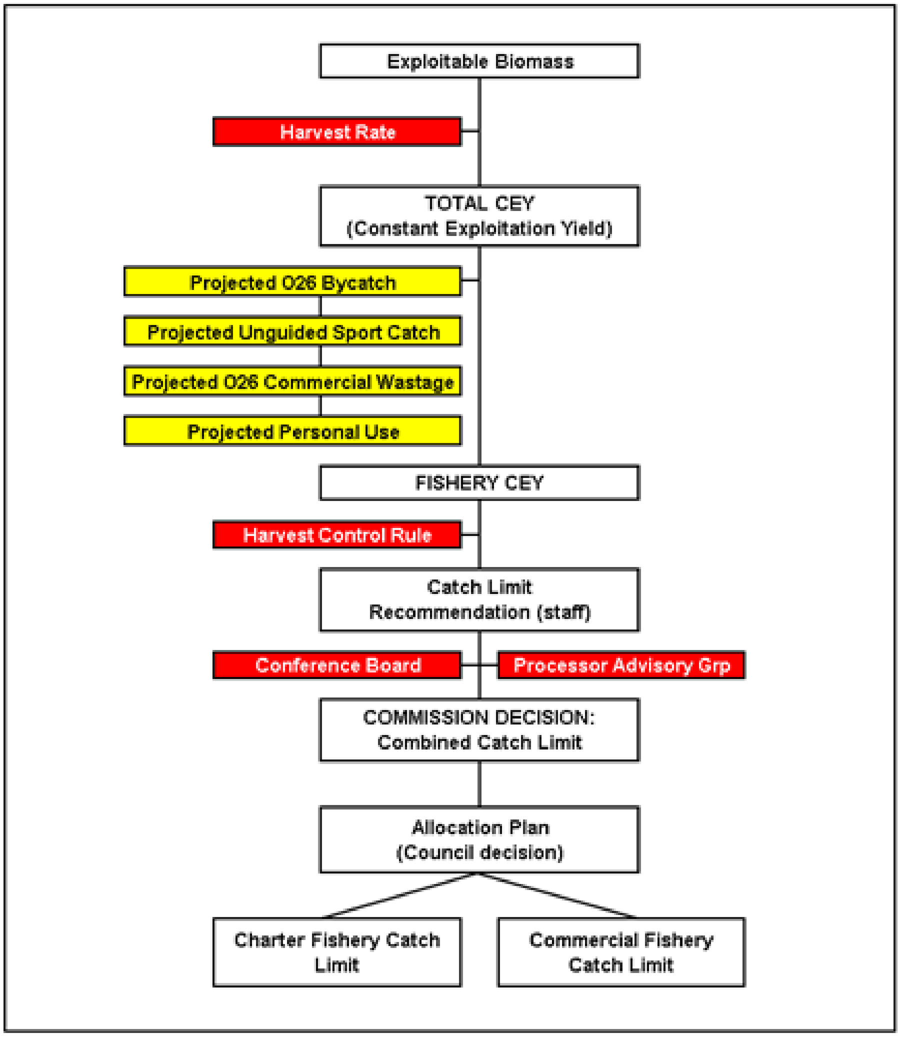

Figure 3-42 IPHC process for setting combined commercial and charter catch limit under proposed Pacific Halibut Catch Sharing Plan (Source: IPHC)

The "race for the fish," and attendant high PSC capture rates, occur because the competition created by PSC limits do not encourage individual fishing operations to take full account of their actions when they make fishing decisions (a "common property externality"). An operation that fishes with high rates of associated PSC ("dirty" fishing); seeking only to maximize its target catch rate, obtains a benefit that accrued to it alone: a larger share of the total groundfish catch (i.e., increased catch per unit effort, lower cost per unit catch). But, the operation does so by hastening the closure of the groundfish fishery. If the closure came before the target groundfish TAC was fully caught, society incurs a cost associated with the value of the foregone groundfish (unharvested TAC). The operation that was fishing dirty would bear some small share of this cost, but much of it would be distributed across other operations in the fishery. However, the dirty operation realizes a direct economic benefit from its actions and offsets its share of this cost through its higher catch per unit of effort (CPUE) as compared to clean fishermen in the fleet. By shifting a large part of its "net" PSC costs to other operations, a dirty operation has no incentive to control PSC rates.

If all the operations in a targeted groundfish fishery controlled their PSC, the fishery could operate longer and produce larger volumes of fish for the participants. However, an operator that chose not to control PSC while all others did would be able to "free ride" on the efforts of those fishermen that incurred the cost of PSC controls. This creates a perverse incentive structure that effectively subverts PSC reduction efforts by any single operation. Without appropriate incentives for an individual operation, a group of fishermen will fail to take actions that would have positive net benefits for them as a group. For more information on the impacts to the groundfish fisheries see Section 4.6.3.

3.4 Marine Mammals

A number of concerns may be related to marine mammals and potential impacts of groundfish fishing, although none are identified in this analysis for the proposed action. For individual species, these concerns include—

- listing as endangered or threatened under the Endangered Species Act (ESA);
- protection under the Marine Mammal Protection Act (MMPA);
- announcement as candidate or being considered as candidates for ESA listings;
- declining populations in a manner of concern to state or federal agencies;
- experiencing large bycatch or other mortality related to fishing activities; or
- being vulnerable to direct or indirect adverse effects from some fishing activities.

Marine mammals have been given various levels of protection under the GOA Groundfish FMP and are the subjects of continuing research and monitoring to further define the nature and extent of fishery impacts on these species. The Alaska groundfish harvest specifications EIS (NMFS 2007a) provides the information regarding fisheries interactions with marine mammals. The most recent status information is available in the 2010 Marine Mammal Stock Assessment Reports (SARS) (Allen and Angliss 2011).

Marine mammals, including those currently listed as endangered or threatened under the ESA, that may be present in the action area are listed in Table 3-25. All of these species are managed by NMFS, with the exception of the northern sea otter, which is managed by U.S. Fish and Wildlife Service. ESA Section 7 consultations with respect to the actions of the federal groundfish fisheries have been completed for all of the ESA-listed species, either individually or in groups. Of the species listed under the ESA and present in the action area, several species may be adversely affected by commercial groundfish fishing. These include Steller sea lions, humpback whales, fin whales, and sperm whales (NMFS 2006a and NMFS 2010a). In 2000, a Biological Opinion concluded that the FMPs are likely to jeopardize the continued existence of the Western distinct population segment (DPS) of Steller sea lions and adversely modify its designated critical habitat (NMFS 2000). In 2001, a Biological Opinion was released that provided protection measures that did not jeopardize the continued existence of the Steller sea lion or adversely modify its designated critical habitat; that opinion was supplemented in 2003.

Table 3-25 Marine mammals likely to occur in the Gulf of Alaska

	Species	Stocks
NMFS Managed Species		
Pinnipedia	Steller sea lion*	Western U.S (west of 144° W long.) and Eastern U.S. (east of 144° W long.)
	Northern fur seal**	Eastern Pacific
	Harbor seal	Southeast Alaska, Gulf of Alaska, Bering Sea
	Ribbon seal	Alaska
	Northern elephant seal	California
Cetacea	Beluga Whale*	Cook Inlet
	Killer whale	Eastern North Pacific Northern Resident, Eastern North Pacific Alaska Resident, Eastern North Pacific GOA, Aleutian Islands, and Bering Sea transient, AT1 transient**, West Coast Transient
	Pacific White-sided dolphin	North Pacific
	Harbor porpoise	Southeast Alaska, Gulf of Alaska, and Bering Sea
	Dall's porpoise	Alaska
	Sperm whale*	North Pacific
	Baird's beaked whale	Alaska
	Cuvier's beaked whale	Alaska
	Stejneger's beaked whale	Alaska
	Gray whale	Eastern North Pacific
	Humpback whale*	Western North Pacific, Central North Pacific
	Fin whale*	Northeast Pacific
	Minke whale	Alaska
	North Pacific right whale*	North Pacific
	Blue whale*	North Pacific
	Sei whale*	North Pacific
USFWS Managed Species		
Mustelidae	Northern sea otter*[3]	Southeast Alaska, Southcentral Alaska, Southwest Alaska

Source: Allen and Angliss 2011.
*ESA-listed species; **Listed as depleted under the MMPA.
[1] Steller sea lions are listed as endangered west of Cape Suckling and threatened east of Cape Suckling.
[2] NMFS designated critical habitat for the northern right whale on July 6, 2006 (71 FR 38277).
[3] Northern sea otters are under the jurisdiction of the USFWS

3.4.1 Marine Mammals Status

The GOA supports one of the richest assemblages of marine mammals in the world. Twenty-two species are present from the orders Pinnipedia (seals and sea lions), Carnivora (sea otters), and Cetacea (whales, dolphins, and porpoises). Some marine mammal species are resident throughout the year, while others migrate into or out of Alaska fisheries management areas. Marine mammals occur in diverse habitats, including deep oceanic waters, the continental slope, and the continental shelf (Lowry et al. 1982).

The PSEIS (NMFS 2004a) provides descriptions of the range, habitat, diet, abundance, and population status for marine mammals. The most recent marine mammal stock assessment reports for the strategic GOA marine mammal stocks (Steller sea lions, northern fur seals, harbor porpoise, North Pacific right whales, humpback whales, sperm whales, and fin whales) were updated in the 2010 SARs (Allen and Angliss 2011). Northern sea otters were assessed in 2008. The information from NMFS (2004a) and Allen and Angliss (2011) are incorporated by reference. The SARs provide population estimates, population trends, and estimates of the potential biological removal (PBR) levels for each stock.[33] The SARs also identify potential causes of mortality and whether the stock is considered a strategic stock under the MMPA.

The Alaska Groundfish Harvest Specifications EIS provides information on the effects of the groundfish fisheries on marine mammals (NMFS 2007a). Direct and indirect interactions between marine mammals and groundfish fishing vessels may occur due to overlap in the size and species of groundfish harvested in the fisheries that are also important marine mammal prey, and due to temporal and spatial overlap in marine mammal occurrence and commercial fishing activities. This discussion focuses on those marine mammals

[33] http://www.nmfs.noaa.gov/pr/pdfs/sars/ak2010.pdf

that may interact with or be affected by the GOA pollock fishery. These species are listed in **Table 3-26** and **Table 3-27**. Note that **Table 3-27** includes Southern Resident killer whales. This stock does not occur in the GOA, but this analysis considers the potential effects of Chinook salmon PSC in the GOA pollock fishery on prey availability for this population of killer whales. The GOA pollock fishery takes Chinook salmon from Pacific Northwest stocks, which are important prey for the Southern Resident killer whales. Additional background information is provided here on the status of ESA-listed species.

Steller sea lion

The Steller sea lion inhabits many of the shoreline areas of the GOA, using these habitats as seasonal rookeries and year-round haulouts. The Steller sea lion has been listed as threatened under the ESA since 1990. In 1997, the population was split into two stocks or DPS based on genetic and demographic dissimilarities, the Western and eastern stocks. Because of a pattern of continued decline in the Western DPS, was listed as endangered on May 5, 1997 (62 FR 30772), while the eastern DPS remains listed as threatened. NMFS is currently considering delisting the EDPS (75 FR 77602, December 13, 2010). The western DPS inhabits an area of Alaska approximately from Prince William Sound westward to the end of the Aleutian Island chain and into Russian waters (west of 144° W longitude).

Throughout the 1990s, particularly after critical habitat was designated, various closures of areas around rookeries, haulouts, and some offshore foraging areas were designated. These closures affect commercial harvests of pollock, Pacific cod, and Atka mackerel, which are important components of the western DPS of Steller sea lion diet. In 2001, a Biological Opinion was released that provided protection measures that would not jeopardize the continued existence of the Steller sea lion or adversely modify its designated critical habitat; that opinion was supplemented in 2003, and after court challenge, these protection measures remain in effect today (NMFS 2001, Appendix A). A detailed analysis of the effects of these protection measures is provided in the Steller Sea Lion Protection Measures Final Supplemental EIS (NMFS 2001).

In the GOA, extensive closures are in place for Steller sea lions including no transit zones and closures of critical habitat around rookeries and haulouts. Pollock is an important prey species for Steller sea lions (NMFS 2010b). The harvest of pollock in the GOA is temporally dispersed into 4 seasons (§ 679.23). Based on the most recent completed biological opinion, these harvest restrictions on the pollock fishery decrease the likelihood of disturbance, incidental take, and competition for prey to ensure the groundfish fisheries do not jeopardize the continued existence or adversely modify the designated critical habitat of Steller sea lions (NMFS 2000, NMFS 2001, and NMFS 2010b).

In 2006, NMFS reinitiated a FMP-level Section 7 consultation on the effects of the groundfish fisheries on Steller sea lions, humpback whales, and sperm whales to consider new information on these species and their interactions with the fisheries (NMFS 2006a). A draft Biological Opinion (BiOp) was released in July 2010 (NMFS 2010b). The draft opinion found that the effects of the groundfish fisheries may be likely to jeopardize the continued existence and adversely modify designated critical habitat (JAM) for Steller sea lions. The draft BiOp also found that the groundfish fisheries were not likely to jeopardize the continued existence of humpback or sperm whales. Because the draft BiOp found that the groundfish fisheries may cause JAM for Steller sea lions, a reasonable and prudent alternative (RPA) was included. The final BiOp was released in November 2010, and NMFS implemented the Steller sea lion protection measures in the RPA on January 1, 2011 (NMFS 2010b) by interim final rule (75 FR 77535, December 13, 2010, corrected 75 FR 81921, December 29, 2010). The RPA did not change the Steller sea lion protection measures in the GOA. Incidental take statements for Steller sea lions, humpback whales, fin whales, and sperm whales were completed on February 10, 2011 (Balsiger 2011).

Table 3-26 Status of Pinnipedia and Carnivora stocks potentially affected by the action.

Pinnipedia and Carnivora species and stock	Status under the ESA	Status under the MMPA	Population trends	Distribution in action area
Steller sea lion – Western (W) and Eastern (E) Distinct Population Segment (DPS)	Endangered (W) Threatened (E)	Depleted & a strategic stock	For the WDPS, regional increases in counts in trend sites of some areas have been offset by decreased counts in other areas so that the overall population of the WDPS appears to have stabilized (NMFS 2010a). The EDPS is steadily increasing and is being considered for delisting.	WDPS inhabits Alaska waters from Prince William Sound westward to the end of the Aleutian Island chain and into Russian waters. EDPS inhabit waters east of Prince William Sound to Dixon Entrance. Occur throughout AK waters, terrestrial haulouts and rookeries on Pribilof Islands, Aleutian Islands, St. Lawrence Island, and off the mainland. Use marine areas for foraging. Critical habitat designated around major rookeries, haulouts, and foraging areas.
Northern fur seal Eastern Pacific	None	Depleted & a strategic stock	Recent pup counts show a continuing decline in the number of pups surviving in the Pribilof Islands. NMFS researchers found an approximately 9% decrease in the number of pups born between 2004 and 2006. The pup estimate decreased most sharply on St. Paul Island.	Fur seals occur throughout Alaska waters, but their main rookeries are located in the Bering Sea on Bogoslof Island and the Pribilof Islands. Approximately 55% of the worldwide abundance of fur seals is found on the Pribilof Islands (NMFS 2007b). Forages in the pelagic area of the Bering Sea during summer breeding season, but most leave the Bering Sea in the fall to spend winter and spring in the N. Pacific.
Harbor seal – Gulf of Alaska	None	None	A moderate to large population decline has occurred in the GOA stock.	GOA stock found primarily in the coastal waters and may cross over into the Bering Sea coastal waters between islands.
Ribbon seal Alaska	None*	None	Reliable data on population trends are unavailable.	Widely dispersed throughout the Bering Sea and Aleutian Islands in the summer and fall. Associated with ice in spring and winter and may be associated with ice in summer and fall. Occasional movement into the GOA (Boveng et al. 2008)
Northern sea otters – SW Alaska	Threatened**	Depleted & a strategic stock	The overall population trend for the southwest Alaska stock is believed to be declining, particularly in the Aleutian Islands.	Coastal waters from Central GOA to W Aleutians within the 40 m depth contour. Critical habitat designated in primarily nearshore waters with few locations into federal waters in the GOA.

Source: Allen and Angliss 2011; List of Fisheries for 2011 (75 FR 68468, November 8, 2010).
Northern fur seal pup data available from http://www.alaskafisheries.noaa.gov/newsreleases/2007/fursealpups020207.htm.
*NMFS determined that ribbon seals were not to be listed on September 23, 2008. The Center for Biological Diversity and Greenpeace filed suit against NMFS regarding this decision on September 3, 2009.
**Northern sea otter information from http://www.nmfs.noaa.gov/pr/pdfs/sars/seaotter2008_ak_sw.pdf and 74 FR 51988, October 8, 2009

A detailed discussion of Steller sea lion population trends in the GOA is included in the most recent Biological Opinion (NMFS 2010b) and is summarized here. Based on non-pup counts of Steller sea lions on trend sites throughout the range of the western DPS in the GOA and Aleutian Islands, the overall population trend for the western DPS of Steller sea lions is stable and may be increasing, but the trend is not statistically significant. The number of non-pups counted at trend sites increased by12% between 2000 and 2008. However, counts increased by only 1% between 2004 and 2008 (DeMaster 2009). Population trends differ across the range of the western DPS. Non-pup counts have declined in the Aleutian Islands, with the decline being most severe in the west and becoming less of a decline towards the east (7% decline in Area 543, 1% to 4% decline in Areas 542 and 541; NMFS 2010b). Pup and nonpup counts in the remainder of the western DPS range are either stable or increasing, ranging from 0% to 5% increases in population growth from 2000 to 2008 (NMFS 2010b).

Table 3-27 Status of Cetacea stocks potentially affected by the action.

Cetacea species and stock	Status under the ESA	Status under the MMPA	Population trends	Distribution in action area
Killer whale – AT1 Transient, E N Pacific transient, W Coast transient, Alaska resident, Southern resident	Southern resident endangered; remaining stocks none	AT1 depleted and a strategic stock, Southern Resident depleted. The rest of the stocks: None	Southern residents have declined by more than half since 1960s and 1970s. Unknown abundance for the Alaska resident; and Eastern North Pacific GOA, Aleutian Islands, and Bering Sea transient stocks. The minimum abundance estimate for the Eastern North Pacific Alaska Resident stock is likely underestimated because researchers continue to encounter new whales in the Alaskan waters.	Southern resident do not occur in GOA. Transient-type killer whales from the GOA, Aleutian Islands, and Bering Sea are considered to be part of a single population.
Dall's porpoise Alaska	None	None	Reliable data on population trends are unavailable.	Found in the offshore waters from coastal Western Alaska throughout the GOA.
Pacific white-sided dolphin	None	None	Reliable data on population trends are unavailable.	Found throughout the GOA.
Harbor porpoise GOA	None	Strategic	Reliable data on population trends are unavailable.	Primarily in coastal waters in the GOA, usually less than 100 m.
Humpback whale – Western and Central North Pacific	Endangered and under status review	Depleted & a strategic stock	Increasing. The Structure of Populations, Levels of Abundance, and Status of Humpbacks (SPLASH) abundance estimate for the North Pacific represents an annual increase of 4.9% since 1991–1993. SPLASH abundance estimates for Hawaii show annual increases of 5.5% to 6.0% since 1991–1993 (Calambokidis et al. 2008).	W. Pacific and C. North Pacific stocks occur in GOA waters and may mingle in the North Pacific feeding area.
North Pacific right whale Eastern North Pacific	Endangered	Depleted & a strategic stock	This stock is considered to represent only a small fraction of its precommercial whaling abundance and is arguably the most endangered stock of large whales in the world. A reliable estimate of trend in abundance is currently not available.	Before commercial whaling on right whales, concentrations were found in the GOA, eastern Aleutian Islands, south-Central Bering Sea, Sea of Okhotsk, and Sea of Japan (Braham and Rice 1984). During 1965–1999, following large illegal catches by the U.S.S.R., there were only 82 sightings of right whales in the entire eastern North Pacific, with the majority of these occurring in the Bering Sea and adjacent areas of the Aleutian Islands (Brownell et al. 2001). Critical habitat near Kodiak Island in the GOA
Fin whale Northeast Pacific	Endangered	Depleted & a strategic stock	Abundance may be increasing but surveys only provide abundance information for portions of the stock in the Central-eastern and southeastern Bering and coastal waters of the Aleutian Islands and the Alaska Peninsula. Much of the North Pacific range has not been surveyed.	Found in the GOA, Bering Sea and coastal waters of the Aleutian Islands.
Beluga whale-Cook Inlet	Endangered	Depleted & a strategic stock	2008 abundance estimate of 375 whales is unchanged from 2007. Trend from 1999 to 2008 is not significantly different from zero.	Occurrence only in Cook Inlet.

Cetacea species and stock	Status under the ESA	Status under the MMPA	Population trends	Distribution in action area
Minke whale Alaska	None	None	There are no data on trends in Minke whale abundance in Alaska waters.	Common in the Bering and Chukchi Seas and in the inshore waters of the GOA. Not common in the Aleutian Islands.
Sperm whale North Pacific	Endangered	Depleted & a strategic stock	Abundance and population trends in Alaska waters are unknown.	Inhabit waters 600 m or more depth, south of 62°N lat. Widely distributed in North Pacific. Found year-round In GOA.
Baird's, Cuvier's, and Stejneger's beaked whale	None	None	Reliable data on population trends are unavailable.	Occur throughout the GOA.

Sources: Allen and Angliss 2011; List of Fisheries for 2011 (75 FR 68468, November 8, 2010); http://www.nmfs.noaa.gov/pr/species/mammals/cetaceans/spermwhale.htm. North Pacific right whale included based on NMFS (2006a) and Salveson (2008). AT1 Killer Whales information based on 69 FR 31321, June 3, 2004. North Pacific Right Whale critical habitat information: 73 FR 19000, April 8, 2008. For beluga whales: 73 FR 62919, October 27, 2008.

Northern Sea Otter

The southwest Alaska DPS of northern sea otter is listed as threatened under the ESA (70 FR 46366, August 9, 2005). This population segment ranges from the Western Aleutian Islands to the Central GOA. NMFS completed an informal consultation on northern sea otters in 2006 and found that the Alaska fisheries were not likely to adversely affect northern sea otters (Mecum 2006). The USFWS has determined that, based on available data, northern sea otter abundance is not likely to be significantly affected by commercial fishery interaction at present (Allen and Angliss 2010), and commercial fishing is not likely a factor in the population decline (70 FR 46366, August 9, 2005). Otters feed primarily in the rocky near shore areas on invertebrates, while groundfish fisheries are conducted further offshore on groundfish species (Funk 2003). Trawl closures where sea otters feed reduce potential interaction between trawl vessels and sea otters and ensure the clam habitat used by sea otters is not disturbed. Critical habitat for sea otters has been designated and is located primarily in nearshore waters (74 FR 51988, October 8, 2009), reducing the potential for effects by Federal fisheries. The USFWS is developing a recovery plan for the southwest Alaska DPS of northern sea otters.

Cook Inlet Beluga Whale

In 2008, the Cook Inlet DPS of beluga whales was listed as an endangered species under the ESA following a significant population decline. NMFS has identified more than one third of Cook Inlet as critical habitat. In 2010, NMFS estimated the Cook Inlet beluga whale population to be 340 individuals, up from the 2009 estimate of 321 whales, although the 10-year annual trend is still declining 1.1% per year. Historical abundance is estimated at approximately 1,300 whales (NMFS 2008). Cook Inlet belugas primarily occur in the northern portion of Cook Inlet. Beluga whales do not normally transit outside of Cook Inlet, and thus are unlikely to encounter vessels fishing in the federal groundfish fisheries. NMFS has determined that the only potential impact of the groundfish fisheries on Cook Inlet belugas is though competition for prey species (Brix 2010).

Southern Resident Killer Whale

The DPS of Southern Resident Killer Whales (SRKWs) was listed as endangered under the ESA on November 18, 2005 (70 FR 69903). SRKWs range from the Queen Charlotte Islands to Central California. The population declined from historical abundance estimates of 140-200 whales in the 1960s and 1970s to fewer than 90 whales in recent years, and was listed as endangered under the ESA in 2005. The stock is currently under a 5-year status review (75 FR 17377, April 6, 2010). Numerous factors have likely caused the decline, including a reduction in availability of preferred prey. SRKWs forage selectively for Chinook salmon which are relatively large compared with other salmon species, have high lipid content, and are available year-round (Ford and Ellis 2006). In inland waters, the diet of SRKWs consists of 82% Chinook salmon during May through September (Hanson et al. 2010). Stock of origin investigations have found that

SRKWs forage on Chinook salmon from the Fraser River, Puget Sound runs, and other Washington and Oregon runs. There have been recent observational reports of SRKWs in poor body condition (Durban et al. 2009). Ford et al. (2005) found a correlation between the reduction in Chinook salmon abundance off Alaska, British Columbia, and Washington and decreased survival of Northern and SRKWs. In 2009, NMFS released a Biological Opinion that evaluates the effects of the ocean salmon fisheries off Washington, Oregon, and California on SRKWs, and found that the proposed action is not causing jeopardy or adverse modification (NMFS 2009). NMFS is currently conducting a scientific review of new evidence that strongly suggests that Chinook salmon abundance is very important to the survival and recovery of SRKWs, which may have implications for salmon fisheries and other activities that affect Chinook salmon abundance.

3.4.2 Effects on Marine Mammals

3.4.2.1 Significance Criteria for Marine Mammals

Table 3-28 contains the significance criteria for analyzing the effects of the proposed action on marine mammals. These criteria are from the 2006–2007 groundfish harvest specifications environmental assessment/final regulatory flexibility analysis (EA/FRFA) (NMFS 2006b). These criteria are applicable to this action because the harvest specifications analysis analyzed the effects of groundfish fisheries on marine mammals. That EA/FRFA provided the latest ideas on determining the significance of effects on marine mammals based on similar information that is available for this EA/RIR. Significantly beneficial impacts are not possible with the management of groundfish fisheries as no beneficial impacts to marine mammals are likely with groundfish harvest. Generally, changes to the fisheries do not benefit marine mammals in relation to incidental take, prey availability, and disturbances; changes increase or decrease potential adverse impacts. The only exception to this may be in instances when marine mammals target prey from fishing gear, as seen with killer whales and sperm whales removing fish from HAL gear. In this example, the prey availability is enhanced for these animals because they need less energy for foraging.

Table 3-28 Criteria for determining significance of impacts to marine mammals

	Incidental take and entanglement in marine debris	Prey availability	Disturbance
Adverse impact	Mammals are taken incidentally to fishing operations or become entangled in marine debris.	Fisheries reduce the availability of marine mammal prey.	Fishing operations disturb marine mammals.
Beneficial impact	There is no beneficial impact.	Generally, there are no beneficial impacts.	There is no beneficial impact.
Significantly adverse impact	Incidental take is more than PBR or is considered major in relation to estimated population when PBR is undefined.	Competition for key prey species likely to constrain foraging success of marine mammal species causing population decline.	Disturbance of mammal is such that population is likely to decrease.
Significantly beneficial impact	Not applicable	Not applicable	Not applicable
Unknown impact	Insufficient information available on take rates.	Insufficient information as to what constitutes a key area or important time of year.	Insufficient information as to what constitutes disturbance.

3.4.2.2 Incidental Take Effects

The Alaska Groundfish Harvest Specifications EIS contains a detailed description of the incidental take effects of the groundfish fisheries on marine mammals (NMFS 2007a) and is incorporated by reference. Marine mammals can be taken in groundfish fisheries by entanglement in gear (e.g., trawl, longline, and pot) and, rarely, by ship strikes for some cetaceans. Table 5-5 of that document lists the species of marine mammals taken in the GOA pollock fishery during the most recent five years of observer data that have been analyzed (Allen and Angliss 2011). In addition to these species, the List of Fisheries for 2012[34] was published on November 29, 2011 (76 FR 73912). Marine mammals that are not listed in Table 3-29 are

[34] http://www.nmfs.noaa.gov/pr/pdfs/fr/fr76-73912.pdf

assumed to be unlikely to be incidentally taken by any of the alternatives due to the absence of incidental take and entanglement records. No records exist of Alaska groundfish fisheries takes of North Pacific right whales.

Table 3-29 Estimated mean annual mortality of marine mammals from observed GOA pollock fisheries compared to the total mean annual human-caused mortality and potential biological removal.

Marine mammal species and stock	5 years of data used to calculate total mean annual human-caused mortality	Mean annual mortality from GOA pollock fishery	Total mean annual human-caused mortality*	Potential biological removal
Steller sea lions (Western)	2004–2008	1.33 (CV: 0.66)	223.8	254
Dall's porpoise (GOA)	2002–2006	0.48 (CV: 0.70)	29.6	undetermined

* Does not include research mortality. Other human-caused mortality is predominantly subsistence harvests for sea lions.
Note: Mean annual mortality is expressed in number of animals and includes both incidental takes and entanglements. The averages are from the most recent 5 years of data since the last SAR update, which may vary by stock. Groundfish fisheries mortality calculated based on Allen and Angliss (2011).

3.4.2.2.1 Incidental Take Effects under Alternative 1: Status Quo

The effects of the status quo fisheries on incidental takes of marine mammals are detailed in the 2007 harvest specifications EIS (NMFS 2007a) and Allen and Angliss (2011). The potential take of marine mammals in the GOA groundfish fisheries is well below the PBRs or a very small portion of the overall human caused mortality for those species for which a PBR has not been determined (Table 5-5 of that document).

3.4.2.2.2 Incidental Take Effects under Alternative 2: Reduced PSC Limits

Alternative 2 may reduce the potential adverse effects of incidental takes on marine mammals compared to the status quo. Because Alternative 2 may further reduce halibut mortality in groundfish fisheries by possibly (but not necessarily) resulting in earlier closures of groundfish fisheries, it is not likely to cause adverse population level effects for marine mammals. Because Alternative 2 is not likely to result in adverse population level effects from the incidental take of marine mammals, the impacts of Alternative 2 on marine mammals is likely insignificant.

3.4.3 Harvest of Prey Species

The Alaska Groundfish Harvest Specifications EIS contains a detailed description of the effects of the groundfish fisheries on prey species for marine mammals (NMFS 2007a) and is incorporated by reference. Harvests of marine mammal prey species in the GOA groundfish fisheries may limit foraging success through localized depletion, overall reduction in prey biomass, and dispersion of prey, making it more energetically costly for foraging marine mammals to obtain necessary prey. Overall reduction in prey biomass may be caused by removal of prey or disturbance of prey habitat. The timing and location of fisheries relative to foraging patterns of marine mammals and the abundance of prey species may be a more relevant management concern than total prey removals. The GOA pollock fishery may impact availability of key prey species of Steller sea lions, harbor seals, northern fur seals, ribbon seals; and fin, minke, humpback, beluga, and resident killer whales. Animals with more varied diets (humpback whales) are less likely to be impacted than those that eat primarily pollock and salmon, such as northern fur seals. Interactions in the GOA pollock fishery more recently are described in NPFMC 2011. Table 3-30 shows the GOA marine mammal species and their prey species that may be impacted by GOA groundfish fisheries.

Table 3-30 Prey species used by GOA marine mammals that may be impacted by the GOA groundfish fisheries.

Species	Prey
Fin whale	Zooplankton, squid, fish (herring, cod, capelin, and pollock), and cephalopods
Humpback whale	Zooplankton, schooling fish (pollock, herring, capelin, saffron, cod, sand lance, Arctic cod, and salmon)
Beluga whale	Wide variety of invertebrates and fish including salmon and pollock
Killer whale	Marine mammals (transients) and fish (residents) including herring, halibut, salmon, and cod.
Ribbon seal	Cod, pollock, capelin, eelpout, sculpin, flatfish, crustaceans, and cephalopods.
Harbor seal	Crustaceans, squid, fish (including salmon), and mollusks
Steller sea lion	Pollock, Atka mackerel, Pacific herring, Capelin, Pacific sand lance, Pacific cod, and salmon

Sources: NOAA 1988; NMFS 2004a; NMFS 2007b; Nemoto 1959; Tomilin 1957; Lowry et al. 1980; Kawamura 1980; and http://www.adfg.state.ak.us/pubs/notebook/marine/orca.php

Several marine mammals may be impacted indirectly by any effects that fishing gear may have on benthic habitat. Table 3-31 lists marine mammals that may depend on benthic prey and known depths of diving. Diving activity may be associated with foraging. The EFH EIS provides a description of the effects of pollock fishing on benthic habitat (NMFS 2005a), including the effects of the pollock fishery in the GOA. Overall, effects from pelagic trawl fisheries are considered minimal. Trawl performance standards for the directed pollock fishery at 50 CFR 679.7(a)(14) reduce the likelihood of pelagic trawl gear use on the bottom. In the GOA, estimated reductions of epifaunal and infaunal prey due to fishing are less than 1 percent for all substrate types. For living structure, overall impacts ranged between 3 percent and 7 percent depending on the substrate. In some local areas where pollock aggregate, effects are greater.

Sperm whales are not likely to be affected by any potential impacts on benthic habitat from fishing because they generally occur in deeper waters than where the groundfish fishery is conducted (Table 3-31). Harbor seals and sea otters are also not likely to have any benthic habitat affected by the groundfish fishery because they occur primarily along the coast where fishing is not conducted. Cook Inlet beluga whales also are not likely to have benthic habitat supporting prey species affected by the groundfish fishery because they do not range outside of Cook Inlet and do not overlap spatially with the trawl fisheries.

Table 3-31 Benthic dependent GOA marine mammals, foraging locations, and diving depths

Species	**Depth of diving and location**
Ribbon seal	Mostly dive < 150 m on shelf, deeper off shore. Primarily in shelf and slope areas.
Harbor seal	Up to 183 m. Generally coastal.
Sperm whale	Up to 1,000 m, but generally in waters > 600 m.
Northern sea otter	Rocky nearshore < 75 m
Gray whale	Benthic invertebrates

Sources: Allen and Angliss 2010; Burns et al. 1981; http://www.adfg.state.ak.us/pubs/notebook/marine/rib-seal.php; http://www.afsc.noaa.gov/nmml/species/species_ribbon.php; http://www.adfg.state.ak.us/pubs/notebook/marine/harseal.php; http://www.nmfs.noaa.gov/pr/species/mammals/cetaceans/spermwhale.htm

3.4.3.1 Prey Availability Effects under Status Quo: Alternative 1

The Alaska Groundfish Harvest Specifications EIS determined that competition for key prey species under the status quo fishery is not likely to constrain the foraging success of marine mammals or cause population declines (NMFS 2007a). In the GOA, the exception is Steller sea lions, which potentially compete for prey with the GOA pollock fisheries (NMFS 2001, 2007a). The introduction to this section reviewed the marine mammal species that depend on pollock or salmon, and the potential impacts of the pollock fishery on benthic habitat that supports marine mammal prey. Below is additional information regarding potential effects of the GOA pollock fishery on prey availability for Steller sea lions, Cook Inlet belugas, and SRKW.

Steller sea lions

The following information on Steller sea lion diet is summarized from the Biological Opinion (NMFS 2010b) and is incorporated by reference. Steller sea lions are generalist predators that eat a variety of fishes and cephalopods. Prey species can be grouped into those that tend to be consumed seasonally, when they become locally abundant or aggregated when spawning (e.g., herring, Pacific cod, eulachon, capelin, salmon and Irish lords), and those that are consumed and available to Steller sea lions more or less year-round (e.g., pollock, cephalopods, Atka mackerel, arrowtooth flounder, rock sole and sand lance.

Stomach content analysis from animals in Kodiak in the 1970s showed that walleye pollock was the most important prey in fall, winter, and spring, while in summer the most frequently eaten prey were small forage fishes (capelin, herring, and sand lance) (Merrick and Calkins 1996). Prey occurrence of pollock, Pacific cod, and herring were higher in the 1980s than in the 1950s -1970s in stomach content samples for both eastern and Western Steller sea lion populations. In a recent study in the Kodiak Archipelago, the most frequent Steller sea lion prey were found to be Pacific sand lance, walleye pollock, arrowtooth flounder, Pacific cod, salmon, and Pacific herring (McKenzie and Wynne 2008). Other studies since 1990 have shown that pollock continue to be a dominant prey species in the GOA. Pacific cod is also an important prey species in winter in the GOA. Salmon was eaten most frequently during the summer months in the GOA.

Killer Whales

Northern resident killer whales consume salmon that are migrating to spawning streams in nearshore waters in Alaska (NMFS 2004). Recent studies have shown that Southern Resident killer whales forage selectively for Chinook salmon which are relatively large compared with other salmon species, have high lipid content, and are available year-round (Ford and Ellis 2006). In inland waters of Washington and British Columbia, the diet of SRKWs consists of 82% Chinook salmon during May through September (Hanson et al. 2010). Stock of origin investigations have found that SRKWs forage on Chinook salmon from the Fraser River, Puget Sound runs, and other Washington and Oregon runs.

Chinook salmon prohibited species catch in the pollock fishery may intercept salmon that would otherwise have been available as prey for Northern and Southern Resident killer whales. Any competition with the pollock fishery for Chinook salmon would depend on the extent to which the fishery intercepts salmon that would have otherwise been available to killer whales as prey. Data are not available to quantitatively evaluate the extent of this effect.

Cook Inlet Beluga Whales

The following information on Cook Inlet beluga diet is from the 2008 Recovery Plan (NMFS 2008) and is incorporated by reference. Cook Inlet belugas feed on a wide variety of species, focusing on specific species when they are seasonally abundant. The groundfish fisheries directly harvest and incidentally catch several species that are important prey species for belugas, including pollock, Pacific cod, yellowfin sole, starry flounder, and staghorn sculpin. Because pollock is not likely to occur in large amounts in Cook Inlet, and appears to be eaten only in spring and fall, it is not likely an important prey species for Cook Inlet beluga whales. The groundfish fisheries also catch eulachon and salmon, which are energetically rich food sources and important prey species in spring and summer, respectively.

Cook Inlet beluga whales are not likely to compete with the GOA pollock fishery for pollock because their occurrence does not overlap spatially with the pollock fishery. Any competition with the pollock fishery for Chinook salmon would depend on the extent to which the fishery intercepts salmon that would have otherwise been available to Cook Inlet belugas as prey. Data are not available to quantitatively evaluate the extent of this effect. Even though the GOA pollock fishery takes Cook Inlet salmon as prohibited species catch, it is not likely that the number of salmon taken under status quo would have a measurable effect on Cook Inlet beluga whales. Of the Alaska Chinook salmon CWT recoveries, 9% are estimated to be Cook Inlet fish. Returns of Chinook salmon are in the thousands of fish based on the number of river systems in the inlet with Chinook salmon runs, and the effects of GOA prohibited species catch on the volume of Cook Inlet spawning runs is likely not substantial. NMFS completed an informal

ESA Section 7 consultation on the effects of the groundfish fisheries on Cook Inlet beluga whales and determined that the incidental harvest of Chinook salmon in the groundfish fisheries was not likely to adversely affect Cook Inlet beluga whales (Salveson 2009 and Brix 2010).

Other marine mammals

Ribbon seals, northern fur seals, and minke, fin, and humpback whales potentially compete with the GOA pollock fishery for pollock because of the overlap of their occurrence with the location of this fishery. Ribbon seals, fin whales, and humpback whales have a more diverse diet than minke whales and northern fur seals, and may therefore have less potential to be affected by any competition with the fishery. There is no evidence that the harvest of groundfish in the GOA is likely to cause population level effects on these marine mammals.

Based on a review of marine mammal diets, and an evaluation of the status quo harvests of potential prey species in the GOA groundfish fishery, the effects of Alternative 1 on prey availability for marine mammals are not likely to cause population level effects and are therefore insignificant.

3.4.3.2 Prey Availability Effects under Alternative 2

A reduction in the PSC limit on Pacific halibut taken in the GOA groundfish fisheries would not directly benefit marine mammals. If a reduced PSC limit results in groundfish fisheries closing before their respective TACs are reached, it could also increase the availability of target species to marine mammals. If the PSC limit results in additional fishing effort in less productive fishing areas with less halibut mortality, the shift in fishing location may result in additional target species being available in those areas where halibut is concentrated, and could provide a benefit if these areas are also used by marine mammals for foraging. A higher limit would be less constraining on the fishery and would likely result in effects on prey availability similar to the status quo. A lower limit would be more constraining on the fishery, making more target species available for prey; and also may increase availability of halibut if the fishery is closed before groundfish TACs are reached.

Consequently, Alternative 2 may reduce the potential effects of the GOA groundfish fisheries on the availability of prey for marine mammals, especially in years when the PSC limit is reached and groundfish fishing may be constrained. It is not likely that the potential effects would result in population level effects on marine mammals, and therefore the effects of Alternative 2 are likely insignificant.

3.4.4 Disturbance

3.4.4.1 Disturbance Effects under Status Quo: Alternative 1

The Alaska Groundfish Harvest Specifications EIS contains a detailed description of the disturbance of marine mammals by the groundfish fisheries (NMFS 2007a). The EIS concluded that the status quo fishery does not cause disturbance to marine mammals that may cause population level effects. Fishery closures limit the potential interaction between fishing vessels and marine mammals (e.g., 3-nm no groundfish fishing areas around Steller sea lion rookeries). Because disturbances to marine mammals under the status quo fishery are not likely to cause population level effects, the impacts of Alternative 1 are likely insignificant.

3.4.4.2 Disturbance Effects under Alternative 2

The effects of the proposed reductions to halibut PSC limits on disturbance would be similar to the effects on incidental takes. If a groundfish fishery closes early because the limit is reached, then less potential exists for disturbance of marine mammals. If a groundfish fishery increases the duration of fishing in areas with lower concentrations of halibut, there may be more potential for disturbance if this increased fishing activity overlaps with areas used by marine mammals. Fishing under a higher PSC limit is likely similar to status quo because it is less constraining than fishing under the lower proposed limits and less likely to cause a change in fishing activities.

None of the disturbance effects on other marine mammals under Alternative 2 are expected to result in population level effects on marine mammals. Disturbance effects are likely to be localized and limited to a small portion of any particular marine mammal population. Because disturbances to marine mammals under Alternative 2 are not likely to result in population level effects, the impacts of Alternative 2 are likely insignificant.

3.5 Seabirds

Thirty-eight species of seabirds breed in Alaska. Breeding populations are estimated to contain 36 million individual birds in Alaska, and total population size (including subadults and nonbreeders) is estimated to be approximately 30% higher. Five additional species that breed elsewhere but occur in Alaskan waters during the summer months contribute another 30 million birds.

Species nesting in Alaska

Tubenoses-Albatrosses and relatives: Northern Fulmar, Fork-tailed Storm-petrel, Leach's Storm-petrel

Kittiwakes and terns: Black-legged Kittiwake, Red-legged Kittiwake, Arctic Tern, Aleutian Tern

Pelicans and cormorants: Double-crested Cormorant, Brandt's Cormorant, Pelagic Cormorant, Red-faced Cormorant

Jaegers and gulls: Pomarine Jaeger, Parasitic Jaeger, Bonaparte's Gull, Mew Gull, Herring Gull, Glaucous-winged Gull, Glaucous Gull, Sabine's Gull

Auks: Common Murre, Thick-billed Murre, Black Guillemot, Pigeon Guillemot, Marbled Murrelet, Kittlitz's Murrelet, Ancient Murrelet, Cassin's Auklet, Parakeet Auklet, Least Auklet, Wiskered Auklet, Crested Auklet, Rhinoceros Auklet, Tufted Puffin, Horned Puffin

Species that visit Alaska waters

Tubenoses: Short-tailed Albatross, Black-footed Albatross, Laysan Albatross, Sooty Shearwater, Short-tailed Shearwater

Gulls: Ross's Gull, Ivory Gull

As noted in the PSEIS (NMFS 2004a), seabird life history includes low reproductive rates, low adult mortality rates, long life span, and delayed sexual maturity. These traits make seabird populations extremely sensitive to changes in adult survival and less sensitive to fluctuations in reproductive effort. The problem with attributing population changes to specific impacts is that, because seabirds are long-lived animals, it may take years or decades before relatively small changes in survival rates result in observable impacts on the breeding population.

More information on seabirds in Alaska's EEZ may be found in several NMFS, Council, and USFWS documents:

- The URL for the USFWS Migratory Bird Management program is at: http://alaska.fws.gov/mbsp/mbm/index.htm
- Section 3.7 of the PSEIS (NMFS 2004a) provides background on seabirds in the action area and their interactions with the fisheries. This may be accessed at http://www.alaskafisheries.noaa.gov/sustainablefisheries/seis/final062004/Chaps/chpt_3/chpt_3_7.pdf
- The annual Ecosystems Considerations chapter of the SAFE reports has a chapter on seabirds. Back issues of the Ecosystem SAFE reports may be accessed at http://www.afsc.noaa.gov/REFM/REEM/Assess/Default.htm.
- The Seabird Fishery Interaction Research webpage of the Alaska Fisheries Science Center: http://www.afsc.noaa.gov/refm/reem/Seabirds/Default.htm
- The NMFS Alaska Region's Seabird Incidental Take Reduction webpage: http://www.alaskafisheries.noaa.gov/protectedresources/seabirds.html
- The BSAI and GOA groundfish FMPs each contain an "Appendix I" dealing with marine mammal and seabird populations that interact with the fisheries. The FMPs may be accessed from the Council's home page at http://www.alaskafisheries.noaa.gov/npfmc/default.htm
- Washington Sea Grant has several publications on seabird takes, and technologies and practices for reducing them: http://www.wsg.washington.edu/publications/online/index.html
- The seabird component of the environment affected by the groundfish FMPs is described in detail in Section 3.7 of the PSEIS (NMFS 2004a).
- Seabirds and fishery impacts are also described in Chapter 9 of the Alaska Groundfish Harvest Specifications EIS (NMFS 2007a).

3.5.1 ESA-Listed Seabirds in the GOA

Several species of conservation concern occur in the GOA (Table 3-32). Short-tailed albatross is listed as endangered under the ESA, and Steller's eider is listed as threatened. Kittlitz's murrelet is a candidate species for listing under the ESA, and the USFWS is currently working on a 12-month finding for black-footed albatross.

Table 3-32 ESA-listed and candidate seabird species that occur in the GOA.

Common Name	Scientific Name	ESA Status
Short-tailed Albatross	*Phoebaotria albatrus*	Endangered
Steller's Eider	*Polysticta stelleri*	Threatened
Kittlitz's Murrelet	*Brachyramphus brevirostris*	Candidate
Black-footed Albatross	*Phoebastria nigripes*	FWS working on 12 month finding

Short-tailed Albatross

Short-tailed albatross (*Phoebaotria albatrus*) is currently listed as endangered under the ESA. Short-tailed albatross populations were decimated by hunters and volcanic activity at nesting sites in the early 1900s, and the species was reported to be extinct in 1949. In recent years, the population has recovered at a 7% to 8% annual rate. The world population of short-tailed albatross in 2009 was estimated at 3,000 birds. The majority of nesting occurs on Torishima Island in Japan, where an active volcano threatens the colony. As part of a 5-year project, chicks have been translocated from Torishima Island to a new breeding colony on Mukojima in the Ogasawara Islands, without the volcanic threat. In February 2011, researchers noted the first return of a short-tailed albatross chick to its hand-reared home on Mukojima.

No critical habitat has been designated for the short-tailed albatross in the United States, since the population growth rate does not appear to be limited by marine habitat loss (NMFS 2004b). Short-tailed albatross feeding grounds are continental shelf breaks and areas of upwelling and high productivity. Short-tailed albatross are surface feeders, foraging on squid and forage fish.

Steller's Eider

Steller's eider (*Polysticta stelleri)* is listed as threatened under the ESA. While designated critical habitat for Steller's eiders does overlap with fishing grounds, there has never been an observed take of this species off Alaska (USFWS 2003a, 2003b; NMFS 2008a), and no take estimates are produced by AFSC. Therefore, impacts to Steller's eider are not analyzed in this document.

Black-footed Albatross

The black-footed albatross (*Phoebastria nigripes*) is a species of concern because some of the major colony population counts may be decreasing or are of unknown status. World population estimates range from 275,000 to 327,753 individuals (Brooke 2004), with a total breeding population of 58,000 pairs (USFWS 2006). In 2004, a petition was filed to list the black-footed albatross under the ESA. USFWS found that the petition was warranted and is currently working on a 12-month finding. Black-footed albatrosses occur in Alaska waters mainly in the northern GOA (Figure 3-43). Naughton et al. (2007) published a conservation plan for laysan and black-footed albatrosses that lists fisheries takes as the most significant source of mortality for both species, but notes that fishery takes off Alaska are a small fraction of the worldwide taking of these species. There have not been reported takes of black-footed albatross with trawl gear in Alaska.

Kittlitz's Murrelet

Kittlitz's murrelet (*Brachyramphus brevirostris*) is a small diving seabird that forages in shallow waters for capelin, Pacific sandlance, zooplankton, and other invertebrates. It feeds near glaciers, icebergs, and outflows of glacial streams, sometimes nesting up to 45 miles inland on rugged mountains near glaciers. Most recent population estimates indicate that it has the smallest population of any seabird considered a regular breeder in Alaska (9,000 to 25,000 birds). This species appears to have undergone significant population declines in several of its core population centers. USFWS believes that glacial retreat and oceanic regime shifts are the factors that are most likely causing population-level declines in this species. Kittlitz's murrelet is currently a candidate species for listing under the ESA. No Kittlitz's murrelets were reported taken in the observed groundfish fisheries between 1993 and 2001 (NMFS 2004a).

3.5.2 Status of ESA Consultations on Seabirds

FWS has primary responsibility for managing seabirds, and has evaluated effects of the BSAI and GOA FMPs and the harvest specifications process on currently listed species in two Biological Opinions (USFWS 2003a and 2003b). Both Biological Opinions concluded that the groundfish fisheries off Alaska, including the GOA pollock fishery, are unlikely to jeopardize populations of listed species or adversely modify or destroy critical habitat for listed species. The current population status, life history, population biology, and foraging ecology of these species, as well as a history of ESA Section 7 consultations and NMFS actions carried out as a result of those consultations are described in detail in Section 3.7 of the PSEIS (NMFS 2004a).

In 1997, NMFS initiated a Section 7 consultation with USFWS on the effects of the Pacific halibut fishery off Alaska on the short-tailed albatross. USFWS issued Biological Opinion in 1998 that concluded that the Pacific halibut fishery off Alaska was not likely to jeopardize the continued existence of the short-tailed albatross. USFWS issued an Incidental Take Statement of two short-tailed albatross in a 2-year period (e.g., 1998/1999, 2000/2001, 2002/2003), reflecting what the agency anticipated the incidental take could be from the fishery action. Under the authority of ESA, USFWS identified non-discretionary reasonable and prudent measures that NMFS must implement to minimize the impacts of any incidental take.

Two updated USFWS biological opinions were published in 2003:

- Section 7 Consultation Biological Opinion on the Effects of the Total Allowable Catch-Setting Process for the GOA and Bering Sea/Aleutian Islands Groundfish Fisheries to the Endangered Short-tailed Albatross (*Phoebastria albatrus*) and Threatened Steller's Eider (*Polysticta stelleri*) (USFWS 2003b).
- Section 7 Consultation Programmatic Biological Opinion on the Effects of the Fishery Management Plans for the GOA and Bering Sea/Aleutian Islands Groundfish Fisheries on the Endangered Short-tailed Albatross (*Phoebastria albatrus*) and Threatened Steller's Eider (*Polysticta stelleri*) (USFWS 2003a).

Although USFWS has determined that the short-tailed albatross is adversely affected by hook-and-line Pacific halibut and groundfish fisheries off Alaska, both USFWS opinions concurred with NMFS and concluded that the GOA and Bering Sea and Aleutian Islands Management Area fishery actions are not likely to jeopardize the continued existence of the short-tailed albatross or Steller's eider or result in adverse modification of Steller's eider critical habitat. USFWS also concluded that these fisheries are not likely to adversely affect the threatened spectacled eider. The Biological Opinion on the TAC-setting process updated incidental take limits to—

- four short-tailed albatross taken every 2 years in the hook-and-line groundfish fishery off Alaska, and
- two short-tailed albatross taken in the groundfish trawl fishery off Alaska while the biological opinion is in effect (approximately 5 years).

These incidental take limits are in addition to the previous take limit set in 1998 for the Pacific halibut hook-and-line fishery off Alaska of two short-tailed albatross in a 2-year period. The 2003 Biological Opinion on the TAC-setting process also included mandatory terms and conditions that NMFS must follow in order to be in compliance with the ESA. These include implementation of seabird deterrent measures, outreach and training of fishing crews on proper deterrence techniques, training observers in seabird identification, and retention of all seabird carcasses until observers can identify and record takes, continued analysis and publication of estimated incidental take in the fisheries, collection of information regarding the efficacy of seabird protection measures, cooperation in reporting sightings of short-tailed albatross, and continued research and reporting on the incidental take of short-tailed albatross in trawl gear.

USFWS also released a short-tailed albatross recovery plan in September 2008 (USFWS 2008). This recovery plan describes site-specific actions necessary to achieve conservation and survival of the species, downlisting and delisting criteria, and estimates of time and cost required to implement the recovery plan.

Because the primary threat to the species recovery is the possibility of an eruption of Torishima Island, the most important recovery actions include monitoring the population and managing habitat on Torishima Island, establishing two or more breeding colonies on non-volcanic islands, monitoring the Senkaku population, and conducting telemetry and other research and outreach. Translocation of chicks to new colonies has begun. USFWS estimates that short-tailed albatross may be delisted in the year 2030, if new colony establishment is successful.

3.5.3 Seabird Distribution in the Gulf of Alaska

Figure 3-43 depicts the observed distributions of several seabird species from the North Pacific Pelagic Seabird Database (NPPSD 2004). The NPPSD represents a consolidation of pelagic seabird data collected from the Central and North Pacific Ocean, the Bering Sea, the Chukchi Sea, and the Beaufort Sea. The NPPSD was created to synthesize numerous disparate datasets including at-sea boat based surveys, stations, land-based observations, and fixed-wing and helicopter aerial surveys collected since 1972 (Drew and Piatt 2004). There are very few observations of short-tailed albatross in the NPPSD, so
Figure **3-44** is included to show observed locations on short-tailed albatross on surveys from 2002 through 2004 (Melvin et al. 2006). Melvin et al. (2006) provides the most current and comprehensive data on seabird distribution patterns off Alaska. Seabird data were collected during International Pacific Halibut Commission halibut surveys, NMFS sablefish surveys, ADF&G Southeast Inside sablefish surveys, and ADF&G Prince William Sound sablefish surveys.

Satellite Tracking of Short-tailed Albatross

USFWS and Oregon State University placed 52 satellite tags on Laysan, black-footed, and short-tailed albatrosses in the Central Aleutian Islands to study movement patterns of the birds in relation to commercial fishing activity and other environmental variables. From 2002 to 2006, 21 individual short-tailed albatrosses (representing about 1% of the entire population) were tagged, including adults, sub-adults, and hatch-year birds. During the non-breeding season, short-tailed albatross ranged along the Pacific Rim from southern Japan through Alaska and Russia to northern California, primarily along continental shelf margins (Suryan et al. 2006).

Eleven of the 14 birds had sufficient data to analyze movements within Alaska. Within Alaska, albatrosses spent varying amounts of time among NMFS reporting areas, with six of the areas (521, 524, 541, 542, 543, 610) being the most frequently used (Suryan et al. 2006). Non-breeding albatross concentrate foraging in oceanic areas characterized by gradients in topography and water column productivity. The primary hot spots for short-tailed albatrosses in the Northwest Pacific Ocean and Bering Sea occur where a variety of underlying physical processes enhance biological productivity or prey aggregations. The Aleutian Islands, in particular, were a primary foraging destination for short-tailed albatrosses.

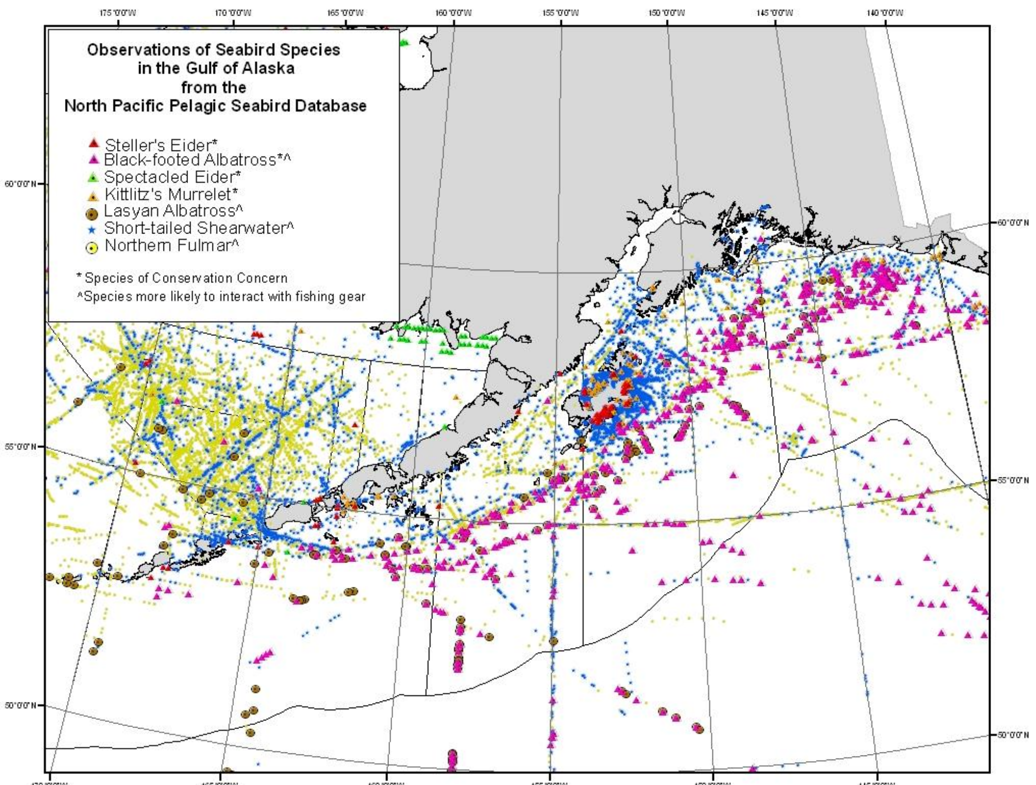

Figure 3-43 Observations of seabird species with conservation status and/or likely to interact with fishing gear in the Gulf of Alaska (NPPSD 2004).

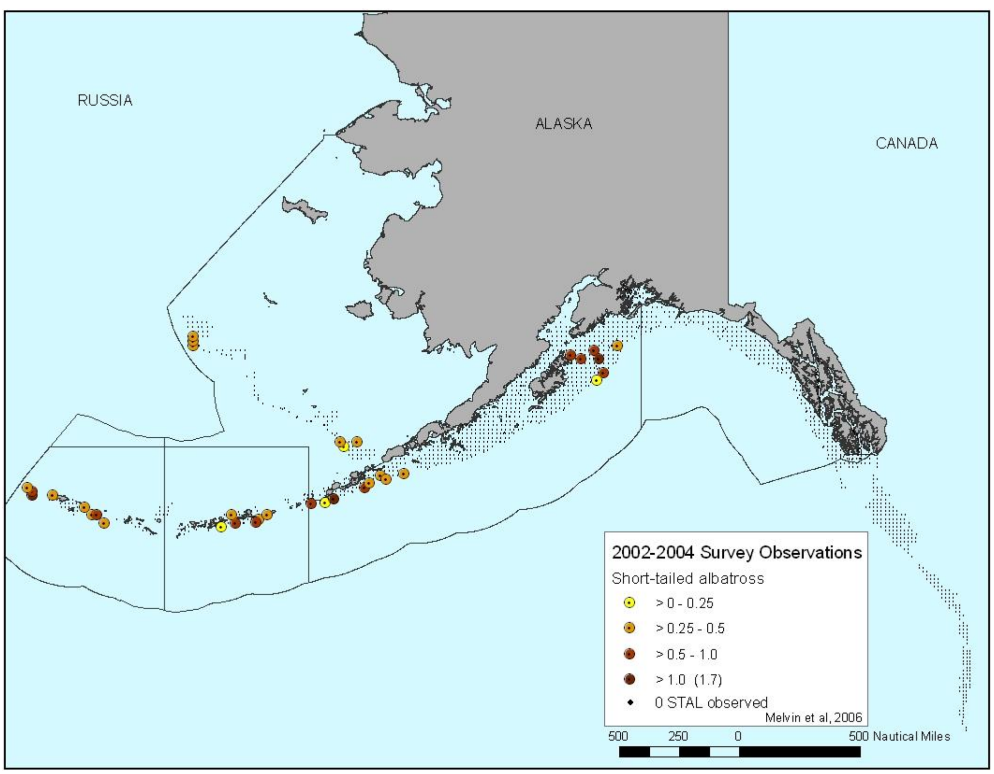

Figure 3-44 Observations of short-tailed albatrosses (Melvin et al. 2006).

3.5.4 Short-tailed Albatross Takes in Alaska Fisheries

Table 3-33 lists the short-tailed albatrosses reported taken in Alaska fisheries since 1983. With the exception of one take in the Western GOA, all takes occurred along the shelf break in the Bering Sea. The Western GOA take was in the hook-and-line halibut fishery. No takes were reported from 1999 through 2009. No takes with trawl gear have been reported.

Table 3-33 Reported takes of short-tailed albatross in Alaska fisheries.

Date of take	Location	Fishery	Age when taken
July 1983	BS	brown crab	juvenile (4 mos)
1 Oct 87	GOA	halibut	juvenile (6 mos)
28 Aug 95*	EAI	hook-and-line	sub-adult (16 mos)
8 Oct 95	BS	hook-and-line	sub-adult
27 Sept 96	BS	hook-and-line	sub-adult (5 yrs)
21 Sept 98	BS	Pacific cod hook-and-line	adult (8 yrs)
28 Sept 98	BS	Pacific cod hook-and-line	sub-adult
27 Aug 2010	BS	Pacific cod hook-and-line	Sub-adult (7 yrs 10 mos)
14 Sept 2010	BS	Pacific cod hook-and-line	Sub-adult (3 yrs 10 mos)

Source: AFSC.

While the incidental take statement take limits for short-tailed albatross have never been met or exceeded, two short-tailed albatrosses were taken in the BSAI hook-and-line Pacific cod fishery in 2010 (Table 3-33 and Figure 3-45). The first bird was taken on August 27, 2010, at 56 37’ N and 172 57’ W in NMFS reporting area 523. The second bird was also taken in the BSAI, on September 14, 2010, at 59 20' N and 176 33' W in NMFS reporting area 521. The last short-tailed albatross take, previous to these two, occurred in 1998. NMFS is working closely with industry and the observer program to understand the specific circumstances of these incidents, and to help prevent future takes.

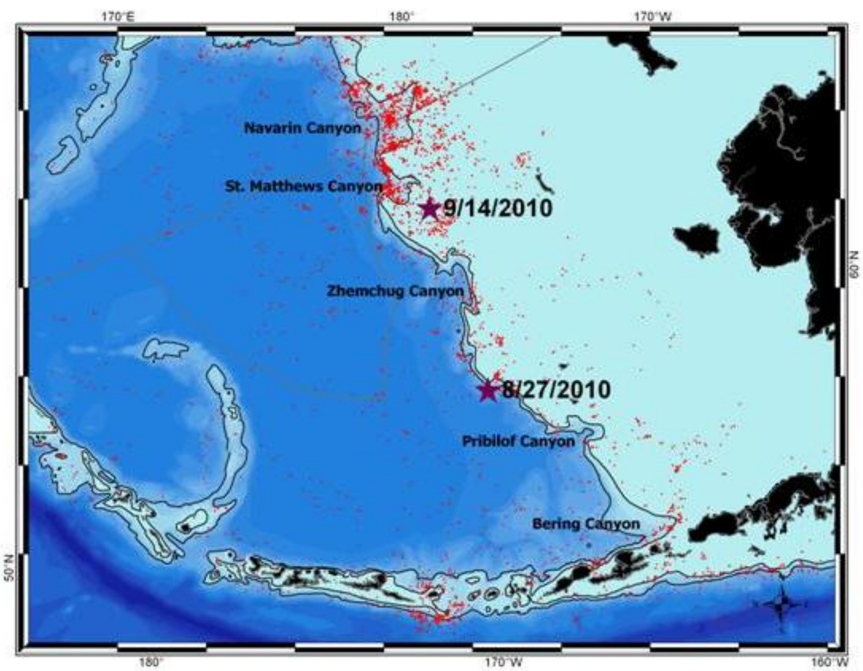

Figure 3-45 Map of two recent short-tailed albatross takes in Alaska hook-and-line fisheries (purple stars). Red dots indicate satellite tagging data from birds tagged between 2001 and 2010.

Credits: Yamashina Institute for Ornithology, Oregon State University, USFWS, and Ministry of Environment Japan.

3.5.5 Effects on Seabirds

The PSEIS identifies how the GOA groundfish fisheries activities may directly or indirectly affect seabird populations (NMFS 2004a). Direct effects may include incidental take in fishing gear and vessel strikes. Indirect effects may include reductions in prey (forage fish) abundance and availability, disturbance to benthic habitat, discharge of processing waste and offal, contamination by oil spills, presence of nest predators in islands, and disposal of plastics, which may be ingested by seabirds.

3.5.5.1 Significance Criteria for Seabirds

Table **3-34** explains the criteria used in this analysis to evaluate the significance of the effects of fisheries on seabird populations in the GOA. These criteria are used in the analysis of alternatives and options that follows, and are from the 2006–2007 groundfish harvest specifications EA/FRFA (NMFS 2006b). These criteria are applicable to this action because this analysis and the harvest specifications analysis both analyze the effects of groundfish fisheries on seabirds, and are the most recent criteria available. The first criterion in the table was further refined for this analysis from NMFS (2006b) to clearly provide a criterion for "insignificant impact" and to be consistent with other analyses of environmental components in this EA/RIR.

Table 3-34 Criteria used to determine significance of impacts on seabirds.

	Incidental take	**Prey availability**	**Benthic habitat**
Insignificant	No substantive change in takes of seabirds during the operation of fishing gear.	No substantive change in forage available to seabird populations.	No substantive change in gear impact on benthic habitat used by seabirds for foraging.
Adverse impact	Non-zero take of seabirds by fishing gear.	Reduction in forage fish populations, or the availability of forage fish, to seabird populations.	Gear contact with benthic habitat used by benthic feeding seabirds reduces amount or availability of prey.
Beneficial impact	No beneficial impact can be identified.	Availability of offal from fishing operations or plants may provide additional, readily accessible, sources of food.	No beneficial impact can be identified.
Significantly adverse impact	Trawl and hook-and-line take levels increase substantially from the baseline level, or level of take is likely to have population level impact on species.	Food availability decreased substantially from baseline such that seabird population level survival or reproduction success is likely to decrease.	Impact to benthic habitat decreases seabird prey base substantially from baseline such that seabird population level survival or reproductive success is likely to decrease. (ESA-listed eider impacts may be evaluated at the population level).
Significantly beneficial impact	No threshold can be identified.	Food availability increased substantially from baseline such that seabird population level survival or reproduction success is likely to increase.	No threshold can be identified.
Unknown impacts	Insufficient information available on take rates or population levels.	Insufficient information available on abundance of key prey species or the scope of fishery impacts on prey.	Insufficient information available on the scope or mechanism of benthic habitat impacts on food web.

3.5.5.2 Incidental Take of Seabirds in Trawl Fisheries

The impacts of the Alaska groundfish fisheries on seabirds were analyzed in the Alaska Harvest Specifications EIS (NMFS 2007a). That document evaluates the impacts of the alternative harvest strategies on seabird takes, prey availability, and seabird ability to exploit benthic habitat. The focus of this analysis is similar, as any changes to the pollock fishery in the GOA could change the potential for direct take of seabirds. Potential changes in prey availability (seabird prey species caught in the pollock trawl fishery) and disruption of bottom habitat via the intermittent contact with non-pelagic trawl gear under different levels of harvest are discussed in NMFS (2007a). These changes would be closely associated with changes in take levels because of the nature of the alternatives using caps and spatial restrictions. Therefore, all impacts are addressed by focusing on potential changes in seabird takes.

Seabirds can interact with trawl fishing vessels in several ways. Birds foraging at the water surface or in the water column are sometimes caught in the trawl net as it is brought back on board. These incidental takes of seabirds are recorded by fisheries observers as discussed below. In addition to getting caught in the fishing nets of trawl vessels, some species strike cables attached to the infrastructure of vessels or collide with the infrastructure itself. Large winged birds such as albatrosses are most susceptible to mortalities from trawl-cable strikes (CCAMLR 2006). Third wire cables have been prohibited in some southern hemisphere fisheries since the early 1990s due to substantial albatross mortality from cable strikes. No short-tailed albatross or black-footed albatross have been observed taken with trawl gear in Alaska fisheries, but mortalities to Laysan albatrosses have been observed.

Average annual incidental take of birds recovered in the nets from trawling operations in the GOA was 87 birds per year from 2002 through 2006 (NMFS 2008a). Northern fulmars and alcids comprised 100% of these takes. During 1993 through 2006, shearwaters also comprised approximately 10% of takes. The estimated takes of gulls, fulmars, and shearwaters in the entire groundfish fishery are very small percentages of these species' populations (NMFS 2008a).

Seabird takes in the GOA trawl fisheries are relatively low, based on standard observer sampling and NMFS estimation. However, standard species composition sampling of the catch does not account for additional mortality due to gear interactions. Special data collections of seabird gear interactions have been conducted, and preliminary information indicates that mortalities can be greater than the birds accounted for in the standard species composition sampling (Melvin 2011; Fitzgerald in prep). To date, striking of trawl vessels or gear by the short-tailed albatross has not been reported by observers. The probability of short-tailed albatross collisions with third wires or other trawl vessel gear in Alaskan waters cannot be assessed; however, given the available observer data and the observed at-sea locations of short-tailed albatrosses relative to trawling effort, the likelihood of short-tailed albatross collisions are very rare, but the possibility of such collisions cannot be completely discounted. USFWS' biological opinion included an Incidental Take Statement (ITS) of two short-tailed albatross for the trawl groundfish fisheries off Alaska (USFWS 2003b).

3.5.5.3 Prey Availability Disturbance of Benthic Habitat

As noted in Table 3-35, prey species of seabirds in the GOA are not usually fish that are targeted by non-pelagic commercial fishing gear. However, seabird species may be impacted indirectly by effects of the non-pelagic trawl gear on the benthic habitat of seabird prey, such as clams, bottom fish, and crab. The essential fish habitat final environmental impact statement provides a description of the effects of trawling on bottom habitat in the appendix (NMFS 2005b), including the effects of the commercial fisheries on the GOA slope and shelf.

It is not known how much seabird species use benthic habitat directly, although research funded by the North Pacific Research Board has been conducted on foraging behavior of seabirds in the Bering Sea in recent years. Thick-billed murres easily dive to 100 m, and have been documented diving to 200 m; common murres also dive to over 100 m. Since cephalopods and benthic fish compose some of their diet, murres could be foraging on or near the bottom (K. Kuletz, USFWS, personal communication, October 2008).

A description of the effects of prey abundance and availability on seabirds is found in the PSEIS (NMFS 2004a) and the Alaska Groundfish Harvest Specifications EIS (NMFS 2007a). Detailed conclusions or predictions cannot be made regarding the effects of forage fish bycatch on seabird populations or colonies. NMFS (2007a) found that the potential impact of the entire groundfish fisheries on seabird prey availability was limited due to little or no overlap between the fisheries and foraging seabirds based on either prey size, dispersed foraging locations, or different prey (NMFS 2007a). The majority of bird groups feed in vast areas of the oceans, are either plankton feeders or surface or mid-water fish feeders, and are not likely to have their prey availability impacted by the nonpelagic trawl fisheries. There is no directed commercial fishery for those species that compose the forage fish management group, and seabirds typically target juvenile stages rather than adults for commercial target species. Most of the forage fish bycatch is smelt taken in the pollock fishery, which is not included in this action.

Table 3-35 Seabirds in the Gulf of Alaska: foraging habitats and common prey species (USFWS 2006; Dragoo et al. 2010).

Species	Foraging habitats	Prey
Short-tailed albatross	Surface seize and scavenge	Squid, shrimp, fish, fish eggs
Black-footed albatross	Surface dip, scavenge	Fish eggs, fish, squid, crustaceans, fish waste
Laysan albatross	Surface dip	Fish, squid, fish eggs and waste
Spectacled eider	Diving	Mollusks and crustaceans
Steller's eider	Diving	Mollusks and crustaceans
Black-legged kittiwake	Dip, surface seize, plunge dive	Fish, marine invertebrates
Murrelet (Kittlitz's and marbled)	Surface dives	Fish, invertebrates, macroplankton
Shearwater spp.	Surface dives	Crustaceans, fish, squid
Northern fulmar	Surface fish feeder	Fish, squid, crustaceans
Murres spp.	Diving fish-feeders offshore	Fish, crustaceans, invertebrates
Cormorants spp.	Diving fish-feeders nearshore	Bottom fish, crab, shrimp
Gull spp.	Surface fish feeder	Fish, marine invertebrates, birds
Auklet spp.	Surface dives	Crustaceans, fish, jellyfish
Tern spp.	Plunge, dive	Fish, invertebrates, insects
Petrel spp.	Hover, surface dip	Zooplankton, crustaceans, fish
Jaeger spp.	Hover and pounce	Birds, eggs, fish
Puffin spp.	Surface dives	Fish, squid, other invertebrates

Seabirds that feed on benthic habitat, including Steller's eiders, scoters, cormorants, and guillemots, may feed in areas that could be directly impacted by nonpelagic trawl gear (NMFS 2004b). A 3-year otter trawling study in sandy bottom of the Grand Banks showed either no effect or increased abundance in mollusk species after trawling (Kenchington et al. 2001), but clam abundance in these studies was depressed for the first 3 years after trawling occurred. McConnaughey, Mier, and Dew (2000) studied trawling effects using the Bristol Bay area Crab and Halibut Protection Zone. They found more abundant infaunal bivalves (not including *Nuculana radiata*) in the highly fished area compared to the unfished area. In addition to abundance, clam size is of huge importance to these birds. However, handling time is very important to birds foraging in the benthos, and their caloric needs could change if a stable large clam population is converted to a very dense population of small first year clams. Additional impacts from nonpelagic trawling may occur if sand lance habitat is adversely impacted. This would affect a wider array of piscivorous seabirds that feed on sand lance, particularly during the breeding season, when this forage fish is also used for feeding chicks.

Recovery of fauna after the use of nonpelagic trawl gear may also depend on the type of sediment. A study in the North Sea found biomass and production in sand and gravel sediments recovering faster (2 years) than in muddy sediments (4 years) (Hiddink, Jennings, and Kaiser 2006). The recovery rate may be affected by the animal's ability to rebury itself after disturbance. Clams species may vary in their ability to rebury themselves based on grain size and whether they are substrate generalist, substrate specialist, or substrate sensitive species (Alexander, Stanton, and Dodd 1993).

3.5.5.3.1 Alternative 1 Status Quo

3.5.5.3.1.1 Incidental Take

The effects of the status quo fisheries on incidental take of seabirds are described in the 2007 harvest specifications EIS (NMFS 2007a). Estimated takes in the GOA trawl groundfish fisheries average 87 birds per year and primarily consist of northern fulmars (98%; NMFS 2008). These take estimates are small in comparison to seabird population estimates, and under the status quo alternative, it is reasonable to conclude that the impacts would continue to be similar. However, observers are not able to monitor all seabird mortality associated with trawl vessels. Several research projects are currently underway to provide more information on these interactions.

Spatial restrictions on the pollock trawl fishery in the GOA were established as part of the Steller sea lion protection measures. These closures decrease the potential for interactions with seabirds in these areas. These restrictions are not anticipated to change, so this protection would continue to be provided under any of the alternatives in this analysis.

3.5.5.3.1.2 Prey Availability and Benthic Habitat

The status quo groundfish fisheries do not harvest seabird prey species in an amount that would decrease food availability enough to impact survival rates or reproductive success, nor do they impact benthic habitat enough to decrease seabird prey base to a degree that would impact survival rates or reproductive success.

3.5.5.3.2 Proposed Alternative

3.5.5.3.2.1 Incidental Take

The range of hard caps under the preferred alternative and Alternative 2 could potentially decrease the number of incidental takes of seabirds in the GOA trawl fisheries. A lower hard cap may preclude pollock fishing in the GOA at some point in the fishing season, which would reduce the potential for incidental takes in fishing areas that overlap with seabird distributions. If the fleet is able to identify hotspots with high Chinook salmon catch rates, and avoid fishing in these areas, however, the distribution of effort in the fishery may change to some extent, although likely within the existing footprint of the pollock fishery. To the extent that the redistribution of effort results in more vessel-days of effort, there could potentially be an increase in the likelihood of incidental takes of seabirds, compared to the status quo. However, the GOA pollock TACs are relatively small compared to the capacity of the GOA groundfish trawl fleet, and seasons are likely to remain short. Overall effects on seabird takes are not likely to increase to a significant level.

A higher hard cap would allow for more pollock fishing and more incidental takes of seabirds than a lower cap. Component 2 to the preferred alternative and Alternative 2 would increase observer coverage in the GOA pollock trawl fishery by extending the 30% coverage requirement to vessels less than 60 feet LOA. This fleet harvests a substantial portion of the Western GOA pollock TAC. Expanded observer coverage would enhance monitoring of incidental takes of seabirds in the GOA pollock fishery and has the potential to improve the accuracy of estimates of incidental take of seabirds, but would not significantly affect seabirds at the population level.

3.5.5.3.3 Prey Availability and Benthic Habitat

Under a hard cap, the fishing season has the potential to be shorter than the status quo fishery in high Chinook salmon PSC years. Decreased fishing effort could further reduce any removals of seabird prey species and further mitigate any effects on benthic habitat at an insignificant level.

3.5.6 Summary of Effects

Many seabird species utilize the marine habitat of the GOA. Several species of conservation concern and many other species could potentially interact with trawl cables. The AFSC estimates of incidental takes are small relative to total estimates of seabird populations. However, those estimates do not include cable-related trawl mortalities. Recent modeling suggests that even if there were to be a large increase in trawl cable incidental takes of short-tailed albatross (the only seabird listed as endangered under the ESA), it would have negligible effects on the recovery of the species. Table 3-36 summarizes the action alternatives' impacts to seabird populations. Because the proposed alternatives are not likely to result in significantly adverse effects to seabirds, the impacts are likely insignificant.

Table 3-36 Summary of impacts to seabirds from alternatives in this analysis.

Alternative	Impact on incidental take of seabirds in Alaska waters	Impact on prey density and benthic habitat
Alternative 1	Seabird takes and disruptions to benthic habitat and prey availability are at low levels and are mitigated (to some degree) by current spatial restrictions on the fisheries in the Gulf of Alaska. Insignificant effects.	Seabird takes and disruptions to benthic habitat and prey availability are at low levels and are mitigated (to some degree) by current spatial restrictions on the fisheries in the Gulf of Alaska. Insignificant effects.
Preferred Alternative and Alternative 2	Seabirds are taken by fisheries in minor amounts compared to population levels. Insignificant effects. Increased observer coverage would improve monitoring of incidental takes.	Overall prey availability is not affected by the groundfish fisheries at a level resulting in population level effects. Insignificant effects.

3.6 Habitat

Fishing operations may change the abundance or availability of certain habitat features used by managed fish species to spawn, breed, feed, and grow to maturity. These changes may reduce or alter the abundance, distribution, or productivity of species. The effects of fishing on habitat depend on the intensity of fishing, the distribution of fishing with different gears across habitats, and the sensitivity and recovery rates of specific habitat features. In 2005, NMFS and the Council completed the EIS for EFH Identification and Conservation in Alaska (NMFS 2005b). The EFH EIS evaluates the long term effects of fishing on benthic habitat features, as well as the likely consequences of those habitat changes for each managed stock based on the best available scientific information. Maps and descriptions of EFH for the GOA groundfish species are available in the EFH EIS (NMFS 2005b). This document also describes the importance of benthic habitat to different groundfish species and the impacts of different types of fishing gear on benthic habitat.

3.6.1 Effects of the Alternatives

The effects of the GOA pollock trawl fishery on benthic habitat and EFH were analyzed in the EFH EIS (NMFS 2005b). Table 3-37 describes the criteria used to determine whether the impacts on EFH are likely to be significant. The GOA pollock fishery is prosecuted with pelagic trawl gear. Trawl performance standards for the directed pollock fishery at 50 CFR 679.7(a)(14) reduce the likelihood of pelagic trawl gear use on the bottom. Year-round area closures protect sensitive benthic habitat. Appendix B to the EFH EIS describes how pelagic trawl gear impacts habitat. The long-term effects index (LEI) estimates the proportion of habitat attributes that would be lost if recent fishing patterns continued. In the GOA, estimated reductions of epifaunal and infaunal prey due to fishing are less than 1% for all substrate types. For living structure, LEI impacts ranged between 3% and 7% depending on the substrate. Local areas with LEI values in excess of 50% occur to the east of Kodiak Island in Barnabus, Chiniak, and Marmot Gullies. These areas support high densities of pollock. In addition to impacting benthic habitat, the pollock fishery catches salmon prey species incidentally, including squid, capelin, eulachon, and herring. The catches of these prey species are very small relative to the overall populations of these species. Thus, fishing activities are considered to have minimal and temporary effects on prey availability for salmon.

Table 3-37 Criteria used to estimate the significance of impacts on essential fish habitat.

No impact	Fishing activity has no impact on EFH.
Adverse impact	Fishing activity causes disruption or damage of EFH.
Beneficial impact	Beneficial impacts of this action cannot be identified.
Significantly adverse impact	Fishery induced disruption or damage of EFH that is more than minimal and not temporary.
Significantly beneficial impact	No threshold can be identified.
Unknown impact	No information is available regarding gear impact on EFH.

The analysis in the EFH EIS concludes that current fishing practices in the GOA pollock trawl fishery have minimal or temporary effects on benthic habitat and essential fish habitat. These effects are likely to continue under Alternative 1, and are not considered to be significant.

The proposed alternatives may reduce the potential adverse effects of fishing on benthic habitat compared to the status quo, if the fishery closes early. To the extent that the redistribution of effort results in more vessel-days of effort, there could potentially be an increase in the habitat impacts compared to the status quo. However, the GOA pollock TACs are relatively small compared to the capacity of the GOA groundfish trawl fleet, seasons are likely to remain short, and the overall footprint of the fishery is unlikely to change. Overall, under the status quo fisheries, the GOA pollock fishery has minimal effects on benthic habitat, although localized areas are more heavily impacted. To the extent that the preferred alternative and Alternative 2 reduce effort in the GOA pollock fishery, this alternative would reduce impacts on habitat relative to the status quo. Because the proposed alternatives are not likely to result in significantly adverse effects to habitat, the impacts are likely insignificant.

3.6.2 Mitigation

Currently, pelagic trawl gear is subject to a number of area closures in the GOA to protect habitat and marine species. If new information emerges to indicate that the GOA pollock trawl fishery is having more than a minimal impact on EFH, the Council may consider additional habitat conservation measures.

3.6.3 Summary of Effects

The EFH EIS (NMFS 2005b) found no substantial adverse effects to habitat in the GOA caused by fishing activities. The preferred alternative and Alternative 2 may reduce any effects on habitat that are occurring under the status quo (Alternative 1). The potential effects on an area would be constrained by the amount of the pollock TAC and by the existing habitat conservation and protection measures. It is possible that impacts may increase slightly in other areas due to displaced fishing effort, but in context of the entire GOA, these impacts are not likely to be substantial. Overall, the combination of the direct, indirect, and cumulative effects on habitat complexity for both living and non-living substrates, benthic biodiversity, and habitat suitability is not likely to be significant under any of the alternatives.

3.7 Ecosystem

Hollowed et al. (2011) recognized that ecosystems are complex adaptive systems, in which feedback among components (species or functional groups within an ecosystem) creates patterns of interconnected change. Currently, an ecosystem assessment chapter for the NPFMC Stock Assessment and Fishery Evaluation (SAFE) report is prepared and presented each year to the Council's PTs and SSC (e.g., Zador and Gaichas 2010). This ecosystem assessment synthesizes the status and trends of multiple ecosystem indicators and is evolving towards providing an 'ecosystem report card' and set of potential reference points for management purposes.

Hollowed et al. (2011) reports that one line of research in terms of ecosystem function in the Alaska region has revolved around trophic ecology: preserving the dynamics of predator/prey interactions and the 'food webs' of marine ecosystems as a whole. Fisheries can shape food webs in multiple ways. Fisheries can induce changes in food web structure through the release of predatory control on prey species because they often deplete high trophic level predators. For example, although such 'top-down' control was traditionally deemed insignificant, there is now ample evidence for predator control on marine species (Baum and Worm 2009).

Research and modeling is currently focusing on improving estimates of multispecies interactions for use in strategic management decisions. The tools used for incorporating trophic ecology into management generally consist of two types of analyses: (i) bulk biomass/flow ('food web') models that aim to quantify the productivity of major components of the food web ('feeding guilds') and (ii) the use of focused individual predator/prey interaction models to identify changes in the productivity of individual stocks, for example, for estimating changes in natural mortality or changes in food supply that are either fisheries-induced or the result of natural variability and/or climate change.

The method used most frequently at present to perform the first type of analysis for marine systems is Ecopath (Polovina 1984) in part because of the availability of a user-friendly software package for the model, Ecopath with Ecosim (Christensen et al.2004). The food web-oriented software has been developed for recent ecosystem assessments (e.g., Zador and Gaichas 2010) which provides a more flexible statistical framework for fitting bulk biomass/stock production models (including an independent implementation of core Ecosim algorithms) to a wide range of available data, providing uncertainty estimates for biomass, diets, age/size structure and functional responses (the Ecosense/ELSEAS routines; Aydin et al. 2005, 2007). This tool is being used annually in the Ecosystem Assessment of the SAFE Report on the status and trends of major trophic guilds (e.g., Zador and Gaichas 2010) (**Figure 3-46**).

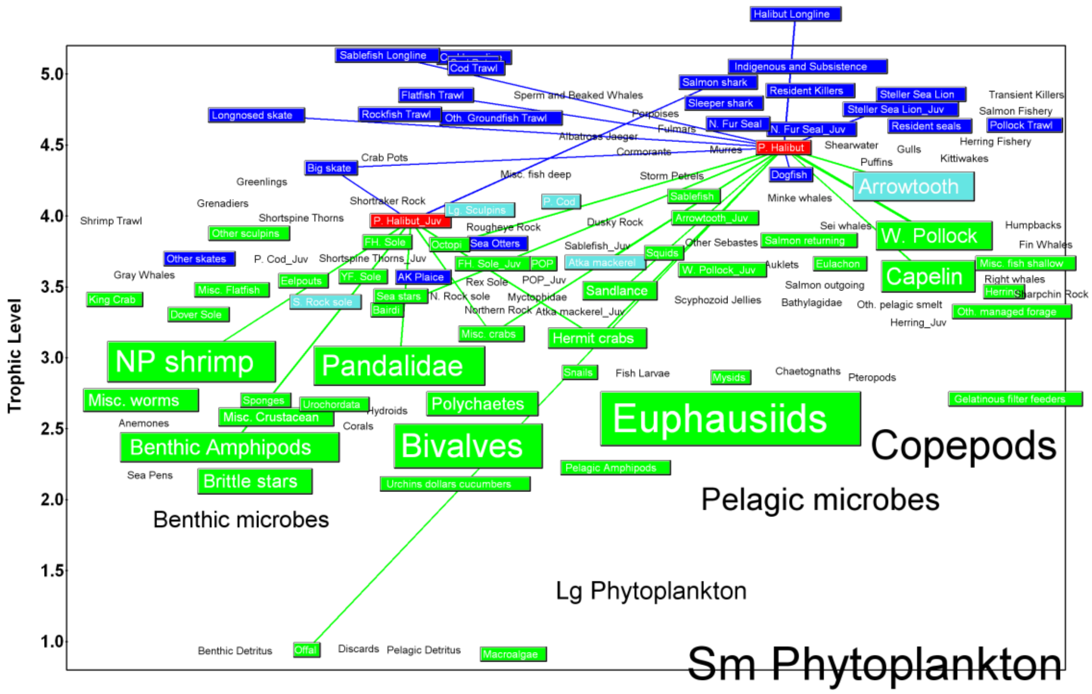

Figure 3-46 GOA food web (Source: Sarah Gaichas, NMFS AFSC)

As described in NMFS (2007) Dorn et al. (2005) noted the decline in assessed adult pollock biomass in the GOA since the 1990 may have resulted in the observed declines of biomass or body weight of groundfish predators specializing in feeding on large pollock; specifically Pacific halibut and Pacific cod. Food habits studies (e.g. Yang and Nelson 2000) indicate that consumption rates of large pollock by cod and halibut have dropped between 1990 and 2005. On the other hand, consumption of juvenile pollock by arrowtooth flounder has remained high, suggesting that top-down control of juvenile pollock by arrowtooth (e.g. as described in Bailey 2000) may be limiting the availability of pollock to halibut and cod. While multispecies analysis was not performed specific to listed EIS Alternatives, the sensitivity analysis described in Dorn et al. (2005) suggested that current fishing levels may be a secondary factor behind arrowtooth predation in limiting pollock availability to other predators.

An analysis of groundfish food habits data collected on the NMFS bottom-trawl survey from 1990-present (data available at http://access.afsc.noaa.gov/REEM/WebDietData/DietTableIntro.php) by Kerim Aydin (unpublished analysis) noted that between decades, the size preference of GOA Pacific halibut for pollock prey has remained similar, with smaller halibut consuming smaller pollock and larger halibut consuming larger pollock in both decades (Figure 3-47). However, the decreasing proportion of pollock in the diets of larger halibut (80+ cm fork length) between the 1990s and 2000s suggests that the larger halibut are encountering and consuming fewer pollock in the more recent time period (Figure 3-48). Research on the impacts and implications of this dietary shift on overall halibut growth rate, as well as on regional patterns (particularly east versus west across the GOA), is currently ongoing.

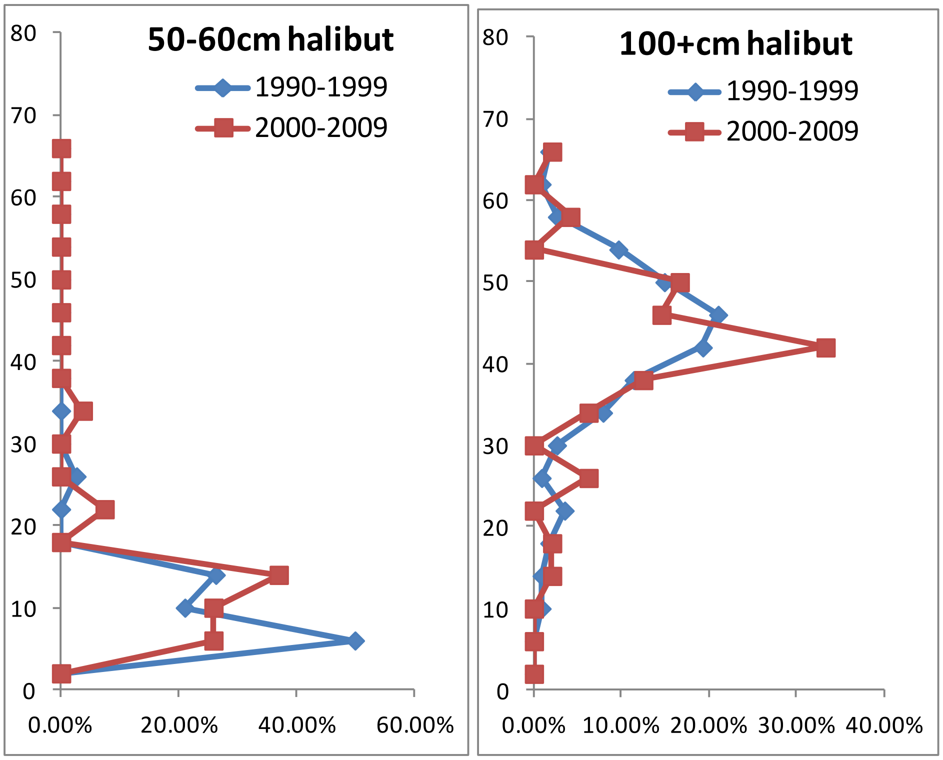

Figure 3-47 Length frequency of pollock (in cm, y-axis) in the diets of 50-60cm fork length (left) and 100+cm fork length (right) Gulf of Alaska Pacific halibut, shown by decade (Source: Kerim Aydin, AFSC).

As explained in Chapter 3, Section 3.3.1 of the Groundfish Harvest Specifications EA (NMFS 2007), NMFS and the Council continue to develop their ecosystem management measures for groundfish fisheries. The Council has created a committee to inform the Council of ecosystem developments and to assist in formulating positions with respect to ecosystem-based management. The Council took the lead in the establishing the interagency Alaska Marine Ecosystem Forum to improve inter-agency coordination and communication on marine ecosystem issues and continues to lead coordination of those meetings. The SSC holds regular ecosystem scientific meetings, often at the February Council meetings. In addition to these efforts to explore how to develop its ecosystem management efforts, the Council and NMFS continue to initiate efforts to take account of ecosystem impacts of fishing activity by designating EFH protection areas and habitat areas of particular concern. Ecosystem protection is supported by an extensive program of research into ecosystem components and the integrated functioning of ecosystems, carried out at the AFSC. Exempted fishing permits (EFPs) currently support investigation of new management approaches for the control of halibut removals through halibut excluder devices http://alaskafisheries.noaa.gov/ram/efp.htm.

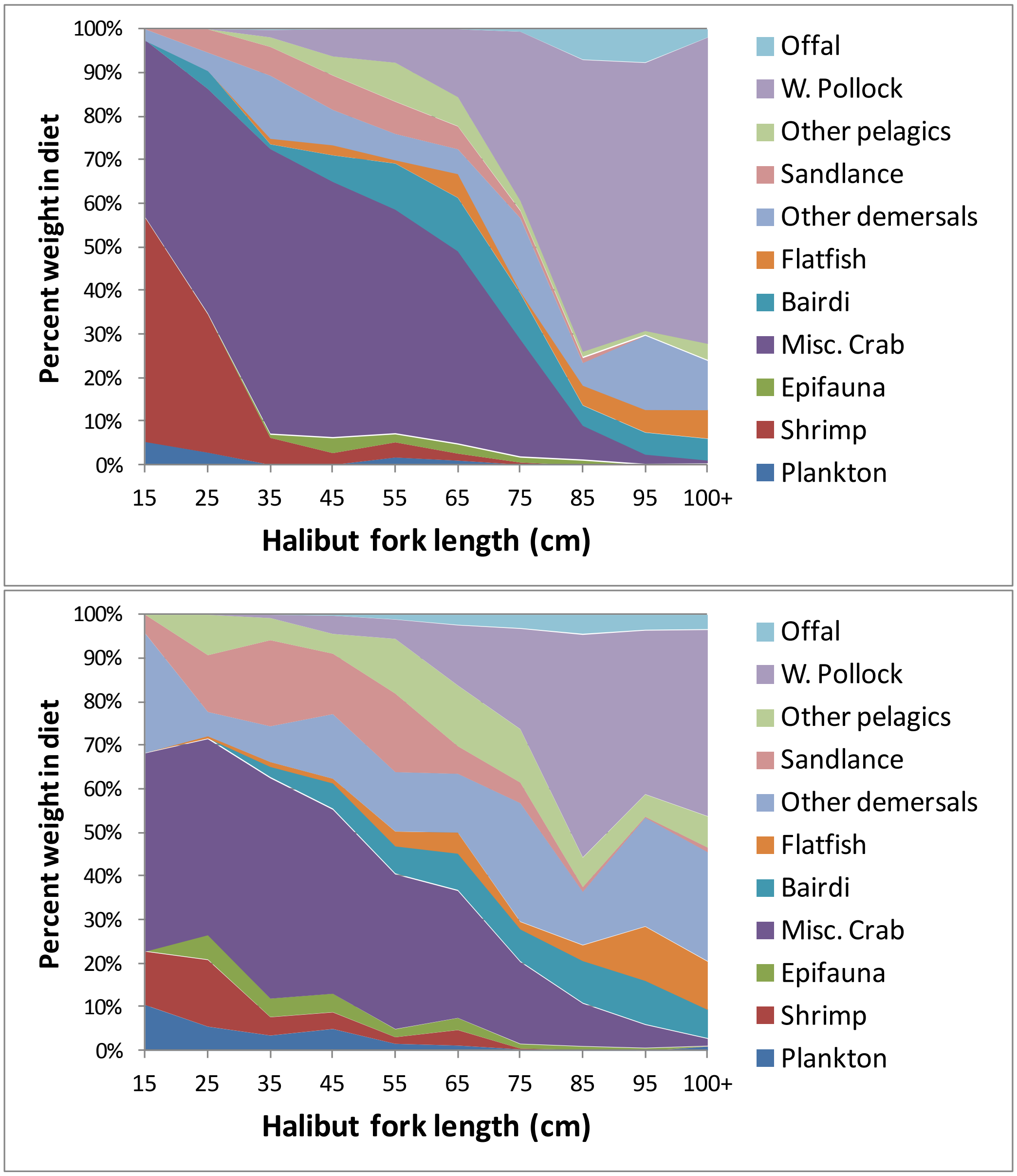

Figure 3-48 Percent weight in diet of major prey items of GOA Pacific halibut, by halibut fork length, for 1990-1999 (top figure) and 200-2009 (bottom figure) (Source: Kerim Aydin, AFSC).

3.8 Cumulative Effects

This section analyzes the cumulative effects of the actions considered in this EA. A cumulative effects analysis includes the effects of past, present, and reasonably foreseeable future action (RFFA). The past and present actions are described in several documents and are incorporated by reference. These include the PSEIS (NMFS 2004), the EFH EIS (NMFS 2005), and the harvest specifications EIS (NMFS 2007a). This analysis provides a brief review of the RFFA that may affect environmental quality and result in cumulative effects. Future effects include harvest of federally managed fish species and current habitat protection from federal fishery management measures, harvests from state managed fisheries and their associated protection measures, efforts to protect endangered species by other federal agencies, and other non-fishing activities and natural events.

The most recent analysis of RFFAs for the groundfish fisheries is in the Harvest Specifications EIS (NMFS 2007a). No additional RFFAs have been identified for this proposed action. The RFFAs are described in the Harvest Specifications EIS Section 3.3 (NMFS 2007a), are applicable for this analysis, and are incorporated by reference. A summary table of these RFFAs is provided below (Table 3-38). The table summarizes the RFFAs identified applicable to this analysis that are likely to have an impact on a resource component within the action area and timeframe. Actions are understood to be human actions (e.g., a proposed rule to designate northern right whale critical habitat in the Pacific Ocean), as distinguished from natural events (e.g., an ecological regime shift). CEQ regulations require a consideration of actions, whether taken by a government or by private persons, which are reasonably foreseeable. This is interpreted as indicating actions that are more than merely possible or speculative. Actions have been considered reasonably foreseeable if some concrete step has been taken toward implementation, such as a Council recommendation or the publication of a proposed rule. Actions simply “under consideration” have not generally been included because they may change substantially or may not be adopted, and so cannot be reasonably described, predicted, or foreseen. Identification of actions likely to impact a resource component within this action’s area and time frame will allow the public and Council to make a reasoned choice among alternatives.

Reasonably foreseeable future actions that may affect target and prohibited species are shown in Table 3-38. Ecosystem management, rationalization, and traditional management tools are likely to improve the protection and management of target and prohibited species, including halibut, and are not likely to result in significant effects when combined with the direct and indirect effects of Alternative 2. Ongoing research efforts are likely to improve our understanding of the interactions between the harvest of groundfish and halibut. NMFS, NPRB, and the commercial fishing industry are conducting or participating in several research projects to improve understanding of the ecosystems, fisheries interactions, and gear modifications to reduce halibut PSC. Other government actions and private actions may increase pressure on the sustainability of target and prohibited fish stocks either through extraction or changes in the habitat or may decrease the market through aquaculture competition, but it is not clear that these would result in significant cumulative effects. Any increase in extraction of target species would likely be offset by federal management. These are further discussed in Sections 4.1.3 and 7.3 of the Harvest Specifications EIS (NMFS 2007).

Table 3-38 Reasonable Foreseeable Future Actions.

Ecosystem-sensitive management	• Increasing understanding of the interactions between ecosystem components, and ongoing efforts to bring these understandings to bear in stock assessments, • Increasing protection of ESA-listed and other non-target species components of the ecosystem, • Increasing integration of ecosystems considerations into fisheries decision-making
Fishery rationalization	• Continuing rationalization of federal fisheries off Alaska, • Fewer, more profitable, fishing operations, • Better harvest and PSC control, • Rationalization of groundfish in Alaskan waters, • Expansion of community participation in rationalization programs
Traditional management tools	• Authorization of groundfish fisheries in future years, • Increasing enforcement responsibilities, • Technical and program changes that will improve enforcement and management
Other federal, state, and international agencies	• Future exploration and development of offshore mineral resources • Reductions in United States Coast Guard fisheries enforcement activities • Continuing oversight of seabirds and some marine mammal species by the USFWS • Expansion and construction of boat harbors • Expansion of state groundfish fisheries • Other state actions • Ongoing EPA monitoring of seafood processor effluent discharges
Private actions	• Commercial fishing • Increasing levels of economic activity in Alaska's waters and coastal zone • Expansion of aquaculture

Reasonably foreseeable future actions for marine mammals and seabirds include ecosystem-sensitive management; rationalization; traditional management tools; actions by other federal, state, and international agencies; and private actions, as described in Sections 8.4 and 9.3 of the Harvest Specifications EIS (NMFS 2007a). Ecosystem-sensitive management, rationalization, and traditional management tools are likely to increase protection to marine mammals and seabirds by considering these species more in management decisions, and by improving the management of the groundfish fisheries through the restructured observer program, catch accounting, seabird avoidance measures, and vessel monitoring systems (VMS). Research into marine mammal and seabird interactions with the groundfish fisheries are likely to lead to an improved understanding leading to trawling methods that reduce adverse impacts of the fisheries. Changes in the status of species listed under the ESA, the addition of new listed species or critical habitat, and results of future Section 7 consultations may require modifications to groundfish fishing practices to reduce the impacts of these fisheries on listed species and critical habitat. Any change in protection measures for marine mammals likely would have insignificant effects because any changes would be unlikely to result in the PBR being exceeded and would not be likely to result in jeopardy of continued existence or adverse modification or destruction of designated critical habitat. Additionally, since future TACs will be set with existing or enhanced protection measures, it is reasonable to assume that the effects of the fishery on the harvest of prey species and disturbance will likely decrease in future years.

Any action by other entities that may impact marine mammals and seabirds will likely be offset by additional protective measures for the federal fisheries to ensure ESA-listed mammals and seabirds are not likely to experience jeopardy or adverse modification of critical habitat. Direct mortality by subsistence harvest is likely to continue, but these harvests are tracked and considered in the assessment of marine mammals and seabirds. The cumulative effect of these impacts in combination with measures proposed under Alternative 2 is not likely to be significant.

Reasonably foreseeable future actions for habitat and the ecosystem include ecosystem-sensitive management; rationalization; traditional management tools; actions by other federal, state, and international agencies; and private actions, as detailed in Sections 10.3 and 11.3 of the Harvest Specifications EIS (NMFS

2007). Ecosystem-sensitive management, rationalization, and traditional management tools are likely to increase protection to ecosystems and habitat by considering ecosystems and habitat more in management decisions and by improving the management of the fisheries through the observer program, catch accounting, seabird and marine mammal protection, gear restrictions, and VMS. Continued fishing under the harvest specifications is likely the most important cumulative effect on EFH but the EFH EIS (NMFS 2005) has determined that this effect is minimal. Any shift of fishing activities from federal waters into state waters would likely result in a reduction in potential impacts to EFH because state regulations prohibit the use of trawl gear in much of state waters. Nearshore impacts of coastal development and the management of the Alaska Water Quality Standards may have an impact on EFH, depending on the nature of the action and the level of protection the standards may afford. Development in the coastal zone is likely to continue, but Alaska overall is lightly developed compared to coastal areas elsewhere and therefore overall impact to EFH are not likely to be great. The pollock, Pacific cod, sablefish, flatfish, and halibut fisheries in the GOA have been independently certified to the Marine Stewardship Council environmental standard for sustainable fishing. Overall, the cumulative effects on habitat and ecosystems are under Alternative 2 are not likely to be significant.

Direct and indirect effects for Pacific halibut include mortality along with changes in reproductive success and prey availability. Halibut spawn in deep waters of the continental slope in midwinter where they are not significantly affected by any fishery. Halibut are opportunistic predators with a wide range of prey species and no significant change to prey structure is expected as a result of Alternative 1. No evidence of fishery impacts to habitat of halibut has been shown, so this effect will not be considered in the cumulative effects analysis that follows.

3.8.1 Considered and Rejected Alternatives

The Council considered, and rejected, several other management approaches to address earlier draft problem statements.

- At its November 2011 meeting the GOA Groundfish Plan Team minutes reported the following recommendations to the Council:
  - "The Team recommends that the EA have reference points which are directly comparable to groundfish reference points in the North Pacific.
  - The Team strongly recommends evaluating a rate-based cap under the suite of alternatives for consideration. The Team notes that information is sufficient to establish some form of floating, biomass-based cap and this should be an option evaluated in this analysis.
  - The Team recommended that there should be some inclusion of incentives for bycatch reduction, citing possible examples amongst the Amendment 80 fleet for incentivizing bycatch reduction.

  Prior to the GOA Plan Team's recommendations the Council had a brief discussion of a biomass-based halibut PSC limit in the GOA which would float with biomass abundance. The Council did not pursue analysis of such an alternative at that time because the U.S. and Canadian IPHC Commissioners, in cooperation with their governments, have agreed to an independent Performance Review[35] of the IPHC to build upon its work to-date and ensure its continued relevance and effectiveness. The review, part of an ongoing international practice to assess regional fishery management organizations, has generated a focused report[36] that will, among other objectives:

    - Assess recent performance of the Commission relative to achievement of the goals set out in the Treaty and its various amendments;
    - Identify effective practices already used by the Commission and highlight opportunities to incorporate (1) best practices employed by other leading international fisheries and oceans

[35] http://www.iphc.int/component/content/article/253.html

[36] http://www.iphc.int/documents/review/FINAL_IPHC_Performance_Review-April30.pdf

management bodies charged with implementing agreements and (2) new approaches put forward by stakeholders;

- Consider, in particular, opportunities to strengthen Commission governance, including stakeholder involvement, information sharing, policy development, decision-making processes and general Commission practices

The proposal of a floating cap that rises and falls with halibut is problematic at this time as to how/when it would be assigned (to Ebio or age 8+ fish). It does not address the potential increased impact on U26 halibut, the most uncertain and vulnerable portion of the stock. It also does not address the halibut convention agreement to reduce bycatch poundage (not just the rate).

The Council chose not to pursue implementation of revised GOA halibut PSC limits for 2012. NMFS staff had identified a number of difficulties with implementing revised halibut PSC limits in conjunction with the annual groundfish harvest specification process (see http://www.fakr.noaa.gov/npfmc/PDFdocuments/halibut/HalibutPSCLimit911.pdf).

- The Council chose not to pursue implementation of revised GOA halibut PSC limits at the start of the next fishing year's harvest specification cycle (i.e., 2013), rather than mid-season 2012, if the latter would undermine or preempt the Council's objective. The Council could have achieved this:
    - through a separate EA/RIR/IRFA (using much of the analysis contained herein);
    - by requesting that NMFS address GOA halibut PSC limits in the scope of alternatives in the next EA/EIS that supports the GOA annual harvest specifications;
    - by rescheduling the proposed action for the 2013/2014 annual harvest specifications cycle, if management issues would prevent implementation of the proposed action in a timely manner in 2012, assuming sufficient management and/or implementation issues are identified through the analysis and/or public comment;
    - by recommending the timing by NMFS of publication in the *Federal Register*.

  The Council identified a potential comprehensive rationalization plan to apportion halibut PSC limits in the groundfish fisheries as a long term solution. The Council reviewed an exploratory discussion paper in October 2011. The Council received a staff discussion paper describing various programs that use Individual Bycatch Quotas (IBQs) to manage species that may not be retained (such as halibut in the trawl fishery). The Council elected to take no action in response to the discussion paper; however, the Council requested additional information concerning management programs in the West Coast and British Columbia groundfish trawl fisheries at a future meeting. This information could be received either through the report of the IPHC halibut bycatch workgroup or by inviting representatives of the management agencies governing those fisheries to address the Council. In April 2011, as part of its motion on GOA halibut PSC limits, the Council adopted the following motion: "In furtherance of above stated objectives, the Council recommends that staff develop a comprehensive FMP amendment and regulatory amendment and analysis of ways to reduce halibut bycatch by all sectors and gear types engaged in GOA groundfish fisheries." The Council noted the aforementioned motion provided an opportunity for the Council to fully state that a comprehensive regulatory amendment and FMP amendment will be started and drafted, so the Council can provide industry with the tools to accomplish things they want to do. The Council is scheduled to review a discussion paper in June 2012 in order to develop a problem statement and alternatives for analysis.

3.8.2 Reasonably Foreseeable Future Actions

In December 2010, the Council initiated two analyses that propose management measures that would apply exclusively to the directed pollock (*Theragra chalcogramma*) fishery in the Western and Central GOA: 1) an expedited joint FMP/regulatory amendment considers the effects of setting PSC limits in the Central and Western GOA for Chinook salmon (*Oncorhynchus tshawytscha*); and 2) an analysis for a joint FMP/regulatory amendment that would address salmon PSC management comprehensively in the GOA trawl fisheries. In February 2010, the Council also requested a discussion paper on Pacific halibut PSC in the BSAI groundfish fisheries. The Council prioritized its review and action on GOA halibut PSC as a higher priority, and the BSAI discussion paper will be scheduled for review in the future.

3.8.2.1 GOA Chinook salmon PSC limits

In June 2011, the Council selected its preferred alternative to limit Chinook salmon PSC in the Western and Central GOA pollock fisheries (Amendment 93). Chinook salmon is a prohibited species in the GOA and their capture must be avoided; however, there had been no specific management measures to minimize Chinook salmon PSC. The Council adopted a PSC limit of 25,000 Chinook salmon for the western and central GOA pollock fisheries.

Upon implementation, the annual cap would be apportioned by area, and would close the pollock fishery in each area should the PSC limit is reached. The proposed PSC limits are: 1) Central GOA: 18,316 Chinook salmon; and 2) Western GOA: 6,684 Chinook salmon. Vessels < 60 ft that are directed fishing for pollock would be required for the first time to have observer coverage, beginning no later than January 1, 2013.

This proposed action primarily affects vessels in the Western GOA, where a large proportion of the fleet uses smaller boats. If the proposed restructured observer program is implemented in 2013, observers would be deployed under that program, otherwise vessels < 60 ft would need to comply with existing 30 percent observer coverage requirements until the restructured observer program is implemented.

The proposed Chinook salmon preferred alternative also would require full retention of all salmon species, by all vessels fishing in the GOA pollock trawl fisheries. The purpose of full retention is to provide an opportunity for collection of scientific data or biological samples; fish that are retained may not be kept for human consumption, unless they are delivered to an authorized prohibited species donation program.

Currently, NMFS is only able to analyze samples from salmon that are caught as PSC on observed pollock trips. Full retention is a key prerequisite to estimating the representative composition, by stock of origin, of Chinook salmon caught as PSC in the GOA pollock fishery. At its June 2011 meeting, the Council heard testimony that all processors of GOA pollock (which, by regulation, must be delivered shoreside) have agreed to participate in SeaShare, an organization participating in the Alaska food bank donation program.

The proposed rule for Amendment 93 was published on December 14, 2011 at http://www.fakr.noaa.gov/prules/76fr77757.pdf. The Secretary approved the FMP amendment on February 17, 2012.The final rule is pending publication in the *Federal Register*. It is anticipated that the Chinook salmon PSC limit may be implemented in mid-2012. If so, the Council has specified reduced PSC limits for the implementation year only, to be effective in the C and D pollock seasons. The PSC limits for 2012 would be 8,929 Chinook salmon in the Central GOA, and 5,598 Chinook salmon in the Western GOA. Additionally, NMFS will work with the industry to improve observed and extrapolated Chinook salmon estimates and their timeliness.

3.8.2.2 GOA Pacific cod sector splits

In December 2009, the Council selected its preferred alternative on GOA Pacific cod sector allocations, limiting the proportion of the respective Western and Central GOA Pacific cod TACs that may be harvested by each of the management areas (Amendment 83). The Council recommended sector allocations to enhance stability in the cod fisheries, reduce competition among the sectors, and preserve the historical distribution of catch among sectors. The Council also recommended measures to limit mothership processing activity in the GOA and potential entry by Federally-permitted vessels into the parallel waters fishery, as well as addressed rollovers and HAL halibut PSC apportionments.

The Council recommended Pacific cod allocations for six sectors in the Western GOA and seven sectors in the Central GOA, including the jig sector. Allocations of cod were calculated by taking each sector's 'best option' from proposed options of catch history in the Western GOA and Central GOA and then scaling the allocations. In addition, the seasonal apportionments of the Western GOA trawl CV and pot CV/CP allocations were shifted to allow more trawl harvests during the A season, because there is little trawl effort during the B season. See Table 3-39and Table 3-40 below.

Table 3-39 Western GOA sector allocations (%) with jig allocation taken off the top of the TAC

	Annual Allocation	Compare to 60/40: A season	Compare to 60/40: B season	A season allocation Percent	B season allocation Percent	A season allocation Percent	B season allocation Percent
HAL CP	19.8	55.2	44.8	10.9	8.9	18.2	22.2
HAL CV	1.4	47.2	52.8	0.7	0.7	1.1	1.8
Pot CV/CP	38.0	52.0	48.0	19.8	18.2	32.9	45.6
Trawl CP	2.4	37.9	62.1	0.9	1.5	1.5	3.7
Trawl CV	38.4	72.3	27.7	27.7	10.7	46.2	26.6
Total	**100.0**			**60.0**	**40.0**	**100.0**	**100.0**

Table 3-40 Central GOA sector allocations with jig allocation taken off the top of the TAC

	Annual Allocation	Compare to 60/40: A season	Compare to 60/40: B season	A season allocation Percent	B season allocation Percent	A season allocation Percent	B season allocation Percent
HAL CP	5.1	80.3	19.7	4.1	1.0	6.8	2.5
HAL CV <50	14.6	63.9	36.1	9.3	5.3	15.5	13.2
HAL CV >=50	6.7	84.0	16.0	5.6	1.1	9.4	2.7
Pot CV/CP	27.8	63.9	36.1	17.8	10.0	29.7	25.1
Trawl CP	4.2	48.8	51.2	2.0	2.2	3.4	5.4
Trawl CV	41.6	50.8	49.2	21.1	20.5	35.2	51.2
Total	**100.0**			**60.0**	**40.0**	**100.0**	**100.0**

Upon implementation, the jig sector would receive an initial allocation from the respective Pacific cod TACs, before allocations to other sectors are made and higher than the sector's historical catch in the GOA, of 1 percent of the Central GOA TAC and 1.5 percent of the Western GOA TAC, with a stair step provision to increase the jig allocation by 1 percent, if 90 percent of the Federal jig allocation in an area is harvested in any given year. The jig allocation would be capped at 6 percent of the Central and Western GOA Federal Pacific cod TACs. In addition, the jig allocation would be stepped down by 1 percent in the following year, if at least 90 percent of the previous allocation is not harvested in a given year, but would not drop below the initial allocation.

The preferred alternative also addressed rollovers and HAL halibut PSC apportionments. Any portion of an allocation that NMFS determines would not be harvested by the respective sectors during the remainder of the fishing year would be rolled over to CV sectors first, and then to all sectors, as needed, to harvest the remaining Pacific cod. The preferred alternative also would apportion the GOA HAL halibut PSC limit, between the CP and CV sectors, in proportion to the total Western GOA and Central GOA Pacific cod allocations made to each sector, after scaling the Pacific cod allocations to reflect the relative size of the Pacific cod TAC area apportionment (**Table 3-41**).

Table 3-41 Halibut PSC allocations to HAL CVs and CPs

CV Allocation	CP Allocation	CV amount (mt)	CP amount (mt)
59.7	40.3	173	117

The preferred alternative also included provisions addressing mothership and stationary floating processor activity in the GOA. The harvest sector allocations would supersede the current 90 percent/10 percent inshore/offshore processing allocations, originally intended to protect historical processing and community delivery patterns established in the GOA groundfish fisheries. Motherships would be allowed to process up to 2 percent of the Western GOA Pacific cod TAC, but would be prohibited from processing groundfish in the Central GOA. Floating processors that do not harvest groundfish or that act as a stationary floating processor in a given year may process up to 3 percent of the respective Western and Central GOA TACs, provided that they operate within the municipal boundaries of Community Quota Entity (CQE) communities. Vessels may continue to elect to operate as a stationary floating processor in the GOA, but would be limited to processing groundfish at a single geographic location in Alaska State waters in a given year, and may not operate as a CP in the GOA or BSAI in the same calendar year. There would be no cap on the amount of Pacific cod processed by stationary floating processors.

Finally, the preferred alternative addressed potential entry by Federally-permitted vessels into the parallel waters fishery. Parallel waters activity by Federally-permitted vessel operators who do not hold LLPs could erode the catches of historical participants who contributed catch history to the sector allocations and depend on the GOA Pacific cod resource. Vessels fishing in Federal waters are required to hold an LLP license, with the appropriate area, gear, and species endorsements, but vessels fishing in parallel State waters are not required to hold an LLP license. The preferred alternative would preclude Federally-permitted vessels that do not have LLP licenses from participating in the GOA Pacific cod parallel fishery, to prevent any such encroachment.

The final rule for Amendment 83 was published on December 1, 2011 at http://www.fakr.noaa.gov/frules/76fr74670.pdf and became effective on January 1, 2012.

3.8.2.3 Central Gulf of Alaska Rockfish (Catch Share) Program

At its June 2010 meeting, the Council selected its preferred alternative to redefine a catch share program for the Central GOA directed rockfish fisheries (Amendment 88). The program would replace the pilot program under which the fisheries are currently managed, as that program expires after the 2011 season. In addition to target rockfish species (POP, northern rockfish, and PSR), the program allocates Pacific cod, sablefish, shortraker rockfish, rougheye rockfish, thornyhead rockfish, and a PSC allowance for Pacific halibut to program participants. The preferred alternative would establish cooperative programs for both catcher processors and catcher vessels. Licenses qualifying for the program would annually form cooperatives that would receive allocations based on the catch histories of members. Catcher vessel cooperatives would be required to associate with a shore-based processor in Kodiak, but members may change cooperatives, and cooperatives may change processor associations, annually, without penalty. All deliveries of catcher vessel catch are required to be made in Kodiak. Licenses used to participate in the trawl entry level fishery under the pilot program would receive an allocation of 2.5 percent of the total allocation to the program, which would be divided among participants in that fishery in proportion to the number of years they participated. Program allocations are otherwise based on catch histories from 2000 to 2006, with each license dropping the two years of its lowest catches. For conservation, halibut PSC allowances are reduced by 12.5 percent of historical levels. In addition, halibut savings may also be realized through a reduction (to 55 percent of the remaining halibut allowance) of the rollover of unused allowance amounts from the program, to the fifth season trawl apportionment. Caps limit the percentage of the various allocations that may be held by any person or harvested by a single vessel, and that may be received or processed by any individual processor. A program review is required after the third year of the program, in addition to any other reviews that may be required by the Magnuson Stevens Act. Sideboards limit the activities of program participants in other fisheries. The new program would expire 10 years after implementation (unless renewed) (Table 3-42).

Table 3-42 Pacific halibut PSC allocation under the pending Central GOA Rockfish Program

<table>
<tr><th>For the following rockfish sectors…</th><th>The following amount of halibut</th><th>Is multiplied by…</th><th>To yield the following amount of halibut PSC assigned to Rockfish CQ…</th><th>The following amount of halibut is not assigned as rockfish CQ, halibut PSC, or halibut IFQ for use by any person</th></tr>
<tr><td>Catcher vessel sector</td><td>134.1 mt</td><td rowspan="2">87.5 %</td><td>117.3 mt</td><td rowspan="2">27.4 mt
(16.8 mt from the catcher vessel sector & 10.6 mt from the catcher/processor sector)</td></tr>
<tr><td>Catcher/Processor sector</td><td>84.7 mt</td><td>74.1 mt</td></tr>
</table>

The preferred alternative also would include a set aside, to establish an entry level fishery for fixed gear vessels. The initial allocation to the entry level fishery would be 5 mt of Pacific ocean perch (POP), 5 mt of northern rockfish, and 30 mt of pelagic shelf rockfish (PSR). These would be increased for a species/complex each time the sector harvested in excess of 90 percent of that allocation. Growth of the entry level fishery would be limited to 1 percent of the POP total allowable catch, 2 percent of the northern rockfish total allowable catch, and 5 percent of the PSR total allowable catch.

Allowance of halibut PSC to the rockfish cooperative program would be based on 87.5 percent of the historical average usage (during the qualifying years), calculated by dividing the total metric tons of halibut PSC in the CGOA rockfish target fisheries during the qualifying years, by the number of years, and multiplying by 0.875. The difference between the historical average usage and the allowance derived above would remain unavailable for use in the groundfish fisheries.

In addition, 55 percent of any cooperative's unused halibut PSC that has been apportioned as CQ and has not been used by the cooperative would be added to the last seasonal apportionment for trawl gear during the current fishing year. Any remaining halibut PSC CQ not added to the last seasonal apportionment would remain unavailable for use for that fishing year.

The final rule for Amendment 88 was published on December 27, 2011 at http://www.fakr.noaa.gov/frules/76fr81248.pdf and became immediately effective.

3.8.2.4 Observer Program

The current federal groundfish observer program in Alaska is structured by vessel size. As such, groundfish vessels less than 60' are not presently required to carry observers; vessels 60' to 125' length overall (LOA) are required to carry and pay for their own observers 30 percent of their fishing days, regardless of gear type or target fishery; vessels greater than 125' LOA are required to carry observers 100 percent of the time. Vessels in the 30 percent coverage category may select when they wish to carry observers, but are marginally constrained in this self-selection by regulatory requirements for quarterly coverage levels. The two size categories with less than 100 percent observer coverage comprise the majority of vessels fishing in the GOA and out of ports other than Dutch Harbor and Akutan in the BSAI.

Observers estimate total catch for a portion of hauls or sets, and sample hauls or sets for species composition, including PSC. These data are extrapolated in the Alaska Region Catch Accounting System (CAS) to make estimates of (among other things) total PSC halibut catch on both observed and unobserved vessels. Observer data are assumed to be representative of the activity of all vessels and are used to estimate total halibut PSC. The ratio estimator is derived from a set of covariates that match both observer and groundfish landing/production information. A detailed description of this process is presented in Cahalan et al. (2010).

Regulations governing observer deployment (i.e., observer coverage requirements) introduces the potential of bias in observer data by using a non-random deployment model, which may facilitate non-representative fishing. Given the use of observer data in CAS, and the subsequent use of CAS estimation in stock assessments and quota management, this issue can undermine the data used to manage halibut PSC (among other species) in the North Pacific groundfish fisheries. In response to these issues, the Council took action at its October 2010 meeting to recommend that NMFS restructure the observer program to address multiple issues with the current program, including bias (NPFM 2010). The recommended restructuring preferred alternative provides NMFS with flexibility to place observers onboard a vessel, using accepted statistical practices, so that coverage gaps and vessel-trip selection bias is addressed (http://www.alaskafisheries.noaa.gov/npfmc/current_issues/observer/ObserverMotion1010.pdf).

The preferred alternative to restructure the observer program is likely to influence estimation most in sectors currently with 30 percent or less coverage. Past analytical examinations of the North Pacific Groundfish Observer Program have dealt with such issues as sampling protocols, reducing bias, estimate expansion, and the statistical properties of estimates (e.g. Jensen et al. 2000, Volstad et al. 1997, Pennington 1996, and Pennington and Volstad 1994). These and other studies suggest bias is likely reduced by changing from the current system, in which 30 percent coverage vessels can choose when and where to take observers, to a new system in which NMFS is responsible for distributing observers among vessels using statistically robust methods.

The extent to which random deployment influences PSC halibut estimates is related to current efforts by the fleet to manipulate PSC rates, as well as the magnitude of bias caused by quarterly deployment regulations and timing of observer coverage. Work presented in the restructuring analysis (NPFMC 2010) suggests evidence of a deployment effect, but the magnitude of this bias on PSC estimates is not known. Improvements in the statistical properties of observer samples and estimates will result in many data improvements, including improved spatial coverage, as smaller vessels that fish in inshore areas receive coverage; a reduction in the ability for vessels to "game" coverage by not taking an observer to certain areas of known high incidental removals or attempting to manipulate PSC rates; CAS estimates may better reflect sector-specific halibut PSC, due to a consistent amount of observer data available throughout the year; and finally a more representative sample of halibut viability may be obtained.

The potential changes in PSC halibut estimation described in the preceding paragraph will most influence groundfish fisheries that currently have a large amount of effort from 30 percent or unobserved vessels. Fisheries currently with a 100 percent or more of coverage will continue to receive vessel specific rates, which is the most accurate and precise estimate available. Fisheries currently with a mixture of 100 percent and 30 percent vessels receive PSC estimates that are vessel-specific for observed vessels and PSC halibut rates derived from observer information collected onboard a mixture of 100 percent and 30 percent vessels. PSC estimates in a fishery may change depending on the direction of deployment bias and the amount of 30 percent coverage relative to 100 percent coverage under the current observer deployment model. Fisheries with both levels of coverage, but historically operated under high levels of 30 percent coverage, may experience a larger reduction in bias (and subsequent change in PSC) than those with a large amount of 100 percent coverage. Further, the amount of variation associated with PSC rates and estimates may also change, due to a representative sample better reflecting true variation of halibut PSC in the fishery, as well as additional vessels (those 40' to 60' LOA) being sampled by observers.

The proposed rule for Amendment 86 was published on March 14, 2012 at 77 FR 15019 http://www.fakr.noaa.gov/prules/77fr15019.pdf. The restructured program is expected to be implemented in 2013.

3.8.2.5 Comprehensive GOA FMP/regulatory amendment to implement management tools

As described in more detail under Section 3.8.2.5 the Council is scheduled to review a discussion paper in June 2012 on issues related to development of a problem statement and analytical alternatives for implementation of comprehensive management tools with which to reduce halibut PSC in the GOA.

3.8.2.6 IPHC Halibut Bycatch Working Group

At its 2010 Annual Meeting the IPHC reconstituted the bilateral (US and Canada) Halibut Bycatch Work Group. Originally formed in 1991 to address several issues significant at that time, this Halibut Bycatch Working Group (hereafter HBWG II) was reformed for very different reasons.

In recent years, several issues have served to increase the need for greater understanding of the impacts of halibut incidental removals, including the decline in halibut exploitable biomass, and new information on migration by juvenile and adult halibut, coming from the 2003/2004 tagging study. In addition, concerns about the adequacy of monitoring and the accuracy of estimates of incidental halibut removals provided to IPHC by domestic agencies have been raised. Thus, the IPHC reconstituted the HBWG II, with the goal of reviewing progress on control of such removals since 1991, incidental harvest monitoring programs, and examining how such mortality is accounted for within the IPHC harvest policy.

The HBWG II met in Seattle, Washington on August 11 and held conference calls on September 27, December 1, and December 20, 2010, as it worked to meet its charge. Additionally, staffs of the U.S. National Marine Fisheries Service (NMFS), IPHC, and Fisheries and Oceans Canada (DFO) produced and reviewed numerous documents and analyses in support of the HBWG II deliberations. The final report is posted at http://www.iphc.int/documents/2012bycatch/Reportof2010HBWG.pdf.

At its 2011 Annual Meeting the IPHC discussed halibut bycatch management and received a report from its Working Group. The IPHC stated it remained concerned about the yield lost to the halibut fishery as a result of bycatch mortality in other fisheries. Accordingly, the Commission established a Halibut Bycatch Project

Team, led by a Commissioner from each country, to gain better understanding of the amounts and potential impacts of halibut bycatch mortality in other fisheries. Further, this Team will explore whether options for reducing this bycatch mortality can be implemented and whether mitigating the impacts of bycatch mortality in one area on the available harvest in other areas is possible.

At its 2012 Annual Meeting the IPHC reviewed progress by the Project Team and Group and developed objectives and timelines for work in 2012. In particular, the Group will review a staff report on halibut migration, review actions taken by both countries to reduce bycatch mortality, identify further actions that will be effective in reducing bycatch mortality, and identify options to mitigate the effects of such mortality.

3.8.2.7 Halibut Bycatch Workshops[37]

In 2009 the IPHC's scientific staff offered two workshops on topics of interest to the fishing industry and to observers of the Pacific halibut fishery. These workshops followed two previous workshops: a 2007 workshop on the IPHC stock assessment, including a formal external peer review; and, a 2008 workshop on biomass apportionment.

Workshop I On April 29 and 30, 2009, the biomass apportionment workshop took place in Seattle. The workshop dealt with a wide variety of subjects, including harvest policy and the use of simulation modeling to study the effects of alternative apportionment methods on the dynamics and status of halibut stocks.

Workshop II On September 29, 2009, the IPHC staff held a one-day workshop in Seattle on the topic of determining and incorporating the impacts of halibut mortality. During this second workshop the staff also covered topics such as the effects of mortality of sublegal fish in halibut fisheries and incorporating mortality into the assessment and management of halibut stocks. All workshop presentations and a summary of all workshops are available on the IPHC's website: http://www.iphc.int. In addition, the workshops resulted in a number of comments and questions, for which the IPHC staff has compiled detailed responses, which are also available on the website.

April 2012 NPFMC/IPHC halibut bycatch workshop Because the Council is evaluating proposed reductions to the halibut PSC limits for trawl and longline fisheries in the GOA under the proposed action and in the BSAI in the future, the Council and the IPHC jointly convened a work shop on April 24-25, 2012 in Seattle, WA to address halibut bycatch estimation, halibut growth and migration, and effects on harvest strategy. Part of the evaluation included an estimate of the impacts of halibut PSC mortality levels on yield (CEY), exploitable and spawning biomass, and the dynamics of the halibut stock. In response to this need, the IPHC staff previously provided an analysis on these metrics, which was included both in the Council analysis and as an appendix to the GOA Halibut PSC Limit EA/RIR.IRFA, and was presented at the workshop.

Halibut PSC mortality impacts are a combination of both the level of mortality and its cumulative impact on yield and spawning biomass, both in total and area-specific, based on estimated halibut movements. That is, impacts are an issue of the *amount* of mortality, and both components require analysis and evaluation, not just an issue of halibut biology (movement, growth, and mortality).

The IPHC staff is preparing a white paper on migration which will detail the current understanding of halibut movements, including sources of information and analyses. This information may inform the Council's discussion of what the area-specific impacts of bycatch might be, given the available data and assuming the existing PSC data are accurate. This white paper is anticipated to be made available in the near future, and its general conclusions were a subject of the workshop discussion. Implications of slow growth currently being observed in halibut, including the relationship to current minimum size limits, also were reviewed at the workshop.

There is broad agreement that the current levels of PSC in the GOA are poorly understood, partly because of necessary extrapolations to vessels not subject to observer coverage, and are not subject to high confidence intervals. Recognizing that the groundfish observer program in the GOA is being restructured to address these deficiencies and to provide better use of available observer coverage, a review and assessment of PSC

[37] http://www.iphc.int/publications/annual/ar2009.pdf

estimation at this workshop was intended to inform to that restructuring process. More comprehensive management measures to reduce halibut PSC (e.g., Individual Bycatch Quotas or similar 'rationalized' approaches) were also addressed.

The workshop included reviews of the methodology and accuracy of the estimation of halibut bycatch in trawl/longline groundfish fisheries off Alaska, and the impacts of any given amount of halibut bycatch on the halibut stock, both coastwide and by area given the current understanding of halibut migration. The workshop also discussed general halibut ecology, including recent trends in exploitable biomass, spawning biomass, and length at age, as well as information concerning the causes and implications of halibut slow growth.

Note that the Council rescheduled final action to June 2012 in order to receive a report that summarized the workshop that is scheduled for release in mid-May. While this analysis could not include the report findings due to the schedule for release of the public review draft of this analysis much of the information reviewed during the workshop is included in the EA.

3.8.3 Summary of Cumulative Effects

Mortality

Direct/Indirect Effects The potential effect of total fishing mortality on GOA Pacific halibut under Alternative 1 reduces halibut recruitment, spawning stock biomass, and available yield to directed fisheries.

Persistent Past Effects Persistent past effects of mortality on Pacific halibut have been identified as reduced recruitment, spawning stock biomass, and yield to directed fisheries.

Reasonably Foreseeable Future External Effects The directed commercial IFQ longline fishery for Pacific halibut is closely managed by IPHC and NMFS. Although state-managed fisheries may remove incidental amounts of halibut, IPHC accounts for all removals, including removals in other fisheries, when setting catch limits for the directed commercial IFQ longline fishery. Thus, changes in total halibut removals (increase or decrease) are reflected in changes to catch limits set for the directed fishery.

Cumulative Effects The combined effects of mortality on Pacific halibut resulting from direct catch, PSC removals, and reasonably foreseeable future external events (both human controlled and natural) under Alternative 1 are not significant under NEPA criteria. No significant change from the baseline condition is expected as a result of Alternative 1.

Change in Reproductive Success

Direct/Indirect Effects The potential effect of changes in reproductive success on Pacific halibut in the GOA is insignificant under Alternative 1. Halibut spawn in deep waters of the continental slope in midwinter where they are not significantly affected by any fishery. No significant change from the baseline condition is expected as a result of Alternative 1.

Persistent Past Effects No persistent past effects has been identified on changes in reproductive success of Pacific halibut. The halibut stock is declining due to reduced catchable size of fish at age, lower growth rates, and higher than target harvest rates. The stock remains at risk of further declines. Conservation of the halibut resource is the primary concern and management objective of the proposed alternatives. Impacts of PSC removals on commercial catch limits is also a concern.

Reasonably Foreseeable Future External Effects Halibut spawn in deep waters of the continental slope in midwinter where they are not significantly affected by any fishery. The directed longline fishery and other state-managed fisheries are not considered contributing factors to changes in reproductive success for halibut since there is no significant spatial/temporal overlap between these fisheries and halibut spawning areas. Long-term climate change and regime shifts could have impacts on the reproductive success of Pacific halibut depending on the direction of the shift. It has been shown that warm trends favor recruitment while cool trends weaken recruitment in most fish species including halibut.

Cumulative Effects The combined effects of changes in reproductive success on Pacific halibut resulting from direct catch, bycatch, and reasonably foreseeable future external events (both human controlled and natural) are considered insignificant for Alternative 1. No significant change from the baseline condition is expected as a result of Alternative 1.

Change in Prey Availability

Direct/Indirect Effects The potential effect of changes in prey availability on BSAI and GOA Pacific halibut is insignificant under Alternative 1. Halibut are opportunistic predators with a wide range of prey species and no significant change to prey structure is expected as a result of Alternative 1.

Persistent Past Effects No persistent past effects impacting prey availability of halibut has been identified.

Reasonably Foreseeable Future External Effects Halibut are opportunistic predators with a wide range of prey species. Increase in prey competition between Pacific halibut and fisheries catch is not expected. Thus, the directed longline fishery and other state-managed fisheries are not considered contributing factors to changes in prey availability for halibut. Long-term climate change and regime shifts could have impacts on certain prey species of Pacific halibut depending on the direction of the shift. It has been shown that warm trends favor recruitment while cool trends weaken recruitment in most fish species; however, the effects of this type of large scale event on the prey structure of halibut cannot be determined at this time.

Cumulative Effects The combined effects of changes in prey availability on Pacific halibut resulting from direct catch, bycatch, and reasonably foreseeable future external events (both human controlled and natural) are considered insignificant for Alternative 1. No significant change from the baseline condition is expected as a result of Alternative 1.

3.8.4 Significance

Considering the direct and indirect impacts of the proposed action when added to the impacts of past and present actions previously analyzed in other documents that are incorporated by reference and the impacts of the reasonably foreseeable future actions listed above, the cumulative impacts of the proposed action are determined to be not significant. This finding is based on conclusions that none of the alternatives:

- can be reasonably expected to jeopardize the sustainability of GOA groundfish or Pacific halibut;
- exceed a threshold of more than minimal and not temporary disturbance to habitat;
- can be reasonably expected to alter the population trend outside the range of natural variation; or
- produce population-level impacts for marine species, or changes community- or ecosystem-level attributes beyond the range of natural variability for the ecosystem.

3.8.5 NEPA SUMMARY

One of the purposes of an environmental assessment is to provide the evidence and analysis necessary to decide whether an agency must prepare an environmental impact statement (EIS). The Finding of No Significant Impact (FONSI) is the decision maker’s determination that the action will not result in significant impacts to the human environment, and therefore, further analysis in an EIS is not needed. The Council on Environmental Quality regulations at 40 CFR 1508.27 state that the significance of an action should be analyzed both in terms of “context” and “intensity.” An action must be evaluated at different spatial scales and settings to determine the context of the action. Intensity is evaluated with respect to the nature of impacts and the resources or environmental components affected by the action. NOAA Administrative Order (NAO) 216-6 provides guidance on the National Environmental Policy Act (NEPA) specifically to line agencies within NOAA. It specifies the definition of significance in the fishery management context by listing criteria that should be used to test the significance of fishery management actions (NAO 216-6 §§ 6.01 and 6.02). These factors form the basis of the analysis presented in this EA/RIR/IRFA. The results of that analysis are summarized here for those criteria.

Context: For this action, the setting is the GOA groundfish fisheries. Any effects of this action are limited to the regulatory areas of the GOA. The effects of this action on society are on individuals directly and indirectly participating in these fisheries and on those who use the ocean resources. Because this action concerns the use of a present and future resource, this action may have impacts on society as a whole or regionally.

Intensity: Considerations to determine intensity of the impacts are set forth in 40 CFR 1508.27(b) and in the NAO 216-6, Section 6. Each consideration is addressed below in order as it appears in the NMFS Instruction 30-124-1 dated July 22, 2005, Guidelines for Preparation of a FONSI. The sections of the EA that address the considerations are identified.

1) *Can the proposed action reasonably be expected to jeopardize the sustainability of any target species that may be affected by the action?*

(Section 3.3.1) No. No significant adverse impacts on target species were identified for the proposed action. The reduction of incidental halibut harvests should enhance sustainability of groundfish target species because their catch may be reduced under the range of proposed options and the sustainability of directed halibut fisheries are also expected to increase by potentially reducing the amount of removals.

2) *Can the proposed action reasonably be expected to jeopardize the sustainability of any non-target species?*

(Section 3.3.1). No. To the extent that halibut PSC is controlled or reduced as a result of this action, it will likely have beneficial impacts on halibut and groundfish stocks. Potential effects of the proposed action on other non-target and prohibited species are expected to be insignificant and similar to status quo, as fishing pressure is unlikely to increase. The proposed alternatives are not likely to jeopardize the sustainability of any non-target or prohibited species.

3) *Can the proposed action reasonably be expected to cause substantial damage to the ocean and coastal habitats and/or essential fish habitat as defined under the Magnuson-Stevens Act and identified in the fishery management plans (FMPs)?*

(Section 3.6). No. No significant adverse impacts were identified for the proposed action on ocean or coastal habitats or EFH. The GOA groundfish fisheries under the status quo have minimal effect on benthic habitat, though localized areas are more heavily impacted. Substantial damage to ocean or coastal habitat or EFH is not expected.

4) *Can the proposed action be reasonably expected to have a substantial adverse impact on public health or safety?*

(Section 2). No. Public health and safety will not be affected in any way not evaluated under previous actions or disproportionately as a result of the proposed action. The proposed action will not change fishing methods (including gear types), nor will they substantially change timing of fishing, which is largely dictated by Steller sea lion protection measures.

5) *Can the proposed action reasonably be expected to adversely affect endangered or threatened species, marine mammals, or critical habitat of these species?*

(Section 3.3.4, 3.5, 3.6). No. The proposed action would not change the Steller sea lion protection measures, ensuring the action is not likely to result in adverse effects not already considered under previous ESA consultations for Steller sea lions and their critical habitat. The proposed action is not likely to adversely affect ESA-listed species or their designated critical habitat.

6) *Can the proposed action be expected to have a substantial impact on biodiversity and/or ecosystem function within the affected area (e.g., benthic productivity, predator-prey relationships, etc.)?*

(Section 3.7). No significant adverse impacts on biodiversity or ecosystem function were identified for the proposed action. No significant effects are expected on biodiversity, the ecosystem, marine mammals, or seabirds, as overall the groundfish fleet is constrained in the location and timing of the fishery by directed fishing allowances, maximum retainable allowances, PSC limits, and Steller sea lion protection measures.

7) *Are significant social or economic impacts interrelated with natural or physical environmental effects?*

Section 4 provides a more detailed discussion of the socioeconomic impacts and the physical environment respectively. Socioeconomic impacts of this proposed action result from the potential that the groundfish fisheries may be closed before their respective TACs are achieved. The impacts increase as the PSC limit becomes more constraining. Under the most constraining cap, the trawl groundfish fisheries would have been closed each of the last eight years; the non-DSR hook-and-line fishery was estimated to close early in six of the last eight years. The decrease in gross ex-vessel value to the groundfish fleets was estimated to be about $0.3 million for each five percent reduction in the hook-and-line PSC limit and $2 million to $9 million for a percent or 15 percent reduction to the trawl PSC limits, respectively Beneficial social impacts may occur for those who depend on directed fisheries for Pacific halibut, with most of the benefits accruing to halibut QS holders Areas 3A and 3B and the guided sport fleet in Area 3A .

8) *Are the effects on the quality of the human environment likely to be highly controversial?*

(Section 4). This action directly affects the GOA groundfish fisheries. There is uncertainty associated with the estimates of halibut PSC for the unobserved portion of the groundfish (and halibut) fleets. However, development of the proposed action has involved participants from the scientific and fishing communities and the potential impacts on the human environment are understood.

9) *Can the proposed action reasonably be expected to result in substantial impacts to unique areas, such as historic or cultural resources, park land, prime farmlands, wetlands, wild and scenic rivers or ecologically critical areas?*

(Section 2). No. This action would not affect any categories of areas on shore. This action takes place in the geographic area of the GOA. The land adjacent to this marine area may contain archeological sites of native villages. This action would occur in adjacent marine waters so no impacts on these cultural sites are expected. The marine waters where the fisheries occur contain ecologically critical areas. Effects on the unique characteristics of these areas are not anticipated to occur with this action because of the amount of fish removed by vessels are within the TACs specified for these fisheries and the alternatives provide protection to EFH and ecologically critical nearshore areas.

10) *Are the effects on the human environment likely to be highly uncertain or involve unique or unknown risks?*

(Sections 3.3.4, 3.5, 3.6, and 0). No. The potential effects of the action are well understood because of the halibut and groundfish stocks, harvesting methods, and area of the activity. For marine mammals and seabirds, enough research has been conducted to know about the animals' abundance, distribution, and feeding behavior to determine that this action is not likely to result in population effects. The potential impacts of different gear types on habitat also are well understood, as described in the EFH EIS (NMFS 2005).

11) *Is the proposed action related to other actions with individually insignificant, but cumulatively significant impacts?*

(Section 3.8). No. Beyond the cumulative impact analyses in the 2006 and 2007 harvest specifications EA and the Groundfish Harvest Specifications EIS, no other additional past or present cumulative impact issues were identified. The combination of effects from the cumulative effects and this proposed action are not likely to result in significant effects for any of the environmental component analyzed and are therefore not significant.

12) *Is the proposed action likely to adversely affect districts, sites, highways, structures, or objects listed in or eligible for listing in the National Register of Historic Places or may cause loss or destruction of significant scientific, cultural, or historical resources?*

(Section 2). No. This action will have no effect on districts, sites, highways, structures, or objects listed or eligible for listing in the National Register of Historic Places, nor cause loss or destruction of significant scientific, cultural, or historical resources. Because this action occurs in marine waters, this consideration is not applicable to this action.

13) *Can the proposed action reasonably be expected to result in the introduction or spread of a nonindigenous species?*

(Section 2). No. This action poses no effect on the introduction or spread of nonindigenous species into the GOA beyond those previously identified because it does not change fishing, processing, or shipping practices that may lead to the introduction of nonindigenous species.

14) *Is the proposed action likely to establish a precedent for future actions with significant effects or represent a decision in principle about a future consideration?*

(Section 2). No. This action would reduce the amount of Pacific halibut PSC occurring in the GOA groundfish fisheries. This action does not establish a precedent for future action because PSC control measures have been frequently used as a management tool for the protection of marine resources in the Alaska groundfish fisheries. Pursuant to NEPA, for all future actions, appropriate environmental analysis documents (EA or EIS) will be prepared to inform the decision makers of potential impacts to the human environment and to implement mitigation measures to avoid significant adverse impacts.

15) *Can the proposed action reasonably be expected to threaten a violation of federal, state, or local law or requirements imposed for the protection of the environment?*

(Section 2). No. This action poses no known violation of federal, state, or local laws or requirements for the protection of the environment. The proposed action would be conducted in a manner consistent, to the maximum extent practicable, with the enforceable provisions of the Alaska Coastal Management Program within the meaning of Section 30(c)(1) of the Coastal Zone Management Act of 1972, and its implementing regulations.

16) *Can the proposed action reasonably be expected to result in cumulative adverse effects that could have a substantial effect on the target species or non-target species?*

(Section 3.2.4, 3.3.1, 3.4.1). No. The effects on target and non-target species from the alternatives are not significantly adverse as the overall harvest of these species will not be affected. No cumulative effects were identified that added to the direct and indirect effects on target and nontarget species would result in significant effects.

4 REGULATORY IMPACT REVIEW

This Regulatory Impact Review (RIR) examines the costs and benefits of a proposed regulatory amendment to implement halibut prohibited species catch reduction measures in the Eastern (regulatory areas 640 and 650), Central (regulatory areas 620 and 630) and Western GOA (regulatory area 610) of Alaska groundfish fisheries. This chapter includes a description of the current Gulf of Alaska halibut PSC regulations, an analysis of the potential effects of the proposed action on the groundfish fisheries operating under halibut PSC limitations and the directed halibut fisheries, and identification of the individuals or groups that may be affected by the action. This section addresses the requirements of Presidential Executive Order 12866 (E.O. 12866), which requires a cost and benefit analysis of Federal regulatory actions.

The requirements of E.O. 12866 (58 51735; October 4, 1993) are summarized in the following statement from the order:

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

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

- Have an annual effect on the economy of $100 million or more or adversely affect in a material way the economy, a sector of the economy, productivity, competition, jobs, local or tribal governments or communities;
- Create a serious inconsistency or otherwise interfere with an action taken or planned by another agency;
- Materially alter the budgetary impact of entitlements, grants, user fees, or loan programs or the rights and obligations of recipients thereof; or
- Raise novel legal or policy issues arising out of legal mandates, the President's priorities, or the principles set forth in this Executive Order.

This RIR examines the costs and benefits of proposed alternatives which include a reduction in the halibut PSC limit in the Eastern, Central and Western Gulf of Alaska hook-and-line and trawl fisheries currently operating under a halibut PSC limit.

4.1 Statutory Authority

Under the Magnuson-Stevens Act (16 USC 1801, et seq.), the United States has exclusive fishery management authority over all marine fishery resources found within the EEZ. The management of these marine resources is vested in the Secretary of Commerce (Secretary) and in the regional fishery management councils. In the Alaska Region, the Council has the responsibility for preparing FMPs and FMP amendments for the marine fisheries that require conservation and management, and for submitting its recommendations to the Secretary. Upon approval by the Secretary, NMFS is charged with carrying out the federal mandates of the Department of Commerce with regard to marine and anadromous fish.

Gulf of Alaska groundfish fisheries in the EEZ off Alaska are managed under the FMP for Groundfish of the Gulf of Alaska. The halibut prohibited species catch management measures under consideration would amend this FMP and federal regulations at 50 CFR 679. Actions taken to amend FMPs or implement other regulations governing these fisheries must meet the requirements of federal law and regulations.

4.2 Problem Statement

The purpose of halibut prohibited species catch management in the GOA is to minimize halibut removals when taken in the groundfish fisheries to the extent practicable, while achieving optimum yield. Minimizing halibut PSC while achieving optimum yield is necessary to maintain a healthy marine ecosystem ensure long-term conservation and abundance of halibut, provide maximum benefit to fishermen and communities that depend on halibut and groundfish resources, as well as U.S. consumers, and comply with the Magnuson-Stevens Act and other applicable federal law. National Standard 9 of the Magnuson-Stevens Act requires that conservation and management measures shall, to the extent practicable, minimize bycatch. National Standard 1 of the Magnuson-Stevens Act requires that conservation and management measures prevent overfishing while achieving, on a continuing basis, the optimum yield from each fishery for the United States fishing industry.

To address these issues, the Council has developed the following problem statement:

> *Currently, the GOA Groundfish harvest specifications annually establish a 2,000 mt halibut Prohibited Species Catch (PSC) limit for trawl gear and a 300 mt halibut PSC limit for hook and line gear. The GOA Groundfish FMP authorizes the Council to recommend, and NMFS to approve, annual halibut mortality limits as a component of the proposed and final groundfish harvest specifications. Halibut PSC limits are set separately for trawl and fixed gear, which may be further apportioned by season, regulatory area, and/or PSC fishery category.*
>
> *The Council is concerned about the feasibility of revising GOA halibut PSC limits through groundfish harvest specifications and recognizes that addressing halibut PSC limits in this manner on an annual basis is not in the best interest of the Council's deliberative process in the long run.*
>
> *With the exception of PSC limit reductions in the IFQ sablefish fishery and the Rockfish Pilot Program, the current PSC limits have not been revised since 1989 for trawl gear and 1995 for hook and line gear. Since that time there have been significant changes in groundfish and halibut management programs and fishing patterns, environmental conditions, fishing technology, and knowledge of halibut and groundfish stocks. Halibut is fully utilized in the directed sport, subsistence, and commercial fisheries and is of significant social, cultural, and economic importance to communities throughout the geographical range of the resource. Halibut PSC limits are also critical to the prosecution of many groundfish fisheries operating in the GOA.*
>
> *Since the existing GOA halibut PSC limits were established, the total biomass and abundance of Pacific halibut has varied and in recent years the stock has experienced an ongoing decline in size at age for all ages in all areas. Exploitable biomass has decreased 50% over the past decade. In recent years, the directed halibut catch limits in regulatory areas 2C, 3A and 3B have declined steadily. From 2002 to 2011 the catch limit for the combined areas 2C, 3A and 3B declined by almost 50% and the Guideline Harvest Level (GHL) to the charter halibut sector in Area 2C has been reduced by a similar percentage.*
>
> *While the IPHC accounts for bycatch mortality when establishing catch limits for the directed fisheries in order to maintain the halibut stock's productivity, it is the Council's responsibility to manage halibut PSC limits and meet the requirements of National Standard 9 to minimize bycatch.*

4.3 Description of the Alternatives

The Council adopted the following alternatives, options, and suboptions for analysis:

Alternative 1 (Status quo). *Retain the process for changing GOA halibut PSC limits through the annual groundfish harvest specifications process.*

Alternative 2. *Amend the GOA Groundfish FMP to remove setting GOA halibut PSC limits from the annual harvest specifications process. GOA halibut PSC limits would be established (and amended) in federal regulation.*

Option 1 (Status quo)*. Retain the existing 2,000 mt trawl and 300 mt hook and line halibut PSC limits and write them into regulation.*

Option 2*. Revise the current GOA halibut PSC limits and write the new limits into regulation.*

Suboption 1*. Reduce the halibut PSC limit for hook and line gear CP sector by:*

a) *5 percent*
b) *10 percent*
c) *15 percent*

Suboption 2*. Reduce the halibut PSC limit for hook and line gear CV sector by:*

a) *5 percent*
b) *10 percent*
c) *15 percent*

Suboption 3*. Reduce the halibut PSC limit for trawl gear by:*

a) *5 percent*
b) *10 percent*
c) *15 percent*

Suboption 3.1*. AFA/Amendment 80/Rockfish Program sideboard limits will be:*

a) *Applied as percentage against the GOA halibut PSC limit (Status quo)*
b) *Redefined in mt, calculated against the status quo GOA halibut PSC limits*

Suboption 3.2. *Allow the Amendment 80 sector to roll unused halibut PSC from one season to the subsequent season (similar to the non-Amendment 80 sectors).*

Suboption 3.3. *Allow available trawl halibut PSC in the second season deep water and shallow water complexes to be aggregated and made available for use in either complex from May 15th through June 30th. Halibut PSC sideboards for the Amendment 80 and AFA sectors would continue to be defined as deep water and shallow water complexes in the second season.*

Alternatives considered as part of the proposed amendment package would reduce the amount of halibut PSC available to the groundfish fisheries currently operating under a halibut PSC limit, by 5%, 10%, and 15%. The Council will also consider the option to maintain the Status Quo. Halibut PSC reductions may be applied to the trawl, fixed gear catcher vessels, fixed gear catcher processors, or all of these fisheries. Currently only the vessels using hook-and-line gear in the fixed gear fishery (this excludes vessels using pot or jig gear) are operating under halibut PSC mortality limits. Tables showing the halibut PSC limits set for specific sectors are presented in this section. Appendix 8 also provides a flow chart of the Status Quo PSC limits that are assumed to be in place for this analysis.

4.3.1 Hook-and-Line Gear Options

Status quo halibut PSC management in the GOA currently sets limits for vessels using hook-and-line gear in the Southeast Outside Demersal Shelf Rockfish (DSR) fishery and vessels using hook-and-line gear when fishing for federally managed groundfish species other than DSR (excluding sablefish).[38] Table 4-1 shows the division of the Status Quo 300 mt hook-and-line gear PSC limits for the GOA.

Non-DSR limits apply to the entire GOA and are divided among three seasons. The majority of the halibut PSC limit (86%) is released during the first season (January 1st through June 9th). Any unused amount of the first season halibut PSC limit may be rolled over to the next season. Two percent of the PSC limit is made available during the second season that runs from June 10th through August 31st. The remaining 12% is available from September 1st through the end of the year. The seasonal allocations are further divided between catcher vessels (59.7%) and catcher processors (40.3%). These breakdowns are reported in Table 4-1 for each of the alternatives the Council is considering. Seasonal and overall limits are set to the nearest

[38] Hook-and-line vessels target sablefish exclusively in the IFQ fishery. Estimates of the halibut mortality of that fleet are considered in management of halibut overall, without a specific apportionment to support the sablefish IFQ fishery.

metric ton. That is the level of precision to which NOAA Fisheries manages these limits. NOAA Fisheries will manage sideboard limits, where there is individual accountability, to the nearest one-tenth of a metric ton. Because NOAA Fisheries manages the overall limits to the nearest metric ton, in cases where the existing seasonal limit is small, the percentage reductions under the alternatives will not result in a change in the seasonal PSC limits. For example, the catcher processor second season limit under the status quo is 2 metric tons. Applying a 5%, 10%, or 15% reduction to that amount, then rounding the result to the nearest metric ton maintains the 2 metric ton limit.

Similarly, the entire Southeast Outside District DSR fishery halibut PSC limit of 10 mt is available for use on January 1st. Under both Options 2 and 3, the limit is 9 mt, as a result of rounding the apportionment to the nearest metric ton.

Table 4-1 Hook-and-line gear halibut PSC mortality limits (mt)

	Total Allocation	1st season 86 percent (January 1 to June 10)	2nd season 2 percent (June 10 to September 1)	3rd season 12 percent (September 1 to End of Year)
All fisheries except demersal shelf rockfish				
Status quo - both operation types	290	250	5	35
Catcher processor (40.3% of total)				
Status quo	117	101	2	14
Option 1 - 5 % reduction	111	96	2	13
Option 2 - 10% reduction	105	91	2	13
Option 3 - 15% reduction	100	86	2	12
Catcher vessel (59.7% of total)				
Status quo	173	149	3	21
Option 1 - 5 % reduction	165	142	3	20
Option 2 - 10% reduction	156	134	3	19
Option 3 - 15% reduction	148	127	3	18
Demersal Shelf Rockfish				
Status quo	10	(no seasonal distribution)		
Option 1 - 5 % reduction	10			
Option 2 - 10% reduction	9			
Option 3 - 15% reduction	9			
All values are metric tons.				

4.3.2 Trawl Gear Options

Halibut PSC mortality limits are set for the GOA deep-water and shallow-water complexes. The deep-water complex includes halibut PSC available for use in the directed rockfish, deep-water flatfish, rex sole, and arrowtooth flounder fisheries.[39] The shallow-water complex includes the directed pollock, Pacific cod, shallow-water flatfish, flathead sole, Atka mackerel, and 'other species' fisheries. If the deep-water complex is projected to reach its halibut PSC limit, NOAA Fisheries will close all of the target fisheries in the deep-water complex. The closure notice will either be effective for the remainder of the calendar year or until the next halibut seasonal apportionment is made available, depending on the amount of halibut PSC that will become available. Target fisheries in the shallow-water complex are treated like the deep-water complex, with the exception of pollock harvested with pelagic trawl gear, which uses very little halibut PSC. Vessels

[39] The deep-water complex halibut would be available for directed sablefish fishery, if such a fishery were opened. Currently, directed sablefish fishing is only permitted under the Central GOA Rockfish Program, which is only subject to this action for purposes of sideboard effects.

in the directed pollock fishery, with pelagic trawl gear, are exempt from PSC closure notices for the shallow-water complex, by regulation.

Seasonal limits for each complex and option are shown. PSC limits reported do not necessarily represent the total amount of halibut PSC that will be available for a season. Halibut PSC that is not taken in earlier seasons are rolled-over into the next season. Likewise, overages from a season are deducted from the next season. Because of these adjustments, halibut PSC available in the second through fifth seasons may be greater or less than shown in the table.

It is also important to note that estimated PSC limits assume the percentage reductions do not apply to the 218.8 mt set aside for the Rockfish Program (see Section 4.5.5 for details of the Rockfish Program allocation).

Treatment of the Central Gulf Rockfish Program allocation and its impact on the proposed action

Summary The Central Gulf of Alaska Rockfish Program was implemented in 2012. A direct apportionment of 191.4 mt of halibut prohibited species catch (PSC) limit was allocated to Rockfish Program participants for use in this trawl fishery from May 1 through November 15. The third seasonal allowance to the deep-water species fishery was reduced by 1) 191.4 mt to fund the rockfish program apportionment and 2) 27.4 mt which may not be used as PSC limit by any sector. However, the 2,000 mt trawl halibut PSC limit was not reduced to reflect the 27.4 mt PSC limit reduction. It was "left in the water" and subject to reallocation to the directed halibut IFQ fixed gear fishery by the International Pacific Halibut Commission. Therefore, the trawl halibut PSC limit is now 1,972.6 mt (2,000 mt – 27.4 mt). And the portion of the halibut PSC limit *outside of the Rockfish Program is reduced by 191.4 mt to 1,781.2 mt to fund the halibut PSC needs of the Rockfish Program.* This amount will be increased if any of the 191.4 mt PSC limit is unused on November 15th. By regulation 55 percent of the unused amount of trawl halibut PSC limit of the 191.4 mt is added to the fifth season unspecified halibut PSC limit total. The remaining 45 percent of the unused amount is not available for use by any sector, effectively reducing the overall trawl PSC limit that year.

The Council analysis assumes, based on the Council's June 2011 motion[40], to exclude the Rockfish Program from any further proposed reductions (i.e., beyond the 27.4 mt PSC limit reduction that was made in 2012, which results in a total of 191.4 mt of PSC limit allocated to the CGOA Rockfish Program). The effect is that the proposed percentage reductions of 5%, 10%, or 15% would be applied to the amount of halibut PSC limit available to all trawl sectors except for the GOA Rockfish Program (2,000 mt – (27.4 mt + 191.4 mt) = 1,781.2 mt). This would result in PSC limit reductions, in addition to those already established in the new Rockfish Program[41], of: a) 89 mt (5%); b) 178 mt (10%); or c) 267 mt (15%). To achieve reduction equal to 5/10/15 percent of the 2,000 mt PSC limit (100/200/300 mt) would require applying a larger percentage reduction to GOA trawl fisheries outside of the Rockfish Program (see more detail below). Note that the Council could select any amount of halibut PSC limit reduction within the range analyzed (0 mt to 267 mt).

The analysts provide an example to illustrate the impacts of halibut PSC limit reductions on trawl fisheries not exempted from the proposed action. At the June 2011 Council meeting the Council indicated that when the proposed reductions would be applied, the CGOA Rockfish Program trawl halibut PSC limit apportionments were to be exempt from the proposed reductions of 5/10/15 percent. The Council's rationale was that the Rockfish Program participants already had their halibut PSC limit apportionment reduced by 27.4 mt and the roll-over of the unused portion of the 191.4 mt would be reduced by 45 percent. In 2011 about 65 percent of the 208 mt halibut PSC limit apportionment to the Rockfish Pilot Program was unused. The Rockfish Pilot Program sunset at the end of 2011 and was replaced by the revised CGOA Rockfish Program in 2012. For example, if half the 191.4 mt apportionment is not used in the future, a 45 percent reduction applied to the roll-over of the unused

[40] http://www.alaskafisheries.noaa.gov/npfmc/PDFdocuments/halibut/GOAHalibutPSC_Motion.pdf

portion to the unspecified trawl halibut PSC limit would equal 43 mt, or a 22.5 percent reduction of the Rockfish Program apportionment. In June 2011 the Council stated its intent that the 27.4 mt and 191.4 mt of rockfish program halibut PSC limit were not subject to the proposed PSC limit reduction. Therefore, all of the tables in the analysis reflect the removal of the 27.4 mt (halibut PSC limit savings left 'in the water') and the 191.4 mt Rockfish Program apportionment from the third season deep-water species fishery allowance before the proposed 5/10/15 reductions are applied. Alternatively, if the Council intent was to apply the proposed percentage reductions to the entire historic 2,000 mt PSC limit (not reducing the Rockfish Program apportionment, but taking additional reductions from the non-Rockfish apportionment to compensate for keeping the current Rockfish Program allocation), the overall PSC limit reduction would increase by the amounts shown below and would increase the effect on trawl vessels when not operating in the CGOA Rockfish Program. The impact on the trawl fleets depend on how the reductions associated with the Rockfish Program halibut PSC limits are distributed among the rest of the fleet.

Table 4-2 Additional halibut PSC limit reduction in metric tons if the reduction was also applied to the Rockfish Program

	Reduction also applied to		
% Reduction	191.4 mt	27.4 mt	Both
5%	9.6	1.4	10.9
10%	19.1	2.7	21.9
15%	28.7	4.1	32.8

Note: It is assumed that the intent was not to reduce the 27.4 mt set aside that is not available for use as PSC limit. It was included for completeness to compare to the 2,000 mt halibut PSC limit.

Because the Council's proposed alternatives and options do not further reduce the Rockfish Program halibut PSC limits beyond how its apportionments were reduced when the program was restructured, applying the above reductions to the other fleets reduces their PSC limits by more than 5 percent, 10 percent, or 15 percent. In order to exempt the Rockfish Program and achieve a full 5/10/15 percent reduction of the current 2,000 mt limit, the reductions applied to halibut PSC limits on trawl sectors not in the Rockfish Program would need to be 5.5 percent, 11.1 percent, or 16.6 percent. Depending on how the reductions to the CGOA rockfish program halibut PSC limit are applied, they will change the PSC limit available by species fishery and season.

If the Council intent is different from that outlined in the summary above, and the 5%, 10%, or 15% halibut PSC limit reduction instead is applied to the current trawl halibut PSC limit, while not affecting the CGOA Rockfish Program halibut PSC limit apportionment of 191.4 mt, the Council should indicate how it intends to distribute the additional reduction associated with the 191.4 mt (and the 27.4 mt if the reduction is also applied to halibut PSC limit no longer available for use) to the non-Rockfish Program trawl sectors. If the Council clarifies in June 2012 that its intent is different than that assumed by staff in the public review draft analysis, staff can provide additional analysis in a subsequent draft.

The analysts seek Council clarification that the Council intent is to reduce the overall 2,000 mt GOA trawl halibut PSC limit to the new limit set at final action. For example, under Alternative 2, option 1 (5 percent reduction) the new limit would be set in federal regulations at 1,911 mt (or 1,884 mt if the 27.4 mt is removed from the overall limit and the percentage allocated to the third season is adjusted, 2,000 mt – 27.4 – 89 mt = 1,884 mt), recognizing that an additional reduction in halibut PSC limit could occur that would equal 45 percent of any unused amount of the 191.4 mt roll-over.

Because federal regulations that implement the Rockfish Program halibut PSC limit apportionments reference the 2,000 mt halibut PSC limit as the basis for the halibut PSC limit apportionments, *the analysts also seek clarification that the Council intent is to revise the percentages that establish the halibut PSC limit apportionments in regulation using the GOA trawl halibut PSC limit that is selected at final action in order to leave their PSC limit apportionment unchanged and to reflect the new (reduced) limit. For example, a new trawl halibut PSC limit would be 1,911 mt if the Council adopts a 5 percent reduction under the proposed action (2,000 mt – 89 mt = 1,911 mt). The 27.4 mt would continue to be* *removed from the third season before the allowance is released and would not be subject to the proposed percentage reductions.*

Based on the assumptions described above, the following tables provide estimates of the trawl halibut PSC limits under each option the Council is considering in this amendment.

Halibut PSC limits for the deep-water and shallow-water complexes are presented in Table 4-3.

Table 4-3 Trawl halibut PSC mortality limits (mt)

	Total allowance	1st season January 20 to April 1	2nd season April 1 to July 1	3rd season* July 1 to September 1	4th season September 1 to October 1	5th season October 1 through December 31
Total Allowance						
seasonal share		27.5 percent	20 percent	30 percent**	7.5 percent	15 percent
Status quo	2000^	550	400	381	150	300
Deep-water complex						
seasonal share		12.5 percent	37.5 percent	50 percent**	0 percent	NA
Status quo	773	100	300	181	0	
Option 1 - 5 % reduction	734	95	285	172		
Option 2 - 10% reduction	695	90	270	163		
Option 3 - 15% reduction	657	85	255	154		
Shallow-water complex						
seasonal share		50 percent	11.1 percent	22.2 percent	16.7 percent	NA
Status quo	900	450	100	200	150	
Option 1 - 5 % reduction	855	428	95	190	143	
Option 2 - 10% reduction	810	405	90	180	135	
Option 3 - 15% reduction	765	383	85	170	128	
Undesignated						
seasonal share						100 percent
Status quo	300	NA				300
Option 1 - 5 % reduction	285					285
Option 2 - 10% reduction	270					270
Option 3 - 15% reduction	255					255

All values are metric tons, except where noted as percentages.
* Excludes 191.4 metric ton rockfish program halibut PSC allowance and 27.4 metric ton reduction from Rockfish pilot program
** Includes rockfish program allocations in the percentage.
^Only 1,973 metric tons are available for the fleet to harvest

4.3.2.1 Sideboard Fisheries

A second set of GOA trawl PSC limits are applicable to specific vessels, because of their participation in cooperatives or other catch share programs. Programs that limit their participants' activities in other fisheries, through the implementation of halibut PSC sideboards, are the Rockfish Program, the Amendment 80, and the Bering Sea cooperatives under the American Fisheries Act (AFA).

4.3.2.1.1 Rockfish Program Sideboard Options

The Council is considering options that would reduce the sideboard limits by maintaining those sideboards at their current percentages of the applicable total halibut PSC limits. Reducing the overall trawl PSC limit and maintaining the current percentages would result in the rockfish program halibut PSC sideboard limit for the deep-water complex being reduced by about 2.5 mt for each 5% reduction in the overall trawl PSC limit (Table 4-4). Alternatively, the Council considered a suboption that maintains sideboards at the status quo tonnage amounts. If the Rockfish program halibut PSC sideboard limits are held constant at their current tonnages, rockfish vessels, while constrained by the PSC sideboard limit, would be allowed to use up to 50 mt of halibut PSC. If they use the entire sideboard limit, other sectors would have less halibut PSC to use to support harvests in their fisheries. Table 4-4 shows that the maintaining the current tonnage of the deep-water sideboard would effectively increase the rockfish program's sideboard percentage from 27.6% (status quo), to 29.0% (5% reduction in PSC), 30.6% (10% reduction in PSC), and 32.4% (15% reduction in PSC) depending on the halibut PSC reduction selected by the Council. Because of rounding to the nearest metric ton, the rockfish program vessels would be allowed to use up to 2 mt of shallow-water complex halibut PSC, under all of the options being considered by the Council.

Table 4-4 Rockfish program July sideboard options by deep-water and shallow-water complexes

		3rd season PSC allowance*	July sideboard tonnage	July sideboard as a percent of the 3rd season PSC allowance
Deep-water complex				
Status quo		181	50	27.6
Maintain current sideboard	Option 1 - 5 % reduction	172	48	27.6
	Option 2 - 10% reduction	163	45	
	Option 3 - 15% reduction	154	43	
Maintain current sideboard	Option 1 - 5 % reduction	172	50	29.0
	Option 2 - 10% reduction	163		30.6
	Option 3 - 15% reduction	154		32.4
Shallow-water complex				
Status quo		200	2	1.0
Maintain current sideboard	Option 1 - 5 % reduction	190	2	1.0
	Option 2 - 10% reduction	180	2	
	Option 3 - 15% reduction	170	2	
Maintain current sideboard	Option 1 - 5 % reduction	190	2	1.1
	Option 2 - 10% reduction	180		1.1
	Option 3 - 15% reduction	170		1.2

All values are metric tons, except where noted as percentages.
* Excludes 191.4 metric ton rockfish program halibut PSC allowance and halibut PSC usage, plus the 27.4 mt that the rockfish program allowance was reduced by the revised program.
** Includes rockfish program allocations in the percentage.

4.3.2.1.2 AFA Catcher Vessel Sideboard Options

The sideboard limit options that maintain the current sideboard percentages for the non-exempt AFA catcher vessel fleet are presented in Table 4-5. Deep-water complex sideboards are currently 56 mt for the entire year. That limit is divided between the first three seasons, no PSC sideboard amount is assigned to the fourth season and the fifth season's sideboard may be used in either the deep-water or shallow-water complex. Each 5% reduction of the trawl PSC limit results in an approximate 3 mt decrease in the annual deep-water sideboard limit.

The current shallow-water complex sideboards limit the fleet to 302 mt of halibut mortality. Each 5% reduction in the trawl PSC limit reduces the AFA catcher vessel non-exempt sideboard limit by 15 mt. That reduction is spread over the first four seasons. The 1st season sideboard limit is reduced by about 8 mt, the second season by 2 mt, the third season by 3 mt, and the fourth season by 3 mt for each 5% reduction. The undesignated PSC sideboard limit available during the fifth season is reduced by about 3 mt for each 5% reduction in the trawl PSC limit. The status quo sets the fifth season sideboard limit at 62 mt. A 15% reduction in the trawl PSC limit decreases the sideboard limit to 53 mt.

Two new suboptions were added by the Council at their February 2012 meeting. Suboption 3.2, under Option 2, would allow the Amendment 80 sector to roll unused halibut from one season to the subsequent season, similar to the AFA sideboarded fleets. Rollovers would be subject to the deep water and shallow water designation in all seasons. Suboption 3.3 would allow available trawl halibut PSC in the second season deep and shallow water complexes to be aggregated and made available for use in either complex from May 15 through June 30. Amendment 80 and AFA sector's halibut PSC sideboard limits would continue to be defined for use in the deep water and shallow water complexes for the entire second season.

Table 4-5 AFA non-exempt catcher vessel sideboard limits (maintaining current percentages)

	Total sideboard	1st season January 20 to April 1	2nd season April 1 to July 1	3rd season July 1 to September 1	4th season September 1 to October 1	5th season October 1 through December 31
Deep-water complex						
Status quo	56	7	21	28	0	NA
Option 1 - 5 % reduction	53	7	20	27		
Option 2 - 10% reduction	50	6	19	25		
Option 3 - 15% reduction	48	6	18	24		
Shallow-water complex						
Status quo	302	153	34	64	51	NA
Option 1 - 5 % reduction	287	145	32	61	48	
Option 2 - 10% reduction	272	138	31	58	46	
Option 3 - 15% reduction	257	130	29	54	43	
Undesignated						
Status quo	62	NA				62
Option 1 - 5 % reduction	59					59
Option 2 - 10% reduction	56					56
Option 3 - 15% reduction	53					53

All values are metric tons, except where noted as percentages.

4.3.2.1.3 Amendment 80 Sideboard Options

Table 4-6 reports the Amendment 80 sector sideboard options that are being considered as part of this amendment. Amendment 80 halibut PSC sideboard limits are calculated as a percentage of the annual trawl PSC limit. Currently, regulations prohibit unused Amendment 80 seasonal sideboard limits from rolling-over to the next season[42]. Therefore, unlike the AFA sideboards, the actual number of metric tons of halibut PSC available to the Amendment 80 sector during a season is reported in the table. The table indicates that each 5% decrease in the trawl PSC limit decreases the deep-water complex sideboard amount by about 17 mt. The fourth season's sideboard limit is always 3 metric tons. For each 5% reduction in the trawl PSC limit, the 1st season's limit is reduced by 1 mt, the second season limit is reduced about 11 mt, the third season limit is reduced by 5 mt, and the fifth season limit is reduced by about 4 mt.[43]

The Status Quo sideboard limit available for use in the shallow-water complex is 92 mt. That limit is reduced by about 5 mt for each 5% reduction in the trawl PSC limit. The first season's reduction is about 0.5 mt, for each 5% reduction in the trawl PSC limit. Rounding to the nearest metric ton would result in the Status Quo and 5% reduction options yielding a 10 mt sideboard limit. For each 5% reduction in the trawl PSC limit, the second season limit is reduced by 2 mt, the third season limit is reduced by about 5 mt, the fourth season limit is reduce by slightly less than 1 mt, and the fifth season limit is reduced by about 2 mt.

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[42] This would change if the Council selected suboption 3.2.

[43] The separate deep-water complex and shallow-water complex sideboard limits apply to the Amendment 80 sector in the fifth season.

Table 4-6 Amendment 80 sideboard halibut limit options

	Total sideboard	1st season January 20 to April 1	2nd season April 1 to July 1	3rd season* July 1 to September 1	4th season September 1 to October 1	5th season October 1 through December 31
Deep-water complex						
Status quo	341	23	214	104	3	74
Option 1 - 5 % reduction	324	22	203	99	3	70
Option 2 - 10% reduction	307	21	193	94	3	67
Option 3 - 15% reduction	290	20	182	88	3	63
Shallow-water complex						
Status quo	92	10	38	29	15	45
Option 1 - 5 % reduction	87	10	36	28	14	43
Option 2 - 10% reduction	83	9	34	26	14	41
Option 3 - 15% reduction	78	9	32	25	13	38

All values are metric tons, except where noted as percentages.
* Note: excludes rockfish program halibut PSC allowance and usage.

The Council also included an option to set the halibut PSC sideboard limits as a fixed number of metric tons at the status quo level. Holding the PSC sideboard amounts at a fixed level would have the potential to reduce the impact of this action on the sideboarded fleets. However, because sideboards are a maximum limit on the amount of halibut PSC a sector may be permitted to use, and not an allocation, the other sectors would have the opportunity to use the PSC limit before it is taken by the sideboarded fleet. The overall reduction in halibut PSC available to the sector may increase undesirable competition for halibut PSC between the sideboarded fleets and the other participants using trawl gear.

4.4 Alternatives Considered But Not Carried Forward

The Council considered several other approaches to addressing the stated problem in the fishery. These are addressed in Section 3.8.1.

4.5 Description of Fisheries

4.5.1 Pacific Halibut Fishery

The halibut resource has traditionally been harvested by commercial, sport (guided and non-guided), and subsistence users and is considered fully utilized. The IPHC did not have a formal regulatory definition of subsistence prior to 2002; however, it did track subsistence harvests that were taken under a personal use category. This distinction ensured that sport harvests are considered exclusively under the sportfishing category. The IPHC adopted regulatory language defining subsistence ("Customary and Traditional Fishing in Alaska") in 2002. Federal regulations now recognize and define a legal subsistence fishery for halibut in Alaska. Additional subsistence information is provided in Section 3.2.7.

Sportfishing for halibut is an important recreational activity for resident and non-resident anglers. Sport harvests of halibut rapidly increased in the late 1980s to mid-1990s, due to continued increases in targeted effort (Tersteeg and Jaenicke 2005). Fishing effort in Area 2C is mostly concentrated around Juneau, Ketchikan, Sitka, Wrangell, and Petersburg. However, substantial effort is also expended near remote fishing lodges and smaller communities throughout the region, in areas such as Craig, Gustavus, and Yakutat (Tersteeg and Jaenicke 2005). Meyer (2005) reported that participation in the marine sport fisheries of Area 3A more than doubled in the 15 years prior 2005. A major portion of marine fishing effort is directed at halibut and state-managed groundfishes, including rockfishes, lingcod, and sharks. Halibut harvests increased from 40,000 fish in 1980, to 286,000 fish in 2000. The 2003 harvest of 278,000 halibut made up 69% (in number) of the statewide recreational harvest. In Southcentral Alaska (Area 3A), charter and unguided sport catch occurs primarily on the Kenai Peninsula.

Alaska sport harvest estimates are derived from statewide postal survey estimates of harvest in numbers of fish, in conjunction with onsite sampling for average weight at points of landing. Estimates usually lag by one year. Halibut removals for Areas 2C are presented in Table 4-7. In summary, guided sport halibut harvests increased by more than 93% from 1997 through 2008 (from 1.03 to 1.99).

Area 2C commercial halibut removals have fluctuated from a low of 7.76 in 1995, to a high of 10.49 in 2005. Removals were between 9.66 and 9.90 during 1997 through 1999. Removals were between 8.27 and 8.45 over the four year period from 2000 through 2003. From 2004 through 2006, removals increased to just below 10.5 in each year. Since 2006, the commercial removals have declined. Commercial removals were 8.3 in 2007 and 4.39 in 2010.

Table 4-7 Area 2C halibut removals (), 1995–2011. Source: G. Williams, IPHC

Year	Total CEY	Fishery CEY	Commercial Catch Limit	Commercial Catch	Sport Guided	Sport Unguided	Sport Total	Bycatch Mortality (O32 Fish)	Subsistence (Personal Use)	Wastage (O32 Fish)	TOTAL CEY REMOVALS
1995	13.94	8.54	9.00	7.761	0.986	0.765	1.751	0.220	0.170	0.054	9.786
1996	n/a	n/a	9.00	8.737	1.187	0.943	2.129	0.230	0.170	0.044	11.140
1997	13.92	11.41	10.00	9.753	1.034	1.139	2.172	0.240	0.170	0.040	12.205
1998	17.70	15.48	10.50	9.666	1.584	0.917	2.501	0.240	0.170	0.041	12.618
1999	12.80	10.49	10.49	9.902	0.939	0.904	1.843	0.230	0.170	0.067	12.212
2000	8.44	6.31	8.40	8.266	1.132	1.126	2.258	0.250	0.170	0.038	10.982
2001	11.20	8.78	8.78	8.273	1.202	0.723	1.925	0.180	0.170	0.037	10.585
2002	10.66	8.50	8.50	8.455	1.275	0.814	2.090	0.170	0.170	0.026	10.911
2003	12.00	9.11	8.50	8.286	1.412	0.846	2.258	0.140	0.624	0.025	11.333
2004	20.00	17.00	10.50	10.116	1.750	1.187	2.937	0.150	0.677	0.031	13.911
2005	14.90	11.80	10.93	10.489	1.952	0.845	2.798	0.140	0.598	0.032	14.057
2006	13.73	10.33	10.63	10.397	1.804	0.723	2.526	0.210	0.580	0.021	13.734
2007	10.80	7.61	8.51	8.346	1.918	1.131	3.049	0.220	0.525	0.029	12.169
2008	6.50	3.92	6.21	6.145	1.999	1.265	3.264	0.220	0.458	0.012	10.099
2009	5.57	2.86	5.20	4.866	1.245	1.123	2.368	0.220	0.457	0.010	7.921
2010	5.02	2.39	4.40	4.388	1.279	1.269	2.548	0.210	0.457	0.009	7.612
2011	5.39	2.33	2.33								

Sources:

1) Sport, Guided & Unguided: S. Meyer, ADF&G
2) Commercial catch, 1995-2009: IPHC Annual Reports, Appendix I, Table 5. Does not include research catch.
3) Commercial catch, 2010: IPHC Bluebook for 2010. Data are preliminary.
4) All other categories, IPHC Bluebooks for the respective year.

Note: The Subsistence (Personal Use) column is a result of IPHC not having a subsistence category until 2002.

The column labeled “Personal Use (Subsistence)” was provided by the IPHC when they generated the tables for this section. It combines two activities that have different legal definitions. For the halibut fisheries this amendment only focus on subsistence harvests as defined in 50 CFR 300.62, since only the subsistence fishery for halibut has been opened in recent years. Since 2003, the subsistence fishery harvest was between 457,000 lbs and 677,000 lbs, with the smaller harvests occurring since 2007.

In Area 3A, guided sport harvests have varied from a low of 2.53 in 1999, to a high of 4.00 in 2008; however, harvests in 1997 and 2008 are about equal (Table 4-8). Both years amounted to approximately 11% of total CEY removals in Area 3A.

Commercial removals followed a similar trend to that in Area 2C. Removals ranged from 18.14 in 1995, to 26.13 in 2007. Commercial removals were highest from 1997 through 1999, and 2004 through 2008. Removals were over 24 in each of those years. Commercial catch then declined to 21.40 in 2009 and 20.10 in 2010. Though the catch data are not available for 2011, the commercial catch limit has been reduced to 14.36 .

Table 4-8 Area 3A halibut removals (), 1995–2011. Source: G. Williams, IPHC

Year	Total CEY	Fishery CEY	Commercial Catch Limit	Commercial Catch	Sport Guided	Sport Unguided	Sport Total	Bycatch Mortality (O32 Fish)	Subsistence (Personal Use)	Wastage (O32 Fish)	TOTAL CEY REMOVALS
1995	31.16	16.87	20.00	18.142	2.845	1.666	4.511	1.460	0.010	0.128	24.251
1996	n/a	n/a	20.00	19.318	2.822	1.918	4.740	1.400	0.010	0.177	25.645
1997	40.66	33.55	25.00	24.235	3.413	2.100	5.514	1.550	0.097	0.074	31.470
1998	45.44	38.71	26.00	24.538	2.985	1.717	4.702	1.470	0.074	0.154	30.938
1999	31.80	24.67	24.67	24.310	2.533	1.695	4.228	1.280	0.074	0.117	30.009
2000	18.98	11.94	18.31	18.166	3.140	2.165	5.305	1.290	0.074	0.059	24.894
2001	27.80	21.89	21.89	21.100	3.132	1.543	4.675	1.620	0.074	0.065	27.534
2002	30.96	24.14	22.63	22.614	2.724	1.478	4.202	1.070	0.074	0.139	28.099
2003	40.00	34.22	22.63	22.324	3.382	2.046	5.427	1.180	0.074	0.068	29.073
2004	36.50	29.98	25.06	24.717	3.668	1.937	5.606	1.520	0.280	0.076	32.199
2005	32.90	26.30	25.47	25.228	3.689	1.984	5.672	1.320	0.429	0.156	32.805
2006	32.18	24.94	25.20	25.238	3.664	1.674	5.338	1.060	0.382	0.051	32.069
2007	35.78	27.63	26.20	26.133	4.002	2.281	6.283	0.990	0.372	0.053	33.831
2008	28.96	22.25	24.22	24.166	3.378	1.942	5.320	1.058	0.337	0.061	30.942
2009	28.01	20.84	21.70	21.399	2.734	2.023	4.757	0.970	0.329	0.044	27.499
2010	26.19	18.28	19.99	20.092	2.992	2.077	5.068	0.950	0.329	0.020	26.459
2011	23.52	14.36	14.36								

Sources:

1) Sport, Guided & Unguided: S. Meyer, ADF&G
2) Commercial catch, 1995-2009: IPHC Annual Reports, Appendix I, Table 5. Does not include research catch.
3) Commercial catch, 2010: IPHC Bluebook for 2010. Data are preliminary.
4) All other categories, IPHC Bluebooks for the respective year.

Note: The Subsistence (Personal Use) column is a result of IPHC not having a subsistence category until 2002.

In Area 3B, sport catch is a much smaller percentage of the total halibut removals than either Area 2C or 3A (Table 4-9). Also in Area 3B, sport catch data are not broken out by the guided and unguided sectors. Sport catch has ranged from a high of 40,000 lb. in 2010, to a low of 9,000 lb. in 2003. The overwhelming majority of the catch is commercial IFQ harvest. Commercial catch ranged from a high of 17.00 in 2002, to a low of 3.12 in 1995. Commercial catch in 2010 was 9.94 . However, the commercial catch in 2011 should decline by about 2.4 , based on the decrease in the commercial catch limit.

Table 4-9 Area 3B halibut removals (), 1995–2011. Source: G. Williams, IPHC

Year	Total CEY	Fishery CEY	Commercial Catch Limit	Commercial Catch	Sport	Bycatch Mortality (O32 Fish)	Subsistence (Personal Use)	Wastage (O32 Fish)	TOTAL CEY REMOVALS
1995	4.96	3.66	3.70	3.117	0.022	0.830	0.037	0.009	4.015
1996	n/a	n/a	3.70	3.360	0.021	0.960	0.037	0.022	4.400
1997	12.74	11.49	9.00	8.729	0.028	0.730	0.037	0.054	9.578
1998	12.19	30.99	11.00	10.464	0.017	0.730	0.020	0.056	11.287
1999	27.67	26.83	13.37	13.160	0.017	0.740	0.020	0.071	14.008
2000	19.36	18.36	15.03	14.888	0.015	0.650	0.020	0.058	15.631
2001	26.13	25.46	16.53	15.993	0.016	0.630	0.020	0.032	16.691
2002	29.10	28.56	17.13	17.003	0.013	0.710	0.020	0.034	17.780
2003	30.00	29.19	17.13	16.965	0.009	0.500	0.028	0.035	17.537
2004	16.30	15.60	15.60	15.180	0.007	0.390	0.034	0.015	15.626
2005	11.20	10.70	13.15	12.874	0.014	0.360	0.046	0.026	13.320
2006	9.00	8.57	10.86	10.565	0.014	0.510	0.049	0.011	11.149
2007	17.20	16.77	9.22	9.047	0.025	0.450	0.048	0.018	9.588
2008	14.80	14.27	10.90	10.617	0.026	0.490	0.042	0.004	11.179
2009	13.76	13.20	10.90	10.616	0.030	0.470	0.026	0.021	11.163
2010	9.86	8.91	9.90	9.938	0.040	0.450	0.026	0.010	10.464
2011	9.24	7.51	7.51						

Sources:

1) Sport, Guided & Unguided: S. Meyer, ADF&G
2) Commercial catch, 1995-2009: IPHC Annual Reports, Appendix I, Table 5. Does not include research catch.
3) Commercial catch, 2010: IPHC Bluebook for 2010. Data are preliminary.
4) All other categories, IPHC Bluebooks for the respective year.

Note: The Subsistence (Personal Use) column is a result of IPHC not having a subsistence category until 2002.

4.5.2 Halibut Growth Rates (source IPHC question page)

For approximately the past 15 years, halibut growth rates have been depressed to levels that have not been seen since the 1920s. Both females and male halibut have the potential to grow rapidly until about age 10, about 2 inches per year for males and 2.5 inches for females. Thereafter, females have the potential to grow even faster, while male’s growth rate generally slows down relative to female growth. Growth rates for these larger fish, approximately over the last 10 years, are more on the order of one inch or less per year. This translates into a much smaller fish at any given age.

There was a dramatic increase in halibut growth rates in the middle of last century, especially in Alaska. Sometime around 1980, growth rates started to drop, and now Alaska halibut of a given age and sex are about the same size as they were in the 1920s. For example, in the northern Gulf of Alaska, an 11-year-old female halibut weighed about 20 pounds in the 1920s, nearly 50 pounds in the 1970s, and now again about 20 pounds. The reasons for both the increase and the decrease are not yet known, but may be tied to increased abundance of other species, such as arrowtooth flounder, and availability of food supply (see Section 3.2.2.2.1).

4.5.3 GOA Hook-and-Line Groundfish Fisheries

4.5.3.1 Non-DSR Hook-and-Line Fisheries

Fishing patterns for hook-and-line vessels in the GOA are somewhat less complicated than for the trawl sector, primarily because hook-and-line vessels participate in fewer target fisheries. Vessels using hook-and-line gear that participate in the GOA non-DSR fisheries typically target Pacific cod, halibut, and sablefish. Information presented in Table 4-10 shows that non-DSR hook-and-line vessels target Pacific cod almost exclusively until the halibut and sablefish IFQ fisheries are opened, typically, early to mid-March.[44] Also, during January and February Pacific cod are typically more aggregated, so the hook-and-line vessels have better catch rates than later in the year. Pacific cod harvests are limited from March through the end of the first cod season (the A season), as TACs are taken and effort is dispersed. During the second halibut PSC season (which occurs from June 10th through August 31st, between the A and B Pacific cod seasons), most of the hook-and-line effort is in the IFQ fisheries. When the third halibut PSC season and the Pacific cod B season (40% of the Central and Western GOA allowance) open on September 1st, effort in the Pacific cod fishery increases until the TAC is harvested, the halibut PSC limit is taken, or other factors (such as weather or other non-groundfish fishery opportunities) cause vessels to stop fishing Pacific cod.[45]

Table 4-10 shows weekly catches by hook-and-line catches in 2010. The table excludes less than 5 mt of catch that occurred in the “rockfish” and “other species” target fisheries, for confidentiality reasons. Too few vessels and processors were operating in those fisheries to report those data on a weekly basis. This catch occurred in both the first and third halibut PSC seasons.

[44] The International Pacific Halibut Commission establishes halibut season dates under authority of the Halibut Act. The Regional Administrator, NOAA Fisheries (NMFS) establishes IFQ sablefish season dates by publishing a notice annually, in the Federal Register. Sablefish seasons have been set simultaneous with those for halibut to reduce waste and discards.

[45] These factors could be economic or weather related.

Table 4-10 Fishing patterns by hook-and-line vessels in non-DSR target fisheries (mt), 2010

Season	Date	Halibut	Pacific Cod	Sablefish	Grand Total
1	1/2/2010		779		779
	1/9/2010		595		595
	1/16/2010		1,469		1,469
	1/23/2010		861		861
	1/30/2010		1,629		1,629
	2/6/2010		294		294
	2/13/2010		1,112		1,112
	2/20/2010		2,851		2,851
	2/27/2010		1,259		1,259
	3/6/2010	5	230		235
	3/13/2010	27	47	110	185
	3/20/2010	78	83	449	611
	3/27/2010	44	105	370	520
	4/3/2010	34	14	193	242
	4/10/2010	130	4	471	605
	4/17/2010	57	106	383	546
	4/24/2010	60	129	531	719
	5/1/2010	126	33	502	662
	5/8/2010	153	98	727	978
	5/15/2010	52		347	399
	5/22/2010	109	7	728	844
	5/29/2010	96	7	390	493
	6/5/2010	42		286	328
1 Total		1,014	11,713	5,489	18,216
2	6/12/2010	95	9	199	303
	6/19/2010	76	10	235	321
	6/26/2010	39		211	250
	7/3/2010	48		111	159
	7/10/2010	21		78	99
	7/17/2010	72		160	231
	7/24/2010	52		126	178
	7/31/2010	50		97	147
	8/7/2010	45		112	157
	8/14/2010	34	1	99	134
	8/21/2010	27		152	179
	8/28/2010	49		136	185
2 Total		608	19	1,717	2,345
3	9/4/2010	35	547	210	792
	9/11/2010	55	1,201	185	1,440
	9/18/2010	51	621	182	854
	9/25/2010	40	537	104	681
	10/2/2010	31	621	23	675
	10/9/2010	53	853	88	994
	10/16/2010	32	582	80	694
	10/23/2010	35		58	93
	10/30/2010	27		47	75
	11/6/2010	8	10	26	44
	11/13/2010	15		47	62
	11/20/2010	*	*		*
	12/11/2010		*		*
3 Total		382	5,000	1,051	6,433
Annual Total		2,005	16,731	8,257	26,993

Source: AKFIN Summary of NOAA Fisheries Catch Accounting data
Note: Amounts are the reported catch by target fishery. Halibut catches do not include all halibut IFQ harvests.

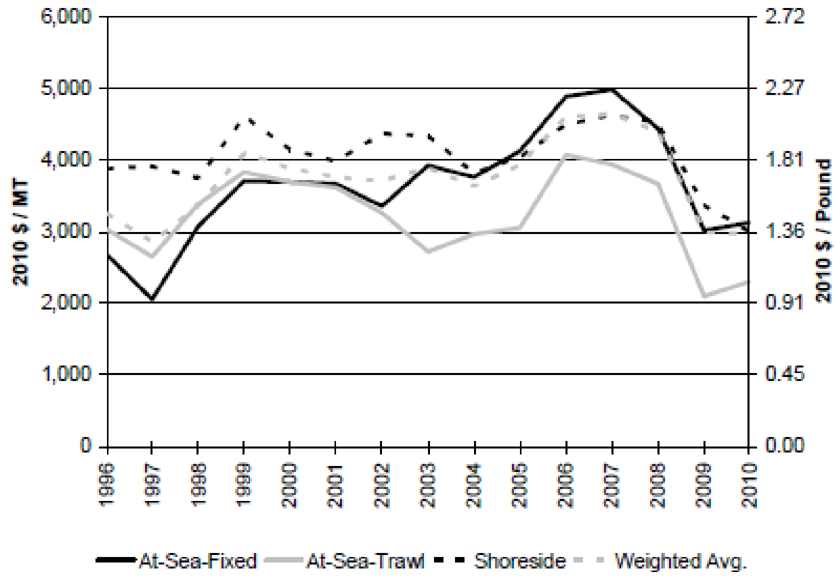
The ex-vessel value of hook-and-line groundfish catch from the GOA is reported in Table 4-11. Information in that table indicates that sablefish generates about seven times the ex-vessel revenue of Pacific cod for the catcher vessel sector and about twice the ex-vessel revenue for the catcher processor sector, on average, from 2005 through 2010. Pacific cod generated the most ex-vessel revenue of the non-IFQ species. On average, Pacific cod generated more than four times the ex-vessel revenue, for the catcher vessels, as all other non-IFQ species combined. The ex-vessel revenue of the Pacific cod fishery relative to the other non-IFQ groundfish species was greater for catcher processors. For that sector, Pacific cod generated about ten-times the ex-vessel revenue of the other non-IFQ groundfish.

Table 4-11 Ex-vessel value of groundfish taken with hook-and-line gear, 2005 through 2010

	Pacific Cod	Sablefish	Other	Total
Year	Catcher Vessels			
2005	3.4	54.0	1.2	58.6
2006	6.7	63.3	1.7	71.7
2007	8.9	61.7	1.7	72.3
2008	10.0	71.5	2.0	83.5
2009	8.1	65.4	1.8	75.3
2010	8.6	73.4	1.7	83.7
2005 through 2010 Average	7.6	64.9	1.7	74.2
	Catcher Processors			
2005	0.7	8.3	0.2	9.2
2006	3.3	8.8	0.5	12.6
2007	5.2	9.4	0.4	15.0
2008	5.4	8.3	0.4	14.1
2009	4.1	6.8	0.2	11.1
2010	5.5	5.9	0.4	11.8
2005 through 2010 Average	4.0	7.9	0.4	12.3
	Hook-and-Line Total			
2005	4.1	62.3	1.4	67.8
2006	10	72.1	2.2	84.3
2007	14.1	71.1	2.1	87.3
2008	15.4	79.8	2.4	97.6
2009	12.2	72.2	2	86.4
2010	14.1	79.3	2.1	95.5
2005 through 2010 Average	11.7	72.8	2.0	86.5

Source: 2010 and 2011 Economic SAFE documents, Table 19.

The first wholesale price per pound of Pacific cod from Alaska was at relatively high levels from 2006 through 2008 (real 2010 dollars) (see Figure 4-1). However, the weighted average price decreased substantially in 2009, to levels that were the lowest since 1998. Prices were about the same in 2010 as they were in 2009. First wholesale Pacific cod prices fell for all gear types, but longline catcher processor prices were slightly more than shorebased products (from all gear types) in 2010.



Note: Product type may include several more specific products. Data are not available to calculate separate prices for the two at-sea sectors prior to 2001.

Source: NMFS Weekly Product Reports and ADF&G Commercial Operator Annual Reports 1996-2010

Figure 4-1 First wholesale price (real 2010 dollars) of Pacific cod from Alaska, 1996 through 2010

Estimates of total Pacific cod abundance (both in biomass and numbers of fish) in the GOA are obtained using the NOAA Fisheries trawl surveys. The highest biomass ever observed by the survey was the 2009 estimate of 752,651 mt, and the low point was the preceding (2007) estimate of 233,310 mt. The 2009 biomass estimate represented a 223% increase over the 2007 estimate. In terms of population numbers, the record high was estimated in 2009, when the estimate exceeded 573 million fish. The 2005 estimate of 140 million fish was the low point. The 2009 abundance estimate represented a 199% increase over the 2007 estimate. The 2011 abundance estimate was down 33% from the 2009 estimate, but still 115% above the 2007 estimate.

The recent increases in Pacific cod biomass estimates in the GOA have resulted in increases in the TAC. GOA wide TACs for Pacific cod, in 2010, 2011, and 2012, were 59,563 mt, 73,719 mt, and 65,700 mt, respectively. From 2000 through 2009 Pacific cod catch in the GOA ranged from 41,000 mt to 59,000 mt. This indicates that the TACs for the foreseeable future may be larger than in the recent past. These increases in the Pacific cod TAC are an important consideration in this action, as they may affect the constraint of halibut PSC limits.

Table 4-12 shows the number of hook-and-line vessels that reported catch in non-IFQ and non-DSR targets. Information in this table excludes hook-and-line vessels that only reported catch in sablefish and halibut target fisheries, because those fisheries are not regulated under the halibut PSC limit modifications being considered. Information on DSR participation is shown in the next section.

Data are broken out by catcher processors and catcher vessels. These two classes of vessels operate under their own halibut PSC limit. Dividing the hook-and-line PSC limit between the two sectors means that when one sector reaches their limit it will not impact the other.

Information in the table shows that, from 2003 through 2010, there was an average of 21 hook-and-line catcher processors in the fishery. The greatest number of catcher processors fished during 2003 (24 catcher processors) and the fewest during 2005 (18 catcher processors). In more recent years (2006 through 2009), 22 catcher processors operated in the fishery. That number decreased by one (to 21 vessels) in 2010.

Table 4-12 Number of hook-and-line vessels operating in the GOA non-DSR target fisheries (Pacific cod) and DSR, fishery 2003 through 2011

Year	2003	2004	2005	2006	2007	2008	2009	2010	2011*
Non-DSR HAL CP	24	19	18	22	22	22	22	21	14
Non-DSR HAL CV	590	595	547	615	650	681	645	631	503
Non-DSR HAL Total	614	614	565	637	672	703	667	652	517
DSR Vessels	133	71	60	24	4	conf	conf	conf	conf
Total HAL	635	631	583	653	676	705	668	653	518
* Through August 17th, 2011									
Conf indicates less than four vessels									

Note: 2011 is excluded from the average, because data only through early August are included.
Source: AKFIN summary of NOAA Fisheries catch accounting data.

An average of 619 catcher vessels targeted groundfish (excluding sablefish and DSR) from 2003 through 2010. The fewest vessels fished during 2005 (547) and the greatest number of vessels fished during 2008 (681). Ex-vessel prices were greater in 2008 than during any other year reported. This high ex-vessel price may have affected some vessel owner’s decision to target Pacific cod (Table 4-16).

4.5.3.2 DSR fishery (Source: 2009 GOA SAFE Report)

The DSR assemblage is comprised of seven species of nearshore, bottom-dwelling rockfishes; the key species in the stock assessment is yelloweye rockfish. The directed fishery for DSR began in 1979, as a small, shore-based, hook-and-line fishery in Southeast Alaska, with fishing occurring primarily inside the 110 m contour. The early directed fishery targeted the entire DSR complex. In more recent years, the fishery targeted primarily yelloweye rockfish and fished primarily between the 90 m and the 200 m contours. Yelloweye rockfish accounted for an average of 97% (by weight) of the total DSR catch between 2004 and 2009. Quillback rockfish accounted for 1.9% of the landed catch in those years.

The directed fishery is prosecuted almost exclusively by longline gear. Although snap-on longline gear was originally used in this fishery, most vessels now use conventional (fixed-hook) longline gear. Products from the fishery are sold primarily into domestic fresh markets. Fish are generally delivered whole, bled, and iced. Processors generally will not accept fish delivered more than three days after being caught. The ex-vessel price per pound (round) decreased in 2009, to $1.65, compared to$2.00 in 2008. This is a further decrease from the ex-vessel price of $2.60 in 2003.

The directed DSR fishery in internal State waters is managed with seasonal allocations; 67% of the directed fishery quota is allocated to the time period between January 5 and the day before the start of the IFQ halibut season and 33% is allocated between the day following the end of the commercial halibut IFQ season and December 31. Southeast Outside (SEO) regulations stipulate one season only for directed fishing for DSR opening January 5th and continuing until the allocation is landed or until the day before the start of the IFQ halibut season, whichever comes first. The directed DSR fleet requested a winter fishery, as the ex-vessel price is highest at that time. The directed season is closed during the halibut IFQ season to prevent over-harvest of DSR.

Prior to 1992, DSR was recognized as a FMP assemblage only in the waters east of 137° W. longitude. In 1992 DSR was recognized in East Yakutat (EYKT), and management of DSR extended westward to 140° W. longitude. This area is referred to as the SEO Subdistrict and is comprised of four management sections: EYKT, Northern Southeast Outside (NSEO), Central Southeast Outside (CSEO), and Southern Southeast Outside (SSEO). In SEO, the State of Alaska and the National Marine Fisheries Service manage DSR jointly. The two internal state water subdistricts, Northern Southeast Inside (NSEI) and Southern Southeast Inside (SSEI) are managed entirely by ADF&G and are not included in the NMFS stock assessment (Figure 4-2). Halibut catch in subdistricts exclusively managed by ADF&G do not accrue against the Federal PSC limits.

Commercial quotas are set by management area and are based on the remaining ABC, after subtracting the estimated DSR incidental catch (landed and at sea discard) in other fisheries. No directed fisheries occurred in 2006 or 2007, in the SEO district, as ADF&G took action in two areas; one was to enact management measures to keep the catch of DSR in the sport fishery to the levels mandated by the Board of Fisheries

(BOF), and the other was to further compare the estimations of incidental catch in the halibut fishery to the actual landings from full retention regulations in the commercial fishery in those years to see how closely our predicted PSC matched the landed catch. Directed fisheries did occur in 2008 and 2009, in two of the outer coast areas, EYKT and SSEO.

The history of domestic landings of DSR from SEO is shown in Table 4-13. The directed DSR catch in SEO increased from 106 mt in 1982, to a peak of 726 mt in 1987. Total landings exceeded 900 mt in 1993. Directed commercial fishery landings have often been constrained by other fishery management actions. In 1992, the directed DSR fishery was allotted a separate halibut PSC limit and is, therefore, no longer affected when the PSC limit is met in other longline fisheries in the GOA. In 1993, the fall directed fishery was cancelled due to an unanticipated increase in DSR incidental catch during the fall halibut fishery.

The directed commercial DSR fisheries in the CSEO and SSEO management areas were not opened in 2005, because it was estimated that total mortality in the sport fish fishery was significant and, when combined with the directed commercial fishery, would likely result in exceeding the TAC. The directed fishery was not opened in 2006 or 2007 in SEO, because the estimation method for predicting incidental catch in the halibut fishery was modified and needed to be compared to actual landings, prior to allowing directed landings. Landings in 2006 and 2007 totaled 205 mt in each of those two years, 97% of which were landed in the halibut fishery. In 2008 and 2009, it was determined that there was sufficient TAC to accommodate anticipated removals in the halibut fishery and directed fisheries in EYKT and SSEO. Total landed catch of DSR in 2008 in SEO was 195 mt.

In February 2006, the Board of Fisheries (BOF) allocated the SEO DSR TAC in the following manner: 84% to the commercial fishery and 16% to the sport fish fishery. In February 2009, the BOF further mandated that the anticipated subsistence catch be deducted from the TAC before splitting the remaining TAC between commercial and sport fish fisheries. For a 2010 TAC of 295 mt, this equates to a 46 mt TAC for sport fish fisheries and a 241 TAC for commercial fisheries after the deduction of 8 mt for anticipated mortality in subsistence fisheries.

Vessels that fished in the DSR Southeast Outside fishery are reported in

Table 4-14. Both catcher vessels and catcher processors are included in the table. The two classes of vessels are combined because too few catcher processors operate in the fishery to report their numbers independently, and the halibut PSC limit for the DSR fishery is not divided between the catcher vessels and catcher processors.

Only the vessels that targeted DSR in the Southeast Outside district are included in the table. Vessels that only harvested DSR as incidental catch in the halibut fishery or other groundfish fisheries are excluded. Also excluded are vessels that only targeted DSR in the State waters fishery. These vessels are excluded because their halibut mortality does not count against the DSR Southeast Outside district PSC limit.

The number of vessels in the DSR Southeast Outside district fishery declined from 133 vessels in 2003, to fewer than 24 vessels since 2006. During the most recent years, there have been fewer than three vessels.

Table 4-13 Reported landings of demersal shelf rockfish (mt round weight) from domestic fisheries in the Southeast Outside Subdistrict (SEO), 1982-2009a

	Research	Directed Landings		Bycatch Landings		Total	
YEAR	Catch	AREA 65	AREA 68	AREA 65	AREA 68	SEO[b]	ABC[c]
1982		106		14		120	
1983		161		15		176	
1984		543		20		563	
1985		388	7	100	4	499	
1986		449	2	41	2	494	
1987		726	77	47	5	855	
1988		471	44	29	8	552	660
1989		312	44	101	18	475	420
1990		190	17	100	36	379	470
1991		199	187	83	36	889	425
1992		307	57	145	44	503	550
1993	13	246	99	254	18	901	800
1994	4	174	109	128	26	441	960
1995	13	110	67	90	22	282	580
1996	6	248	97	62	23	436	945
1997	13	202	65	62	25	381	945
1998		176	65	83	34	363	560
1999		169	66	74	38	348	560
2000	5	126	57	70	24	282	340
2001	6	122	50	110	37	326	330
2002	2	136	0	115	38	292	350
2003	7	102	0	123	51	276	390
2004	2	85	83	106	49	325	450
2005	4	0	41	137	55	237	410
2006	2	0	0	161	42	205	410
2007	9	0	0	140	56	205	410
2008	2	20	22	103	48	195	382
2009	4	31	45	78	51	209	362

[a] Landings from ADF&G Southeast Region fish ticket database and NMFS weekly catch reports through October 13, 2009.
[b] Sport and subsistence fisheries and estimated unreported DSR mortality associated with halibut fishery not reflected in totals.
[c] No ABC prior to 1988, 1988-1993 ABC for FMP area 65 only.

In 2011 the total DSR catch was estimated to be 177 mt (2011 GOA SAFE), which was smaller than the catch reported in recent years.

2011 DSR Catch SEO (mt)	*Directed Commercial*	*Incidental Commercial*	*Recreational Fisheries*	*Total*
Landed	22	84	35	141
Estimated discard	0	8	4	12
Overages (halibut fishery) >10%	0	24	0	24
Total	22	116	39	177

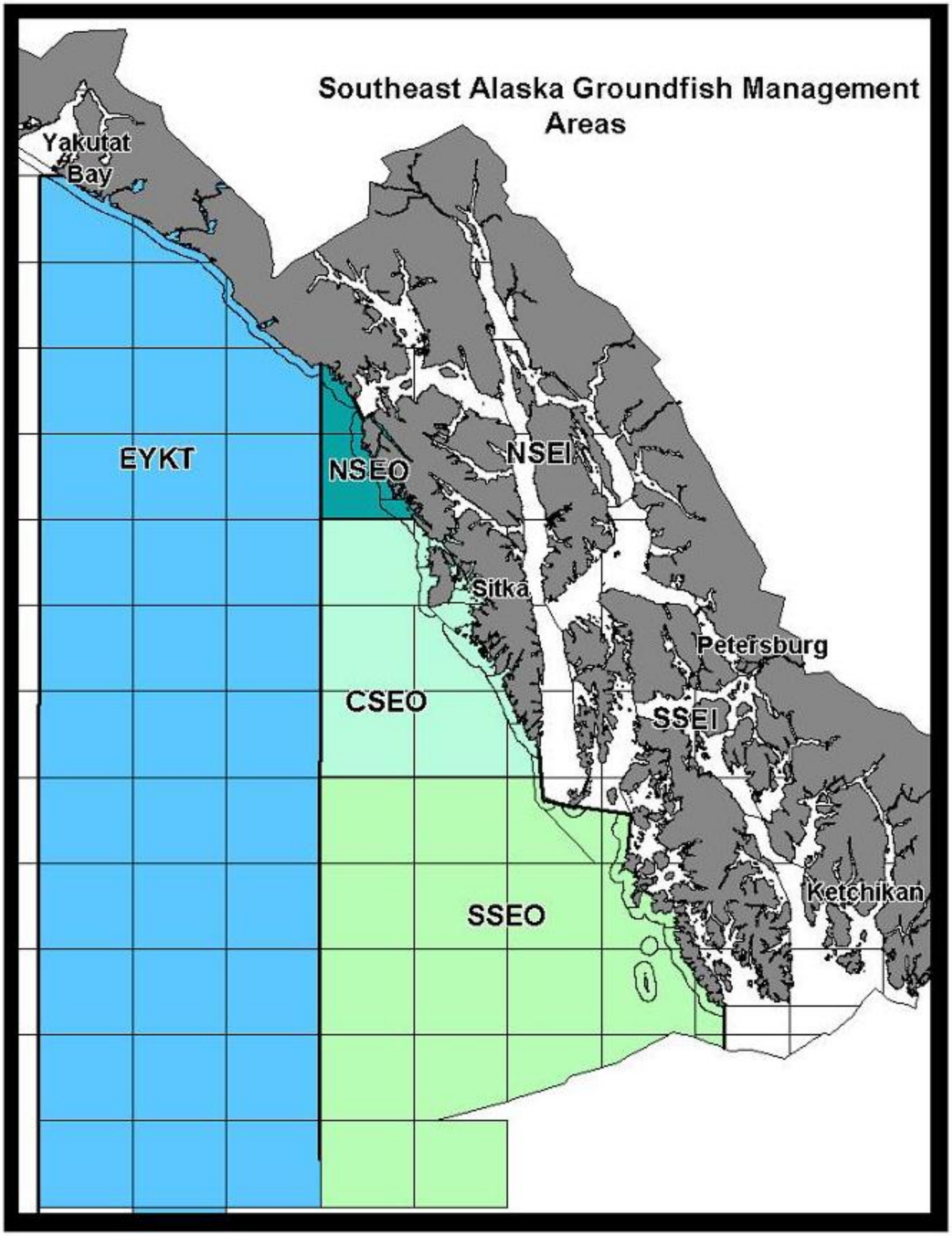


Figure 4-2 **The Eastern Gulf of Alaska with Alaska Department of Fish and Game groundfish management areas: the EYKT, NSEO, CSEO, and SSEO sections comprise the Southeast Outside (SEO) Subdistrict**

Table 4-14 Number of vessels harvesting DSR from the Southeast Outside District

Year	SE DSR Vessels
2003	133
2004	71
2005	60
2006	24
2007	4
2008	2
2009	1
2010	1
2011	1

Source: AKFIN summary of NOAA Fisheries Catch Accounting data.

4.5.4 GOA trawl fisheries

Halibut PSC limits in the GOA trawl fishery are divided into deep-water and shallow-water complexes that are made available to the fleet during five seasons throughout the year. Based on this distribution of halibut PSC and the scheduling of target fisheries openings, fishermen must determine when and where to utilize the halibut PSC in various target fisheries. These individual decisions are often based on generating the greatest return from fishing effort, given the available target fisheries and halibut PSC. A variety of factors influence the return that may be realized from fisheries and halibut PSC usage. Local processing markets vary for the different species. Timing of fish aggregations (particularly in Pacific cod fisheries) may affect choices of when to prosecute those fisheries, as increased aggregation typically result in cost savings from increased catch per unit of effort and from the decrease in halibut PSC. Roe conditions also influence when fishermen choose to fish (particularly in the pollock fishery). In considering the effects of changes in halibut PSC limits, it is important to understand these choices, which are reflected in the general trends of timing of prosecuting the various target fisheries historically.

Table 4-15 shows that total GOA groundfish catch by vessels using trawl gear. Trawl catcher vessels primarily harvest pollock, with flatfishes, Pacific cod, and rockfish making up most of the remaining catch. Catcher processors harvest very little GOA Pacific cod, and only trivial amounts of pollock, because the inshore/offshore regulations allocate only 10% of GOA Pacific cod and no directed pollock to the offshore sector[46]. The limited allocation does not constitute sufficient TAC for a directed fishery. Instead, these vessels focus primarily on flatfish and rockfish. They also harvested limited amounts of other GOA species.

Table 4-16 shows the gross ex-vessel revenue generated by vessels using trawl gear to harvest GOA groundfish. The information shows that, on average from 2005 through 2009, GOA catcher vessels using trawl gear generated almost 45% of their gross ex-vessel revenue from pollock. Pacific cod accounted for almost 25% of their gross revenue. Flatfish accounted for about 15%. Rockfish, sablefish, and other species accounted for the remaining 16%. Catcher processors were estimated to have generated half of their gross "ex-vessel equivalent" revenue from rockfish[47]. Flatfish accounted for just over 20% of this sector's gross "ex-vessel equivalent" revenue. Sablefish accounted for just over 15%. The remaining 15% of gross "ex-vessel equivalent" revenue was generated from Pacific cod, other species, and pollock.

[46] GOA Inshore/Offshore regulations contain provisions that classify CPs that are ≤125' and that process fewer than 126 mt (round weight) of pollock during any fishing week as "inshore" operations.

[47] Catcher processors do not generate ex-vessel revenue, because no market transaction occurs between the harvester and processor. NOAA Fisheries staff estimates this "ex-vessel equivalent" value as a percentage of the first wholesale revenue for comparative purposes only, with the catch vessel and inshore processor segment..

Table 4-15 Total catch of GOA groundfish (1,000 mt) by vessels using trawl gear, 2005 through 2010

	Pollock	Sablefish	Pacific cod	Flatfish	Rockfish	Other	All Groundfish
Year	Catcher Vessels						
2005	80	1	13	17	8	2	121
2006	71	1	12	25	8	4	121
2007	52	1	14	26	9	3	105
2008	52	0	19	32	9	3	115
2009	42	0	12	27	8	4	93
2010	75	0	21	23	9	3	131
2005 through 2010 Average	62	1	15	25	9	3	114
	Catcher Processors						
2005	0	1	1	13	11	2	28
2006	0	1	1	16	14	2	34
2007	1	1	1	13	13	1	30
2008	1	0	1	13	13	2	30
2009	2	0	2	15	14	3	36
2010	1	0	1	15	15	3	35
2005 through 2010 Average	1	1	1	14	13	2	32
	Trawl Total						
2005	80	2	14	30	19	4	149
2006	71	2	13	41	22	6	155
2007	53	2	15	39	22	4	135
2008	53	0	20	45	22	5	145
2009	44	0	14	42	22	7	129
2010	76	0	22	38	24	6	166
2005 through 2010 Average	63	1	16	39	22	5	147

Source: 2010 and 2011 Economic SAFE (Table 2)

Table 4-16 Ex-vessel gross revenue of GOA groundfish species by vessels using trawl gear ($million)

	Pollock	Sablefish	Pacific cod	Flatfish	Rockfish	Other	All Groundfish
Year	Catcher Vessels						
2005	21.5	1.7	7.7	3.3	3.8	0.4	38.4
2006	20.8	1.9	8.6	6.4	2.7	0.7	41.1
2007	16.1	2.0	13.6	7.2	3.3	0.7	42.9
2008	19.3	1.9	15.4	8.3	3.1	1.2	49.2
2009	15.4	3.3	5.6	6.7	1.5	1.1	33.6
2010	28.4	3.3	9.3	4.7	2.5	1.1	49.3
2005 through 2010 Average	20.3	2.4	10.0	6.1	2.8	0.0	41.0
	Catcher Processors						
2005	0.1	1.6	0.5	1.4	5.3	0.4	9.3
2006	0.1	1.8	0.9	2.6	4.5	0.2	10.1
2007	0.1	1.8	1.2	2.6	4.4	0.4	10.5
2008	0.2	1.6	1.0	2.7	4.5	0.5	10.5
2009	0.5	2.6	0.8	1.9	2.5	1.1	9.4
2010	0.4	2.9	0.6	1.7	3.6	0.9	10.1
2005 through 2010 Average	0.2	2.1	0.8	2.2	4.1	0.6	10.0
	Trawl Total						
2005	21.6	3.3	8.2	4.7	9.1	0.8	47.7
2006	20.9	3.7	9.5	9.0	7.2	0.9	51.2
2007	16.2	3.8	14.8	9.8	7.7	1.1	53.4
2008	19.5	3.5	16.4	11.0	7.6	1.7	59.7
2009	15.9	5.9	6.4	8.6	4.0	2.2	43.0
2010	28.8	6.2	9.9	6.4	6.1	2.0	59.4
2005 through 2010 Average	20.5	4.4	10.9	8.3	7.0	0.6	51.0

Source: 2010 and 2011 Economic SAFE (Table 19)

Four tables are provided to illustrate the annual fishing cycle in GOA trawl fisheries. The first two tables (Table 4-17 and Table 4-18) provide information on the 2010 fisheries. Information that was determined to be confidential was replaced with an asterisk. The first table shows the total groundfish catch, by halibut PSC allowance per complex, target fishery, and fishing week. The second table shows halibut PSC removals by target fishery. The two tables together illustrate choices of target fisheries and the use of both the available TACs and halibut PSC allowances arising from those choices.

The tables indicate that the Central GOA and Western GOA trawl fleets began fishing immediately, on the January 20th trawl fishery opening, targeting Pacific cod and pollock. In the Central Gulf, inshore effort focused heavily on the Pacific cod fishery, harvesting the A season total allowable catch for the inshore sector and closing the fishery on January 31st. After this closure, harvest data show a sharp drop in Pacific cod harvests (with some continued harvests from the Western GOA and West Yakutat and the offshore fisheries) and a large increase in the pollock catches. The A season Area 630 pollock fishery (which is only open to catcher vessels) was fully harvested a short time later, with that fishery closing on February 5th. Some of this effort likely then shifted to the Area 620 pollock fishery, which closed for the A season, based on harvest of that total allowable catch, on February 25th.

In the Western GOA, the inshore Pacific cod fishery closed on harvest of the A season TAC on February 19th. Catches in the Pacific cod fishery decreased, but the West Yakutat fisheries remained opened with some continued targeting of Pacific cod until late February and early March. Throughout February (after the heavy targeting of Pacific cod in late January and early February), a small number of vessels targeted various flatfish (in both the deep-water and shallow-water complexes).

Pollock targeting intensifies again in early March, with the opening of the B season of that fishery. Effort in the Central GOA closed areas 620 and 630 within approximately 1 week, while the Western GOA (Area 610) fishery remained open into early April.

Halibut usage in the first halibut PSC season was dominated by the Pacific cod fisheries, which started with the intense effort on their opening. Once those fisheries began closing, early in February, halibut PSC allowance usage declined substantially. Halibut PSC was then spread throughout the various flatfish fisheries, in both the deep-water and shallow-water complexes, for the remainder of the first season.

When the second halibut PSC allowance season began (on April 1st), the active trawl fleet (primarily catcher processors) targeted arrowtooth flounder and rex sole in the deep-water complex, through the month of April. In May, when the Central GOA rockfish pilot program seasons opened, catcher vessel and catcher processor effort moved into that fishery. Beginning in April, effort periodically targeted flatfish species in the shallow-water complex, drawing on that halibut PSC allowance. This activity continued through the summer months (and the third PSC allowance season, which runs from July 1 through September 1). Most of the effort in the deep-water complex, from May through August, was in the rockfish fisheries, including a brief surge of effort in early July, when the limited access rockfish fisheries in West Yakutat and the Western GOA opened. The Western GOA fisheries drew most of this effort and were fully prosecuted over approximately one week, primarily by catcher processors. Limited effort was also reported in the rex sole and arrowtooth flounder fisheries.[48]

Halibut PSC allowance usage in the second and third seasons follow the trends of effort among the various flatfish targets. In April, arrowtooth flounder and rex sole targets used substantial portions of the deep-water complex halibut PSC allowance, while the flathead sole and shallow-water flatfish targets were the primary users of shallow-water complex halibut PSC.

[48] Some directed sablefish and Pacific cod fishing is also reported in this period. These harvests were made under the rockfish program, which allows directed harvest of any allocation under the program. It should also be noted that some of the rockfish program PSC usage is associated with this targeting of sablefish.

Table 4-17 Gulf of Alaska groundfish catch in 2010 by vessels using trawl gear, by target fishery and week

Halibut PSC Seasons	Week Ending Date	Deep water halibut PSC complex					Deep Total	Shallow water halibut PSC complex							Shallow Total	Total
		Arrowtooth Flounder	Deep Water Flatfish - GOA	Rex Sole - GOA	Rockfish	Sablefish		Atka Mackerel	Flathead Sole	Other Species	Pacific Cod	Pollock - bottom	Pollock - midwater	Shallow Water Flatfish - GOA		
1st: Jan 20 to Apr 1	January 23, 2010									0	3,392	236		0	3,695	3,695
	January 30, 2010									0	4,566			0	5,555	5,555
	February 6, 2010	*		*			596	*		0	386	*	143	134	3,268	3,864
	February 13, 2010	*		*			419			0	567	1,053		0	1,962	2,381
	February 20, 2010	*		*			339			0	491	1,265	*	102	3,847	4,186
	February 27, 2010			*			117				0	1,666		0	5,405	5,522
	March 6, 2010	*					217	*			0	465		0	3,680	3,896
	March 13, 2010							*			0	701		0	7,859	7,859
	March 20, 2010	*	*	*			282				0	518	*	24	7,254	7,535
	March 27, 2010	*		*			508	*			0	251	*	21	3,286	3,793
1st Season Total		1,633	*	*			2,477		332		9,402	9,608	26,188	281	45,811	48,288
2nd: Apr 1 to Jul 1	April 3, 2010	1,078		460			1,538		194			*	*	*	950	2,488
	April 10, 2010	*		*			3,209		300			*	*	*	2,352	5,561
	April 17, 2010	2,004		331			2,336		235				*	78	344	2,680
	April 24, 2010	*		*			3,369		117					70	186	3,555
	May 1, 2010	525	*	*			636		119		*			374	503	1,139
	May 8, 2010				548	*	556		108		*			183	342	898
	May 15, 2010				521	*	524		*					53	126	651
	May 22, 2010				1,301	*	1,308		*					260	319	1,627
	May 29, 2010				716	*	740				129			112	241	981
	June 5, 2010				330	*	335				*			243	446	781
	June 12, 2010				550	*	559				*			210	422	981
	June 19, 2010				473		473							253	253	726
	June 26, 2010				*		276		*					257	386	662
2nd Season Total		9,419	*	1,587	4,715	55	15,856		1,319	9	613	*	*	2,184	6,871	22,728
3rd: Jul 1 to Sep 1	July 3, 2010				4,846		4,846		94					121	215	5,061
	July 10, 2010			*	*		6,463	*						*	122	6,585
	July 17, 2010			*	3,315	*	3,472							373	373	3,845
	July 24, 2010			*	2,348	*	2,475							369	409	2,883
	July 31, 2010				771		771							135	135	906
	August 7, 2010	*			*		788							376	376	1,164
	August 14, 2010				*	*	211							59	59	271
	August 21, 2010				*	*	450							457	457	907
	August 28, 2010	*		150	*		456				*	*	*	203	2,084	2,539
3rd Season Total		475		427	18,799	231	19,932	*	94		*	*	*	2,212	4,230	24,162
4th: Sep 1 to Oct 1	September 4, 2010			96			96			*	3,848	3,291	2,336		9,479	9,575
	September 11, 2010		*	60			61				2,447	2,172	3,959		8,578	8,639
	September 18, 2010			164			164				*	*	2,970	365	3,943	4,107
	September 25, 2010	*			41		41					*	1,231	*	1,801	1,841
4th Season Total		1		321	41		363			*	*	6,067	10,496	798	23,800	24,163
5th: Oct 1 through Dec 31	October 2, 2010				*		*					*	*	117	*	6,315
	October 9, 2010	*			*		625		168			6,076	*	62	10,701	11,325
	October 16, 2010	699					1,245					1,406	*	574	2,406	3,651
	October 23, 2010	873			*	*	1,549		*			*	*	590	989	2,538
	October 30, 2010	1,526		*	*		1,860					*		49	51	1,911
	November 6, 2010	447		*	*		*							*	*	552
	November 13, 2010	108		*	*		326		137					46	183	509
	November 20, 2010	100					100		247					*	257	357
	November 27, 2010	*		*			197							*	30	228
	December 4, 2010	*		*			140		4					*	33	173
	December 11, 2010	*					*		84					*	*	121
5th Season Total		4,292		544	2,198	19	7,053		709			8,502	9,887	1,529	20,627	27,680
	Total	15,821	175	3,627	25,752	306	45,681	*	2,454	*	16,531	25,671	49,664	7,004	101,339	147,020

Source: NOAA Catch Accounting, Provided by AKFIN

Table 4-18 Trawl GOA halibut PSC by target fishery and week ending date, 2010

Halibut PSC Seasons	Week Ending Date	Deep water halibut PSC complex: Arrowtooth Flounder	Deep Water Flatfish - GOA	Rex Sole - GOA	Rockfish	Sablefish	Deep Total	Shallow water halibut PSC complex: Atka Mackerel	Flathead Sole	Other Species	Pacific Cod	Pollock - bottom	Pollock - midwater	Shallow Water Flatfish - GOA	Shallow Total	Total
1st: Jan 20 to Apr 1	January 23, 2010										44	0	0		44	44
	January 30, 2010										63	2			66	66
	February 6, 2010	*		*			5	*	7		2	*	0	13	25	30
	February 13, 2010	*		*			5				2	1	0		3	8
	February 20, 2010	*		*			10				2	1	*	9	12	22
	February 27, 2010			*			9					1	0		1	10
	March 6, 2010	*					9	*	3			0	0		3	12
	March 13, 2010							*	3			0	0		4	4
	March 20, 2010	*	*	*			9					0	*	1	1	10
	March 27, 2010	*		*			25	*	1			0	*	1	2	26
1st Season Total		20	*	*			71		14		113	10	1	23	160	231
2nd: Apr 1 to Jul 1	April 3, 2010	17		22			39		9			*	*	*	12	51
	April 10, 2010	*		*			91		13			*	*	*	15	106
	April 17, 2010	45		39			83		15				*	5	20	104
	April 24, 2010	*		*			118		8					10	19	137
	May 1, 2010	15	*	*			19		17		*			54	74	93
	May 8, 2010				0	*	0		5		*			27	33	33
	May 15, 2010				0	*	0		*					7	8	9
	May 22, 2010				1	*	1		*					13	13	14
	May 29, 2010				2	*	3				3			6	9	12
	June 5, 2010				1	*	1				*			12	14	15
	June 12, 2010				2	*	3				*			6	8	12
	June 19, 2010				1		1							36	36	36
	June 26, 2010				*		0		*					10	12	12
2nd Season Total		208	*	142	7	2	358		72		11	*	*	192	274	632
3rd: Jul 1 to Sep 1	July 3, 2010				10		10		9					6	15	25
	July 10, 2010			*	*		38	*						*	7	46
	July 17, 2010			*	20	*	28							16	16	44
	July 24, 2010			*	6	*	9							13	13	22
	July 31, 2010				3		3							7	7	9
	August 7, 2010	*			*		6							23	23	29
	August 14, 2010				*	*	0							3	3	3
	August 21, 2010				*	*	1							11	11	12
	August 28, 2010	*		6	*		12				*	*	*	5	6	17
3rd Season Total		8		17	82	1	107	*	9		*	*	*	89	100	207
4th: Sep 1 to Oct 1	September 4, 2010			4			4			*	63	0	12		75	80
	September 11, 2010		*	6			6				55	0	0		55	62
	September 18, 2010			9			9				*	*	0	25	31	40
	September 25, 2010	*					0					*	0	*	21	21
4th Season Total		0	0	19			19			*	*	1	12	47	183	202
5th: Oct 1 through Dec 31	October 2, 2010				*		*					*	*	3	*	5
	October 9, 2010	*			*		9		8			3	*	3	15	24
	October 16, 2010	20					20					2	*	22	25	44
	October 23, 2010	45			*	*	46		*			*	*	42	44	90
	October 30, 2010	73		*	*		78					*		8	8	85
	November 6, 2010	17		*	*		*							*	*	19
	November 13, 2010	3		*	*		6		3					3	6	12
	November 20, 2010	3					3		17					*	18	21
	November 27, 2010	*		*			11							*	1	11
	December 4, 2010	*		*			6		6					*	7	13
	December 11, 2010	*					*		38					*	*	40
5th Season Total		174		20	6	0	200		72			7	1	84	164	364
	Total	410	0	248	95	3	755	*	167	*	247	18	14	434	881	1,637

Source: NOAA Catch Accounting, Provided by AKFIN

Note: The table indicates there is targeting of shallow flats in late September, but that fishery should have been closed on September 3rd, because the halibut PSC limit for the shallow-water complex had been taken. From the data, it is not possible to determine the reason for this occurrence.

At the start of the fourth halibut PSC allowance season (which runs from September 1 through October 1), Pacific cod (the B season of which also opens September 1st) was a primary target; however, the seasonal shallow-water complex halibut PSC limit had been reached on September 3rd, almost exclusively from this effort in the Pacific cod target. Effort was also expended in the pollock fishery (the C season of which opens August 25th), which is not subject to closure when the halibut PSC limit is reached, as that fishery uses little halibut PSC. Limited fishing activity occurred in the deep-water halibut PSC complex that season, in part, because a specific PSC limit is not set for the fourth season and only rollover amounts of halibut PSC are available to prosecute those directed fisheries.

A halibut PSC allowance in the fifth season (which runs from October 1st until the end of the year) is not assigned to the deep-water or shallow-water complex, and can be used for any directed groundfish fishery that is open. The fifth season began with increased effort in the pollock fishery, as well as some targeting of flatfish in both the deep-water and shallow-water complexes. In addition, harvests from the rockfish program fisheries continue during October, the last month of that season. On November 1st, the fifth season halibut PSC allowance may also be supplemented by any unused halibut PSC allowance from rockfish program cooperatives. Effort, however, declined at the end of October, with remaining effort primarily in both deep-water and shallow-water flatfish complexes. Halibut PSC usage in the fifth season generally trends with effort in these flatfish fisheries.

The movements of vessels among different targets throughout the year are driven by the availability of the various TACs and the degree to which those fisheries may be targeted with the halibut PSC amounts available. In considering the overall activity relative to halibut PSC it is also useful to generally examine halibut PSC usage seasonally. In the first halibut PSC season, which ends April 1st, the Pacific cod fishery accounts for most halibut PSC, with slightly less used in the deep-water and shallow-water flatfish fisheries. In the second halibut PSC season, which runs from April 1 to July 1, halibut allowances are used almost exclusively by those flatfish fisheries. Small amounts of deep-water complex halibut PSC are used in the limited access rockfish target fishery in the Central Gulf, which has opened May 1st under the rockfish program since 2007. In the third season, halibut usage in the deep-water complex is primarily by rockfish limited access fisheries, which predominantly fish in the Western GOA and, to a lesser extent, in West Yakutat. The limited entry portions of the Central GOA rockfish program were also prosecuted at this time, but will no longer exist under the new rockfish program. In the shallow-water complex, halibut usage is almost exclusively in the shallow-water flatfish fisheries (which are almost exclusively in the Central GOA). The fourth season begins simultaneously with the opening of Pacific cod B season, which is the primary halibut allowance use in that PSC season. Flatfish fisheries in both complexes also use fourth season halibut, but substantially less than the cod fishery. In the shallow-water complex this trend is driven by halibut PSC in the Pacific cod fishery, which typically uses the lion's share of the seasonal allowance within one or two weeks, closing other fisheries that rely on that shallow-water halibut PSC allowance. Fifth season halibut PSC usage is also dominated by deep-water and shallow-water flatfish.

The next two tables (Table 4-19 and Table 4-20) provide information on groundfish catch and halibut PSC by week and target fishery, from 2003 through 2010. It is noteworthy that some weeks may fall in two different seasons over the time period considered, depending on the year. For example, the week ending date 26 includes the dates June 26 through July 1. That means that some of the week ending dates reported as the second season may actually have occurred during the third season. The delivery timing has a similar impact, when catch made while a fishery is open is not delivered and reported until the next fishing week. Therefore catch in these transition weeks may be incorrectly attributed to the previous or following season depending on the distribution of weekending dates in the particular year.

The information reported in these tables suggests that the fishing patterns over this time period are similar to those reported for 2010. In general, vessels are used to target Pacific cod when the fishery opens. When the Pacific cod fishery is closed vessels are moved into the pollock fishery, but some also begin the fishing flatfish. During the second halibut PSC season vessels tend to finish fishing for Pacific cod or pollock and then fish flatfish until the rockfish fishery opens. During the third season effort generally focuses on rockfish[49]; however, some vessels also fish various flatfish species. The fourth season again is focused on the pollock and Pacific cod TACs that are made available, with less production in flatfish and rockfish. Finally, the fifth season is used to clean up any pollock, Pacific cod, or rockfish that are available. Arrowtooth flounder and other flatfish species are also targeted, if there is halibut PSC allowance amounts available.

[49] With the implementation of the Central GOA rockfish program, catches of rockfish are currently distributed over a broader period, beginning May 1st and ending November 1st. Rockfish harvests in other areas, mostly from the Western Gulf, remain concentrated after the July 1st opening of the limited access fisheries.

Table 4-19 Reported Gulf of Alaska trawl groundfish catch by week and fishery, 2003 through 2010

Halibut PSC Seasons	Week of the Year	Deep water halibut PSC complex					Deep Total	Shallow water halibut PSC complex							Shallow Total	Total
		Arrowtooth Flounder	Deep Water Flatfish - GOA	Rex Sole - GOA	Rockfish	Sablefish		Atka Mackerel	Flathead Sole	Other Species	Pacific Cod	Pollock - bottom	Pollock - midwater	Shallow Water Flatfish - GOA		
1st: Jan 20 to Apr 1	3										829	357	3,082	3	4,271	4,271
	4	588		53			641		13		21,224	2,719	16,098	173	40,226	40,868
	5	655	8	119			781		133	0	16,458	1,776	1,876	258	20,502	21,283
	6	3,993	235	327			4,555		346	0	6,601	4,918	938	468	13,272	17,827
	7	4,133	26	552			4,710		205		8,792	2,785	10,635	409	22,826	27,536
	8	3,138		960			4,099			123	8,445	4,713	16,390	204	29,874	33,973
	9	1,960	534	556			3,049		99	6	8,119	6,347	17,179	315	32,066	35,115
	10	1,264	191	649			2,103		694		458	8,617	21,886	244	31,898	34,002
	11	536		503			1,039		383			11,946	54,941	158	67,428	68,467
	12	1,697	174	651			2,522		524		95	10,692	37,666	667	49,644	52,166
	13	3,560		836	2		4,398		1,060	15		963	20,468	1,285	23,792	28,190
1st Season Total		21,524	1,166	5,206	2	0	27,898	0	3,457	145	70,192	55,477	198,076	4,182	331,529	359,427
2nd: Apr 1 to Jul 1	14	10,977	80	1,494		15	12,566		709	3		1,170	5,884	1,615	9,381	21,947
	15	15,187	144	2,673			18,004		883	14	35	721	2,987	1,647	6,287	24,291
	16	11,961	19	1,877			13,858		969	4	30	187	20	1,839	3,050	16,908
	17	10,033	217	1,627			11,877		746	141		78	15	1,668	2,648	14,524
	18	4,791	184	1,136	496		6,606		646	204	42	1		1,824	2,718	9,324
	19	2,591	40	778	1,487	8	4,905		316	10	121			2,443	2,889	7,793
	20	2,667		337	2,136	23	5,163		208	55		68		1,983	2,314	7,477
	21	24			3,529	35	3,589		104	81	84			1,832	2,100	5,689
	22	15			2,746	111	2,871		51	176	277			1,491	1,996	4,866
	23				1,416	37	1,453		72	132	268			1,149	1,622	3,076
	24				2,809	44	2,853		197	115	228			1,312	1,853	4,706
	25	0			3,834		3,834		61	160				1,479	1,700	5,534
	26	41	0		5,349	48	5,438		178		134			1,190	1,501	6,940
2nd Season Total		58,287	684	9,923	23,802	321	93,018	0	5,140	1,094	1,220	2,225	8,907	21,472	40,059	133,076
3rd: Jul 1 to Sep 1	27	258		264	40,601	146	41,268		94	10	53			1,795	1,953	43,221
	28	664		605	47,478	386	49,133	3		32	3			1,773	1,811	50,944
	29	1,273		837	31,248	109	33,467	64			126			1,542	1,732	35,198
	30	1,974		939	21,749	112	24,774		55	98	248			1,564	1,964	26,738
	31	1,083		798	3,925	12	5,817		3	1	170	1		4,167	4,342	10,160
	32	3,029		761	1,076	29	4,895		78	264	39			4,405	4,787	9,681
	33	2,385		443	540	38	3,406		79					2,331	2,410	5,816
	34	2,261		547	770	73	3,650		0		41	10	597	2,075	2,724	6,375
3rd Season Total		12,925	0	5,193	147,387	905	166,410	66	309	406	681	12	597	19,653	21,723	188,133
4th: Sep 1 to Oct 1	35	3,772		594	441	48	4,855				836	6,881	29,341	941	37,999	42,853
	36	3,512		403	302	39	4,256		0	9	18,313	6,092	14,274	438	39,127	43,383
	37	2,813	0	338	1,483	57	4,691			57	7,689	4,290	7,901	719	20,657	25,348
	38	817	0	458	728	20	2,022			8	660	7,560	8,944	1,481	18,654	20,676
	39	939		254	753		1,946				72	2,062	4,636	579	7,350	9,296
4th Season Total		11,853	0	2,046	3,707	164	17,770	0	0	74	27,571	26,886	65,097	4,159	123,786	141,556
5th: Oct 1 through Dec 31	40	5,414		183	954	8	6,559		40		2,362	12,959	31,943	2,902	50,207	56,766
	41	2,713	0	64	648		3,425		199	2	496	22,488	24,690	1,556	49,431	52,856
	42	1,965		37	781		2,784		604	4	528	7,131	8,589	3,281	20,137	22,921
	43	1,198		43	708	11	1,959		69		82	3,937	3,558	1,306	8,952	10,911
	44	1,698		198	484		2,379				71	1,689	2,066	1,613	5,439	7,818
	45	557		165	847		1,569							704	704	2,274
	46	110		243	228	9	590		137		27			456	621	1,211
	47	100		29	95		224		393					676	1,069	1,293
	48	80		142			222		108		4			362	474	696
	49	67		158			226		13					269	282	508
	50	83		128			211		84					421	505	716
	51	63		15			77		1					89	90	167
	53													10	10	10
5th Season Total		14,048	0	1,405	4,744	28	20,225	0	1,648	6	3,570	48,203	70,847	13,646	137,921	158,146
	Total	118,638	1,851	23,773	179,642	1,418	325,321	66	10,555	1,725	104,063	133,160	346,605	63,114	659,288	984,610

Source: NOAA Catch Accounting, provided by AKFIN

Halibut PSC usage also follows the same pattern reflected in the 2010 season. In the first and fourth seasons, the Pacific cod fisheries are the predominant users of halibut PSC. Flatfish fisheries in both the deep-water and shallow-water complexes use halibut PSC throughout the year, when halibut allowances are available. In the shallow-water fisheries, this use is concentrated in the second, third, and fifth PSC seasons, while deep-water usage is more evenly distributed throughout the year, except for a concentration in the second season. Rockfish fisheries historically used a large share of halibut PSC shortly after their opening in July, but more recently have decreased this concentration with the adoption of the cooperative program in the Central GOA fishery.

Generally, the halibut PSC patterns follow those shown for groundfish catch. Directed fisheries that have higher halibut PSC rates will have relatively more halibut PSC than those with lower halibut PSC rates. Focusing on the fifth season, fishermen tend to target pollock and Pacific cod, if they are available.

Table 4-20 Reported Gulf of Alaska trawl halibut PSC by week and fishery, 2003 through 2010

Halibut PSC Seasons	Week of the Year	Deep water halibut PSC complex					Deep Total	Shallow water halibut PSC complex							Shallow Total	Total
		Arrowtooth Flounder	Deep Water	Rex Sole - GOA	Rockfish	Sablefish		Atka Mackerel	Flathead Sole	Other Species	Pacific Cod	Pollock - bottom	Pollock - midwater	Shallow Water		
1st: Jan 20 to Apr 1	3										49	0	0	0	49	49
	4	1		2			3		0		520	39	0	17	576	579
	5	16		5			21		1	0	502	9	0	11	523	544
	6	75	15	20			110		10	0	205	7	0	30	252	362
	7	69		27			96		3		167	15	0	34	220	316
	8	67		62			128			3	141	3	0	16	163	291
	9	70	29	96			195		6	0	160	2	0	23	192	387
	10	67	10	52			129		52		3	2	0	20	78	206
	11	27		36			64		9			3	1	6	20	83
	12	79		47			125		26		5	0	1	30	61	187
	13	138		58			196		52	0		0	0	64	116	313
1st Season Total		609	54	404	0	0	1,067	0	160	3	1,704	81	2	251	2,201	3,269
2nd: Apr 1 to Jul 1	14	316	3	98			417		29	0		3	0	72	104	521
	15	401	0	187			588		37	0	1	0	0	137	176	764
	16	280	1	161			441		63	0	1	0	0	135	199	640
	17	236	33	158			426		42	5		0	0	129	176	602
	18	147	1	56	1		205		49	8	5	0		142	203	408
	19	94	1	28	2	0	125		16	0	8			188	212	337
	20	147		8	5	0	161		10	1		1		200	213	373
	21	0			4	1	5		3	1	3			158	164	169
	22	1			4	1	6			5	6			93	104	110
	23				2	0	2		2	5	3			97	107	109
	24				7	1	9		3	5	3			84	95	103
	25	0			7		7		1	7				129	137	144
	26	0	0		19	0	19		2		1			94	97	116
2nd Season Total		1,622	39	695	51	3	2,411	0	256	37	31	4	0	1,660	1,988	4,398
3rd: Jul 1 to Sep 1	27	8		8	225	1	241		9	0	0			85	94	335
	28	37		34	433	2	506	1		0	0			120	121	627
	29	34		43	302	1	380	0			5			66	71	451
	30	72		43	214	1	329		5	0	1			64	70	400
	31	22		20	25	0	67		0		3	0		250	253	320
	32	59		15	4	0	79		2	5	0			240	248	327
	33	54		11	2	2	69		2					186	188	257
	34	55		11	3	2	71		0		0	0	0	191	191	262
3rd Season Total		342	0	185	1,208	8	1,743	1	18	6	9	0	0	1,201	1,236	2,979
4th: Sep 1 to Oct 1	35	126		19	5	2	152				34	9	1	131	176	328
	36	113		9	1	1	124		0	0	1,501	4	13	82	1,599	1,723
	37	86	0	13	1	0	101			1	408	2	0	153	564	665
	38	15	0	15	2	0	32			0	108	4	0	101	213	246
	39	25		7	2		33				11	10	0	50	72	105
4th Season Total		366	0	63	10	3	443	0	0	1	2,062	29	14	517	2,624	3,067
5th: Oct 1 through Dec 31	40	270		5	22	0	297		8		90	78	1	316	493	790
	41	94	0	4	13		110		14		16	86	1	109	226	336
	42	54		0	14		68		23	0	27	10	0	200	260	328
	43	48		3	2	0	53		1		4	4	0	97	105	159
	44	84		9	5		97					4	0	125	129	226
	45	24		4	6		34							53	53	86
	46	3		8	4	1	16		3		1			44	48	65
	47	3		1	4		8		23					49	72	80
	48	2		9			11		4		0			18	22	33
	49	3		7			9		6					18	23	33
	50	3		7			10		38					29	67	77
	51	2		0			2		0					7	7	9
	53													0	0	0
5th Season Total		590	0	56	69	1	715	0	118	0	139	181	3	1,065	1,507	2,222
	Total	3,529	93	1,403	1,338	16	6,379	1	553	47	3,994	295	20	4,695	9,605	15,984

Source: NOAA Catch Accounting, provided by AKFIN

Otherwise, the primary focus is on arrowtooth flounder and shallow-water flatfish. These directed fisheries have relatively high halibut PSC rates, so substantial amounts of the remaining PSC allowance are taken in those fisheries in the first week of the fifth season. Those higher rates may consume all of the unused halibut PSC quickly.

Vessels using trawl gear that harvested groundfish managed under the trawl halibut PSC limit are reported in Table 4-21. During 2008, only 14 trawl catcher processors reported groundfish catch in those

Table 4-21 Number of trawl catcher processors and catcher vessels that reported groundfish catch in the GOA, 2003 through 2011 (as of August 8th)

Harvest Sector	YEAR								
	2003	2004	2005	2006	2007	2008	2009	2010	2011
Catcher Processors	21	16	16	16	15	14	18	17	17
Catcher Vessels	92	77	78	73	72	73	71	67	60
Total	113	93	94	89	87	87	89	84	77

Source: AKFIN summaries of NOAA Fisheries catch accounting data

fisheries. This was the fewest number of trawl catcher processors in the GOA from 2003 through 2011. The greatest number of trawl catcher processors fished in the GOA during 2003. That year a total of 21 trawl catcher processors fished in the GOA. During the two most recent years, 17 trawl catcher processors have fished groundfish in the GOA.

Catcher vessels operating in the trawl groundfish fisheries have, in general, declined from 2003 through 2010. A total of 92 trawl catcher vessels were in GOA groundfish fisheries during 2003. By 2010, the last complete year of data, the number of vessel had decreased to 67. From 2006 through 2009, the number of catcher vessels ranged from 71 through 73 vessels.

The total number of harvesting vessels in the GOA ranged from a high of 113 (2003) to a low of 84 (2010). From 2006 through 2009, either 87 or 89 vessels operated in the fisheries. These data indicate the largest reduction in the fleet occurred earlier in the time period considered, but smaller declines have continued to present.

Table 4-22 shows the fisheries the GOA trawl catcher processors participated in and the number of vessels that are classified as small entities under the Small Business Administration (SBA) definitions (see the Section 5.4). Information in the table indicates that the majority of catcher processors fish in the rockfish, rex sole, flathead sole, and arrowtooth flounder fisheries. These vessels also have limited participation in the sablefish, shallow-water flatfish, and Atka mackerel fisheries.[50] During the earlier years of the time period considered, they also had limited participation in the other species target fishery.

Table 4-22 Number of trawl catcher processors that reported groundfish catch in the GOA by fishery, 2003 through 2011 (as of August 8th)

Complex	Target Fishery	2003	2004	2005	2006	2007	2008	2009	2010	2011
Deep-water	Arrowtooth Flounder	15	5	7	9	11	6	3	*	5
	Deep Water Flatfish - GOA									
	Rex Sole - GOA	9	4	5	3	3	3	6	4	3
	Rockfish	13	13	10	11	7	11	15	15	12
	Sablefish	*	*					*	*	
Shallow-water	Atka Mackerel					*			*	*
	Flathead Sole	5	4	5	3	4	4	3	4	3
	Other Species	*	*	*						
	Pacific Cod	6	6	4	3	*	3	4	*	*
	Pollock - bottom							*		*
	Pollock - midwater									
	Shallow Water Flatfish - GOA	*	*	*	*	*		3	*	*
Total CPs		21	16	16	16	15	14	18	17	17
Number of CPs classified as small entities		3	3	3	1	0	1	2	2	2

Source: AKFIN summaries of NOAA Fisheries catch accounting data

From 2009 through 2011, only two of the trawl catcher processors active in the GOA are considered small entities. The other GOA trawl catcher processors are vessels either in cooperatives or with harvests valued in

[50] The offshore sector is prohibited from directed fishing for pollock in the Gulf. Only catcher processors that are defined as inshore processors are included in the CP pollock counts.

excess of the SBA $4 million threshold. Reductions in the halibut PSC limit will affect both businesses that are considered small entities and those that are not.

Table 4-23 provides information on the number of trawl catcher vessels that harvested GOA groundfish, by target fishery, from 2003 through August 8, 2011. Fewer vessels targeted fish in the deep-water complex than the shallow-water complex. In the deep-water complex, most of the vessels participated in the rockfish fishery (23 to 34 vessels) and arrowtooth flounder fishery (20 to 30 vessels after 2003). Trawl catcher vessels also participate in the sablefish fishery (12 to 15 vessels after 2006). The rex sole and deep-water flatfish fisheries have attracted fewer than seven catcher vessels in each year since 2005.

Table 4-23 Number of trawl catcher vessels that reported groundfish catch in the GOA by fishery, 2003-2011 (as of August 8th)

Complex	Target Fishery	2003	2004	2005	2006	2007	2008	2009	2010	2011
Deep-water	Arrowtooth Flounder	7	23	24	23	23	30	27	25	20
	Deep Water Flatfish - GOA	9	7	3	*	*	*	*	3	*
	Rex Sole - GOA	3					3	6	*	*
	Rockfish	34	32	25	25	27	28	26	27	23
	Sablefish	*		*	*	14	13	15	12	9
Shallow-water	Flathead Sole	14	12	3	7	4	7	6	8	7
	Other Species	14	4	*			4	5	*	*
	Pacific Cod	68	62	66	57	60	64	59	52	45
	Pollock - bottom	40	45	54	52	51	49	45	53	42
	Pollock - midwater	71	64	66	63	56	58	61	61	49
	Shallow Water Flatfish - GOA	28	25	19	24	27	30	30	24	14
Total CVs		92	77	78	73	72	73	71	67	60
Number of CVs classified as small entities		66	53	55	54	35	39	36	34	

Source: AKFIN summaries of NOAA Fisheries catch accounting data

The majority of vessels target Pacific cod and pollock in the shallow-water complex. Of the remaining target fisheries, more catcher vessels target shallow-water flatfish than either flathead sole or ‘other species’. Of the 67 trawl catcher vessels that participated in the GOA groundfish fisheries in 2010, 34 were classified as small entities. The remaining 33 vessels are members of cooperatives or the company that owns them exceeds the SBA small entity threshold.

4.5.5 Rockfish program allocation

In 2003, the U.S. Congress directed the Secretary of Commerce to establish, in consultation with the Council, a pilot program for management of the Pacific ocean perch, northern rockfish, and pelagic shelf rockfish[51] fisheries in the Central Gulf of Alaska. Following this directive, the Council adopted a cooperative management program, under which the total allowable catch of the target rockfish is based on the aggregate catch histories of the members of each cooperative. Under this pilot program, cooperatives also received allocations of “secondary species” typically harvested in the fishery (including Pacific cod and sablefish), and an apportionment of the halibut PSC limit, to be used when catching their allocations. With the program slated to sunset after the 2011 season, the Council adopted a new cooperative management program for the rockfish fisheries, in June of 2009. This new program is intended to perpetuate the benefits derived from that pilot program, including a reduction of halibut PSC usage by the fishery.

Under the new program, cooperatives will continue to receive allocations of target rockfish and species typically harvested in the rockfish fishery, as well as an apportionment of the halibut PSC allowance. The halibut PSC allowance is reduced to 87.5% of the fishery’s historical annual usage (during the 2000 through 2006 qualifying period), which is 191.4 metric tons. The reduction – 27.4 metric tons – is unavailable for use (and is to remain in the water). The program’s allowance is deducted from the third season deep-water complex allowance, as the rockfish fishery was historically prosecuted in the third season. The allowance is divided between operation types, with catcher vessel cooperatives limited to 117.3 metric tons of halibut PSC

[51] Pelagic shelf rockfish comprises light dusky rockfish, yellowtail rockfish, and widow rockfish.

and catcher processor cooperatives limited to 74.1 metric tons of halibut PSC, annually (after making the set aside). These cooperative limits are used exclusively during the harvest of rockfish program allocations, which are harvestable from May 1st to November 15th. On completion of harvests from the program fishery (which occurs for each cooperative either at the end of the season or on the cooperative's notifying NOAA Fisheries that it has completed fishing for the season), 55% of the remaining halibut PSC allowance is added to the last season's trawl gear season apportionment, which is available beginning October 1st for the harvest of either deep-water complex or shallow-water complex fisheries.

Although pilot program management differs from the management of the new program, the experience with pilot program halibut PSC usage provides some information concerning potential usage under the new program. In the pilot program, the maximum halibut PSC allowance available to the fishery was 224.4 metric tons, the average annual halibut usage during its qualifying period from 1996 through 2002 (see Table 4-24). Eligible license holders had a choice of either joining a cooperative and receiving an exclusive allocation of halibut PSC or fishing a limited access fishery. Each cooperative received allowances of halibut PSC based on the percentage of the target rockfish quota share pool held by its members. The limited access fishery used halibut PSC from the third season deep-water complex allowance. On completion of cooperative harvests, any unused halibut PSC available to a cooperative was available for use in the last season by all fisheries. The pilot program differs from the new program in three major respects. First, in the pilot program, no deduction from historical halibut usage was made prior to making the allocation to the rockfish fisheries. In the new program, 12.5% of the historical annual usage (or 27.4 metric tons) will be set aside, unavailable for use as PSC by any GOA groundfish fishery that year. Second, under the pilot program, catcher processors could choose to fish a limited entry rockfish fishery, which used halibut PSC from the third season allowance (after allowances were distributed to cooperatives). This limited entry did not receive any specific halibut PSC apportionment. Catcher processors could also choose to "opt-out" of the fishery altogether, but these vessels would continue to be constrained by sideboards. Under the new program, catcher processors do not have a limited entry option, but must either join a cooperative or "opt-out" of the fishery each year. Also, an entry level limited entry fishery received 5% of the target rockfish, harvest of which was supported by seasonal halibut PSC allowances.[52] In the new program, the entry level fishery is limited to fixed gear vessels. It will begin with 5 metric tons of Pacific ocean perch, 5 metric tons of northern rockfish, and 30 metric tons of pelagic shelf rockfish, which will be subject to increase when fully harvested up to 1%, 2% and 5% of the respective total allowable catches of those species. No limited access rockfish fishery will be available for trawl licenses eligible for the program. Third, the rollover of unused cooperative halibut PSC allowances (which are made available in the last season) occurred without reduction in the pilot program. Under the new program, only 55% of the unused cooperative allowances will be available, with the other 45% remaining unavailable for use as PSC by any fishery.

Pilot program PSC usage provides some indication of potential performance under the new program. Yet, differences between the pilot program and the new program could result in some changes in halibut PSC usage under the new program, as both the constraint of the allowances and incentives for reducing halibut usage have changed. Under the pilot program, cooperatives substantially reduced halibut PSC, using less than 30% of the available allowance in each of the first four years of that program. These reductions have allowed for between 135 metric tons and 150 metric tons of additional halibut PSC to be available for the last season in each of those years. Under the new program, vessels could participate in the rockfish fishery only by joining a cooperative (and not through a limited access fishery). Halibut PSC is available to cooperatives, but only after reductions attributable to the set aside. Given the available halibut PSC under the pilot program far exceeded usage, it is not anticipated that the halibut PSC set aside (of 27.4 metric tons) will affect fishing under the new program.[53] The reduction in the rollover to 55% of the halibut PSC allowance will

[52] Although the entry level allocation was made available to both trawl and fixed gear vessels, most of the fixed gear allocation was harvested by trawl vessels under a rollover.

[53] Although additional halibut will be made available to cooperatives (since no limited access opportunity will exist), that halibut allowance will be proportional to the additional target rockfish quota that is allocated to cooperatives. Consequently, the constraint facing cooperatives should be similar to that faced under the pilot program.

substantially reduce the amount available in the last season. This set aside, prior to the rollover, could reduce the incentive for halibut savings by cooperatives, to the extent that cooperative members perceive that the reduced rollover will be too small to justify the additional cost and effort that may be necessary to avoid halibut in the target rockfish fishery. Clearly, the fishery has demonstrated that substantial reductions in halibut PSC usage from historical levels can be achieved and reductions from the pre-pilot program levels are likely to be continued. Yet, the extent of those reductions may not be as substantial as under the pilot program if participants in the program perceive that the returns (from the halibut rollover) are not substantial enough to merit the added halibut avoidance costs.

Table 4-24 Halibut PSC allowances and usage by cooperatives in the rockfish pilot program (2007-2011)

Year	Cooperative halibut PSC usage (in metric tons)	Cooperative halibut allowances (in metric tons)	Remaining allowances (in metric tons)	Percent remaining
2007	41	176	135	76.7%
2008	36	171	135	78.9%
2009	27	170	143	84.1%
2010	60	209	149	71.3%
2011	72	208	135	64.9%

4.5.6 Processor participation

The number of catcher processors was discussed in the harvesting vessel section. This section of the analysis focuses on the number of processors that took groundfish deliveries from catcher vessels during the years 2003 through 2010. The data do not include catch that identified fixed gear halibut or sablefish as the target. Summing the area counts does not equal the total, because the counts are based on the FMP area the catch was taken from, not the location of the processor. Additional information on processor impacts on communities is discussed in Section 4.6.8 and Appendix 7.

Table 4-25 reports the number of processors that took deliveries from groundfish harvested from the GOA. This table includes deliveries from both trawl and hook-and-line gear types. Both gear types are included because some processors rely on deliveries made using all gear types to obtain their raw fish. This table was also included to give a count of the processors that would be impacted by the proposed action. Additional tables are provided that consider only hook-and-line and trawl deliveries. These tables are included, because not all processors take deliveries from vessels using both gear types, and because the Council has the option to reduce the halibut PSC limit on one sector and not the other.

Information in Table 4-25 indicates a general downward trend in the number of processors taking groundfish deliveries. A total of 50 processors took deliveries from catcher vessels in 2003. The number decreased to 21 (42% of the 2003 number) in 2010. The largest declines in numbers were in the Southeast and Central GOA areas. Declines in the Southeast may be, in part, due to increased reporting of groundfish catch on halibut targets. If groundfish catch is reported separately from the halibut portion of a trip, it may be considered a groundfish target. In later years, data tended to include more groundfish from the halibut target fishery. This difference could arise from changes in reporting practices, which could suggest a decline in groundfish targeting. In the Central Gulf, the number of processors declined by 14 over the time period considered. This reduction may also, in part, be due to target definitions, but it also reflects the exit of some groundfish processors.

Table 4-25 Number of processors taking catcher vessel deliveries of groundfish harvested with hook-and-line or trawl gear by GOA management areas, 2003-2010

Area	2003	2004	2005	2006	2007	2008	2009	2010
Southeast	17	13	10	6	3	3	*	*
West Yakutat	16	15	10	9	7	6	9	11
Central Gulf	27	21	17	23	16	18	18	13
Western Gulf	11	9	9	8	10	10	9	6
GOA Total	50	39	34	38	30	28	26	21

Source: AKFIN summary of NOAA Fisheries catch accounting data.

When considering only processors that took groundfish deliveries from hook-and-line catcher vessels (Table 4-26), the counts remain the same in the Southeast and decline in all other areas. The greatest decline occurred in the West Yakutat area. In 2010, seven processors accepted only trawl deliveries. In 2010, all active processors in Central GOA accepted both hook-and-line and trawl deliveries and only two processors in the Western GOA accepted trawl deliveries and not hook-and-line deliveries.

Table 4-26 Number of processors taking catcher vessel deliveries of groundfish harvested with hook-and-line gear from GOA management areas, 2003-2010

Area	2003	2004	2005	2006	2007	2008	2009	2010
Southeast	17	13	10	6	3	3	*	*
West Yakutat	11	12	5	6	4	3	5	4
Central Gulf	26	19	16	20	15	13	17	13
Western Gulf	8	4	7	6	7	8	7	4
GOA Total	47	35	30	35	27	24	23	20

Source: AKFIN summary of NOAA Fisheries catch accounting data.

4.5.7 First wholesale gross revenue

The gross first wholesale value of GOA groundfish, by sector (catcher vessel and catcher processor), are presented in Table 4-27 . Data for 2010 are not included because they were not available at the time of this analysis. Information on the gross first wholesale value of groundfish harvests taken with jig and pot gear are presented to provide a more complete summary of the processors gross revenue (especially for catcher vessel deliveries). Processors that take deliveries from hook-and-line vessels may also take deliveries from jig and pot vessels. Excluding that catch from the table would underestimate the gross revenue these processors derive from GOA groundfish.

In the catcher processor sector, less than $1 million in first wholesale gross revenue is from jig or pot gear vessels. The majority of the gross revenue is generated by trawl catcher processors (about $27 million in 2009). Hook-and-line catcher processors generated less than $7 million in first wholesale gross revenue, during 2009.

Table 4-27 First wholesale value ($million) of groundfish by vessel type and gear type, 2003-2009

Harvest Mode	Gear	Year						
		2003	2004	2005	2006	2007	2008	2009
Catcher Processors	Hook-and-Line	$6.35	$5.31	$1.21	$6.15	$8.71	$11.15	$6.60
	Jig	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
	Pot	$0.29	$1.05	$1.38	$0.78	$1.50	$0.23	$0.90
	Trawl	$24.36	$17.71	$27.60	$33.01	$26.63	$26.66	$26.67
CP Total		$30.99	$24.08	$30.19	$39.94	$36.85	$38.04	$34.17
Catcher Vessels	Hook-and-Line	$5.86	$7.36	$6.52	$13.38	$13.48	$14.16	$11.32
	Jig	$4.31	$4.05	$3.97	$1.61	$1.27	$3.38	$3.73
	Pot	$25.66	$30.78	$31.94	$47.76	$46.83	$49.13	$29.40
	Trawl	$73.63	$80.22	$105.53	$121.09	$114.50	$131.18	$73.42
CV Total		$109.46	$122.41	$147.96	$183.84	$176.09	$197.84	$117.87
Total 1st Wholesale Gross Revenue		$140.45	$146.48	$178.15	$223.78	$212.94	$235.89	$152.03

Source: AKFIN summary of NOAA Fisheries catch accounting data.

Dividing the first wholesale gross revenue by the number of processors in the sector yields the average GOA gross revenue per processor (see Table 4-28). The actual first wholesale gross revenue of individual processors will vary from the average, but those data cannot be presented because of confidentiality restrictions placed on reporting of the data. On average, hook-and-line catcher processors generated between $250,000 and $500,000 in gross first wholesale revenue per year. During 2009, the average was $300,000 per vessel. Trawl catcher processors averaged between $1.1 million and $2.1 million in first wholesale gross revenue per year. During 2009, trawl catcher processors averaged about $1.5 million per vessel. Including revenues from the BSAI and other fisheries would increase these estimates for both sectors. However, because the BSAI revenues are not directly affected by this action, the analysis focuses on changes to gross revenues derived from participation in the GOA.

Table 4-28 Average first wholesale gross revenue of GOA groundfish per processor, 2003-2009

Sector	2003	2004	2005	2006	2007	2008	2009
Hook-and-Line CP	$0.26	$0.28	$0.07	$0.28	$0.40	$0.51	$0.30
Trawl CP	$1.16	$1.11	$1.72	$2.06	$1.78	$1.90	$1.48
Other Processors	$1.59	$2.25	$3.30	$3.54	$4.27	$5.19	$3.26

Processors, other than catcher processors, generated between $1.5 million and $5.2 million in first wholesale gross revenue on average, annually. During 2009, they generated an average of $3.3 million in first wholesale revenue from non-IFQ GOA groundfish fisheries. There are a variety of sizes of processors that take deliveries of GOA groundfish. They range from the large pollock processors to processors that focus on niche markets. The first wholesale revenue generated by these two types of processors would vary dramatically.

4.5.8 Arrowtooth Flounder Markets

This section is included because arrowtooth flounder has been identified as one the primary species whose catch would decline if PSC limits are reduced. Harvest reductions are discussed in the RIR when the PSC reduction is applied to all seasons and the fifth season only.

The 2007 EA/RIR/IRFA to revise the maximum retainable amounts of groundfish in the arrowtooth flounder fishery includes a market assessment for arrowtooth flounder. That section states that in the past efforts to market arrowtooth were constrained the muscle rapidly degrading at cooking temperature resulting in a paste-like texture of the cooked product. In recent years, several food grade additives have been successfully used that inhibit the enzymatic breakdown of the muscle tissue. These discoveries have enabled a targeted fishery in the Kodiak Island area for marketable products, including whole fish, surimi, headed and gutted (both with and without the tail on), fillets, frills (fleshy fins used for sashimi and soup stock), bait, and meal (NMFS 2007).

Most arrowtooth flounder are processed as headed and gutted. The majority of the headed and gutted product also has the tail removed. NMFS trade records do not report U.S. exports of arrowtooth flounder. However, industry representatives indicate that all of the headed and gutted fish are sent to China for re-processing. The primary product for arrowtooth flounder is the frill, which is the fleshy fins used for *engawa*, a type of sushi (NMFS 2007). *Engawa*, normally a premium sushi made from halibut or Greenland turbot, is more affordable using arrowtooth flounder. Unlike most other flatfish, the frill of the arrowtooth flounder is sufficiently sized to cover the rice on sushi, which is critical in sushi markets. The primary market for arrowtooth flounder *engawa* is Japan.

A secondary product for arrowtooth flounder is fillets (NMFS 2007). A large portion of the arrowtooth flounder exported to China are processed into fillets and re-imported to U.S. markets as inexpensive flounder. Some arrowtooth flounder processed in China is also sold as fillets in the Japanese market. Recently, some arrowtooth flounder fillets have shown up in European markets.

Data are collected and made available on the products that are first processed in the US. Data are not collected by NMFS in a systematic manner and made available on re-processing in China. So, while descriptive information on the markets are included from knowledgeable sources, no data on the value of arrowtooth frills versus the other product forms is provided at the final consumer level.

4.5.9 Halibut Mortality Rates

Gulf of Alaska halibut PSC limits are based on the assumed halibut mortality that occurs when a specific gear type is used in a target fishery. Halibut mortality is calculated by multiplying the total amount of halibut that is caught by the assumed halibut mortality rate. Pacific halibut discard mortality rates (DMRs) in the Alaskan groundfish fisheries are estimated from viability (injury and condition) data collected by National Marine Fisheries Service observers. These data are analyzed by IPHC staff to estimate mortality rates (Williams, G.H., 2009). Williams describes the process used every three years to determine the assumed halibut mortality rates in an appendix to the annual SAFE document. A portion of that appendix is included below:

NMFS observers examined halibut for release condition or injury immediately before being returned to the sea. Each fish was judged according to a set of criteria (Williams and Chen 2003), which were used to determine internal and external injuries, and body damage from predators (e.g., amphipods and marine mammals). Beginning in 2000, a dichotomous key was introduced to reduce subjectivity in the determinations of condition and injury. Observers recorded the number of halibut in excellent, poor, and dead condition (trawls and pots) or with minor, moderate, severe injuries, or deemed dead (longlines) on each haul or set sampled, respectively. Samples were only collected on hauls that were sampled for species composition. The species composition sampling provides an estimate of the total number of halibut caught in the haul, as well as the catch of groundfish, necessary for determining the target.

Several factors contribute to release condition, which vary by gear type. Condition is related to the size of the catch, tow duration, and halibut size when trawl gear is used. Injuries are most frequently caused by improper release methods used by vessel crews in hook-and-line fisheries. Another significant factor is the length of the soak time, which can exacerbate the mortality caused by hooking injuries and also increase the potential for amphipod predation. The condition of halibut caught in pots is affected by soak time and the presence of other animals in the pot, especially crabs.

The mortality rate varies among gear types and represents the aggregate effects of external and internal injuries to the fish and the presence of predation by amphipods or marine mammals. The mortality rates have been determined through long term tagging studies conducted by IPHC. See Clark et al. (1992) for trawls, Williams (1996) for pots, and Kaimmer and Trumble (1998) for longlines.

After the DMRs are estimated by the IPHC and presented to the Council, the Council recommends the rates to be used during their annual specifications process. During December 2010, the Council recommended that the DMRs developed and recommended by the IPHC for the 2010 through 2012 GOA groundfish fisheries be used to implement the 2011 and 2012 GOA halibut PSC limits allowances.

The IPHC analyzes observer data and recommends changes to the DMRs when it shows large variation from the mean. Most of the IPHCs assumed mortality rates were based on an average determined from NMFS observer data collected between 1999 and 2008. Long-term average rates were not available for some fisheries (for example, sufficient information from the deep-water flatfish fishery has not been available in recent years), so the IPHC used the average rates from the available years between 1999 and 2008. For other fisheries targets (which include Atka mackerel, skates, squids, sharks, octopuses, and sculpins for all gear types; and for the hook-and-line sablefish targets), where no mortality data was available, the IPHC recommended the mortality rate of halibut caught in the Pacific cod fishery for that gear type, as a default rate.

Because assumed halibut mortality rates have changed over the years, Table 4-29 has been developed to report the rates used to manage PSC limits from 2000 through 2011[54]. The DMRs in the hook-and-line gear fisheries for rockfish have ranged from a high of 0.11 in 2000 to a low of 0.08 from 2001 through 2006. Currently, the hook-and-line rate is set at 0.09, a slight decrease from the 0.10 rate used from 2007 through 2009. The lower rate means that a greater percentage of the halibut PSC is assumed to live when returned to the water.

Halibut DMRs for vessels using pot gear are set annually for Pacific cod and other fisheries. However, when harvest specifications are set, pot gear has traditionally been exempted from halibut PSC limits, because the halibut mortality associated with pot gear is determined to be sufficiently low. The exemption means that

[54] Because PSC rates are set for three years the 2012 rates are the same as those reported for 2011.

DMRs are not a part of the calculation used to determine when pot gear vessels will be closed to directed fishing for specific species. They are only closed to fishing when the TAC is assumed to have been taken.

Table 4-29 Assumed Pacific Halibut Mortality Rates for Vessels Fishing in the Gulf of Alaska, 2000-2011

	2011	2010	2009	2008	2007	2006	2005	2004	2003	2002	2001	2000
Directed Fishery	**Hook-and-Line Gear**											
Other Fisheries	0.12	0.12	0.14	0.14	0.14	0.13	0.13	0.13	0.14	0.14	0.14	0.17
Pacific Cod	0.12	0.12	0.14	0.14	0.14	0.13	0.13	0.13	0.14	0.14	0.14	0.17
Rockfish	0.09	0.09	0.10	0.10	0.10	0.08	0.08	0.08	0.08	0.08	0.08	0.11
	Trawl											
Arrowtooth flounder	0.72	0.72	0.69	0.69	0.69	0.69	0.69	0.69	0.62	0.62	0.62	0.55
Atka Mackerel			0.60	0.60	0.60	0.60	0.60	0.60	0.70	0.70	0.70	0.57
Deep-water flatfish	0.48	0.48	0.53	0.53	0.53	0.57	0.57	0.57	0.60	0.60	0.60	0.56
Flathead sole	0.65	0.65	0.61	0.61	0.61	0.62	0.62	0.62	0.58	0.58	0.58	0.57
Non-pelagic pollock	0.59	0.59	0.59	0.59	0.59	0.59	0.59	0.59	0.61	0.61	0.61	0.61
Other fisheries	0.62	0.62	0.63	0.63	0.63	0.61	0.61	0.61	0.61	0.61	0.61	0.66
Pacific cod	0.62	0.62	0.63	0.63	0.63	0.61	0.61	0.61	0.61	0.61	0.61	0.63
Pelagic pollock	0.76	0.76	0.76	0.76	0.76	0.75	0.75	0.75	0.72	0.72	0.72	0.75
Rex sole	0.64	0.64	0.63	0.63	0.63	0.62	0.62	0.62	0.61	0.61	0.61	0.53
Rockfish	0.67	0.67	0.67	0.67	0.67	0.67	0.67	0.67	0.69	0.69	0.69	0.66
Sablefish	0.65	0.65	0.65	0.65	0.65	0.62	0.62	0.62	0.66	0.66	0.66	0.71
Shallow-water flatfish	0.71	0.71	0.71	0.71	0.71	0.68	0.68	0.68	0.69	0.69	0.69	0.69
	Pot											
Other Fisheries	0.17	0.17	0.16	0.16	0.16	0.17	0.17	0.17	0.14	0.14	0.14	0.14
Pacific cod	0.17	0.17	0.16	0.16	0.16	0.17	0.17	0.17	0.14	0.14	0.14	0.14

Source: NOAA Fisheries Annual Specification Tables (e.g., http://www.fakr.noaa.gov/sustainablefisheries/specs/goatable8.pdf)

Halibut DMRs are currently set for 11 directed trawl fisheries in the GOA[55]. The current halibut rates indicate that from about half (48% in the deep-water trawl fishery) to about three-quarters (arrowtooth flounder and shallow-water flatfish) of trawl caught halibut is assumed to die, depending on the fishery.

Fisheries with higher mortality rates would realize a greater direct benefit from reducing the amount of halibut caught, because the amount of halibut deducted from the mortality limit is closer to the actual amount caught. Therefore, the incentive to reduce halibut PSC is greatest in fisheries that are expected to most quickly reach their halibut PSC limit, and the fisheries that benefit most, on a pound of PSC per pound of mortality basis, from reducing PSC are those with the highest assumed mortality rates.

Table 4-30 shows the maximum and minimum DMRs for each directed fishery from 2000 through 2011. From the maximum and minimum rates, the difference is calculated (maximum minus minimum). These differences indicate that the greatest changes in halibut rates have occurred in the flatfish fisheries (except shallow-water flatfish) and Atka mackerel, before it was included in the “other fisheries” category. The percentage change was 24% for arrowtooth flounder, 20% for deep-water flatfish, 19% for Atka mackerel, 17% for rex sole, and 12% for flathead sole. Pollock and Pacific cod had changes in the DMR of 5% or less. These changes in mortality rates directly impact the total amount of halibut that may be caught before the PSC mortality limit is reached.

[55] Atka mackerel has been included in the other fisheries category for the purpose of specifying DMRs since 2010.

Table 4-30 Changes in assumed trawl halibut mortality rates, 2000-2011

Fishery	Maximum	Minimum	Difference	% Change
Arrowtooth flounder	0.72	0.55	0.17	24%
Atka Mackerel	0.70	0.57	0.13	19%
Deep-water flatfish	0.60	0.48	0.12	20%
Flathead sole	0.65	0.57	0.08	12%
Non-pelagic pollock	0.61	0.59	0.02	3%
Other fisheries	0.66	0.61	0.05	8%
Pacific cod	0.63	0.61	0.02	3%
Pelagic pollock	0.76	0.72	0.04	5%
Rex sole	0.64	0.53	0.11	17%
Rockfish	0.69	0.66	0.03	4%
Sablefish	0.71	0.62	0.09	13%
Shallow-water flatfish	0.71	0.68	0.03	4%

Source: NOAA Fisheries Annual Specification Tables

4.5.10 Summary of Halibut PSC Closures

PSC mortality limits set for fisheries trigger closures when the limit is taken. Since 2000, both the hook-and-line and trawl sectors have had directed fisheries closed because of the halibut PSC mortality limit. Because the DSR fishery has had insufficient observer coverage to accurately monitor halibut PSC, that fishery was never closed due to attainment of a halibut PSC limit, from 2000 through April 2012.

The non-DSR hook-and-line fishery has been closed during part of the year in 5 of the 13 years, from 2000 through April 2012, as a result of the halibut PSC limit being taken. The closure notices applied to several fisheries, but because the Pacific cod fisheries are typically the most important to vessels using hook-and-line gear, those closures are the focus of this discussion (Table 4-31). The Eastern GOA inshore Pacific cod fishery was closed March 9, 2000, as a result of the halibut PSC limit. The available TAC was taken in the other inshore areas on March 4th. Only the Central Gulf offshore Pacific cod fishery was closed due to halibut PSC, as the other areas had taken their TACs. During 2001, Central GOA and Eastern Gulf offshore Pacific cod fisheries were closed by the halibut limit. Later that year, the seasonal halibut PSC apportionment allowed the fishery to open on September 1st, but all inshore and offshore areas were closed on September 4th, because the halibut PSC limit was reached. During 2003, the Eastern GOA was closed due to halibut PSC, on August 1st. All areas were closed due to halibut PSC, for the inshore and offshore sectors on October 2, 2004. Finally, all sectors and areas were closed on October 16, 2008, because the limit had been attained, except the Central GOA inshore component of the fishery, where the available Pacific cod TAC was fully taken prior to the limit being reached. The fishery has not been closed by PSC limits since 2008.

Table 4-31 **Summary of halibut PSC closures of Pacific cod Hook-and line fisheries from 2000 through April 2012**

Date	Species	WESTERN GULF	CENTRAL GULF	EASTERN GULF
3/9/2000	Pacific Cod - Inshore			Closed
3/9/2000	Pacific Cod - Offshore		Closed	
2/26/2001	Pacific Cod - Offshore		Closed	Closed
9/4/2001	Pacific Cod - Inshore	Closed	Closed	Closed
9/4/2001	Pacific Cod - Offshore	Closed	Closed	Closed
8/1/2003	Pacific Cod - Inshore			Closed
8/1/2003	Pacific Cod - Offshore			Closed
10/2/2004	Pacific Cod - Inshore	Closed	Closed	Closed
10/2/2004	Pacific Cod - Offshore	Closed	Closed	Closed
10/16/2008	Pacific Cod - Inshore	Closed		Closed
10/16/2008	Pacific Cod - Offshore	Closed	Closed	Closed

Source: NOAA FR notices entered in an Excel data base by Northern Economics Inc. staff and analyzed by the Council staff/contractors.

The constraint of halibut PSC limits has closed GOA trawl fisheries every year, from 2000 through 2011. Table 4-32 provides a tabular summary of the closures. The text following the summary is taken from the Federal Register notices that implement the annual groundfish specifications.

Halibut PSC restrictions seasonally constrained trawl gear fisheries during the 2003 fishing year. Trawling closed during the second season for the shallow-water complex on June 19 (68 FR 37094, June 23, 2003), during the fourth season for the shallow-water complex on September 12 (68 FR 54395, September, 17, 2003), during the second season for the deep-water fishery complex on May 16 (68 FR 27479, May 20, 2003), and during the fifth season for all trawling for the remainder of the year on October 15 (68 FR 59889, October 20, 2003).

During the 2004 fishing year, trawling closed during the fourth season for the shallow-water complex on September 10 (69 FR 55783, September 16, 2004), during the first season for the deepwater fishery complex on March 19 (69 FR 12980, March 19, 2004), during the second season on April 26 (69 FR 23450, April 29, 2004), during the third and fourth seasons on July 25 (69 FR 44973, July 28, 2004), and during the fifth season for all trawling for the remainder of the year on October 1 (69 FR 57655, September 27, 2004).

Halibut PSC restrictions seasonally constrained trawl gear fisheries during the 2005 fishing year. Trawling during the first season closed for the deep-water complex on March 23 (70 FR 15600, March 28, 2005) and during the second season on April 8 (70 FR 19339, April 13, 2005). The April 8 closure was modified to open trawling for the deep-water fishery complex from April 24 through May 3 (70 FR 21678, April 27, 2005 and 70 FR 23940, May 6, 2005). Trawling during the third season closed for the deep-water complex on July 24 (70 FR 43327, July 27, 2005) and during the fourth season on September 4 (70 FR 52326, September 2, 2005). Trawling during the third season closed for the shallow-water complex on August 19 (70 FR 49507, August 24, 2005) and during the fourth season on September 4 (70 FR 52325, September 2, 2005). Trawling for all groundfish targets (with the exception of pollock by vessels using pelagic trawl gear) closed for the fifth season on October 1 (70 FR 57803, October 4, 2005).

Trawling during the second season, of the 2006 fishing year, closed for the deep-water species category on April 27 (71 FR 25781, May 2, 2006) and for the fourth season on September 5 (71 FR 52754, September 7, 2006). Trawling during the first season closed for the shallow-water species category from February 23 to February 27 (71 FR 9977, February 28, 2006, and 71 FR 10625, March 2, 2006) and during the second season on June 10 (71 FR 34021, June 13, 2006). To prevent exceeding the fourth season halibut PSC limit for the shallow-water species category, directed fishing using trawl gear was limited to four 12-hour open periods on September 1 (71 FR 51784, August 31, 2006), September 6 (71 FR 53339, September 11, 2006), September 20 (71 FR 55134, September 21, 2006), and September 25 (71 FR 56898, September 28, 2006).

Trawling for all groundfish targets (with the exception of pollock by vessels using pelagic trawl gear) was closed for the fifth season on October 8 (71 FR 60078, October 12, 2006).

Table 4-32 Summary of GOA trawl closures by halibut PSC limits, 2000 through April 2011

	Western Gulf		Central Gulf		West Yakutat		Eastern Gulf	Entire Gulf
Date	Deep	Shallow	Deep	Shallow	Deep	Shallow	Shallow	Shallow
5/13/2000	Closed		Closed		Closed			
5/27/2000		Closed						
5/28/2000		Closed		Closed		Closed	Closed	Closed
8/11/2000		Closed		Closed		Closed	Closed	Closed
8/23/2000	Closed		Closed		Closed			
4/27/2001		Closed		Closed		Closed	Closed	Closed
5/25/2001	Closed		Closed		Closed			
5/26/2001		Closed		Closed		Closed	Closed	Closed
7/23/2001	Closed		Closed		Closed			
8/4/2001		Closed		Closed		Closed	Closed	Closed
9/5/2001		Closed		Closed		Closed	Closed	Closed
10/21/2001	Closed	Closed	Closed	Closed	Closed	Closed	Closed	Closed
5/15/2002		Closed		Closed				Closed
5/24/2002	Closed		Closed					
8/2/2002	Closed		Closed					
8/5/2002		Closed		Closed				Closed
9/1/2002		Closed		Closed				Closed
10/13/2002	Closed	Closed	Closed	Closed				Closed
11/10/2002	Closed	Closed	Closed	Closed				Closed
5/16/2003	Closed		Closed		Closed			
6/19/2003		Closed		Closed		Closed		Closed
9/12/2003		Closed		Closed		Closed	Closed	Closed
10/15/2003	Closed	Closed	Closed	Closed	Closed	Closed		Closed
3/19/2004	Closed		Closed		Closed			
4/26/2004	Closed		Closed		Closed			
7/25/2004	Closed		Closed		Closed			
9/10/2004		Closed		Closed		Closed	Closed	Closed
10/1/2004	Closed	Closed	Closed	Closed	Closed	Closed	Closed	Closed
3/23/2005	Closed		Closed		Closed			
4/8/2005	Closed		Closed		Closed			
5/3/2005	Closed		Closed		Closed			
7/24/2005	Closed		Closed		Closed			
8/19/2005		Closed		Closed		Closed	Closed	
9/4/2005	Closed	Closed	Closed	Closed	Closed	Closed	Closed	Closed
9/10/2005	Closed		Closed		Closed			
9/19/2005								Closed
10/1/2005	Closed	Closed	Closed	Closed	Closed	Closed	Closed	Closed
2/23/2006		Closed		Closed		Closed	Closed	Closed
4/27/2006	Closed		Closed		Closed			
6/10/2006		Closed		Closed		Closed	Closed	Closed
9/1/2006		Closed		Closed		Closed	Closed	Closed
9/5/2006	Closed		Closed		Closed			
9/6/2006		Closed		Closed		Closed	Closed	Closed
9/20/2006		Closed		Closed		Closed	Closed	Closed
9/25/2006		Closed		Closed		Closed	Closed	Closed
10/8/2006	Closed	Closed	Closed	Closed	Closed	Closed	Closed	Closed
5/17/2007	Closed		Closed		Closed			
6/4/2007		Closed		Closed		Closed	Closed	Closed
8/10/2007	Closed	Closed	Closed	Closed	Closed	Closed		Closed
9/1/2007		Closed		Closed		Closed	Closed	Closed
9/6/2007		Closed		Closed		Closed	Closed	Closed
9/11/2007		Closed		Closed		Closed	Closed	Closed
9/23/2007		Closed		Closed		Closed	Closed	Closed
10/8/2007	Closed	Closed	Closed	Closed	Closed	Closed	Closed	Closed
10/15/2007	Closed	Closed	Closed	Closed	Closed	Closed	Closed	Closed
1/23/2008		Closed		Closed		Closed	Closed	Closed
3/10/2008		Closed		Closed		Closed	Closed	Closed
4/21/2008	Closed		Closed		Closed			
5/21/2008		Closed		Closed		Closed	Closed	Closed
8/7/2008		Closed		Closed		Closed	Closed	Closed
9/3/2008		Closed		Closed		Closed	Closed	Closed
9/9/2008	Closed		Closed		Closed			
9/11/2008	Closed	Closed	Closed	Closed	Closed	Closed	Closed	Closed
11/6/2008	Closed	Closed	Closed	Closed	Closed	Closed		Closed
3/3/2009	Closed		Closed		Closed			
4/23/2009	Closed		Closed		Closed			
9/2/2009		Closed		Closed		Closed	Closed	Closed
4/28/2010	Closed		Closed		Closed			
5/1/2010			Closed					
9/3/2010		Closed		Closed		Closed	Closed	Closed
4/22/2011	Closed		Closed		Closed			

Halibut PSC restrictions seasonally constrained trawl gear fisheries during the 2007 fishing year. Trawling closed for the second season for the deep-water species category on May 17 (72 FR 28620, May 22, 2007), and for the third season on August 10 (72 FR 45697, August 15, 2007). Trawling closed for the second season for the shallow-water species category on June 4 (72 FR 31472, June 7, 2007), and for the third season on August 10 (72 FR 45697, August 15, 2007). To prevent exceeding the fourth season halibut PSC limit for the shallow-water species category, directed fishing using trawl gear was limited to three 12-hour open periods on September 1 (72 FR 49229, August 28, 2007), September 6 (72 FR 51717, September 11, 2007), and September 11 (72 FR 52491, September 14, 2007), and to one 48-hour period beginning September 21 (72 FR 54603, September 26, 2007). Trawling for all groundfish targets (with the exception of pollock by vessels using pelagic trawl gear) closed for the fifth season on October 8 (72 FR 57888, October 11, 2007), reopened on October 10 (72 FR 58261, October 15, 2007) until October 15 (72 FR 59038, October 18, 2007), and reopened on October 22 (72 FR 60586, October 25, 2007). The amount of groundfish that trawl gear operations might have harvested, if halibut PSC limits had not been exceeded in the 2007 season is unknown.

Halibut PSC restrictions seasonally constrained trawl gear fisheries during the 2008 fishing year. The trawl fishery closed during the second season for the deep-water species category on April 21 (73 FR 22062, April 24, 2008), and for the fourth season on September 11 (73 FR 53159, September 15, 2008). The trawl fishery during the first season was closed for the shallow-water species category on March 10 (73 FR 13464, March 13, 2008) and reopened on March 21 through May 21 (73 FR 15942, March 26, 2008, and 73 FR 30318, May 27, 2008). To prevent exceeding the fourth season halibut PSC limit for the shallow-water species category, directed fishing using trawl gear was limited to one 48-hour open period beginning September 1 (73 FR 51601, September 4, 2008), and to one 36-hour period beginning September 10 (73 FR 52930, September 12, 2008). The trawl fishery for all groundfish targets (with the exception of vessels targeting pollock were open using pelagic trawl gear and vessels participating in the Rockfish Program in the Central GOA) closed for the fifth season on November 6, 2008 (73 FR 66561, November 10, 2008) and reopened on November 16, 2008 (73 FR 69586, November 19, 2008) following the reallocation of unused halibut PSC from rockfish cooperatives in the Central Gulf of Alaska Rockfish Pilot Program, to vessels using trawl gear in the GOA (73 FR 69587, November 19, 2008).

During 2009, the deep-water trawl fishery was opened on January 20th and closed on March 3rd. The second halibut mortality limit was released on April 1st and the limit was assumed to have been taken on April 23rd. The shallow-water complexes did not reach a seasonal halibut PSC constraint until the fourth season. The fourth season shallow-water trawl fisheries were opened on September 1, 2009, and closed September 2, 2009.

Halibut PSC restrictions seasonally constrained trawl gear fisheries during the 2010 fishing year. The deep-water trawl fishery opened the first season on January 20, 2010 and was closed April 28th. The fourth season shallow-water trawl fisheries were opened on September 1, 2010 and closed September 3, 2010. The deep-water complex was reopened on September 11, 2010 and closed on October 1, 2010.

The deep-water trawl fishery opened on January 20, 2011. That fishery was only closed on April 22 and reopened on July 1. Deep-water trawl fisheries remained open the remainder of the trawl fishing year. Shallow-water trawl fisheries also opened on January 20, 2011. The fishery closed on September 3rd because the halibut PSC limit was projected to be taken. NOAA Fisheries reopened the fishery for 48 hours on September 14th. NOAA fisheries again opened the fishery on September 20th, and the fishery remained open for the remainder of the year.

During 2012, the deep-water and shallow-water trawl fisheries opened on January 20th. Deep-water fisheries were closed on April 19th until the third halibut release on July 1. The shallow-water fisheries closed on March 26th. Shallow-water fisheries reopened on April 1, when the second halibut seasonal apportionment was made available.

Given the seasonal closures that occurred and the options of target fisheries that could be prosecuted, it is difficult to determine the actual amount of harvest foregone, because of the halibut PSC mortality limits being reached. NOAA staff concluded that the amount of groundfish that trawl and hook-and-line gear might have harvested, if halibut PSC limitations had not restricted the harvest, is indeterminate.

4.6 Analysis of Alternatives

Alternatives considered as part of the proposed amendment package would reduce the amount of halibut PSC mortality available to the groundfish fisheries currently operating under a halibut PSC mortality limit by 5%, 10%, or 15%. The status quo is also included as an option. This section of the analysis will describe the social and economic impacts those reductions may have on various groups that rely on access to halibut, as either PSC to prosecute their directed fisheries or as their directed catch.

The status quo halibut PSC mortality management in the GOA currently sets limits for the Southeast Outside Demersal Shelf Rockfish fishery, hook-and-line vessels fishing for groundfish species other than DSR (sablefish is exempt), and vessels using trawl gear. Persons and businesses that rely on these fisheries may experience reduced gross revenue and increased costs, if halibut mortality limits decrease and are constraining. Negative economic impacts may also be realized by communities whose residents participate in fisheries adversely affected by reductions in halibut PSC limits or that are the homeport for harvesting vessels or fish processors in those fisheries. Those communities would also be negatively affected if reduced groundfish catch caused state and local taxes to their community to decrease.

Decreasing the amount of halibut mortality in groundfish fisheries may have beneficial impacts on persons and businesses that harvest, process, or consume halibut, as well the halibut female spawning biomass. The discussion of these beneficial impacts will primarily focus on halibut harvested by two groups:

1. Guided sport fishing firms that operate in IPHC areas 2C and 3A
2. Commercial IFQ sectors that operate in areas 2C, 3A, and 3B.

Other users of halibut are assumed to experience minimal impacts, given the size of the reductions considered and the fact that subsistence harvest, projected over 26” (O26) halibut PSC, projected unguided sport catch, projected O26 commercial wastage, and projected personal use are deducted from the total CEY prior to the guided sport and commercial IFQ limits being set. Deducting for those removal before the guided sport and commercial IFQ allowances are determined, means that any change in the total CEY will be divided among the guided sport and commercial IFQ sectors. This assumes that no change in the projected subsistence catch, unguided sport catch, projected O26 commercial wastage, and projected personal removals will occur.

4.6.1 Assumptions Used in Analysis

Economic impacts estimated in this analysis are not intended to represent the changes in net National benefits. Data to conduct that analysis are costly and time consuming to collect. Models would need to be developed for each of the halibut fleets and groundfish fleets to determine the net value of halibut, taken as PSC in groundfish fisheries, to the IFQ and guided sport sectors and the net value of the groundfish fisheries foregone. While work has been done on general models to compare the value of halibut in multiuse fisheries (Criddle, 2004 and Larson et al, 1996), additional work would need to be completed to utilize such models and generate net National benefits. That work is beyond the scope of this analysis.

This analysis relied on two simplified approaches to consider some economic effects of the Council’s action. The first was applied to the directed halibut fisheries. IPHC staff provided estimates of the increased amount of halibut that would be available to the guided sport and IFQ fisheries, if the reduction in the PSC limit was the actual amount of halibut savings each year in the groundfish fishery. That analysis provided to the Council examined the effect of reducing the GOA halibut PSC limits for the groundfish trawl and hook & line fisheries (Hare et al 2012). The analysis was framed against the question of “What is the impact to the halibut fishery and the resource by reductions in the halibut PSC limits”. The answer to the impacts on the fishery is answered by examining changes in the Fishery Constant Exploitation Yield (FCEY), whereas the latter is addressed by estimating the change to the female spawning biomass (FSBio). The results were presented to the Council at the February 2012 meeting.

Following discussion, the Council requested the following additional information: a) the methods and assumptions used in the lost yield and migration models that are briefly described within the analysis; and b) the methods used by IPHC staff to apportion bycatch among the U26, O26-U32, and O32 size categories. This section addresses this request.

Methods and assumptions used in the lost yield and migration models that are briefly described within the analysis

To estimate the effects of PSC reductions, the analysis modeled the GOA bycatch for each gear type as a distinct, separate population, as if each had been left in the water, i.e., a life history simulation. Changes in biomass and productivity were then estimated and accumulated over a 30-year time horizon, which was chosen to fully capture the contributions from all age classes in the bycatch population, including the youngest, who would have the greatest contribution. Key features and assumptions used in the simulation model included:

1. Size (length) composition of the GOA bycatch, by gear and area. Available from observer sampling. The most recently available data were from 2008;
2. A methodology to decompose a length sample to age and sex components (Hare 2010);
3. Growth was governed by mean size at age by area;
4. Yield was determined using the commercial fishery area-specific selectivity-at-age curve as estimated in the IPHC stock assessment model;
5. Natural mortality, assumed constant for all ages/sex (m = 0.15);
6. Fishery harvest rates (currently at 2C/3A = 0.215; 3B = 0.161); and
7. FSBio gains were estimated using an age-specific maturity curve.

The simulation of the growth of each gear/area bycatch ‘population’ proceeded using the aforementioned assumptions and methodologies. Results were accumulated separately for U26/O26 halibut because only O26 bycatch mortality is deducted from total CEY in the determination of FCEY (Hare 2011b). For FCEY, reductions in O26 PSC will have immediate benefits as the catch is simply transferred to the directed fishery. Assuming the transferred O26 catch is taken, there is little anticipated impact on FSBio. There are quantifiable benefits to both FCEY and FSBio from the U26 component of the PSC reductions. These benefits are distributed “downstream” in both time and space.

As stated in the IPHC analysis, migration was not factored into the results (Hare et al 2012). There is considerable uncertainty about the precise timing and destination of halibut movements, and any results would be significantly influenced by the choice in migration rates. Thus, the results attribute impacts to the area in which the bycatch is taken, as though migration is assumed to not occur. Thus, the analytical results will tend to overestimate the impacts in Areas 3A and 3B, and underestimate impacts in Area 2C and areas outside of the GOA, such as Areas 2B and 2A, when migration is taken into account. The uncertainty about the precise impacts of PSC reductions by area, while important, does not change the coastwide impacts on total CEY or FSBio.

Methods used by IPHC staff to apportion bycatch among the U26, O26- U32, and O32 size categories

Bycatch is split among the U26 and O26 (i.e., O26/U32 + O32) size categories according to the halibut bycatch length composition data collected by observers. This split is done because of the differing treatment of U26 and O26 halibut in the determination of yield for the directed fishery, FCEY. Bycatch mortality that is larger than 26 inches, i.e., O26, is deducted from the total CEY in the area where the bycatch mortality occurred. This allows for similar treatment of commercial fishery wastage, and sport and subsistence harvests, based on their similar length compositions. Details of the analysis supporting this approach can be found in Hare (2011b), which was conducted to support a change implemented beginning in 2011. The change was made to provide a consistent treatment of these mortalities in the fishery yield determination process. U26 bycatch mortality is accounted for with the harvest rate policy, whereby the harvest rate is adjusted downward in all areas to compensate for the loss of recruitment. This effectively distributes the effect of U26 bycatch mortality in relation to Ebio distribution.

Estimates provided by the IPHC were used to calculate increases in gross revenue that the charter sector and first wholesale revenue the IFQ sector could generate, by GOA IPHC area. While gross revenue is not an appropriate measure to determine changes in net benefits, it does provide some information on the limits of benefits that could be generated by the fleets. To complete this analysis, additional information on the guided sport fishing fleet's costs (including opportunity costs), revenues, and actual increase in catch would be needed. Information would also be needed on the consumer surplus of the charter clients. Cost and revenue information would be needed for the IFQ fleet and the processors of their catch, as well as data on consumer surplus of the people that purchase halibut.

The second approach was applied to the GOA groundfish fishing fleets. A retrospective analysis was conducted that compared halibut PSC usage, to groundfish catch and first wholesale gross revenue. It was assumed that all catch occurring the week after the fishery was closed by the halibut PSC limit, would have been foregone. Catch the week after the fishery was closed was included to give harvesters time to offload catch made prior to the closure. That reduction in gross revenue was calculated for each halibut PSC limit that is set (except for the DSR fishery) and each halibut PSC reduction being considered by the Council. For all fisheries, it was assumed that the fleet's behavior would not have changed if the PSC had been lower. The analysis also assumes that the TAC in place during those years did not change. These assumptions simplify the analysis. However, it is likely that these assumptions will not hold into the future. TACs for Pacific cod and some flatfish species are expected to increase over the near future. Increased Pacific cod abundance is expected to allow for TAC increases. Some flatfish species TAC have been constrained to lower than ABC levels, in part, because of the halibut PSC limits. Increases in the TAC would result in increased estimates in the amount of gross revenue foregone. Assuming the fleet did not modify its behavior (and no intervening factors affect halibut PSC rates) the same halibut PSC rates may be applied to the groundfish catch. If the fleet modifies its behavior to reduce these rates, more groundfish may be harvested and the amount of gross revenue foregone would be overestimated. The potential for and ability of the fleet to modify behavior is discussed in Section 4.6.5. That section also discusses potential cost changes that could arise from this action. Since 2003 (the earliest year considered in the data analysis), industry and management have undertaken a variety of efforts and measures to address halibut PSC. These efforts have and will likely continue to lower halibut PSC rates from the level that would have occurred in their absence. However, it is not possible to predict how much those rates will be affected in the future.

4.6.2 Impacts of proposed action on halibut fisheries

Staff of the IPHC was asked to estimate the potential benefits/impacts on fishery constant exploitation yield (CEY) and female spawning biomass (FSB) from various levels of PSC limit reductions. The request assumed that the PSC limit would be taken each year and the proposed reductions in the PSC limit would be fully realized.[56] In reality, the data indicate that the PSC limit is not fully taken each year, so the benefits discussed in this section should be considered the maximum benefit that would occur when all levels of PSC under consideration are harvested in all fisheries.

Based on these assumptions and the assumptions described in the full IPHC report (Appendix 5), the projected increase in CEY, during the first year of the PSC reduction, is shown in Table 4-33 for each IPHC area and the total. These benefits will increase over time as additional years of benefits accrue. The change in fishery CEY is reported in both metric tons (round weight) and 1,000s of pounds net weight. The conversion factor from metric tons round weight to 1,000s of pounds net weight is:

$$1000 \text{ lb net weight} = \text{metric tons} / 604.7898 * 1000.$$

Any projected increase in the amount of halibut available to the guided sport and commercial IFQ fisheries are assumed to be divided using the proposed Catch Share Plan (CSP) formula. In general, that formula would allocate the fish available to the guided sport sector and the commercial IFQ sectors using the

[56] Fully realized means the percentage reductions were taken from the 2,000 mt limit for the trawl sector. As discussed in this document, the actual reduction may be less, if the Rockfish Program's (191.4 mt allotment and 27.4 mt reduction) halibut allowance is not included in the percentage reduction.

percentages shown in Table 4-37. The information in that table shows that at smaller fishery CEYs, the guided sport sector is allocated a larger percentage of the total. These allocations were approved by the Council to help ensure the charter sector would be able to meet client demand for trips at lower fishery CEY levels.

Table 4-33 Changes in fishery CEY under each Council alternative reported in metric tons round weight and 1,000's of pounds net weight

A) Values in metric tons (mt)

GOA		Trawl PSC (mt) 2000	1900	1800	1700
HAL PSC (mt)	300	0.0	62.5	125.0	187.5
	285	11.3	73.8	136.3	198.8
	270	22.6	85.1	147.6	210.1
	255	33.8	96.3	158.9	221.4

2C		Trawl PSC (mt) 2000	1900	1800	1700
HAL PSC (mt)	300	0.0	0.0	0.0	0.0
	285	0.1	0.1	0.1	0.1
	270	0.2	0.2	0.2	0.2
	255	0.3	0.3	0.3	0.3

3A		Trawl PSC (mt) 2000	1900	1800	1700
HAL PSC (mt)	300	0.0	46.4	92.8	139.1
	285	4.2	50.5	96.9	143.3
	270	8.3	54.7	101.1	147.5
	255	12.5	58.9	105.2	151.6

3B		Trawl PSC (mt) 2000	1900	1800	1700
HAL PSC (mt)	300	0.0	16.1	32.3	48.4
	285	7.0	23.2	39.3	55.4
	270	14.0	30.2	46.3	62.5
	255	21.1	37.2	53.3	69.5

B) Values in 1000s of net pounds

GOA		Trawl PSC (1000 lbs) 3307	3142	2976	2811
HAL PSC (1000 lbs)	496	0.0	103.4	206.7	310.1
	471	18.6	122.0	225.4	328.7
	446	37.3	140.7	244.0	347.4
	422	55.9	159.3	262.7	366.0

2C		Trawl PSC (1000 lbs) 3307	3142	2976	2811
HAL PSC (1000 lbs)	496	0.0	0.0	0.0	0.0
	471	0.1	0.1	0.1	0.1
	446	0.3	0.3	0.3	0.3
	422	0.4	0.4	0.4	0.4

3A		Trawl PSC (1000 lbs) 3307	3142	2976	2811
HAL PSC (1000 lbs)	496	0.0	76.7	153.4	230.0
	471	6.9	83.6	160.2	236.9
	446	13.8	90.4	167.1	243.8
	422	20.6	97.3	174.0	250.7

3B		Trawl PSC (1000 lbs) 3307	3142	2976	2811
HAL PSC (1000 lbs)	496	0.0	26.7	53.4	80.1
	471	11.6	38.3	65.0	91.7
	446	23.2	49.9	76.6	103.3
	422	34.8	61.5	88.2	114.9

Source: IPHC estimates of increased fishery CEY (net weight)

4.6.2.1 Pacific Halibut Commercial Fishery

Table 4-34 shows the number of persons that held halibut QS in 2010. The number of QS holders is reported by area. Summing the areas does not equal the GOA total, because persons may hold QS in more than one area. A total of 1,162 QS holders held halibut shares in Area 2C. About 300 more persons held QS in Area 3A (1,461). In are 3B, 488 persons held halibut QS. The total number of persons in those three areas holding halibut QS in 2010 was 2,549. It is these QS holders that are assumed to share any increases in commercial halibut that are generated from reducing PSC limits in the GOA.

Table 4-34 Number of halibut QS holders in 2010, by area

Area	QS holders
2C	1,162
3A	1,461
3B	488
GOA Total	2,549

Using the estimated increase in fishery CEY and the CSP formula for dividing the combined fishery CEY, it is possible to estimate the increased amount of halibut that would be available to the commercial IFQ fisheries, by IPHC area and for the GOA as a whole. The impact on the charter and commercial sectors is also discussed in terms of the current Guideline Harvest Level (GHL) division of halibut. The GHL discussion is provided below and is followed by the section based on the catch sharing plan methodology. Both discussions are provided because of the uncertainty regarding how the available halibut will be divided in the future. Increases in the halibut available are reported as the round weight increase and the net weight increase. Because the commercial and guided sport allowances are issued in net weight, those tables are the focus of this discussion.

Guideline Harvest Level

The amount of halibut available to the charter sector and commercial IFQ fishery is currently divided among the two sectors using the Guideline Harvest Level (GHL) established for the charter sector in areas 2C and 3A. An area's annual total CEY determines the charter sector's GHL[57]. Halibut still available after the charter GHL amount is removed from the combined catch limit is assigned to the IFQ fishery. The formula to calculate the total CEY is the exploitable biomass multiplied by the harvest rate (0.215).

If the total CEY is greater than the amount listed for the tiers in Table 4-35, the corresponding GHL for that tier is set for the charter sector in that area. Since the GHL has been in effect, the area 3A GHL has always been set at 3.65 million lb, because the total CEY has always been above 21.581 million lb. However, the total CEY has been declining and, in 2011, was set at 23.520 million lb. If the GHL declines by 1.939 million lb from its 2011 level, it will trigger a reduction in the GHL. At that time, reductions in the PSC may have an impact on the GHL that is set for Area 3A.

In Area 2C the total CEY has declined from Tier 1 to a point where the GHL is currently set at Tier 4. That means the GHL has been decreased to about two-thirds the amount of the initial GHL. The GHL in Area 2C can be reduced one more tier under current regulations. Tier 5 of the GHL would set the charter allowance at 788,000 lbs, which is the tier the charter allowance was set for 2011.

[57] The GHL is the level of harvest NMFS tries to limit the charter sector to in an area. The GHL has often been exceeded, because management tools available are too coarse to precisely manage the fleet.

Table 4-35 GHL tiers for IPHC Areas 2C and 3A and 2009-2011 total CEYs

	Area 2C		Area 3A	
GHL Tier	If Annual Total CEY (1,000 lbs)	Then GHL (1,000 lbs)	If Annual Total CEY (1,000 lbs)	Then GHL (1,000 lbs)
1	> 9,027	1,432	> 21,581	3,650
2	> 7,965	1,217	> 19,042	3,103
3	> 6,903	1,074	> 16,504	2,734
4	> 5,841	931	> 13,964	2,373
5	> 4,779	788	> 11,425	2,008
Year	Total CEY 2C		Total CEY 3A	
2011	5,390		23,520	
2010	5,020		26,192	
2009	5,570		28,010	

Source: IPHC

Halibut PSC reductions of O26" fish are assumed to be taken in the directed halibut fishery at a 1:1 ratio. Because it is taken in the directed halibut fishery, reductions in the PSC of over 26” halibut is assumed to not change the total exploitable biomass the following year.

Reducing the PSC of U26” halibut will have the impact of increasing the exploitable biomass and the total CEY in future years, as the smaller halibut recruit into the directed fishery. In this analysis, projections of total CEY increases, for the U26” halibut PSC savings from one year, are calculated over a 30-year time period. That projection estimated that the total CEY would increase in Area 3A by 53,703 lb, for each 100 mt of trawl PSC, and 2,189 lb, for each 15 mt of hook-and-line PSC, over 30 years. A maximum 15% PSC reduction, applied to both gear types, would increase the total CEY by 167,676 lb (a one year PSC reduction after 30 years). The change in total CEY between tiers is 2.5 million lb; the 2011 total CEY was 1.939 million lb above the next tier. Therefore, the reduction in the PSC limit is unlikely to have an impact on the GHL in the near term unless the total CEY falls just below a tier level. However, in the long term, it could impact the GHL amount, as multiple years of savings compound the benefits. With the available information and the amount of uncertainty surrounding the increase in the total CEY over a 30-year horizon for all years during that time period, estimating the change in total in the long term may generate results that are misleading and are not provided.

Unless the total CEY is very close to, but below a tier level, without the PSC reduction, in the short-run, all of the benefits from decreasing the PSC limit, in Area 3A, will flow to the halibut QS holders and the fishermen and industries that support them. In the near-term, benefits are expected to be slightly greater than increases in profitability and employment that can be derived only from the O26” halibut PSC. As the U26” halibut are recruited into the exploitable biomass (and total CEY), industries dependent on the halibut IFQ fishery will begin to derive benefits from the PSC savings associated with U26” fish. Benefits associated with the U26” fish will increase over a longer time horizon. The U26” halibut are expected to be fully recruited into the exploitable biomass after 30 years.

During the year that the PSC is decreased, only the foregone O26” halibut PSC is assumed to be available to the IFQ and charter fisheries. If the change in the total CEY does not trigger a change in the GHL tier, all of the benefits will flow to the IFQ sector the first year. In terms of first wholesale revenue for the IFQ sector, the estimated increase in revenue is provided in Table 4-36[58].

As discussed earlier, these estimates will increase as additional years are added and the U26" fish, not taken as PSC, begin to recruit into the exploitable biomass. Estimates for future years are not provided because growth rates would need to be applied to the U26" halibut and they would need to be added to the exploitable biomass when they reach exploitable size. Then 21.5% of the recruits to the exploitable biomass would be added to the total CEY and harvested. Therefore, the IFQ sector first wholesale revenue estimates in Table 4-36 are assumed to be a lower bound for future years, if the change in total CEY does result in a change in GHL tiers. If the change in total CEY does result in a tier change in Area 3A, the charter sector would be allowed to harvest an additional 361,000 lbs to 547,000 lbs of halibut, depending on the tier level. The IFQ fishery would experience a decrease of approximately the same amount.

In Area 2C, the increase in total CEY is 80 lb for each year's 15 mt reduction of hook-and-line PSC (5% reduction in the PSC limit) over 30 years. A 15% reduction PSC reduction in a year would increase the total CEY by 240 lb after 30 years. Adding those benefits for 30 years of PSC reductions would still generate an increase in the total CEY of less than 10,000 lb. The difference in the 2C GHL tiers is 1.062 million lb. The 2011 total CEY was 451,000 lb from the next tier, so the increase in total CEY from the PSC reduction would likely have no impact on the GHL that year. In the future, unless the total CEY is very close but below the next tier, it is very unlikely that any of the proposed Area 2C PSC reductions will impact the size of the GHL in the near term. It is also unlikely that it will impact the GHL in the long term, unless the total CEY would have been close to, but below a tier in the future.

In Area 3B, the reductions in the PSC limit will increase the total CEY in future years. The benefits of those increases are assumed to all flow to the halibut QS holders in that area, because of the limited sport fishery in that area.

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[58] *The tables below are provided as an example of how to interpret the data presented in the halibut impact sections. Proposed trawl PSC limits (in mt on the left and 1,000 lb on the right) head columns across the top of each table and proposed hook-and-line PSC limits (in 1,000 lb) head each rows to the left of the same table. The pounds of PSC are converted from metric tons using the following formula: PSC (mt) ÷ 604.7898 ×1000. For example, the 2,000 mt of halibut PSC is equivalent to 3,307 thousand pounds (or 3.3 million pounds) of halibut net weight of fish over 26 inches. These sample tables demonstrate which proposed options for halibut PSC reductions (0/5/10/15 percent) are associated with each proposed PSC limit (in mt and thousand lb). The table shows the change for each option under consideration (if the Council selects the same percentage reduction for hook-and-line catcher vessels and catcher processors).*

The matrix of cells represents the increase in halibut available to the guided sport and commercial IFQ sectors under each option. Using the bookends of results from the above table on the right as an example of how to interpret the tables, maintaining the status quo trawl PSC limit (e.g., 0% reduction) and reducing the hook-and-line limit under Alternative 2 Option 1 (e.g., 5%), results in an estimated 18,600 lb increase in the amount of halibut available to the guided sport and commercial IFQ sectors (net weight). If both the trawl and hook-and-line sector's PSC limit is reduced under Alternative 2, Option 3 (e.g., 15%), an additional 366,000 lb of halibut is estimated to be available, GOA wide, for the guided sport and commercial IFQ sectors.

		Trawl PSC (mt)			
GOA		2,000 (0%)	1,900 (5%)	1,800 (10%)	1,700 (15%)
HAL PSC (mt)	300 (0%)	All combinations of PSC reductions, some tables report weight others report revenue changes			
	285 (5%)				
	270 (10%)				
	255 (15%)				

		Trawl PSC (1000 lb)			
GOA		3307 (0%)	3142 (5%)	2976 (10%)	2811 (15%)
HAL PSC (1000 lbs)	496 (0%)	0.0	103.4	206.7	310.1
	471 (5%)	18.6	122.0	225.4	328.7
	446 (10%)	37.3	140.7	244.0	347.4
	422 (15%)	55.9	159.3	262.7	366.0

Table 4-36 **Estimated increase in IFQ sector first wholesale revenue ($1,000), using a low and high first wholesale price, under the GHL assuming no change in the tier level as a result of the decrease in the PSC**

GHL: Lower first wholesale revenue estimate

GOA		Trawl PSC (1000 lbs)			
		3307	3142	2976	2811
HAL PSC (1000 lbs)	496	$0	$380	$760	$1,140
	471	$73	$453	$833	$1,213
	446	$146	$525	$905	$1,285
	422	$218	$598	$978	$1,358

3A		Trawl PSC (1000 lbs)			
		3307	3142	2976	2811
HAL PSC (1000 lbs)	496	$0	$270	$539	$809
	471	$24	$294	$563	$833
	446	$48	$318	$588	$857
	422	$73	$342	$612	$881

2C		Trawl PSC (1000 lbs)			
		3307	3142	2976	2811
HAL PSC (1000 lbs)	496	$0	$0	$0	$0
	471	$1	$1	$1	$1
	446	$1	$1	$1	$1
	422	$2	$2	$2	$2

3B		Trawl PSC (1000 lbs)			
		3307	3142	2976	2811
HAL PSC (1000 lbs)	496	$0	$110	$221	$331
	471	$48	$158	$269	$379
	446	$96	$206	$317	$427
	422	$144	$254	$365	$475

GHL: Higher first wholesale revenue estimate

GOA		Trawl PSC (1000 lbs)			
		3307	3142	2976	2811
HAL PSC (1000 lbs)	496	$0	$727	$1,454	$2,182
	471	$141	$869	$1,596	$2,323
	446	$283	$1,010	$1,737	$2,464
	422	$424	$1,151	$1,879	$2,606

3A		Trawl PSC (1000 lbs)			
		3307	3142	2976	2811
HAL PSC (1000 lbs)	496	$0	$510	$1,019	$1,529
	471	$46	$555	$1,065	$1,575
	446	$92	$601	$1,111	$1,621
	422	$137	$647	$1,157	$1,666

2C		Trawl PSC (1000 lbs)			
		3307	3142	2976	2811
HAL PSC (1000 lbs)	496	$0	$0	$0	$0
	471	$1	$1	$1	$1
	446	$2	$2	$2	$2
	422	$3	$3	$3	$3

3B		Trawl PSC (1000 lbs)			
		3307	3142	2976	2811
HAL PSC (1000 lbs)	496	$0	$218	$435	$653
	471	$95	$312	$530	$747
	446	$189	$407	$624	$842
	422	$284	$501	$719	$936

Tier 1 of Catch Share Plan

If implemented, the catch share plan will divide the combined fishery CEY, for Areas 2C and 3A, between the charter and commercial IFQ sectors. Catch share plan percentages proposed to divide the combined fishery CEY, are presented in Table 4-37.

Table 4-37 Percentage of combined fishery CEY allocated to guided sport and commercial

Combined fishery CEY	Guided Sport	Commercial
	Area 2C	
<5 million lbs	17.3%	82.9%
5 million lbs or more	15.1%	84.7%
	Area 3A	
< 10 million lbs	15.4%	84.6%
10 million lbs or more	14.0%	86.0%

When the combined fishery CEY is less than 5 million lb in Area 2C, the division of the projected increase in pounds of IFQ available to the commercial sector is 82.9% in that area. Similarly, when the combined fishery CEY is less than 10 million lb in Area 3A, the division of the projected increase in pounds of IFQ available to the commercial sector is 84.6% in that area. This is referred to as tier 1 of the CSP. Using this division, reducing the PSC limit the first year is estimated to increase the GOA-wide commercial IFQ by an estimated to range of zero pounds under the status quo to 327,300 lbs, when both the hook-and-line and trawl PSC limits are reduced by 15%. Smaller reductions in the PSC mortality limits result in smaller increases in the fishery CEY and IFQ allowances. The increases in IFQ lb (net weight), resulting from lowering the hook-and-line PSC limits by 5%, was 17,600 lb. Each additional 5% reduction in the hook-and-line sector PSC mortality limit increased the GOA IFQ lb by an additional 17,600 lb. Decreasing the trawl fishery PSC limit by 5% was estimated to increase the pounds of IFQ available in the GOA by 91,600 lb. The projections are also linear for the trawl PSC mortality reductions, so each reduction of the trawl PSC mortality limit by 5% is estimated to increase the annual halibut IFQ by 91,600 lb. These changes are for the first year of the PSC reduction, so these changes in IFQ amounts are impacted by only the O26" component of the halibut PSC.

When the overall changes in IFQ available in the GOA are considered on an IPHC area level, the increase in Area 2C is much smaller than either Area 3A or 3B. The increase in IFQ available in 2C is less, because most of the PSC occurs in areas 3A and 3B. When the IPHC staff generated the estimates they cautioned that the 2C increases are likely understated, because the calculations did not account for halibut migration patterns. Including that information was beyond the scope of this analysis, given the complexity and time required to build that information in the estimates. Given these assumptions, the projected annual increase in the pounds of IFQ in is estimated to be between zero lb under the status quo to about 400 lb under a 15% reduction to both the hook-and-line and trawl sectors. Recall that trawl fishing is limited in the Southeast management area, so the estimated increases in IFQ lb are driven by changes in the hook-and-line PSC mortality limit. Changes in the trawl PSC mortality limit, under these assumptions, does not affect the projected fishery CEY or the IFQ lb available in Area 2C.

In Area 3A, the increases in IFQ ranged from zero lb under the status quo to 212,100 lb when the 15% reduction is applied to the hook-and-line and trawl sectors. A 5% decrease in the hook-and-line PSC mortality limit increased the 3A IFQ available by 5,800 lb. A 5% decrease in the PSC limit in the trawl sector increased the IFQ lb by 64,900 lb.

In Area 3B, the increase in IFQ lb available ranged from zero lb under the status quo to 114,900 lb when both sectors' PSC limit was reduced by 15%. Each 5% reduction in the hook-and-line PSC mortality was estimated to increase the 3B IFQ by 11,600 lb. Each 5% reduction in the trawl PSC mortality limit was estimated to increase the 3B IFQ by 26,700 lb.

Table 4-38 Changes in commercial IFQ (1,000 lbs net weight) under each option to reduce the PSC mortality limit, low fishery CEY (tier 1 of CSP)

		Trawl PSC (1000 lbs)			
GOA		3307	3142	2976	2811
HAL PSC (1000 lbs)	496	0.0	91.6	183.1	274.7
	471	17.6	109.1	200.7	292.2
	446	35.1	126.7	218.2	309.8
	422	52.7	144.2	235.8	327.3

		Trawl PSC (1000 lbs)			
3A		3307	3142	2976	2811
HAL PSC (1000 lbs)	496	0.0	64.9	129.7	194.6
	471	5.8	70.7	135.6	200.4
	446	11.6	76.5	141.4	206.3
	422	17.5	82.3	147.2	212.1

		Trawl PSC (1000 lbs)			
2C		3307	3142	2976	2811
HAL PSC (1000 lbs)	496	0.0	0.0	0.0	0.0
	471	0.1	0.1	0.1	0.1
	446	0.2	0.2	0.2	0.2
	422	0.4	0.4	0.4	0.4

		Trawl PSC (1000 lbs)			
3B		3307	3142	2976	2811
HAL PSC (1000 lbs)	496	0.0	26.7	53.4	80.1
	471	11.6	38.3	65.0	91.7
	446	23.2	49.9	76.6	103.3
	422	34.8	61.5	88.2	114.9

Source: IPHC estimates of increased Fishery CEY (net weight)

Tier 2 of Catch Share Plan

Under Tier 2 of the CSP, at assumed TAC levels, the commercial IFQ sector is allocated 84.7% of the Area 2C fishery CEY increase and 86.0% of the Area 3A increase. Tier 2 under the CSP uses the same percentages as all of the higher tiers. Therefore, any fishery CEY greater than or equal to 5 million lb in Area 2C and 10 million lb in 3A would result in the increases described in this section.

At tier 2 fishery CEY levels the increase in GOA halibut IFQ ranges from zero lb under the status quo to an increase of 330,900 lb when both the hook-and-line and trawl PSC mortality limits are reduced by 15%. As before, this assumes that both sectors harvest up to their PSC limit each year. This assumption will tend to overstate the actual impacts. Each 5% decrease in the hook-and-line PSC limit is estimated to increase the GOA halibut IFQ by 17,700 lb (net weight); and each 5% decrease in the trawl PSC mortality limit will is estimated to increase the GOA IFQ by 92,600 lb.

IFQ lb increased in Area 2C by 130 lb for each 5% reduction in the hook-and-line PSC limit. Based on model assumptions, the trawl PSC limit did not impact the estimated IFQ lb that would be available in Area 2C. Estimated increases in IFQ lb ranged from 0 lb under the status quo to 390 lb under a 15% reduction to both the hook-and-line and trawl sectors.

Table 4-39 Changes in commercial IFQ (1,000 lb net weight) under each option to reduce the PSC mortality limit, tier 2 of CSP

		Trawl PSC (1000 lbs)			
GOA		3307	3142	2976	2811
HAL PSC (1000 lbs)	496	0.0	92.6	185.3	277.9
	471	17.7	110.3	202.9	295.5
	446	35.3	127.9	220.6	313.2
	422	53.0	145.6	238.2	330.9

		Trawl PSC (1000 lbs)			
3A		3307	3142	2976	2811
HAL PSC (1000 lbs)	496	0.0	65.9	131.9	197.8
	471	5.9	71.9	137.8	203.8
	446	11.8	77.8	143.7	209.7
	422	17.8	83.7	149.6	215.6

		Trawl PSC (1000 lbs)			
2C		3307	3142	2976	2811
HAL PSC (1000 lbs)	496	0.0	0.0	0.0	0.0
	471	0.1	0.1	0.1	0.1
	446	0.3	0.3	0.3	0.3
	422	0.4	0.4	0.4	0.4

		Trawl PSC (1000 lbs)			
3B		3307	3142	2976	2811
HAL PSC (1000 lbs)	496	0.0	26.7	53.4	80.1
	471	11.6	38.3	65.0	91.7
	446	23.2	49.9	76.6	103.3
	422	34.8	61.5	88.2	114.9

Source: IPHC estimates of increased Fishery CEY (net weight)

IFQ increases in Area 3A are estimated at 5,900 lb for each 5% decrease in the hook-and-line PSC mortality limit and 65,900 lb for each 5% reduction in the trawl PSC limit. The overall range of impacts is 0 lb for the status quo and 215,600 lb of IFQ when a 15% reduction in the PSC limit is applied to both the hook-and-line sector and the trawl sector.

In Area 3B, each 5% reduction in the hook-and-line PSC limit increased IFQ lb by 11,600. Every 5% reduction in the trawl PSC limit increased the areas IFQ by 26,700 lb. When the maximum reduction under consideration (15%) was applied to both sectors the area's IFQ lb increased by 114,900.

Increased gross first wholesale value of GOA IFQ harvest

Estimates of increased first wholesale gross revenue of GOA halibut harvests are estimated in this section. The estimates are generated by multiplying the increase in IFQ pounds by the average IFQ first wholesale price for the area, reported by COAR. These prices are currently reported on an IPHC area basis, based on processor location[59]. Using data from 2003 through 2010, the average high and low annual price is reported by area. These prices reflect a different trend than ex-vessel prices[60], which are typically higher in Area 2C.

Table 4-40 High and low gross first wholesale prices of halibut by IPHC area, 2003-2010

Area	Low	High
2C	$3.64	$6.32
3A	$3.52	$6.65
3B	$4.13	$8.15

Source: COAR data from AKFIN

These low and high ex-vessel prices are then multiplied by the increase in net weight in each area, to estimate the increased first wholesale gross revenue that the commercial sector may generate, resulting from reducing the PSC mortality limit in the first year. The calculations do not break out the change in revenue associated with hook-and-line catcher vessels and hook-and-line catcher processors. Class "A" IFQ shares can be used on either catcher vessels or catcher processors, so PSC reductions in one sector do not directly apply to that sector. Several other assumptions were made to complete the analysis and if they do not hold they may introduce misleading results if different PSC percentage reductions are selected for catcher vessels and catcher processors.

The primary assumptions that were used to develop the estimates of increases in gross first wholesale revenue from halibut IFQ are:

1. The groundfish fleets will catch the entire PSC limit, so all of the reduction in PSC mortality is realized;
2. First wholesale price range is based on the high and low price in an area from 2003 through 2010 using COAR data;
3. The CSP split between commercial and guided sport were used in areas 2C and 3A;
4. All of the increase in net weight in Area 3B was assigned to the commercial IFQ fishery;
5. No IFQ leases occurred between the guided sport and commercial IFQ fishery in Area 2C or Area 3A;
6. The historic percentages of the GOA halibut PSC, by IPHC area and gear type (including hook-and-line catcher vessels and catcher processors), will continue into the future.

[59] First wholesale halibut prices are reported in the COAR by processors and first buyers of halibut. The total first wholesale value for an area was divided by the weight purchased to estimate the area-wide annual first wholesale prices. http://www.fakr.noaa.gov/ram/ifqreports.htm - special

[60] Additional information on the impacts at the ex-vessel level are reported in Appendix 9

Tier 1 Increased gross first wholesale value of GOA IFQ harvest

Table 4-41 shows the total increase in gross first wholesale revenue, as a result of increased IFQ from decreasing halibut PSC during the first year of the program, by vessels fishing in the GOA. This table is based on the assumption that the first wholesale price is low price reported in Table 4-40 and both areas 2C and 3A are at tier 1 of the CSP (under which commercial IFQ receives a relatively lower percentage of the available CEY). The information in the table indicates that for each 5% reduction in the hook-and-line PSC limit, GOA wide gross first wholesale revenue from halibut increases by about $69,000. Halibut gross first wholesale revenue increased by about $338,000 for each 5% reduction in the trawl PSC mortality limit. About two-thirds of the increase is in Area 3A and one-third in Area 3B. Area 2C is projected have realize increases in gross first wholesale revenue, but they are smaller than the other areas and accrue only from the reductions in hook-and-line PSC mortality.[61] Gross first wholesale revenue increases to Area 2C are less than $1,500 for each of the options that are considered.

Table 4-41 Estimated increases in halibut gross first wholesale revenue ($1,000) of the IFQ fleet based on lower price per lb and tier 1 of the CSP

		Trawl PSC (1000 lbs)			
GOA		3307	3142	2976	2811
HAL PSC (1000 lbs)	496	$0	$338	$677	$1,015
	471	$69	$407	$746	$1,084
	446	$138	$476	$815	$1,153
	422	$207	$545	$884	$1,222

		Trawl PSC (1000 lbs)			
3A		3307	3142	2976	2811
HAL PSC (1000 lbs)	496	$0	$228	$456	$684
	471	$20	$249	$477	$705
	446	$41	$269	$497	$725
	422	$61	$290	$518	$746

		Trawl PSC (1000 lbs)			
2C		3307	3142	2976	2811
HAL PSC (1000 lbs)	496	$0	$0	$0	$0
	471	$0	$0	$0	$0
	446	$1	$1	$1	$1
	422	$1	$1	$1	$1

		Trawl PSC (1000 lbs)			
3B		3307	3142	2976	2811
HAL PSC (1000 lbs)	496	$0	$110	$221	$331
	471	$48	$158	$269	$379
	446	$96	$206	$317	$427
	422	$144	$254	$365	$475

Source: COAR price data and IPHC estimates of net weight increases in fishery CEY

Tier 2 Increased gross first wholesale value of GOA IFQ harvest

Table 4-42 reports the estimated increases in halibut gross first wholesale revenue for the GOA commercial IFQ fishery under each of the alternatives being considered by the Council, using the low IPHC area-wide average price and tier 2 of the CSP. The estimates of increased halibut IFQ gross first wholesale revenue are slightly larger than those reported in Table 4-41, because the commercial IFQ sector gets a larger percentage of the fishery CEY under tier 2 of the CSP in areas 2C and 3A. Because it was assumed that the entire increase in Area 3B goes to the commercial IFQ sector, changing from tier 1 to tier 2 of the CSP does not alter the estimated impacts reported in the two tables. Overall the GOA commercial IFQ sector is estimated to generate an additional $1.2 million in gross first wholesale revenue, annually, if PSC mortality is decreased by 15% for the hook-and-line <u>and</u> trawl sectors. Each 5% decrease in the hook-and-line PSC limit increases halibut IFQ gross first wholesale revenue by $69,000, gulf-wide; and each 5% decrease in trawl PSC mortality increases annual halibut IFQ gross first wholesale revenue by $342,000.

[61] Recall, groundfish trawling is prohibited in this area.

Table 4-42 Estimated increases in halibut gross first wholesale revenue ($1,000) of the IFQ fleet based on low price per lb and tier 2 of the CSP

GOA		Trawl PSC (1000 lbs) 3307	3142	2976	2811
HAL PSC (1000 lbs)	496	$0	$342	$684	$1,027
	471	$69	$411	$754	$1,096
	446	$139	$481	$823	$1,165
	422	$208	$550	$892	$1,234

3A		Trawl PSC (1000 lbs) 3307	3142	2976	2811
HAL PSC (1000 lbs)	496	$0	$232	$464	$696
	471	$21	$253	$485	$716
	446	$42	$273	$505	$737
	422	$62	$294	$526	$758

2C		Trawl PSC (1000 lbs) 3307	3142	2976	2811
HAL PSC (1000 lbs)	496	$0	$0	$0	$0
	471	$0	$0	$0	$0
	446	$1	$1	$1	$1
	422	$1	$1	$1	$1

3B		Trawl PSC (1000 lbs) 3307	3142	2976	2811
HAL PSC (1000 lbs)	496	$0	$110	$221	$331
	471	$48	$158	$269	$379
	446	$96	$206	$317	$427
	422	$144	$254	$365	$475

Source: COAR first wholesale price data and IPHC estimates of net weight increases in fishery CEY

Table 4-43 reports the estimated increases in halibut IFQ gross first wholesale revenue to commercial IFQ fishermen, assuming the high first wholesale prices from Table 4-40. The only difference between this table and Table 4-41 is the higher first wholesale price was used here and a lower price was used in Table 4-41.

Gulf-wide, the IFQ fleet was estimated to annually increase gross first wholesale revenue by over $2.3 million. Increases in Area 2C were $1,000, $2,000, and $2,000, at 5%, 10%, and 15% decreases in the hook-and-line PSC limit, respectively. The 10% and 15% PSC reductions yield the same first wholesale revenue change due to rounding. In Area 3A, a 5% reduction in the hook-and-line PSC limit was estimated to increase IFQ fleet gross first wholesale revenues by $39,000, annually. A 5% reduction in the trawl PSC limit was estimated to increase gross first wholesale revenue $431,000, annually. Increases in Area 3B gross first wholesale revenue are estimated to be $95,000, annually, for each 5% decrease in hook-and-line PSC mortality and $218,000 for each 5% decrease in the trawl PSC mortality.

Table 4-43 Estimated increases in halibut gross first wholesale revenue ($1,000) of the IFQ fleet based on the higher price per lb. and tier 1 of the CSP

GOA		Trawl PSC (1000 lbs) 3307	3142	2976	2811
HAL PSC (1000 lbs)	496	$0	$649	$1,297	$1,946
	471	$134	$783	$1,432	$2,080
	446	$268	$917	$1,566	$2,215
	422	$402	$1,051	$1,700	$2,349

3A		Trawl PSC (1000 lbs) 3307	3142	2976	2811
HAL PSC (1000 lbs)	496	$0	$431	$862	$1,294
	471	$39	$470	$901	$1,332
	446	$77	$509	$940	$1,371
	422	$116	$547	$979	$1,410

2C		Trawl PSC (1000 lbs) 3307	3142	2976	2811
HAL PSC (1000 lbs)	496	$0	$0	$0	$0
	471	$1	$1	$1	$1
	446	$2	$2	$2	$2
	422	$2	$2	$2	$2

3B		Trawl PSC (1000 lbs) 3307	3142	2976	2811
HAL PSC (1000 lbs)	496	$0	$218	$435	$653
	471	$95	$312	$530	$747
	446	$189	$407	$624	$842
	422	$284	$501	$719	$936

Source: COAR first wholesale price data and IPHC estimates of net weight increases in fishery CEY

Finally, Table 4-44 shows the increases in gross first wholesale revenue to the IFQ fleet when the higher first wholesale halibut prices are assumed and the fishery CEY triggers tier 2 or higher of the CSP. The gulf-wide gross first wholesale revenue increase in the IFQ halibut fishery ranges from $0, under the status quo, to about $2.4 million when the hook-and-line sector and the trawl sector are both reduced by 15%.

Table 4-44 Estimated increases in halibut gross first wholesale revenue ($1,000) of the IFQ fleet based on the higher price per lb. IFQ and tier 2 of the CSP

GOA		Trawl PSC (1000 lbs)			
		3307	3142	2976	2811
HAL PSC (1000 lbs)	496	$0	$656	$1,312	$1,968
	471	$135	$791	$1,447	$2,102
	446	$270	$925	$1,581	$2,237
	422	$404	$1,060	$1,716	$2,372

3A		Trawl PSC (1000 lbs)			
		3307	3142	2976	2811
HAL PSC (1000 lbs)	496	$0	$438	$877	$1,315
	471	$39	$478	$916	$1,354
	446	$79	$517	$955	$1,394
	422	$118	$556	$995	$1,433

2C		Trawl PSC (1000 lbs)			
		3307	3142	2976	2811
HAL PSC (1000 lbs)	496	$0.0	$0.0	$0.0	$0.0
	471	$0.8	$0.8	$0.8	$0.8
	446	$1.6	$1.6	$1.6	$1.6
	422	$2.4	$2.4	$2.4	$2.4

3B		Trawl PSC (1000 lbs)			
		3307	3142	2976	2811
HAL PSC (1000 lbs)	496	$0	$218	$435	$653
	471	$95	$312	$530	$747
	446	$189	$407	$624	$842
	422	$284	$501	$719	$936

Source: COAR first wholesale price data and IPHC estimates of net weight increases in fishery CEY

QS Value

Ex-vessel halibut prices are not expected to change dramatically as a result of reducing the PSC limit. Because the total halibut harvests from all areas in Alaska are not affected, the quantity of halibut on the market is not expected to be increased to a level that would substantially decrease ex-vessel prices. The increase in quantity of halibut sold, primarily by Area 3A and 3B fishermen, and the modest expected change in ex-vessel prices that would result, is expected to increase the QS value of the fleet in those areas, all else equal[62]. Because QS is expected to generate higher net revenues, the asset value of Area 3A and 3B QS is also expected to increase. Persons that decide to sell their QS would be expected to receive more for their QS. Ignoring for the moment that QS constitutes a "revocable privilege" and not a property right, their higher market value would increase their worth as an asset, against which to borrow money. QS values in Area 2C may increase, but, because change in expected net revenue is expected to be quite modest, the corresponding change in QS value is also expected to be modest if they are realized, all else equal.

4.6.2.2 Guided Sport

In 2007, the Council adopted a moratorium on new entry into the charter halibut sector. The limited entry permit (LEP) strictly limits the number of operations that may provide charter trips and the number of clients each vessel may carry on a trip (NPFMC 2007a). The program was implemented by NOAA fisheries for the 2011 fishing year. The RAM database indicates that as of March 5, 2012, 575 permits were issued to 447 permit holders in Area 2C (Table 4-45). Of the Area 2C permits issued, 39 are considered to be interim permits (or disputed).

In Area 3A, a total of 498 permits were issued to 492 permit holders. A total of 475 of the permits are not contested, and 23 permits are considered interim permits. Interim permits were issued to 25 permit holders.

[62]Other factors that affect demand for halibut and the ex-vessel and QS prices, have resulted in recent price increases. Those changes are not a result of the change in the PSC limit proposed and may continue to impact halibut prices in the future.

Table 4-45 Number of permits issued and number of permit holders receiving the permits under the charter halibut limited access program

Type	Area	Transferable	Interim	Permit Count	Angler Count	Permitholder Count
CHP	2C	N	N	158	765	147
CHP	2C	N	Y	12	50	15
CHP	2C	Y	N	340	1,814	271
CHP	2C	Y	Y	29	128	5
CQE	2C	N	N	36	216	9
2C Total				575	2,973	447
CHP	3A	N	N	91	551	98
CHP	3A	N	Y	14	63	18
CHP	3A	Y	N	330	2,552	359
CHP	3A	Y	Y	9	63	7
CQE	3A	N	N	49	294	8
MWR	3A	N	N	5	n/a	2
3A Total				498	3,523	492

Source: RAM permit database as of March 5, 2012.

Table 4-46 shows charter industry participation in bottomfish[63] fisheries from 2004 through 2010. This time period covers the years that were included in the qualification period for an LEP. Based on the number of vessels that fished during those years, the number of permits issued is expected to be substantially fewer than the number of vessels that fished halibut in 2010. In Area 2C, 604 vessels charter fished during 2010, and 591 permits were issued (although only 479 are not considered interim). In Area 3A, 523 vessels were used to take clients bottomfish fishing in 2010, compared to 535 permits that were issued (442 are not interim permits).

Table 4-46 Participation in the fisheries in the qualifying and recency years

	2C			3A		
Year	Trips	Vessels	Trips/Vessel	Trips	Vessels	Trips/Vessel
2004	20,117	625	32	23,248	530	43
2005	20,925	652	32	23,278	567	41
2006	25,923	693	37	24,126	622	39
2007	27,456	727	38	25,491	643	40
2008	26,221	719	36	23,314	604	39
2009	19,333	636	30	18,981	547	35
2010	19,984	604	33	19,599	523	37

Source: ADF&G Saltwater Logbook data.

The proposed reductions in the halibut PSC mortality limits will increase the amount of halibut available to the guided sport sectors in IPHC areas 2C and 3A. Area 3B increases were assumed to go to the commercial IFQ fleet, as there is not a developed guided sport fishery for halibut, in part due to the remote locations. The

[63] It is an unfortunate fact that charter fishing data, collected by the State of Alaska during this period did not distinguish between 'halibut' charter fishing trips and charter trips targeting other groundfish (e.g., lingcod, rockfish). As a result, while it is 'assumed' that the vast majority of charter 'bottomfish' trips were, in fact, targeting halibut, this cannot be empirically verified.

total estimate of guided and unguided sport removals in 2010 was about 40,000 lb. Therefore, no increases in halibut are projected to go to the guided sport sector in that area, in this analysis.

Table 4-47 reports the estimated increase in the pounds of halibut available to the guided sport sector under each alternative considered by the Council (using the larger share applicable under tier 1 of the CSP). Gulf-wide the increase ranges from 0 lb under the status quo to 64,500 lb under a 15% PSC mortality reduction in both the hook-and-line and trawl sectors. The majority of the increase is projected to occur in Area 3A. In Area 2C, the increase ranges from 0 lb to just over 100 lb, depending on the alternative selected.

Table 4-47 Increases in halibut (in 1,000 lb. net weight) available to the guided sport sector in areas 2C and 3A, under tier 1 of the CSP

		Trawl PSC (1000 lbs)			
GOA		3,307	3,142	2,976	2,811
HAL PSC (1000 lbs)	496	0.0	20.1	40.2	60.2
	471	1.4	21.5	41.6	61.7
	446	2.9	23.0	43.0	63.1
	422	4.3	24.4	44.5	64.5

		Trawl PSC (1000 lbs)			
3A		3,307	3,142	2,976	2,811
HAL PSC (1000 lbs)	496	0.0	20.1	40.2	60.2
	471	1.4	21.5	41.6	61.6
	446	2.8	22.9	43.0	63.0
	422	4.2	24.3	44.3	64.4

		Trawl PSC (1000 lbs)			
2C		3,307	3,142	2,976	2,811
HAL PSC (1000 lbs)	496	0.0	0.0	0.0	0.0
	471	0.0	0.0	0.0	0.0
	446	0.1	0.1	0.1	0.1
	422	0.1	0.1	0.1	0.1

		Trawl PSC (1000 lbs)			
3B		3,307	3,142	2,976	2,811
HAL PSC (1000 lbs)	496	0.0	0.0	0.0	0.0
	471	0.0	0.0	0.0	0.0
	446	0.0	0.0	0.0	0.0
	422	0.0	0.0	0.0	0.0

Source: IPHC estimates of change in fishery CEY

Increases in the net weight of halibut available to the guided sport sector, when the fishery CEY triggers tier 2 or higher of the CSP, are provided in Table 4-48. The values are slightly smaller than those reported in Table 4-47, because under tier 2 of the CSP the guided sport sector is allocated a smaller percentage of the fishery CEY. When the hook-and-line and trawl sector's PSC limit is reduced by 15%, the gulf-wide increase to guide sport amount is 58,700 lb (net weight). Most of the increase occurs in Area 3A, because trawl halibut PSC is not taken in Area 2C.

Table 4-48 Increases in halibut (in 1,000 net weight) available to the guided sport sector in areas 2C and 3A, under tier 2 of the CSP

		Trawl PSC (1000 lbs)			
GOA		3,307	3,142	2,976	2,811
HAL PSC (1000 lbs)	496	0.0	18.3	36.5	54.8
	471	1.3	19.6	37.8	56.1
	446	2.6	20.9	39.1	57.4
	422	3.9	22.2	40.4	58.7

		Trawl PSC (1000 lbs)			
3A		3,307	3,142	2,976	2,811
HAL PSC (1000 lbs)	496	0.0	18.3	36.5	54.8
	471	1.3	19.5	37.8	56.0
	446	2.5	20.8	39.0	57.3
	422	3.8	22.1	40.3	58.6

		Trawl PSC (1000 lbs)			
2C		3,307	3,142	2,976	2,811
HAL PSC (1000 lbs)	496	0.0	0.0	0.0	0.0
	471	0.0	0.0	0.0	0.0
	446	0.1	0.1	0.1	0.1
	422	0.1	0.1	0.1	0.1

		Trawl PSC (1000 lbs)			
3B		3,307	3,142	2,976	2,811
HAL PSC (1000 lbs)	496	0.0	0.0	0.0	0.0
	471	0.0	0.0	0.0	0.0
	446	0.0	0.0	0.0	0.0
	422	0.0	0.0	0.0	0.0

The mean weight of halibut taken on charter trips for Area 2C and Area 3A is reported in Table 4-49. The information in that table indicates that guided sport halibut taken in Area 2C have historically been larger, on average, than guided sport halibut taken in Area 3A. The mean of the annual averages from 2003 through 2010 in Area 2C is 20.7 lb (net weight). In Area 3A the mean weight is 17.6 lb.

Table 4-49 Charter mean net weight[64] (lb), Areas 2C and 3A, 1995–2010

Year	Area 2C	Area 3A
1995	19.9	20.6
1996	22.1	19.7
1997	20.2	22.3
1998	29.1	20.8
1999	17.8	19.2
2000	19.8	19.7
2001	18.1	19.2
2002	19.7	18.2
2003	19.1	20.7
2004	20.7	18.6
2005	19.1	17.8
2006	19.9	17.9
2007	17.7	16.9
2008	19.4	17.0
2009	23.3	16.3
2010*	26.4	15.2

Source: ADF&G

* 2010 estimates are preliminary

If the 2003 through 2010 mean weights for Areas 2C and 3A are applied to the increased allocations that result from the PSC reductions to the groundfish fleets, an estimate of the increased number of halibut that may be harvested can be calculated. In Area 2C, the number of fish available to the guided sport sector increases by approximately 1.5 halibut for each 5% reduction in the hook-and-line gear PSC limit. The increased number of halibut available is the same for both tier 1 and tier 2 of the CSP.

In Area 3A, the number of halibut assigned the guided sport sector increases by 46 fish for each 5% decrease in the hook-and-line PSC limit (tier 1 of CSP). The increase in number of halibut is 661 fish for each 5% decrease in the trawl PSC limit. The range of fish is 0 under the status quo, to 2,121[65] when the hook-and-line and trawl PSC limits are reduced by 15%.

Under tier 2, the guided sport sector increases by 42 fish for each 5% decrease in the hook-and-line PSC limit. The increase in number of halibut is 601 fish for each 5% decrease in the trawl PSC limit. The range of fish is 0 under the status quo to 1,928 when the hook-and-line and trawl PSC limits are reduced by 15%. The number of halibut available is slightly less under tier 2, because tier 2 of the CSP allocates a smaller percentage of the fishery CEY increase to the charter sector than tier 1.

[64] Charter weights provided are for headed and dressed halibut. Commercial weights are also for headed and dressed halibut with a deduction for “slime and ice,” made by the processor at delivery.

[65] Under the prevailing two-fish bag limit in 3A, that represents a minimum of 1,061 charter customer-days.

Table 4-50 **Increased number of halibut (numbers of fish) that are available to the guided sport fleets in areas 2C and 3A, under tier 1 and tier 2 of the CSP**

Step 1

2C		Trawl PSC (1000 lbs)			
		3,307	3,142	2,976	2,811
HAL PSC (1000 lbs)	496	0	0	0	0
	471	1	1	1	1
	446	3	3	3	3
	422	4	4	4	4

Step 1

3A		Trawl PSC (1000 lbs)			
		3,307	3,142	2,976	2,811
HAL PSC (1000 lbs)	496	-	661	1,322	1,983
	471	46	707	1,368	2,029
	446	92	753	1,414	2,075
	422	138	799	1,460	2,121

Step 2

2C		Trawl PSC (1000 lbs)			
		3,307	3,142	2,976	2,811
HAL PSC (1000 lbs)	496	0	0	0	0
	471	1	1	1	1
	446	3	3	3	3
	422	4	4	4	4

Step 2

3A		Trawl PSC (1000 lbs)			
		3,307	3,142	2,976	2,811
HAL PSC (1000 lbs)	496	-	601	1,202	1,803
	471	42	643	1,244	1,845
	446	84	685	1,286	1,887
	422	125	726	1,327	1,928

The average harvest per client, used in the Catch Sharing Plan RIR, was estimated using 2002 through 2006 ADF&G data on the number of clients and the total charter harvest by area. Those calculations resulted in an estimated average harvest per client of 24 lb in Area 2C and 30 lb in Area 3A[66]. Annual variation in the size of halibut retained and the number of halibut harvested per angler could result in future averages being different from these projections. In addition, adoption of the 37 inch maximum size limit for the halibut that may be retained in Area 2C will affect future average harvest per client. The likely result would be a decrease the average size of retained halibut. However, given the estimated impact of 1 to 4 additional halibut available to harvest in Area 2C, changes in the estimated size of halibut caught will have a negligible effect on the additional number of clients that would fish to take the additional halibut.

In Area 3A, the average harvest per client was estimated to be 30 lb. Dividing the additional pounds of halibut available by 30 lb. per client, provides an estimate of the additional number of clients that could fish in Area 3A. Multiplying that number of clients by $225 per client[67] to charter a trip, yields an estimate of the additional revenue that would be generated by the guided sport fleet. Table 4-51 shows the estimated annual gross revenue increase for the guided sport sector in Area 3A. The increases range from $0 under the status quo to $289,549 ($263,226) with a 15% PSC reduction to both groundfish sectors at tier 1 of CSP (tier 2 of CSP).

Table 4-51 **Estimated increases in guided sport revenue in Area 3A, under tier 1 and tier 2 fishery CEY divisions**

Step 1

3A		Trawl PSC (1000 lbs)			
		3,307	3,142	2,976	2,811
HAL PSC (1000 lbs)	496	$ -	$ 90,238	$180,475	$270,713
	471	$ 6,279	$ 96,516	$186,754	$276,991
	446	$ 12,557	$102,795	$193,032	$283,270
	422	$ 18,836	$109,074	$199,311	$289,549

Step 2

3A		Trawl PSC (1000 lbs)			
		3,307	3,142	2,976	2,811
HAL PSC (1000 lbs)	496	$ -	$ 82,034	$ 164,068	$ 246,102
	471	$ 5,708	$ 87,742	$ 169,776	$ 251,810
	446	$ 11,416	$ 93,450	$ 175,484	$ 257,518
	422	$ 17,124	$ 99,158	$ 181,192	$ 263,226

Those increases would be divided among the businesses[68] that hold a permit to offer guided halibut trips to clients. If the gross revenue was equally divided among all of the business that held a halibut charter permit, the average increase in revenue per guided sport business is reported in Table 4-52. The increases in gross

[66] The average weight of charter caught halibut was greater in Area 2C than Area 3A, but the average weight harvested per client was greater in Area 3A. This indicates that, on average, clients harvested more halibut in Area 3A.

[67] $225 per client was used as the average cost of a trip in the CSP RIR, NPFMC 2010.

[68] The number of businesses was taken from the RAM website during 2011. Resolution of interim pernits since then will reduce the number of businesses with permits.

revenue range from $0 to about $1,094, annually, depending on the number of businesses that are permitted in the long term and the division of the fishery CEY (tier 1 or tier 2).

Table 4-52 Mean gross revenue increase per business holding a halibut charter permit in Area 3A

Step 1 (272 businesses)		Trawl PSC (1000 lbs)			
3A		3,307	3,142	2,976	2,811
HAL PSC (1000 lbs)	496	$ -	$ 341	$ 682	$ 1,023
	471	$ 24	$ 365	$ 706	$ 1,047
	446	$ 47	$ 388	$ 729	$ 1,070
	422	$ 71	$ 412	$ 753	$ 1,094

Step 2 (272 businesses)		Trawl PSC (1000 lbs)			
3A		3,307	3,142	2,976	2,811
HAL PSC (1000 lbs)	496	$ -	$ 310	$ 620	$ 930
	471	$ 22	$ 332	$ 641	$ 951
	446	$ 43	$ 353	$ 663	$ 973
	422	$ 65	$ 375	$ 685	$ 995

Step 1 (326 businesses)		Trawl PSC (1000 lbs)			
3A		3,307	3,142	2,976	2,811
HAL PSC (1000 lbs)	496	$ -	$ 284	$ 569	$ 853
	471	$ 20	$ 304	$ 589	$ 873
	446	$ 40	$ 324	$ 609	$ 893
	422	$ 59	$ 344	$ 628	$ 913

Step 2 (326 businesses)		Trawl PSC (1000 lbs)			
3A		3,307	3,142	2,976	2,811
HAL PSC (1000 lbs)	496	$ -	$ 259	$ 517	$ 776
	471	$ 18	$ 277	$ 535	$ 794
	446	$ 36	$ 295	$ 553	$ 812
	422	$ 54	$ 313	$ 571	$ 830

4.6.2.3 Unguided Sport and Subsistence

A summary of the unguided sport and subsistence use halibut harvest for 1995 through 2010 is provided in Table 4-7 for Area 2C, Table 4-8 for Area 3A, and Table 4-9 for Area 3B. In Area 2C the unguided sport harvest of halibut ranged from a low of 0.72 in 2001 and 2003 to a high of 1.27 in 2010. The subsistence catch was 0.17 from 1995 through 2002 and increased to a high of 0.68 in 2004. During both 2009 and 2010, the subsistence harvest was estimated to be 0.46 .

In Area 3A, the unguided sport harvest was 1.48 in 2002. The harvest increased to 2.28 in 2007, before declining to 2.01 in 2010. Subsistence harvest was at its lowest level in 1995 and 1996 (10,000 lb). Harvest increased to 0.43 in 2005, before declining to 0.33 in 2009 and 2010.

Guided and unguided sport harvest of halibut is not divided in Area 3B. The guided sport fishery is limited in that area, due to its remoteness and associated logistical complexities and costs. The majority of the sport harvest is unguided, by local residents in the area. Table 4-9 indicates that the sport harvest of halibut was 7,000 lb. in 2004. Harvest increased to 40,000 lb. in 2010. Subsistence harvest was estimated to be 20,000 lb. from 1998 through 2002. Harvest increased to 49,000 lb in 2006 and then decreased to 26,000 lb in 2010.

Fall et al (2011) provide a detailed analysis of the 2009 halibut subsistence fishery. This is the most recent year for which detailed data have been published. The report includes information on all communities that participate in the subsistence fishery for halibut. Special emphasis is placed on the study of Sitka, Petersburg, Cordova, Port Graham, Kodiak, and Sand Point. These are communities in IPHC Area 2C, 3A or 3B. Persons considered to reside in Kodiak or on the Kodiak road system harvested the most subsistence halibut in 2009 (177,769 lb). This harvest was made by 1,826 Subsistence Halibut Registration Certificate (SHARC) holders. Sitka SHARC holders (1,731) harvested the second largest amount of subsistence halibut (174,880 lb), which was 11% of the statewide subsistence total. The 1,041 SHARC holders in Petersburg harvested 46,766 lb of subsistence halibut. Cordova SHARC holders (599) harvested 23,364 lb. Sand Point SHARC holders (137) harvested 11,759 lb of subsistence halibut. The 47 Port Graham SHARC holders harvested 6,426 lb of subsistence halibut in 2009.

The methodology used to allocate the available halibut resource to subsistence users and the unguided sport sector means they receive their allowance prior to determining the amount of halibut available to the guided sport and commercial IFQ sectors. Because their harvests are deducted from the total CEY at the same time projected O26 removals and O26 commercial wastage is deducted and the size of the reductions in GOA PSC limits proposed, the subsistence users and unguided sport sector are not expected to be impacted by decreasing PSC limits. Therefore, reducing the GOA halibut PSC limit by 5%, 10%, or 15% is assumed not to affect the amount of halibut that is available to subsistence users and the unguided sport sector in IPHC areas 2C, 3A, or 3B.

4.6.3 Impacts on the Groundfish Fisheries[69]

This section of the analysis will provide information on the social and economic impacts of the proposed halibut PSC limit reductions. The impacts will be discussed for each fishery and option being considered by the Council. Impacts will be discussed both in terms of metric tons of groundfish foregone and estimated gross value of that groundfish (based on standardized annual prices). The weight of groundfish foregone will be generated using the assumption that it is the difference between the status quo harvest and the amount harvested up to the reduced PSC limit. The analysis does not attempt to project how much additional fish would have been harvested, if the fishery had not closed early under the status quo. Estimating that catch was not included, because the focus of this analysis is estimating the impacts of reducing the PSC limit, not determining the impact the status quo had on fishery harvest and gross revenues. Again, this is a static assessment employing a hypothetical "back-cast" approach.

4.6.3.1 Demersal Shelf Rockfish Fishery

Estimating the impacts on the directed DSR fishery of reducing the 10 mt halibut PSC limit by 5%, 10%, or 15% requires more information than is currently available. Despite these shortcomings, a few observations concerning the fishery allow for weak conclusions concerning the effects of the alternatives. Observer coverage levels in this fishery have been deemed to be insufficient to estimate halibut PSC, because the majority of the vessels in the fishery are less than 60' LOA and have not been required to have observer coverage. As a result of limited halibut PSC data from the fishery, NOAA Fisheries has not found it possible to actively manage the 10 mt halibut PSC limit. If the proposed restructured observer program is implemented, NOAA Fisheries will be able to collect catch and PSC data that would allow them to estimate halibut PSC usage in the SEO DSR fishery. However, until that information is available - 2013 at the earliest - it is not possible to project the impact of reducing PSC limits, except to say that halibut PSC could be constraining in the future. To the extent such a constraint is binding, a lower cap would impose a greater constraint.

Assuming that the DSR fishery has no halibut PSC mortality reduces the halibut removal estimates for IPHC Area 2C. To the extent that any halibut mortality arises in the DSR fishery and future observer coverage provides an estimate of that mortality, alternatives that reduce halibut PSC from the DSR fishery would have a minor effect on the halibut fishery in Area 2C. Any commercial DSR harvest from the SEO District would need to be harvested within the 10 mt annual halibut PSC allowance (under the status quo and a 5% reduction) or the 9 mt PSC limit (under the 10% and 15% reductions) shown in Table 4-53. As stated earlier, it is not possible to determine the economic impacts that decreasing these limits may have on the directed commercial harvesters, processors, communities, and consumers. The effect, however, is likely to be small, as both the DSR fishery and the halibut PSC available to the fishery are small, especially in comparison to the amounts of target species and halibut PSC available to other fisheries.

To assess the potential impacts of the action on the DSR fishery, it is important to consider the management of that fishery (and the species) in recent years. Background information on the DSR fishery presented in Section 4.5.3.2 showed that since 2004, the majority of annual DSR landings are taken as incidental catch in other fisheries. Incidental catch in the halibut IFQ fishery was 197 mt (2006), 190 mt (2007), 144 mt (2008), 163 mt (2009), and 147 mt (2010) (GOA SAFE, 2010). Directed fishing for DSR was not opened during 2006 or 2007, because it was projected that insufficient TAC would be available, after incidental catch needs of other fisheries were deducted. The fishery was opened in 2008, 2009, and 2010, but the directed fishery was smaller than the incidental catch from other fisheries.

[69] Includes summary of effects on sideboards.

Because harvesters may utilize much of the available DSR as incidental catch in the halibut IFQ fishery, reducing the halibut PSC limit on the directed fishery may not greatly reduce the amount of DSR that may be harvested. At the current low 2C halibut IFQ levels (2,330,000 lb or about 1,057 mt), the 10 percent[70] DSR rate would allow only up to 105 mt of DSR to be taken. Additional DSR may be taken above the limit that may be sold, bartered, or traded. DSR retained above the 10% limit is primarily for personal use. This catch would not be affected by this action.

Since the halibut PSC changes to the DSR fishery proposed under this action amount to 1 mt at most, this action is unlikely to have a noticeable effect on either participants in that fishery or the directed halibut fishery.

Table 4-53 Demersal Shelf Rockfish PSC limits under the proposed alternatives

Demersal Shelf Rockfish	Total Allocation	1st season 86 percent (January 1 to June 10)	2nd season 5 percent (June 10 to September 1)	3rd season 9 percent (September 1 to End of Year)
Status quo	10	(no seasonal distribution)		
Option 1 - 5 % reduction	10			
Option 2 - 10% reduction	9			
Option 3 - 15% reduction	9			

4.6.3.2 Non-DSR hook-and-line

Impacts of modifying the non-DSR halibut PSC limits for hook-and-line vessels are discussed in this section. The analysis examines the extent to which the limits proposed under the alternatives would have bound participants in the fisheries, if those limits had been in place historically. A few factors should be considered in assessing the results of the analysis. The limits, to date, were not applied on a sector basis (e.g., to catcher vessels and catcher processors independently). Instead, both sectors fished under a combined limit. In addition, to the extent that the sectors are subject to separate limits in the future, the incentive for a sector may be different than under the historical management of the combined limit. The effects of these factors are considered in Section 4.6.3 below.

As presented in Section 4.5.3.1, the non-DSR hook-and-line fishery is divided into three seasons, with catcher processors being given 40.3% of each seasonal halibut PSC limit and catcher vessels being given the remaining 59.7%. Because unused PSC may be rolled-over from earlier seasons, when a season's cumulative PSC limit is reached by a sector (either the catcher vessels or catcher processors), the sector is closed to fishing. The fisheries reopen when the next seasonal allowance becomes available, if it was not taken as an overage the previous season. Cumulative halibut PSC limits for the non-DSR hook-and-line catcher vessel and catcher processor sectors are presented in Table 4-54.

[70] When DSR is closed to directed fishing in the SEO, the operator of a catcher vessel that is required to have a Federal fisheries permit under § 679.4(b), or the manager of a shoreside processor that is required to have a Federal processor permit under § 679.4(f), must dispose of DSR retained and landed as follows: (i) A person may sell, barter, or trade a round weight equivalent amount of DSR that is less than or equal to 10 percent of the aggregate round weight equivalent of IFQ halibut and groundfish species, other than sablefish, that are landed during the same fishing trip. (ii) A person may sell, barter, or trade a round weight equivalent amount of DSR that is less than or equal to 1 percent of the aggregate round weight equivalent of sablefish in a given landing. Additional DSR may be retained, but it cannot be sold, bartered, or traded. Most of the DSR above the stated limits is used for personal consumption or donated.

Table 4-54 Cumulative Non-DSR hook-and-line halibut PSC mortality limits (mt)

	Total Allocation	1st season 86 percent (January 1 to June 10)	2nd season 2 percent (June 10 to September 1)	3rd season 12 percent (September 1 to End of Year)
All fisheries except demersal shelf rockfish				
Status quo - both operation types	290	250	5	35
Catcher processor (40.3% of total)				
Status quo	117	101	2	14
Option 1 - 5 % reduction	111	96	2	13
Option 2 - 10% reduction	105	91	2	13
Option 3 - 15% reduction	100	86	2	12
Catcher vessel (59.7% of total)				
Status quo	173	149	3	21
Option 1 - 5 % reduction	165	142	3	20
Option 2 - 10% reduction	156	134	3	19
Option 3 - 15% reduction	148	127	3	18
Demersal Shelf Rockfish				
Status quo	10	(no seasonal distribution)		
Option 1 - 5 % reduction	10			
Option 2 - 10% reduction	9			
Option 3 - 15% reduction	9			
All values are metric tons.				

Source: Council options

It should be noted that when the catcher vessel and catcher processor split of halibut PSC was implemented under GOA FMP Amendment 83, a decision was made regarding the amount of halibut PSC allocated to each sector. That division of halibut PSC is used as the status quo for this analysis. As shown in Table 4-54 the catcher processor sector was allocated 40.3% of the 290 mt limit, and catcher vessels were allocated 59.7%. Members of the catcher processor sector have indicated that under Amendment 83 their sector's percentage of the halibut PSC limit was reduced and that reduction should be considered when determining any additional halibut PSC reductions to their sector. Table 2-55, from Amendment 83 (http://www.fakr.noaa.gov/sustainablefisheries/amds/83/earirfrfa0911.pdf), indicates that using the "best" 3, 5, or 7 years of data over select years, during the 1995 through 2008 time period, the catcher processor's halibut PSC usage ranged between 46.4% and 49.1% of the total hook-and-line allowance. Given that their current allowance is 40.3%, their PSC was reduced 13.1% compared to the 46.4% option and 17.9% compared to the 49.1% option. However, if the PSC usage estimates are based on the relative halibut PSC usage used in this analysis (see Table 4-56) the catcher processor sector used between 20.4% and 54.0% of the combined PSC limit, annually, between 2003 and 2011. During 2010 (54.0%) and 2011 (53.7%) the catcher processor sector had greater PSC usage than previous years and the status quo allowance is less than the halibut PSC usage those years. On average, over that entire period, the catcher processor sector accounted for 36.7% of the hook-and-line PSC usage, which is less than their status quo allowance. Based on these estimates, it is dependent on the years selected and how they are combined, whether the catcher processor sector is currently operating under a PSC reduction.

The 2012 division of the Central and Western Gulf Pacific cod TAC is reported in Table 4-55. The total percentage division of Pacific cod in these tables reflects the status quo percentage division of halibut PSC.

Table 4-55 **Western and Central GOA Pacific cod allocations for 2012**

Sector	Cental GOA		Western GOA		Total	
	mt	%	mt	%	mt	%
CP	2,158	19.3%	4,100	93.4%	6,258	40.2%
CV	9,009	80.7%	290	6.6%	9,299	59.8%
Total	11,167	100.0%	4,390	100.0%	15,557	100.0%

Source: http://www.fakr.noaa.gov/sustainablefisheries/specs12_13/goatable5.pdf

The information presented in Table 4-55 excludes the Eastern GOA Pacific cod fishery (1,971 mt) and any other hook-and-line target fisheries in the GOA, because they are not allocated to individual sectors. These fisheries will impact the halibut PSC usage by each sector, but will vary by year depending on the participation by catcher vessels and catcher processors. Finally, if the catcher processor PSC limit has effectively been reduced, any benefit would be realized by the catcher vessel sector, since the overall hook-and-line PSC limit is unchanged.

4.6.3.2.1 Status Quo

Table 4-56 shows the status quo PSC limits, in metric tons, as a cumulative total by sector. The first row of data shows the status quo PSC limits, which are applied beginning in 2012. The yearly information in the rows below the PSC limit shows the cumulative halibut PSC, by season and sector. Cells that are highlighted indicate the sector would have exceeded its cumulative PSC limit (had those limits been in effect at the time). For example, the catcher vessel sector's halibut PSC limit through the second season is 152 mt. During the 2003 fishing year, catcher vessels were estimated to have taken 165 mt of halibut PSC by the end of the second season. Therefore, they exceeded the status quo cumulative second season PSC limit by 13 mt. Because the hook-and-line PSC limit was not divided among catcher vessels and catcher processors until 2010, the fishery did not close that year, since catcher processors were more than 13 mt below their seasonal cumulative limit. However, the Eastern GOA Pacific cod fisheries (both inshore and offshore) were closed by halibut PSC on August 1st, because the second season limit was projected by NOAA Fisheries to have been taken. The Central and Western GOA fisheries were already closed, based on their TACs having been harvested. The catcher vessel sector also would have exceeded its PSC limit for the third season. Catcher processors did not exceed their limit during 2003.

Table 4-56 **Status quo non-DSR hook-and-line PSC limit (cumulative) and the cumulative halibut PSC (mt), 2003-2011**

Year	1st Season			2nd Season			3rd Season			Annual
	CP	CV	Total	CP	CV	Total	CP	CV	Total	Pcod TAC
PSC Limit	101	149	250	103	152	255	117	173	290	
2003	87	134	221	89	165	254	107	179	286	40,540
2004	74	121	195	74	122	195	123	171	294	48,033
2005	17	82	99	17	82	99	43	164	207	44,433
2006	35	106	142	35	107	142	141	192	333	39,090
2007	68	105	173	68	105	173	105	185	290	52,264
2008	73	130	202	73	131	204	101	395	496	50,269
2009	64	136	201	64	137	202	95	183	278	41,807
2010	59	77	136	59	77	136	122	104	226	59,563
2011	35	46	81	35	46	81	130	111	242	73,719

Source: AKFIN summary of NOAA Catch Accounting Data and NOAA Fisheries Specification Tables for the GOA 2003 through 2011.

Overall, NOAA Fisheries closed the non-DSR hook-and-line groundfish fisheries (other than sablefish) that were still open on August 1, 2003 (for the remainder of the second season), and on October 2, 2004, and

October 16, 2008 for the remainder of those years. While the PSC limit was exceeded during the 2006 fishing year, halibut PSC never resulted in fishery closures.

The halibut PSC in 2008 (496 mt) is greater than the amount reported on the NOAA Fisheries web site (425 mt). However, both numbers exceed the PSC limit of 290 mt that would have been in place that year. Because the fishery was not closed by halibut mortality when the data indicate the limit was reached, it is difficult to retrospectively assess the impacts of the overage, in comparison to what would have occurred if the fishery were operating under a reduced PSC limit. Therefore, some tables provide averages that exclude 2008, because of the uncertainty surrounding the PSC data used in the analysis.

4.6.3.2.2 5 Percent Halibut PSC Reduction

A 5% reduction in the non-DSR PSC limit equates to a total limit of 276 mt; that allowance is divided so that catcher processors may take 111 mt and catcher vessels 165 mt. Limits set for the first season would allow the catcher processor sector 96 mt of halibut PSC and the catcher vessel sector to take 142 mt of halibut PSC. The first season combined limit is 238 mt (86% of the annual total). By the end of the second season, catcher processors would be allowed to take 98 mt of halibut PSC cumulatively (a two metric ton increase from the first season). Catcher vessels would be allowed to take up to 145 mt cumulatively (a three metric ton increase from the first season). Table 4-57 shows these limits and the extent to which they would have been binding, historically.

Table 4-57 A 5% reduction in the non-DSR hook-and-line PSC limit (cumulative) and the cumulative halibut PSC (mt), 2003-2011

Year	1st Season			2nd Season			3rd Season			Annual
	CP	CV	Total	CP	CV	Total	CP	CV	Total	Pcod TAC
PSC Limit	96	142	238	98	145	243	111	165	276	
2003	87	134	221	89	165	254	107	179	286	40,540
2004	74	121	195	74	122	195	123	171	294	48,033
2005	17	82	99	17	82	99	43	164	207	44,433
2006	35	106	142	35	107	142	141	192	333	39,090
2007	68	105	173	68	105	173	105	185	290	52,264
2008	73	130	202	73	131	204	101	395	496	50,269
2009	64	136	201	64	137	202	95	183	278	41,807
2010	59	77	136	59	77	136	122	104	226	59,563
2011	35	46	81	35	46	81	130	111	242	73,719

Source: AKFIN summary of NOAA Catch Accounting Data

Based on the information presented for 2003 through 2009, it appears that the greatest impact of reducing the halibut PSC limit would be on the catcher vessel sector. The catcher vessel sector exceeded the PSC limit that would have been in place, using the current PSC division, each year. However, during 2010, the catcher processor sector reported more halibut PSC than the catcher vessel sector and would have slightly exceeded their PSC limit. That year the catcher vessel sector remained about 60 mt under their annual limit and would not have reached or exceeded their limit during any season. Based on data available through 2011, the catcher processor sector slightly exceeded their annual PSC limit during 2004, 2006, 2010, and 2011. The limit was not a constraint in either the first or second seasons. Catcher vessels did not exceed their PSC limit in the first or second seasons (except during 2003), and still had 54 mt of halibut PSC available at the end of 2011.

Table 4-58 A 10% reduction in the non-DSR hook-and-line PSC limit (cumulative) and the cumulative halibut PSC (mt), 2003-2011

Year	1st Season			2nd Season			3rd Season			Annual
	CP	CV	Total	CP	CV	Total	CP	CV	Total	Pcod TAC
PSC Limit	91	134	225	93	137	230	105	156	261	
2003	87	134	221	89	165	254	107	179	286	40,540
2004	74	121	195	74	122	195	123	171	294	48,033
2005	17	82	99	17	82	99	43	164	207	44,433
2006	35	106	142	35	107	142	141	192	333	39,090
2007	68	105	173	68	105	173	105	185	290	52,264
2008	73	130	202	73	131	204	101	395	496	50,269
2009	64	136	201	64	137	202	95	183	278	41,807
2010	59	77	136	59	77	136	122	104	226	59,563
2011	35	46	81	35	46	81	130	111	242	73,719

Source: AKFIN summary of NOAA Catch Accounting Data

Table 4-59 A 15% reduction in the non-DSR hook-and-line PSC limit (cumulative) and the cumulative halibut PSC (mt), 2003-2011

Year	1st Season			2nd Season			3rd Season			Annual
	CP	CV	Total	CP	CV	Total	CP	CV	Total	Pcod TAC
PSC Limit	86	127	213	88	130	218	100	148	248	
2003	87	134	221	89	165	254	107	179	286	40,540
2004	74	121	195	74	122	195	123	171	294	48,033
2005	17	82	99	17	82	99	43	164	207	44,433
2006	35	106	142	35	107	142	141	192	333	39,090
2007	68	105	173	68	105	173	105	185	290	52,264
2008	73	130	202	73	131	204	101	395	496	50,269
2009	64	136	201	64	137	202	95	183	278	41,807
2010	59	77	136	59	77	136	122	104	226	59,563
2011	35	46	81	35	46	81	130	111	242	73,719

Source: AKFIN summary of NOAA Catch Accounting Data

A summary of the 2003 through 2010 fisheries is presented in Table 4-60. The top section of the table shows the non-DSR hook-and-line halibut PSC mortality (mt) for the years 2003 through 2010. These data are reported by month and halibut PSC season. Confidential data are withheld and replaced with an asterisk. That only occurred in December 2010, but to keep that information confidential the information for November is also removed.

Average halibut PSC mortality rates are presented for 2003 through 2010, and for 2003 through 2010 excluding 2008, because 2008 halibut PSC used in this analysis (AKFIN summary of NOAA catch accounting data) was about 70 mt more than was reported by NOAA Fisheries for management that year. Halibut PSC mortality for all the other years used in this analysis are about the same as used by NOAA Fisheries to manage the PSC allowance. Including both amounts allows the reader to examine the effects of including 2008 data.

The middle section of the table reports the GOA groundfish catch (retained and discarded) of the non-DSR hook-and-line fleet reported in the NOAA Fisheries catch accounting system. Catch is from all groundfish directed fisheries (except hook-and-line sablefish) and is reported in metric tons. The vast majority of these landing are Pacific cod.

Halibut PSC mortality rates are provided in the bottom section of the table. Rates were calculated by dividing the amount of halibut mortality in the top section of the table by the groundfish catch in the middle section of the table. Average rates are then presented by month and season for 2003 through 2010. A second average is calculated using the same range of years, but excluding 2008.

Table 4-60 Monthly and seasonal halibut PSC, groundfish catch, and halibut mortality rates, 2003-2010

	1st Season							2nd Season				3rd Season					Annual
Year	Jan	Feb	Mar	Apr	May	9-Jun	Total	10-Jun	Jul	Aug	Total	Sep	Oct	Nov	Dec	Total	
	Halibut Mortality																
2003	66	81	45	16	11	3	221	12	16	5	33	33	0		0	33	287
2004	176	16	1	1	1	0	195	0	0	0	1	79	19	0		99	294
2005	86	8	5	0	0	0	99	0	0	0	0	75	11	2	21	108	207
2006	57	61	23	0	1	0	142	0	0	0	0	37	58	76	21	191	333
2007	41	94	38		1	0	173					32	54	8	23	117	290
2008	64	107	28	2	1	0	202	1	0		1	246	46	0		292	496
2009	97	89	8	1	5	0	201	0		0	1	35	28	13		77	278
2010	56	69	6	3	2		136	0		0	0	64	26	*	*	90	226
Average	80	66	19	3	3	1	171	2	3	1	5	75	30	17	16	126	301
Avg excluding 2008	83	60	18	4	3	1	167	2	4	1	6	51	28	20	16	102	274
	Total Groundfish																
2003	3,909	2,907	1,873	238	146	44	9,117	175	278	98	550	890	0		6	896	10,563
2004	7,121	981	85	27	82	1	8,297	39	22	36	96	1,650	401	1		2,052	10,445
2005	3,229	365	51	126	6	1	3,777	4	1	0	4	1,187	178	39	492	1,896	5,677
2006	2,797	2,866	640	8	12	3	6,326	6	1	0	7	939	1,071	1,723	515	4,248	10,581
2007	1,881	3,691	1,540		40	3	7,156					1,071	2,011	390	833	4,305	11,460
2008	2,219	5,076	1,877	119	83	12	9,388	52	12		64	1,914	558	8		2,480	11,931
2009	4,353	4,429	458	93	297	26	9,656	21		21	42	1,394	1,542	874		3,810	13,509
2010	5,334	5,516	465	253	145		11,714	18		1	19	2,905	2,057	*	*	5,000	16,734
Average	3,855	3,229	874	124	101	13	8,179	45	63	26	112	1,494	977	506	461	3,086	11,363
	Halibut Mortality Rate (halibut (mt) per groundfish (mt))																
2003	0.017	0.028	0.024	0.066	0.075	0.065	0.024	0.067	0.059	0.046	0.059	0.037	0.031		0.016	0.037	0.027
2004	0.025	0.016	0.017	0.024	0.012	0.037	0.023	0.007	0.013	0.007	0.008	0.048	0.048	0.065		0.048	0.028
2005	0.026	0.022	0.089	0.003	0.041	0.041	0.026	0.037	0.020	0.059	0.034	0.063	0.060	0.044	0.042	0.057	0.036
2006	0.020	0.021	0.035	0.027	0.044	0.037	0.022	0.037	0.037	0.037	0.037	0.040	0.054	0.044	0.040	0.045	0.031
2007	0.022	0.025	0.024		0.023	0.024	0.024					0.030	0.027	0.021	0.028	0.027	0.025
2008	0.029	0.021	0.015	0.013	0.012	0.020	0.022	0.020	0.021		0.020	0.128	0.082	0.058		0.118	0.042
2009	0.022	0.020	0.016	0.013	0.017	0.017	0.021	0.017		0.023	0.020	0.025	0.018	0.015		0.020	0.021
2010	0.011	0.013	0.013	0.011	0.012		0.012	0.012		0.020	0.013	0.022	0.013	*	*	0.018	0.014
Average	0.021	0.020	0.022	0.026	0.027	0.042	0.021	0.044	0.054	0.034	0.046	0.050	0.031	0.033	0.035	0.041	0.027
Avg excluding 2008	0.020	0.021	0.031	0.024	0.032	0.037	0.022	0.029	0.032	0.032	0.028	0.038	0.036	0.038	0.031	0.036	0.026

Source: AKFIN summaries of NOAA Fisheries catch accounting data 2003 through 2010.

Table 4-61 Estimates of groundfish catch under each Council option to reduce the non-DSR hook-and-line PSC limit, 2003-2010

Year	PSC mortality limit reduction			
	0%	5%	10%	15%
2003	10,685	10,151	9,616	9,082
2004	10,308	9,793	9,277	8,762
2005	7,947	7,549	7,152	6,755
2006	9,218	8,757	8,296	7,835
2007	11,448	10,875	10,303	9,731
2008	6,978	6,629	6,280	5,931
2009	14,087	13,383	12,678	11,974
2010	21,438	20,366	19,294	18,222

Source: AKFIN summary of NOAA Fisheries catch accounting data

Table 4-62 **Estimates of maximum, minimum, average, and median groundfish catch under each Council option to reduce the non-DSR hook-and-line PSC limit, 2003-2010**

Year	PSC mortality limit reduction			
	0%	5%	10%	15%
Maximum	21,438	20,366	19,294	18,222
Minimum	6,978	6,629	6,280	5,931
Average (exclude 2008)	11,113	10,557	10,001	9,446
Median (excluding 2008)	10,497	9,972	9,447	8,922

Table 4-63 **Estimates of changes in gross ex-vessel and gross first wholesale revenue, 2003-2010**

Year	Estimated change in catch from a 5% reduction in PSC (mt)	Gross $/mt		Change in Gross Revenue ($1,000)	
		Ex-vessel*	1st Wholesale**	Ex-vessel	1st Wholesale
2003	534	670	1,206	$358	$644
2004	515	589	1,225	$303	$631
2005	397	657	1,327	$261	$527
2006	461	886	1,690	$408	$779
2007	572	1,093	1,990	$626	$1,139
2008	349	1,235	2,164	$431	$755
2009	704	666	1,340	$469	$944
2010	1,072	608	1,373	$652	$1,472

Source: Prices are from
*Table 18 of the 2006 and 2011 Economic SAFE Documents (Pacific cod prices were used)
**Table 27 of the 2006 and 2011 Economic SAFE Documents (average of CP and shorebased Pacific cod prices)
Assumptions: Entire 5% PSC reduction would have been taken and sufficient Pacific cod TAC was available to harvest under any PSC limit.

The above projections were made based on annual harvest rates. Separating historical catch data by week allows estimates of revenue foregone to be derived, by allowing analysts to project the date of fishery closures and the influence of changes in the available halibut PSC on those closures. The exvessel gross revenue and first wholesale gross revenue foregone under each of the options is estimated by summing the revenue that was generated after the fishery was projected to have closed. Section 4.5.4 shows the catch by season and the dates the fisheries were projected to close. Those are the dates used to determine the first wholesale revenue foregone. Data from halibut IFQ and sablefish IFQ targets were excluded, because those fisheries are not closed as a result of the PSC limit being reached.

Using this method, the catcher vessels and the processors taking deliveries from those vessels would have realized the greatest reduction in gross revenue. Ex-vessel gross revenue reductions for both catcher vessels and catcher processors are presented in Table 4-64. Based on the average 2003 through 2010 annual ex-vessel revenue reductions, the total revenue foregone under a 5%, 10%, and 15% PSC reduction was $170,000, $390,000, and $640,000, respectively. In general the catcher vessel sector accounted for about two-thirds of the reduction under each alternative. These estimates are based on the assumption that the sector level halibut PSC limit been in place and NOAA Fisheries had closed the fishery when the PSC limit was reported to have been taken.[71]

[71] The estimate assumed the PSC limit was split between catcher vessels and catcher processors those years. That split did not occur until 2011. If the split had been in place, it may have altered the behavior of participants. The potential behavioral changes are discussed in Section 4.6.6 below, but are assumed to have no effect for purposes of this computation.

Table 4-64 Estimated ex-vessel gross revenue reductions associated with hook-and-line catch by each of the options being considered by the Council ($million)

	CPs (percentage reductions)				CVs (percentage reductions)			
Year	Status Quo	5%	10%	15%	Status Quo	5%	10%	15%
2003	$0.00	$0.00	$0.00	$0.09	$0.00	$0.26	$0.31	$0.49
2004	$0.00	$0.10	$0.10	$0.10	$0.00	$0.03	$0.14	$0.14
2005	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.09	$0.26
2006	$0.00	$0.00	$0.34	$0.34	$0.00	$0.12	$0.27	$0.44
2007	$0.00	$0.00	$0.00	$0.00	$0.00	$0.50	$0.70	$0.87
2008	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.36
2009	$0.00	$0.00	$0.00	$0.00	$0.00	$0.03	$0.43	$0.97
2010	$0.00	$0.33	$0.77	$1.06	$0.00	$0.00	$0.00	$0.00
Average	$0.00	$0.05	$0.15	$0.20	$0.00	$0.12	$0.24	$0.44

Source: NOAA Fisheries catch accounting and Economic SAFE annual prices

First wholesale gross revenue reductions are presented in Table 4-65. The overall reduction follow a similar trend as reported at the ex-vessel level, with the first wholesale reductions being about two times as large as the ex-vessel reductions. Annual average first wholesale revenue reductions under a 5%, 10%, and 15% PSC reduction was $340,000, $780,000, and $1.27 million, respectively.

Table 4-65 Estimated first wholesale gross revenue reductions associated with hook-and-line catch by each of the options being considered by the Council ($million)

	CPs (percentage reductions)				CVs (percentage reductions)			
Year	Status Quo	5%	10%	15%	Status Quo	5%	10%	15%
2003	$0.00	$0.00	$0.00	$0.16	$0.00	$0.47	$0.56	$0.88
2004	$0.00	$0.20	$0.20	$0.20	$0.00	$0.06	$0.30	$0.30
2005	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.18	$0.53
2006	$0.00	$0.00	$0.65	$0.65	$0.00	$0.22	$0.52	$0.85
2007	$0.00	$0.00	$0.00	$0.00	$0.00	$0.92	$1.28	$1.59
2008	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.63
2009	$0.00	$0.00	$0.00	$0.00	$0.00	$0.06	$0.86	$1.95
2010	$0.00	$0.74	$1.74	$2.39	$0.00	$0.00	$0.00	$0.00
Average	$0.00	$0.12	$0.32	$0.43	$0.00	$0.22	$0.46	$0.84

Source: AKFIN summary of NOAA Fisheries catch accounting data

4.6.3.3 Trawl Fishery Impacts

Economic impacts on the trawl fisheries are discussed in this section. The section includes analysis of both deep-water and shallow-water complexes. Overall impacts on the participants in the two complexes will be discussed first, followed by a section that distinguishes the effects on the various sectors that participate in affected fisheries.

The analysis goes on to assess the effects on sideboarded sectors, as well as the potential for vessels subject to the sideboards to affect others who are not operating under sideboard limits. The overall impacts are discussed first, because sideboard limits are not guarantees of access to a specific amount of halibut PSC allowance, and do not close all sectors to fishing. Sideboard limits, however, provide a specific level of protection to vessels not subject to the limits. The protection, and its effects, will vary under the alternatives and options before the Council. Participation in the trawl fishery (including participating sectors) is described in Section 4.3.2 above.

Table 4-66 shows the percentage of first wholesale gross revenue generated by GOA groundfish fishing, by operation type (i.e., catcher vessel/catcher processor) and target complex (i.e., deep-water/shallow-water).

Information presented in this table shows relative dependence of each sector on the various fisheries, based upon first wholesale gross revenue.[72] For catcher processors, deep-water complex fisheries (rockfish, arrowtooth flounder, and rex sole) generate the most first wholesale gross revenue, with rockfish accounting for half or more of the sector's total gross revenues in most years. Shallow-water complex gross revenue is substantially less, making up less than 10% of the sector's GOA total first wholesale gross revenues in each of the five most recent years (2006 through 2010). Flathead sole has generated the greatest amount of gross first wholesale revenue in the shallow-water complex in recent years. Pacific cod generated up to 10% of gross first wholesale revenue in 2004, but, in the more recent years, it has only generated 1% or 2% of gross first wholesale revenue from GOA fisheries. Low pollock and Pacific cod revenues are a direct result of the limitations placed on the fleet by inshore/offshore regulations and sideboards.

Table 4-66 Percentage of GOA first wholesale gross revenue by fishery and year, 2003-2010

	Deep-water Complex					Shallow-water Complex						
Year	Arrowtooth Flounder	Deep Water Flatfish	Rex Sole	Rockfish	Sablefish	Atka Mackerel	Flathead Sole	Other Species	Pacific Cod	Pollock-Bottom	Pollock-midwater	Shallow Water Flatfish
	Catcher Processors											
2003	41%	0%	12%	40%	0%	0%	2%	1%	4%	0%	0%	0%
2004	5%	0%	8%	65%	2%	0%	7%	0%	10%	0%	0%	3%
2005	20%	0%	6%	59%	0%	0%	5%	0%	5%	0%	0%	4%
2006	24%	0%	10%	59%	0%	0%	2%	0%	4%	0%	0%	1%
2007	23%	0%	13%	58%	0%	0%	3%	0%	2%	0%	0%	0%
2008	28%	0%	9%	59%	0%	0%	3%	0%	1%	0%	0%	0%
2009	6%	0%	27%	57%	1%	0%	3%	0%	2%	0%	0%	1%
2010	0%	0%	14%	74%	7%	0%	7%	0%	0%	0%	0%	0%
	Catcher Vessels											
2003	1%	1%	0%	17%	0%	0%	1%	1%	22%	4%	48%	5%
2004	4%	1%	0%	14%	0%	0%	0%	0%	20%	10%	49%	2%
2005	5%	0%	0%	11%	0%	0%	0%	0%	13%	15%	52%	4%
2006	7%	0%	0%	13%	0%	0%	0%	0%	14%	28%	32%	6%
2007	8%	0%	0%	12%	2%	0%	0%	0%	19%	14%	37%	9%
2008	9%	0%	0%	9%	1%	0%	0%	0%	24%	16%	33%	8%
2009	12%	0%	1%	13%	3%	0%	0%	0%	13%	12%	33%	12%
2010	5%	0%	1%	10%	1%	0%	0%	0%	15%	19%	37%	13%

Source: AKFIN summaries of NOAA Fisheries catch accounting data

While the catcher processors were more dependent on the deep-water complex fisheries for revenue, the catcher vessel sector (including the processors to which the catcher boats deliver raw catch) generated most gross first wholesale revenue from species in the shallow-water complex. In the shallow-water complex, pollock accounted for 45% to 67% of annual gross first wholesale revenue. Because pelagic trawl gear may be used to harvest pollock, even when the shallow-water halibut PSC limit is reached, the revenue from this fishery should not be affected by reductions in the PSC limit. However, individual vessel owners (and, indirectly, the processors they deliver to) could be affected, if they are unable to successfully convert to the mid-water gear necessary to harvest pollock after the halibut PSC limit is reached. Vessel owners that do not have mid-water trawl gear would face substantial acquisition costs to enter that fishery. The nets, doors, and other equipment needed could cost in excess of $100,000 (personal communication Julie Bonney). Smaller trawlers, recently active in the GOA pollock fishery - like some less than 60' LOA vessels in the Western GOA, are reported to all have used mid-water gear in the pollock fishery.

Pacific cod, which can be constrained by the halibut PSC limits, is also an important source of first wholesale gross revenue for the catcher vessel sector. From 2003 through 2010, between 13% and 24% of the annual revenue was derived from Pacific cod target fisheries. Shallow-water flatfish have generated a larger percentage of the sector's revenue in recent years (about 10%), than prior to 2007 (2% to 6%). Atka mackerel, flathead sole, and other species have generated very small amounts of first wholesale gross revenue in recent years for the catcher vessel sector.

[72] This species level information was not as important for the hook-and-line sector, because almost all of the groundfish revenue of those vessels is derived from the Pacific cod fishery.

Target fisheries in the deep-water complex that contribute the most first wholesale gross revenue to the catcher vessel sector are rockfish and arrowtooth flounder. These target fisheries contributed 13% and 12%, respectively, of this sector's first wholesale gross revenue during 2009. Those percentages decreased in 2010. Table 4-32 provides background information on the timing of these trawl fisheries, as part of the annual fishing cycle.

4.6.3.3.1 Deep-water Complex

Deep-water complex target fisheries include all trawl target fisheries in the GOA that are not included in the shallow-water complex. These target fisheries include arrowtooth flounder, deep-water flatfish, and rockfish.

Table 4-67 provides information on halibut PSC mortality, groundfish catch, and halibut PSC mortality rates, by month and year, for the deep-water complex from 2003 through 2010. As indicated in the table, during the first halibut PSC season, vessels fishing species in the deep-water complex targeted primarily arrowtooth flounder and rex sole. The halibut PSC mortality rate is typically higher in this first season (and again in the fifth season), than during the any other times of the year. Most of the deep-water complex harvest occurs during the second and third halibut PSC allowance seasons. The second season begins with harvest in the arrowtooth flounder and rex sole targets and switches over to the rockfish fishery in May. The third season is primarily focused on the rockfish fishery, which is not subject to this action. The halibut PSC mortality rates in the third season are lower than the annual average, while halibut PSC mortality rates in the second season are typically slightly higher than the annual average. Deep-water complex harvests during the fourth season are limited, because only halibut PSC allowance amounts that are rolled over from previous fishing seasons are available, as there is no direct allowance for the fourth season. When halibut is available, it is typically used to target rockfish, arrowtooth flounder, or rex sole, depending on the relative value of the respective fisheries with available TAC s.

Halibut PSC rates are relatively high during fifth season. That season, the halibut PSC limit may be used in any trawl target fishery (deep-water complex or shallow-water complex). During 2010, the effort was in the rockfish fishery at the start of the season, through the end of October. Effort then moved into the arrowtooth flounder fishery and, later in October through November, into the rex sole fishery.

Table 4-67 Halibut PSC mortality (mt), groundfish catch (mt), and halibut PSC mortality rate by month and year for the deep-water complex, 2003-2010

		Season 1			Season 1	Season 2			Season 2	Season 3		Season 3	Season 4	Season 5			Season 5	Annual
Data	Year	Jan	Feb	Mar	Total	Apr	May	Jun	Total	Jul	Aug	Total	Sep	Oct	Nov	Dec	Total	Total
Halibut Mortality (mt)	2003	0	22	94	116	160	146	0	306	236	50	286	29	206	0	0	206	943
	2004	0	73	100	173	307	*	*	314	*	*	386	*	0	0	0	0	876
	2005	12	67	99	178	242	*	*	271	*	*	326	58	*	*	0	0	833
	2006	0	31	65	96	299	*	*	299	225	76	301	85	131	0	0	131	913
	2007	0	40	66	106	128	206	17	351	57	37	94	73	37	*	*	47	671
	2008	*	*	49	63	317	14	2	332	93	153	245	44	42	25	0	67	751
	2009	0	185	0	185	240	6	2	248	75	31	106	35	43	*	*	64	638
	2010	0	29	42	71	331	23	4	358	88	19	107	19	155	*	*	200	755
Total Groundfish (mt)	2003	0	359	704	1,063	4,304	4,962	0	9,266	20,912	3,080	23,992	994	4,281	0	0	4,281	39,595
	2004	0	1,036	1,223	2,259	5,372	*	*	5,508	23,557	*	23,563	*	0	0	0	0	31,368
	2005	393	1,648	1,972	4,014	5,792	*	*	6,422	23,124	*	23,136	911	*	*	0	13	34,495
	2006	0	838	1,406	2,243	9,033	*	*	9,034	23,139	2,538	25,677	2,995	1,972	0	0	1,972	41,921
	2007	526	1,716	1,476	3,718	5,607	5,768	5,309	16,683	12,532	2,752	15,285	4,264	1,477	*	*	2,195	42,145
	2008	*	*	996	1,474	12,800	2,939	2,479	18,218	15,453	6,894	22,347	1,554	1,908	674	0	2,582	46,175
	2009	0	8,672	0	8,672	6,910	2,105	2,423	11,438	16,225	1,493	17,717	3,984	1,455	*	*	2,130	43,941
	2010	0	1,471	1,006	2,477	10,451	3,763	1,643	15,856	18,028	1,905	19,932	363	5,722	*	*	7,053	45,681
PSC Rate: Halibut Mortaility (mt) / Total Groundfish (mt)	2003		0.062	0.133	0.109	0.037	0.029	0.066	0.033	0.011	0.016	0.012	0.029	0.048			0.048	0.024
	2004		0.070	0.082	0.076	0.057	*	*	0.057	*	*	0.016	*					0.028
	2005	0.031	0.041	0.050	0.044	0.042	*	*	0.042	*	*	0.014	0.064	*			0.000	0.024
	2006		0.036	0.046	0.043	0.033	*	*	0.033	0.010	0.030	0.012	0.028	0.067			0.067	0.022
	2007	0.000	0.023	0.045	0.028	0.023	0.036	0.003	0.021	0.005	0.013	0.006	0.017	0.025	*	*	0.022	0.016
	2008	*	*	0.049	0.043	0.025	0.005	0.001	0.018	0.006	0.022	0.011	0.028	0.022	0.037		0.026	0.016
	2009		0.021		0.021	0.035	0.003	0.001	0.022	0.005	0.021	0.006	0.009	0.030	*	*	0.030	0.015
	2010		0.020	0.041	0.029	0.032	0.006	0.003	0.023	0.005	0.010	0.005	0.054	0.027	*	*	0.028	0.017

Source: AKFIN summaries of NOAA Fisheries catch accounting

Table 4-68 provides information on the proposed deep-water halibut PSC allowance options relative to halibut PSC reported for 2003 through 2010. Shaded cells in the table indicate the PSC that season exceeded the proposed 15% PSC reduction. The information in the table assumes that halibut PSC allowance limits roll-over from season-to-season. For example, under the status quo, the 1st season PSC limit is 100 mt and the second season is 300 mt. Adding the 1st and second seasons together yields the maximum amount of halibut PSC that may be permitted by the end of the second season (400 mt) without triggering a closure. To assess whether the fleet is within its limit in the first season, halibut PSC can be compared to the 100 mt first season limit. To assess the constraint of the limit in the second season, however, requires one to compare the cumulative limit from the first and second seasons (e.g., 400 mt) with the cumulative catch for the year. The comparison here assumes the fleet does not alter their behavior to stay within the limit. Their ability to modify harvest strategies to reduce halibut PSC is discussed in Section 4.6.5. In summary, their ability and the incentive to adjust behavior will vary by sector, but overall may be limited, since some tools already are implemented and the incentive for vessels to reduce halibut PSC may be limited, because of the management structure of the fisheries.

Table 4-68 Deep-water complex cumulative seasonal halibut PSC limits and cumulative seasonal halibut PSC take in the GOA trawl fisheries (mt)

	Option or Year	Season 1	Season 2	Season 3	Season 4	Season 5
Proposed Limit	Status quo	100	400	581	581	1,781
	Option 1 - 5 % reduction	95	380	552	552	1,692
	Option 2 - 10% reduction	90	360	523	523	1,603
	Option 3 - 15% reduction	85	340	494	494	1,514
Halibut PSC Mortaility Reported	2003	116	422	708	737	2,085
	2004	173	487	873	875	2,444
	2005	178	449	774	833	2,106
	2006	96	395	697	781	1,984
	2007	106	457	551	624	1,945
	2008	63	395	640	684	1,954
	2009	185	433	539	574	1,828
	2010	71	429	536	555	1,637
	2011	119	455	530	720	1,856

Notes: The fifth season combines catches and PSC limits for the deep-water and shallow-water complexes.
The third season is reduced by the 191.4 mt Rockfish Program halibut PSC allowance and the 27.4 mt halibut PSC reduction, implemented during the Rockfish program.
Source: AKFIN summaries of NOAA Fisheries catch accounting data.

Comparing the proposed limits under the status quo, Option 1, Option 2, and Option 3 with halibut PSC reported in the catch accounting data indicates that the annual halibut PSC limits would be exceeded most seasons **(**Table 4-69**)**. Under the status quo[73], the total PSC limit would have been exceeded every year, from 2003 through 2009 and in 2011. The only year the halibut PSC allowance would not have been exceeded is 2010. Option 1 (5% reduction) also yields a halibut PSC allowance that the fleet would have exceeded during eight of the nine years. Option 2 (10% reduction) and Option 3 (15% reduction) would have been exceeded every year.

Seasonal halibut PSC allowance would also have been exceeded in most years. The status quo first season halibut PSC allowance would have been exceeded in 2003, 2004, 2005, 2007, 2009, and 2011. It would not have been exceeded during the other three years considered. Under each of the options to reduce the halibut PSC allowance, the fleet would have exceeded the limit in seven of the nine years.

The status quo second season halibut PSC limit was exceeded during seven of the nine years. Only during the 2006 and 2008 fishing years was this second season limit not exceeded. Those two years, the fleet was 5 mt under the status quo second season limit. Every option to reduce the PSC limit would have been exceeded in all nine years considered.

Trawl vessels were under their status quo third season deep-water PSC limit and the Option 1 (5% reduced) halibut PSC allowance during four of the nine years considered. In two of the three most recent years, the fleet was under the status quo fourth season halibut PSC allowance and the Option 1 (5% reduction) PSC

[73] The status quo does not reflect the PSC limit that was in place when the halibut PSC was taken. Recall, the third season deep-water PSC limit was reduced by 27.4 mt under the rockfish program.

limit during the fourth season, but over the limit all other years. The fleet exceeded the third and fourth season halibut PSC allowance limits under Option 2 (10% reduction) and Option 3 (15% reduction) in every year.

Table 4-69 Number of years the proposed deep-water PSC limits would have been exceeded, 2003-2011

Option	Season 1	Season 2	Season 3	Season 4	Season 5*
Status quo	6	7	5	7	8
Option 1 - 5 % reduction	7	9	5	7	8
Option 2 - 10% reduction	7	9	7	9	9
Option 3 - 15% reduction	7	9	9	9	9

Source: AKFIN summary of NOAA Fisheries catch accounting data

Estimates of the difference in first wholesale gross revenue and metric tons, when the options being considered by the Council are reduced by the status quo amount, are presented in Table 4-70. This was necessary because the methodology used in this analysis resulted in estimates of revenue foregone under the status quo. Subtracting the amount estimated under the status quo allows the gross first wholesale revenue changes from changing the PSC limit to be directly compared. In Table 4-70, the status quo estimates are always zero, since the outcome will not be affected by maintaining the status quo.

Subtracting the estimated foregone revenue under the status quo from the forgone revenue under Option 1 (5% reduction), on average, yields an estimated reduction in deep-water complex fishery gross revenue arising from the 5% halibut PSC allowance reduction proposed under Option 1, is $730,000. Comparing the average first wholesale gross revenue reduction under the status quo with Option 2 (10% reduction), the estimated revenue foregone under Option 2 is $2.49 million. That represents a 341% increase in foregone revenues in comparison to Option 1. Option 3 (15% reduction in halibut PSC) results in an average annual decrease in first wholesale revenue of $3.35 million, or a 135% increase from Option 2. Therefore, the marginal impact on first wholesale gross revenue of decreasing the halibut PSC limit appears to be greatest between Option 1 and Option 2, followed by the marginal change between Option 2 and Option 3, and the Status Quo and Option 1.

Table 4-70 Difference between the status quo estimate of GOA deep-water complex first wholesale gross revenue and metric tons foregone and the three primary options to reduce the halibut PSC allowance amount

Year	First wholesale gross revenue ($million)				Metric tons of groundfish			
	0%	5%	10%	15%	0%	5%	10%	15%
2010	$0.00	$0.00	$0.00	$2.01	0	0	0	1,269
2009	$0.00	$0.36	$0.78	$2.03	0	352	788	1,824
2008	$0.00	$1.44	$3.39	$3.39	0	1,023	3,233	3,233
2007	$0.00	$1.68	$5.29	$5.80	0	1,555	4,611	5,196
2006	$0.00	$0.49	$2.39	$2.39	0	390	2,076	2,076
2005	$0.00	$0.79	$4.43	$6.16	0	643	3,373	5,517
2004	$0.00	$0.00	$1.45	$1.45	0	0	1,769	1,769
2003	$0.00	$1.10	$2.18	$3.58	0	1,396	2,310	4,038
Average	$0.00	$0.73	$2.49	$3.35	0	670	2,270	3,115
Total	$0.00	$5.86	$19.91	$26.81	0	5,359	18,160	24,922

Source: AKFIN summary of NOAA Fisheries catch accounting and COAR data.

Assuming that the options considered by the Council result in the first wholesale gross revenue foregone presented above, Table 4-71 shows the percentage of revenue foregone by Council option, target fishery, and season. Breaking down the foregone gross revenues in this manner is intended to allow the reader to discern the fisheries and seasons that are most likely to be affected by the proposed changes. The table shows that the first wholesale gross revenue foregone primarily comes from the arrowtooth flounder, all 'other species'[74],

[74] The revenue foregone in this grouping is mostly rockfish from the Western GOA and West Yakutat areas, but it also includes "non-IFQ" sablefish and deep-water flatfish.

Table 4-71 Percentage of GOA first wholesale gross revenue estimated to have been foregone by deep-water complex fishery and season, 2003-2010

		Option 1 (5% reduction)			Option 2 (10% reduction)			Option 3 (15% reduction)		
Year	Season	Arrowtooth Flounder	Rex Sole	All Other	Arrowtooth Flounder	Rex Sole	All Other	Arrowtooth Flounder	Rex Sole	All Other
2003	1	0%	100%	0%	0%	100%	0%	0%	73%	27%
	2	81%	19%	0%	81%	19%	0%	68%	30%	2%
	3	68%	24%	8%	47%	16%	36%	47%	16%	36%
	4	90%	10%	0%	90%	10%	0%	90%	10%	0%
	5	85%	0%	15%	85%	0%	15%	85%	0%	15%
2003 Total		77%	16%	7%	66%	14%	21%	62%	19%	19%
2004	1	100%	0%	0%	100%	0%	0%	100%	0%	0%
	2	80%	20%	0%	65%	28%	7%	65%	28%	7%
	3	8%	9%	83%	8%	9%	83%	8%	9%	83%
	4	100%	0%	0%	100%	0%	0%	100%	0%	0%
	5	0%	0%	0%	0%	0%	100%	0%	0%	0%
2004 Total		21%	8%	71%	30%	13%	58%	30%	13%	82%
2005	1	92%	8%	0%	92%	8%	0%	92%	8%	0%
	2	81%	19%	0%	81%	19%	0%	74%	22%	4%
	3	46%	6%	49%	31%	4%	65%	31%	4%	65%
	4	100%	0%	0%	100%	0%	0%	100%	0%	0%
	5	100%	0%	0%	100%	0%	0%	100%	0%	0%
2005 Total		72%	7%	21%	52%	6%	43%	55%	8%	37%
2006	1	0%	0%	0%	0%	0%	0%	0%	0%	100%
	2	0%	0%	0%	95%	5%	0%	95%	5%	0%
	3	82%	18%	0%	76%	18%	6%	76%	18%	6%
	4	99%	1%	0%	99%	1%	0%	99%	1%	0%
	5	0%	0%	0%	0%	0%	0%	0%	0%	0%
2006 Total		86%	14%	0%	83%	13%	4%	83%	13%	4%
2007	1	0%	0%	0%	0%	0%	0%	77%	23%	0%
	2	0%	0%	100%	0%	0%	100%	0%	0%	100%
	3	0%	0%	0%	54%	5%	41%	54%	5%	41%
	4	74%	22%	4%	78%	17%	5%	78%	17%	5%
	5	88%	12%	0%	93%	7%	0%	93%	7%	0%
2007 Total		67%	19%	15%	69%	12%	18%	70%	13%	17%
2008	1	0%	0%	0%	0%	0%	0%	0%	0%	0%
	2	4%	0%	96%	16%	0%	84%	16%	0%	84%
	3	0%	0%	0%	94%	6%	0%	94%	6%	0%
	4	100%	0%	0%	100%	0%	0%	100%	0%	0%
	5	86%	0%	14%	87%	0%	13%	87%	0%	13%
2008 Total		66%	0%	34%	79%	2%	18%	79%	2%	18%
2009	1	0%	0%	0%	0%	0%	0%	0%	0%	0%
	2	0%	0%	100%	0%	0%	100%	0%	0%	100%
	3	0%	0%	0%	46%	54%	0%	2%	98%	0%
	4	0%	0%	0%	3%	91%	6%	59%	30%	11%
	5	5%	95%	0%	0%	0%	100%	3%	91%	6%
2009 Total		2%	29%	70%	6%	39%	54%	16%	51%	34%
2010	1	0%	0%	0%	0%	0%	0%	0%	0%	0%
	2	0%	0%	0%	0%	0%	0%	38%	4%	58%
	3	0%	0%	0%	0%	0%	0%	40%	24%	36%
	4	0%	0%	0%	0%	0%	0%	0%	0%	100%
	5	0%	0%	0%	0%	0%	0%	30%	70%	0%
2010 Total		0%	0%	0%	0%	0%	0%	32%	26%	43%
All Years		61%	12%	27%	59%	11%	30%	56%	15%	29%

Source: AKFIN summary of NOAA Fisheries catch accounting data and COAR reports.

and rex sole fisheries. In recent years, the deep-water flatfish fishery has not been prosecuted. Rockfish revenues from the Central GOA are assumed not to decline, since participants in the Rockfish program are operating under a separate halibut PSC allowance limit.

The arrowtooth flounder fishery is estimated to have accounted for between 56% and 61% of the foregone gross revenues from the deep-water complex from 2003 through 2010 under the options under consideration. Annually, the estimated forgone gross revenues from the arrowtooth fishery range from less than 30%, to over 80% of the total deep-water revenues foregone. The all 'other species' grouping accounted for 27%, to 30%, depending on the option considered. The remaining 11% to 15% of foregone first wholesale gross revenue was from the rex sole fishery.

4.6.3.3.2 Shallow-water

The shallow-water halibut PSC complex for trawl gear includes the pollock, Pacific cod, shallow-water flatfish, flathead sole, Atka mackerel, and "other species" target fisheries. Halibut PSC allowance limits proposed by the Council and the halibut PSC mortality reported (based on catch accounting data) are provided in Table 4-72. Shaded cells indicate fishing seasons during which the shallow-water complex halibut PSC reported exceeded the proposed seasonal limit under Option 3 (15% reduction). Therefore, the shaded cells show the seasons that could have been shortened, if the most restrictive option considered by the Council had been in place.

Table 4-72 Shallow-water complex cumulative seasonal halibut PSC limits and cumulative seasonal halibut PSC taken in the GOA trawl fisheries (mt)

	Option or Year	Season 1	Season 2	Season 3	Season 4	Season 5
Proposed Limit	Status quo	450	550	750	900	1,781
	Option 1 - 5 % reduction	428	522	712	855	1,692
	Option 2 - 10% reduction	405	495	675	810	1,603
	Option 3 - 15% reduction	383	467	637	765	1,514
Halibut PSC Mortaility Reported	2003	275	626	770	1,069	2,085
	2004	360	532	725	1,567	2,444
	2005	171	448	734	1,272	2,106
	2006	312	587	702	787	1,984
	2007	367	524	751	976	1,945
	2008	396	563	708	877	1,954
	2009	192	525	688	834	1,828
	2010	160	434	534	717	1,637
	2011	194	302	431	545	1,856

Notes: Season 5 combines catches and PSC limits for the deep-water and shallow-water complexes.
The fifth season accounts for the deep-water complex halibut PSC reduction of 191.4 mt to the Rockfish Program and the 27.4 mt halibut PSC reduction of the overall limit implemented during the Rockfish program.
*The fifth season includes data through December 3, 2011.
Source: AKFIN summaries of NOAA Fisheries catch accounting data.

Information on the number of seasons that are estimated to have closed in Table 4-72 is summarized for each option considered by the Council in Table 4-73. One closure would have occurred in the first season, under Option 3 (15% reduction). All other options would have set a limit above the reported halibut PSC mortality for the first season. This information indicates that the proposed limits would have, historically, had minimal impacts on the first season.

Option 2 and Option 3 were estimated to set a limit below historical catch amounts in the second season during six of the eight years. Option 1 would set a limit less than halibut PSC during five of the eight years. Finally, the status quo limit would have been less than the reported halibut PSC in three of the eight years. Proposed halibut PSC limits are projected to be substantially more binding during the second season than during the first season. Because the number of years that the proposed limit was less than the historical halibut PSC reported in the catch accounting data varied by option, the range of historical catch falls close to the proposed limits.

Table 4-73 **Number of years the proposed shallow-water PSC limits would have been exceeded, 2003 through December 3, 2011**

Option or Year	Season 1	Season 2	Season 3	Season 4	Season 5*
Status quo	0	3	1	4	8
Option 1 - 5 % reduction	0	5	4	5	8
Option 2 - 10% reduction	0	6	7	6	9
Option 3 - 15% reduction	1	6	7	7	9

Source: AKFIN summaries of NOAA Fisheries catch accounting data

The number of years the reported halibut PSC exceeded the proposed limit ranged from one, under the status quo, to seven under Option 2 and Option 3. Option 1 was exceeded in four of the eight years. The only years that the limit was not exceeded under Option 2 and Option 3 was 2010 and 2011.

The fourth season's halibut PSC limit was exceeded during four years under the status quo, and increased by one year for each 5% reduction in the overall limit. Finally, the fifth season's PSC limit was exceeded during eight of the nine years under the Status Quo and Option 1. The limit was exceeded every year under Option 2 and Option 3. Because of the fisheries that are targeted (typically Pacific cod, if available, or shallow-water flatfish) have relatively high halibut mortality rates that season, and vessels race to catch the target species as long as halibut PSC is available, the proposed halibut limits will likely continue to be a constraint during the fifth season, under any alternative.

Table 4-74 shows the estimated difference in first wholesale gross revenue under each option relative to the status quo. This table normalizes the action options, by removing the projected decline arising under the status quo. Under Option 1 (5% reduction), the average decrease in first wholesale gross revenue relative to the status quo is projected to have been $1.02 million. The average reduction in first wholesale gross revenue was estimated to have been $2.74 million, annually, under Option 2 relative to the status quo. Finally, under Option 3 (15% reduction), the annual reduction was estimated at $5.10 million, relative to the status quo, all else equal.

Table 4-74 **Difference between the status quo estimate of GOA shallow-water complex first wholesale gross revenue and metric tons foregone for the three primary options to reduce halibut PSC**

	Estimated Foregone Revenue ($ million)				Estimated Foregone Groundfish (mt)			
Year	Status Quo	5%	10%	15%	Status Quo	5%	10%	15%
2010	$0.00	$0.00	$1.68	$11.69	0	0	939	5,131
2009	$0.00	$0.66	$4.42	$4.90	0	764	4,426	5,046
2008	$0.00	$1.74	$4.76	$8.96	0	1,604	4,556	7,317
2007	$0.00	$4.47	$7.50	$8.79	0	4,159	6,606	7,452
2006	$0.00	$0.52	$1.62	$3.42	0	580	1,862	3,950
2005	$0.00	$0.00	$0.38	$0.38	0	0	431	431
2004	$0.00	$0.11	$0.45	$0.77	0	171	699	1,188
2003	$0.00	$0.64	$1.08	$1.86	0	854	1,464	2,492
Total	$0.00	$8.13	$21.89	$40.79	0	8,132	20,983	33,007
Average	$0.00	$1.02	$2.74	$5.10	0	1,016	2,623	4,126

Source: AKFIN summaries of NOAA Fisheries catch accounting data

Changes in the number of metric tons of groundfish caught, in comparison to the status quo, were estimated to be 1,016 mt (Option 1), 2,623 mt (Option 2), and 4,126 mt (Option 3), on average. The greatest decrease occurred between Option 1 and Option 2 (1,607 mt). The smallest decrease was between the Status Quo and Option 1 (1,016 mt).

Table 4-75 provides information on the percentage of foregone revenue generated, by fishery and season, over the years 2003 through 2010. The Atka mackerel, flathead sole, and other species are combined in the "all other" grouping to conceal confidential revenue information. Information reported in the table indicates that the "all other" grouping, on average, accounted for about 5% of the foregone gross revenue. Those reductions often occur in the second or fifth season. Pacific cod target fisheries revenue reductions occur after the first season, even though the first season is an important season for Pacific cod revenues. The

Table 4-75 Percentage of first wholesale gross revenue reduction by shallow-water complex fishery and season, 2003-2010

		Option 1 (5% reduction)			Option 2 (10% reduction)			Option 3 (15% reduction)		
Year	Season	All Other	Pacific Cod	Shallow Water Flatfish	All Other	Pacific Cod	Shallow Water Flatfish	All Other	Pacific Cod	Shallow Water Flatfish
2010	1	0%	0%	0%	0%	0%	0%	0%	0%	0%
	2	0%	0%	0%	0%	0%	0%	0%	0%	0%
	3	0%	0%	0%	0%	0%	0%	0%	0%	0%
	4	0%	0%	0%	0%	0%	0%	0%	0%	0%
	5	0%	0%	0%	0%	25%	75%	5%	68%	27%
2010 Total		0%	0%	0%	0%	25%	75%	5%	68%	27%
2009	1	0%	0%	0%	0%	0%	0%	0%	0%	0%
	2	0%	0%	0%	10%	0%	90%	10%	0%	90%
	3	0%	0%	0%	0%	0%	100%	0%	0%	100%
	4	0%	0%	0%	0%	98%	2%	0%	98%	2%
	5	39%	0%	61%	18%	7%	75%	18%	7%	75%
2009 Total		39%	0%	61%	7%	49%	44%	7%	44%	50%
2008	1	0%	0%	0%	0%	0%	0%	0%	0%	0%
	2	3%	65%	31%	10%	44%	46%	16%	30%	54%
	3	0%	100%	0%	3%	17%	81%	2%	22%	76%
	4	0%	0%	0%	0%	0%	0%	0%	100%	0%
	5	0%	0%	100%	0%	2%	98%	0%	2%	98%
2008 Total		1%	21%	78%	3%	16%	80%	4%	38%	58%
2007	1	0%	0%	0%	0%	0%	0%	0%	0%	0%
	2	0%	0%	0%	0%	0%	100%	0%	0%	100%
	3	1%	16%	83%	1%	16%	83%	1%	16%	83%
	4	0%	100%	0%	0%	39%	61%	0%	59%	41%
	5	0%	3%	97%	0%	31%	69%	0%	31%	69%
2007 Total		1%	13%	86%	1%	25%	75%	0%	33%	67%
2006	1	0%	0%	0%	0%	0%	0%	0%	0%	0%
	2	29%	0%	71%	18%	0%	82%	18%	0%	82%
	3	0%	0%	100%	0%	0%	100%	0%	0%	100%
	4	0%	52%	48%	0%	52%	48%	0%	57%	43%
	5	0%	72%	28%	0%	72%	28%	0%	72%	28%
2006 Total		9%	25%	67%	4%	13%	83%	3%	8%	89%
2005	1	0%	0%	0%	0%	0%	0%	0%	0%	0%
	2	0%	0%	0%	0%	0%	0%	0%	0%	0%
	3	0%	0%	0%	0%	0%	100%	0%	0%	100%
	4	0%	100%	0%	0%	100%	0%	0%	100%	0%
	5	0%	0%	0%	0%	0%	0%	0%	0%	0%
2005 Total		0%	100%	0%	0%	9%	91%	0%	9%	91%
2004	1	0%	0%	0%	0%	0%	0%	0%	0%	0%
	2	0%	0%	100%	38%	0%	62%	31%	0%	69%
	3	0%	0%	0%	0%	0%	0%	0%	0%	0%
	4	0%	96%	4%	0%	96%	4%	0%	96%	4%
	5	0%	0%	0%	0%	0%	0%	0%	0%	0%
2004 Total		0%	94%	6%	4%	86%	10%	5%	80%	15%
2003	1	0%	0%	0%	0%	0%	0%	0%	0%	0%
	2	26%	1%	73%	23%	1%	76%	28%	1%	71%
	3	0%	68%	32%	0%	37%	63%	22%	21%	57%
	4	10%	18%	72%	10%	18%	72%	10%	18%	72%
	5	10%	69%	22%	10%	69%	22%	10%	69%	22%
2003 Total		17%	28%	56%	15%	24%	61%	21%	20%	59%
All Years		5%	34%	61%	5%	33%	62%	5%	40%	55%

Source: AFKIN summary of NOAA Fisheries catch accounting data

aggregate decline in first wholesale gross revenues from Pacific cod, from 2003 through 2010, accounted for 33% to 40% of the total reduction depending on the option considered. Shallow-water flatfish first wholesale gross revenue reductions occur after the first season. Depending on the option selected, the shallow-water flatfish target accounted for between 55% and 62% of the first wholesale gross revenue foregone.

The options considered by the Council would have less impact on the first season that is dominated by the Pacific cod and pollock target fisheries (in terms of first wholesale revenue). The second and third seasons that focus more on the flatfish fisheries, are more subject to closure. The fourth season that again focuses on

Pacific cod is also estimated to be closed early in some years. Effort could then move to the pollock fishery to harvest any available TAC in that fishery. The fifth season could be used to fish for any pollock still available or Pacific cod, if both TAC and halibut PSC are available. If halibut PSC allowance amounts remain available, the fleet could target shallow-water flatfish or species in the deep-water complex, until the limit is reached.

4.6.3.4 Summary of First Wholesale Gross Revenue Changes in the Groundfish Fisheries

The previous discussions used retrospective analyses to derive the economic impacts on each of the groundfish sectors, individually. This section will summarize the information, to provide an estimate of overall impacts, based on those retrospective analyses. All the estimates assume that the status quo would not cause any change from those realized in the fisheries. Therefore, all estimated changes attributable to the options considered by the Council, reflect incremental reductions (e.g., foregone landings, accruing gross revenues, etc.) from the status quo outcome, observed in the baseline fisheries and seasons.

No direct comparisons are made between potential revenue increases in the directed halibut fisheries and the projected gross revenue foregone in the groundfish fisheries, attributable to the proposed action. Those estimates were made using different methodologies and assumptions, and as such, direct comparisons would be inappropriate and may generate misleading conclusions. In addition, since any such effects would be realized by different sectors, it would be important to consider any distributional effects arising from the different impacts.

As discussed earlier, the estimates assume no change in fleet behavior as a result of implementing the halibut PSC reductions. If harvesters are able to reduce the halibut PSC rates in the fishery, these estimates will tend to exceed those that would have actually occurred as a result of the management action. Conversely, the analysis assumes the TAC, in place historically, will not change. Stock assessment models and forecasts discussed in the GOA SAFE documents indicate that TACs are projected to increase for Pacific cod and other valuable GOA species. If the TACs increase, and halibut PSC rates do not change, the estimated amount of first wholesale gross revenue foregone will be underestimated. Prices are not assumed to change, if the quantity of fish harvested is reduced. Such an assumption is reasonable, over the range considered, since these species are sold in a world market for groundfish and the changes in quantities delivered from the GOA fisheries are not expected to influence the world market prices.

Because insufficient data are available to estimate the impacts on the Southeast Outside District DSR fishery, no changes in first wholesale gross revenue generated by that fishery are estimated. The changes in first wholesale gross revenue from the non-DSR hook-and-line fishery, the deep-water complex trawl fishery, and the shallow-water complex trawl fishery are summed and presented in Table 4-76. The estimated reductions in first wholesale gross revenue provided in the table are based on the average annual reductions to the trawl and hook-and-line sectors under each option considered. The smallest reduction ($330,000) from the status quo, results from a 5% halibut PSC reduction to the hook-and-line fleet. Hook-and-line first wholesale revenue reductions are greatest when both the catcher vessel and catcher processor halibut PSC limits are reduced by 15% ($1.26 million). Adding those values to the first wholesale gross revenue reductions from the trawl fleet provides the aggregate total estimates. So, a 5% decrease in the trawl halibut PSC limit was estimated to reduce the first wholesale gross revenue from the trawl fishery by $1.75 million. Adding that value to the first wholesale gross revenue reduction estimated for a 10% halibut PSC reduction to the hook-and-line fleet ($790,000), yields the $2.54 million estimate in that cell of the matrix (where the hook-and-line and trawl reductions intersect).

Table 4-76 Estimated annual average first wholesale gross revenue foregone in GOA groundfish fisheries ($million)

		Trawl PSC Reductions			
		Status Quo	5%	10%	15%
Hook-and-Line Reductions	Status Quo	0	$ 1.75	$ 5.23	$ 8.45
	5%	$0.33	$ 2.08	$ 5.56	$ 8.78
	10%	$0.79	$ 2.54	$ 6.02	$ 9.24
	15%	$1.26	$ 3.01	$ 6.49	$ 9.71

Source: AKFIN summaries of NOAA Fisheries catch accounting and COAR data

These estimates are intended to provide information on the amount of first wholesale revenue that would have been foregone, if the halibut PSC reductions had been in place from 2003 through 2010. Actual reductions in revenue that occur in the future will differ from these estimates as halibut PSC rates and TACs change. Given the variety of factors, both endogenous and exogenous, that contribute to those changes, projecting revenue changes for future fishing years would generate estimates with unacceptably large amounts of uncertainty. Therefore, those estimates are not provided in this analysis.

Even if the analyst were able to accurately estimate the amount of revenue that would be foregone in the future, it is currently not possible to determine how individual firms would be affected by such changes. These estimates are fleet-wide averages of changes in gross revenue, based upon historical records of catches, prices, and production. Information is currently unavailable to determine the effect that reductions in gross revenue may have on the net revenue of firms, which is a more informative indicator of economic performance. It is the overall profitability of the firms that is of greatest interest, because that determines whether individual firms will remain viable in the long run, if revenues decline. Models of those effects are not currently available.

4.6.3.5 Applying the Entire Halibut PSC Reduction to the Fifth Season

This suboption was removed from consideration during the February 2012 Council meeting. The Council determined that applying the entire reduction to the fifth season would have adverse impacts, especially on the community of Kodiak, that were not desirable. Additional information on the impacts of this option may be found in the February draft of the analysis[75].

4.6.3.6 Halibut Sideboards

Over time, a variety of sideboards have been implemented, limiting the amount of halibut PSC available to specific participants in the GOA groundfish fisheries. These sideboards are adopted as part of catch share programs to prevent program participants from using the flexibility provided by catch share allocations to increase their harvests in other fisheries. While sideboards may take a variety of forms, including prohibitions on targeting certain fisheries or limits on target catches, in some cases, a sideboard will limit usage of halibut PSC allowances by identified vessels or licenses. This section reviews the sideboards affecting halibut PSC availability in the Gulf of Alaska.

4.6.3.6.1 AFA sideboards

The American Fisheries Act (AFA) established a cooperative program for the Bering Sea and Aleutian Island pollock fisheries. As a part of that program, the Council developed a variety of sideboards to prevent vessels from increasing their catch in other fisheries. AFA catcher processors are, for example, prohibited from fishing in the Gulf of Alaska, and will therefore be unaffected by this action. AFA catcher vessels are split into two categories, those subject to sideboard limits in the GOA and those exempt from sideboard limits. The Council created the sideboard exemption for vessels that have substantial dependence on GOA fisheries, and limited history in the BSAI pollock fishery. The specific action exempts from GOA groundfish and PSC sideboard limits AFA catcher vessels that 1) are less than 125 feet length overall, 2) have landings of pollock in the BSAI of less than 5,100 metric tons [or 1,700 metric tons, annually] from 1995 through 1997, and 3) made at least 40 landings of GOA groundfish from 1995 through 1997. Seventeen vessels are currently qualified for this sideboard exemption. Although not incorporated in regulation, the Council recommended and approved the exemption with the understanding that no sideboard exempt vessel would lease its Bering Sea pollock in a year that it exceeds its GOA average harvest level from 1995 through 1997. To ensure this Council's intent is satisfied, the Catcher Vessel Inter-cooperative Agreement binds vessels to this limitation.

Currently 111 catcher vessels are permitted for the AFA BSAI pollock cooperatives. Seventeen of these vessels were exempted from the GOA groundfish sideboard limits (including halibut PSC sideboard limits).

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[75] http://www.fakr.noaa.gov/npfmc/PDFdocuments/halibut/GOAHalibutPSC112.pdf

The remaining AFA catcher vessels are subject to the sideboard limits, which are calculated based on the catch histories of these non-exempt vessels. As a part of the specification process, these sideboard amounts are divided seasonally, and between the deep-water and shallow-water complexes in seasons when those divisions apply (see Table 4-77). Under the sideboards, fisheries in the applicable complex are closed for the remainder of a season, once NOAA Fisheries determines that the sideboard will be reached. In addition, because a substantial number of AFA vessels receive allocations under the rockfish program (and an associated halibut PSC allowance), the limited access deep-water complex fisheries are closed to AFA vessels in the third season.

Table 4-77 AFA catcher vessel halibut PSC sideboard limits

Trawl season	Halibut PSC complex	Halibut PSC sideboard percentage (ratio of 1995–1997 retained catch by non-exempt AFA CVs in the PSC target category relative to total retained catch in the target category)	2011 Halibut PSC sideboard amount (in metric tons)	2011 total halibut PSC limit (in metric tons)
First seasonal allowance (January 20 - April 1)	shallow-water	34.0	450	153
	deep-water	7.0	100	7
Second seasonal allowance (April 1 July 1)	shallow-water	34.0	100	34
	deep-water	7.0	300	21
Third seasonal allowance (July 1 - September 1)	shallow-water	34.0	200	68
	deep-water	7.0	400	28
Fourth seasonal allowance (September 1 - October 1)	shallow-water	34.0	150	51
	deep-water	7.0	0	0
Fifth seasonal allowance (October 1 - December 31)	all targets	20.5	300	61

Source: NMFS specifications

4.6.3.6.2 Amendment 80 Sideboards

Amendment 80 establishes a cooperative program for non-pollock trawl catcher processors in the Bering Sea and Aleutian Island groundfish fisheries. As under other catch share programs, the cooperative allocations under the program provide an opportunity for participants to alter fishing patterns, for example, allowing them to increase their activity in other fisheries. To prevent any increase in catches by these vessels, sideboard limits were established on both target groundfish and halibut PSC in GOA fisheries. In addition, vessels with 10 or fewer weeks of participation in flatfish fisheries in the GOA are prohibited from participating in those fisheries. Thirteen of the twenty-eight vessels eligible for Amendment 80 cooperatives qualify for these flatfish fisheries. In addition, an exemption from halibut PSC sideboard limits is available for any Amendment 80 eligible vessel that fished at least 80% of its weeks in the GOA flatfish fisheries, from January 1, 2000 through December 31, 2003. One vessel qualifies for this exemption. To access the allocation, the vessel must give up its Amendment 80 allocation. In addition, the vessel’s historical halibut PSC usage will not count toward the halibut PSC sideboard limit, and its halibut PSC in the future would not be applied to the limit. In addition, the exempt vessel is prohibited from participating in target fisheries other than the flatfish target fisheries in the GOA (specifically pollock, Pacific cod, and rockfish fisheries).

The seasonal halibut PSC sideboard limits are based on halibut PSC allowance usage by Amendment 80 vessels, from 1998 through 2004. Separate limits are defined for the shallow-water complex and deep-water complex for each season (including the fifth season, when the seasonal trawl allowance is not divided between the two complexes). In addition, the sideboard limit in the deep-water complex in the third season excludes the allowances of halibut PSC in the rockfish pilot program to Amendment 80 participants[76]. Consequently, that sideboard limit applies only to harvest from the other deep-water complex fisheries (specifically the deepwater flatfish, rex sole, and arrowtooth flounder fisheries).[77]

Table 4-78 Halibut PSC sideboard limits for Amendment 80 vessels

Trawl season	Halibut PSC complex	Halibut PSC sideboard percentage (percentage of halibut PSC usage by Amendment 80 vessels 1998-2004)	2011 Halibut PSC sideboard amount (in metric tons)	2011 total halibut PSC limit (in metric tons)
First seasonal allowance (January 20 - April 1)	shallow-water	0.5	450	10
	deep-water	1.2	100	23
Second seasonal allowance (April 1 July 1)	shallow-water	1.9	100	38
	deep-water	10.7	300	214
Third seasonal allowance (July 1 - September 1)	shallow-water	1.5	200	29
	deep-water		400	104*
Fourth seasonal allowance (September 1 - October 1)	shallow-water	0.7	150	15
	deep-water	0.1	0	3
Fifth seasonal allowance (October 1 - December 31)	shallow-water	2.27	300	45
	deep-water	3.71		74
Source: NMFS specifications				

* Excludes halibut allowance to CPs and Amendment 80 participant halibut usage in the Central Gulf of Alaska rockfish fishery program.

4.6.3.6.3 Rockfish program sideboards

Licenses and vessels eligible for the Central GOA rockfish program are subject to sideboards, to prevent those vessels from using the flexibility provided by their cooperative allocations under the program to increase their effort in other fisheries. Historically, the rockfish fisheries were prosecuted in a derby fishery in the month of July. Due to the rate of harvest, the rockfish fisheries typically ended prior to end of July. As a consequence, sideboards in the program apply only during the month of July. Catcher vessel sideboards in the rockfish program are also relatively simple compared to those in other programs. In part to achieve that simplicity, as well as to reduce observer costs associated with overseeing sideboard limits, the program prohibits participants in the program from fishing in target rockfish fisheries in West Yakutat and the Western Gulf, as well as deep-water complex fisheries (i.e., the arrowtooth flounder, deep-water flatfish, and rex sole fisheries) in the Central Gulf. These limitations effectively limit rockfish program catcher vessels to shallow-water complex fisheries in the Gulf of Alaska. These vessels, however, are not subject to <u>any</u> halibut PSC limit in those fisheries, if they are not restricted by the AFA sideboard limits. An estimated seven "non-

[76] This excludes the one vessel discussed above that only participates in the GOA flatfish fisheries.

[77] It should be noted that the sideboard limit of 104 metric tons is based on Amendment 80 historical halibut PSC usage (212.6 metric tons), minus the PSC allowance available to all catcher processors under the rockfish pilot program (108 metric tons). This sideboard amount was not adjusted under the Council's new rockfish program, under which the PSC allowance to catcher processors will decrease, based on lower historical usage (84.7 metric tons, prior to the set aside, which is not included in the allowance available under the program).

exempt AFA catcher vessels" are participants in the rockfish program. These vessels may only fish the shallow-water complex fisheries in the GOA and are subject to AFA sideboard limits in those fisheries.

Catcher processor sideboards under the rockfish program are more detailed than those of catcher vessels. In the Western GOA and West Yakutat, direct sideboard limits are defined for rockfish fisheries. In addition, separate deep-water complex and shallow-water complex halibut PSC limits are defined, which when reached, close participants out of fisheries that typically close based on halibut PSC. These include the flathead sole, shallow-water flatfish in the shallow-water complex, and rex sole, deep-water flatfish, and arrowtooth flounder in the deep-water complex. Each cooperative is limited to the collective historical PSC usage of its members in each complex. Vessels that "opt-out" of the fishery are collectively limited by their historical share of these two halibut PSC sideboard limits. These vessels are closed out of the same flatfish fisheries that typically close based on halibut PSC availability, once their halibut PSC sideboard is reached. Depending on the number of vessels that choose to "opt-out", it is possible that the halibut PSC limit available to those vessels may be inadequate to allow any fishing in those flatfish fisheries. In that case, the vessels would be unable to target flatfish in the applicable complex during the month of July. The total deep-water complex halibut PSC sideboard limit for catcher processors in the rockfish program is 2.5% of the annual mortality limit (or 50 metric tons, based on the current annual limit). The total shallow-water complex halibut PSC limit for catcher processors in the rockfish program is 0.1% of the annual mortality limit (or 2 metric tons, based on the current annual limit). These relatively low halibut PSC sideboard limits make it unlikely that vessels "opting-out" of the rockfish fishery will be permitted to target flatfish (particularly in the shallow-water complex) during the applicable period of the limit, in the absence of an agreement that adequately ensures that the limit will not be exceeded.[78]

4.6.3.6.4 Management of sideboard limits

Sideboard limits do not guarantee the sector that is sideboarded any amount of halibut PSC allowance. If other sectors take the available PSC limit before the sideboard limit is taken, both the sideboard fishery and the other vessels fishing the halibut PSC complex will be closed to directed fishing for those species. However, if the sideboarded fleet reaches their PSC limit before the entire seasonal PSC limit is taken, they would be closed to directed fishing, but the remainder of the fleet may continue to fish under the remaining halibut PSC allowance.

NOAA Fisheries manages fleets to maintain their catches below the prescribed sideboard limits. The management approach differs with the sizes of the sideboard amount and the subject fleet, as well as the fleet's fishing practices. In fisheries with small sideboard limits that are deemed unmanageable, given the size of the sideboarded fleet, NOAA Fisheries may choose not to open the fishery. In fisheries with sideboard limits that can be managed, given the fleet size, NOAA Fisheries will permit sideboarded vessels to fish, monitoring their catches and timing the closure of the fishery to vessels subject to the sideboard limit to maintain catches at or below the sideboard. In some instances, a fleet may demonstrate to NOAA Fisheries satisfaction that it has in place self-regulating measures to prevent it from exceeding the sideboard limit, in which case NOAA Fisheries may choose to either open a fishery to the sideboarded vessels that would otherwise remain closed (as the sideboard is too small for NOAA Fisheries to adequately manage) or to leave a fishery open longer to sideboarded vessels. Whether to open a fishery to sideboarded vessels (or keep a fishery open to those vessels) based on these types of arrangements is fully at the discretion of NOAA Fisheries. Residual PSC seasonal sideboard limits are not subject to rollover; however, if a fleet exceeds its PSC seasonal sideboard limit, the overage will be deducted from the following season's sideboard limit.

4.6.3.6.5 Impact of Reducing Sideboard Limits

As just discussed, NOAA Fisheries manages fleets to maintain their catches below the prescribed sideboard limits. The management approach differs with the sizes of the sideboard amount and the subject fleet, as well as the fleet's fishing practices. An important factor in determining the appropriate halibut PSC sideboard

[78] Vessels that "opt-out" of the rockfish fishery are also subject to stand-downs in fisheries that they have not demonstrated a threshold level of participation in, during the 2000 through 2006 qualifying period.

limit is recognizing that in some cases these halibut PSC limits can constrain participants, more than groundfish sideboard limits. Halibut PSC limits restrict the harvest of several groundfish species in the GOA. These sideboard limits often constrain harvests of species assigned in both the deep-water and shallow-water fishery complexes, under which trawl halibut PSC mortality is managed.

Table 4-79 lists those trawl sideboard fisheries that NOAA Fisheries has not opened to directed fishing, due to an unmanageably small halibut PSC sideboard limit. For the AFA non-exempt catcher vessels, the list of sideboard fisheries never opened due to small sideboard halibut PSC limits is extensive and includes the Western GOA deep-water flatfish, Western GOA Pacific ocean perch, and GOA-wide pelagic shelf rockfish fisheries. Rockfish program sideboards for the catcher vessel fleet had little historical catch in July. Western GOA rockfish fisheries in the July GOA deep-water complex fisheries are typically constrained by halibut PSC, therefore these July sideboard fisheries are routinely never opened. In addition, the shallow-water complex fisheries are never opened for the catcher processors, due to a small halibut PSC sideboard limit. The remaining sideboarded fleet operating in the GOA, the Amendment 80 sector has not been constrained by Amendment 80 sideboard fisheries that never open to directed fishing. Note that the Amendment 80 sector also participates in the rockfish program, restricting them from targeting shallow-water complex fisheries during the third season, due to insufficient halibut PSC allowance amounts.

Table 4-79 Sideboard fisheries that never open to directed fishing

AFA	Amendment 80	Rockfish Program*
Eastern Pacific cod (inshore and offshore)	No directed fishing closures	CV Western pelagic shelf rockfish
Western deep-water flatfish		CV Western Pacific ocean perch
Eastern and Western rex sole		CV Western northern rockfish
Eastern and Western arrowtooth flounder		CV deep-water complex fisheries
Eastern and Western flathead sole		CP shallow-water complex fisheries
Western Pacific ocean perch		
Western Northern rockfish		
Entire GOA pelagic shelf rockfish		
SEO District demersal shelf rockfish		
Entire GOA sculpins		
Entire GOA squids		
* For the month of July		

Halibut PSC reductions in this action would not affect the fisheries that are never open to directed fishing, due to extremely low halibut PSC or groundfish sideboard limits. Because they have not been opened under the Status Quo, further reductions of the halibut PSC limits will not impact the fleet's revenue generated by these fisheries. It will remain zero under any option being considered.

For fisheries with sideboard limits that can be managed given the fleet size, NOAA Fisheries will permit sideboarded vessels to target these species. NOAA Fisheries monitors sideboard catch and attempts to time the closure of the sideboard fishery to maintain catch at or below the sideboard limit. Members of these fleets, through cooperative agreements, may also be required to monitor their catch to stay within their sideboard limits.

4.6.3.6.5.1 AFA non-exempt catcher vessels

In the GOA, halibut PSC sideboard limits apportioned between deep- and shallow-water complexes and seasons were developed for AFA non-exempt catcher vessels (Table 4-77). Table 4-80 shows the number of AFA non-exempt catcher vessels participating in the deep-water and shallow-water complex, by season, since 2003. Table 4-81 provides halibut PSC sideboard usage by deep- and shallow-water complex and season from 2003 to April 2012.

As noted in Table 4-80 and Table 4-81, AFA non-exempt catcher vessels are most active in the shallow-water complex, particularly the first, third, and fourth seasons. The fleet is also active in the fifth season, but the halibut PSC sideboard limit is undesignated during the fifth season and, therefore, not apportioned between the deep-water and shallow-water complex fisheries. By comparison, participation in the deep-water complex fisheries is far more limited, with few vessels targeting these fisheries. Since only a limited number of AFA non-exempt catcher vessels participate in deep-water complex fisheries, confidentiality requires masking the halibut PSC usage data.

When considering halibut PSC usage, relative to the reduced sideboard limits in Table 4-82, only three times during 2003 to April 2012 did seasonal halibut PSC allowance usage exceed the current seasonal sideboard limit. In addition, in only those three cases (all in the deep-water complex) would the seasonal usage have exceeded any of the proposed halibut PSC reduction options.

Given that halibut PSC limit sideboard usage by the AFA non-exempt catcher vessel fleet is, in most cases, well below the applicable current sideboard limits, the halibut PSC reduction options would appear to have the potential to minimally constrain the fleet, assuming current fishing practices continue. In addition, given that NOAA Fisheries is authorized to roll over unused halibut PSC sideboard limits for the AFA non-exempt catcher vessel from season-to-season, the proposed halibut PSC sideboard reduction options appear to pose little constraint for their deep-water or shallow-water complex fisheries. Despite the limited effect the proposed halibut PSC sideboard reduction will have on the AFA non-exempt trawl catcher vessels, there is some likelihood that a reduction in the overall halibut PSC limit could shorten the deep- and shallow-water seasons for all fishery participants (including those subject to the AFA sideboard limits). Because sideboard amounts apply only as limits (i.e., are not set aside exclusively for the subject fleet), overall halibut PSC closures would also close the sideboard fishery. Such closures would affect the AFA non-exempt trawl catcher vessel fleet.

Table 4-80 Number of AFA non-exempt catcher vessels participating in the deep-water and shallow-water complex fishery, by season, from 2003 to April 2012

	1st season January 20 to April 1	2nd season April 1 to July 1	3rd season July 1 to September 1	4th season September 1 to October 1	5th season* October 1 through December 31	Total
	Deep-water					
2003	1	3	3		1	4
2004			3			3
2005		2	1			2
2006	1	1	2			2
2007		1	2		1	2
2008		2	1			2
2009		1		2		2
2010		2	1		1	2
2011		1		2	1	2
2012						
	Shallow-water					
2003	8	3	3	1	3	12
2004	7		4	4	4	9
2005	7		1	2	4	8
2006	10		1	2	4	10
2007	7		1	1	3	9
2008	7	1	2	2	4	9
2009	3		3	6	7	10
2010	8	3	2	4	4	9
2011	6	1	1	3	4	8
2012	6					6

*Halibut PSC allocated to the fifth season is not designated as deep-water complex or shallow-water complex.

Table 4-81 Seasonal halibut PSC allowance usage (mt) for deep-water and shallow-water complex fisheries from 2008 to April 2012 for AFA non-exempt catcher vessels

Year	1st season January 20 to April 1	2nd season April 1 to July 1	3rd season July 1 to September 1	4th season September 1 to October 1	5th season* October 1 through December 31	Total Sideboard Usage
	Deep-water					
2003		*	*			*
2004			*			*
2005		*	*			*
2006	*	*	*			*
2007		*	*		N/A	*
2008		*	*			*
2009		*		*		*
2010		*	*			*
2011		*		*		*
2012						
	Shallow-water					
2003	3	*	*	*		3
2004	3		*	*		3
2005	4		*	*		4
2006	9		*	*		9
2007	8			0	N/A	8
2008	14	0	*	*		14
2009	1		*	*		1
2010	5	*	*	4		8
2011	16	*	*	0		16
2012	1					1
	Undesignated					
2003					0	0
2004					0	0
2005					0	0
2006					0	0
2007					1	1
2008	N/A				5	5
2009					22	22
2010					24	24
2011					13	13
2012					0	0

Source: AKFIN summary of NOAA catch accounting data.

Table 4-82 Proposed seasonal halibut PSC allowance limits for deep-water and shallow-water complex fisheries for AFA non-exempt catcher vessels (mt)

	Total sideboard	1st season January 20 to April 1	2nd season April 1 to July 1	3rd season July 1 to September 1	4th season September 1 to October 1	5th season October 1 through December 31
Deep-water complex						NA
Status quo	56	7	21	28	0	
Option 1 - 5 % reduction	53	7	20	27		
Option 2 - 10% reduction	50	6	19	25		
Option 3 - 15% reduction	48	6	18	24		
Shallow-water complex						NA
Status quo	302	153	34	64	51	
Option 1 - 5 % reduction	287	145	32	61	48	
Option 2 - 10% reduction	272	138	31	58	46	
Option 3 - 15% reduction	257	130	29	54	43	
Undesignated						
Status quo	62	NA				62
Option 1 - 5 % reduction	59					59
Option 2 - 10% reduction	56					56
Option 3 - 15% reduction	53					53

4.6.3.6.5.2 Amendment 80

As noted above, Amendment 80 established a cooperative program for non-pollock trawl catcher processors in the BSAI groundfish fisheries. As under other catch share programs, the cooperative allocations provide an opportunity for participants to increase their activity in other fisheries, unless they are constrained from doing so. To prevent this undesirable change in fishing behavior, sideboard limits were established on both target groundfish allocations and halibut PSC allowances in the GOA. A notable difference in these sideboards and those applicable to the AFA fleet is that unused sideboard amounts may not be rolled over to the following season. Instead, any residual seasonal sideboard halibut PSC limit becomes unavailable to the fleet after the season ends. Halibut PSC sideboard amounts for the Amendment 80 fleet are reported in Table 4-77.

As depicted in Table 4-83 and Table 4-84, Amendment 80 vessels are most active in the deep-water complex, which includes the rockfish and flatfish fisheries (e.g., rex sole, arrowtooth flounder). [79] Of the five seasons shown for the deep-water complex, the third season has the largest number of participating Amendment 80 vessels. Participation in the shallow-water complex by the Amendment 80 sector is smaller, with only one to three vessels targeting these fisheries. Given the small number of Amendment 80 participants operating in the GOA groundfish fisheries, all of the halibut PSC sideboard usage in this shallow-water complex, and all but the second and third season of the deep-water complex halibut PSC, are masked due to confidentiality. For those halibut PSC amounts that are reported, only the third season of 2008 deep-water complex halibut PSC sideboard usage (92 metric tons) would have exceeded the proposed 15 percent reduction option (88 mt) noted in Table 4-85. Unfortunately, an estimate of first wholesale gross revenue impacts, as a result of the halibut PSC sideboard closure, cannot be provided due to confidentiality restrictions.

[79] Central Rockfish program halibut PSC usage during the third season, as well as halibut PSC usage by the Golden Fleece (exempt from sideboard limits), have been removed from halibut PSC usage by the Amendment 80 fleet.

Table 4-83 Number of Amendment 80 vessels participating in the deep-water and shallow-water complex fishery, by season, from 2008-2010

Number of Amendment 80 vessels						
Year	1st season January 20 to April 1	2nd season April 1 to July 1	3rd season** July 1 to September 1	4th season September 1 to October 1	5th season October 1 to December 31	Annual total
Deep-water complex						
2008	2	5	12	1	3	13
2009	0	4	16	1	2	16
2010	2	4	14	0	2	16
Shallow-water complex						
2008	3	2	0	0	2	5
2009	1	3	2	1	2	7
2010	1	1	0	0	1	3

Table 4-84 Seasonal halibut PSC usage (mt) for deep-water and shallow-water complex fisheries, from 2008-2010, for Amendment 80 vessels

Year	Total sideboard usage	1st season January 20 to	2nd season April 1 to July 1	3rd season** July 1 to	4th season September 1 to	5th season October 1 to
Deep-water complex						
2008	226	*	134	92	*	*
2009	221	0	141	80	*	*
2010	243	*	162	81	*	*
Shallow-water complex						
2008	*	*	*	0	0	*
2009	*	*	*	*	*	*
2010	*	*	*	0	0	*
All values are metric tons, except where noted as percentages.						
*Withheld due to confidentiality requirements						
** Note: excludes rockfish program halibut PSC allowance and usage.						

Table 4-85 Proposed seasonal halibut PSC allowance limits for deep-water and shallow-water complex fisheries for Amendment 80 vessels (mt)

	Total sideboard	1st season January 20 to April 1	2nd season April 1 to July 1	3rd season* July 1 to September 1	4th season September 1 to October 1	5th season October 1 through December 31
Deep-water complex						
Status quo	418	23	214	104	3	74
Option 1 - 5 % reduction	397	22	203	99	3	70
Option 2 - 10% reduction	376	21	193	94	3	67
Option 3 - 15% reduction	355	20	182	88	3	63
Shallow-water complex						
Status quo	137	10	38	29	15	45
Option 1 - 5 % reduction	130	10	36	28	14	43
Option 2 - 10% reduction	123	9	34	26	14	41
Option 3 - 15% reduction	116	9	32	25	13	38

Although there were only a few instances of halibut PSC amounts exceeding the estimated halibut PSC sideboard limit under the proposed options during 2008 through 2010, the prohibition on sideboard rollovers from season-to-season for the Amendment 80 sector will increase the potential for the deep-water and shallow-water complex fisheries to close to Amendment 80 vessels, especially the deep-water complex during the second and third season. The largest portion of halibut PSC mortality inflicted by Amendment 80 vessels occurs in these two seasons. Since implementation of the Amendment 80 program, the Amendment 80 fleet has averaged 68% of its second and third season sideboard limits. If the deep-water species TACs were to increase significantly in the future, there is the possibility that the sector may have an insufficient halibut PSC sideboard allowance to harvest the deep-water complex TACs. In the shallow-water complex, historical halibut PSC removals by the Amendment 80 sector indicates the 1st season could be constrained by the halibut PSC sideboard allowance in the future.

With the exception of apportionment of halibut PSC allowances to the Rockfish Program, trawl halibut PSC in the GOA is not apportioned between the different sectors. Given that halibut PSC allowance amounts are shared by all trawlers, the Amendment 80 sector is often racing other trawlers in their GOA groundfish fisheries. In general, the proposed reduction of halibut PSC allowances will likely increase the incentives to race for fish in the GOA, amongst all the trawlers. In addition, since sideboards are not an allocation but a maximum limit, a halibut PSC allowance reduction for all GOA trawlers could result in a shortened sideboard fishery, if the Amendment 80 fleet reaches its halibut PSC sideboard limit more rapidly than in the past.

4.6.3.6.5.3 Rockfish Program

Catcher processor vessels participating in the Central GOA rockfish program will be limited in their halibut PSC allowance while targeting deep-water and shallow-water complexes under a sideboard limit that is intended to constrain harvests from fisheries that are typically halibut PSC constrained. Table 4-86 provides the number of Central GOA Rockfish Program catcher processors participating in the deep-water and shallow-water complex fisheries during the month of July (which is the only time that the sideboard applies), since implementation of the rockfish program in 2007. The table also provides halibut PSC sideboard removals, reported for catcher processors participating in the deep-water and shallow-water complex of the Central GOA Rockfish Program during the same time period. As seen in Table 4-86, effort by the GOA Rockfish Program catcher processors during the month of July is centered on the deep-water complex, with the number of vessels ranging from 6 in 2010, to 11 vessels in 2009. Halibut PSC allowance usage by these vessels has ranged from 30 mt in 2010, to 67 mt in 2008. The halibut PSC limit sideboarded vessels focused most of their effort during the month of July on Western GOA and West Yakutat rockfish, with some effort in the rex sole fishery. By comparison, effort by the Rockfish Program catcher processors in the shallow-water complex during the month of July is nearly non-existent. One catcher processor participated in the shallow-water complex in 2009, but halibut PSC removals for that vessel cannot be reported, due to confidentiality restrictions.

Historical deep-water complex halibut PSC sideboard removals by the Central GOA Rockfish Program catcher processors, relative to the current halibut PSC sideboard limits and proposed halibut PSC sideboard limit reduction options are provided in Table 4-87. During 2007, 2008 and 2009, halibut PSC removals by the catcher processors exceeded the 50-mt halibut PSC sideboard allowance under the new Rockfish Program. That level of PSC would have triggered a premature closure in the deep-water complex fisheries under all of the halibut PSC sideboard limit reduction options. Since the catcher processor's halibut PSC sideboard removals would have triggered a halibut PSC sideboard closure under status quo, as well as under the three halibut PSC sideboard reduction options, determining the estimated foregone first wholesale revenue from a halibut PSC sideboard reduction is not possible. However, given that deep-water halibut PSC sideboard removals exceeded the status quo three times in the last four years, there is a high likelihood that the deep-water complex fisheries will be constrained by a reduced halibut PSC sideboard limit, during the month of July, all else equal. Even without factoring in the effects of increasing GOA flatfish TACs, any reduction in the deep-water halibut PSC sideboard allowance, from the current 50-mt sideboard limit, will likely constrain the catcher processors subject to the limit. As noted above under the Amendment 80 sideboard section, halibut PSC allowance amounts are apportioned across the deep-water and shallow-water complex and across the seasons, but not between the different trawl sectors. So, those catcher processors who are constrained by the Rockfish Program halibut PSC sideboard limit have an economic incentive to race other trawlers, before a halibut PSC limit is obtained, forcing a shut down during the month of July. A reduction of the halibut PSC will only increase this race for fish during the third season, and would likely result in shortened third season in most years.

The remaining option under consideration, taking all sideboard reductions in the fifth season, would have no impact on the Rockfish Program halibut PSC sideboard fisheries, since the Rockfish Program sideboard fishery is conducted during the month of July and the fifth season is from October 1 to December 31.

Table 4-86 **Vessel count and halibut PSC sideboard usage of Central GOA rockfish program catcher processors during the month of July by halibut PSC complex, 2007-2010**

Year	Catcher processor 3rd season sideboard usage*	Catcher processor 3rd season sideboard vessel count
Deep-water complex		
2007	59	7
2008	67	10
2009	58	11
2010	30	6
Shallow-water complex		
2007	0	0
2008	*	0
2009	0	0
2010	0	0
* Excludes rockfish program halibut PSC allowance.		
Note: Assumes suboption 1 does not apply and maintains the status quo, since this sideboard affects only the 3rd quarter PSC allowances and limits.		

Table 4-87 **Proposed seasonal halibut PSC limits for deep-water and shallow-water complex fisheries for rockfish program catcher processors**

		3rd season PSC allowance*	July sideboard tonnage	July sideboard as a percent of the 3rd season PSC allowance
Deep-water complex				
Status quo		181	50	27.6
Maintain current sideboard percentage	Option 1 - 5 % reduction	172	48	27.6
	Option 2 - 10% reduction	163	45	
	Option 3 - 15% reduction	154	43	
Maintain current sideboard tonnage	Option 1 - 5 % reduction	172	50	29.1
	Option 2 - 10% reduction	163		30.7
	Option 3 - 15% reduction	154		32.5
Shallow-water complex				
Status quo		200	2	1.0
Maintain current sideboard percentage	Option 1 - 5 % reduction	190	2	1.0
	Option 2 - 10% reduction	180	2	
	Option 3 - 15% reduction	170	2	
Maintain current sideboard tonnage	Option 1 - 5 % reduction	190	2	1.1
	Option 2 - 10% reduction	180		1.1
	Option 3 - 15% reduction	170		1.2
* Excludes rockfish program halibut PSC allowance				
Note: Assumes suboption 1 does not apply and maintains the status quo, since this sideboard affects only the 3rd quarter PSC allowances and limits.				

4.6.3.6.6 Suboption 3.1: Maintaining Sideboard Limits at Current Levels

This suboption would allow the sectors operating under sideboard limits to maintain their historic sideboard amounts, in metric tons, under any option that reduces the overall trawl halibut PSC limit. An analysis of the status quo and options to reduce the sideboard limits was provided in Section 4.6.3.6.5. The impacts of reducing sideboard limits on the sideboarded fleets are provided in that section. The analysis in this section of the document will focus on impacts to the vessels using trawl gear that are protected by sideboard limits.

The method used to reduce the sideboard limits in Section 4.6.3.6.5 was to maintain the current percentages of the annual or seasonal halibut PSC limit that are currently in regulation. Applying those percentages to a reduced halibut PSC limit will reduce the sideboards at the same rate as the overall halibut PSC limit. This suboption will reduce the overall halibut PSC limit by the same amounts, for each of the three primary options, presented in that section. However, the sideboard limits would be set, by regulation, in metric tons. Any change in the overall trawl halibut PSC limit would not alter the amount of halibut PSC that could be used by the sideboard fisheries.

Maintaining the sideboard limits at the current metric tonnage, would reduce the amount of halibut PSC available to trawl vessels in general, while allowing fleets operating under sideboard limits to access the same tonnage (or a greater percentage of the total limit). Because less halibut PSC is available for use in excess of the sideboard limits, this change is likely to lead to increased competition among all trawl sectors for the available halibut PSC, when the overall halibut PSC limit is anticipated to be a constraint.

Halibut PSC sideboards were developed at different times using different methodologies to calculate the sideboard amount. The halibut PSC sideboard limits for non-exempt AFA CVs in the GOA are based on the aggregate retained groundfish catch by non-exempt AFA CVs in each PSC target category from 1995 through 1997 divided by the retained catch of all vessels in that fishery from 1995 through 1997 (§ 679.64(b)(4)). That calculation yielded a ratio (or percentage if multiplied by 100) that is multiplied by the seasonal PSC limit for the deep-water and shallow-water complex to calculate the sideboard limits. A summary of the current non-exempt AFA catcher vessel sideboard limits are presented in Table 4-88. The ratios that are currently in regulation and the metric tonnage amount that would replace the ratio are provided in the table.

Table 4-88 Non- exempt AFA catcher vessel halibut PSC sideboard limits

Season	Dates	Complex	Ratio	Metric Tons
1	January 20 to April 1	Shallow-water	0.34 (of 450)	153
		Deep-water	0.07 (of 100)	7
2	April 1 to July 1	Shallow-water	0.34 (of 100)	34
		Deep-water	0.07 (of 300)	21
3	July 1 to September 1	Shallow-water	0.34 (of 200)	68
		Deep-water	0.07 (of 200)	14
4	September 1 to October 1	Shallow-water	0.34 (of 150)	51
		Deep-water	0.07 (of 0)	0
5	October 1 through December 31	Both	0.205 (of 300)	62

The rockfish program includes halibut PSC sideboards to limit the ability of participants eligible for the rockfish program to harvest an excessive amount of the PSC limit available during July in fisheries other than the Central GOA rockfish fisheries. The rockfish program provides certain economic advantages to harvesters, who could use this advantage to increase their participation in other fisheries, thus possibly adversely affecting participants in other fisheries. The proposed halibut sideboard limits the total amount of halibut mortality used by catcher processors in the deep-water complex to historic levels. The sideboard measures are in effect only during the month of July (see Table 4-89). The current 2.50% of the 2,000 mt limit would be replaced by the 50-mt sideboard limit in regulations.

Table 4-89 Rockfish program halibut PSC sideboard limits in effect during the month of July

Sector	Shallow-water complex halibut PSC sideboard ratio (percent)	Deep-water complex halibut PSC sideboard ratio (percent)	Annual halibut mortality limit (mt)	Annual shallow-water complex halibut PSC sideboard limit (mt)	Annual deep-water complex halibut PSC sideboard limit (mt)
C/P	0	2.50	2,000	0	50

The PSC sideboard limits for Amendment 80 program vessels in the GOA are based on the historic use of halibut PSC by Amendment 80 program vessels in each PSC target category from 1998 through 2004. These values are slightly lower than the average historic use to accommodate two factors: Allocation of halibut PSC Cooperative Quotas (CQs) under the Central GOA rockfish program and the exemption of the F/V Golden Fleece from this restriction (§ 679.92(b)(2)). Table 4-90 lists the final 2011 halibut PSC limits for Amendment 80 program vessels. The ratios listed in the table would be replaced in regulation by the mt listed in the right column, if this suboption were implemented.

Table 4-90 Amendment 80 halibut PSC sideboard limits

Season	Dates	Complex	Ratio	Metric Tons
1	January 20 to April 1	Shallow-water	0.0048	10
		Deep-water	0.0115	23
2	April 1 to July 1	Shallow-water	0.0189	38
		Deep-water	0.1072	214
3	July 1 to September 1	Shallow-water	0.0146	29
		Deep-water	0.0521	104
4	September 1 to October 1	Shallow-water	0.0074	15
		Deep-water	0.0014	3
5	October 1 through December 31	Shallow-water	0.0227	45
		Deep-water	0.0371	74

Note: All ratios are multiplied by the current 2,000 mt limit to determine sideboard amount (mt)

Reducing the overall PSC limit by 5% (Option 1), 10% (Option 2), or 15% (Option 3) and keeping the sideboard amounts the same reduces the difference between the overall seasonal halibut PSC limits and the cumulative sideboard limits. The estimated differences are shown in **Table 4-91**. It should be noted that only the non-exempt AFA CV sideboard amounts and the Amendment 80 sideboard amounts were deducted from the overall limit, when the difference was calculated. Rockfish catcher processor sideboards were excluded because the majority[80] of this fleet is also under Amendment 80 sideboards. NOAA Fisheries accounts for halibut PSC sideboards in July by deducting the estimated amount taken from both the Amendment 80 sideboard limit and the Rockfish Program sideboard limit, if a vessel is operating under both sideboards. Therefore, if the difference shown in **Table 4-91** included both, it would underestimate the amount of halibut PSC available to non-sideboarded fleet free of competition from the sideboarded fleets. However, since there are four Rockfish Program catcher processors that are not Amendment 80 vessels, there associated sideboard limit also was not included in the table. Since their associated sideboard limited should be included in the cumulative sideboard limit but could not be determined at this time, the table overestimates the amount of halibut PSC available to non-sideboarded fleets in excess of the sideboard limit.

Data in **Table 4-91** is presented to indicate the amount of "protection" non-sideboarded trawl vessel owners have from the sideboard fleets. Columns labeled as "%" indicates the sideboard limits are calculated as a percentage of the annual or seasonal limit; columns labeled as "mt" indicates the sideboard limit are held

[80] A maximum of four vessels could be included in the rockfish program that are not fishing under the Amendment 80 sideboard limit. The actual difference will depend on whether any vessels opt out of the rockfish program.

Table 4-91 Comparison of halibut PSC amounts in excess of sideboard limits when sideboard percentage and metric tonnage amounts are maintained

	Total allowance		1st season January 20 to April 1		2nd season April 1 to July 1		3rd season* July 1 to September 1		4th season September 1 to October 1		5th season October 1 through December 31	
	Maintaining %	Maintaining mt	Maintaining %	Maintaining mt	Maintaining %	Maintaining mt	Maintaining %	Maintaining mt	Maintaining %	Maintaining mt	Maintaining %	Maintaining mt
Deep-water complex												
Status quo halibut PSC limit	162	162	70	70	65	65	27	27	0	0		
Option 1 - 5 % reduction	154	131	67	65	62	50	25	16	0	0	NA	
Option 2 - 10% reduction	145	101	63	60	59	35	24	6	0	0		
Option 3 - 15% reduction	137	70	60	55	55	20	23	-5	0	0		
Shallow-water complex												
Status quo halibut PSC limit	504	504	287	287	28	28	105	105	84	84		
Option 1 - 5 % reduction	479	459	273	265	27	23	100	95	80	77	NA	
Option 2 - 10% reduction	454	414	258	242	25	18	94	85	76	69		
Option 3 - 15% reduction	428	369	244	220	24	13	89	75	72	62		
Undesignated												
Status quo halibut PSC limit	119	119									119	119
Option 1 - 5 % reduction	113	104					NA				113	104
Option 2 - 10% reduction	107	89									107	89
Option 3 - 15% reduction	101	74									101	74

All values are in metric tons

*Excludes 191.4 mt rockfish program halibut PSC allowance and halibut PSC usage plus the 27.4 mt reduction.

constant in metric tons. Numbers provided in the table are the difference between the annual or seasonal halibut PSC limit and the cumulative non-exempt AFA catcher vessel sideboards and the Amendment 80 sideboards. Using the total allowance for the deep-water complex as an example, under the status quo, both methods result in an annual halibut PSC limit that is 184 mt greater than the cumulative sideboard amount (excluding the rockfish program limit). That 184 mt of halibut is only available to vessels that are not operating under sideboard limits. Because the overall limit is assumed to be 581 mt in the deep-water complex, it means that 397 mt are available for use by the sideboarded fleets. If the non-sideboarded fleet takes more than 184 mt of halibut PSC, at least one sideboard would not be binding, and some portion of the sideboarded fleet would have failed to use the full sideboard amount available to it. If the sideboarded fleets take 397 mt, they are required to stop fishing, and any additional halibut PSC that is available may be used only by the non-sideboarded vessels.

Under Option 1, maintaining the sideboard percentages would result in the non-sideboarded fleet having access to 175 mt of halibut PSC free of competition from the sideboarded sectors. Implementing Suboption 2 to maintain the sideboards in metric tons reduces amount available in excess of the sideboard limits to 155 mt. That means the amount of halibut PSC available only to vessels that are not sideboarded would be decreased by 20 mt. All the decreases in halibut PSC available only to non-sideboarded vessels (or halibut PSC in excess of the sideboard limits) are presented in Table 4-92.

Table 4-92 Decrease in metric tons of halibut PSC available only to non-sideboarded vessels (or in excess of sideboard limits)

	Total sideboard	1st season January 20 to April 1	2nd season April 1 to July 1	3rd season July 1 to September 1	4th season September 1 to October 1	5th season October 1 through December 31
Deep-water complex						
Status quo	0	0	0	0		
Option 1 - 5 % reduction	20	2	12	7	0	NA
Option 2 - 10% reduction	40	3	24	13		
Option 3 - 15% reduction	60	5	35	20		
Shallow-water complex						
Status quo	0	0	0	0	0	
Option 1 - 5 % reduction	20	8	4	5	3	NA
Option 2 - 10% reduction	39	16	7	9	7	
Option 3 - 15% reduction	39	24	11	14	10	
Undesignated						
Status quo	0					0
Option 1 - 5 % reduction	9			NA		9
Option 2 - 10% reduction	18					18
Option 3 - 15% reduction	27					27

The sideboard analysis of Options 1 through 3 indicates that the shallow-water sideboard limits have not been a constraint historically. That analysis also concluded that reductions in sideboard limits are expected to have minimal impacts on the non-exempt AFA fleets, given the amount of halibut PSC they historically harvested. Assuming that the sideboarded vessels in the shallow-water complex would have not harvested their PSC limit under the options considered, maintaining the current sideboard tonnage limits is not expected to impact the non-sideboarded fleet. This assumes that the sideboarded vessels in the shallow-water complex do not modify their fishing patterns in a way that increases their PSC usage. Whether changes will occur cannot be predicted, but will likely depend on circumstances in the sideboard fisheries and other fishing opportunities. If sideboard fisheries have relatively large TACs, while other fisheries experience downturns in their TACs, it is possible that vessels that are not currently constrained by a sideboard limit would increase their effort up to that limit. I For example, if the Pacific cod TAC continues to increase, that fishery attract additional effort from sideboarded fleets using more of their shallow-water halibut PSC limit, leaving less available to the other (primarily inshore) fleets.

The majority of the impacts of changing the sideboard limits are likely to occur in the deep-water complex. In 2010, 16 Amendment 80 catcher processors were reported to have targeted species in the deep-water complex. Two of the non-exempt AFA catcher vessels fished in the deep-water complex during the second season and one during the third. Therefore, 19 vessels operating under Amendment 80 or non-exempt AFA sideboards fished in the deep-water complex during 2010.

Amendment 80 vessels fished primarily during the third season (for rockfish). That season 14 of the 16 vessels fished. Four Amendment 80 vessels fished during the second season, two during the first and fifth seasons, and no vessels fished during the fourth season. The vessels that fished outside of the rockfish fishery are the flatfish qualified vessels. Flatfish are primarily harvested by two companies and they are most likely to be impacted by a reduction in the PSC limit. A total of 17 trawl catcher processors were reported to have fished in the GOA during 2010. That means only one trawl catcher processor would have been outside the sideboard limits (was protected by sideboards).Three non-exempt AFA catcher vessels were reported to have fished for deep-water complex species, in 2010. A total of 25 catcher vessels were reported to have targeted arrowtooth flounder. In other words, about 22 catcher vessels were harvesting outside the sideboards.

If the halibut PSC limits for deep-water complex are a constraint, the increased competition for the halibut PSC appears to be between the local GOA catcher vessel fleets and sideboarded fleets. That increased competition could result in decreased arrowtooth flounder and rex sole catches by vessels that are not subject to the sideboards, most of which operate out of Kodiak. If halibut PSC sideboard limits are established as fixed tonnages, and this level of competition persists, the effect would likely be a reduction in deep-water complex catches for this fleet.

Each 5% reduction in the PSC limit will reduce the amount of halibut PSC in the deep-water complex, not protected by the sideboard limits, by 20 mt. Option 1 would decrease the unprotected deep-water complex halibut PSC from 175 mt to 155 mt. Quantifying how that change will affect the fleets is difficult. Increased competition for the available halibut will occur between and among the vessels operating with and without sideboard limits. Halibut PSC taken during the second season would have closed the fishery every year from 2003 through 2010. The fishery would have closed during the third and fourth seasons every year from 2003 through 2008. Option 3 would have closed the fishery every year from the second through fifth seasons. Increasing the competition by maintaining the current tonnage limits (and increasing the limit as a percentage of the total) could stimulate additional competition for the halibut PSC limit, increasing the pace of the fishery, when vessels tend to focus on arrowtooth flounder and rex sole.

4.6.3.6.6 Suboption 3.2: Allow the Amendment 80 sector to roll unused halibut PSC from one season to the subsequent season (similar to the non-Amendment 80 sectors).

Suboption 3.2 was added to the list of proposed options at the February 2012 Council meeting. This suboption proposes treating the Amendment 80 sector like all other sectors, in that their unused halibut PSC sideboards could roll-over to the next season. The non-exempt AFA sideboards already have this flexibility as do the sectors not operating under sideboards. While unused sideboards would roll-over to the following season, sideboards do not guarantee halibut PSC will be available and the Amendment 80 sector and non-exempt AFA catcher vessels must continue to compete with other sectors for fish while halibut PSC is available. For the Amendment 80 sector, the current inability to roll-over sideboards may create an incentive to fish until the sideboard limit is used within a season and, perhaps, fish earlier than they would like. The reason they fish earlier than they want to, is that other sector’s catch could cause the deep-water (primarily) or shallow-water halibut limit to be reached before the Amendment 80 sector reaches their sideboard cap. The Amendment 80 sector’s inability to roll over unused halibut PSC and the race to catch as much of their groundfish sideboard limit and non-sideboarded flatfish species as possible, within the halibut PSC constraints, may create economic incentives that do not allow the best use of their halibut PSC sideboards. A rollover provision may help provide positive incentives.

Table 4-93 shows the amount of halibut that would be available to roll-over from each of the first four seasons and the total of those four seasons. The fifth season is not included since sectors cannot roll-over halibut to the following year. Because flatfish in the deep-water complex are primarily fished during the second and fifth seasons, the greatest benefit would like be derived in the fifth season, although benefits could also be generated during other seasons as well. The impact of reducing the overall PSC limit is also presented in this table. For example, the total roll-overs available in the 2010 deep-water complex decrease from 91 mt under the status quo to 39 mt under the 15% reduction. This further indicates as the PSC limit is reduced the amount available to roll-over to future seasons is also reduced. The greater scarcity of halibut PSC will tend to increase it per unit value. So, while less halibut may be available to roll-over, the increased flexibility of its use will become more important.

Table 4-93 Amendment 80 halibut PSC sideboards (mt) that would have been available to roll-over during the 2009 and 2010 fishing years

	Total sideboard available to roll-over	1st season January 20 to April 1	2nd season April 1 to July 1	3rd season* July 1 to September 1	4th season September 1 to October 1	5th season October 1 through December 31
Deep-water complex				*Year 2010*		
Status quo	91	13	52	23	3	n/a
Option 1 - 5 % reduction	74	12	41	18	3	n/a
Option 2 - 10% reduction	57	11	31	13	3	n/a
Option 3 - 15% reduction	39	10	20	7	3	n/a
Shallow-water complex						
Status quo	90	9	38	29	14	n/a
Option 1 - 5 % reduction	85	9	36	28	13	n/a
Option 2 - 10% reduction	81	8	34	26	13	n/a
Option 3 - 15% reduction	76	8	32	25	12	n/a
Deep-water complex				*Year 2009*		
Status quo	123	23	73	24	3	n/a
Option 1 - 5 % reduction	106	22	62	19	3	n/a
Option 2 - 10% reduction	89	21	52	14	3	n/a
Option 3 - 15% reduction	71	20	41	8	3	n/a
Shallow-water complex						
Status quo	63	0	20	29	14	n/a
Option 1 - 5 % reduction	59	-1	18	28	14	n/a
Option 2 - 10% reduction	54	-1	16	26	13	n/a
Option 3 - 15% reduction	50	-2	14	25	12	n/a

Source: NOAA Fisheries catch accounting data for 2009 and 2010. Staff estimates of PSC limits under each of the alternatives.

While the table above shows the total halibut PSC that was available for the Amendment 80 sector to roll-over in 2009 and 2010, halibut PSC is divided among cooperative members based on their contracts. This means that while the total sideboard limit has not been attained in some seasons, it may have been for specific companies. That level of detail cannot be reported. However, if a company had reached their cap within the cooperative, they could try to buy or trade with other cooperative members to obtain more PSC. Whether a trade is made will ultimately depend on the asking price for the PSC and the value the “buyer” places on that halibut.

Amendment 80 GOA groundfish sideboard limits are set for pollock (seasonal), Pacific cod (seasonal), Pacific ocean perch (annual), Northern rockfish (annual), and pelagic shelf rockfish (annual). The GOA flatfish fisheries are not subject to Amendment 80 sideboard limits, since those fisheries are traditionally limited by the halibut PSC. Therefore, it is the halibut PSC sideboards that primarily determine the Amendment 80 sector’s GOA flatfish harvest.

Some mmembers of the Amendment 80 sector have traditionally fished deep-water complex flatfish in April (the second halibut PSC season). In recent years it has been four or five vessels targeting the arrowtooth flounder and rex sole fisheries, primarily. It is unlikely that Amendment 80 operations that traditionally participated in these fisheries would forgo the April fishery to save halibut for later in the year. Vessels that historically fished in the Gulf in April (deep-water complex flatfish) and in July (the rockfish fishery) do not have the Bering Sea quota under the Amendment 80 allowances that was a typical target at those times of year.[81] Because they do not have much history earned in the Bering Sea during April, increased Bering Sea harvests then would reduce the amount that could be harvested later in the year when that history was earned.

[81] The Bering Sea halibut PSC apportionments started on April 1 allowing flathead sole to be targeted.

This behavior would alter their fishing patterns and could result in cooperative members harvesting their Bering Sea groundfish allocations earlier, and perhaps creating additional effort in GOA later in the year.

Members of the Amendment 80 fleet have indicated that they would like to have the opportunity to delay fishing in the GOA deep-water complex until later in April or May, in part to reduce halibut PSC usage rates. However because they are competing with the catcher vessels in the GOA for both groundfish TAC and halibut PSC, they would not risk waiting until later in the month because deep-water complex trawl fisheries traditionally close late in April[82].

The third seasonal apportionment of deep-water halibut is typically used in the flatfish fisheries as halibut sideboard limits are available and general limits allow. Some years vessels target deep-water flatfish species before or after the rockfish fishery. These vessels will likely continue this opportunistic fishing.

The fourth seasonal apportionment is a function of the stellar sea lion regulations placed on the Pacific cod fishery. During the fourth season the Amendment 80 sector deep-water halibut PSC sideboard was set at 3 mt and the shallow-water sideboard is 15 mt. That allows for a shallow water halibut apportionment to coincide with the start date of GOA cod B season (September 1). The Pacific cod B season sideboard limit for the Amendment 80 sector is 206 mt in the Western Gulf and 801 mt in the Central Gulf. Allowing unused shallow-water halibut PSC to roll-over would have increased the shallow-water halibut available to the fourth season by about 38 mt to 76 mt (based on 2009 through 2010 data), depending on the PSC reduction and the year.

The fifth seasonal apportionment is a traditional fishery for some Amendment 80 participants. They have indicated that under any rollover plan, they would not forgo their second seasonal deep-water halibut apportionment in an attempt to save the sideboards for the fifth season. Based on data from 2008 through 2010, the Amendment 80 sector would have about 50 mt to 100 mt of deep-water complex halibut to roll-over to the fifth season. A total of three or four Amendment 80 vessels targeted flatfish in 2008 through 2010 this season.

The Amendment 80 sector and the AFA non-exempt catcher vessels would still be subject to deep-water and shallow-water sideboards, so on an annual basis they would not be expanding their PSC take in each class beyond their annual limits. This means that deep-water halibut that rolls-over will remain deep-water halibut. Shallow-water halibut will also retain its designation, if rolled-over to the following season.

Because sideboards are not an allocation, the Amendment 80 sector is impacted by other sector's fishing activity. For example, catcher vessels could utilize all of the halibut PSC before the Amendment 80 sector reaches the PSC sideboard limit, or the groundfish TAC could be taken closing the fishery to directed effort. It is also possible that halibut PSC overages that occur in earlier seasons could reduce the total halibut PSC available in later seasons. Overages could affect both the Amendment 80 sector and other sector's GOA operations. These factors would reduce the incentive for the Amendment 80 sector to "bank" halibut PSC for use later in the year. If they were to forgo some harvest early in the year another sector may gain the benefit of the Amendment 80 sector's reduced effort and related halibut PSC usage.

In summary, roll-over privileges would provide the Amendment 80 sector the opportunity to take advantage of excess halibut from previous seasons. It would also treat the Amendment 80 sector like all other sectors, in terms of roll-overs. If the Amendment 80 sector were able to modify their fishing patterns, it may reduce halibut PSC rates (e.g., fishing deep-water species after halibut migrate to shallower water). Reducing PSC usage rates may result in more target groundfish species catches for the Amendment 80 sector and potentially for the overall trawl fleet. Increased harvesting flexibility may provide some opportunity for the Amendment 80 sector to increase their fishing activity in the GOA, particularly in the fifth season, which could result in less halibut PSC available for other participants.

[82] As shown in section 4.5.10 the deep-water complex closed on April 21, 2008, April 23, 2009, April 28, 2010, and April 22, 2011.

Potential risks to other sectors are decreased by not altering the deep-water and shallow-water complex structure for the five seasonal sideboards. Increased flexibility of rolling Amendment 80 sideboards may also help that sector respond more efficiently to recent changes to GOA groundfish management that includes GOA cod sector splits, the Central Gulf rockfish program, Chinook salmon PSC limits, and potentially reduced halibut PSC limits. Likewise, it may also help the sector respond to changes in BSAI management associated with Steller sea lion measures and modifications to fishing near shore yellowfin sole grounds.

4.6.3.6.7 Suboption 3.3: Allow available trawl halibut PSC in the second season deep water and shallow water complexes to be aggregated and made available for use in either complex from May 15 through June 30. Halibut PSC sideboards for the Amendment 80 and AFA sectors would continue to be defined as deep water and shallow water complexes in the second season.

<u>Management Issues</u>

From May 15 to July 1, NMFS would close all trawl gear in the GOA (except vessels fishing Rockfish Program cooperative quota or pollock using pelagic trawl gear) if the combined second season deep-water and shallow-water halibut PSC limit was reached. Closures would not be separately issued to deep-water or shallow-water species fisheries, since they would be managed as a combined limit.

There are two possible methods to determine how to account for unused halibut after the second season. From May 15 to July 1, the deduction for halibut PSC could either be from:

1) the species fishery where it was used, or
2) from the species fishery where it was initially available.

NOAA Fisheries staff has indicated that Option 1 is the only method that would not require the agency to revise their catch accounting system. Revising the catch accounting system would require funds that are currently not budgeted for that purpose. Given the budget constraints that the agency is currently operating under, they have indicated a preference that Option 1 be selected. The fleet should be aware that an overage of the second season PSC limits could significantly decrease the amount available for the third season fisheries. An example of the halibut PSC deducted from the species fishery where it was used (option 1) would be if the deep-water fisheries close on their second season halibut PSC limit, 400 mt, prior to May 15. As of May 15, the shallow-water fisheries have 100 mt of halibut PSC limit remaining. The trawl fleet starts fishing deep-water species on May 15 instead of waiting until the third season halibut PSC allocation becomes available July 1[83]. All 100 mt remaining in the shallow-water fisheries PSC limit is caught by participants targeting deep-water fisheries. This would reduce the third season deep-water fishery halibut PSC limit by 100 mt to 81 mt instead of 181 mt (400 mt minus 191.4 mt allocation and 27.4 mt set-aside for the Rockfish Program). If the catch halibut PSC taken in deep-water complex fisheries was more than 181 mt, the third season deep-water complex would not be opened and the fourth season's limit would be reduced by the amount necessary to cover the overage.

An example of the halibut PSC deducted from the species fishery where it was initially available (option 2) would be if the deep-water fisheries were closed because of their second season halibut PSC limit, 400 mt in 2012, prior to May 15. As of May 15, the shallow-water fisheries have remaining 100 mt of halibut PSC limit (just like under the first example). The trawl fleet starts fishing deep-water species May 15 instead of waiting until the third season halibut PSC allocation available July 1 to fish deep-water species fisheries (except Central GOA Rockfish Program participants). All the 100 mt remaining in the shallow-water fisheries PSC limit is caught by the deep-water fisheries. This would reduce the second season shallow-water fishery halibut PSC limit by 100 mt and all trawl fisheries would close until the third season halibut PSC limits became available. For this example, programming changes <u>would</u> be necessary in the catch accounting system to deduct the May 15 to July 1 halibut PSC from the shallow-water species fishery instead of the

[83] Except Central GOA Rockfish Program participants who would be utilizing their halibut PSC allocation.

deep-water fishery where it was actually caught. **Modifications required to the catch accounting system and its associated expense makes selecting Option 2 problematic for NOAA Fisheries to implement.**

In conclusion, the halibut PSC during May 15 to July 1 must accrue to either the deep-water species fishery or the shallow water species fishery since NMFS must continue to manage the halibut PSC limits by these species fisheries from July 1 to October 1. Any underage or overage for the second season would need to be added or subtracted from the species fishery where it was used or initially available.

Impacts of the Suboption

Selecting suboption 3.3 would give members of the trawl industry increased flexibility to utilize their halibut PSC during the second season. Increased flexibility may provide some sectors with the ability to reduce halibut PSC rates by fishing target fisheries at times of year when the PSC rates are lower and halibut PSC is not available.

As shown in Table 4-94, from 2008 through 2012 the deep-water complex was closed because the halibut PSC limit was reached in late April. The shallow-water complex had not closed during the second season those years (though 2012 is not complete). Because the shallow-water complex remained open after May 15, halibut PSC assigned to the shallow-water complex could be used by vessels to target species in the deep-water complex.

Table 4-94 GOA trawl fishery halibut PSC closure dates from 2008 through April 26, 2012

Year	Season 1	Season 2	Season 3	Season 4	Season 5
	Jan 20 to Apr 1	Apr 1 to Jul 1	Jul 1 to Sep 1	Sep 1 to Oct 1	Oct 1-Dec 31
	Deep-water complex				
2008		21-Apr		11-Sep	Nov 6 - Nov 15
2009	3-Mar	23-Apr			
2010		28-Apr			
2011		22-Apr			
2012		19-Apr			
	Shallow-water complex				
2008	Mar 10 - Mar 20	21-May	7-Aug	Sep1-3; Sep 10-11	Nov 6 - Nov 15
2009				2-Sep	
2010				Sep 3 - Sep 10	
2011				Sep 3 - Sep 13	
2012	26-Mar				

Source: NOAA Fisheries

Because of when the deep-water complex closes, there are no recent data on halibut PSC usage rates in the GOA deep-water trawl flatfish fisheries in May or June. Since quantitative data are unavailable, the analysis of this option is primarily based on qualitative information and annual halibut movement patterns. The IPHC (http://www.iphc.int/publications/annual/ar2009.pdf, p. 66) notes that "*Pacific halibut can be highly mobile and do not remain on the same grounds year-round… the population can be viewed as existing in at least three different spatial states each year: a summer state associated with feeding distributions, a winter state associated with spawning structure, and autumn-spring migratory states in which distribution is continually changing.*" Adults are thought to migrate annually from shallow summer feeding grounds to deeper areas to spawn from November to March (St-Pierre, 1984). Halibut movement into shallow-water during warmer months may result in lower halibut usage in the deep-water complex after May 15. At a minimum, having both the shallow-water complex and deep-water complex either open or closed during the second half of May and June provides the trawl fleet's greater flexibility regarding the best use of the limited halibut PSC.

A retrospective analysis of the amount of shallow-water complex halibut PSC available under each of the options is reported in Table 4-95. These estimates are not exact, since the data used were aggregated by week-ending date. Only week-ending dates before May 15 were included in the "up to May 15" column. Therefore, some halibut PSC may have been included in the "May 15 to Jul 1" column that actually was taken before May 15. From 2009 forward, between 126 mt and 330 mt of shallow-water complex halibut was estimated to be available on May 15, depending on the year used and the option selected. Even after all the shallow-water complex used in the second season is considered, at minimum of 34 mt remained unused in 2010 and 173 mt was unused in 2011. This information indicates that in recent years there was halibut PSC available from the shallow-water complex to be used as undesignated PSC for deep-water targets. In some years shallow-water complex halibut PSC would not have been available to fund deep-water fisheries.

Table 4-95 PSC usage and limits through the second season in the shallow-water complex before and after May 15, 2003-2011

	PSC usage through 2nd season			Shallow-water PSC Limit available as of May 15th				Shallow-water PSC Limit available as of June 30			
Year	Up to May 15	May 15 to Jul 1	Total	SQ (550mt)	5% (522mt)	10% (495mt)	15% (467mt)	SQ (550mt)	5% (522mt)	10% (495mt)	15% (467mt)
2003	524	102	626	26	-2	-29	-57	-76	-104	-131	-159
2004	437	94	532	113	85	58	30	18	-10	-37	-65
2005	284	164	447	266	238	211	183	103	75	48	20
2006	465	122	587	85	57	30	2	-37	-65	-92	-120
2007	425	99	524	125	97	70	42	26	-2	-29	-57
2008	540	23	563	10	-18	-45	-73	-13	-41	-68	-96
2009	341	183	525	209	181	154	126	25	-3	-30	-58
2010	332	101	433	218	190	163	135	117	89	62	34
2011	220	75	294	330	302	275	247	256	228	201	173

Source: NOAA Fisheries catch accounting data.

Selecting May 15 as the date to remove the deep-water and shallow-water halibut PSC restrictions allows a cooling-off period before the deep-water complex is anticipated to reopen. The time between closing and reopening the fisheries is estimated to be between three and four weeks, using historic data. For vessels that are not dependent on flatfish or local to the GOA, this gap in fishing opportunities may cause the vessels to leave for other fisheries or ports. It was also suggested that closing the flatfish grounds may have the beneficial effect of allowing flatfish to reaggregate. If the fish do aggregate, it could result in lower halibut PSC rates per metric ton of target species catch. This would help to achieve optimum yield in fisheries that have historically not taken the entire TAC. For example, in the Central Gulf only 44% of the rex sole TAC was taken in 2011. While 97% of the 30,000 mt arrowtooth flounder TAC was taken, the ABC was set close to 145,000 mt. Therefore, it is likely the TAC could have been set higher if halibut were available to utilize a higher TAC. In the Western Gulf only 21% of the arrowtooth flounder TAC was taken in 2011 and 9% of the rex sole TAC.

Fleets operating under sideboards will continue to be constrained by their deep-water and shallow water sideboard limits for the entire second season. Amendment 80 catcher processors and non-exempt AFA catcher vessels will benefit from the undesignated halibut PSC in that they may utilize any unused PSC after May 15 to harvest deep-water species if they have room under their deep-water sideboard limit. The Amendment 80 sector will also benefit if they are allowed to roll-over any of their deep-water sideboard limit from the first season.

Members of the catcher vessel sector have indicated that the savings to fund this additional, within-season fishery would likely come from the shallow-water complex fisheries, and that most of the benefits derived from suboption 3.3 will result from fishing practices of the non-sideboarded CV sectors. Maintaining incentives for catcher vessels to minimize their use of shallow-water halibut PSC come about by allowing those vessels to obtain benefit from the undesignated season.

Members of the catcher vessel sector that is not operating under sideboards are concerned that allowing sideboarded vessels to pool their deep-water and shallow-water PSC limits would reduce the benefits they would derive and would reallocate some of those benefits to fleets operating under sideboard limits. Because of this potential change, they oppose allowing the sideboarded fleets to pool unused sideboard limits during the undesignated portion of the second season.

4.6.4 Implementation after the Start of the Fishing Year

Given the timing of potential final action, it is likely that the Council's preferred alternative for setting (and potentially revising) halibut PSC limits in the GOA in federal regulations would not be implemented by January 1 or January 20, 2013. NOAA Fisheries has indicated that the Council's preferred alternative likely would be implemented for the start of the 2014 fishing year, so, mid-season implementation of PSC reductions is unlikely.

This section responds to a Council request for the analysis to address the effects of mid-year implementation of the preferred alternative[84]. If revised halibut PSC limits were implemented after the start of a fishing year, the fisheries would begin operation under the Status Quo PSC limits. In this case, halibut PSC limits would not be reduced until after the first season. To address this contingency, this section of the analysis examines implementation of the halibut PSC reduction measures after the start of the fishing year.

Because the DSR fishery halibut PSC limit is not divided by seasons, if the reduction is not implemented at the start of a fishing year, participants in that fishery would not realize a reduction until the next year. They would be given their historical limit at the beginning of the year, and when the final harvest specifications are released, the public would be notified that the next year's limit would be reduced.

The non-DSR hook-and-line fishery halibut PSC limit is divided into three seasons. The first season limit would be made available on January 1, based on the status quo (in the amount of 86% of 290 mt, or 250 mt). The fleet would be monitored and managed subject to that halibut PSC allowance, until June 10. On June 10, any part of that 250 mt allowance that was not used could be rolled-over to the second season. The second season limit would then also be made available (2% of the reduced overall limit). However, because 2% of any option considered would still be 5 mt, no real reduction would occur until the third season. That season, the non-DSR hook-and-line limit would be reduced from the 35 mt limit (plus, any roll-overs) under the status quo, to 33 mt, 31 mt, or 30 mt, under the 5%, 10%, or 15% reductions, respectively. These calculations indicate that, if the PSC limit is not implemented on January 1 of the first year, the maximum reduction in the PSC allowance amount that would be imposed upon the hook-and-line fleet is 5 mt (35 mt minus 30 mt in the third season). The 5 mt reduction equates to an overall reduction in the non-DSR halibut PSC limit of 1.7%. Since the reduction is relatively small, implementing the program after the start of the fishing year is expected to have a similarly small impact in the first year.

The trawl halibut PSC limit is divided into five seasonal limits; the first season defined as January 20th to April 1st. Publishing the final harvest specifications for 2012/2013 occurred on March 14, 2012[85]. Therefore, it is assumed that the revised halibut PSC limits could not be in place before the second season. Currently, up to 450 mt of halibut PSC is available to the shallow-water species fishery and up to 100 mt to the deep-water species fishery in the first season (which, together, makes up slightly more than three-fourths of the annual halibut PSC limit of the trawl sector). That entire limit would be available on January 20th, 2012. Any halibut PSC remaining after the first season could be rolled-over to the next season. Starting with the second season, the reductions to the PSC limit would be applied. So, the amount of halibut PSC reduction that would be applied is less than three-fourths of the annual maximum PSC limit. By not reducing the PSC allowance during the first season (550 mt) of the first year the program is implemented, the halibut PSC reduction would be 63 mt to 188 mt less than later years[86], depending on the option selected. There is, of course, a difference between how much the PSC "maximum limit" is reduced, and the amount of halibut actually

[84] This discussion may be dropped from the next draft of the analysis.

[85] http://alaskafisheries.noaa.gov/frules/77fr15194.pdf

[86] These amounts assume the reduction is not applied to the Rockfish Program allocation of halibut PSC.

removed as PSC. Because groundfish fishermen are required to avoid PSC, to the extent practicable, the two numbers need not (and, ideally, would not) be the same (i.e., halibut PSC amounts would remain below the maximum allowance limit).

4.6.5 Tools for Industry to Reduce Halibut PSC[87]

This section of the analysis provides a discussion of management measures and industry backed programs intended to reduce halibut PSC amounts in the GOA groundfish fisheries. A section on measures either implemented or considered by the Council is presented first. That section is followed by a discussion of measures that were driven by industry's desire to reduce halibut PSC, to increase their groundfish harvest.

4.6.5.1 Council Measures

Council measures that have been considered or implemented to reduce halibut PSC, include seasonal and area allocations of groundfish quotas for selected target species, seasonal and year-round area closures, gear restrictions, careful release requirements, public reporting of individual prohibited species catch rates, and gear modifications. Examples of the latter include biodegradable panels and halibut excluder devices that are required on all groundfish pots. While halibut in the pot fishery does not accrue against the current PSC limits, it is an example of efforts to reduce halibut PSC.

The GOA groundfish FMP allows the Council to set the season start dates to accommodate fishery interests and has relied on the seasonal apportionments of halibut PSC limits to take advantage of seasonal differences in halibut and some groundfish fishery species distributions. Gear restrictions specified to reduce PSC of halibut include revised specifications for pelagic trawl gear that constrain the pelagic trawl fisheries for groundfish to a trawl gear configuration designed to enhance escapement of halibut.

The Council has adopted numerous management measures to reduce halibut prohibited catch in groundfish fisheries. Essentially, these PSC limits direct fisheries, by area or time, to regions where the highest volume or highest value target species may be harvested with minimal halibut PSC encounters. When any fishery exceeds its seasonal limit, directed fishing for that species must stop, and the species may not be retained incidentally in other directed fisheries. All other users and gear types remain unaffected. Reaching a PSC limit results in closure of an area or a groundfish directed fishery, even if some of the groundfish (particularly flatfish) TAC for that fishery remains unharvested.

The measures that have been implemented create PSC limits that are essentially a common property resource that may be accessed by any GOA fishermen that is licensed to participate in that fishery. Target fisheries constrained by a PSC limit are highly competitive. The PSC limit for a fishery can become an effective limit on the target fishery, preventing the TAC from being completely harvested. This situation sets up “perverse” economic incentives that encourage individual vessels to “race” to catch their intended target species before the fishery's collective PSC limit is taken and the fishery closed. This race accelerates catch of PSC, resulting in an earlier closure of the fishery. PSC limits have quickly led to numerous and expensive groundfish fishing closures, as discussed in the sections on revenue foregone. These closures have the potential to inflict significant adverse economic impacts on hook-and-line and non-pelagic trawl fisheries in the GOA.

The “race for the fish,” and attendant higher PSC rates, occur because the competition created by PSC limits do not take individual account of the behavior of fishing operations, removing any direct individual accountability for their fishing decisions (a “common property externality”). An operation that fished with less regard for high rates of associated PSC while seeking to maximize its target catch rate, obtains a benefit that accrued to it alone. That benefit is realized through a larger share of the total groundfish catch (i.e., increased catch per unit effort, lower cost per unit catch). But, the operation does so by hastening the closure of the groundfish fishery. If the closure came before the target groundfish TAC was fully caught, society incurs a cost associated with the value of the foregone groundfish (unharvested TAC). The operation that was fishing with excessive PSC would bear some small share of this cost, but much of it would be distributed

[87] Much of the information in this section is taken from the IPHC Report to the 2010 Halibut Bycatch Workgroup.

across other operations in the fishery. However, the high halibut PSC rate operation may realize a direct economic benefit from its actions that offsets its share of the cost, through its higher catch as compared to fishermen in the fleet that choose to forego groundfish catch to reduce their halibut PSC. By shifting a large part of its “net” PSC costs to other operations, a high halibut PSC rate operation has less incentive to reduce it PSC rates.

If all the operations in a targeted groundfish fishery worked to limit their PSC, the fishery could operate longer and produce larger volumes of fish. Currently, the only fisheries in the GOA operating under a system where individuals directly benefit from constraining their halibut PSC are the Rockfish Program fisheries, in which cooperatives each have a specific halibut PSC allowance, and the GOA Longline CP Pacific cod fishery, in which members have agreed to a division of the available halibut PSC. However, in the other fisheries, when an operator chooses not to control PSC while all others do, they could benefit from the efforts and costs borne by those working to limit their PSC. This creates a perverse incentive structure that effectively subverts PSC reduction efforts. Without appropriate incentives for individuals to reduce PSC, fishermen are likely to fail to take sufficient PSC control actions that would yield positive net benefits from the fishery.

To directly limit halibut PSC, the Council and NMFS have supported numerous actions to establish PSC protection areas, encourage PSC reduction, and improve the selectivity of fishing gear:

1) Amendments 12a and 18 (54 FR 19199) introduced PSC limits into groundfish management in the BSAI and GOA Groundfish FMPs, respectively. PSC limits were established and apportioned among fisheries based on gear or target species. Once a fishery had taken its PSC limit for a given species, directed fishing for the target species was closed. The program was introduced for part of 1989 and all of 1990.
2) Amendments 16 and 21 to the BSAI and GOA Groundfish FMPs, respectively, (56 FR 2700) would have created incentives for individual fishing operations to control their PSC rates. The incentive program was referred to as the “penalty box” program; it would have required operations in a fishery to “maintain a four-week average bycatch rate less than two times the concurrent fleet average in each fishery for each of three identified bycatch species. Failure of a vessel to meet such bycatch rate standards would result in a suspension of the vessel from the Alaskan groundfish fishery (or “placement in the penalty box”) for a period ranging from five days to six weeks.” The Secretary did not approve the penalty box program, because of legal considerations.
3) Regulatory amendments (56 FR 21619) implemented a vessel incentive program (VIP) in the BSAI and GOA to replace its rejected penalty box program.
4) Amendments 19/24 to the BSAI and GOA Groundfish FMPs (57 FR 43926) delayed the season opening date of the BSAI and GOA groundfish trawl fisheries to January 20 of each fishing year, to reduce salmon and halibut PSC rates. In addition, that action delayed the season opening date of the GOA trawl rockfish fishery to the Monday closest to July 1 to reduce halibut and Chinook salmon PSC rates; and changed directed fishing standards to further limit halibut PSC associated with bottom trawl fisheries.
5) GOA Groundfish FMP Amendment 59 (65 FR 30559; 65 FR 67305; 66 FR 8372) closed important fish habitat areas (including halibut and salmon habitat) to fishing.
6) GOA Groundfish FMP Amendment 60 (67 FR 34424; 67 FR 70859) prohibited the use of trawl gear in Cook Inlet, in part to protect salmon and halibut in that area.
7) GOA Groundfish FMP Amendment 68 (71 FR 27984; 71 FR 67210) implemented the Central GOA Rockfish pilot program, a 5-year catch share program (CSP) for several rockfish species, sablefish, and Pacific cod to cooperatives formed by mid-sized trawl vessels with shore-based processor associations and at-sea fleets that form cooperatives. Halibut PSC by rockfish trawl vessels have been reduced substantially under the program. The Council has approved GOA Groundfish FMP Amendment 88 (pending Secretarial review). It would allocate catch shares to rockfish program cooperatives and reduce the GOA halibut PSC limit by 27.4 mt (or 60,000 lb) in the Central GOA rockfish target fishery. To create an incentive for further halibut mortality reductions, 55% of any cooperative’s unused halibut allowance would be available for use in the fifth season trawl fisheries.

The remaining halibut allowance would remain unused for that fishing year. The program will have a 10-year duration.

8) Issuance of an exempted fishing permit to test a new device designed to reduce halibut PSC in trawl gear.
9) Installation of vessel monitoring systems to assist enforcement of numerous regulatory measures (including improved monitoring of halibut PSC).
10) Encouraging voluntary industry PSC control measures (e.g., Sea State, Inc.).

4.6.5.2 Industry Incentives

In addition to Council adopted actions to reduce halibut PSC, industry has undertaken several measures to address halibut PSC. The Freezer Longline Coalition implemented a voluntary cooperative in the GOA in 2006. The Freezer Longline Coalition Cooperative (FLCC) internally negotiated an agreement defining which of its member vessels would fish, and then divided the "sector's halibut PSC limit" among its members. The "sector's halibut PSC limit" was defined by the sector as the total hook-and-line limit, less the estimated halibut PSC needs of the shoreside hook-and-line sector and freezer longliners that are eligible for the fisheries, but that did not join the coalition.

The FLCC contracted with Fisheries Information Service (FIS) and now SeaState, Inc. to monitor real-time target catch (usually Pacific cod) and halibut PSC in the hook-and-line sector. An ancillary function is to collect and analyze halibut viability data for determining discard mortality. All federally permitted freezer-longliners participate in the monitoring program. SeaState downloads observer information on daily catch and PSC rates from NMFS. Detailed information about vessel-specific totals (and the remaining halibut PSC limit), halibut PSC rates, estimates of the timing of a vessel's complete exhaustion of its halibut PSC based on recent catches, and graphics showing a vessel's progression toward complete usage of its halibut limit, are sent to each boat and/or boat manager on a daily basis. Information is provided weekly to the entire FLLC fleet and NMFS in-season managers.

The efforts of the FLCC to assign direct responsibility for halibut PSC to individual vessels contributed to a reduction of the halibut discard mortality rate (DMR), from 13% to 11% for 2010-2012, for the Pacific cod longline fishery. Better handling of halibut under the cooperative structure was a primary reason for the DMR reduction calculated by the IPHC. The constraint of halibut PSC limits has created incentives for industry to investigate the use of halibut excluders and methods to reduce halibut mortality rates, through improved handling procedures.

Commercial trawl industry representatives have also worked to develop halibut excluder devices for use in flatfish and Pacific cod trawl fisheries in the BSAI and GOA. The potential for halibut excluders is particularly important in the Pacific cod fishery, since, according to fishermen, Steller sea lion regulations have forced more cod fishing towards summer and early fall, when halibut prohibited species catch rates are higher in the cod fishery (Gauvin 2008).

Several halibut excluder devices have been developed. Rose and Gauvin (2000) and Gauvin and Rose (2000) reported on a rigid grate system and escape panel, which are installed ahead of the trawl codend, to avoid catching halibut. In the GOA deep-water flatfish fishery, in which halibut and deep-water flatfish are concentrated in the same areas, exclusion of halibut allow for substantial increases in the harvest of the target species. Since the halibut caught in this fishery tend to be large (and significantly larger than the target flatfish), the potential exists for size selectivity to lower halibut catches with minimal loss of target species catch. To exploit this potential, gear was developed in which halibut and deep-water flatfish are separated, with concentrations of each in overlapping areas, allowing the exclusion of halibut. The test gear excluded 94% of the halibut, while releasing 38% of the target flatfish. Results of simulations of its use in the flatfish fishery estimated that fleet-wide use of the grate would result in a 171% increase in the duration of the fishery, a 61% increase in target flatfish catch, and a 71% reduction in overall halibut PSC. Unfortunately, other simulations demonstrated a high incentive for individual non-compliance, without a rationalized fishery, as the loss of target catch by participants using the excluder could be exploited by vessels that attain higher target catch rates by choosing not to use the excluder.

Gauvin (2004) also studied the tradeoffs of target flatfish catch rates and halibut PSC in Central GOA trawl fisheries. He examined the potential for gear modifications to reduce halibut PSC rates, while increasing utilization of GOA flatfish resources within the available halibut PSC allowance. Results from the study concluded that there are differences in the usage ratios of target catch to halibut for different GOA fishing areas and within different flatfish target fisheries. These differences were seasonal, with the relative strength and repeatability of between-area and within-season patterns being an unresolved question for improving the efficiency of flatfish yields against PSC usage. Gauvin made some general observations based on experience of the BSAI flatfish trawl fleet.

- The Central GOA flatfish fishery faces greater challenges in terms of finding areas where tradeoffs between target and non-target rates can be achieved. This observation is based primarily on the relative degree of consistency and predictability of target catch and halibut incidental catch rates by area for the flatfish fisheries of the Bering Sea relative to the Central GOA.
- Catch and halibut PSC trends the Bering Sea flatfish fishery appear less variable, both in terms of the range of catch rates for target species and the range in halibut PSC rates from season-to-season and year-to-year at the core fishing locations.
- The Pacific cod fishery in the GOA and Bering Sea are similar in several respects. For instance, the GOA and Bering Sea cod fisheries appear to have relatively similar ranges of catch and halibut PSC rates (i.e., from high to low). Additionally, both fisheries have a few core areas that tend to offer clearly better tradeoffs in terms catch rates and halibut PSC usage. However, the GOA cod fishery has more small discrete fishing areas, across which a variety of rates for catch and halibut PSC are observed. Most importantly, both rates vary in an unpredictable way within and across areas. This is not the case for the Bering Sea, where cod fishing tends to occur in three general locations: Unimak Pass, the Slime Bank, and south and west of the Pribilof Islands. The differences in the target catch rates and halibut PSC rates between these areas are relatively small and are generally predictable from year-to-year and within seasons.
- Gauvin (2004) reviewed the halibut excluder devices tested in the BS and GOA for the flatfish and cod fisheries. He concluded that the use of "soft" halibut excluders on shoreside trawlers could increase utilization under a catch share program, with potential for increases in flatfish yields, as halibut PSC rates declined. This conclusion depends on the secure allocations of target catch amounts and halibut PSC apportionments of the catch share program. Gauvin concluded that the remaining selectivity and usage issues could be ameliorated with additional field testing for some species; however, in the absence of secure allocations and apportionments of the PSC limit, vessels not using the excluder would have a substantial advantage in the fishery in comparison to those using the excluder. In addition, fisheries for arrowtooth flounder and flathead sole continue to appear problematic for halibut PSC reduction due to similar average size of arrowtooth flounder, flathead sole and halibut. He reported limited success with the use of spreading bars with webbing or soft-panel excluders has provided some success for achieving the proper surfaces for selectivity. He also reported limited success with the use of spreading bars for achieving the proper surface for sorting panels made of square mesh webbing.

Members of industry have provided public testimony that they are currently developing or have tried to utilize the tools available to them to reduce halibut PSC. They indicated that some efforts were unsuccessful because of the race for halibut PSC that occurs in the GOA fisheries and their inability to control the behavior of individuals unwilling to comply with the proposed tools (e.g., stand downs). Efforts to refine other tools are still underway, but will require additional time and expense to determine if they can be effective solutions. They have stressed that there are no simple measures that they are aware of that have not been considered or tried.

4.6.6 Effects of reduction in halibut PSC limit – Fleet responses

As discussed above, the general effect of reductions in halibut PSC allowances will be earlier seasons closures and a concomitant reduction in target groundfish catches, when the lower seasonal limit is reached. While this effect is generally consistent across gear types and segments of the fleets, the potential for earlier closures and the effects of any such closure will vary, to the extent that fleets change behavior in response to lower limits. This section examines the potential responses of the various fleets to reductions in PSC limits and the potential consequences of those responses.

While historical catch and halibut prohibited species catches can be used to assess when the fisheries would have closed, had reduced prohibited species catch limits been in place in previous years, the assumption behind that conjecture is that behavior of participants would not be affected by the adoption and implementation of a reduction in the limit. To the extent that the reduction in the limit affects behavior, it is possible that participants may modify their behavior to avoid a closure. Consequently, the historical analysis of the timing of closures, based on the proposed limits and recent empirical fishing data, could be inaccurate to the extent that fleets would have modified their behavior to avoid reaching the reduced limit. The willingness of participants to take steps to avoid halibut may vary across participants and over time, depending on the circumstances in the fisheries and of the participants. This section discusses both potential measures that could be adopted by participants, individually, to reduce halibut prohibited species catch, and factors that are likely to affect the willingness of participants to adopt those measures. In considering the effects of the alternatives, the analysis must consider not only changes in gross revenues, but also changes in costs driven by the alternatives. If the fleet is successful in taking action to control halibut prohibited species catch to avoid a closure, additional gross revenues may be gained. Yet, it should also be recognized that any such measures come at a cost. This section also considers these added costs, including the propensity of additional costs to create a disincentive for adopting halibut avoidance measures.

Since the available halibut avoidance measures and their effects will differ across gear and operation types, this section discusses the various fleets separately. As applicable, the discussion also considers both the potential for measures to be effective in the various area and target fisheries, and the potential for interactions between those fisheries to affect the propensity of participants to adopt avoidance measures. For each gear and operation type, the analysis first considers the current halibut avoidance practices and prohibited species catch. The analysis then goes on to consider potential changes that may arise under the prohibited species catch reductions proposed under the alternatives.

4.6.6.1 Hook and line catcher processors

Under the recent action dividing the Pacific cod total allowable catch among different gear and operation types, the catcher processor longline sector and catcher vessel longline sector each receives not only a portion of the Pacific cod TAC, but also an apportionment of halibut PSC allowance. Because of the almost complete overlap of the sector's participants in the BSAI with participants in the GOA Pacific cod fisheries, and the relatively few participants in the sector – fewer than 20 vessels participate each year, members of the catcher processor sector have been able to extend their cooperative agreement from the BSAI fishery through a less formal agreement in the GOA fisheries. To date, the sector has fished without a sector allocation in the GOA fisheries. Instead, the sector fishes Pacific cod under the general allocation that is shared with hook and line catcher vessels and trawl vessels and is supported by a halibut prohibited species catch limit that is shared with the hook and line catcher vessels. Despite the lack of a sector allocation, the sector agreed to a variety of measures intended to reduce the chance that its halibut prohibited species catch would result in a fishery closure. Beginning in 2012, the sector will receive an allocation of Pacific cod and a halibut PSC limit that are not accessible to any other sector.

Table 4-96 Non-trawl LLP licenses by area, operation type, hook and line Pacific cod endorsement, and MLOA

Operation Type	Central Gulf only	Western Gulf only	Central Gulf and Western Gulf	Central Gulf or Western Gulf
Catcher Vessel	711	90	173	974
with hook-and-line Pacific cod endorsement	123	21	8	152
MLOA<50'	69	n/a	n/a	n/a
MLOA>= 50'	62	n/a	n/a	n/a
Catcher Processors	22	4	26	52
with hook-and-line Pacific cod endorsement	12	7	11	30

Source: NOAA RAM Division

Under its agreement, the hook and line catcher processor sector has agreed to individual limits on halibut prohibited species catch, based on the available hook and line halibut prohibited species catch limit. These contractual limits operate as an additional constraint on cooperative members, who also must stop fishing any time regulators announce a fishery closure based on its determination that a hook and line halibut prohibited species catch limit will be reached, regardless of whether a member's cooperative limit is reached. To establish the cooperative limits, the cooperative first assumes the usage of a portion of the total hook and line prohibited species catch limit by catcher vessels and the one catcher processor that is not a cooperative member. Since these non-member vessels are not limited by the agreement, the cooperative must assume those vessels could take a disproportionate share of the available PSC allowance, effectively imposing a disproportionate cost of the PSC limit on the cooperative's members. The amount of the total hook and line limit remaining after this assumed usage is then privately apportioned among cooperative members. Under their agreement, members may use or transfer their cooperative prohibited species catch limits, with each member required to stop fishing when that member's limit (either initially assigned in the cooperative agreement or by transfer from another member) is reached. In practice, participants in the cooperative have historically consolidated their cooperative limits on a few member vessels that then have prosecuted the GOA Pacific cod fishery.

In addition to establishment of member prohibited species catch limits based on the current total hook and line halibut prohibited species limit, the cooperative has also adopted a variety of other measures to reduce halibut prohibited species catch. In general, these efforts are focused on avoiding fishing in areas and at times of relatively high prohibited species catch rates. To aid these efforts, the cooperative collects prohibited species catch information from all members. This reporting includes both time and location of fishing, from which weekly reports are generated, showing halibut prohibited species catch, on a vessel basis. These reports are used to manage the cooperative limits, but also result in some degree of peer pressure for vessels with poor prohibited species catch rates. Vessels choose fishing locations to avoid halibut prohibited species catch using not only the information disseminated through this cooperative reporting, but also using informal, on-the-grounds communication among captains. Fishing practices of cooperative members (as prescribed by the private cooperative agreement) also aid in minimizing halibut prohibited species catch. Under the terms of the agreement, vessels moving into a new area are limited in the amount of gear that may be set, until it is determined that halibut prohibited species catch rates are below an acceptable level.

Given the scale of the current actions of the informal cooperative, a reduction of halibut prohibited species catch available to the hook and line catcher processors might stimulate only minor additional halibut avoidance measures. While it is difficult to speculate concerning additional measures, the most likely measures would be additional coordination of the fleet, such as coordinated stand downs. The effectiveness of any such measures is uncertain, as the fleet already uses a variety of measures to reduce halibut mortality.

Assessing the effectiveness of halibut prohibited species catch avoidance measures, requires consideration of the applicable mortality rate of halibut for hook and line gear. Currently, mortality in the hook and line fishery is estimated to be between 9% and 12%, depending on the target fishery (see Table 4-60). So, for each 10 pounds of halibut caught and discarded, the assumption is approximately 1 pound of mortality results. Given this mortality rate, a substantial reduction in halibut PSC will be needed to substantially reduce halibut mortality in the fishery.[88]

The transition to a sector allocation of Pacific cod and sector apportionment of halibut prohibited species catch allowance amounts for the hook and line catcher processor sector should improve the ability of the cooperative to manage its halibut prohibited species catch. The cooperative is currently negotiating with the only vessel in the sector that has not participated in the cooperative, in an attempt to fully specify the division of the halibut PSC limit available to the sector among its members.[89] This more complete specification of the division of the limit, however, is unlikely to have a large effect on halibut avoidance measures, as the cooperative is already reportedly exerting substantial efforts toward halibut avoidance.

4.6.6.2 Hook and line catcher vessels

The GOA hook and line catcher vessel sector incurs halibut prohibited species catch primarily in the target Pacific cod fishery, with some catches in the rockfish target fisheries. [90] The hook and line catcher vessel sector has many more participants than the hook and line catcher processor sector, with more than 300 vessels participating annually, on average. A core group of approximately 100 vessels make up the primary fleet, with most of the other vessels making only a few trips in a target fishery subject to the halibut prohibited species catch limits.

Although the GOA hook and line catcher vessel sector will be subject to a sector level halibut prohibited species catch limit beginning in 2012, the potential for the further apportionment of that limit within the sector by private agreement is very limited, due largely to the number of vessels in the fleet (i.e., high transaction costs), and the potential for other license holders to enter vessels in the fisheries.[91] Organization of such a large fleet to divide the catch limit is unlikely, as vessels may perceive an opportunity to gain an advantage by remaining outside of the agreement. For example, if the agreement were to require vessels to

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[88] An example of a potential action the industry could consider is that catcher processors could commit halibut IFQ to incidentally caught halibut, thereby avoiding the need to discard. However, this type of initiative to reduce PSC is complex and may not be able to achieve substantial improvements in PSC usage. The Pacific cod A season is typically completed prior to the opening of the halibut IFQ fishery on March 15, so IFQ cannot be used to avoid halibut discards during that season. By the B season opening on September 1, much of the halibut IFQ will have been used. The value of fresh halibut in comparison to frozen halibut (particularly early in the halibut season) creates a disincentive for catcher processors to set aside halibut IFQ for use in other target fisheries, in which catcher processors take relatively long trips that may require the freezing of halibut. In addition, “A share” (freezer longliner) IFQ have been issued for approximately 1.5 million pounds annually, since the IFQ program was implemented. The current halibut prohibited species catch limit for catcher processors would be approximately 0.5 million pounds of mortality, which would arise from approximately 5 million pounds of halibut discards. Although this may suggest that halibut IFQ could offset slightly less than one-third of the halibut catch of the hook and line catcher processors, the use of these IFQ for offsetting halibut catches would require coordination of IFQ use on vessels in other target fisheries. Whether this coordination can be achieved is uncertain.

[89] The single holdout has a relatively strong position in the negotiation, since no direct consequence arises from its failure to join the cooperative. As a consequence, that vessel may be able to secure a disproportionate share of the halibut PSC, whether or not it elects to join

[90] While participating in the sablefish IFQ fishery, persons are exempt from halibut PSC limits. The exemption results from the assumption that most sablefish IFQ holders also hold halibut IFQ and are required to retain halibut and use any IFQ available prior to discarding halibut. In addition, jig and pot vessels are exempted from halibut prohibited species catch limits, as those gear types are determined to have negligible halibut mortality.

[91] Although the sector’s Central GOA Pacific cod allocation is divided between vessels greater than 50 feet in length and vessels less than or equal to 50 feet in length, the halibut prohibited species catch apportionment is shared by all hook and line catcher vessels, GOA-wide.

stand down or move when halibut PSC rates exceed a certain level, a vessel outside the agreement may attempt to increase its share of the catch in the fishery by continuing to fish. Despite this potential advantage, some catcher vessels currently undertake efforts to avoid halibut through informal arrangements. Under these arrangements, vessels share on-the-grounds information concerning halibut encounter rates, helping vessels to avoid areas with relatively high halibut prohibited species catch.[92] Measures adopted by the hook and line catcher vessels are unlikely to extend beyond these informal arrangements (or to more costly measures, such as stand downs that delay fishing) under any of the suggested reductions in the sector's halibut prohibited species catch limit, because of the potential for persons outside the agreement to realize gains by increasing their shares of the total catch.

The relatively low amount of halibut prohibited species catch mortality yielded by halibut avoidance also reduces the incentive for the hook and line catcher vessel sector to adopt additional measures to reduce halibut prohibited species catch. Hook and line catcher vessels are subject to the same assumed mortality rate as hook and line catcher processors. Consequently, halibut mortality is estimated at approximately 10% of discards.[93]

4.6.6.3 Trawl vessels

Trawl vessels in the GOA fish under Gulf-wide season and fishery complex halibut prohibited species catch limits that are available for use by any licensed trawl vessel. In the shallow-water complex, these halibut prohibited species catch limits historically constrained the fleet most often in September, during the fourth halibut prohibited species catch limit season, coinciding with the Pacific cod B season. The shallow-water seasonal limits have also constrained the fleet occasionally at various times throughout the year, most often in flatfish fisheries. Deep-water limits have historically constrained the fleet's flatfish fisheries from the late spring and early summer, into the fall. Summer rockfish fisheries were also constrained in the past, but those fisheries are now managed under a catch share program to which a separate apportionment of halibut prohibited species catch is devoted.

The shared seasonal apportionments of the halibut prohibited species catch limits may affect the propensity of a vessel operator to avoid halibut prohibited species, since the allowance of halibut mortality is shared with a large fleet (including both catcher vessels and catcher processors) fishing in multiple target fisheries and over a large area (including multiple management areas) (see Table 4-97). These conditions can be a barrier to formation of agreements among participants to address halibut prohibited species catch, as participants may have a variety of competing interests and little historical relationship. In addition, policing any informal agreement would be complicated by the diversity of the fleets and the geographic distribution of their activities.

Despite these circumstances, in some cases agreements have been reached and practices adopted to avoid halibut prohibited species catch among segments of the fleets. To better understand fleet responses to proposed changes in the halibut prohibited species catch limits (including these fleet agreements and how they may change) the analysis separates the discussion by fleets. Catcher processors are considered first, followed by Central GOA catcher vessels and Western GOA catcher vessels. Although trawl catcher vessel sectors in the two areas have some communications, to the extent that measures have been adopted to address halibut prohibited species catch, those measures are undertaken separately in each area.

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[92] It should be noted that vessels generally have some incentive to avoid areas of excessively high halibut catch rates, as fishing time and bait are lost through the discards of halibut.

[93] To a minor extent, the requirement that any holder of unused IFQ who catches legal size halibut is required to retain the halibut and use those IFQ prior to discarding halibut may reduce halibut discards and mortality. Yet, retention can only occur in the Pacific cod B season, which opens on September 1st, since the Pacific cod A season is typically closed by the March 1st halibut fishery opening. By the B season opening, however, many holders of halibut IFQ have used their annual IFQ allocations targeting halibut.

Table 4-97 Trawl LLP licenses by area and operation type

Operation Type	Central Gulf only	Western Gulf only	Central Gulf and Western Gulf	Central Gulf or Western Gulf
Catcher Vessel	46	27	51	124
Catcher Processors	8	7	13	28
Amendment 80 vessels	4	7	11	22
Non-Amendment 80 vessels	4	0	2	6
Source: NOAA RAM Division				

4.6.6.3.1 Trawl catcher processors

Most of the trawl catcher processors that fish in the GOA are also qualified for the Amendment 80 program. All but one of these Amendment 80 vessels are limited by sideboards, which either limit GOA halibut prohibited species catch, by season and fishery complex (i.e., deep-water complex or shallow-water complex), or prohibit the vessel from fishing altogether in certain GOA fisheries. Sideboard amounts that are not used in a season are not rolled over to the next season. Overages, on the other hand, are deducted from the following season's sideboard amount. The limits are managed by NOAA Fisheries with some assistance from cooperatives, which may provide assurances to NOAA Fisheries that their vessels will limit their catches to below the sideboard amounts. These sideboards have compelled most members of Amendment 80 cooperatives to exert some efforts to reduce halibut prohibited species catch.

In part to maintain the distribution of fleet catches under the sideboards, Amendment 80 cooperative members communicate halibut prohibited species catch rates to cooperative managers. These reports are compiled by the cooperative manager and reported to the fleet on a weekly basis. Occasionally, halibut prohibited species hot spots are identified through these reports. In addition, cooperative members may use small tows when beginning fishing in a new location to assess whether halibut catch rates are acceptably low and will move from areas of relatively high halibut PSC. Vessels in an Amendment 80 cooperative may also informally communicate with one another when fishing, concerning halibut PSC rates.

Most of the vessels in the Amendment 80 fleet that fish in the GOA flatfish and Pacific cod fisheries use halibut excluders, originally developed for the fleet's use in the Bering Sea. These excluders are believed to be more effective in the Gulf, as halibut tend to be larger in the GOA than in the Bering Sea. Excluders, however, are not believed to be fully effective and are not used on all vessels at all times. In addition, the effectiveness of the excluder will depend on fishing practices, and may reduce target species catch rates. As a consequence, even when used, it is possible that certain fishing practices will increase target catch rates and reduce the effectiveness of an excluder. The incentive to adopt practices reducing the effectiveness of an excluder is likely greatest when the vessel operator believes the fleet is approaching a halibut prohibited species catch limit that will inevitably close the fishery.

Although some catcher processors may adopt practices to avoid halibut prohibited species catch, the incentive to adopt these measures is reduced to the extent that halibut prohibited species catch apportionments for the trawl sector are available to vessels (including both trawl catcher processors and trawl catcher vessels) that may not adopt similar measures. For example, some trawl catcher processors would prefer to delay targeting of certain species during periods of known relatively high halibut catch rates. These delays would likely result only in forgone catches of the target species, as other vessels (including those in other targets) may continue to fish and consume the common PSC allowance. At times, and despite the legal requirement to minimize PSC, to the extent practicable, Amendment 80 participants are likely to have an additional incentive to fish during periods of high halibut prohibited species catch, as Amendment 80 halibut prohibited species catch sideboard limits that are unused in a season do not rollover to the next season.[94] As a consequence, Amendment 80 participants interested in participating in GOA fisheries may perceive an incentive to fish to the seasonal sideboard limit, prior to the trawl seasonal allowance being fully exhausted, rather than conserve allowance amounts for later seasons.

Given the number of vessels eligible for GOA trawl fisheries, the adoption of halibut avoidance measures (which often reduce target catch rates) are likely to reduce a vessel's gross revenues from the fisheries. The proposed reductions in halibut prohibited species catch limits under this action alone are unlikely to induce any notable additional halibut avoidance by trawl catcher processors. Most vessels participating in an Amendment 80 cooperative are likely to continue to communicate with other members of that cooperative concerning halibut encounter rates and continue to use informal arrangements to reduce halibut prohibited species catch. These measures are instigated largely by the Amendment 80 sideboards, rather than limits on halibut prohibited species catch that apply to the trawl fleet, as a whole.

4.6.6.3.2 Trawl catcher vessels

As with trawl catcher processors, trawl catcher vessels face substantial competition for the available halibut prohibited species catch limits. Because of sideboard limits placed on the Amendment 80 fleet and AFA catcher processor fleet's prohibition on participation in the GOA, most of the competition is from other trawl catcher vessels. Table 4-98 shows the number of trawl catcher vessels that were reported to have landed groundfish from 2006 through 2010. The number of vessels ranged from 74 in 2006 to 68 in 2010, with numbers of vessels trending downward over that time period. The peak months for vessels entering the GOA correspond to pollock and Pacific cod fisheries.

Table 4-98 Number of trawl catcher vessels participating in GOA groundfish fisheries (2006-2010) and average percentage of first wholesale revenue derived from target fisheries (2003-2010)

		Percent of first wholesale revenue (2003 through 2010 average)												
PSC Season		1			2			3		4	5			
PSC Complex	Target Fishery	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Species Total
Deep-water	Arrowtooth Flounder	0.1%	1.2%	0.3%	3.5%	0.4%	0.0%	0.1%	0.6%	0.5%	0.3%	0.0%	0.0%	7.0%
	Deep Water Flatfish	0.0%	0.1%	0.1%	0.1%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.2%
	Rex Sole	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.1%
	Rockfish	0.0%	0.0%	0.0%	0.0%	1.2%	1.6%	8.1%	0.3%	0.6%	0.1%	0.2%	0.0%	12.1%
	Sablefish	0.0%	0.0%	0.0%	0.0%	0.1%	0.1%	0.3%	0.1%	0.1%	0.0%	0.0%	0.0%	0.9%
Shallow-water	Flathead Sole	0.0%	0.0%	0.0%	0.1%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.3%
	Other Species	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.2%
	Pacific Cod	4.5%	7.2%	1.6%	0.0%	0.1%	0.1%	0.1%	0.1%	3.8%	0.6%	0.0%	0.0%	18.0%
	Pollock - bottom	0.4%	1.4%	4.6%	0.3%	0.0%	0.0%	0.0%	0.3%	2.4%	5.5%	0.1%	0.0%	15.1%
	Pollock - midwater	2.6%	4.0%	16.9%	0.9%	0.0%	0.0%	0.0%	3.4%	3.8%	7.8%	0.3%	0.0%	39.7%
	Shallow Water Flatfish	0.0%	0.1%	0.2%	0.8%	0.9%	0.5%	0.8%	1.3%	0.3%	1.1%	0.4%	0.1%	6.6%
Total		7.7%	14.0%	23.7%	5.8%	2.8%	2.3%	9.5%	6.1%	11.5%	15.4%	1.1%	0.1%	100.0%
	Year	Trawl Catcher Vessel Participation by Month												
	2006	57	55	68	27	9	5	25	26	44	44	8	0	74
	2007	51	51	61	22	20	17	21	26	34	34	16	2	72
	2008	40	50	61	37	22	11	19	34	40	42	21	4	73
	2009	46	50	49	22	19	18	10	34	39	50	13	6	71
	2010	52	53	48	37	24	16	14	36	53	50	12	3	68

Consideration of rationalizing the GOA groundfish fisheries and increased flatfish values, may result in additional trawl vessels entering the GOA since more licenses are available than are currently being used. Vessels entering a fishery, in whole or in part to qualify for future fishing privileges based on historic participation, is well documented for the groundfish license limitation program, the crab license limitation program, and the halibut and sablefish IFQ program. If effort does increase as expected, especially in flatfish and Pacific cod fisheries, it will also generate greater competition for the available halibut PSC.

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[94] This reveals an inherent "inconsistency" in interpreting what a PSC limit constitutes. The PSC 'allowance' should not be equated to an 'allocated' amount of available catch. Instead, it reflects the ***maximum*** removal amount of the designated species that society is prepared to tolerate, before it takes punitive action to curtail further PSC losses (e.g., fishery closures). That is, PSC allowances do not convey 'property-rights' to use of a given amount of the prohibited species, but rather reflect society's upper-limit on its willingness to incur uncompensated losses of prohibited species, to realize benefits from the harvest of, in the present case, GOA groundfish. Because PSC must be avoided, to the extent practicable, it cannot be regarded as an asset of fixed quantity, but instead as an upper-bound threshold, the farther below which the total PSC mortality level, the better, all else equal.

A total of 152 groundfish licenses have a trawl endorsement for the Central and/or Western GOA. The breakdown of these licenses is reported in Table 4-99. Adding the Central GOA endorsements indicates that 118 vessels could fish with trawl gear in that area; in the Western GOA 98 vessels could fish with trawl gear.

Table 4-99 Central and Western GOA groundfish licenses with trawl endorsements

Endorsement	Trawl	Non-trawl & Trawl	Total
CG	20	34	54
WG	14	20	34
CG & WG	28	36	64
Total	62	90	152

Given the above distribution of effort in past years and the number of GOA trawl license available, there are many ways the trawl catcher vessel fleet could be classified. It could be classified based on their recent activity, status in catch share programs, the ports where they deliver their catch, or their size. In this analysis we will focus on their status under the AFA and the port they traditionally deliver their GOA groundfish harvest. Information on actual delivery amounts and values cannot be provided by port because of the confidentiality standards being applied to the number of processors taking deliveries by port. However, a qualitative description can be provided that breaks out the catcher vessel fleet by owner's residence and AFA status.

AFA Fleet

The following are the AFA classifications that will be used:

1) AFA exempt: Meaning they are not bound by AFA sideboard limits because they had substantial history in the GOA during the AFA qualifying period;
2) AFA non-exempt: Meaning they are bound by GOA sideboard limits because of their limited dependence on the GOA during the AFA qualifying period or;
3) Non-AFA: Meaning they did not qualify for a BS pollock allocation under the AFA.

As shown in Table 4-97 there are a total of 109 catcher vessels that have AFA endorsements. Table 4-100 shows that 40 AFA vessels have a license (or licenses) that allows the vessel to trawl for groundfish in the Central and/or Western GOA. A total of 69 AFA catcher vessels are not licensed to fish with trawl gear in the GOA. Of the 40 AFA catcher vessels that are licensed to use trawl gear, eight vessels are endorsed to only trawl in the Western Gulf (one is exempt from sideboards), 16 vessels are endorsed to trawl only in the Central Gulf (five are exempt from sideboards), and 16 vessels hold trawl endorsements to trawl in both the Western and Central Gulf (11 are exempt from sideboards). Therefore, the maximum number of AFA vessels that can trawl in the Western Gulf is 24 and the maximum that can trawl in the Central Gulf is 32.

Table 4-100 AFA catcher vessels by groundfish license endorsement type

GOA Endorsements			Number of AFA Vessels (vessels exempt from sideboards)				
			No GOA	Non-trawl	GOA trawl endorsment(s)		
Western	Central	Eastern			Western	Central	Both
No	No	No	57				
No	Non-trawl;Trawl	No				7 (4)	
No	Non-Trawl	No		2			
Non-trawl;Trawl	No	No			2		
Non-trawl;Trawl	Non-trawl;Trawl	No					8 (6)
Non-trawl;Trawl	Non-Trawl	No			1		
Non-trawl;Trawl	Non-Trawl	Yes			1		
Non-Trawl	No	No		5			
Non-Trawl	Non-trawl;Trawl	No				1	
Non-Trawl	Non-Trawl	No		5			
No	Trawl	No				8 (1)	
Trawl	No	No			4 (1)		
Trawl	Trawl	No					8 (5)
Total of 109 AFA catcher vessels(17 are exempt)			57	12	8 (1)	16 (5)	16 (11)

Source: NOAA Fisheries AFA vessel list and LLP data.

Because 17 of the 40 vessels with a trawl endorsement are exempt from halibut PSC sideboard limits, only 23 AFA vessels would operate under trawl PSC sideboard constraints that are AFA eligible. Twelve of these 23 vessels may fish in the Western Gulf and 16 may fish in the Central Gulf. The 12 non-exempt vessels in the Western Gulf were typically larger than the exempt vessels. However, all of these vessels were less than 125’ LOA. In the Central Gulf, the vessels were typically larger than the Western GOA vessels, with several vessels being greater than 125’ LOA.

Table 4-80 indicates that, in general, fewer than half of the 23 eligible non-exempt AFA catcher vessels fished in the GOA during a year from 2003 to April 2012. Table 4-81 indicates that they are typically well below their annual halibut PSC limit.

Vessels by Area

While competition naturally creates some economic disincentive for the adoption of halibut avoidance measures, catcher vessels have adopted a variety of such measures in recent years. These measures are generally adopted at the prompting of NOAA Fisheries, which is likely unable to manage the fleet effort to remain within the halibut prohibited species catch limit in the absences of the measures. In such a case, managers would be compelled to close the fishery or have short openings to control the fleets’ efforts. Given the circumstances, fleet members have made agreements to address NOAA Fisheries’ managers concerns. In addition, some fleets have adopted additional measures to increase target harvests that can be made using the available halibut PSC allowance. These measures are applied both in fisheries that are constrained by the halibut prohibited species catch limit, and in fisheries that are not constrained by those limits. In these latter fisheries, the measures are intended to reduce halibut PSC, so as to increase the amount of the halibut PSC allowance available for later seasons.

Measures vary across regions and seasons, as the consequences of failing to reduce halibut prohibited species catch to prevent fishery closures vary throughout the year, depending on available target fisheries. The Pacific cod fisheries (in the Central GOA and Western Gulf) are the fisheries of greatest value most likely to be subject to closures because of the halibut prohibited species catch limit being reached. Table 4-98 indicates that from 2003 through 2010, Pacific cod accounted for 18% of the first wholesale gross revenue of groundfish delivered by these vessels. Only pollock generated more revenue. Of the Pacific cod taken from the Western GOA, from 2001 through 2008, by trawl catcher vessels less than 60’ LOA, 97% was taken before June 10th. When trawl catcher vessels greater than or equal to 60’ LOA are considered, it is 95%. This indicates that trawl catcher vessels operating in the Western GOA fish Pacific cod almost exclusively during the Pacific cod "A" season that runs from January 20th to June 10th. The majority of their catch is delivered to King Cove and Sand Point. The Central GOA Pacific cod harvests have been spread out over the Pacific cod "A" and "B" seasons. These vessels are most deliver the greatest percentage of their catch to Kodiak based processors. Trawl catcher vessels less than 60' LOA harvested 77% of their Central GOA Pacific cod during the "A" season. Trawl catcher vessels greater than or equal to 60' LOA harvested 56% of their Central GOA Pacific cod during the "A" season. These vessels, especially the greater than 60' LOA fleet, have a greater reliance on the Pacific cod "B" season. As a result, the halibut PSC available to the shallow-water complex in September (fourth season) and the undesignated amount of halibut PSC from October forward have a greater impact on the Central GOA vessels (and the community of Kodiak) than the Western GOA vessels and the communities where they deliver .

As may be expected, these fisheries also draw substantial numbers of the eligible participants (see Table 4-23). In the mid-2000s, managers had difficulty managing halibut prohibited species catch during the Pacific cod "B" season, primarily because of the rate at which the fleet prosecuted the fishery and the delay in processing observer data reports. To address this difficulty, managers moved to a system of short openings (of 12 hours and 24 hours), after each of which, halibut prohibited species catch data were processed and reviewed. If halibut PSC amounts remained available, an additional opening would be announced. This change successfully addressed the immediate problem of managing halibut prohibited species catch. Yet, short openings, several days apart, made fishing less efficient for participants. To address this loss of efficiency, the fleet has worked with NOAA Fisheries managers to develop several measures to avoid halibut and improve the timeliness of observer data coming available to managers. These efforts have allowed managers to extend the B season Pacific cod openers to a few days duration.

In addition, participants in the Pacific cod fishery worked to develop a halibut excluder that can be used on the smaller trawl vessels that participate in the GOA fisheries.[95] Although the excluder tests had mixed results, some participants believe it effectively reduces halibut prohibited species catch without unacceptable decreases in target catch (particularly in the Pacific cod fishery). These participants have continued to use the excluder, experimenting with adaptations to improve its effectiveness.

While the fall Pacific cod fishery may pose an economic challenge to the trawl catcher vessel fleet in the Gulf, the fleet has been constrained by the halibut prohibited species catch limits during other fisheries and seasons. To minimize losses from the increasing the PSC constraint, the fleet (particularly in the Central Gulf) has adopted more general measures to address halibut prohibited species catch throughout the year in all targets. Currently, the Central GOA trawl catcher vessel fleet shares halibut prohibited species catch information that is used both for identifying hot spots and for releasing weekly reports of halibut prohibited species catch, by vessel. These latter reports identify vessels by name, which may create peer pressure on participants who have relatively high halibut prohibited species catch rates.

Central GOA catcher vessels have a greater reliance of halibut PSC in the deep-water complex than the Western GOA vessels. Because Western Gulf catcher vessels primarily focus on pollock and Pacific cod their halibut PSC usage is applied against the shallow-water complex PSC limit. Central GOA catch vessels often rely on pollock, Pacific cod, arrowtooth flounder, and rex sole. Therefore the availability of shallow water halibut PSC after the Pacific cod "A" season deep-water complex halibut after the pollock and Pacific

[95] Use of excluders on these smaller trawl catcher vessels presents a challenge, as deckspace and reel use cannot accommodate the rigid structure of excluders used on larger vessels. The adapted excluders were tested under an Exempted Fishing Permit (EFP) during the 2006 and 2007 seasons. Tests of the excluder showed relatively high halibut escape rates, but escapes decreased with fish size. The tests also showed higher than expected Pacific cod escapement. These initial tests suggested that the excluder may not be practical for use in the fishery, as Pacific cod escapement rates were too high relative to halibut escapement (Gauvin, 2008). Since that time, efforts have been made by fishermen to modify the excluder to improve its performance, mostly by steps to increase its rigidity while still allowing the excluder to be rolled up on the net reel. Some participants believe the excluder effectively reduces halibut PSC rates (without excessive loss of target catches) and continue to use the excluder when they believe circumstances justify its use.

cod fisheries are closed is highly valued be many Central GOA catcher vessel operators and the processing plants that take deliveries from these vessels.

In the Western Gulf, halibut avoidance is less well coordinated in the fleet. A few factors likely contribute to this difference. The Western GOA fleet, as stated earlier, primarily delivers into two locations, Sand Point and King Cove; whereas, the Central GOA fleet delivers almost exclusively into Kodiak. In addition, the Western GOA fleet tends to be smaller vessels than Central Gulf vessels, and operate with a greater degree of independence. Few of the Western GOA participants have experience with cooperative programs, while many of the Central GOA participants have experience as members of AFA cooperatives or rockfish cooperatives. While those programs may not apply directly to GOA fishing, vessel operators' experiences in those programs provide them with an understanding of the potential benefits that may be derived from coordination, and provide some degree of familiarity with the means of coordinating efforts in a fleet.

Halibut avoidance in the Western GOA has generally consisted of moving from areas of high halibut prohibited species catch. To some degree, vessels exchange information concerning areas of high halibut prohibited species catch to aid in these efforts. While these practices are likely to continue, the potential for substantially greater effort to avoid halibut PSC arising from this practice is limited.

Operators of vessels that deliver to Sand Point or King Cove also have limited coordination with the fleet from Kodiak. During the 2012 Pacific cod "A" season. In part because of the new Pacific cod splits, the Western GOA was closed to trawl catcher vessels targeting Pacific cod on February 22. The Central GOA remained open to trawl catcher vessels targeting Pacific cod, and some vessels that deliver to Sand Point fished Pacific cod in area 620 and delivered their catch to Sand Point. Central GOA fleet had moved into pollock as a means to reduce halibut PSC usage about the time the Western GOA fleet began fishing are 620. The vessels delivering to the Sand Point plant used about 40% of their combined halibut PSC in area 620. This example highlights how the inability of the fleet to coordinate their activities in early 2012 impacts their ability to implement effective PSC reduction strategies in a changing regulatory environment.

Additional information on at the community level, where it can be reported for Kodiak, Sand Point, and King Cove is provided in Appendix7. That appendix provides a discussion of each community and the fishing sectors within the community.

While this action, in and of itself, is unlikely to stimulate additional efforts to control halibut prohibited species catch by trawl catcher vessels in the Gulf, it is possible that this action together with other aspects of the trawl catcher vessel fisheries and their management may collectively lead to more coordinated efforts to control halibut PSC and achieve greater returns from the fisheries.

4.6.7 Changes in Seasonal Limits

The Council requested that the analysis provide a discussion of potential methods to modify PSC limits and implement seasonal changes in the assignment of PSC limits. This section will consider the mechanism for implementing annual limits, based on the BSAI model. A discussion is also provided that focuses on modifying season dates and changing the PSC allowance assigned to a season.

It is assumed that any halibut PSC limit (or sideboard amount) not used within a season will be rolled-over into the next season, for the sectors it is currently allowed. For the Amendment 80 sector, the analysis will provide discussions of 1) maintaining the current no roll-over regulation and 2) modifying the regulation to allow unused halibut PSC sideboards to be rolled-over to next season.

Changing the Annual PSC Limits

During the development of this proposed amendment, the Council has considered two methods to implement changes in the annual halibut PSC limits. The first method would implement the annual PSC limits as part of the annual specifications process. This method was considered to allow the changes in the annual PSC limits to be implemented during, but not at the start of the 2012 fishing year. Both GOA TACs and annual PSC limits would be recommended to the SOC at the December meeting based on the current two-year notice cycle. If approved by the SOC, NOAA Fisheries would publish the final PSC limits and apportionments in the *Federal Register*. The PSC limits would be implemented after the start of the fishing year.[96] After considering implementation and timing issues identified at the October 2011 meeting, the Council elected to consider a different approach, which would implement the annual PSC limit changes through the normal regulatory process. This method would require the type of analysis, review, and approval associated with any regulatory amendment. Placing the annual PSC limit in regulation would ensure that the limit is in place at the start of a fishing year, which would avoid issues associated with modifying the annual limit during a fishing year.

A summary of some of the issues identified with implementing changes in the annual PSC limit through the annual harvest specifications process are:

- Implementation would occur after the start of the fishing year, therefore, at least the first seasonal allocation would be based on the previous year's PSC limit;
- Debating the appropriate annual PSC limit during the harvest specifications process may make the TAC and PSC setting process more contentious;
- Modifying the annual PSC limit could complicate the analytical package needed to implement the annual harvest specifications;
- A less thorough analysis might be provided on the impacts of changing the PSC limits as a result of the timeline for implementing the annual harvest specifications.

Because of these issues, implementation of a reduced PSC limit during 2012 through the harvest specification process would have been difficult achieve. Therefore, the Council shifted their focus to implementing the PSC limit reductions through the regulatory process, as is done in the BSAI.

Annual halibut PSC limits for the BSAI are set in regulation at §679.21. In the GOA, the process for setting the final halibut PSC limits and apportionments is defined in §679.21(d), but the amounts of the annual limits are not defined. The Council is proposing to modify those regulations to include the annual limit in the GOA regulations, while keeping the process for setting the seasonal limits in the annual harvest specifications process. It should also be noted that the Council would maintain the authority to withhold a portion of the annual limit when making seasonal apportionments through the normal regulatory process. This is currently done in the BSAI where the PSC limit is reduced by 150 mt under Amendment 80. That 150 mt halibut PSC reduction is not available to any sector. Such a set-aside has the same effect as reducing the annual PSC limit. A similar set-aside is made by the Rockfish program in the GOA. Under that program, the 2,000 mt trawl PSC limit is reduced by 27.4 mt, which is set-aside under the program, but not made available to any groundfish fisheries. When setting the annual PSC limit in the GOA, the final PSC limit could include any set-aside amount, which would continue to be deducted from the PSC limit as provided for in regulation. In such a case, the annual limit would overstate the actual amount of PSC limit available for use.

Under the proposed action, the Council would recommend annual PSC limits based on the alternatives considered. If approved by the SOC, the GOA annual limits would be defined in regulation. Once implemented, changing the annual limit (or changing or creating any set-asides) would require a regulatory amendment. The time required to change the annual limit, once in regulation, will depend on the priority of the analysis and rule making.

While the annual PSC limit could only be changed through regulatory amendment, seasonal changes to the PSC limits could still be made through the annual harvest specifications process. This would give the Council the flexibility to adjust season dates and seasonal apportionments within the constraints of the annual limit. Adjusting seasonal limits and dates will affect sectors of industry differently, depending on other regulations that restrict their flexibility to utilize halibut PSC.

Changing Season Dates and Seasonal Apportionments

Under §679.20, NMFS seasonally allocates the halibut PSC limits based on recommendations from the Council. The FMP requires that the following information be considered by the Council in recommending

[96] Section 4.6.4 is a discussion of implementation after the start of the fishing year.

seasonal allocations of halibut: (a) Seasonal distribution of halibut, (b) seasonal distribution of target groundfish species relative to halibut distribution, (c) expected halibut bycatch needs on a seasonal basis relative to changes in halibut biomass and expected catches of target groundfish species, (d) expected bycatch rates on a seasonal basis, (e) expected changes in directed groundfish fishing seasons, (f) expected actual start of fishing effort, and (g) economic effects of establishing seasonal halibut allocations on segments of the target groundfish industry.

During the annual harvest specifications process members of industry could recommend to the Council that halibut PSC season dates be modified or that the limit be redistributed among seasons to allow the TACs to be more fully utilized. It is assumed that vessel operators will attempt to maximize profits from the groundfish available by minimizing the halibut PSC utilized to harvest groundfish. It is further assumed that the harvest of the most valuable groundfish species would be prioritized in establishing the seasonal distribution of PSC limits and in harvest choices to ensure sufficient halibut is available to realize the greatest return from the fisheries. After these high value species priorities are satisfied, halibut PSC will be slated for use for lower valued species. Of course, each industry sector and companies within those sectors focus on different fisheries, depending on their vessel's capabilities, markets, and historic participation patterns. So, not all vessels have the same annual fishing cycle. These differences are likely to be revealed in discussions during the annual harvest specification process and will result in different impacts on sectors of industry.

The current annual GOA halibut PSC limit (2,000 metric ton for trawl fisheries has been in place since 1986 (although the total amount that may be utilized was reduced by the 27.4 mt set-aside under the Rockfish Program starting in 2012). While the overall limit has remained unchanged, seasonal distributions of the limit have changed in a few instances since 1986.

In 1990, industry requested an emergency rule to apportion the annual GOA PSC limit quarterly to prevent the fishery from closing early. For the 1991 fishing year, the halibut PSC limit was divided into four seasons. The first season was from January1st through March 31st (and received 30% of limit); the second season was from April 1st through June 30th (and received 30% of limit); the third season was July 1st through September 29th (and received 20% of limit); and the fourth season was September 30th through the end of the year (and received 20% of limit). These seasonal limits accounted for migration patterns of halibut and the timing of target fishing for various species harvested in deep-water and shallow-water species fisheries. At the September 1993 meeting, the Council recommended that NMFS prepare a rule for Secretarial approval that authorized separate apportionments of the trawl halibut bycatch mortality limit between the deep-water species fisheries and the shallow-water species fisheries. An emergency rule was prepared by NMFS and implemented February 7, 1994 (59 FR 6222, February 10, 1994). The emergency rule specified the deep-water species fisheries/shallow-water species fisheries trawl fishery apportionments of the 1994 GOA trawl halibut bycatch mortality limit and divided those apportionments further among seasons. These apportionments of the trawl limit were developed, in part, to separate PSC limits for fisheries primarily taken by catcher vessels from PSC limits for fisheries primarily taken by catcher processors.

As discussed in detail throughout the RIR, the GOA trawl halibut PSC limit is currently divided among five seasons and two species fisheries. Because seasonal and complex changes are proposed to occur under the annual harvest specifications process, this analysis has not focused on those changes. However, the following information presents the perspectives of some industry members concerning the effects of changes in seasonal and complex limits on GOA trawl fisheries. Both catcher vessel and catcher processor representatives have suggested that options increasing their flexibility to efficiently utilize the available PSC limit would be beneficial. However, it is important to also consider the effects of sideboard limits, which cannot be altered through the annual harvest specifications process. The interaction of changes in the seasonal distribution with changes in sideboard limitations, especially in the case of the Amendment 80 sector, could nullify benefits to either the Amendment 80 sector or other sectors that might arise from those modifications.

Representatives of the shorebased sector stressed the need to remove barriers that prevent efficient use of halibut PSC limits, if they are reduced. Specifically, the ability to change season dates and the seasonal distribution of halibut PSC, along with the ability to move halibut between the shallow-water and deep-water species fisheries, as a part of the annual harvest specification process is believed to be important to facilitate the modification of fishing patterns in a manner that reduces halibut PSC usage. For example, if high bycatch is typically observed at a particular time period in certain shallow-water fisheries, the most efficient use of the halibut may limit the PSC available in that fishery during that period. In considering this change, the effects on the various sectors, particularly those subject to sideboards, are important to consider. These effects are most acute for the Amendment 80 sector, which is limited by seasonal sideboards in each complex that are not rolled over. In other words, if the sideboard is not used during its specified season and complex, that sideboard will not available for use at a later time. At the extreme, a seasonal allocation reduction could result in the Amendment 80 sideboard for that season being greater than the total halibut PSC apportionment for that season, in effect leaving Amendment 80 sideboarded vessels with no choice but to either use all of the available halibut PSC in that season or not use their sideboard.

To address this concern, representatives from the Amendment 80 sector indicated that their preference would be to consider more flexible mechanisms for limiting their halibut PSC usage. The most flexible mechanism would be sector splits of the PSC limit such that the Amendment 80 sector would be given their own allowance using a methodology similar to that developed to determine their sideboard limits. Because halibut PSC limits are often a primary constraint in harvesting their GOA groundfish sideboards, PSC limit sector splits might enable the Amendment 80 sector to effectively rationalize their GOA fisheries. Through cooperative agreements, the Amendment 80 sector could divide their PSC limit among cooperative members, in all but the third season when vessels outside the Best Use Cooperative are fishing rockfish in the Western Gulf. Best Use Cooperative members would be held accountable for their PSC usage by the cooperative through private agreements. The sector as a whole would be held accountable by NOAA fisheries. The flexibility and individual accountability afforded by sector splits is viewed by Amendment 80 participants as the optimal "tool" for utilizing any amount halibut PSC limit that is available to the Amendment 80 sector.[97] Even though Amendment 80 participants are subject to target species sideboards, a sector split is perceived by other Gulf trawl fishery participants to disadvantage those vessels relative to Amendment 80 participants. Specifically, Amendment 80 participants will be best positioned in the fleet to ensure that they are able to harvest their entire sideboard of valuable species. As a corollary, the incentive for other participants to reduce halibut PSC usage may be reduced, if they perceive the need to ensure adequate halibut are available to harvest valuable target species despite relatively high PSC rates. For example, if PSC usage is particularly high in September and decreases in October, it may be desirable to limit the amount of halibut available for Pacific cod harvests in September, shifting the available PSC limit to October. However, if the Amendment 80 vessels are able to use their own allocated halibut during this period and incorporate other measures to reduce halibut usage in September, it is possible that the Amendment 80 participants can ensure that they are able to harvest their entire Pacific cod sideboard. Others perceiving this opportunity may be less likely to support a shifting of halibut PSC limits away from periods of high PSC usage, if they perceive a potential lost opportunity in a fishery.

If a sector split of the annual PSC limit could not be achieved in this amendment package[98], an alternative might be to "reform" the Amendment 80 sideboard structure. These reforms would also require amending the sideboard structure that is in regulation and shown in Table 38 to 50 CFR Part 679. Such changes are currently outside the suite of options being considered by the Council for this amendment package.

Three types of modifications to their sideboard limit were proposed by the Amendment 80 sector. The first would be to simply issue their halibut PSC sideboard limit as a single amount that can be used any time during the year, for any fishery, eliminating seasonal and species fishery sideboards for the Amendment 80 sector. Eliminating PSC seasons and species fisheries from the sideboards would remove the constraints associated with not allowing unused seasonal sideboard limits to roll-over. If the Amendment 80 sideboard limit exceeds the total seasonal limit, the Amendment 80 sideboarded fleet would not be limited by the

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[97] **It is important to note that the Amendment 80 sector would need to either receive its own apportionment of the limit (available for use exclusively by Amendment 80 eligible vessels) or reach agreement with any Gulf eligible catcher processors to ensure that the full benefit can be derived from the sector apportionment.**

[98] Alternatives would need to be included in this package to define sector splits before this option could be considered at final action.

halibut sideboard during that season, but would not be permitted to fish in a fishery once the applicable overall seasonal and species fishery apportionment is reached. In addition, the Amendment 80 fleet would be constrained by target species sideboard limits (regardless of their halibut PSC usage). Because the PSC sideboard limit would be issued as an undesignated "lump sum", it could be used in any season for species fishery as long as halibut PSC limit is available to the general fleet. During the early seasons when most of the sideboard limit is still available, the "lump sum" sideboard would not constrain the Amendment 80 fleet's usage of the overall sideboard limit. During those times the Amendment 80 sideboard limit would essentially be eliminated, and the other fleets would not be "protected" by those limits. If Amendment 80 participants use this flexibility to change harvest patterns, it is possible that other fleets fishing patterns could be disrupted.

The second option would be to allow any unused sideboard amounts to roll-over from season-to-season. This would treat Amendment 80 sideboard limits more like the sideboard limits that were created for the non-exempt AFA catcher vessel sector, but would provide less flexibility than the "lump sum" option, because they would still be bound by species fishery limits and their entire PSC sideboard limit would not be available at the beginning of the year. The amount of halibut PSC that would roll-over from season to season is the difference between their sideboard limit and their PSC usage estimated by NOAA Fisheries. Roll-overs would allow the sector to benefit from their halibut PSC savings that accrued from previous seasons, if there was sufficient halibut PSC available overall for that season and species fishery. It is important to note that the Amendment 80 sector would be subject to not only their halibut PSC sideboard limits but also the general halibut PSC limits, which means that the Amendment 80 fleet could be precluded from fishing by other vessels' use of the applicable seasonal and species fishery limits.

Finally, the third option presented would combine the Amendment 80 deep-water and shallow-water species fishery sideboards. This would allow their sideboards in a season to be used in any open target fishery. This change could be implemented with or without the provision to allow roll-overs. If it excluded the roll-over provision, the Amendment 80 sector would be able to utilize any of the seasonal limit in either species fishery. The current species fishery designations, at times, constrain the use of halibut PSC by the sector, particularly in the shallow-water species fishery. Depending on the circumstance, it is possible that combining the sideboard for the two species fisheries could impose on other participants, but the Amendment 80 sector would still be subject to sideboard limits on target species that should limit their potential to increase their catches beyond historical levels in the various target fisheries.

Representatives of the Amendment 80 sector stressed that these last three options were considered to be "band-aids" and that only the first option, the sector split of halibut PSC, would address the underlying problem of being able to efficiently utilize decreasing halibut PSC limits to harvest groundfish. They also understood that without modifications to the current list of alternatives being considered, it would not be possible to move any of the options discussed forward in the current amendment package.

To aid readers in considering the effects of seasonal distributions of halibut PSC limits, a few examples are presented. These examples assume that seasonal PSC limits could be changed under the annual harvest specification process and the annual limit, Rockfish Program limit, and sideboard limits would be defined in regulation. In some cases, the examples use extreme cases to provide a more clear effect. In no case should these examples be interpreted as attempt to capture any Council preference for an alternative.

For the first example, it is assumed that the current structure of limitations on halibut PSC usage remains in place and a 15% reduction of the annual limit is imposed on all seasons. The 15% reduction is used in this example because it would have the greatest impact and more clearly illustrates issues discussed, especially in the fifth season. It is not assumed that a 15% reduction is the Council's preferred alternative. Further, we will assume that industry has recommended and the Council and SOC have approved moving all of the fourth season apportionment of 128 mt (based on 15% reduction) of halibut PSC to the fifth season. Vessels could continue to fish during the fourth season if sufficient halibut PSC was rolled-over from previous seasons. If all the halibut PSC available to a species fishery had been taken by the end of the third season, those fisheries would not be opened during September.

Even though the Amendment 80 sector would have small halibut PSC sideboard limits for the fourth season, no halibut PSC limit is available and that sector's members would be closed to fishing like the other trawl sectors. Sixteen mt of their historic halibut PSC sideboard limit would become unusable, because no PSC was available under the general limit in the fourth season and the unused sideboard amount does not roll-over.

With no shallow-water roll-overs available for the fourth season, the start of fishing in the Pacific cod trawl "B" season would shift from September 1 to October 1. Vessels would still be allowed to target pollock using pelagic gear since it is exempt from PSC limits. Effort would not be divided between pollock and Pacific cod during September bringing additional effort in the pollock fishery (if markets are available) and resulting in less pollock being available to harvest later in the year.

In the fifth season, the amount of halibut available would increase from 255 mt to 383 mt. The size of the Amendment 80 sector's PSC sideboard limit in the fifth season would stay the same, since they are calculated as a percentage of the annual limit. It would also allow vessels to utilize halibut from the fourth season, during which no allocation is typically made to the deep-water species fishery during the fifth season, since halibut PSC is not assigned by species fishery during the fifth season. Access to all target fisheries allows individuals to utilize the PSC limit to harvest the most valuable species that have TAC remaining. However, because of structure of the sideboard limits, the Amendment 80 sector would still bound by their deep-water species fishery and shallow-water species fishery sideboard limits in the fifth season. Although more halibut PSC may be available for use in either species fishery, the Amendment 80 sector participants would be limited in each species fishery. AFA catcher vessel's PSC sideboard limits are calculated based on a percentage of the seasonal PSC limit. Deep-water species fishery PSC sideboard percentages during the first four seasons are 34% of the total; shallow-water species fishery PSC limits are 7% of the seasonal limit. During the fifth season, the AFA catcher vessel's sideboard limit is 20.5% of that season's total. The weighted average of the other season's sideboard limit is about 21% so increasing the fifth season limit would slightly decrease the overall sideboard limit. The overall affect would be minimal, in terms of changing their PSC sideboards.

Under our example of moving the entire fourth season's limit to the fifth season, the fifth season's PSC limit would increase from 300 mt to 450 mt (with no PSC reduction). With a 15% reduction, the PSC limit would decrease from 450 mt to 383 mt, then applying the 300 mt reduction to that total yields an 83 mt halibut PSC limit for the fifth season. The Amendment 80 sector's sideboard limit would be 54 mt (23 mt in the deep-water species fishery and 31 mt in the shallow-water species fishery)[99], so they could use a maximum of 54 mt of the 83 mt available (assuming no roll-overs). The non-exempt AFA catcher vessels would have a larger sideboard limit for the fifth season, because their sideboard is calculated as a percentage of the seasonal limit. Their PSC sideboard limit for the fifth season would increase from 0 mt to 17 mt.

As a second example, consider a 15% reduction applied entirely to the fifth season. Under this alternative no halibut is assigned to the fifth season, since the fifth season currently is allocated 15% of the total annual halibut PSC limit. If no halibut PSC is rolled over to the fifth season the trawl fishery (except pollock using pelagic trawl gear) would be closed. However, unused halibut PSC limit could be rolled-over from previous seasons if available. The Amendment 80 sector would be allowed to utilize any of the halibut PSC available, up to their fifth season limit of 54 mt, but this limit is divided into separate deep-water and shallow-water species fishery limits. If no roll-overs of halibut PSC are available, the Amendment 80 sector would forego their 54mt sideboard limit from the fifth season.

The non-exempt AFA catcher vessel sector would not receive any halibut sideboards for their fifth season (0.205*0mt=0mt). However, they would be able to utilize any PSC limit that was unused during the previous seasons, if they had unused halibut PSC sideboards since that sectors halibut PSC sideboard limit can be

[99] Halibut PSC limits are not managed as shallow-water and deep-water species fisheries for the fifth season. However, the sideboard limits are managed as deep-water species fisheries sideboards and shallow-water species fisheries sideboards in the fifth season. That management strategy limits the Amendment 80 sector to 23 mt of deep-water species fisheries halibut PSC in the fifth season, under a 15% reduction of the annual limit.

rolled-over. Their overall halibut PSC sideboard would be approximately the same because they are issued about the same percentage of each seasonal limit. Therefore, under the current seasonal distributions, both the Amendment 80 sector and non-exempt AFA catcher vessels would be dependent on roll-overs to fish during the fifth season, if the entire reduction was applied to that season; however, the AFA sideboarded vessels would have the fifth season sideboard reduced proportionally to the reduction in the overall PSC limit in that season.

Reducing the amount of halibut available in the fifth season and making the fleets dependent on roll-overs will increase uncertainty and increase competition for the available PSC during the fifth season. Catcher vessels will likely focus on the Pacific cod fishery at the start of the season, assuming the Pacific cod season is still open. Flatfish qualified Amendment 80 vessels, would tend to fish for arrowtooth flounder with their halibut usage accruing against their 23mt deep-water species fishery limit.

Amendment 80 representatives also indicated that applying the entire reduction to the fifth season would likely require reevaluating the cooperative agreements for GOA halibut PSC. During the second and fifth seasons the majority of the flatfish eligible fleet fishes deep-water species (arrowtooth flounder). They also fish GOA flatfish during the third season. The second season's deep-water halibut sideboard limit is fully utilized, most years. Eliminating, or greatly reducing, the fifth season would cause members of the sector to reconsider their position under the current cooperative agreement, as it would alter the distribution of benefits within the sector. For example, some companies may have developed trading partners. Those trades may involve companies trading halibut sideboard limits for other species. Modifying regulations that greatly increase the uncertainty of a fifth season flatfish fishery, would likely result in those agreements being reconsidered if halibut PSC was not available to harvest flatfish.

In conclusion, most participants in the Gulf trawl fisheries that use halibut PSC agree that additional flexibility in the distribution of halibut PSC limits seasonally is important to reducing halibut PSC usage and obtaining the greatest benefit from the use of that halibut PSC; however, changes in the distribution that benefit one segment of participants can harm others. Discussing the impacts of hypothetical seasonal changes is difficult without specific alternatives to consider. Yet, from the discussion above it is apparent that seasonal changes that can be implemented through the annual harvest specifications process will provide limited benefits to the Amendment 80 sector, because of the structure of their sideboard limits. Catcher vessel sectors operating in the GOA may derive greater benefits from adjusting seasonal apportionments, but the benefits are dependent on the structure of the changes. Therefore, allowing seasonal adjustments as part of the annual harvest specifications process gives industry an opportunity to provide input on proposed changes to the Council, the Council the latitude to request changes in a timely fashion, and have NMFS implement seasonal changes that are thought to be beneficial relatively quickly. It also provides the opportunity to adjust PSC limits relatively quickly when groundfish harvesting, PSC rates during the year, or market conditions change. In considering modifications to the seasonal distribution of halibut, these effects should be given careful consideration.

4.6.8 Communities

Appendix 7 provides a community analysis for the proposed Gulf groundfish PSC revisions. This section provides a brief summary of that analysis.

For the purposes of community analysis, a two-pronged approach to analyzing the community or regional components of changes associated with the implementation of proposed Gulf halibut PSC revisions was utilized. First, tables based on existing quantitative fishery information for the period 2003 through 2010 were developed to identify patterns of participation in the various components of the relevant fisheries (see Appendix 7). There are, however, substantial limitations on the data that can be utilized for these purposes, based on confidentiality restrictions. Tables 4-97 through 4-101 provide summary quantitative sector participation information, by Alaska community (to the extent allowed by confidentiality restrictions) and other geographies. (Section 4.6.9 provides a separate analysis of potential impacts to Alaska community public revenues.)

The second approach involved selecting a subset of Alaska communities most heavily engaged in the relevant Gulf groundfish fisheries for characterization to describe the range, direction, and order of magnitude of social- and community-level engagement and dependency on those fisheries. A series of profiles were compiled for those communities, which included Anchorage, Chignik Lagoon, Homer, Juneau, King Cove, Kodiak, Petersburg, Sitka, and Sand Point (see Appendix 7). Table 4-102 provides a graphic representation of Gulf groundfish fisheries engagement and Gulf halibut fisheries engagement for the communities profiled. As noted in Appendix 7, a number of other Alaska communities are substantially engaged in the potentially affected Gulf groundfish fisheries, but none have the range and/or level of engagement of the communities profiled, particularly in terms of steady local fleet participation over the last few years. That said, Cordova, Akutan, and Unalaska/Dutch Harbor shore-based processors have been steadily engaged in Gulf groundfish processing over the 2003 through 2010 period.

In general (as discussed in Appendix 7), it is not possible to quantitatively differentiate potential impacts of the different Gulf halibut PSC reduction alternatives on an individual community basis. Qualitatively, however, it is possible to anticipate the communities where adverse impacts, if any, would most likely accrue, along with the nature, direction, and at least rough order of magnitude of those impacts. Adverse impacts would likely be felt at the individual operation level for at least a few vessels in a number of Alaska communities, due to increased costs and/or a drop in revenues associated with either changing fishing patterns and/or practices to reduce halibut PSC or because of season-ending closures, based on a particular gear- or species-based sector hitting a (revised) halibut PSC limit, earlier in the season than would have been the case under previous (higher) halibut PSC thresholds. Additionally, recent community and social impact assessments for North Pacific fishery management actions suggest that as locally operating vessels experience adverse impacts, indirect impacts are also soon felt by at least some local support service providers, to the degree that those individual enterprises are dependent upon customers who participate in the specific fishery or fisheries affected (and the relative dependence of those customers on those specifically affected fisheries). Given the scope of overall impacts anticipated to result from any of the management alternatives assessed for the proposed Gulf halibut PSC allowance revisions, however, community-level impacts would likely not be discernible for most of the engaged communities. The three communities where community-level impacts are a greater possibility are King Cove, Sand Point, and Kodiak, based on the relative involvement with the trawl sector, both on a local fleet and processing basis.

As described in detail in Appendix 7, potential mitigating factors for possible adverse impacts in King Cove and Sand Point, however, include the specific gear, species, and seasonal nature of the Gulf groundfish trawl-related efforts in those communities, such that any Gulf halibut PSC revisions that affected any season other than the cod "A" season (January 1 through June 9) in the Western Gulf would have minimal impacts to King Cove and Sand Point.

Kodiak, however, is substantially engaged in a wide range of Gulf groundfish fisheries in terms of spatial and seasonal distribution of effort, species targeted, and gear types utilized with respect to its local fleet, and Kodiak processing operations are very much the center of Gulf groundfish shore-based processing. Kodiak would be especially more likely to experience any adverse impacts related to Gulf groundfish trawl fisheries in the later part of the year, particularly with respect to flatfish-related operations. A potential mitigating factor for adverse community-level impacts in Kodiak is that the community is substantially engaged in and dependent upon a wide range of fisheries, not just the Gulf groundfish fisheries, and multiple gear types within the Gulf groundfish fisheries. For the local Gulf groundfish fleet, exvessel gross revenues are roughly comparable for the fixed gear and trawl segments of the fleet. For processing operations, a lack of flatfish toward the end of the year in particular could create a range of challenges with respect to continuity of operations and processing labor issues. For Kodiak shore-based processors, flatfish (year-round) accounted for roughly 10% of combined flatfish and other groundfish first wholesale gross revenues on an annual average basis in recent years and roughly 5% of first wholesale gross revenues for all species combined.

In general, adverse community-level impacts are not likely to be significant for any of the involved communities and the sustained participation of these fishing communities would not be put at risk by any of the proposed Gulf halibut PSC revision alternatives being considered. For some individual operations, however, especially within the Gulf groundfish trawl sector in Kodiak and those processing operations in Kodiak substantially dependent upon Gulf groundfish trawl deliveries of flatfish in particular, adverse impacts may be felt at the operational level, particularly if the fleet cannot effectively modify behavior to reduce historical halibut PSC rates.

It is assumed that direct halibut fisheries, including the commercial, sport charter, and subsistence halibut fisheries, would potentially benefit from the proposed Gulf halibut PSC revisions relative to the degree that the Gulf halibut stock itself would potentially benefit from these proposed actions (and the effective redistribution of overall allocations between sectors that may occur with the various alternatives). Beneficial impacts to these fisheries would likely, in some measure, serve to offset adverse impacts to Gulf groundfish fisheries resulting from the proposed Gulf halibut PSC revisions at the community level if not at the individual operational level. The communities most heavily engaged in the relevant Gulf groundfish fisheries, however, are not always the communities most centrally engaged in/dependent upon the various Gulf halibut fisheries; therefore, the individual communities that have the potential to experience the greatest adverse impacts to the groundfish fisheries may or may not be the same communities as those that have the potential to experience the greatest beneficial impacts to the halibut fisheries. Further, while adverse impacts to some Gulf groundfish fishery participants would be immediate, beneficial impacts to Gulf halibut fishery participants would likely not be immediately realized. In general, the potential beneficial impacts to the various halibut fisheries would be spread more widely among communities than would be the potential adverse impacts to the groundfish fisheries. This potential differential distribution of adverse and beneficial impacts is expected to vary within and among communities, but the greatest overlap of potential negatively affected and positively affected populations would most likely occur in the communities profiled as those most centrally engaged in the Gulf groundfish fisheries.

Table 4-101 Alaska Communities with Annual Average Number of Locally Owned Gulf Groundfish Trawl Vessels Equal to or Greater than 1, 2003-2010

	Number of Vessels	Percent of Alaska Total	Percent of Grand Total
Kodiak	15.0	46.4%	16.3%
Sand Point	10.6	32.8%	11.5%
King Cove	3.5	10.8%	3.8%
Petersburg	1.0	3.1%	3.1%
Subtotal	30.1	93.2%	32.7%
Alaska Total	32.3	100.0%	35.1%
Oregon Total	17.1	na	18.6%
Washington Total	40.0	na	43.5%
All Other States Total	2.6	na	2.9%
All Geographies Total	92.0	na	100.0%

Table 4-102 (Table 98) Gulf Groundfish Trawl Vessels Annual Average Exvessel Gross Revenues by Alaska Community of Ownership, 2003-2010

Community*	Millions (dollars)	Percent of Alaska Total	Percent of Grand Total
Kodiak	$10.4	71.7%	18.0%
Sand Point	$3.1	21.4%	5.4%
Subtotal	$13.5	93.1%	23.3%
Alaska Total	$14.5	100.0%	25.0%
Washington Total	$30.4	na	52.4%
All Other States Total	$13.0	na	22.5%
All Geographies Total	$57.9	na	100.0%

*Table displays all Alaska communities with at least 4 or more vessels present each year (minimum to allow data disclosure for each individual year).

Table 4-103 (Table 99) Alaska Communities with Annual Average Number of Locally Owned Gulf Groundfish Hook-and-Line Vessels Equal to or Greater than 5, 2003-2010

	Number of Vessels	Percent of Alaska Total	Percent of Grand Total
Kodiak	125.4	34.2%	28.5%
Homer	48.0	13.1%	10.9%
Sitka	34.8	9.5%	7.9%
Sand Point	34.6	9.4%	7.9%
King Cove	15.3	4.2%	3.5%
Anchorage	11.0	3.0%	2.5%
Petersburg	9.1	2.5%	2.1%
Juneau	8.4	2.3%	1.9%
Chignik Lagoon	7.3	2.0%	1.7%
Subtotal	293.9	80.2%	66.9%
Alaska Total	366.5	100.0%	83.4%
Oregon Total	10.1	na	2.3%
Washington Total	53.9	na	12.3%
All Other States Total	8.9	na	2.0%
All Geographies Total	439.4	na	100.0%

Table 4-104 (Table 100) Gulf Groundfish Hook-and-Line Vessels Annual Average Exvessel Gross Revenues by Alaska Community of Ownership, 2003-2010

Community*	Millions (dollars)	Percent of Alaska Total	Percent of Grand Total
Kodiak	$8.5	37.6%	26.0%
Homer	$2.8	12.4%	8.6%
Sand Point	$1.9	8.4%	5.8%
King Cove	$1.9	8.4%	5.8%
Chignik Lagoon	$1.1	4.9%	3.4%
Anchorage	$0.6	2.7%	2.7%
Subtotal	$16.8	74.3%	51.4%
Alaska Total	$22.6	100.0%	69.1%
Oregon Total	$4.4	na	4.4%
Washington Total	$25.3	na	25.3%
All Other States Total	$1.3	na	1.3%
All Geographies Total	$32.7	na	100.0%

*Table displays all Alaska communities with at least 4 or more vessels present each year (minimum to allow data disclosure for each individual year).

Table 4-105 (Table 101) Shore-Based Processors Annual Average First Wholesale Gross Revenues from Deliveries of Gulf Groundfish by Gear Type and by Alaska Community of Operation, 2003-2010

Community*	First Wholesale Gross Revenues by Gear Sector (Millions of dollars)			Percentage of Combined Total
	Trawl	Hook-and-Line	Combined	
Kodiak	$74.3	$8.8	$83.1	75.7%
All Other Geographies	$25.4	$1.3	$26.7	24.3%
Total	$99.7	$10.1	$109.8	100.0%

*Table displays all Alaska communities with at least 4 or more processors present each year (minimum to allow data disclosure for each individual year).

Table 4-106 (Table 4-102) Graphic Representation of Annual Average Engagement in Potentially Affected Gulf Groundfish and Halibut Fisheries for Profiled Alaska Communities

Community	Relative Community Size	Gulf Groundfish Engagement			Gulf Halibut Engagement	
		Locally Owned Vessels		Shore-Based Processing Location	Local Commercial Halibut Quota Share Holders	Local Sport Charter Permit Holders
		Trawl Sector	Hook-and-Line Sector			
Anchorage	●	•	○	•	○	●
Chignik Lagoon	•	none	•	none	•	none
Homer	○	•	●	○	●	●
Juneau	●	•	•	•	○	○
King Cove	•	○	○	○	•	none
Kodiak	○	●	●	●	●	●
Petersburg	○	○	•	○	●	•
Sand Point	•	●	●	○	•	none
Sitka	○	none	●	●	●	●

Key for Table 4-102

Type/Level of Engagement	•	○	●
Community Size	2010 population = less than 1,000	2010 population = 1,000 – 10,000	2010 population = greater than 10,000
GOA Groundfish Trawl Participation	2003-10 annual avg. = 0.1 – 0.9 vessels	2003-10 annual avg. = 1.0 – 9.9 vessels	2003-10 annual avg. = 10.0 or more vessels
GOA Groundfish Hook-and-Line Participation	2003-10 annual avg. = 0.1 – 9.9 vessels	2003-10 annual avg. = 10.0 – 24.9 vessels	2003-10 annual avg. = 25.0 or more vessels
GOA Groundfish Shore-Based Processing Participation	2003-10 annual avg. = 0.1 – 0.9 plants	2003-10 annual avg. = 1.0 – 1.9 plants	2003-10 annual avg. = 2.0 or more plants
GOA Commercial Halibut Participation	2003-10 annual avg. = 0.1 – 49.9 QS holders	2003-10 annual avg. = 50.0 – 199.9 QS holders	2003-10 annual avg. = 200 or more QS holders
GOA Sport Charter Halibut Participation	2011 (only) = 1 – 19 permit holders	2011 (only) = 20 – 39 permit holders	2011 (only) = 40 or more permit holders

4.6.9 Taxes Generated by the GOA Groundfish Fisheries

There are three fisheries taxes that are levied on GOA groundfish catch/landings by the State of Alaska. The descriptions of these taxes were taken from the State of Alaska web site and are provided below:

- "A **Fisheries Business Tax** is levied on persons who process or export fisheries resources from Alaska. The tax is based on the price paid to commercial fishers or fair market value when there is not an arms-length transaction. Fisheries business tax is collected primarily from licensed processors and persons who export fish from Alaska."

The fisheries business tax is based on the price paid to the fishermen for the unprocessed fisheries resource. Direct marketers, catcher processors, buyer exporters and licensed companies having someone custom process on their behalf must use market value to calculate the tax. The tax rate on the aggregate unprocessed value depends upon the type of processing activity and whether the resource is designated as an established or developing species by the Department of Fish & Game.

The tax rates are as follows:

Established Species	Rate	Developing Species	Rate
Floating	5%	Floating	3%
Salmon Cannery	4.5%	Shore-Based	1%
Shore-Based	3%	Direct Marketers	1%
Direct Marketers	3%		

- "A **Fishery Resource Landing Tax** is levied on fishery resources processed outside the 3-mile limit and first landed in Alaska or any processed fishery resource subject to sec. 210(f) of the American Fisheries Act. The tax is based on the unprocessed value of the resource, which is determined by multiplying a statewide average price (determined by the Alaska Department of Fish and Game data) by the unprocessed weight. The Fishery Resource Landing Tax is collected primarily from factory trawlers and floating processors which process fishery resources outside of the state's 3-mile limit and bring their products into Alaska for transshipment."

Some GOA fisheries are, in part or primarily, harvested by catcher processors that process their catch at sea. These vessels, and any deliveries to at-sea motherships, would be subject to the Fishery Resource Landing Tax.

The tax is calculated on the unprocessed weight of the resource. Taxpayers can use actual weight or, if they do not weigh their unprocessed catch, can use the NMFS Product Recovery Rate tables to calculate unprocessed weights. The unprocessed weights are multiplied by the statewide average price (SWAP) to determine the taxable value of the fishery resource. The tax rate is 3% for established species and 1% for developing species (as designated by the Alaska Department of Fish & Game).

- "A **Seafood Marketing Assessment** is levied at a rate of 0.5% of the value of seafood products processed first landed in, or exported from Alaska."

The Seafood Marketing Assessment would be levied on all GOA groundfish landings and any changes in the total value of the GOA fisheries will impact the tax revenue that is generated by the State of Alaska.

The State of Alaska statewide prices used to determine tax liability are available for the 2010 tax year (http://www.tax.alaska.gov//programs/documentviewer/viewer.aspx?2347f). Fish values reported in that table are multiplied by the appropriate rate established for that species. For 2010, the following species were considered to be developing in the GOA by the State of Alaska:

- Arrowtooth flounder
- Squid
- Skates
- Flatfish (all areas but Southeast) – except yellowfin sole, Greenland turbot, and rock sole
- Black rockfish (Southeast and west of 164° 44' W longitude)
- Octopus
- Groundfish not mentioned above (except walleye pollock, Pacific cod, sablefish, rockfish, Pacific Ocean perch, and forage fish species)

Based on the above criteria, it is possible to estimate the statewide tax foregone under each of the options considered by the Council. Because of the limited number of catcher processors that participated in the fisheries that would have been foregone, the data can only be reported in aggregate. The estimated state tax revenue foregone varies by year, but for this analysis, the most recent year of data available (2010) was used to show the difference. Halibut tax revenue is assumed to stay constant under all years, because the IPHC estimates of halibut gains were based on the assumption that the total amount of halibut under each option would be taken.[100] A tax rate of 3.5% was applied to halibut to cover both the Fisheries Business Tax and the Seafood Marketing Assessment. Changes in revenue were calculated at the first step of the Catch Sharing Plan. Alaska statewide average prices (2010) were used for both halibut and groundfish.

Under Option 1 (a 5% reduction in halibut PSC), the 2010 tax revenues were projected to increase by the amount of the tax applied to halibut landings. This is due to the fact that under the 5% reduction in halibut PSC, the groundfish fishery did not forego any revenue in 2010 (2010 was a low halibut PSC year). No ex-vessel revenues foregone in the groundfish fishery and $30,000 increase in halibut tax revenues were estimated under the 5% reduction. When the PSC limit was reduced by 10%, the state tax was estimated to have increased by $59,000 from halibut landings. Using the groundfish method to estimate tax changes, their tax liability decreased by $17,000. Reducing the PSC limit from 10% to 15% substantially increased the

[100] In considering the computation of effects, readers should note that the methodology of computing the halibut increases are, in some instances, inconsistent with the analysis of groundfish fisheries. Specifically, in some cases the groundfish fisheries are found to be unconstrained by the halibut PSC limit, but the calculation of effects on the halibut resource assumed that all available halibut PSC would be used. In other words, in cases where the halibut PSC limit is not binding, a gain in halibut may occur under that status quo that is ascribed to the change in the PSC limit, under the assumptions of the analysis of halibut resource effects.

amount of groundfish foregone. The linear calculation for the change in halibut tax liability resulted in an increase of $89,000.

Table 4-107 Estimated changes in statewide taxes

	Status Quo	5%	10%	15%
Directed Halibut Fisheries	$0	$30,000	$59,000	$89,000
Directed Groundfish Fisheries	$0	$0	($17,000)	($114,000)

Source: AK statewide average prices for 2010, AKFIN summary of NOAA Fisheries catch accounting data, IPHC estimates of increased halibut available to directed fisheries

Municipality Raw Fish Taxes

Some municipalities also levy raw fish taxes on fish first landed at processing plants located in their communities. Municipalities that charged a raw fish tax on GOA groundfish deliveries in 2010 are shown in Table 4-108. Also reported in the table is each municipality's population, raw fish tax rates, 2010 reported raw fish tax revenue, and estimated reduction in groundfish tax revenue for 2010. Estimated tax revenues were reported for 2010, because that is the most recent year statewide average ex vessel prices were available from the Alaska Department of Revenue to make the estimates.

Municipalities that charged a raw fish tax on GOA groundfish deliveries set the tax rate at 2% of ex vessel revenue. King Cove was the only municipality to charge a Fisheries Impact Tax and it is set at a flat rate of $100,000. The Fisheries Impact Tax is levied against the local processor, to help pay for city resources used by the plant. The cities of King Cove, False Pass, and Sand Point impose a 2% fish tax in addition to the 2% fish tax imposed by the Aleutians East Borough. Chignik imposes a 2% fish tax on vessels and a 1% fish tax on processors. Unalaska imposes a 2% fish tax. Estimates of the municipal fish taxes cannot be reported, because fewer than three groundfish processors are located in each community. Several communities where GOA groundfish are landed do not charge a raw fish tax.

Instead of a raw fish tax, the Kodiak Borough imposed a severance tax of 1.05% on harvested natural resources, including commercial fishing, timber sales, sand or gravel extraction, and mining activities that occurred during 2010. In June 2011, Kodiak lawmakers increased the Borough's severance tax rate to 1.25%.

In general, the reductions in raw fish taxes assessed by municipalities would, potentially, have the greatest impact on the community of Kodiak. Under this amendment, their groundfish tax revenues would be reduced when the reduced halibut PSC limits cause closures of the Central and Western GOA non-pollock groundfish fisheries, reducing harvests from those fisheries. Increases in halibut tax revenue may partially or completely offset these decreases. However, determining specific amounts of halibut landings increases, as well as associated prices, by community is required to estimate the net change in taxes. Although specific landings patterns are not predictable, some information provides insight into the overall effect of this action. For example, if 16% of the projected IFQ increase in Areas 3A and 3B under Option 1 (a 5% halibut PSC reduction) were to be landed in Kodiak, the taxes realized by the community from those IFQ landings would offset the loss of groundfish tax revenue from the lower halibut PSC limit, all else equal. On the other hand, under the 15% halibut reduction of Option 3, almost 95% of the 3A and 3B halibut IFQ increase must be landed in Kodiak to offset the groundfish tax losses. These estimates are derived based on several assumptions used throughout this analysis. The discussion highlights the difficulties in determining whether tax revenues at the community level will increase or decrease, given the proposed changes in the halibut PSC percentages.

Table 4-108 Municipality imposed raw fish taxes

Municipality	Population	Raw Fish Tax	2010 Raw Fish Tax Revenue	Estimated tax reduction from groundfish in 2010 (rounded to nearest $1,000)[a]
Aleutians East Borough	2,778	2%	$3,421,781	Confidential
Chignik	62	1% Proc / 2% Vess	$66,100/$62,795	Confidential
False Pass	41	2%	$35,832	Confidential
King Cove	744	2%/Flat amount*	$100,000*	Confidential
Kodiak Island Borough	13,860	1.05%^	*(not available)*	5%: $0 10%: $3,000 15%: $30,000
Lake & Peninsula Borough	1,547	2%	$1,617,102	Confidential
Pilot Point	66	3%	$382,983	Confidential
Sand Point	1,001	2%	$500,689	Confidential
Unalaska	3,662	2%	$3,596,623	Confidential
Yakutat, City and Borough of	628	1%	$24,747	Confidential

*Fisheries Impact Tax of $100,000

^Kodiak Island Borough imposes a severance tax on harvested natural resources, including commercial fishing, timber sales, gravel extraction, and mining activities. The 1.05% rate was in effect for 2010 and collected about $1.34 million in tax revenue, but that rate will increase to 1.25% based on recent action by the Kodiak Island Borough Assembly.

Source: State of Alaska, DCED, 2011. http://www.dced.state.ak.us/dca/osa/pub/10Taxable.pdf

[a] This estimate is the reduction in tax from the groundfish fishery. There will be an increase in tax revenue as a result of the changes in the halibut fishery. The increase in halibut IFQ will primarily apply to Area 3A and Area 3B, but it is not known how much of the increase in halibut would have been landed in Kodiak. Therefore, the numbers presented overestimate the reduction in tax revenue to Kodiak.

4.7 Monitoring and Enforcement

4.7.1 North Pacific Groundfish Observer Program

The Fisheries Monitoring Division of the Alaska Science Center operates the North Pacific Groundfish Observer Program (NPGOP, or Observer Program). The current Observer Program generally covers groundfish vessels greater than 60 feet in length over-all (LOA) and governed under a FFP. The amount of observer coverage described in regulation is broadly divided into three categories: Vessels less than 60’ are not required to carry observers; vessels between 60’ and 125’ LOA are required to carry observers 30 percent of their fishing days; and vessels greater than 125’ must have all fishing days observed. Vessels between 60’ and 125’ make up the majority of vessels fishing groundfish in the GOA and out of ports other than Dutch Harbor and Akutan in the BSAI. Regardless of length, vessels that are associated with CSPs, such as Amendment 80, AFA, and RPP, are required to carry an observer whenever the vessel is fishing. Many of the larger processing vessels now carry 2 observers at all time to ensure round the clock observation.

Observer information represents the only at-sea discard information available to estimate mortality of halibut in Alaska groundfish fisheries and is central to understanding catch activity in waters off Alaska. Observer data from observed vessels are assumed to be representative of the activity of all vessels (observed and unobserved), and are used to estimate total incidental catch of prohibited species (halibut) for the entire fishery. In addition, observers collect lengths and sample halibut viability and injury, which are used to assess halibut mortality estimates for groundfish fisheries. Further, observer information is used extensively in management analysis, halibut stock assessment, and in-season forecasting of PSC limits.

In 2010 the Council recommended restructuring the observer program for vessels and processors that are determined to need less than 100% observer coverage in federal fisheries, including previously uncovered sectors such as the commercial halibut sector and <60’ groundfish sector. NMFS would contract directly with observer companies to deploy observers according to a scientifically valid sampling and deployment plan, and industry would pay a fee equal to 1.25% of the ex-vessel value of the landings included under the program. NMFS will have the flexibility to deploy observers in response to fishery management needs and to reduce the bias inherent in the existing program. The industry sectors that are determined to need ≥100% coverage would be included in the ‘full coverage’ category and continue to meet observer coverage requirements by contracting directly with observer companies under the status quo service delivery model. These vessels and processors include: CPs and motherships; CVs while fishing under a management system that uses PSC limits in conjunction with a catch share program; and shoreside and floating processors when taking deliveries of AFA and CDQ pollock.

The Council would not require 100% coverage on CPs <60' with a history of CP and CV activity in the same year or any CP with an average daily production of less than 5,000 lb in the most recent full calendar year of operation prior to January 1, 2010. These vessels would make a one-time election as to whether they will be in the <100% coverage category and pay an ex-vessel value based fee, or in the ≥100% coverage category and pay a daily rate directly to observer providers for coverage. This will provide some flexibility for the smallest class of catcher processors, and those vessels that currently operate as both a CP and CV during the year.

All other CV sectors, including those participating in the halibut and sablefish IFQ program, would be included in the partial coverage category (<100% coverage) and pay the 1.25% ex-vessel fee. No observer coverage is planned for vessels <40' length overall in the first year(s) of the program. The new program may be implemented as early as 2013.

4.7.2 Logbook program

While not used for PSC estimation, the NMFS logbook program has been in place since 1991 and has largely been used for enforcement purposes. Paper logbooks are required to be completed and submitted for federally permitted vessels over 60' in length that are fishing for groundfish and for vessels that are 25' and over in length fishing for IFQ halibut. Catcher vessels and CPs that participate in both the groundfish fishery and sablefish or halibut IFQ fishery during the same fishing year are allowed to submit a single combined NMFS/IPHC logbook. Haul-specific information, including date and time, location, vessel estimates of total catch and species-specific catch, fishing gear, fishing depth, and at-sea discard are recorded in the logbook. These data are not available electronically and are not used in catch estimation.

A small number of vessels are currently participating in an electronic logbook program. This program was implemented in 2003 and involves 12 voluntary participants. Expansion of electronic logbooks would provide haul-specific effort information on unobserved vessels and the information could be useful for halibut discard estimation or observer deployment processes in the future.

4.7.3 Electronic monitoring

NMFS and industry having been working together to evaluate the potential for video monitoring to augment observer information (Cahalan et al. 2010b, Kingsolving 2006, Bonney and McGauley 2008, Bonney et al. 2009). In 2008, NMFS, the North Pacific Research Board (NPRB) and the North Pacific Fishery Management Council (NPFMC, or Council) conducted a workshop to assess the state of EM technology across the nation and internationally (AFSC, 2008). One session discussed past pilot studies conducted in the US and Canada. Other sessions included industry perspectives, legal, management, and enforcement concerns, and research and development advancements. The workshop concluded with a synthesis of the discussions of the workshop. The major outcomes of the workshop were that EM may have potential in the North Pacific but the applicability depends on the specific objectives of the program that must be monitored and potential directions for further investigation of EM.

Most EM work in Alaska to date has been focused on compliance monitoring, with some tests of EM efficacy for fisheries management. Currently, EM has limited potential as a biological data collection tool. EM will likely not be able to collect age or sex information, but as the technology advances may be able to provide species and length information. Video has been implemented through regulations in two programs: as a tool to monitor pre-sorting in the Amendment 80 program, and to monitor Chinook salmon PSC under Amendment 91.

4.7.4 Summary of the accuracy of data collected from monitoring programs

The current catch estimation methodology employed by NMFS in the CAS and Observer Program constitutes the best available science for data collection. Observers are currently the only reliable method through which PSC data can be collected in the North Pacific groundfish fisheries.

Past analytical examinations of the Observer Program have discussed sampling protocols, bias, estimate expansion, and the statistical properties of estimates (e.g., Jensen et al. 2000; Miller 2005; Miller and Skalski 2006a, 2006b; Miller et al. 2007; MRAG Americas 2000, 2002; Volstad et al. 2006; Volstad et al. 1997, Pennington 1996; Pennington and Volstad 1994). These recommendations are considered when adjustments are made to the methods used by observers to collect catch and biological data. Redesigned data collections were implemented by the Observer Program in 2008 and include recording sample-specific in lieu of pooled information, increased use of systematic sampling over simple random and opportunistic sampling, and decreased reliance on observer computations. In addition, studies suggest the risk of bias in the data is reduced by changing from the current system, in which 30 percent coverage vessels can choose when and where to take observers, to a restructured observer deployment program in which NMFS is responsible for distributing observers among vessels using statistically robust methods.

At its October 2010 meeting, the Council recommended restructuring the Observer Program such that NMFS could address issues of bias among other issues in the current deployment model (NPFMC 2010a). This flexibility would enable NMFS to explore and develop alternative observer sampling designs (including sample size analyses and optimization) and estimators of catch. The proposed new methods that incorporate random selection would also likely reduce bias introduced through an observer deployment effect as has been shown elsewhere (Benoit and Allard, 2009). Further, randomization of trip selection in the portion of the groundfish fleet that is not subject to full coverage will increase the statistical credibility of the catch estimates used to regulate the fisheries, and may decrease the bias that arises from non-representative spatial and temporal distribution of observed catch (relative to total catch; NMFS 2010).

The ability for NMFS to assess the statistical reliability of CAS is hampered by the current non-random placement of observers on vessels less than 125 feet, unknown consequences of post-stratification of observer information in CAS, unknown bias associated with imputation methods (Cahalan et al. 2010a). The restructured Observer Program will greatly enhance NMFS's ability to assess uncertainty associated with halibut PSC estimates. In addition, NMFS and the Pacific State Marine Fisheries Commission are currently working to evaluate procedures used to estimate total catch and discard from Alaska's groundfish fisheries. Recently, an evaluation of the imputation methodology (Mondragon et al. 2010) and spatial analysis (Gasper et al. 2010) were prepared. The continued evaluation is expected to assess alternative estimators of total catch and PSC as well as develop and incorporate statistically valid variance estimates.

Finally, evaluations of sampling methods used by the Observer Program to estimate catch have been conducted. These studies range from evaluations of sampling tools used such as motion compensated flow scales (Dorn et al. 1999), evaluation of haul weight estimation (e.g., Dorn et al. 1997, Dorn et al. 1995), and evaluation of observer coverage levels (e.g., NPFMC 2010a). These studies, as well as those mentioned in preceding paragraphs, informed the development of current and future sampling protocols and provide information on the reliability of historic sampling methodology used by the Observer Program.

5 INITIAL REGULATORY FLEXIBILITY ANALYSIS (to be completed after final action)

5.1 Introduction

The action under consideration is a reduction of the halibut PSC limits that may be used by hook-and-line or trawl gear vessels operating in the Gulf of Alaska (GOA), and placing the proposed PSC limits in regulation. This action is taken in accordance with the Fishery Management Plans (FMPs) for the GOA, recommended by the Council pursuant to the Magnuson-Stevens Act.

This Initial Regulatory Flexibility Analysis (IRFA) meets the statutory requirements of the Regulatory Flexibility Act (RFA) of 1980, as amended by the Small Business Regulatory Enforcement Fairness Act (SBREFA) of 1996 (5 U.S.C. 601-612).

5.2 The purpose of an IRFA

The RFA, first enacted in 1980, was designed to place the burden on the government to review all regulations to ensure that, while accomplishing their intended purposes, they do not unduly inhibit the ability of small entities to compete. The RFA recognizes that the size of a business, unit of government, or nonprofit organization frequently has a bearing on its ability to comply with a Federal regulation. Major goals of the RFA are (1) to increase agency awareness and understanding of the impact of their regulations on small business, (2) to require that agencies communicate and explain their findings to the public, and (3) to encourage agencies to use flexibility and to provide regulatory relief to small entities. The RFA emphasizes predicting impacts on small entities as a group distinct from other entities and on the consideration of alternatives that may minimize the impacts while still achieving the stated objective of the action.

On March 29, 1996, President Clinton signed the Small Business Regulatory Enforcement Fairness Act. Among other things, the new law amended the RFA to allow judicial review of an agency's compliance with the RFA. The 1996 amendments also updated the requirements for a final regulatory flexibility analysis, including a description of the steps an agency must take to minimize the significant (adverse) economic impacts on small entities. Finally, the 1996 amendments expanded the authority of the Chief Counsel for Advocacy of the SBA to file *amicus* briefs in court proceedings involving an agency's alleged violation of the RFA.

In determining the scope or "universe" of the entities to be considered in an IRFA, NMFS generally includes only those entities that can reasonably be expected to be directly regulated by the proposed action. If the effects of the rule fall primarily on a distinct segment, or portion thereof, of the industry (*e.g*., user group, gear type, geographic area), that segment would be considered the universe for the purpose of this analysis. NMFS interprets the intent of the RFA to address negative economic impacts, not beneficial impacts, and thus such a focus exists in analyses that are designed to address RFA compliance.

Data on cost structure, affiliation, and operational procedures and strategies in the fishing sectors subject to the proposed regulatory action are insufficient, at present, to permit preparation of a "factual basis" upon which to certify that the preferred alternative does not have the potential to result in "significant economic impacts on a substantial number of small entities" (as those terms are defined under RFA).

Because, based on all available information, it is not possible to "certify" this outcome, should the proposed action be adopted, a formal IRFA has been prepared and is included in this package for Secretarial review.

5.3 What is required in an IRFA?

Under 5 U.S.C., Section 603(b) of the RFA, each IRFA is required to contain:

- A description of the reasons why action by the agency is being considered;
- A succinct statement of the objectives of, and the legal basis for, the proposed rule;

- A description of and, where feasible, an estimate of the number of small entities to which the proposed rule will apply (including a profile of the industry divided into industry segments, if appropriate);
- A description of the projected reporting, recordkeeping and other compliance requirements of the proposed rule, including an estimate of the classes of small entities that will be subject to the requirement and the type of professional skills necessary for preparation of the report or record;
- An identification, to the extent practicable, of all relevant Federal rules that may duplicate, overlap or conflict with the proposed rule;
- A description of any significant alternatives to the proposed rule that accomplish the stated objectives of the proposed action, consistent with applicable statutes, and that would minimize any significant adverse economic impact of the proposed rule on small entities. Consistent with the stated objectives of applicable statutes, the analysis shall discuss significant alternatives, such as:

    1. The establishment of differing compliance or reporting requirements or timetables that take into account the resources available to small entities;
    2. The clarification, consolidation, or simplification of compliance and reporting requirements under the rule for such small entities;
    3. The use of performance rather than design standards;
    4. An exemption from coverage of the rule, or any part thereof, for such small entities.

5.4 What is a small entity?

The RFA recognizes and defines three kinds of small entities: (1) small businesses, (2) small non-profit organizations, and (3) and small government jurisdictions.

<u>Small businesses</u>. Section 601(3) of the RFA defines a “small business” as having the same meaning as “small business concern” which is defined under Section 3 of the Small Business Act. “Small business” or “small business concern” includes any firm that is independently owned and operated and not dominant in its field of operation. The SBA has further defined a “small business concern” as one “organized for profit, with a place of business located in the United States, and which operates primarily within the United States or which makes a significant contribution to the U.S. economy through payment of taxes or use of American products, materials or labor...A small business concern may be in the legal form of an individual proprietorship, partnership, limited liability company, corporation, joint venture, association, trust or cooperative, except that where the firm is a joint venture there can be no more than 49% participation by foreign business entities in the joint venture.”

The SBA has established size criteria for all major industry sectors in the United States, including fish harvesting and fish processing businesses. A business involved in fish harvesting is a small business if it is independently owned and operated and not dominant in its field of operation (including its affiliates) and if it has combined annual receipts not in excess of $4.0 million for all its affiliated operations worldwide. A seafood processor is a small business if it is independently owned and operated, not dominant in its field of operation, and employs 500 or fewer persons on a full-time, part-time, temporary, or other basis, at all its affiliated operations worldwide. A business involved in both the harvesting and processing of seafood products is a small business if it meets the $4.0 million criterion for fish harvesting operations. Finally a wholesale business servicing the fishing industry is a small business if it employs 100 or fewer persons on a full-time, part-time, temporary, or other basis, at all its affiliated operations worldwide.

The SBA has established “principles of affiliation” to determine whether a business concern is “independently owned and operated.” In general, business concerns are affiliates of each other when one concern controls or has the power to control the other or a third party controls or has the power to control both. The SBA considers factors such as ownership, management, previous relationships with or ties to another concern, and contractual relationships, in determining whether affiliation exists. Individuals or firms that have identical or substantially identical business or economic interests, such as family members, persons with common investments, or firms that are economically dependent through contractual or other relationships, are treated as one party with such interests aggregated when measuring the size of the concern in question. The SBA counts the receipts or employees of the concern whose size is at issue and those of all its domestic and foreign affiliates, regardless of whether the affiliates are organized for profit, in determining the concern's size. However, business concerns owned and controlled by Indian Tribes, Alaska Regional or Village Corporations organized pursuant to the Alaska Native Claims Settlement Act (43 U.S.C. 1601), Native Hawaiian Organizations, or Community Development Corporations authorized by 42 U.S.C. 9805 are not considered affiliates of such entities, or with other concerns owned by these entities solely because of their common ownership.

Affiliation may be based on stock ownership when (1) A person is an affiliate of a concern if the person owns or controls, or has the power to control 50% or more of its voting stock, or a block of stock which affords control because it is large compared to other outstanding blocks of stock, or (2) If two or more persons each owns, controls or has the power to control less than 50% of the voting stock of a concern, with minority holdings that are equal or approximately equal in size, but the aggregate of these minority holdings is large as compared with any other stock holding, each such person is presumed to be an affiliate of the concern.

Affiliation may be based on common management or joint venture arrangements. Affiliation arises where one or more officers, directors or general partners control the board of directors and/or the management of another concern. Parties to a joint venture also may be affiliates. A contractor or subcontractor is treated as a participant in a joint venture if the ostensible subcontractor will perform primary and vital requirements of a contract or if the prime contractor is unusually reliant upon the ostensible subcontractor. All requirements of the contract are considered in reviewing such relationship, including contract management, technical responsibilities, and the percentage of subcontracted work.

Small non-profit organizations The RFA defines "small organizations" as any not-for-profit enterprise that is independently owned and operated and is not dominant in its field.

Small governmental jurisdictions The RFA defines small governmental jurisdictions as governments of cities, counties, towns, townships, villages, school districts, or special districts with populations of fewer than 50,000.

5.5 Why the action is being considered

Decreases in the amount of halibut available to the directed GOA halibut fisheries focused awareness of halibut PSC usage by both the trawl and hook-and-line sectors. In area 2C, the commercial IFQ sectors have experienced substantial decreases in their allowable harvest, since 2007. Charter harvests have declined, since 2009, as a result of reductions in bag limits and size limits (See Section 4.5.1). Declines in harvest limits reportedly have decreased profitability, or, in some cases, resulted in economic losses. Participants in directed halibut fisheries often site halibut PSC usage as an area that should be examined as a way to reduce halibut removals. In area 3A, the IPHC has indicated that future fishery CEYs could decline substantially. If those declines occur, the directed halibut fisheries in area 3A may face economic conditions similar to those experienced in area 2C.

The proposed action would reduce one or more of the halibut PSC limits that have been established for the GOA. Halibut savings would then accrue to the directed fisheries in both the near term and long term. Near term benefits would result from the PSC savings of halibut that are over 26" in length (O26"). The current 32" minimum size limit, in the commercial halibut fishery, means the O26" component of halibut PSC O32" would be available to the IFQ fishery the year the PSC is foregone, or when the fish reach the 32" limit. Longer term benefits, in the directed fisheries, would accrue from under 26" (U26") halibut PSC. Benefits from these smaller halibut would occur as they recruit into the directed fishery.

The benefits to the directed halibut fisheries would primarily accrue to small entities. The costs would be borne by the entities that rely on PSC to harvest groundfish. The vast majority of the vessels that harvest groundfish are also considered to be small entities under the SBA definitions. Some of the vessels that harvest groundfish using hook-and-line gear also harvest IFQ halibut. Whether these vessels benefit from the PSC reduction depends on their relative dependence on the halibut and groundfish fisheries.

Objectives

The objective of the proposed action is to reduce halibut PSC limits for the GOA groundfish fisheries. Reductions in the PSC limit will generate halibut savings in years of relatively high halibut PSC. In years of low PSC usage, the PSC limit reduction may not be a constraint. Those years the groundfish sectors would be affected by the proposed changes. In years that halibut PSC savings occur, they will benefit the halibut resource and the directed halibut fisheries dependent on the GOA halibut resource. Conversely, groundfish harvesters will have their harvest constrained those years. The reductions in harvest will impact revenue generated from the fisheries. The magnitude of the revenue change will depend on the quantity of groundfish harvest foregone and the price flexibility of those groundfish species.

The purpose of this action would be to modify the GOA PSC limits and how they are set. Currently the PSC limits are set as part of the annual specifications process. Implementing this amendment would establish the PSC limits for the trawl and fixed gear sectors in regulation. GOA PSC limits could then only be modified through an amendment to those regulations.

PSC limits meet the need for the management of the groundfish fisheries and the conservation of marine resources, as required by the Magnuson-Stevens Act and as described in the management policy, goals, and objectives in the FMPs, and comply with the Magnuson-Stevens Act and other relevant laws, the groundfish FMPs, and applicable Federal regulations.

PSC limits meet the Magnuson-Stevens Act's ten national standards for fisheries conservation and management. Perhaps the most influential of these is National Standard 1, which states "conservation and management measures shall prevent overfishing while achieving, on a continuing basis, the optimum yield (OY) from each fishery for the United States fishing industry" and National Standard 9, which states that management measures should "minimize bycatch or mortality from bycatch" (16 U.S.C. 1851).

The FMP imposes procedures for setting the harvest specifications. Of particular importance are the definitions of areas and stocks (Section 3.1), procedures for determination of harvest levels (Section 3.2), rules governing time and area restrictions (Section 3.5), and rules governing catch restrictions (Section 3.6).

Legal basis

The Northern Pacific Halibut Act of 1982 (16 U.S.C. 773-773k; Pub. L. 97-176, as amended, "Halibut Act") authorizes the Secretary of Commerce to enforce the terms of the Convention between the United States and Canada for the Preservation of the Halibut Fishery of the Northern Pacific Ocean and Bering Sea. The Secretary promulgates regulations pursuant to this goal in 50 CFR Part 301.

Under the authority of the Magnuson-Stevens Act, the Secretary of Commerce (NMFS Alaska Regional Office) and the North Pacific Fishery Management Council have the responsibility to prepare fishery management plans and associated regulations for the marine resources found to require conservation and management. NMFS is charged with carrying out the Federal mandates of the Department of Commerce with regard to marine fish, including the publication of Federal regulations. The Alaska Regional Office of NMFS, and Alaska Fisheries Science Center, research, draft, and support the management actions recommended by the Council. The GOA groundfish fisheries are managed under the Gulf of Alaska Groundfish Fishery Management Plan (GOA FMP). The proposed action represents amendments to the GOA groundfish FMP, as well as amendments to associated Federal regulations.

5.6 Number and description of small entities directly regulated by the proposed action

The entities directly regulated by this action are those that fish groundfish in the Federal waters and parallel fisheries of the GOA with trawl gear or hook-and-line gear (excluding sablefish). These directly regulated entities include the groundfish catcher vessels and groundfish catcher/processor vessels active in this area. Sideboard limits for halibut are also established for certain organizations, the American Fisheries Act (AFA) inshore processing sector[101], the Rockfish Program Cooperatives, and the Amendment 80 ("Head-and-gut") cooperative. These entities are therefore also considered directly regulated.

Business firms, non-profit entities, and governments are the appropriate entities for consideration in a regulatory flexibility analysis. Following the practice in other analyses in the Alaska Region, fishing vessels have been used as a proxy for business firms when considering catcher vessels. This is a practical response to the relative lack of information currently available on the ownership of multiple vessels by individual firms. This approach leads to overestimates of the numbers of firms, since several vessels may be owned by a single firm, and to an overestimate of the relative proportion of small firms, since more of the smaller vessels might have been treated as large if multiple ownership was addressed, while no large entities would be moved to the small category. The estimates of the number, and gross revenues of, small and large vessels are based on this approach. It is possible, however, to take account of AFA inshore cooperative and GOA rockfish cooperative affiliations among catcher vessels, and this is done below.

Information about firm-level affiliations is more readily available for the smaller number of catcher/processors. For these vessels, information on firm ownership, and cooperative affiliations, has been used when this information is readily available in the public domain, for example, on corporate and cooperative web sites, or on RAM licensing reports posted to the web. However, NMFS has not conducted an audit of the information. Therefore, these are estimates of the numbers of small entities, not the results of a detailed evaluation of all possible records, or a survey of firms. The current approach was chosen as a cost effective; one that would be minimally intrusive to regulated entities. Aside from firm affiliations, generally obtained from firm or association web sites listing vessel ownership, the key affiliations considered are among vessels in a fishery cooperative. Cooperatives formed pursuant to Secretarial regulation, such as the AFA and Amendment 80 trawl cooperatives are considered.

The entities directly regulated by this action are those entities that participate in harvesting groundfish from the federal or parallel groundfish fisheries of the GOA. It does not include entities that only harvest groundfish from state waters GHL fisheries. The table below shows the estimated number of small entities and total entities that meet this definition. Fishing vessels are considered small entities if their total annual gross receipts, from all their activities combined, are less than $4.0 million. The tables in this section provide estimates of the number of harvesting vessels that are considered small entities. These estimates may overstate the number of small entities (and conversely, understate the number of large entities) for two reasons.

First, these estimates include only groundfish revenues earned from activity in the EEZ off Alaska. Some of these vessels may also be active in the salmon and other state managed fisheries off of Alaska, or in fisheries off the west coast of the U.S. Ideally, all such activity would be accounted for within this RFA evaluation. However, data and access limitations preclude this at present.

Second, the RFA requires a consideration of affiliations between entities for the purpose of assessing if an entity is small. The estimates in Table 5-1 do not take into account all affiliations between entities. There is not a strict one-to-one correlation between vessels and entities; many persons and firms are known to have ownership interests in more than one vessel, and many of these vessels with different ownership, are otherwise affiliated with each other. For example, vessels in the AFA catcher vessel sectors are categorized as "large entities" for the purpose of the RFA under the principles of affiliation, due to their being part of the AFA pollock cooperatives. However, vessels that have other types of affiliation, (i.e., ownership of multiple vessel or affiliation with processors), not tracked in available data, may be misclassified as a small entity.

Table 5-1 shows the number of harvesting vessels that participated in the GOA groundfish fisheries in 2010 to provide information on the number of directly regulated entities.

[101] AFA regulations prohibit the AFA qualified catcher processor sector from participation in the GOA fisheries.

Table 5-1 Estimated numbers of directly regulated entities (vessels) in the Gulf of Alaska groundfish fisheries under Alternative 2

	Year							
	2003	2004	2005	2006	2007	2008	2009	2010
Total Vessels	728	710	659	727	754	782	744	736
	Small Entities							
Hook-and-Line Gear	618	615	567	629	652	675	646	642
Trawl Gear	66	53	55	54	35	39	36	34
Small Entities Total*	**668**	**657**	**607**	**669**	**673**	**701**	**666**	**664**

Source: AKFIN summary of NOAA Fisheries Catch Accounting Data, 2003-2010.

* The total number of small entities is greater than the sum of the small entities by gear and mode because some vessels used both hook-and-line and trawl gear.

Through the Community Development Quota (CDQ) program, the Council and NMFS allocate a portion of the BSAI groundfish TACs, and prohibited species halibut and crab PSC limits, to 65 eligible Western Alaska communities. These communities work through six non-profit CDQ Groups, and are required to use the proceeds from the CDQ allocations to start or support activities that will result in ongoing, regionally based, commercial fishery or related businesses. The CDQ group's ownership of harvesting vessels that operate in the GOA means that some of the group's activities could be directly regulated in the same manner other small entities that own vessels harvesting groundfish in the GOA are regulated. The 65 communities are not directly regulated. Because they are nonprofit entities, the CDQ groups are considered small entities for RFA purposes.

The AFA and Amendment 80 fisheries cooperatives are directly regulated, since they receive sideboard limits of halibut PSC. The Freezer Longline Conservation Cooperative (FLCC), a voluntary private cooperative which became fully effective in 2010, is not considered to be directly regulated. The FLCC runs a catch sharing program among its members, but it does not, itself, receive an allocation under specifications, however, the longline CP sector in the GOA does have a separate hook-and-line PSC limit from the catcher vessel sector. The AFA and Amendment 80 cooperatives are non-profit entities, since they exist to manage the quota programs for their members. They are thus, technically, small entities for the purpose of this action. However, the entities affiliated through the cooperative programs are large entities.

In 2011, there were seven inshore AFA cooperatives and two Amendment 80 cooperatives, the Alaska Seafood Cooperative (formerly the Best Use Cooperative) and the Alaska Groundfish Cooperative. [102]

5.7 Recordkeeping and reporting requirements

The IRFA should include "a description of the projected reporting, recordkeeping, and other compliance requirements of the proposed rule, including an estimate of the classes of small entities that will be subject to the requirement and the type of professional skills necessary for preparation of the report or record..." This action does not modify recordkeeping or reporting requirements.

5.8 Federal rules that may duplicate, overlap, or conflict with proposed action

An IRFA should include "An identification, to the extent practicable, of all relevant Federal rules that may duplicate, overlap or conflict with the proposed rule..." This analysis did not reveal any Federal rules that duplicate, overlap, or conflict with the proposed action.

[102] The count of 2011 AFA cooperatives was obtained from the NMFS Alaska Region Restricted Access Management (RAM) web site: http://alaskafisheries.noaa.gov/ram/daily/afa_ic.htm. (accessed July 27, 2011). The Amendment 80 cooperatives were obtained from the RAM web site http://alaskafisheries.noaa.gov/ram/daily/A80_coop_list-en-us.pdf (accessed July 27, 2011).

5.9 Significant alternatives

An IRFA should include “A description of any significant alternatives to the proposed rule that accomplish the stated objectives of the Magnuson-Stevens Act and any other applicable statutes and that would minimize any significant (implicitly adverse) economic impact of the proposed rule on small entities.”

The significant alternatives were those considered as alternative PSC limits when the Council selects its preferred PSC limit in 2012. These included the alternatives listed in Section 2.3 that address timing of the current measure and consideration of long term solutions that would sub-divide the PSC limit by user groups. Issues regarding when the reductions could be implemented depends on whether the PSC limits remain under the annual specifications process or are implemented through regulation. All the options being considered (other than the Status Quo) would implement the PSC limits through regulation. This would delay the date the program could be implemented, but would eliminate mid-year implementation issues. It would also eliminate the need for industry to negotiate PSC limit apportionments under the annual specifications process. This would reduce uncertainty of what the final PSC limit would be each year. This may benefit small entities.

Other significant alternatives considered would further divide the GOA halibut PSC limits among various user groups. Further division of the PSC limits is a long term solution that the Council has indicated they may consider. This division could take the form of individual PSC limits, cooperative PSC limits, or some other method that would be defined in discussion papers as the alternatives are developed. The impact of these PSC limit divisions on small entities will ultimately depend on size of PSC limits and how they are divided among the various user groups.

6 FMP AND MAGNUSON-STEVENS ACT CONSIDERATIONS

6.1 Magnuson-Stevens Act National Standards

Below are the 10 National Standards as contained in the Magnuson-Stevens Act, and a brief discussion of the consistency of the proposed alternatives with those National Standards, where applicable.

National Standard 1 — Conservation and management measures shall prevent overfishing while achieving, on a continuing basis, the optimum yield from each fishery

Neither the Pacific halibut stock nor any of the GOA groundfish stocks are currently overfished nor is overfishing occurring. Status of all affected stocks is discussed in Sections 3.2.4 and 3.3.1.

The proposed action would revise PSC limits in the GOA groundfish longline and trawl fisheries. In most years, these limits could prevent the longline and trawl fisheries from achieving annual total allowable catch of some target groundfish fisheries. Additionally, the proposed action would reduce incidental removals of halibut. While halibut is not subject to a Federal fishery managed under the Magnuson-Stevens Act, a reduction in PSC limits of Pacific halibut may result in an increase in yield from the directed halibut fisheries. The Council's preferred alternative balances the potential increased yield in the directed halibut commercial, sport, and subsistence fisheries with potential decreased yields in the directed groundfish fisheries in which halibut are taken. The groundfish fleet has shown great innovation in improving gear technology and fishing techniques to improve its rate of harvesting groundfish relative to incidental halibut harvests; it is possible that some fisheries can achieve similar levels of target groundfish harvest with reduced halibut PSC limits.

In terms of achieving "optimum yield" from a fishery, the Act defines "optimum", with respect to yield from the fishery, as the amount of fish which—

> (A) will provide the greatest overall benefit to the Nation, particularly with respect to food production and recreational opportunities, and taking into account the protection of marine ecosystems;
>
> (B) is prescribed as such on the basis of the maximum sustainable yield from the fishery, as reduce by any relevant economic, social, or ecological factor; and
>
> (C) in the case of an overfished fishery, provides for rebuilding to a level consistent with producing the maximum sustainable yield in such fishery.

Overall benefits to the Nation may be affected by the proposed action, though our ability to quantify those effects is limited. Overall net benefits to the Nation would not be expected to change to an identifiable degree between the alternatives under consideration.

National Standard 2 — Conservation and management measures shall be based upon the best scientific information available.

Information in this analysis represents the most current, comprehensive set of information available to the Council, recognizing that some information (such as operational costs) is unavailable. Information previously developed on Pacific halibut and GOA groundfish stocks and fisheries, as well as the most recent information available, has been incorporated into this analysis. It represents the best scientific information available.

National Standard 3 — To the extent practicable, an individual stock of fish shall be managed as a unit throughout its range, and interrelated stocks of fish shall be managed as a unit or in close coordination.

The IPHC sets annual catch limits for halibut based on annual surveys and stock assessments (http://www.iphc.int/library/raras/149-rara-2010.html). The annual TACs are set for GOA groundfish stocks according to the annual harvest specification process that is outlined in the GOA Groundfish FMP. NMFS conducts the stock assessments for these species based on the most recent catch and survey information. The assessment author(s), along with the GOA Groundfish Plan Team and Science and Statistical Committee makes recommendations for overfishing levels and allowable biological catches to the Council. The Council sets annual harvest specifications for these stocks based on those scientific recommendations (http://www.afsc.noaa.gov/refm/stocks/assessments.htm).

National Standard 4 — Conservation and management measures shall not discriminate between residents of different states. If it becomes necessary to allocate or assign fishing privileges among various U.S. fishermen, such allocation shall be (A) fair and equitable to all such fishermen, (B) reasonably calculated to promote conservation, and (C) carried out in such a manner that no particular individual, corporation, or other entity acquires an excessive share of such privileges.

Nothing in the alternatives considers residency as a criterion for the Council's decision. Residents of various states, including Alaska and states of the Pacific Northwest, participate in the major sectors affected by these allocations. No discriminations are made among fishermen based on residency or any other criteria.

National Standard 5 — Conservation and management measures shall, where practicable, consider efficiency in the utilization of fishery resources, except that no such measure shall have economic allocation as its sole purpose.

Efficiency in the context of this amendment refers to economic efficiency. The analysis presents information regarding the relative importance of economic efficiency versus other considerations and provides information on the economic risks associated with the proposed range of halibut PSC limits.

National Standard 6 — Conservation and management measures shall take into account and allow for variations among, and contingencies in, fisheries, fishery resources, and catches.

All of the proposed alternatives appear to be consistent with this standard.

National Standard 7 — Conservation and management measures shall, where practicable, minimize costs and avoid unnecessary duplication.

All of the proposed alternatives appear to be consistent with this standard.

National Standard 8 — Conservation and management measures shall, consistent with the conservation requirements of this Act (including the prevention of overfishing and rebuilding of overfished stocks), take into account the importance of fishery resources to fishing communities in order to (A) provide for the sustained participation of such communities, and (B) to the extent practicable, minimize adverse economic impacts on such communities.

Many of the coastal communities in the Central and Western GOA, as well as coastal communities elsewhere in Alaska and the Pacific Northwest, participate in the GOA groundfish fisheries in one way or another, such as homeport to participating vessels, the location of processing activities, the location of support businesses, the home of employees in the various sectors, or as the base of ownership or operations of various participating entities. A summary of the level of fishery engagement and dependence in the communities of vessels affected by the proposed action is provided in the RIR (Section 4), IRFA (Section5.6), and the community analysis discussion (Appendix 7).

In general (as discussed in Appendix 7), it is not possible to quantitatively differentiate potential impacts of the different Gulf halibut PSC reduction alternatives on an individual community basis. Qualitatively, however, it is possible to anticipate the communities where adverse impacts, if any, would most likely accrue, along with the nature, direction, and at least rough order of magnitude of those impacts. Adverse impacts would likely be felt at the individual operation level for at least a few vessels in a number of Alaska communities, due to increased costs and/or a drop in revenues associated with either changing fishing patterns and/or practices to reduce halibut PSC or because of season-ending closures, based on a particular gear- or species-based sector hitting a (revised) halibut PSC limit, earlier in the season than would have been the case under previous (higher) halibut PSC thresholds. Given the scope of overall impacts anticipated to result from any of the management alternatives assessed for the proposed Gulf halibut PSC allowance revisions, however, community-level impacts would likely not be discernible for most of the engaged communities. The three communities where community-level impacts are a greater possibility are King Cove, Sand Point, and Kodiak, based on the relative involvement with the trawl sector, both on a local fleet and processing basis.

As described in detail in Appendix 7, potential mitigating factors for possible adverse impacts in King Cove and Sand Point, however, include the specific gear, species, and seasonal nature of the Gulf groundfish trawl-related efforts in those communities, such that any Gulf halibut PSC revisions that affected any season other than the cod “A” season (January 1 through June 9) in the Western Gulf would have minimal impacts to King Cove and Sand Point.

Kodiak, however, is substantially engaged in a wide range of Gulf groundfish fisheries in terms of spatial and seasonal distribution of effort, species targeted, and gear types utilized with respect to its local fleet, and Kodiak processing operations are very much the center of Gulf groundfish shore-based processing. Kodiak would be especially more likely to experience any adverse impacts related to Gulf groundfish trawl fisheries in the later part of the year, particularly with respect to flatfish-related operations. A potential mitigating factor for adverse community-level impacts in Kodiak is that the community is substantially engaged in and dependent upon a wide range of fisheries, not just the Gulf groundfish fisheries, and multiple gear types within the Gulf groundfish fisheries.

In general, adverse community-level impacts are not likely to be significant for any of the involved communities and the sustained participation of these fishing communities would not be put at risk by any of the proposed Gulf halibut PSC revision alternatives being considered. For some individual operations, however, especially within the Gulf groundfish trawl sector in Kodiak and those processing operations in Kodiak substantially dependent upon Gulf groundfish trawl deliveries of flatfish in particular, adverse impacts may be felt at the operational level, particularly if the fleet cannot effectively modify behavior to reduce historical halibut PSC rates.

National Standard 9 — Conservation and management measures shall, to the extent practicable, (A) minimize bycatch, and (B) to the extent bycatch cannot be avoided, minimize the mortality of such bycatch.

The proposed action is specifically intended to control incidental removals of Pacific halibut in the groundfish fisheries. The practicability of reducing halibut removals in groundfish fisheries is discussed in the analysis of the impacts of the various alternatives and options.

National Standard 10 — Conservation and management measures shall, to the extent practicable, promote the safety of human life at sea.

The proposed alternatives appear to be consistent with this standard. None of the proposed alternatives or options would change safety requirements for fishing vessels. No safety issues have been identified relevant to the proposed action.

6.2 Section 303(a)(9) Fisheries Impact Statement

Section 303(a)(9) of the Magnuson-Stevens Act requires that any plan or amendment include a fishery impact statement which shall assess and describe the likely effects, if any, of the conservation and management measures on (a) participants in the fisheries and fishing communities affected by the plan or amendment; and (b) participants in the fisheries conducted in adjacent areas under the authority of another Council, after consultation with such Council and representatives of those participants taking into account potential impacts on the participants in the fisheries, as well as participants in adjacent fisheries.

The proposed alternatives are described in Section 2. The impacts of these actions on participants in the fisheries and fishing communities are addressed in Section 3 and in the RIR and IRFA (Sections 5 and 6).

6.2.1 Fishery Participants

The proposed actions directly impact participants in the GOA groundfish fisheries. The total number of harvesting vessels in the GOA ranged from a high of 113 (2003) to a low of 84 (2010)

6.2.2 Fishing Communities

The fishing communities that are expected to be potentially directly impacted by the proposed action are those communities which serve as homeports to the vessels potentially affected by the area closures, where they offload product, take on supplies, provide vessel maintenance and repair services, and provide homes to vessel owners and crew. Information on the residence of the vessel crew and processing crew that work aboard the potentially affected vessels is not readily available; however, generally companies operating vessels in the Central GOA groundfish sector tend to recruit crew from many locations.

Detailed information on the range of fishing communities relevant to the proposed action may be found in a number of other documents, including the *Alaska Groundfish Fisheries Final Programmatic Supplemental EIS* (NMFS 2004), *Sector and Regional Profiles of the North Pacific Groundfish Fishery* (Northern Economics and EDAW 2001), and in a technical paper (Downs 2003) supporting the *Final EIS for Essential Fish Habitat Identification and Conservation in Alaska* (NMFS 2005) as well as that EIS itself. These sources also include specific characterizations of the degree of individual community and regional engagement in, and dependency upon, the North Pacific groundfish fishery.

Section 3 describes the potential effects of the range of alternatives on selected GOA communities.

6.2.3 Participants in Fisheries in Adjacent Areas

The proposed alternatives would not significantly affect participants in the fisheries conducted in adjacent areas under the authority of another Council.

6.3 GOA FMP — Groundfish Management Policy Priorities

The alternatives discussed in this action accord with the management policy of the GOA Groundfish FMP. The Council's management policy (NPFMC 2009) includes the following objectives:

- Control the bycatch of prohibited species through prohibited species catch limits or other appropriate measures.
- Continue and improve current incidental catch and bycatch management program.
- Continue to manage incidental catch and bycatch through seasonal distribution of total allowable catch and geographical gear restrictions.
- Continue program to reduce discards by developing management measures that encourage the use of gear and fishing techniques that reduce bycatch which includes economic discards.

By proposing reduced halibut PSC limits to control halibut removals in groundfish fisheries, the Council is consistent with its management policy.

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[103] incomplete

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