DRAFT
ENVIRONMENTAL ASSESSMENT
For Issuing an Exempted Fishing Permit for the Purpose of Testing a Salmon Excluder Device in the Central Gulf of Alaska Pollock Fishery

November 2012

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Abstract: This Environmental Assessment analyzes alternatives to issue an exempted fishing permit for testing of a salmon excluder device in the Central Gulf of Alaska (GOA) pollock trawl fishery. The experiment would be conducted during the spring and fall of 2013 and 2014. The pollock trawl industry continues to experience Chinook salmon bycatch even though salmon bycatch measures are in place. Salmon excluder devices have been tested in the Bering Sea and are successful in reducing salmon bycatch. The purpose of extending these tests to the GOA is to test the potential of these devices for reducing Chinook salmon bycatch and lowering the cost of bycatch measures on the pollock fishing industry. This exempted fishing permit would allow for development and testing of a salmon excluder device in the GOA with focused efforts on reducing Chinook salmon bycatch and refinement in the design and operation of the salmon excluder device. The proposed action is not expected to have significant impacts on the human environment.

Public comments must be received by 5 p.m., Alaska local time, December 14, 2012

This draft analysis has not been reviewed by NOAA General Counsel, Alaska Region

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EXECUTIVE SUMMARY

The purpose of this action is to extend the development and testing of a salmon excluder device to the Central Gulf of Alaska (GOA) pollock trawl fishery. Chinook salmon *(Oncorhynchus tshawytscha)* are caught incidentally in Alaska groundfish fisheries, primarily in the walleye pollock (*Theragra chalcogramma)* trawl fishery. Salmon are a prohibited species in the groundfish fisheries (50 CFR 679.21) with annual limits placed on the number of Chinook salmon taken in the GOA pollock trawl fisheries.

Beginning in 2012, Amendment 93 to the Fishery Management Plan for Groundfish of the Gulf of Alaska was implemented to manage Chinook salmon prohibited species catch (PSC) in the Western and Central GOA pollock fishery. The purpose of Amendment 93 is to address PSC of Chinook salmon in the GOA pollock trawl fisheries, and establish measures that protect against the risk of high Chinook salmon removals in the GOA pollock trawl fisheries in future years. This program manages Chinook salmon bycatch in the pollock fishery through a system of annual PSC limits (18,316 Chinook salmon in the Central GOA and 6,684 Chinook salmon in the Western GOA). The regulations implementing Amendment 93 close the directed pollock fishery in a regulatory area once the Chinook salmon limit is attained and require full retention of salmon species until an observer is provided the opportunity to count and biologically sample the salmon.

The primary objective of the exempted fishing permit (EFP) research will be the development and testing of an excluder that reduces Chinook salmon bycatch rates without significant negative effects on pollock fishing.–Additional measures are needed to reduce the number of salmon taken, and the excluder device may provide another tool for the pollock fishery to reduce salmon bycatch. A salmon excluder device would reduce potential constraints being placed on the pollock fishery by salmon bycatch area closures based on reaching the Chinook salmon PSC limits.

The 9-year average (2003 through 2010) for Chinook salmon PSC in the groundfish fisheries of the GOA is 23,037 Chinook salmon, while the most recent 5-year average (2007 through 2011) is 28,088 Chinook salmon. Chinook salmon PSC in the pollock target fishery accounts for approximately three-quarters of Chinook salmon PSC in the GOA. PSC levels are highly variable from year to year. The highest Chinook salmon mortality from all GOA groundfish fisheries of 54,559 salmon occurred in 2010, with the majority (31,581 Chinook salmon) occurring in the Western GOA. Chinook salmon mortality was also high in 2007, primarily attributed to the Chignik area (reporting area 620). In the Kodiak area (reporting area 630), 2005 was the highest PSC year. In 2009, Chinook salmon PSC in all areas was considerably lower than in the previous five years. It is assumed that salmon caught in groundfish fisheries have a 100% mortality rate.

To facilitate the development and testing of the salmon excluder device, an EFP is required (50 CFR 679.6). Exemptions are needed from fishery regulations regarding, Chinook salmon PSC limits, prohibitions to retain pollock above the pollock maximum retained amounts, and most observer regulations to permit the applicant to collect data required to meet the experimental plan for testing the device. Only one EFP application has been received that meets the experimental plan. The applicant for the EFP has worked with the Alaska Fisheries Science Center to develop a scientifically sound experiment to test the excluder device. Based on receipt of only one application that meets the needs of the experimental plan, the alternatives for this proposed action are limited to Alternative 1 (status quo) and issuing the EFP under Alternative 2 (preferred alternative).

The analysis of this proposed EFP in combination with all previous actions (including Amendment 93) is determined to have no significant impacts on target groundfish species, prohibited species, and marine

mammals. In addition, the experimental work from this EFP could result in a production version of the salmon excluder in the future. A successful production version of the salmon excluder has the potential to further reduce Chinook salmon bycatch in the future. It may also provide additional benefits to the pollock trawl fisheries in the form of increased access to pollock TAC, though the amount of future use of the salmon excluder device cannot be determined. Alternative 2 is preferred over the status quo because it would allow for the continued development and testing of the salmon excluder device under the scientific review of the AFSC, potentially leading to the reduction of Chinook salmon PSC in the pollock trawl fishery.

1.0 INTRODUCTION

1.1 Proposed Action

The proposed action is the issuance of an EFP under 50 CFR 679.6 to Gauvin and Associates, LLC, to allow exemptions from certain fishery regulations under 50 CFR Part 679. These exemptions are necessary to facilitate the development and testing of a Chinook salmon excluder device for pollock trawl gear in the Central GOA. The EFP would be effective from January 20, 2013, through November 1, 2014, to provide for testing in the winter and fall of 2013 and 2014 and to allow for enough tows with the device to gather sufficient data to meet the statistical requirements of the experiment. Details of the exemptions provided by the EFP are in chapter 2, and the experimental design is detailed in Appendix A.

1.2 Project Area

The experiment is limited to the Central GOA Chignik district (reporting area 620), and the Kodiak district (reporting area 630), in the locations commonly used by catcher vessels and catcher/processors to harvest pollock. The primary reasons for selecting the Central GOA as the project area for this study is to test salmon excluders in areas with high concentrations of salmon bycatch and in areas that are representative of typical fishing locations. Testing salmon excluders in these locations and conditions will help ensure that the experiments will be able to determine the effectiveness of the excluder under conditions similar to conditions in the commercial pollock fishery (Figure 1.1). The Alaska Fisheries Science Center (AFSC) (Demasters 2012b) recommended in its letter of support for this project that the area be located where pollock catch rates represent actual fishing conditions, because pollock catch rates are likely to affect excluder performance. The applicant for the EFP provided Figures 1.1 and 1.2 to show the action area and where fishing under the EFP is most likely to be concentrated (Gauvin 2012).

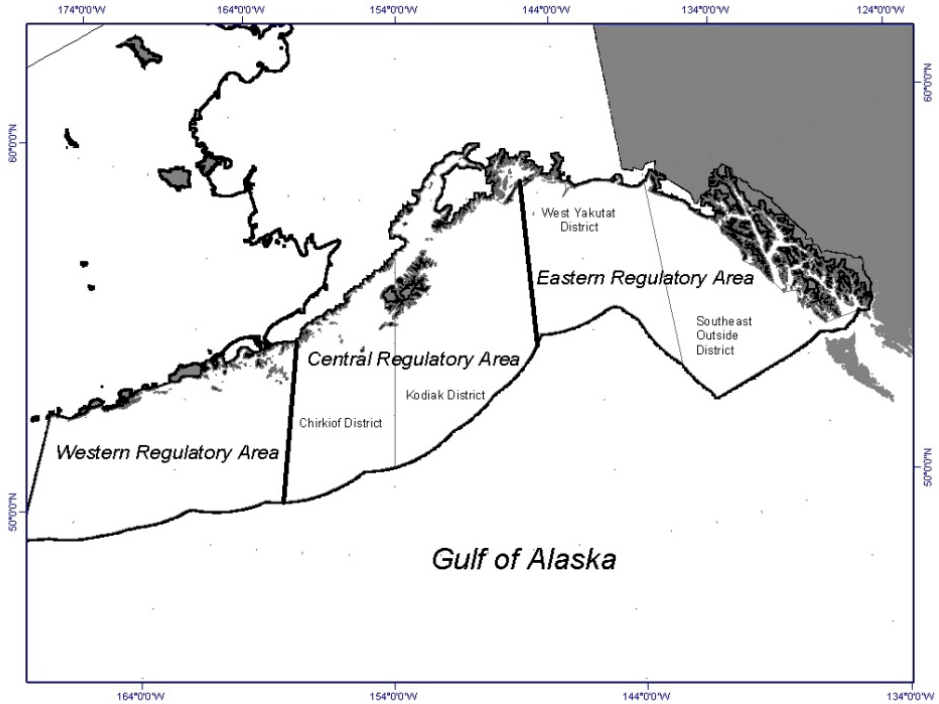

Figure 1.1 Reporting areas. Figure 3 to 50 CFR part 679.

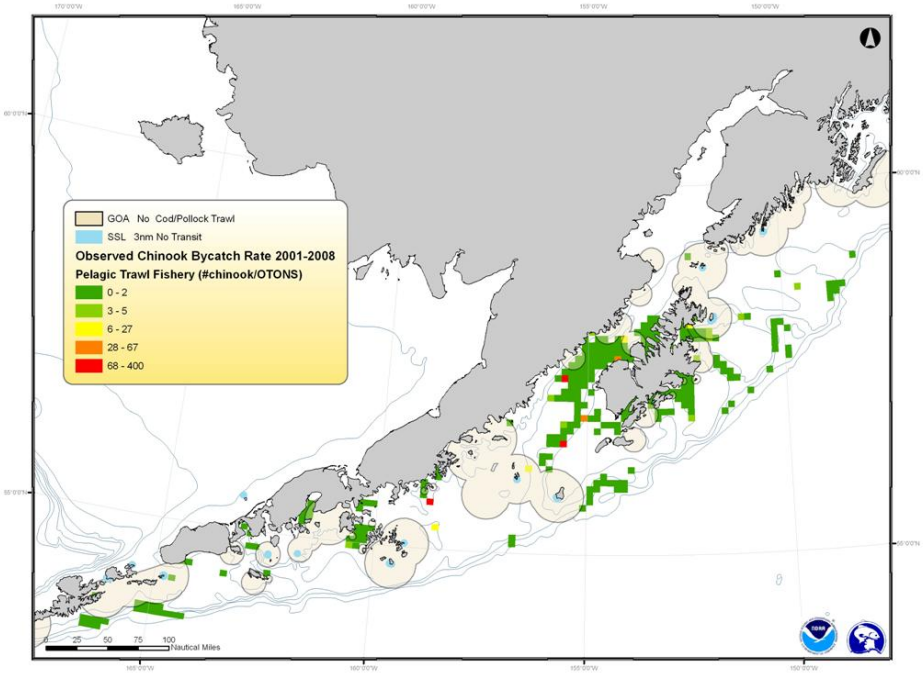

Figure 1.2 Observed catch of Chinook salmon PSC in the Central GOA pelagic trawl fishery, summed over 2001 through 2008, number of salmon per metric ton of total catch (NMFS 2012b).

1.3 Purpose and Need for Action

The purpose of this action is to allow the development and testing of a salmon excluder device for the Central GOA pollock trawl fishery. Chinook salmon *(Oncorhynchus tshawytscha)* are caught incidentally in Alaska groundfish fisheries, primarily in the walleye pollock (*Theragra chalcogramma)* trawl fisheries. This action is needed to develop an additional method for reducing salmon bycatch in the GOA pollock fisheries. Salmon bycatch in the GOA pollock fisheries is a great concern to those who depend on salmon resources in Alaska and Canada, and further reduction in salmon bycatch is desired by those who use salmon resources and by the pollock fishing industry. Salmon are a prohibited species in the groundfish fisheries (50 CFR 679.21) with annual limits placed on the number of Chinook salmon taken in the GOA pollock trawl fisheries. Exceeding these limits triggers the closure of the directed pollock trawl fishery in the area where the limit was exceeded, allowing for only retention of pollock up to the maximum permissible amounts published in Table 11 to 50 CFR 679.

Since the implementation of the groundfish fishery management plans for Alaska, the North Pacific Fishery Management Council (Council) has adopted measures intended to control the bycatch of species taken incidentally in groundfish fisheries. Certain species, including all Pacific salmon species, are designated as "prohibited" in the groundfish fishery management plans, as they are the target of other domestic fisheries, including commercial, recreational, personal-use, and subsistence fisheries and/or have unique societal or cultural importance. To further reduce the loss of these prohibited species, various control measures have been instituted in the Alaska groundfish fisheries (a history is provided in NMFS 2004b, Appendix F.5). In the GOA groundfish fisheries, PSC limits (which close the groundfish target fisheries after the limits are reached) have been set for halibut, and seasonal and permanent area closures have been established to protect red king crab and Tanner crab. Prior to GOA Amendment 93 (77 FR 42629, July 20, 2012) no control mechanism was in place specifically for salmon species taken incidentally in GOA groundfish fisheries.

In June 2011, the Council took final action to recommend that NMFS implement Amendment 93 to the Fishery Management Plan for Groundfish of the Gulf of Alaska (GOA FMP). In July 2012, NMFS implemented Amendment 93 to manage Chinook salmon bycatch (77 FR 42629, July 20, 2012). In December 2010, the Council also initiated a long-term amendment package to comprehensively address salmon PSC management in the other GOA trawl fisheries with final action scheduled for February 2013. The Council focused their efforts on the pollock fishery first due to the majority of the Chinook salmon bycatch occurring in the pollock fishery.

Amendment 93 established separate PSC limits in the Central and Western GOA for Chinook salmon that would cause NMFS to close the directed pollock fishery in the Central or Western regulatory areas of the GOA, if the applicable limit is reached. The action also required retention of salmon by all vessels in the Central and Western GOA pollock fisheries until the catch is delivered to a processing facility where an observer is provided the opportunity to count the number of salmon and to collect scientific data or biological samples from the salmon. More details on Amendment 93 are in Section 1.4.3 and NMFS 2012b.

NMFS and the Council continue to develop and analyze alternative measures to reduce salmon bycatch. The pollock industry, NMFS, the Council, users of salmon resources, and environmental organizations continue to be interested in tools that would help to further reduce salmon bycatch amounts in the GOA pollock fisheries. The Council and NMFS also have a responsibility assure that federal fisheries actions are consistent with the Magnuson-Stevens Fishery Management and Conservation Act (Magnuson-Stevens Act) National Standards, including National Standard 9 to minimize bycatch to the extent

practicable. This EFP would help to address these needs by supporting the development of gear that may reduce salmon bycatch.

1.4 Background

This section provides historical information regarding salmon bycatch in the pollock trawl fishery, costs of salmon bycatch, and efforts to date to reduce salmon bycatch.

1.4.1 Historical Salmon Bycatch Information

From 2003 through 2012, an annual average of 17,287 Chinook salmon and 4,283 non-Chinook salmon were incidentally caught in GOA groundfish trawl fisheries (Table 1.1). Trawl bycatch is primarily of juvenile salmon that are one or two years away from returning to the river of origin as adults. The 2010 Chinook salmon trawl PSC was the highest on record since 2003 for all groundfish fisheries and is estimated at 44,779 fish. Chinook salmon bycatch in the GOA has declined in recent years to 13,832 fish in 2011. As of September 29, 2012, the 2012 estimated total PSC of Chinook salmon in the GOA trawl fishery is 3,768 fish (NMFS Alaska Region Catch Accounting System).

Table 1.1 Bycatch of Pacific Salmon in GOA Groundfish trawl, non-trawl fisheries from 2003 to 2012. Numbers of Fish.

Year	Chinook trawl	Chinook other	Chinook Total	Non-Chinook All gear
2003	4,400	10,995	15,395	9,892
2004	13,152	4,625	17,777	6,263
2005	27,927	3,343	31,270	7,010
2006	15,944	3,060	19,004	4,459
2007	35,177	5,362	40,539	3,617
2008	10,696	5,480	16,176	2,905
2009	3,195	5,202	8,397	2,557
2010	44,779	9,780	54,559	2,029
2011	13,832	6,937	20,769	3,024
2012	3,768	2,720	6,488	1,070
Average	17,287	5,750	23,037	4,283

Source: NMFS Alaska Region Catch Accounting System (9/29/12).

1.4.2 Salmon fisheries, disaster determinations, and ESA-listing

In addition to the principals highlighted in National Standard 9 under the Magnuson-Stevens Act, there are several reasons for addressing Chinook salmon bycatch in the groundfish fisheries. Salmon is a very important and carefully managed and allocated resource among competing user groups. Returns of Chinook salmon have been so low in some locations in Alaska that the Secretary of Commerce has determined that a commercial fishery failure has occurred due to a fishery resource disaster. In addition, several evolutionarily significant units (ESUs) of Endangered Species Act (ESA) listed Chinook salmon from the Pacific Northwest occur in the GOA.

Pacific salmon support large commercial, recreational, subsistence, and personal use fisheries throughout Alaska. Chinook salmon commercial harvests since 1970 have ranged from 352,000 fish (2000) to 877,000 fish (1982). Commercial Chinook salmon harvests in 2010 were 365,000 fish (ADF&G 2010a). Although a reduction in salmon run size may be attributable to changes in multiple factors, including ocean conditions (Hare and Francis 1995; Kruse 1998), considerable public concern has been raised as to the effect of low salmon returns on the commercial, personal use, subsistence, recreational, and fishery dependent communities in south-central, southeast, and western Alaska.

Other areas of Alaska have also occasionally experienced lower than average Chinook salmon runs, resulting in reduced subsistence, commercial, personal use, or recreational fisheries. For example, in recent years of low Chinook salmon returns, the in-river harvest of western Alaska Chinook salmon has been severely restricted and, in some cases, river systems have not met escapement goals. Because of low Chinook salmon returns, the State of Alaska reduced the 2008 commercial Chinook salmon harvest to 89 percent below the recent 5-year average. No commercial Chinook salmon fishery was allowed in 2009 on the Yukon River, and subsistence openings for Chinook salmon were limited (Parnell 2009). On January 15, 2010, Secretary of Commerce Gary Locke determined a commercial fishery failure for the Yukon River Chinook salmon due to low salmon returns (U.S. Department of Commerce 2010). Due to low Chinook salmon returns in the Yukon River in 2012, the Governor of the State of Alaska again requested the Secretary of Commerce to declare a fishery disaster for the 2011 and 2012 Chinook salmon fisheries on the Yukon and Kuskokwim rivers (Parnell 2012). That request was followed by a second State of Alaska request for declaration of a fishery disaster for commercial salmon fisheries of Cook Inlet following the low returns and escapements of Chinook salmon in several river systems in Cook Inlet. On September 12, 2012, the Acting Secretary of Commerce determined a commercial fisheries failure due to a fishery resource disaster for Chinook salmon fisheries of the Yukon River, the Kuskokwim River, and for Cook Inlet (U.S. Department of Commerce 2012). With this determination, Congress may appropriate funds for fishery disaster relief under the Magnuson-Stevens Act. The fishery may also qualify for other forms of federal assistance.

Surplus fish beyond escapement needs and subsistence uses are made available for other uses. In coastal communities of the GOA, Chinook salmon fisheries generate income, recreation, personal use, and subsistence for a substantial number of residents. Commercial fishing for Chinook salmon may provide one of the few sources of income for many people who live in communities or villages. Chinook salmon, chum salmon, and other salmon species are also an important subsistence resource for western Alaska and the GOA (NPFMC 2011a).

Three Chinook salmon stocks from the Pacific Northwest that are listed under the ESA have been identified in the Alaska groundfish fisheries: the Lower Columbia River, Upper Columbia River, and the Upper Willamette River Chinook stocks. On January 9, 2012, the NMFS Northwest Regional Administrator concurred with the NMFS Alaska Region conclusions on the ESA section 7 consultation on incidental catches of Chinook salmon in the GOA groundfish fisheries (Stelle 2012). The consultation addressed the effects of current limits in the Central GOA pollock trawl fishery for reducing bycatch of Chinook salmon (implemented in Amendment 93). The consultation determined that authorizing the GOA groundfish fisheries is not likely to jeopardize the continued existence of the ESA-listed Chinook salmon ESUs and would have no effect on their critical habitat.

NMFS Alaska Region requested ESA section 7 consultation on the effects on ESA-listed salmonids from the authorization of the Bering Sea and Aleutian Islands (BSAI) groundfish fisheries and the changes proposed under Amendment 91 to the Fishery Management Plan for Groundfish of the Bering Sea and Aleutian Islands Management Area (BSAI FMP). This amendment implemented Chinook salmon

bycatch management measures for the Bering Sea pollock fishery (75 FR 53026, August 30, 2010). A supplemental biological opinion was completed on December 2, 2009, and provides a new incidental take statement that reflects the expected take of ESA-listed Chinook salmon under the management measures of Amendment 91 (NMFS 2009b). This consultation found that authorizing the BSAI groundfish fisheries and Amendment 91 is not likely to jeopardize the continued existence of ESA-listed salmon and was not likely to have a significant adverse effect on their critical habitat.

1.4.3 Salmon Bycatch Reduction Measures

In response to low salmon returns in Western Alaska and ongoing incidences of salmon bycatch, the Council is continuing to review salmon bycatch management measures to reduce salmon bycatch to the extent practicable, as required by the Magnuson-Stevens Act, National Standard 9. NMFS prepared an Environmental Assessment /Regulatory Impact Review/Final Regulatory Flexibility Analysis (EA/RIR/IRFA) on GOA Chinook salmon prohibited species catch limits in February 2012 (NMFS 2012b). Chapter 3 of the Final Regulatory Impact Review (RIR) for the Gulf of Alaska Chinook Salmon Bycatch Management provides an overview of the importance of subsistence, recreational, and commercial harvests of salmon (NMFS 2012b).

Salmon are listed as a prohibited species in the GOA and BSAI groundfish fishery management plans, meaning that they must be avoided and cannot be retained for sale. Prior to implementing GOA Amendment 93, regulations required vessel operators to discard salmon when an observer is not aboard. When an observer is aboard, they are required to allow for sampling by an observer before discarding prohibited species. In the pollock fishery, however, it was very common for vessel operators to retain all salmon, regardless of whether an observer was onboard, because of the operational characteristics of the fishery. Large volumes of pollock are brought aboard and rapidly stowed in below-deck tanks. In general, detection of salmon as the pollock are brought aboard and stowed is not practical, and is considered generally unsafe due to deck space limitations and stability concerns.

Salmon Bycatch Measures in the BSAI

Prior to implementation of Amendment 93 in the GOA, measures for reducing salmon bycatch were developed and implemented in the BSAI. Between1994 and 2011 several salmon bycatch measures were considered by the Council and implemented in the BSAI. Starting in 1994, regulations established the Chum Salmon Savings Area (CSSA), which is an area with historically high non-Chinook salmon bycatch (50 CFR 679.21(e)(7)(vii)). In 1995, regulations established the Chinook Salmon Savings Areas and mandated year-round accounting of Chinook salmon bycatch in the trawl fisheries (60 FR 61215, November 29, 1995). The savings areas were adopted based on historic observed salmon bycatch rates and were designed to avoid areas with high levels of salmon bycatch.

Amendment 84 to the BSAI FMP became effective November 28, 2007 (72 FR 61070, October 29, 2007). This amendment allows vessels participating in the directed fisheries for pollock in the BSAI to use an intercooperative agreement (ICA) to reduce salmon bycatch using the voluntary rolling hot spot (VRHS) program. The VRHS uses real-time salmon bycatch information to avoid areas of high chum bycatch rates. Parties to the ICA include all pollock fishing vessels, at least one third-party group representing western Alaskans who depend on salmon and have an interest in salmon bycatch reduction, and at least one private firm retained to facilitate bycatch avoidance behavior and information sharing. The VRHS uses a system of base bycatch rates, assignment of vessels to tiers based on bycatch rates relative to the base rate, a system of closures for vessels in certain tiers, and monitoring and enforcement

through private contractual arrangements. Vessels participating in the salmon bycatch ICA are exempted from closures of the CSSA in the Bering Sea.

NMFS issued regulations to implement Amendment 91 to the BSAI FMP (75 FR 53026, August 30, 2010). Amendment 91 is an innovative approach to managing Chinook salmon bycatch in the Bering Sea pollock fishery that combines a PSC limit on the amount of Chinook salmon that may be caught incidentally with an incentive plan agreement and performance standard designed to minimize bycatch to the extent practicable in all years. This program replaced the Chinook salmon bycatch management provisions adopted under Amendment 84.

Gulf of Alaska Chinook Salmon Bycatch Management Measures (Amendment 93)

In June 2011, the Council recommended Amendment 93 to the GOA FMP. Amendment 93 became effective on August 25, 2012 (77 FR 42629, July 20, 2012). Amendment 93, applies exclusively to the directed pollock trawl fisheries in the Central and Western Reporting Areas of GOA (Central and Western GOA). Amendment 93 establishes separate PSC limits in the Central and Western GOA for Chinook salmon, which would cause NMFS to close the directed pollock fishery in the Central or Western reporting areas of the GOA, if the applicable limit is reached. This action also requires retention of salmon by all vessels in the Central and Western GOA pollock fisheries until the catch is delivered to a processing facility where an observer is provided the opportunity to count the number of salmon and to collect scientific data or biological samples from the salmon. The implementation of Chinook salmon PSC limits effectively prevents excessively high levels of bycatch of this prohibited species in the pollock fisheries in the future.

In December 2010, the Council noted that the trawl fisheries account for approximately 80 percent of Chinook salmon PSC in the GOA groundfish fisheries. Under Amendment 93, the Chinook salmon PSC limits are based on the Council's recommended GOA-wide goal of limiting Chinook salmon bycatch by the pollock fisheries to no more than 25,000 Chinook salmon annually. The Chinook salmon PSC limit of 25,000 fish is divided into annual PSC limits of 18,316 Chinook salmon for the Central GOA and 6,684 Chinook salmon for the Western GOA. The Council's recommended apportionment of the PSC limit between the Central GOA and the Western GOA apportions the GOA-wide Chinook salmon PSC limit between the Central and Western GOA proportional to both the historical pollock harvest in each area and the average number of salmon historically caught as bycatch in each area.

Apportioning the GOA-wide PSC limit to the Central and Western GOA prevents high incidental catch of Chinook salmon in one area from triggering the closure of the pollock fisheries in both areas. This apportionment creates incentives for fleets in each area to limit their Chinook salmon bycatch, recognizes that salmon bycatch is highly variable, and limits the economic impacts on the entire fishery when there is a spike in bycatch in one area.

Information is currently unavailable for NMFS to assess the stock of origin of the Chinook salmon that are incidentally caught in the GOA pollock fisheries. Amendment 93 requires full retention of salmon species incidentally caught in the Central or Western GOA pollock fisheries, which is a necessary prerequisite to NMFS' ability to conduct stock of origin analyses on these salmon. NMFS manages the PSC limits based on the extrapolation of PSC catch from observed vessels rather than a census of all salmon.

1.4.4 Costs Associated with Salmon Bycatch

Under Amendment 93, if high Chinook bycatch should cause NMFS to close directed pollock fishing in a regulatory area, the vessels that contributed to the closure have the potential to impose significant costs on pollock fishermen operating in the GOA. Costs to industry could also change and potentially increase as it takes steps to control its salmon bycatch. Furthermore, handling salmon bycatch creates costs for catcher vessels and shoreside processing operations.

The closing of one regulatory area also may impose information costs on trawl operations that no longer have access to salmon bycatch information for fishing decisions in an adjacent regulatory area. If one regulatory area closes, trawl operations may experience travel and other costs by shifting to regulatory areas that are not closed, which may be further from their delivery ports. If closures prevent access to pollock fishing altogether, pollock fishermen may shift to other fisheries. Furthermore, shifting fishing effort to these new areas may result in added expense to the pollock fishing industry by moving the fleet to potentially less productive fishing grounds, decreasing catch per unit effort. Vessel operators may be forced to fish on pollock stocks or other species of lower quality (maybe on smaller fish). Processors producing fillets prefer larger pollock than processors producing surimi. Pollock quality and its price at landing can be reduced if fishermen on catcher vessels are forced by closures to fish further from delivery ports.

A salmon excluder device that GOA pollock trawlers perceive as a benefit to deploy and operate, would reduce bycatch, thereby lessening the potential for exceeding the PSC limits and reduce the potential for constraints being placed on the pollock trawl fishery due to exceeding salmon PSC limits. Reductions in salmon bycatch rates during normal fishing activities (prior to closures) also may serve to reduce fishing costs for the industry because fewer salmon would need to be handled and disposed of as required by the fisheries regulations (50 CFR 679.21).

Costs of Present Management Measures

Voluntary or contractually obligated changes in fishing patterns may impose costs on pollock fishermen similar to those costs involved in closures implemented by NMFS under Amendment 93. To the extent that information on bycatch is shared among fishermen, and voluntary efforts are coordinated by cooperating fishermen to avoid locations reported to have high bycatch, reductions in salmon bycatch rates associated with successful development of the salmon excluder device will reduce the costs of this system and make it more cost effective. Excluder devices willreduce the salmon catch associated with initial inadvertent discovery of areas with high concentrations of salmon. Excluder devices also will slow the rate of salmon catch in high bycatch areas in the interval between the time the high bycatch is identified and the time the fleet becomes aware of increasing salmon bycatch and directed away from it or internally restricted from fishing on it. It may be possible to fish in areas that would otherwise have to be closed if the excluder device lowers salmon bycatch rates sufficiently. Finally, some salmon bycatch would take place in normal fishing operations outside of areas of high bycatch. Successful development of an excluder device would reduce salmon bycatch associated with these operations.

Cost of Salmon Bycatch to Salmon Fisheries

Salmon caught by the pollock fleet will not return to their natal waters and will not become available to the fisheries exploiting salmon returning to those waters. Returning salmon are used in subsistence, commercial, personal use, and recreational fisheries and for escapement and investment in future stocks. Changes in trawl technology that reduce bycatch rates will increase the numbers of salmon returning to these uses. Reductions in salmon bycatch in the pollock fishery will not translate directly into one-to-one increases in salmon available for United States regional, near-shore, and in-river fisheries, and spawning

for two reasons: the increased return to United States fisheries will be less than the reduction in trawl salmon harvest since many of the fish originate in Canada or Asian waters and because many of the salmon may die from natural causes between the time they escape the trawl and the time they would otherwise have returned to those waters.

Challenges to the Fishing Industry Regarding Salmon Bycatch in GOA Groundfish Fisheries

The nature of the bycatch problem with salmon is complex and inherently difficult due to the unpredictable nature of salmon locations and movements and challenges to industry coordination of its own salmon avoidance behavior. In the GOA, the pollock trawl industry participants are not organized into a similar cooperative structure that has formed in the Bering Sea pollock industry under the American Fisheries Act (AFA). Through AFA and several supporting regulations, the participants are able to some extent agree on and implement voluntary practices to reduce salmon bycatch. In the GOA, the pelagic trawl fishery has attempted to form contractual agreements to monitor, share information, and avoid salmon bycatch with limited success. To successfully implement voluntary salmon avoidance measures, GOA pollock trawlers must also contend with areas of salmon concentration that are often transitory. By the time such concentrations are identified, a relatively large number of salmon may have already been taken and salmon may have already moved to other locations. Because of these challenges, overall, avoidance and other approaches have provided limited success, but these efforts can only achieve success to the degree that salmon movements (and hence bycatch) follow some sort of predictable pattern.

The challenge of voluntary salmon bycatch avoidance to contain Chinook bycatch within the fixed annual limits set under Amendment 93 creates costs for the pollock industry. This situation could become more acute if salmon populations become more abundant in the Western or Central GOA. The cost of bycatch avoidance could also increase if Chinook stocks become less abundant in the GOA, causing increased pressure on the pollock industry to reduce Chinook bycatch beyond the current Chinook salmon PSC limits in the GOA. The potential effects of existing management controls on salmon bycatch are provided in the RIR for Amendment 93 (NMFS 2012b).

One further complication is that salmon avoidance is not the only constraint facing the pollock industry. The decision of where to fish is affected by other constraints. An important constraint on where pollock vessels might fish in order to avoid salmon are regulations to minimize competition between pollock removals and Steller sea lions (50 CFR 679.22).To reduce the potential for competition for prey species between the pollock fishery and Steller sea lions, fishing areas must be selected outside of Steller sea lion protection areas, even when salmon bycatch is relatively low in those areas. In some cases, this tradeoff can mean higher bycatch rates of salmon.

In the Bering Sea, trawl skippers developed and tested excluder devices for bottom trawls for many years. In the past 4 years, a major effort has been focused on designing a salmon excluder device for pelagic trawls used in the BSAI pollock fisheries. Recent bycatch events, recent reduction in the run size and escapements of Chinook salmon in Cook Inlet and other areas of the GOA, and increasing awareness of the importance of salmon to directed commercial, subsistence, and recreational fisheries in Alaska have driven industry's efforts to develop a salmon excluder device.

1.4.5 Why Use an Exempted Fishing Permit to Develop a Salmon Bycatch Reduction Device and Evaluate Its Performance?

EFPs are an effective way to develop bycatch reduction gear by allowing for systematic testing under a experimental conditions. In the experience of the fishing industry, informal efforts to test net

modifications in an *ad hoc* manner may not be efficient because a fisherman working independently typically may not apply a systematic or rigorous test of a bycatch reduction device. While fishermen often possess a strong grasp of technical aspects of fishing gear in combination with an outstanding ingenuity for adaptation, coordinated studies with review and input from staff at the AFSC has proven to be a more productive way to develop bycatch reduction devices.

EFPs are advantageous because of the relatively high cost of chartering large research vessels similar to vessels used in the GOA pollock fishery. In the GOA, the trawl pollock vessels will be utilizing contractual agreements during the directed pollock fishery to provide vessels fishing under this permit the necessary access to aggregations of pollock with minimal competition from the regulated access participants. Additional fishing under the EFP when the directed pollock fishery is closed is necessary to ensure sufficient quantities of pollock and salmon can be harvested to meet the statistical requirements of the experimental design. In addition, there are benefits to evaluating gear modifications under the most realistic fishing scale and conditions. Research charters can be a difficult and potentially very expensive and possibly less effective way to recreate actual fishing conditions compared to an EFP test. The EFP also allows for the collection of data in context of the experimental design that would not otherwise be allowed under the groundfish regulations. For these reasons, an EFP is considered the best method for developing a salmon excluder device.

1.4.6 Evolution of the Concept of a Salmon Excluder Device for the Pollock Fishery

The EA for EFP 08-02 to support the development of a salmon excluder device (NMFS 2008a), and the final reports for the work under EFP 08-02 (Gauvin et al. 2010) and EFP 2010-02 (Gauvin 2012) detail the steps leading up to the application for this EFP and continuing changes to the design. Working with the industry, Dr. Craig Rose of the AFSC used images of salmon behavior in a pollock trawl net to develop an excluder that would permit the escapement of salmon without the loss of pollock. EFP 08-02 resulted in the current flapper excluder designed to allow escapement during towing. This design is based on installing the flapper in the straight tube section just ahead of the packing tube or codend. Weight is placed on the forward part of the flapper panel and floatation on the aft section of the escapement hole is used to achieve lift and additional room for escapement. The flapper excluder achieved between 25% and 35% Chinook salmon escapement by number with pollock (groundfish) escapement in the range of one-half to one and one-half percent by weight (Gauvin et al. 2010). Adding artificial light above or around the escapement hole did not appear to increase the Chinook salmon escapement rate in spring of 2012 testing, but this could not be determined definitively due to the inability to install the artificial lighting in a manner that achieved the desired effect of casting the light outside the recapture net in a consistent manner.

Figure 1.3 depicts the device to be tested and potentially modified under this action.

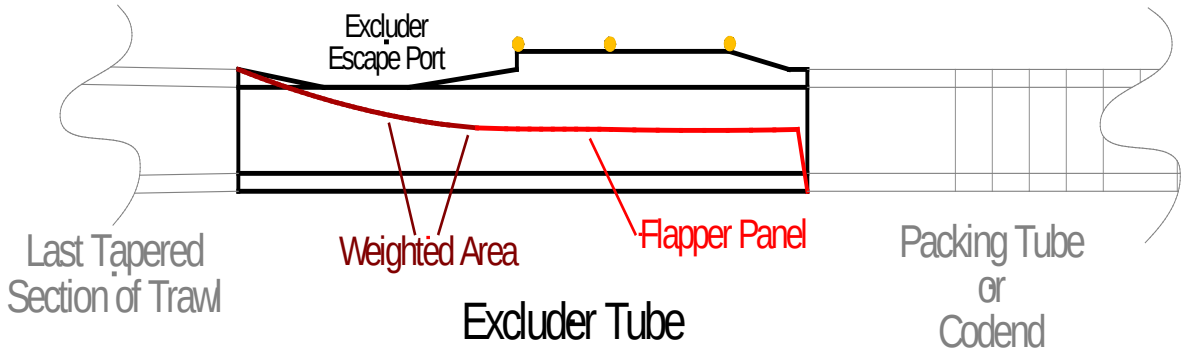

Figure 1.3: Design of flapper excluder in preparation for winter A season 2013 EFP testing (Gauvin 2012).

1.5 Related NEPA and ESA Documents

The National Environmental Policy Act (NEPA) and ESA documents listed below have detailed information on the groundfish fisheries, and on the natural resources and the economic and social activities and communities affected by those fisheries and potential effects on ESA-listed species. These documents contain valuable background for the action under consideration in this EA. The Council on Environmental Quality (CEQ) regulations encourage agencies preparing NEPA documents to incorporate by reference the general discussion from a broader environmental impact statement (EIS) and concentrate solely on the issues specific to the EA subsequently prepared. According to the CEQ regulations, whenever a broader EIS has been prepared and a NEPA analysis is then prepared on an action included within the entire program or policy, the subsequent analysis shall concentrate on the issues specific to the subsequent action. The subsequent EA need only summarize the issues discussed and incorporate discussions in the broader EIS by reference (see 40 CFR 1502.20).

Alaska Groundfish Programmatic Supplemental EIS (PSEIS)

In June 2004, NMFS completed the PSEIS that described the impacts from alternative groundfish fishery management programs on the human environment (NMFS 2004b). NMFS issued a Record of Decision on August 26, 2004, with the simultaneous approval of Amendments 74 to the GOA groundfish FMP and Amendment 81 to the BSAI groundfish FMP. This decision implemented a policy for the groundfish fisheries management programs that is ecosystem-based and is more precautionary when faced with scientific uncertainty. For more information on the PSEIS, see the Alaska Region website at: http://www.alaskafisheries.noaa.gov/sustainablefisheries/seis/default.htm.

The PSEIS provides the decision-maker and the public a detailed assessment on the human environment, while describing the potential environmental, social, and economic consequences of alternative policy approaches and their corresponding management regimes for management of the groundfish fisheries off Alaska. In doing so, it serves as the overarching analytical framework that will be used to define future management policy with a range of potential management actions. Future amendments and actions will logically derive from the chosen policy direction set for the preferred alternative identified in the PSEIS.

The PSEIS provides a detailed description of the impacts of fishing on the human environment and past, present, and future actions that may result in cumulative effects in combination with impacts of the groundfish fisheries. This EA will incorporate by reference information from the PSEIS that has remained unchanged since 2004.

Alaska Groundfish Harvest Specifications EIS

In January 2007, NMFS completed an EIS analyzing the impacts of various harvest strategies for the Alaska groundfish fisheries (NMFS 2007b). Except for the no action alternative, the alternatives analyzed would implement the preferred management strategy contained in the PSEIS. This document contains an analysis of the effects of the alternative harvest strategies on target groundfish species, non-target species, prohibited species, marine mammal, seabirds, habitat, ecosystem relationships, and social and economic concerns. This EIS is based on the latest information at that time regarding the status of each of these environmental components and provides the most recent consideration of reasonably foreseeable future actions to consider in the cumulative effects analysis. The EIS provides the latest overall analysis of the impacts of the groundfish fisheries on the environment and is a substantial reference for this EA. This document is available from the NMFS Alaska Region website athttp://www.alaskafisheries.noaa.gov/analyses/specs/eis/default.htm.

Final Environmental Assessment/ Regulatory Impact Review/ Initial Regulatory Flexibility Analysis EA/RIR/FRFA) for Amendment 93 to the Fishery Management Plan for Groundfish of the Gulf of Alaska; Chinook Salmon Prohibited Species Catch in the Gulf of Alaska Pollock Fishery

This EA/RIR/IRFA (NMFS 2012b) contains recent information regarding the bycatch of Pacific salmon in the GOA groundfish fisheries and the effects of management measures for reducing salmon bycatch on the human environment. A thorough description of the effects of the pollock fishery on salmon is contained in this document and will be incorporated by reference in this EA. This document is available from the NMFS Alaska Region website at
http://www.alaskafisheries.noaa.gov/sustainablefisheries/amds/93/amd93earirirfa0212.pdf.

2010 Biological Opinion on the Effects of the Groundfish Fisheries on ESA-listed Species, EA for the GOA 2004 Steller Sea Lion Protection Measures, and the 2001 Steller sea lion Protection Measures Supplemental EIS

A supplemental EIS (SEIS) was completed in 2001 to evaluate the impacts of groundfish fishery management measures in the GOA and BSAI on Steller sea lions (NMFS 2001a). The purpose of the SEIS was to provide information on potential environmental impacts from implementing a suite of fisheries management measures to protect the western population of Steller sea lions. Fisheries management measures were designed to not jeopardize the continued existence of the western population of Steller sea lions or adversely modify its critical habitat. The Steller sea lion protection measures were implemented by emergency rule in 2002 and by final rule making in 2003 (68 FR 204, January 2, 2003).The EIS may be found on the NMFS Alaska Region website at:http://www.alaskafisheries.noaa.gov/sustainablefisheries/seis/sslpm/default.htm.

In 2004, several changes were made to the GOA groundfish fisheries Steller sea lion protection measures to provide some relief to fishing participants while maintaining protections to Steller sea lions. These changes are analyzed in an EA/RIR/FRFA available from the NMFS Alaska Region website at http://209.112.168.2/analyses/ssl/earir1004.pdf. (NMFS 2004a). This analysis has more recent status information on Steller sea lions and the pollock fishery in the GOA than the 2001 supplemental EIS.

In 2010, NMFS completed a biological opinion on the effects of the Alaska groundfish fisheries on ESA-listed species and their critical habitat (NMFS 2010b). This biological opinion found that there were no changes needed for the Steller sea lion protection measures used for the GOA to ensure that Alaska groundfish fisheries are not likely to result in jeopardy of continued existence or adverse modification or destruction of designated critical habitat. Detailed information on the status of Steller sea lions in the GOA and the potential impacts of the pollock fishery on the Steller sea lions and their critical habitat is in this document and adopted by reference in this EA for the salmon excluder EFP.

1.6 Public Participation

The notice of receipt of an application for the exempted fisheries permit was published in the *Federal Register* before the December 2012 Council meeting (insert cite and date) with a 30-day public comment period. NMFS provided the U.S. Coast Guard, the State of Alaska, the International Pacific Halibut Commission, the NMFS Northwest Regional Office, and the Council copies of the application and draft EA for consultation purposes. The application was on the agenda for the Council's December 2012 meeting. The applicant presented this project and NMFS presented this EA to the Council's Scientific and Statistical Committee (SSC), the Council's Advisory Panel (AP), and the Council at its December 2012 meeting. If the SSC, AP, and the Council recommend issuing the EFP the recommendation will be included as an attachment to the final EA.

2.0 ALTERNATIVES CONSIDERED

The CEQ regulations implementing NEPA require a range of alternatives to be analyzed for a federal action. The alternatives analyzed may be limited to a range of alternatives that could reasonably achieve the need that the proposed action is intended to address. Section 1.3 of this document described the purpose and need of the proposed action.

The purpose of this action is to develope and test a salmon excluder device for pollock trawl gear in the Central GOA. The applicant has worked closely with the AFSC in the development of the experimental design, and this design has been approved by the AFSC (DeMaster 2012). The experimental design requires the applicant's exemption from several groundfish fisheries regulations at 50 CFR part 679.

Additional exemptions from 50 CFR part 679 are anticipated for amendments to observer regulations, following the publication of the final rule to restructure the North Pacific Observer Program (Observer Program). The proposed rule was published in the *Federal Register* on April 18, 2012 (77 FR 23326). Implementation of the restructured Observer Program is scheduled for January 2013.

Alternative 1 (Status Quo): No EFP is issued. Exemptions from the regulations to facilitate the continued development and testing of the salmon excluder device would not be granted.

Alternative 2: An EFP is issued (Preferred Alternative). The testing of the salmon excluder device would be permitted in 2013 and 2014 with exemptions from certain regulations under 50 CFR part 679, as described in detail below. The EFP would allow the applicant to conduct the experiment as designed in cooperation with the AFSC. Details of the experiment are contained in Appendix A. An EFP is needed for this action to ensure the testing of the device follows an experimental protocol that requires the harvesting of pollock and salmon in sufficient quantities to meet the statistical requirements of the experimental design (Appendix A). Because the TAC for Central GOA pollock is likely to be fully harvested by the commercial fishery and reaching the Chinook salmon PSC limit could result in closing the commercial fishery, the EFP would provide pollock and salmon outside of the pollock total allowable catch (TAC) and outside of the Chinook salmon PSC limit. Exemptions to closures would be included in the permit as pollock and salmon harvesting under the EFP may be required in locations of known high levels of salmon bycatch, which may be closed to pollock fishing at the time of the experiment.

The experiment will be conducted during the winter (January and February, A season and B season in 2013 and 2014) and end of the fall (D season) of 2013 and 2014. Two or more pollock vessels used in the GOA trawl fishery that deliver to a shoreside processor will be engaged through a Request for Proposal to the applicant to conduct the field testing work. The trawl net will be modified to add the salmon excluder device and a recapture device to provide for data collection. Deliveries of EFP groundfish from individual trips may exceed the daily 136 metric tons (mt) pollock trip limit. The maximum size of the groundfish delivery from any individual trip may approach the recirculating sea water (RSW) tank capacity of the largest vessel. This could include as much as 500 mt of groundfish.

To conduct the EFP, the applicant must deliver all groundfish and salmon from each trip to provide the observer the opportunity to count and sample the salmon at shore. No catch in the recovery net or codend would be discarded. Discards during the EFP would prevent good tow by tow accounting of EFP pollock catches. The means of accounting for pollock catches in the vessel's codend against pollock escapement in the recapture net is described further in the application (Appendix 1).

Analysis of the EFP performance will primarily focus on the estimation of the proportions of pollock and salmon excluded from the catch by the device. The experiment is designed to estimate these values for the combination of all tows, representing the value of the device in ordinary fishery conditions. Variability of escape rates between tows will be examined for indications of conditions affecting excluder performance. Combined size composition data will be tested for differences between retained and escaping fish. Groundfish harvested by the charter vessel will be retained for sale to the extent allowed under § 679.20(e) and (f) with pollock designated as the target species. The sea samplers will conduct sampling of salmon at the plant for genetic, coded wire-tagged (CWT), and other measurements according to the requirements of the AFSC. The sea sampler will collect samples from each salmon at landing for any trip that is equal to or greater than 50 Chinook salmon. Tissue from salmon harvested during the study will be provided for genetic testing to determine region of origin. If the salmon is of acceptable quality, it may be donated under the Prohibited Species Donation Program (§ 679.26); otherwise it will be discarded as

required by § 679.21(b). Results will be presented by the applicant in preliminary and final reports made available to managers, trawlers, scientists, the Council, and the public.

Exemptions for 2013 and 2014 GOA Salmon Excluder EFP

To accomplish the purpose of this proposed action, within the provisions of the groundfish regulations (50 CFR parts 600 and 679) and ensuring the use of the carefully developed experimental design, an EFP under 50 CFR 679.6 would be required. The EFP would include exemptions from the following regulations to facilitate the activities under the EFP. These regulations include those currently effective and those proposed under the restructured Observer Program that is scheduled for implementation in January 2013.

1. § 679.7(a)(2): The permit holder and participating vessels would be exempt from § 679.7(a)(2), which prohibits the conduct of fishing prior to notification of inseason action, closure, or adjustment, as applied to the specific regulations detailed below in number 2 (§ 679.20), number 3 (§ 679.7(a) and § 679.20), and number 4 (§ 679.21).

2. § 679.20(d): The permit holder and participating vessels would be exempt from § 679.20(d)(1)(iii)(B) for pollock caught as an incidental species. Section 679.20(d)(1)(iii)(B) states "Except as described in § 679.20(e)(3)(iii), if directed fishing for a target species or species group is prohibited, a vessel may not retain that incidental species in an amount that exceeds the maximum retainable amount, as calculated under paragraphs (e) and (f) of this section, at any time during a fishing trip."

3. § 679.7(a): The permit holder and participating vessels would be exempted from § 679.7(a)(16), as it applies to estimating incidental catch, based on the maximum retained amounts for pollock. When the pollock trawl fishery has been closed in the Central GOA to retention of an amount of pollock that exceeds the maximum retained amount for pollock as determined in Table 11 to part 679, the permit holder and participating vessels may exceed the maximum retainable amount of pollock as calculated by using Table 11, and as established under § 679.20(e).

4. § 679.21: The permit holder and participating vessels would be exempt from complying with 2013 and 2014 Chinook salmon PSC limits at § 679.21(h)(3)(i). "NMFS establishes an annual PSC limit of 18,316 Chinook salmon for vessels engaged in directed fishing for pollock in the Central reporting area of the GOA." If the annual PSC limit is reached, the permit holder may exceed the Central reporting area Chinook salmon PSC limit by no more than 2,400 Chinook salmon.

5. § 679.21(d): The permit holder and participating vessels are exempt from the prohibition for exceeding halibut PSC limits for trawl gear at § 679.21(d)(3), because these vessels are anticipated to take a total of approximately 4.0 mt of halibut bycatch in the duration of EFP fishing. The final GOA halibut PSC amounts that this EFP will be exempted from are published in the 2013 GOA annual specifications at (FR notice to be cited here when it is published).

6. § 679.7(b)(2): The permit holder and participating vessels are exempt from the prohibition for exceeding daily pollock trip landing and retention limits § 679.7(b)(2)(i) and (b)(2)(ii)[1] for each designated EFP trip.

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[1] § 679.7(b)(2) states "Catcher vessel harvest limit for pollock. (i) Retain more than 300,000 lb (136 mt) of unprocessed pollock on board a catcher vessel issued a FFP at any time during a fishing trip as defined at § 679.2;

7. § 679.50: The vessel owners or operators are exempt from the observer requirements at § 679.50 while conducting activities under this EFP, except § 679.50(g).[2]

8. Specifications/ABC exceptions: Pollock catch may exceed the TAC and the allowable biological catch (ABC) of Central GOA pollock by up to 2,304 mt (including 96 mt of other groundfish and 4 mt of halibut). The overall catch of pollock by vessels participating in this permit, for the effective period January 4, 2013, to November 1, 2013 (and the same amount in 2014), is not counted against the TACs and shall not exceed 2,400 mt of groundfish. Participating vessels will retain all pollock and may retain other groundfish species in accordance with the maximum retainable amounts at § 679.20(e) and (f), using only pollock as the basis species, up to 2,400 mt of groundfish (pollock requirements for this action are estimated to be 96% of the total groundfish). Other groundfish is estimated to be 4% of the total, and halibut is estimated to be 4.0 mt, for a total of 2,404 mt.

9. Exemptions (potential) under proposed rule 77 FR 23326 (April 18, 2012)

a. Observer Program: The permit holder and participating vessels are exempt from the prohibition at § 679.7 (a)(3)(i) [3], which prohibits fishing for groundfish except in compliance with the terms of the Groundfish Observer Program. The participating vessels will be exempt from specific portions of the restructured Observer Program, as listed below in b through f.

b. Applicability: Each of the vessels approved to participate under this permit are required to comply with the applicability of the Observer program at subpart E of 50 CFR 679. These vessels will be included in the Observer Declare and Deploy System, and be assigned to a trip pool[4], based on the criteria established under the program.

c. Deployment System: Each of the vessels approved to participate under this permit will be included in the Observer Declare and Deploy System at § 679.51(a)(1)(ii).

d. For each EFP trip, the permitted vessels will be exempt from the requirements of the trip selection pool at § 679.51(a)(1)(ii)(E). A vessel included under this permit will not be required to register an EFP fishing trip in advance with the Observer Declare and Deploy System.

f. Fee collection: Each of the vessels approved to participate under this permit would be exempt from the fee collection at § 679.55, for all groundfish caught while EFP fishing.

3.0 METHODS FOR IMPACTS ANALYSIS

(ii) Land more than 300,000 lb (136 mt) of unprocessed pollock harvested in any GOA reporting area from a catcher vessel issued a FFP to any processor or tender vessel during a calendar day as defined at § 679.2; ….”

[2] The vessel owners or operators are exempt from selected observer requirements (under the current regulations) at § 679.50 while conducting activities under this EFP, except § 679.50(g). Instead, the catch and discards will be monitored by “sea samplers” who are NMFS-qualified observers hired to provide the data collection and sampling support for the experiment. However, the sea samplers will be considered NMFS observers for purposes of §§ 679.50(g) and 679.7(g), and the permit holder is required to comply with these provisions for their sea samplers.

[3] § 679.7 Prohibitions.
(a) * * *
(3) Groundfish and Halibut Observer Program. (i) Fish or process groundfish except in compliance with the terms of the Groundfish and Halibut Observer Program as provided by subpart E of this part.

[4] None of these vessels would quality for the vessel pool.

The environmental impacts generally associated with fishery management actions are effects resulting from (1) harvest of fish stocks, which may result in changes in food availability to predators and scavengers, changes in the population structure of target fish stocks, and changes in the marine ecosystem community structure; (2) changes in the physical and biological structure of the marine environment as a result of fishing practices, for example, effects of gear use and fish processing discards; and (3) entanglement/entrapment of non-target organisms in active or inactive fishing gear. An analysis of the effects associated with groundfish harvest on the human environment is discussed in the Alaska Groundfish Harvest Specifications EIS (NMFS 2007b). The Alaska Groundfish Harvest Specifications EIS also provides a recent description of environmental components, the groundfish fisheries, and potential impacts on the human environment. This EA adopts much of the environmental status description in this EIS.

Each section on an environmental component describes the criteria by which the impacts of the proposed action on that environmental component are analyzed. Because of the limited potential impacts of the proposed action, the effects analysis is limited to groundfish, prohibited species, and marine mammals. Evaluation criteria have been developed recently for each of these categories within the HAPC EA (NMFS 2006a) and in the Groundfish Harvest Specifications EA (NMFS 2006b). The analysis used in this EA adopts the significance criteria used in the HAPC EA (NMFS 2006a), the 2006–2007 Groundfish Harvest Specifications EA (NMFS 2006b), and the Amendment 93 EA/RIR/IRFA (NMFS 2012b) because of the similar type of action analyzed and the latest methods of analyzing significance of effects provided by these analyses.

The reference point condition, where used, represents the state of the environmental component in a stable condition or in a condition judged not to be threatened at the present time. For example, a reference point condition for a fish stock would be the state of that stock in a healthy condition, able to sustain itself, successfully reproducing, and not threatened with a population-level decline. The following section describes the significance criteria used to evaluate the proposed alternatives.

After identification of any direct or indirect impacts on an environmental component is completed, the analysis of any cumulative effects is needed to determine if the combination of the direct, indirect and cumulative impacts are likely to result in significant impacts.

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 CEQ regulations for implementing NEPA define 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 analyzed. The cumulative impact of reasonable foreseeable future actions is addressed in each section for the environmental components analyzed.

Information provided by the applicant for the EFP indicates that harvesting of target groundfish species (primarily pollock) and prohibited species (salmon, and minor amounts of herring and halibut in relation to harvests in commercial fisheries) is required for testing the salmon excluder device. Potential effects on the environment can occur with the removal of target and prohibited species during groundfish harvesting. Pollock and salmon are also prey species of marine mammals, including Steller sea lions, warranting further analysis of potential effects on marine mammals. The successful development of a salmon excluder device may affect the efficiency of the pollock fisheries to avoid bycatch and prosecute a fishery with fewer restrictions. Because of the limited amounts of harvest, manner of testing, gear type used, and the short duration of the testing, other components of the environment are not likely to be impacted and further analysis is not needed.

Table 3.1 shows the components of the human environment and whether Alternative 2 may have an impact on the component beyond status quo, Alternative 1, and require further analysis. Extensive environmental analysis on all environmental components is not needed in this document because the proposed action is not anticipated to have environmental impacts on every component. Analysis is included for those environmental components on which Alternative 2 may have an impact beyond impacts analyzed for Alternative 1 based on the most recent NEPA analyses for Amendment 93(NMFS 2012b).

Table 3.1 Resources potentially affected by Alternative 2 beyond Status Quo.

Essential Fish Habitat	Ecosystem	Pollock	Marine Mammals	Seabirds	Non-Target Species	Prohibited Species
N	N	Y	Y	N	N	Y

N = no impact anticipated by the alternative on the component.
Y = an impact is possible if the alternative is implemented.

Essential Fish Habitat

The EFP participants will use pelagic trawl gear in the Central GOA subarea for testing the salmon excluder device. The areas trawled will be areas previously trawled for pollock, and outside of Steller sea lion protection areas. The evaluation of the potential effects of pelagic trawling on benthic habitat is detailed in the EIS for essential fish habitat (EFH) identification and conservation (NMFS 2005a) and the EFH 5-year review for 2010 (NMFS 2010a). The conclusions from this analysis found the alternatives would have impacts on EFH similar to those found in the EFH EIS. However, the best available information does not identify any effects of fishing as significantly adverse. In other words, effects may occur from fishing, however these effects do not exceed the minimal and temporary limits established by 50 CFR 600.815(a)(2).

The continuing groundfish fishing activity associated with the annual commercial fishery is potentially the most relevant long term source of additional annual adverse impacts on marine benthic habitat in the action area. The size of these impacts would depend on the size of the fisheries, the protection measures in place, and the recovery rates of the benthic habitat. However, a number of factors will tend to reduce the impacts of fishing activity on benthic habitat in the future. These include the trend towards ecosystems management. Ecosystem sensitive management will increase understanding of habitat and the impacts of fisheries on them, protection of EFH and habitat areas of particular concern (HAPC), and institutionalization of ecosystems considerations into fisheries governance. Because of the type of gear, amount of fishing, and the location of the fishing in previously trawled areas, the EFP would have no

impact on EFH beyond those analyzed in the EA for Amendment 93 (NMFS 2012b) and the EIS for EFH Identification and Conservation (NMFS 2005a).

Ecosystem

An evaluation of the effects of the GOA pollock fisheries on the ecosystem is discussed annually in the Ecosystem Considerations section of the pollock chapter of the stock assessment and fishery evaluation (SAFE) report (Dorn et al. 2011), and was evaluated in the Alaska Groundfish Harvest Specifications EIS (NMFS 2007b). The analysis concluded that the current GOA pollock fisheries do not produce population-level impacts to marine species or change ecosystem-level attributes beyond the range of natural variation. Consequently, the GOA groundfish fisheries are not expected to have a significant impact on the ecosystem. Due to the limited time period of the EFP, gear type used, limited amount of pollock harvest in relation to the pollock biomass and commercial pollock fishery, limited amount of salmon, and the small amount of other nontarget species, the fishing activity under the proposed EFP is not predicted to have additional measurable impacts on the ecosystem beyond those identified in the Alaska Groundfish Harvest Specifications EIS (NMFS 2007b).

Seabirds

Alaska groundfish fisheries' impacts on seabirds were analyzed in the Alaska Groundfish Harvest Specifications EIS (NMFS 2007b), which evaluates the impacts of the alternative harvest strategies on seabird takes, prey availability, and seabird ability to exploit benthic habitat. Impacts on seabirds are primarily from the hook-and-line groundfish fisheries. Seabirds may be directly affected by pelagic trawl vessels by striking the third wire on the trawl or by striking the vessel. The potential impacts from the EFP activities is limited primarily to pollock and salmon removals using pelagic trawl gear, limiting potential impacts on prey resources. The exposure of seabirds to the EFP activity is small compared to the commercial fishery because the amount of groundfish harvest under the EFP is a small fraction of the overall harvest of the groundfish fisheries TACs, the time period of the EFP is limited to two years, the gear type used is not as likely to harm seabirds compared to hook-and-line gear, and harvesting is limited to between one and two vessels over several months each year. Based on this limited exposure, it is likely that the additional interaction overall with seabirds from EFP fishing would be minimal and any potential effects would not be discernable from status quo.

Non-Target Species

Experimental trawling under the EFP would primarily remove pollock and salmon species. The commercial directed trawl fishery for pollock in the GOA intercepts a small incidental catches of non-pollock groundfish species in the Western and Central districts (typically between 3% and 6% of the directed pollock catch between 2003 and 2012). Based on the performance of the directed pollock fishery, and because the EFP is intended to simulate commercial pollock trawling, the pollock trawls associated with this EFP are also anticipated to take small amounts of other groundfish species, within the range of approximately 75 to100 mt (a point estimate of 96 mt is applied to analyze effects in this EA). The composition of any non-pollock species caught during this EFP is also expected to be similar to the commercial groundfish fishery (John Gauvin, personal communication, September 2012). The composition of GOA pollock trawl incidental catch typically includes: Pacific cod, sablefish, several rockfish species, Pacific Ocean perch, shallow water flatfish, deep water flatfish, rex sole, arrowtooth flounder, flathead sole, eulachon, shark, skate, squids, octopus, sculpins, jellyfish, and grenadiers. All of these fish except shark, skate, squids, octopus, sculpins jellyfish, and grenadiers are target groundfish species.

Since the pollock fishery is primarily pelagic, the bycatch of non-target species is small relative to the magnitude of the fishery (NPFMC 2007b). Arrowtooth flounder and Pacific cod represent the largest component of the pollock bycatch of non-target species and the directed and incidental catch of these species are maintained well below the ABC and overfishing limit (OFL). For purposes of this EA, other species taken in the groundfish fisheries include species of invertebrates and fish not managed under the FMP and forage fish species. The amounts of other species (e.g., jellyfish, octopus, sculpins, and grenadiers) expected to be taken under the EFP are so small that any effects on these non-target species would not be discernable from the status quo. The amount of nontarget species (other groundfish species and other nontarget species) taken under the EFP is expected to be a small fraction of the nontarget species harvested in the pollock commercial fishery and therefore it is not likely that effects from the EFP activities on nontarget species would be discernable from those effects under status quo. Additional information on the impacts to non-target species under Alternative 2 is presented at 4.2.3.

4.0 STATUS OF AND IMPACTS ON THE AFFECTED ENVIRONMENT

4.1 Status of Managed Groundfish Species

Designated target groundfish species and species groups that are typically open for portions of the year in the GOA are walleye pollock, Pacific cod, sablefish, several rockfish species, Pacific Ocean perch, shallow water flatfish, deep water flatfish, rex sole, arrowtooth flounder, and flathead sole. Other groundfish species that are not designated target groundfish species include shark, skate, squids, octopus, and sculpins. This EA adopts by reference and summarizes the status of the stock information in the SAFE reports (NPFMC 2011a). For detailed life history, ecology, and fishery management information regarding groundfish stocks in the GOA see section 3.3. in the PSEIS (NMFS 2004b) and the Alaska Groundfish Harvest Specifications EIS (NMFS 2007b).

The current, detailed status of each target species category, biomass estimates, and ABC specifications for the GOA are presented annually both in summary and in detail in the annual GOA SAFE report (NPFMC 2011b). The SAFE reports for the 2012 and 2013 groundfish fisheries are available through the AFSC's website at http://www.afsc.noaa.gov/refm/stocks/assessments.htm.

For those stocks with enough information, none are considered overfished or approaching an overfished condition. Overall, the status of the stocks continues to appear relatively favorable. The GOA Plan Team met in November 2012 to finalize the SAFE report and to forward ABC and OFL recommendations to the Council for action at its December 2012 meeting. The Council recommends harvest specifications annually for 2-year periods. This provides for the public review of the proposed specifications and the management of the fisheries using the most recent survey information. The final ABC, OFL, and TAC amounts for each target species or species group for 2013 and 2014 will be recommended by the Council in December 2012 and is scheduled to be specified by NMFS in February 2013. Final ABC, TAC, and OFL amounts for each target species and species group for 2014 and 2015 will be specified by NMFS in February 2014. Table 4.1 shows the proposed 2013 and 2014 ABC, OFL, and TAC amounts for the GOA groundfish. The final specifications implemented in February 2014 are expected to be similar to the amounts specified for 2014 in the final specifications for 2013 and 2014, implemented in February 2013.

Since 1992, the GOA pollock TAC has been apportioned spatially and temporally, to reduce potential impacts on Steller sea lions. The details of the apportionment scheme have evolved over time, but the general objective is to allocate the TAC to management areas based on the distribution of surveyed

biomass, and to establish three or four seasons between mid-January and autumn, during which some specified fraction of the TAC can be taken. The Steller sea lion protection measures implemented in 2001 (66 FR 7276, January 22, 2001) established four seasons in the Central and Western GOA, beginning January 20 (A season), March 10 (B season), August 25 (C season), and October 1 (D season), with 25% of the total TAC allocated to each season. Allocations to regulatory areas 610, 620, and 630 are based on the seasonal biomass distribution as estimated by groundfish surveys. In addition, a new harvest control rule was implemented that requires suspension of directed pollock fishing when spawning biomass declines below 20% of the reference unfished level (Dorn et al. 2011).

The 2012 GOA bottom trawl survey biomass estimate for pollock in regulatory areas 610 through 640 was 667,131 mt, and the estimated pollock biomass for 2013 is 678,000 mt (NPFMC 2011b). The pollock management areas of 610 through 640 (including the Western, Central, and West of Yakutat areas) are considered to be a single population and stock resulting in a single combined OFL. According to the status determination of the SAFE report, the walleye pollock stock in the Central, Western, and West of Yakutat areas is not being subjected to overfishing, is not overfished, and is not approaching an overfished condition (Dorn 2011).

Multiple sources of information indicate that Central, Western, and West of Yakutat GOA pollock biomass is increasing. The estimated abundance of mature fish in 2013 is projected to be slightly higher than in 2012, and is projected to increase gradually over the next 5 years (Dorn 2011).

Table 4.1 2012 and 2013 Overfishing Level (OFL), Acceptable Biological Catch (ABC), and Total Allowable Catch (TAC), of Selected Groundfish in the GOA.

[Amounts are in metric tons]

		2012			2013		
Species	**Area/District[1]**	**OFL**	**ABC**	**TAC**	**OFL**	**ABC**	**TAC**
Pollock[2]	W/C/WYK	143,716	105,670	105,670	155,402	114,560	114,560
	SEO (650)	14,366	10,774	10,774	14,366	10,774	10,774
Total		*158,082*	*116,444*	*116,444*	*169,768*	*125,334*	*125,334*
Pacific cod[3]		104,000	87,600	65,700	*108,000*	*91,000*	*68,250*
Sablefish[4]	All GOA	15,330	12,960	12,960	15,129	12,794	12,794
Flatfish[5] (shallow-water)	All GOA	61,681	50,683	37,029	56,781	46,483	36,550
Flatfish[6] (deep-water)	All GOA	6,834	5,126	5,126	6,834	5,126	5,126
Rex sole	All GOA	12,561	9,612	9,612	12,326	9,432	9,432
Arrowtooth flounder	All GOA	250,100	212,882	103,300	249,066	212,033	103,300
Flathead sole	All GOA	59,380	47,407	30,319	60,219	48,081	30,408
Pacific ocean perch	All GOA	19,498	16,918	16,918	19,021	16,500	16,500

4.2 Effects on Target and non-Target Species

The significance criteria used to evaluate the effects of this action on pollock target species are in Table 4.2. These criteria are adopted from the significance criteria used in the HAPC EA (NMFS 2006a).

Table 4.2 Criteria Used to Estimate the Significance of Effects on the FMP Managed Target Stocks of Pollock.

Effect	Criteria			
	Significantly Negative (-)	Insignificant (I)	Significantly Positive (+)	Unknown (U)
Stock Biomass: Potential for increasing and reducing stock size	Changes in fishing mortality are expected to jeopardize the ability of the stock to sustain itself at or above its MSST.	Changes in fishing mortality are expected to maintain the stock's ability to sustain itself above MSST.	Changes in fishing mortality are expected to enhance the stock's ability to sustain itself at or above its MSST.	Magnitude and/or direction of effects are unknown.
Fishing mortality	Reasonably expected to jeopardize the capacity of the stock to yield sustainable biomass on a continuing basis.	Reasonably expected not to jeopardize the capacity of the stock to yield sustainable biomass on a continuing basis.	Action allows the stock to return to its unfished biomass.	Magnitude and/or direction of effects are unknown.
Spatial or temporal distribution	Reasonably expected to adversely affect the distribution of harvested stocks either spatially or temporally such that it jeopardizes the ability of the stock to sustain itself.	Unlikely to affect the distribution of harvested stocks either spatially or temporally such that it has an effect on the ability of the stock to sustain itself.	Reasonably expected to positively affect the harvested stocks through spatial or temporal increases in abundance such that it enhances the ability of the stock to sustain itself.	Magnitude and/or direction of effects are unknown.
Change in prey availability	Evidence that the action may lead to changed prey availability such that it jeopardizes the ability of the stock to sustain itself.	Evidence that the action will not lead to a change in prey availability such that it jeopardizes the ability of the stock to sustain itself.	Evidence that the action may result in a change in prey availability such that it enhances the ability of the stock to sustain itself.	Magnitude and/or direction of effects are unknown.

The potential direct and indirect effects of the groundfish fisheries on target species, (pollock is the only target species relevant to this EFP) are detailed in the Alaska Groundfish Harvest Specifications EIS (NMFS 2007b). Direct effects include fishing mortality for each target species and spatial and temporal concentration of catch. Indirect effects include the changes in prey composition and changes in habitat suitability. Indirect effects are not likely to occur with either alternative because the proposed action does not change overall fishing practices that indirectly affect prey composition and habitat suitability. Temporal concentration of pollock catch is not likely because the EFP would occur during fall and winter seasons from A season 2013 through B season 2014 using up to two vessels. Spatial concentration also is not as likely because the harvest during the experiment occurs in various locations that are known for high Chinook salmon bycatch rates but are also common pollock trawling areas. These potential areas cover many square miles (Figures 1.1 and 1.2), and harvest will be done by no more than two vessels at a time. The only potential direct effect on target species is fishing mortality on groundfish species during the testing of the salmon excluder device.

4.2.1 Alternative 1. Status Quo Effects on Pollock

The effects of fishing on groundfish under Alternative 1 are described in detail in the Alaska Groundfish Harvest Specifications EIS in section 4.1.2 (NMFS 2007b). The status quo pollock fishery impacts on groundfish stocks is not expected to (1) jeopardize the capacity of the stocks to produce maximum sustainable yield on a continuing basis, (2) alter the genetic sub-population structure such that it jeopardizes the ability of the stocks to sustain themselves at or above the minimum stock size threshold

(MSST) or experience overfishing, (3) decrease reproductive success in a way that jeopardizes the ability of the stocks to sustain themselves at or above the MSST, (4) alter harvest levels or distribution of harvest such that prey availability would jeopardize the ability of the stocks to sustain themselves at or above the MSST or experience overfishing, or (5) disturb habitat at a level that would alter spawning or rearing success such that it would jeopardize the ability of the stock to sustain itself at or above the MSST or prevent overfishing. Therefore the impacts of Alternative 1 are likely insignificant.
If the EFP is not issued, an effective salmon excluder device is less likely to be developed, and the pollock fisheries may continue to experience rates of salmon bycatch that could potentially result in the restriction of pollock fishing. Less pollock may be taken under this alternative if the regulatory area closures are initiated by NMFS under Amendment 93. The EA for Amendment 93 concludes that if the pollock TAC is not fully harvested due to reaching the Chinook salmon PSC limit, fishing will have less impact on the stock, and there will be no significantly adverse impact on the pollock stock from the fishery. If the PSC limit is triggered it is likely that reductions in the pollock fishery is likely to occur in the C and D seasons, while the earlier A and B seasons are likely to remain unchanged. Changing fishery patterns or seasonal changes in the timing of the fishing pressure may result in the fishery focusing on different ages of pollock than would otherwise have been taken. These changes, however, would be monitored, updated in future stock assessment and reflected in any future estimates of stock biomass, OFLs, and ABCs. Also the pollock that are estimated to be taken during the testing of the salmon excluder device under Alternative 2 will not be harvested under the status quo, but this amount is less than two percent of the annual ABC for pollock. The amount of fish harvested under the EFP in relation to the total harvest is very small and any effects are not likely discernable, as further explained below under Alternative 2.

4.2.2 Alternative 2. Issue the EFP: Effects on Pollock

The EFP applicant estimated that total harvest of allocated groundfish species is 2,400 mt spread over two to four seasons. Incidental catch of non-pollock groundfish are likely to occur in proportions that are similar to the groundfish fisheries. Approximately 96% (2,304 mt) is expected to be pollock and 4% (96 mt) is expected to be other groundfish species such as Pacific cod and flatfish (John Gauvin, personal communication, 2012). A maximum of 4 mt is anticipated to be Halibut PSC. Thus, the projected catch of pollock from this EFP is estimated to not exceed 2,304 mt.

The 2012 and 2013 pollock biomass for this subarea is 667,131 mt and 678,000 mt respectively. The potential harvest of target species under this proposed action is approximately 0.3% of the 2013 Western, Central, and West of Yakutat (W/C/WYK) GOA pollock biomass. A GOA-wide pollock OFL of 169,768 mt is apportioned between the W/C/WYK GOA subarea and the Southeastern GOA subarea. The W/C/WYK GOA subarea OFL is set at 155,402 mt.

The research catch associated with this EFP has been addressed by the GOA groundfish plan team at their September 2012 meeting as a source of mortality that is subtracted from the stock biomass for the W/C/WYK GOA pollock in the 2013 and 2014 stock assessment (NPFMC, September 11 through 14, 2012, http://www.tinyurl.com/yaprzrk). When the projected EFP catch is applied to the biomass in the stock assessment model for GOA pollock the OFL is approximately 155,000 mt. It would reduce the 2013 ABC downward by a similar amount. This removal of the projected EFP pollock mortality in the stock assessment provides a conservative method to fully account for EFP mortality in establishing the OFL and ABC, so that these catches would not be subtracted again during annual catch accounting under the annual catch limit.

The preliminary 2014 W/C/WYK GOA OFLs are expected to be similar to 2013, and pollock removals from the EFP would represent approximately 1.5% of the OFL for 2013 and presumably a similar percent for 2014. The recommended ABC for 2013 and 2014 continues to maintain the Central and Western GOA harvest rate at the average of the last 5 years and hedges against poor environmental conditions that could occur in the future (NPFMC 2010b). Because the proposed 2013 and 2014 amounts of pollock under the EFP in relation to the total harvest of pollock in the W/C/WYK GOA subarea is small (1.5% of the OFL) it is unlikely to have any discernable effects on the pollock stock or non-target groundfish species compared to status quo fishing (Martin Dorn, AFSC, personal communication October, 2012).

Alternative 2 impacts on pollock stocks are not expected to affect (1) stocks' ability to be sustained above MSST, (2) the capacity of the stocks to yield sustainable biomass on a continuing basis, (3) the distribution of harvested stocks either spatially or temporally such that it has an effect on the ability of the stocks to be sustained; therefore, the impacts of Alternative 2 are likely insignificant on pollock.

4.2.3 Alternative 2. Issue the EFP: Effects on Non-Target species

The significance criteria used to evaluate the effects of this action on non-target species is the same criteria that is applied to the pollock target species in Table 4.2. These criteria are adopted from the significance criteria used in the HAPC EA (NMFS 2006a). The total amount of other groundfish expected to be taken under Alternative 2 each year is approximately 96 mt. Compared to annual commercial fishing harvests of groundfish, only small amounts of arrowtooth flounder, Pacific cod, shallow-water flatfish, deep-water flatfish, rex sole, and non-groundfish would be taken during the permitted activities under Alternative 2. The GOA groundfish plan team has determined that the amount of non-target groundfish allocated to this EFP is insignificant, and the research catch from this project will not be subtracted from the TAC for any of the target or non-target groundfish fisheries. In addition, for some species such as Pacific cod, shallow water flatfish, arrowtooth flounder, and flathead sole, annual TAC is set below the ABC, and incidental catch of groundfish from this EFP presents no potential for approaching the ABC (Table 4.1). For other non-target species that have annual TACs set equal to the ABC (sablefish, deep water flatfish, rex sole, and Pacific ocean perch), the additional catch anticipated harvest from the EFP is less significant than the rounding error for estimating the commercial catch of these species and would likely have no effect on these stocks. Furthermore, because the experimental fishing will spread out incidental catch of groundfish over two or more seasons over consecutive years, the removal of these species will be temporally dispersed throughout the calendar year. Because the amount of all groundfish anticipated to be harvested during the experiment is very small in relation to the annual commercial harvest, and in many cases is well below the ABCs, it is not likely that harvesting these groundfish species under Alternative 2 will have any discernable effects on these groundfish stocks. Because this EFP represents small fraction of a percent of the catch for these target fisheries, the stock biomasss partial distribution, and temporal distribution of these non-target species would be unchanged or not possible to detect in comparison with Alternative 1.

4.2.4 Cumulative Effects

CEQ regulations require that the analysis of environmental consequences include a discussion of the action's impacts in the context of all other activities (human and natural) that are occurring in the affected environment and impacting the resources being affected by the proposed action and alternatives. This cumulative impact discussion should include incremental impacts of the action when added to past, present, and reasonably foreseeable future actions. A discussion of the cumulative effects of the groundfish fisheries is in the Alaska Groundfish Harvest Specifications EIS (NMFS 2007b). The past and current cumulative effects are discussed in the PSEIS (NMFS 2004b). Both of these discussions are

incorporated by reference. For target species, several future actions were identified as reasonably foreseeable future actions. These actions are described in section 3.3 of the Alaska Groundfish Harvest Specifications EIS and are updated annually in the supplemental information reports, available from the NMFS Alaska Region website at http://209.112.168.2/cm/analyses/. The reasonably foreseeable future actions that may impact target species are—

- ecosystem-sensitive management;
- fisheries rationalization;
- traditional management tools;
- actions by other state, federal, and international agencies; and
- private actions.

The following reasonably foreseeable future actions may have a continuing, additive, and meaningful relationship to the direct and indirect effects of the alternatives on target species. This analysis builds on the analysis of the impacts of each of these actions on target species in section 4.1.3 of the Alaska Groundfish Harvest Specifications EIS (NMFS 2007b) and the Amendment 93 EA (NMFS 2012b).

Ecosystem-sensitive management

Ecosystem-sensitive management is likely to benefit target species. The specific actions that will be taken to implement an ecosystem policy for fisheries management are unknown at this time; therefore, the significance of cumulative effects of ecosystem policy implementation on mortality, spatial and temporal distribution of the fisheries, changes in prey availability, and changes in habitat suitability are unclear. However, these actions may enhance the ability of stocks to sustain themselves at or above MSST, as ways are found to introduce ecosystem considerations into the management process.

As noted in section 3.3.1 of the Alaska Groundfish Harvest Specifications EIS (NMFS 2007b), an increased understanding of interactions between ecosystem components is reasonably foreseeable. This coupled with another reasonably foreseeable action, increased integration of ecosystem considerations into fisheries decision-making, is likely to result in fishery management that reduces potential adverse impacts of the proposed action on target stocks. An example of the ways new information may change our perspectives was suggested at a workshop on multi-species and ecosystem-based management held at the February 2005 Council meeting. Multi-species and ecosystem projections of biomass impacts from eliminating fishing mortality for 20 years were compared to similar estimates made with single-species models. A report of the discussions noted that, "Results… were similar for top predators such as Pacific cod. However, results for walleye pollock, a key forage species, were different when predator/prey interactions were included. Both the multi-species and ecosystem models predicted much more modest increases in pollock biomass than did the single-species model, as predation increased to compensate for the increase in food supply." Predation here refers to cannibalism of juvenile pollock by larger adult pollock.

The reasonable foreseeable future actions (related to eco-system issues) that will most impact the pollock fisheries and pollock stocks are changes to the management of the fisheries due to increasing understanding of the eco-system and protection of ESA-listed and other non-target species. The Council is not considering further action on management measures to minimize salmon bycatch in the pollock fishery, but considering the scarcity of Chinook salmon stocks in and around the GOA, could consider further action in the future.

Rationalization

The only groundfish fishery that is currently rationalized in the GOA is the rockfish trawl fishery. The Council, however, could consider rationalization of other GOA groundfish fisheries in the future. Voluntary efforts to form Chinook salmon bycatch cooperatives in the Western and Central GOA highlight the potential for use of limited access allocations to individual or cooperatives in the GOA. Fisheries rationalization programs generally make large changes to the way the fisheries are managed by allocating a specified amount of catch to an individual or group. Should new GOA rationalization programs be implemented, the future effects on target species are likely to be minimal because rationalization would not change the setting of TACs, which control the impacts of the fisheries on fishing mortality. To the extent rationalization improves fishing practices and the manageability of the fisheries, it could reduce the adverse effects of the proposed action on target species. It is unlikely any changes to the rationalization of the GOA groundfish fisheries would occur during the time period of the EFP, and therefore any cumulative effects from rationalization would not occur until well after the completion of the EFP.

Traditional management tools

Future harvest specifications will primarily affect fishing mortality, as the other significance criteria for target species (temporal and spatial harvest, prey availability, and habitat suitability) are primarily controlled through regulations in 50 CFR part 679. The setting of annual harvest levels is controlled to ensure the stock can produce maximum sustainable yield (MSY) on a continuing basis and to prevent overfishing. Each year's setting of harvest specifications include the consideration of past harvests and future harvests based on available biomass estimates. In-season managers close species to directed fishing as fishermen approach TACs, prohibit retention of species when a TAC has been reached, and introduce fishing restrictions, or actual fishery closures, in fisheries in which harvests approach OFL. Other management tools include pollock trip limits, restrictions on retention of groundfish when a species is closed to directed fishing, and various license limitations. The optimum yield for the GOA as established in regulation, also contributes significantly to preventing overharvests. The controls on fishing mortality in setting harvest specifications ensure the stocks are able to produce MSY on a continuing basis.

Because of improved fish stock information, the number of TAC categories with low values of ABC/OFL are increasing, which tends to increase the likelihood that closures of directed fisheries to prevent overfishing will occur. In recent years management of species groups has tended to separate the constituent species into individual ABCs and OFLs. While managing the species with separate ABCs and OFLs reduces the potential for overfishing the individual species, the effect of creating more species categories can increase the potential for incurring management measures to prevent overfishing, such as fishery closures. Managers closely watch species with fairly close amounts between the OFL and ABCs during the fishing year, and the fleet will adjust behavior to prevent incurring management actions.

A large proportion of the groundfish fleet now carries vessel monitoring systems (VMS) due to VMS requirements introduced in connection with the Steller sea lion protection measures, EFH/HAPC protection measures, and the Crab Rationalization Program. The entire pollock fleet now carries VMS due to VMS requirements introduced in 2002. In-season managers currently use VMS intensively to manage fisheries so that harvests are as close to TACs as possible. VMS has also become a valuable diagnostic tool for addressing situations with unexpected harvests. It was used as a diagnostic tool in July 2006 to investigate the sources of a sudden and unexpected bycatch of squid in the pollock fishery. As agency experience with VMS grows, it should allow in-season managers to more precisely match harvests

to TACs, reducing potential overages, and maximizing the value of TACs to industry. Extension of VMS will be associated with larger costs for vessels that will adopt it.

NMFS has published a proposed rule to implement observer restructuring for Amendments 86 in the BSAI and 76 in the GOA (April 18, 2012, 77 FR 23326) that, if approved, would also improve the accounting of pollock in target and non-target groundfish fisheries. The program would improve the observer deployment system for pollock trawl vessels to meet management and conservation needs, and resolve data quality issues for catch accounting of target and non-target fisheries.

Other government actions

The Bureau of Ocean Energy Management, Regulation and Enforcement (BOEMRE) expects that reasonably foreseeable future activities include development of oil and gas deposits over the next 15 to 20 years in federal waters off Alaska. Potential environmental risks from the development of offshore drilling include the impacts of increased vessel offshore oil spills, drilling discharges, offshore construction activities, and seismic surveys. Oil and gas leases are primarily located in Cook Inlet and on the North Slope. North slope oil and gas development are less likely to have impacts on the GOA resources than Cook Inlet. Adverse environmental impacts resulting from exploration and development in the future could impact salmon, halibut, and herring stocks and habitat that may support groundfish species. The extent to which these impacts may occur is unknown.

Private actions

Fishing activities by private fishing operations, carried out under the authority of the annual harvest specifications, are an important class of private action. The impact of these actions has been considered under traditional management tools.

A private action not addressed above is the Marine Stewardship Council (MSC) environmental certification of fisheries. The MSC developed standards for sustainable fishing and seafood traceability. They ensure that MSC-labeled seafood comes from, and can be traced back to, a sustainable fishery. The MSC certified the GOA pollock, Pacific cod, flatfish, halibut, and sablefish fisheries (http://www.msc.org/track-a-fishery/certified/pacific). Certification will have to be renewed in the future. If the MSC environmental certification has important marketing benefits, this will increase industry incentives to address the environmental issues connected with the fishery. In this context, it may tend to lengthen industry's time horizon, and increase its interest in target stock sustainability. More information on the MSC certification program may be found at www.msc.org.

Increasing economic activity in and off Alaska may affect future fisheries. The high levels of traffic between the West coast and East Asia raise concerns about pollution incidents or the introduction of invasive species from ballast water. Pollution issues were highlighted in December 2004 when the M/V *Selendang Ayu* wrecked on Unalaska Island and again in July 2006 with the M/V *Cougar Ace* accident. Large cargo vessels can carry thousands of gallons of fuel that can have a large impact on near shore habitat depending on the location of the spill, type of fuel, and oceanographic conditions.

Alaskan economic development can affect the coastal zone and species that depend on the zone. However, Alaska remains relatively lightly developed compared to other states in the nation. In 2011, Alaska stopped implementing a coastal zone management program under the Coastal Zone Management Act, and therefore has less involvement in coastal zone management than other states that participate in

the program. Marine transportation associated with coastal development may be more of a concern than in states, due to the relatively greater importance of marine transportation to Alaska's economy.

The development of aquaculture may affect prices for, and the harvest of, some species. For example, the development of sablefish aquaculture may reduce wild sablefish prices and reduce interest in sablefish harvests in high-operating-cost areas in the GOA where sablefish TACs are currently not fully harvested. More direct impacts, through development of finfish aquaculture in waters off Alaska, do not appear to be likely at this time.

4.2.5 Summary of Effects

The direct, indirect, and cumulative effects of the alternatives are not expected to (1) jeopardize the capacity of the pollock stock to produce maximum sustainable yield on a continuing basis, (2) alter the genetic sub-population structure such that it jeopardizes the ability of the pollock stock to sustain itself at or above the minimum stock size threshold or experience overfishing, (3) decrease reproductive success in a way that jeopardizes the ability of the pollock stock to sustain itself at or above the minimum stock size threshold, (4) alter harvest levels or distribution of harvest such that prey availability would jeopardize the ability of each stock to sustain itself at or above the minimum stock size threshold or experience overfishing, and (5) disturb habitat at a level that would alter spawning or rearing success such that it would jeopardize the ability of each stock to sustain itself at or above the minimum stock size threshold or experience overfishing. **For these reasons, impacts to pollock are predicted to be not significant under Alternatives 1 and 2.**

4.3 Status of Prohibited Species Stocks

Prohibited species taken incidentally in groundfish fisheries include: Pacific salmon (Chinook, coho, sockeye, chum, and pink salmon), steelhead trout, Pacific halibut, Pacific herring, and king, Tanner, and snow crabs. In order to control bycatch of prohibited species in the GOA groundfish fisheries, the Council annually specifies PSC limits. The status of the prohibited species in the GOA is detailed in section 7.2 of the Alaska Groundfish Harvest Specifications EIS (NMFS 2007b) and in the SAFE report (NPFMC 2010a). During haul sorting, these species or species groups are to be returned to the sea with a minimum of injury except when their retention is required by other applicable law and regulation. Salmon taken must be retained until an observer is given the opportunity to count and biologically sample the salmon. Afterwards, the salmon is either discarded or donated to a participant in the Prohibited Species Donation program.

Under the proposed action, salmon and halibut are the only PSC species that are expected to be taken in measurable amounts because the EFP fishing uses pelagic trawl gear in a manner that meets the trawl performance standard at 50 CFR 679.7, preventing the bycatch of other PSC species. Status information regarding salmon and halibut is provided in this section. A trace amount of the herring may be taken in the pelagic trawl fishery (NMFS 2007b), and a review of the PSC bycatch rates published on the NMFS Alaska Region website for 2012 showed no herring being caught in the GOA pollock pelagic trawl fishery (http://www.alaskafisheries.noaa.gov/2012/pscinfo.htm). Therefore a very small amount (if any) of herring is likely to be taken in the EFP fishing so that any effects on herring are likely not discernable over status quo and will not be further analyzed in this EA.

Salmon is the most common PSC species taken in the midwater pelagic trawl pollock fishery (NMFS 2007b), and Chinook salmon is managed under a PSC limit of 18,316 for the Central GOA (§ 679.21(h)(3)(i)). Halibut is managed under a PSC limit through the annual specification process. For the

2012/2013 harvest specification the halibut PSC for the GOA trawl fisheries is 2,000 mt (77 FR 15194, March 14, 2012). The limit and annual PSC catch may vary by year and season, and a different amount may be specific for 2014 during the 2014/2015 harvest specifications process.

4.3.1 Salmon

The EA/RIR/IFRA for Amendment 93 to the GOA FMP has the latest status information for salmon that may be taken in the GOA groundfish fisheries (NMFS 2012b). The EA details the status of Chinook salmon stocks in Chapter 4. Chapter 4 of that document contains a detailed description of the commercial harvest and hatchery production of Chinook salmon throughout the GOA, extending through the Pacific rim. Status of GOA salmon bycatch are detailed in section 4.3, and this bycatch may include stocks from the Japanese, Russian, Alaskan, and Korean run hatchery programs.

Chinook salmon are the predominant salmon species taken in the GOA groundfish fisheries. Table 4.3 shows the estimated number of salmon measured by the observer program in 2011 in the GOA groundfish fisheries (Balsiger 2012). Because the number of salmon measured for lengths by species is in proportion to the number of each species observed caught, this information indicates the proportion of salmon species observed taken in the GOA groundfish fisheries. Because the taking of chum, coho, sockeye, and pink salmon is a relatively rare event in the GOA groundfish fisheries, the proposed action is not likely to result in a substantial portion of these species being taken. This analysis will focus on Chinook salmon.

Table4.3 Estimated Number of Salmon in GOA trawl pollock fishery measured and sampled by observers in 2011.

Area/Fishery	Salmon species	Length	Genetic tissue	CWT
GOA pollock	Chinook	235	221	12
	Chum	6	3	0
	Coho	13	0	0
	Pink	1	0	0
	Sockeye	0	0	0
Subtotal		255	244	12
	Chinook	62	n/a	7
	Chum	25	n/a	0
	Coho	6	n/a	0
	Pink	1	n/a	0
	Sockeye	0	n/a	0
Subtotal		94	n/a	7
Total		349	224	19

Source: Balsiger 2012

4.3.1.1 Chinook Salmon Status

Stock composition of Chinook salmon bycatch in the GOA pelagic trawl fishery is not well understood. While genetic and scale pattern derived stock composition analyses have been completed for available sample sets from the Chinook salmon PSC of the BSAI groundfish trawl fisheries (Myers and Rogers 1988; NMFS 2009a; Guyon et al. 2010a; Guyon et al. 2010b), limited sampling has precluded stock composition of the salmon PSC in the GOA pollock trawl fishery. For the 2010 genetic analyses, approximately 116 Chinook salmon axillary process samples from the Western GOA, and 45 samples from statistical area 620 in the Central GOA were received by the NMFS Auke Bay Lab from the Alaska groundfish fisheries PSC. The overall fraction sampled was 0.4% and did not exceed 0.8% for any area. The lack of representative samples and small sample sizes preclude calculating statistically reliable stock composition estimates of the 2010 GOA Chinook salmon bycatch as a whole. The statistical area 610

sample set of 116 samples originated from 5 cruises from 34 offloads/hauls. The statistical area 620 sample set of 45 samples originated from 5 cruises (36 were from 1 cruise) from 9 hauls/offloads (Guyon et al. 2011). Samples were genotyped for 43 single nucleotide polymorphism markers represented in the Alaska Department of Fish and Game (ADF&G) coastwide Chinook salmon baseline. The 2010 GOA samples were predominantly from Chinook salmon stocks from the U.S. Pacific Northwest, British Columbia, and coastal southeastern Alaska. For reasons discussed above, these results provide presence indicators of Chinook salmon stocks rather than relative abundance (Guyon et al. 2011).

With respect to direct mortality, the EA for Amendment 93, indicates that there is insufficient information available to directly link groundfish PSC to salmon stock biomass levels. The Alaska Groundfish Fisheries Harvest Specifications EIS (NMFS 2007b) also considered impacts of the fisheries on the genetic structure of the population, reproductive success, and habitat, and concluded that it is unlikely that groundfish fishing has indirect impacts on these aspects of Chinook salmon sustainability. The 2007 analysis concludes that minimum escapement had generally been met in the preceding years, despite increasing levels of Chinook and chum salmon PSC in the GOA pollock fishery. The pollock fishery also incidentally catches salmon prey species, including squid, capelin, eulachon, and herring, however the catches of these prey species are very small relative to the overall populations of these species. Thus, pollock fishing activities are considered to have minimal and temporary effects on prey availability for salmon (NMFS 2007b).

Since 2007, there have been below average Chinook salmon runs in Western Alaska. In 2010 and 2011, Chinook salmon run size was also below average in most of the GOA, except in Chignik and Southeast Alaska where escapement goals were largely met. In 2012, Chinook salmon run size was again below average in most of Cook Inlet and Southeast Alaska, with some Cook Inlet stocks not reaching escapement goals. The Chinook salmon stock composition of the GOA pollock fishery PSC is not available; however, the fishery has been documented to catch Chinook salmon from Southeast Alaska (where escapement levels have been largely met) and from Cook Inlet (where many of the escapement goals were not met in 2010 and 2012)(NMFS 2012b). Chinook salmon PSC since 2007 was high in the Central GOA in 2007, particularly low in 2008 and 2009, high again in 2010, low in 2011, and high (approaching the Chinook salmon PSC limit) in 2012 (Table 1.1). It is not possible to draw any correlation between patterns of PSC and the status of salmon stocks, especially given the uncertainty associated with estimates of PSC in the groundfish fisheries, and the lack of data on river of origin of Chinook salmon PSC. There is also no evidence to indicate that the groundfish fisheries' take of Chinook salmon is causing low escapement in Alaska rivers. Beginning in 2011, efforts are underway to improve genetic sampling of salmon PSC in the GOA pollock fishery, which should, in time, allow for a better understanding of the stock composition of PSC in the GOA pollock fishery.

The first priority of the State of Alaska in managing Chinook salmon is to meet spawning escapement goals, in order to sustain salmon resources for future generations. Salmon surplus above escapement needs are made available for subsistence and other uses. North Pacific Chinook salmon are the target of subsistence, commercial, and recreational fisheries. While a few river systems in the GOA have subsistence salmon fisheries, approximately 90 percent of the subsistence harvest of salmon is taken in the Yukon and Kuskokwim river systems. For more information on state management of salmon subsistence fisheries, refer to the ADF&G website at www.adfg.alaska.gov/index.cfm?adfg=fishingSubsistence.main and the Alaska Subsistence Salmon Fisheries 2007 Annual Report at www.subsistence.adfg.state.ak.us/techpap/TP346.pdf. The majority of the Alaska commercial Chinook salmon catch is made in Southeast, Bristol Bay, and the Arctic-Yukon-Kuskokwim areas. Fish taken commercially average about 18 pounds. The majority of the catch is made with troll gear or gillnets.

The Chinook salmon is the most highly prized sport fish on the west coast of North America. Average annual recreational catches of Chinook salmon in Alaska during the 12-year period of 1994 to 2005 and the 6-year period of 2006 to 2011 have decreased from 176,000 to 155,000 fish (ADF&G 2012) with Cook Inlet and adjacent watersheds frequently contributing over half of the catch. Unlike non-Chinook salmon species, most Chinook salmon stocks spend a substantial portion of their lifecycle rearing in inshore marine waters and are, therefore, available to commercial and sport fishermen all year.

Directed commercial Chinook salmon fisheries in Alaska occur in the Yukon River, Nushagak District, Copper River, and the Southeast Alaska troll fishery. In all other areas of Alaska, Chinook salmon are taken incidentally and mainly in the early portions of the sockeye salmon fisheries. Catches in the Southeast Alaska troll fishery have been declining in recent years, due to United States/Canada treaty restrictions and declining run size of many Chinook salmon stocks in British Columbia and the Pacific Northwest. Chinook salmon catches were moderate to high in most regions between 1984 and 2004 (Eggers 2004). However, western Alaska Chinook salmon stocks declined sharply in 2007 and have remained depressed since. In recent years of low Chinook salmon returns, the in-river harvest of western Alaska Chinook salmon has been severely restricted and, in some cases, river systems have not met escapement goals. Because of low Chinook salmon returns, the State of Alaska reduced the 2008 commercial Chinook salmon harvest to 89 percent below the recent 5-year average. No commercial Chinook salmon fishery was allowed in 2009 on the Yukon River. The State of Alaska also restricted subsistence harvests. After the Governor of the State of Alaska requested that the Secretary of Commerce determine a fishery resource disaster Chinook salmon on the Yukon and Kuskokwim rivers on January 15, 2010, Secretary of Commerce Gary Locke determined a commercial fishery failure for the Yukon River Chinook salmon due to low salmon returns (U.S. Department of Commerce 2010). Due to low Chinook salmon returns in the Yukon River in 2012, the Governor of the State of Alaska again requested that the Secretary determine a fisheries resource disaster. That request was followed by a second request Cook Inlet following the low returns and escapements of Chinook salmon in several river systems in the Cook Inlet. On September 12, 2012, the Acting Secretary of Commerce determined a fisheries resource disaster for Chinook salmon fisheries of Yukon River, Kuskokwim River and for Cook Inlet (Commerce 2012). The fishery may also qualify for other forms of federal assistance.

4.3.1.2 Endangered Species Act (ESA)-listed Chinook Salmon in the Alaska Groundfish Fisheries

Of the nine Chinook salmon ESUs in the Pacific Northwest that are listed under the ESA, three are known to have been taken as PSC in the Alaska groundfish fisheries. The information currently available on Chinook salmon ESA-listed ESUs caught in the GOA groundfish fisheries is from CWTs. Chinook salmon from the Lower Columbia River, Upper Columbia River, and Upper Willamette River Spring ESUs have been recovered in the GOA trawl fishery. Small numbers of the Puget Sound Chinook salmon ESU, the Snake River Spring/Summer Chinook salmon ESU, and the Snake River Basin steelhead ESUs have been documented by research surveys in the GOA, indicating that these stocks also occur in the GOA. All of the Chinook salmon from ESA-listed ESUs that have been recovered in the GOA trawl fishery have been spring run. One of the Lower Columbia River CWTs recovered in high seas research (2001) was a fall run (Adrian Celewycz, personal communication, November 2010).

In January 2007, the NMFS Northwest Region completed a supplemental biological opinion to the November 30, 2000 biological opinion on the effects of the Alaska groundfish fisheries on ESA-listed salmon (NMFS 2007c). An incidental take statement was included in the 2000 and 2007 biological opinions, which established a threshold of 40,000 Chinook salmon caught as PSC in the GOA groundfish

fisheries. Both the 2000 and 2007 biological opinion concluded that the GOA groundfish fisheries are not likely to jeopardize the continued existence of ESA-listed Chinook salmon stocks. If, during the course of the fisheries, the specified level of take is exceeded, a reinitiation of consultation is required, along with a review of the reasonable and prudent measures identified in the 2007 supplemental biological opinion.

Detailed information on listed stocks is available in updated status reports of ESA-listed ESUs (Good et al. 2005, and in the Interim Regional Recovery Plan for Washington management units of the listed ESUs in the Lower Columbia River (LCFRB 2004). Additional information related to the status of Lower Columbia River and Upper Willamette River Chinook salmon is summarized in the EA/RIR/IRFA for Amendment 93 (NMFS 2012b). No critical habitat is designated in Alaska waters for the Chinook salmon ESA-listed stocks.

In 2010, NMFS completed a 5-year review of Pacific salmon and steelhead populations listed under the ESA to ensure the accuracy and classification of each listing (Ford 2010). The review includes the salmon species taken in the GOA fisheries and research cruises. NMFS has developed a strategy for recovery planning in Washington, Idaho, Oregon, and California that combines ESA-listed salmon and steelhead distinct population segments into geographic areas. The Northwest Region has identified its four recovery planning areas, or recovery domains, and has established technical recovery teams of scientists for each domain. Recovery plans in each domain will address all salmon species within that geographic area, and will involve stakeholders on a local level. More information on the recovery activities is available from http://www.nwr.noaa.gov/Salmon-Recovery-Planning/index.cfm.

Chinook salmon from ESA-listed ESUs are observed more frequently in the GOA groundfish fishery than the BSAI groundfish fishery because the GOA is closer to the streams from which these stocks originate (NMFS 2009b). The probability that an ESA-listed Chinook salmon will be taken in the GOA groundfish fishery depends on the duration of the time period considered and the cumulative total Chinook salmon PSC over that time. During 2004 through 2011, the total catch of Chinook salmon in the GOA groundfish fishery was 208,491 (Balsiger 2011).

Because of the high number of Chinook salmon taken in the GOA groundfish fisheries in 2010, the NMFS Alaska Region reinitiated ESA section 7 formal consultation with NMFS Northwest region on the 2010 incidental take of Chinook salmon (Balsiger 2010). The incidental take of Chinook salmon in the 2010 GOA groundfish fisheries was 54,576 fish (NMFS Alaska Region Catch Accounting System February 10, 2011). The Northwest Regional Administrator concurred with the Alaska Region conclusion that the authorization of the GOA groundfish fisheries and Amendment 93 to the GOA FMP was unlikely to jeopardize the continued existence of Northwest ESA-listed salmon ESUs (Stelle 2012). The consultation stated:

> "it is apparent that exceeding the Chinook salmon by-catch limit (catch of GOA Chinook salmon authorized in the 207 Biological Opinion) in the GOA groundfish fisheries is not a chronic situation. Even so, the Chinook salmon by-catch caps that the NPFMC recently adopted substantially reduce the likelihood that it will happen again. However, even if the authorized by-catch limit is exceeded on occasion, by-catch of listed Chinook salmon ESUs in the GOA groundfish fisheries continues to be extremely low."
>
> "By-catch rates of listed Chinook salmon have declined since the period of time NMFS used to establish the bycatch limit reflected in the 2007 opinion. In fact, based on the available data, it is apparent that by-catch rates of listed fish are now lower than they were at the start of the original consultation. Therefore, after consideration of all the information discussed above, NMFS

concludes that the effects of the proposed action are not likely to jeopardize the continued existence of either the UWR or LCR Chinook salmon ESUs. Since the proposed action occurs outside of designated critical habitat, NMFS also concludes that the proposed action will have no effect on designated critical habitat for the UWR and LCR Chinook salmon ESUs."

"Recently adopted NPFMC management measures (under Amendment 93) should reduce Chinook salmon by-catch, improve by-catch estimation, monitoring and sampling, and increase the likelihood of remaining below the incidental take limit. NMFS encourages the NPFMC to continue to improve observer coverage and address the uncertainties identified for CWT expansions in order to improve bycatch estimation and reduce concerns that the recently adopted by-catch caps for the GOA pollock fishery might result in some unobserved vessels discarding Chinook salmon by-catch. This guidance is consistent with the conservation recommendations in the 2007 supplemental biological opinion."

4.3.2 Pacific Halibut

On an annual basis, the International Pacific Halibut Commission (IPHC) assesses the abundance of Pacific halibut and sets annual harvest limits for the commercial setline fishery (IFQ fishery). The stock assessment is based on data collected during scientific survey cruises, information from commercial fisheries, and an area-specific harvest rate that is applied to an estimated amount of exploitable biomass. This information is used to determine a biological limit for the total area removals from specific regulatory areas. The biological target is known as the "Constant Exploitation Yield" (CEY) for a specific area and year. Removals from sources other than the IFQ fishery are subtracted from the CEY to obtain the "Fishery CEY". These removals include bycatch mortality greater than 26 inches in total length, halibut killed by lost and abandoned gear, halibut harvested for personal use, and sport catch. Halibut bycatch under 26 inches is accounted for in the setting of the harvest rate, which is applied to the total exploitable biomass calculated by the IPHC on an annual basis. Finally, the amount of halibut recommended for the IFQ fishery may be different from the Fishery CEY level due to other considerations by the IPHC.

The IPHC holds an annual meeting where IPHC commissioners review IPHC staff recommendations for harvest limits and stock status (e.g., CEY). The IPHC stock assessment model uses information about the age and sex structure of the Pacific halibut population, which ranges from northern California to the Bering Sea. The most recent halibut stock assessment was developed by IPHC staff in December 2011 for the 2012 fishery. This assessment resulted in a coast wide exploitable biomass of 318 million pounds, up from 275 million pounds estimated in 2011. Based on the currently estimated age compositions, both exploitable and spawning biomass are projected to increase over the next several years as several strong year classes recruit to the fishable and spawning components of the population. Using scientific survey estimates of relative abundance, an apportionment methodology was used to estimate biomass in each IPHC regulatory area.

Halibut PSC has often acted as a limit to the full utilization of the trawl TAC for GOA target fisheries. Halibut PSC in GOA trawl fisheries is divided between shallow-water complex fisheries (primarily Pacific cod, shallow water flatfish, and pollock) and deep-water complex fisheries (primarily rockfish, rex sole, and arrowtooth flounder) across four seasons, with a fifth season apportionment available for use by fisheries in either complex. In recent years, deep-water complex fisheries have frequently used all of the available seasonal apportionments of halibut PSC. Seasonal apportionments in shallow-water complex fisheries are periodically fully used, with the first season limit being reached the least frequently. That season receives a relatively large apportionment to allow for prosecution of the first season in the Pacific

cod fishery. These shared seasonal apportionments—available to catcher vessels and catcher processors in multiple target fisheries across two management areas—create a substantial barrier to the formation of agreements to address halibut PSC usage (NMFS 2012b).

4.4 Effects on Salmon and Halibut

The significance criteria used to evaluate the effects of the action on prohibited species are in Table 4.4. These criteria are from the 2006–2007 groundfish harvest specifications environmental assessment/final regulatory flexibility analysis (NMFS 2006b).

Table 4.4 Criteria Used to Estimate the Significance of Impacts on Prohibited Species.

No impact	No incidental take of the nontarget and prohibited species in question.
Adverse impact	There are incidental takes of the nontarget and prohibited species in question.
Beneficial impact	Natural at-sea mortality of the nontarget and prohibited species in question would be reduced – perhaps by the harvest of a predator or by the harvest of a species that competes for prey.
Significantly adverse impact	Fisheries are subject to operational constraints under PSC management measures. Groundfish fisheries without the PSC management measures would be a significantly adverse effect on prohibited species. Operation of the groundfish fisheries in a manner that substantially increases the take of nontarget species would be a significantly adverse effect on nontarget species.
Significantly beneficial impact	No benchmarks are available for significantly beneficial impact of the groundfish fishery on the nontarget and prohibited species, and significantly beneficial impacts are not defined for these species.
Unknown impact	Not applicable

Section 7 of the Alaska Groundfish Harvest Specifications EIS (NMFS 2007b) analyzes the impacts of pollock fishing on prohibited species. Potential direct and indirect effects include mortality of the PSC species, spatial and temporal effects on genetic structure and reproductive success, impacts on habitat, and impacts on prey composition for PSC species.

Salmon and halibut are the primary PSC species of concern in the GOA pollock fishery (NMFS 2007b). Thus, salmon and halibut are potentially impacted by the proposed action. The applicant projects and NMFS concurs that other PSC species such as Pacific herring are not likely to be taken during the EFP activities because of the use of pelagic trawling in the mid-water areas have minimal PSC bycatch. This action is not likely to affect PSC prey or habitat because any changes to the habitat or prey composition during the experiment is not expected based on the use of pelagic trawl gear to harvest a small amount of fish in relation to the commercial fishery, over a limited time period by no more than two vessel in areas previously fished. Pelagic trawl gear is to be used in compliance with the trawl standard (50 CFR 679.7), which keeps the gear off the bottom, and the bycatch of this gear type is not likely to include prey that PSC species use. Because salmon and halibut reproduce in habitats where groundfish fishing is not conducted, the EFP fishing is unlikely to have any effect on reproductive success (NMFS 2007b).

4.4.1 Alternative 1 Status Quo Effects on Salmon

The effects of the groundfish fisheries on salmon are described in detail in the EA/RIR for Amendment 93 (NMFS 2012b), and the Alaska Groundfish Harvest Specifications EIS (NMFS 2007b, section 7.2). Much of the discussion in these documents is incorporated here by reference.

The number of Chinook salmon taken as PSC in the Central GOA pollock fishery and the rate at which they are caught varies by year. Table 4.5 reports the pollock catch, Chinook salmon PSC, and the catch

rates for the Central Gulf and the Western Gulf for the years 1994 through 2011. Data from 1994 is the earliest year that area breakouts were included on the PSC data on the NMFS Alaska Region website.

Table 4.5 Chinook salmon prohibited species catch (PSC) and pollock catch in the Central and Western Gulf of Alaska pollock fishery, 1994 through 2012.

Area	Year	Chinook PSC	Pollock Harvest (mt)	Chinook/ mt pollock	mt pollock/ Chinook	%of CG/WG PSC	% of CG/WG pollock harvest
Central Gulf	1994	6,589	84,130	0.08	12.8	92%	81%
	1995	3,051	38,897	0.08	12.7	67%	56%
	1996	10,598	26,450	0.40	2.5	95%	52%
	1997	8,800	57,826	0.15	6.6	94%	69%
	1998	10,464	88,136	0.12	8.4	75%	75%
	1999	23,758	68,275	0.35	2.9	91%	74%
	2000	15,907	47,691	0.33	3.0	87%	68%
	2001	8,234	37,663	0.22	4.6	87%	55%
	2002	2,487	31,437	0.08	12.6	49%	64%
	2003	3,557	31,290	0.11	8.8	83%	66%
	2004	10,655	38,311	0.28	3.6	82%	62%
	2005	21,429	46,802	0.46	2.2	78%	60%
	2006	11,138	42,299	0.26	3.8	71%	63%
	2007	31,647	32,205	0.98	1.0	90%	65%
	2008	8,014	30,769	0.26	3.8	79%	67%
	2009	2,215	22,700	0.10	10.2	83%	62%
	2010	12,300	44,033	0.28	3.6	28%	63%
	2011	9,838	55,248	0.18	5.6	72%	73%
	2012	7,221	55,248	0.13	7.7	85%	76%
1994-2011CG Average		11,149	45,787	0.2	4.1	74%	67%
2003-2011 CG Average		12,310	38,184	0.3	3.1	67%	65%
Western Gulf	1994	591	19,894	0.03	33.7	28%	72%
	1995	1,506	30,958	0.05	20.6	38%	62%
	1996	565	24,200	0.02	42.8	6%	94%
	1997	524	26,141	0.02	49.9	12%	88%
	1998	3,448	29,301	0.12	8.5	50%	50%
	1999	2,307	23,384	0.10	10.1	22%	78%
	2000	2,472	22,074	0.11	8.9	25%	75%
	2001	1,237	30,471	0.04	24.6	16%	84%
	2002	2,548	17,455	0.15	6.9	65%	35%
	2003	738	15,970	0.05	21.6	29%	71%
	2004	2,327	23,124	0.10	9.9	27%	73%
	2005	5,951	30,756	0.19	5.2	30%	70%
	2006	4,529	24,427	0.19	5.4	41%	59%
	2007	3,359	17,303	0.19	5.2	16%	84%
	2008	2,116	14,828	0.14	7.0	35%	65%
	2009	441	14,010	0.03	31.8	24%	76%
	2010	31,581	25,766	1.23	0.8	81%	19%
	2011	3,764	20,208	0.19	5.4	51%	49%
	2012	1,264	17,516	0.07	13.9	36%	64%
1994-2011 WG Average		3,889	22,793	0.2	5.9	26%	33%
2003-2011 WG Average		6,090	20,710	0.3	3.4	33%	35%

In the Central Gulf pollock target fishery, the smallest number of Chinook salmon were taken as PSC in 2009. Only 2,215 Chinook salmon were estimated to have been caught by pollock trawlers that year. The largest number of Chinook salmon PSC occurred in the Central GOA fishery was in 2007, when an estimated 31,647 fish were taken. On average just over 12,300 Chinook salmon were intercepted by pollock trawlers in the GOA, annually, during the 2003 through the 2011 time period.

The analysis for implementing the final rule for Amendment 93 estimates the amount of Chinook salmon "savings" that would have occurred during this period of time if the Central and Western GOA pollock limit of 18,316 and 6,684 Chinook salmon (respectively) was in place. The Council recommended these amounts to meet their goal of limiting Chinook salmon PSC in the pollock fishery to 25,000 Chinook salmon throughout the GOA.

The analysis for Amendment 93 (NMFS 2012b) documents best available scientific data on the distribution of Chinook salmon by caught in the GOA pollock fisheries by system and region of origin based on a compilation of genetic and CWT recovery information. Stock origin from this data includes CWT recoveries from Oregon, Idaho and Washington to British Columbia, and Alaska.
The EA/RIR/IRFA for Amendment 93 concludes that it is not possible to draw any correlation between patterns of PSC and the status of salmon stocks, especially given the uncertainty associated with estimates of PSC in the groundfish fisheries, and the lack of data on river of origin of GOA Chinook salmon PSC. There is also no evidence to indicate that the groundfish fisheries' take of Chinook salmon is causing reductions in the escapements in Alaska rivers. Beginning in 2011, efforts are underway to improve genetic sampling of salmon PSC in the GOA pollock fishery, which should, in time, allow for a better understanding of the stock composition of PSC in the GOA pollock fishery.

Any impact from the status quo groundfish fishery (with the Amendment 93 PSC limits in place) to the Chinook salmon stocks as a whole, is likely to represent either no change from the status quo, or to be beneficial, as PSC levels either remain the same or are reduced. The EA/RIR/IRFA for Amendment 93 also concluded that, pollock fishing activities are considered to have minimal and temporary effects on prey availability for salmon. Thus, this analysis did not identify any significant adverse impact to Chinook salmon stocks for the GOA groundfish fishery.

4.4.2 Alternative 2 Issue the EFP: Effects on Salmon

The experimental design of the EFP calls for PSC catch of 2,400 Chinook salmon in 2013 and 2014, for a total of 4,800 Chinook salmon over two years. The A, B, and D seasons are the most likely seasonal periods identified by the applicant for EFP fishing. The average harvest of Chinook salmon for the Central GOA from 2003 to 2011 is 12,310 Chinook salmon. If the 2003 to 2011 average Chinook period is duplicated during the 2013 EFP fishing the additional catch from the EFP would represent approximately a 19% increase in the total Chinook PSC removed during the calendar year. If the Central GOA limit of 18,316 Chinook salmon is reached during 2013 or 2014, the additional catch of 2,400 Chinook salmon would account for less than a 13% increase in total Chinook PSC removed during each year of the EFP.

Considering the small proportion of GOA Chinook salmon PSC represented by this EFP compared to other sources of mortality and the amount taken in the groundfish fisheries, the EFP is not likely to have a discernible effect on mortality on individual salmon stocks over Alternative 1. The increased harvest of Chinook salmon from this EFP is not substantial in comparison with other known sources of salmon mortality, namely, the substantial commercial directed salmon fisheries from Alaska to Oregon,

recreational, subsistence fisheries, and for certain Chinook salmon stocks in Washington, Oregon and British Columbia, in-river hydro-electric and transportation barriers, agricultural, transportation and land use sources of mortality. In this context, removals of Chinook salmon by the pollock fishery is likely to be a small contributor to the overall, mortality, recruitment and exploitable stock size for most Chinook salmon stocks in the Pacific Northwest through the North Pacific coast. Because the levels of salmon bycatch under the EFP are such small amounts, and the harvest is dispersed over a substantial portion of the Central GOA and over different regional stocks and considering the short duration of the two, consecutive year studies, it is not likely there would be any discernible effects on the genetic structure of any Chinook salmon stocks. The EFP would only require the take of Chinook salmon over the 18,316 Central GOA Chinook salmon limit in the event that limit for the Central GOA was reached.

This EFP is under consideration, explicitly because it will contribute to the knowledge base for reducing Chinook salmon bycatch in the GOA. If this research allows for successful application of salmon excluders in the GOA, the potential effects on salmon stocks; commercial, recreational, and subsistence fishermen; salmon management; and conservation goals are likely to be beneficial. After refinement of a similar salmon excluder in the Bering Sea, these devices have been successful in allowing approximately 40% of the Chinook salmon to escape pollock trawl gear with no substantial loss of pollock. While it is not possible to project the salmon savings rate a fully developed excluder may produce in the GOA, the applicant has a record of innovating workable production versions of excluders in cooperation with the AFSC. The AFSC has expressed substantial support for this study, and has invested sampling design and technical support to increase the probability for future implementation of this technology. Thus in the long term, this EFP could contribute to a reduction in future Chinook salmon PSC in GOA pollock pelagic trawl fisheries to the net benefit of other competing uses and conservation of Chinook salmon**.**

Under Alternative 2, it is unlikely that a CWT from an ESA-listed ESU would be recovered during the EFP fishery because of the small number of salmon harvested in relation to the pollock fishery salmon bycatch and the very low rate of CWTs recovered in the GOA commercial pollock fishery. The previous ESA consultations for the BS salmon excluder EFP concluded that issuing that EFP was not likely to adversely affect ESA-listed Chinook salmon (Stelle 2011). The NMFS Alaska Region will consult with the NMFS Northwest Region under ESA section 7 on the effects to ESA-listed Chinook salmon from this proposed EFP.

If the research conducted with this EFP is successful, a production version of the salmon excluder could result in long-term reductions in the interception of Chinook salmon in the GOA trawl fisheries (see 1.4.6). Any future reduction in GOA trawl interception of ESA-listed Chinook salmon PSC is likely to be insignificant and not measurable given the likelihood that these salmon are a rare occurrence in the bycatch from GOA trawl fisheries.

4.4.3 Alternative 1 and Alternative 2 Effects on Halibut

The impacts of the PSC limits and the total halibut bycatch in the groundfish fisheries were analyzed in the Alaska Groundfish Harvest Specifications EIS (NMFS 2007b). The EIS examines the impacts of the fisheries on bycatch mortality, genetic structure, reproductive success, prey availability, and habitat. The EIS concludes that the impacts of the groundfish fisheries on prohibited species are reduced by existing management measures that mitigate adverse impacts to prohibited species. The IPHC takes account of the halibut bycatch in the groundfish fisheries when determining the fishery CEY. Groundfish fishery categories are closed to directed fishing when halibut PSC limits are taken. Bycatch of halibut in the GOA groundfish fisheries is not expected to interfere with sustainable management of halibut stocks.

The process used by the IPHC to specify the annual catch limit for the IFQ fishery considers removals of halibut by the trawl fishery. Because the annual amount of halibut PSC in the trawl fishery is limited by federal regulation, halibut mortality cannot be above biologically sustainable levels determined by the IPHC. Further, the IPHC adjusts catch in the IFQ program in accordance with other sources of halibut mortality such as trawl fishing.

In previous BSAI salmon excluder device testing, up to 12 mt of halibut was taken per season (NMFS 2011b). This was less than 1 percent of the combined groundfish and PSC catch. Because of the locations selected for this experiment in the GOA, and the low incidence of halibut bycatch in GOA pelagic trawl fisheries where pelagic nets are used in off-bottom mode consistently, the applicant anticipates a lower amount of bycatch, approximately 4.0 mt for halibut each year of the EFP. The entire halibut bycatch from the 2013 and 2014 study is unlikely to exceed 8.0 mt of halibut for the duration of the EPF. The annual 2012 apportionment of halibut in the GOA was 2,000 mt, however the 2013 apportionment of halibut bycatch to the GOA trawl fisheries will be adjusted by some additional adjustments for rationalization of rockfish fisheries. The final GOA halibut trawl apportionments will not be specified till December 2013, but for the purposes of this EA, the annual apportionment of GOA halibut is assumed to be approximately 1970 mt based on the estimated needs of the rockfish fisheries.

The applicant proposes, and this EA assumes that EFP fishing under this permit will be exempted from halibut PSC limits at § 679.21, and as specified in the GOA 2013 and 2014 annual harvest specifications. A catch of 4.0 mt of halibut for this EFP would represents approximately 0.2% of the annual trawl apportionment. The International Pacific Halibut Commission allocates approximately 10,850 mt of halibut to directed IFQ hook and line fisheries for Areas 2C, 3A, and 3B. The catch from this EFP would represent approximately 0.037% of the commercial hook and line directed fishery allocation. For purposes of estimating recruitment, the IPHC considers the halibut stock to be a single Pacific and North Pacific stock, with larval life stages distributed broadly throughout these areas. Thus, the alternatives considered in this analysis are not expected to change the catch of Pacific halibut in a manner that would impact the recruitment or abundance of this species. It is also likely that the catch of halibut under this action in combination with the trawl halibut limit is not likely to exceed the halibut PSC limits based on past trawl fishing practices that did not reach the PSC limits (NMFS Catch Accounting System, years 2011-2008, accessed 10/8/12). Therefore the effects of these alternatives are expected to be the same as those previously analyzed (NMFS 2007b and 2006a) and are not significant.

4.4.5 Cumulative Effects

A discussion of the cumulative effects of the groundfish fisheries is in the Alaska Groundfish Harvest Specifications EIS (NMFS 2007b). The past and current cumulative effects are discussed in the PSEIS (NMFS 2004b). Both of these discussions are incorporated by reference. The discussion in the analysis for Amendment 93 expands on other substantial anthropogenic sources of mortality for Chinook salmon in the Pacific Northwest, British Columbia, and Alaska (NMFS 2012b). For prohibited species, several future actions were identified as reasonably foreseeable future actions. These actions are described in section 3.2 of the Alaska Groundfish Harvest Specifications EIS. The reasonably foreseeable future actions that may impact prohibited species are—

- ecosystem-sensitive management;
- fisheries rationalization;
- traditional management tools;
- actions by other state, federal, and international agencies; and
- private actions.

The following reasonably foreseeable future actions may have a continuing, additive, and meaningful relationship to the direct and indirect effects of the alternatives on prohibited species. This analysis builds on the analysis of the impacts of each of these actions on prohibited species in section 7.3 of the Alaska Groundfish Harvest Specifications EIS (NMFS 2007b) and on the updates provided by the Supplemental Information Reports provided each year since the EIS publication (http://209.112.168.2/cm/analyses/).

Ecosystem approaches to management

As noted in section 3.3.1 of NMFS 2007b, an increased understanding of interactions between ecosystem components is reasonably foreseeable. Coupled with other reasonably foreseeable actions, increased integration of ecosystem considerations into fisheries decision-making, is likely to result in fishery management that reduces potential adverse impacts of the proposed action on prohibited species stocks.

Ecosystem research, and increasing attention to ecosystem issues, should lead to increased attention to the impact of fishing activity on non-target resource components, including prohibited species. This is likely to result in reduced adverse impacts. The North Pacific Groundfish Observer Program and Alaska Fisheries Science Center's Auke Bay Lab collection and analysis of salmon tissue samples will help identify the regions and natal streams of origin of by caught salmon, and help clarify the dimensions of the environmental impact.

Many efforts are underway to assess the relationship between oceanographic conditions, ocean mortality of salmon, and their maturation timing to their respective rivers of origin for spawning. It is unclear whether the observed changes in salmon bycatch in recent years is due to fluctuations in salmon abundance, or whether there is a greater degree of co-occurrence between salmon and pollock stocks as a result of changing oceanographic conditions. Pollock distribution has been shown to be affected by bottom temperatures, with densities occurring in areas where the bottom temperatures are greater than zero (Ianelli et al. 2008). Specific ocean temperature preferences for salmon species are poorly understood. Regime shifts and consequent changes in climate patterns in the North Pacific Ocean have been shown to correspond with changes in salmon production (Mantua et al. 1997). Anecdotal information suggests that Chinook salmon prefer different (warmer) ocean water temperatures than adult pollock. A study linking temperature and salmon bycatch rates was conducted and preliminary evidence indicates a relationship, even when factoring for month and area; Chinook salmon bycatch appeared to be also related to conditions for a given year, season, and location (Ianelli et al. 2010).

Some evidence exists for a contraction of ocean habitats for salmon species under global warming scenarios (Welch et al. 1998). Studies in the Pacific Northwest have found that juvenile survival is reduced when in-stream temperatures increase (Marine and Cech 2004, Crozier and Zabel 2006). A correlation between sea surface temperature and juvenile salmon survival rates in their early marine life has also been proposed (Mueter et al. 2002). The variability of salmon responses to climate changes is highly variable at small spatial scales, and among individual populations (Schindler et al. 2008). This diversity among salmon populations means that the uncertainty in predicting biological responses of salmon to climate change remains large, and the specific impacts of changing climate on salmon cannot be assessed. It is not expected that the effects of continued climate change on prohibited species will have effects beyond those already discussed in the Alaska Groundfish Final Programmatic Supplemental EIS (NMFS 2004b), the Alaska Groundfish Harvest Specifications EIS (NMFS 2007b), and the Amendment 93 Chinook salmon bycatch EA (NMFS 2012b).

Rationalization

The rationalization programs currently under consideration in both the BSAI and GOA will consider methods to reduce the incidental catch of prohibited species in the groundfish fisheries affected. Fisheries rationalization may allow for better incidental catch controls and monitoring in the groundfish fisheries. In all areas, rationalization programs may include individual or cooperative incidental catch accounts for PSC, which could encourage fishermen to reduce their incidental catch of prohibited species. To the extent rationalization improves fishing practices and reduces incidental catch, it would reduce the adverse effects on prohibited species.

Traditional management tools

Annual harvest specifications will continue to authorize annual and seasonal groundfish fishing activity and associated annual incidental catch of PSC species. The improvement of the Catch Accounting System has made it possible for NMFS to maintain more timely and accurate information regarding the incidental catch of prohibited species. This information can be used by NMFS and the industry to reduce incidental catch of prohibited species by tracking when and where it is occurring and react quickly to reduce the potential for additional incidental catch.

NMFS has published a proposed rule to restructure the Observer Program (April 18, 2012, 77 FR 23326) that, if approved, would also impact salmon PSC management and accounting. The proposed rule expands observer coverage in the GOA for pollock trawlers vessels. This extended coverage would improve the precision and accuracy of Chinook salmon bycatch estimates and assist with bycatch management implemented through Amendment 93. Implementation of the restructured Observer Program is scheduled for January 2013.

Actions by Other Federal, State, and International Agencies

The reasonable foreseeable future actions that will impact the range of stocks included in the GOA trawl bycatch depend substantially on the conservation and development actions taken by region of Chinook origin. The data provided in the Amendment 91 EIS (NMFS 2009a), and Amendment 93 EA (NMFS 2012b) provide substantial information on the reasonably foreseeable future actions that federal, state, local, and international jurisdictions may take, that could impact these Chinook salmon stocks. As previously noted, CWT and genetic information reveal that the areas of stock origin include Asia, Washington, Oregon, Idaho, British Columbia, and Alaska. Reasonably foreseeable future actions are noted by each of these broad areas.

For the stocks originating in the Pacific Northwest and British Columbia, habitat protection, salmon restoration, and continued growth of resource development actions that degrade salmon habitat; as well as regional commercial, and recreational and tribal fishery management actions are the most likely human activities to effect population size, recruitment, and mortality of the these stocks. The effects of major Pacific Northwest energy infrastructure projects, agriculture, and transportation projects on PNW salmon stocks have been well documented. Fishing and in some cases overfishing of commercial, recreational, tribal (first Nations) fisheries in the Pacific Northwest and British Columbia have been attributed directly to short term and long term decline of a number of Chinook stocks because of their level of regulated and unregulated effort exerted on Chinook salmon stocks as they approach regional fishing grounds in close proximity to natal streams. In comparison, the directed salmon commercial and recreational fisheries on those stocks that migrate through and graze in the distant water fisheries of Alaska are likely to provide a less significant influence on the mortality health of those stocks because of the low proportion of these distant stocks represented in the mixed stock Chinook salmon fisheries of Alaska. Progressing down the

scale of significant future actions, the continuation of trawl groundfish fisheries, considering the small scale of the bycatch and geographic diversity of stocks recorded in the CWT recoveries and limited genetic information available, are not likely to influence Chinook salmon stocks originating from these regions at levels that would impact individual populations or stocks.

For the stocks originating from Asia (through primarily artificial salmon propagation) the financial support and continuing national programs for ocean ranching in Japan and Russia, are likely to be the primary influence on the abundance and returns of those stocks along with the capability of those jurisdictions to manage their domestic salmon capture fisheries to sustain adequate escapement of coastal Chinook salmon broodstocks. The magnitude of the effect of exploitation of Asian Chinook stocks from directed salmon fisheries along the Alaska coast are unknown, however the migration patterns of these stocks pass through the Pacific and North Pacific, where Asian Chinook salmon are likely to be exposed to substantial sources of mortality. The bycatch of the stocks of Asian origin in the trawl fishery and from any future salmon excluder EFP is likely to have a negligible influence on the number of salmon returning to Asian commercial fisheries.

For Chinook salmon originating from salmon systems in Alaska, the predominant future actions that may impact the recruitment and mortality of these stocks are the continuation of effective State of Alaska management of the directed commercial, subsistence, and recreational fisheries. The ADF&G is responsible for managing commercial, subsistence, sport, and personal use salmon fisheries. The Alaska State Constitution, Article VII, Section 4, states that "Fish, forests, wildlife, grasslands, and all other replenishable resources belonging to the State shall be utilized, developed, and maintained on the sustained yield principle, subject to preferences among beneficial users." The EA for Amendment 93 provides a history of the State of Alaska commercial fishery management program that was developed by the Alaska State Board of Fisheries in subsequent State regulation (NMFS 2012b). That discussion in Chapter 4 "Escapement Goals and Stock of Concern Definitions," is incorporated by reference, and summarized as follows.

The first priority for management is to meet spawning escapement goals to sustain salmon resources for future generations. Highest priority use is for subsistence under both state and federal law. Surplus fish beyond escapement needs and subsistence use are made available for other uses. The Alaska Board of Fisheries adopts regulations through a public process to conserve fisheries resources and to allocate fisheries resources to the various users. Subsistence fisheries management includes coordination with U.S. Federal government agencies where federal rules apply under Alaska National Interest Lands Conservation Act. Subsistence salmon fisheries are an important culturally and greatly contribute to local economies. Commercial fisheries are also an important contributor to many local communities as well as supporting the subsistence lifestyle. While specific aspects of salmon fishery management continue to be modified, it is reasonably foreseeable that the current State management of the salmon fisheries will continue into the future.

Alaska coastal commercial and recreational fisheries are the primary source of removals for the Chinook salmon stocks managed by the State of Alaska. For example, total commercial catch of Chinook salmon is typically between 200,000 and 450,000 fish. The Southeast troll fishery includes annual Chinook salmon catches that are typically between 75,000 and 100,000 salmon. The annual recreational fishing harvest of Chinook salmon is typically between 125,000 fish, and 170,000 fish, annually, with Cook Inlet and adjacent watersheds contributing over half the catch (Volk and Josephson 2009, 2010). A reduction in Chinook salmon returns to Cook Inlet in 2012 prompted the Governor of the State of Alaska to declare a fishery disaster. Data are not currently available to estimate Alaska regional catch of Chinook salmon

for 2012, however the contribution of Cook Inlet to the State's commercial, recreational and subsistence harvest is likely to have declined for calendar year 2012.

The continued release of salmon fry into the ocean by domestic and foreign hatcheries is also expected to continue at similar levels. Hatchery production increases the numbers of salmon in the ocean beyond what is produced by the natural system, however some studies have suggested that efforts to increase salmon populations with hatcheries may have an impact on the body size of Pacific salmon (Holt et al. 2008). It is also likely that hatchery salmon compete with naturally occurring salmon for ocean resources. The overall effect of this competition is not known.

Continuation of the GOA pollock fishery is a likely forseeable activity, and the effects of that fishery are described in the Amendment 93 EA (NMFS 2012b). Amendment 93 EA lists selected escapement, catch and management of Chinook salmon and changes to the management of the GOA pollock fishery. Analysis of any new management measures for the pollock fleet would consider the impacts of adding those new measures to the existing suite of management measure for the pollock fleet and analyzing those impacts on prohibited species.

Resource development in Alaska could also have a significant impact on some selected salmon stocks and fisheries. Federal and State of Alaska permits for hydro-electric power, mining, and oil and gas exploration and extraction are under review. The potential exists for additional development of these resources near the action area for this EFP and in areas adjacent to Chinook salmon habitat. In Southeast Alaska, logging activities have historically been associated with impacts to riparian habitat, resulting in stream buffer zones on federally managed lands. Future timber development is a potential activity that is likely to continue at some level in this region.

BOEMRE expects that reasonably foreseeable future activities include development of oil and gas deposits over the next 15 to 20 years in federal waters off Alaska. Potential environmental risks from the development of offshore drilling include the impacts of increased vessel offshore oil spills, drilling discharges, offshore construction activities, and seismic surveys. Adverse environmental impacts resulting from exploration and development in the future could impact salmon and halibut stocks. The extent to which these impacts may occur is unknown.

The IPHC will continue to manage halibut and conduct annual projects for stock assessments and basic halibut biology. These continued activities will improve the information available for halibut management. In addition, the IPHC implemented a maximum length limit restriction on charter vessel anglers in Area 2C (Southeast Alaska) for the 2011 fishery. The IPHC determined that without additional regulations restricting charter harvest in 2011, charter harvest was likely to exceed the guideline harvest level (GHL) and result in total harvest exceeding the total CEY. Guided charter angler catch in 2010 was 62 percent over the GHL. The IPHC determined that limiting charter harvests in Area 2C to one fish of no more than 37 inches would be likely to maintain charter harvests within the GHL in 2011.

Private sector actions

Many of the relevant reasonable foreseeable future actions that have been previously listed for governmental jurisdictions of Washington, Oregon, Idaho, British Columbia, and Asia stocks of Chinook salmon also have a private sector component. Likewise, most of these species support directed fisheries that will continue. Ongoing economic development of coastal Alaska, and increasing levels of marine transportation activity may interact adversely with PSC species. Development that may impact coastal

and riverine spawning habitat may have the greatest potential for affecting salmon. However, development in Alaska remains small compared to development in other coastal states.

Fishing activity will continue in future years as constrained by fishing regulations and the ABCs and TACs set by the Council in each year. This fishing activity is expected to result in annual incidental catch of prohibited species, subject to the FMPs and regulatory measures that constrain groundfish fishery PSC. The Marine Stewardship Council's certification of the pollock fishery may add to pollock industry incentives to minimize Chinook salmon bycatch. Additionally, the current development and future use of salmon excluder devices for trawl vessels may result in decreases of Chinook salmon incidental catch in the GOA pollock trawl fishery.

Increasing economic activity in and off the coast of Alaska may affect future fisheries. The high levels of traffic between the West coast of the United States and East Asia raise concerns about pollution incidents or the introduction of invasive species from ballast water. Pollution issues were highlighted in December 2004 when the M/V *Selendang Ayu* wrecked on Unalaska Island and again in July 2006 with the M/V *Cougar Ace* accident. Salmon stocks may also be affected by onshore mining activities, to the extent that pollutants or contaminants from those operations may affect salmon spawning streams.

Alaskan economic development can affect the coastal zone and the species that depend on the zone. However, Alaska remains relatively lightly developed compared to other states in the nation. Marine transportation associated with that development may be more of a concern than in other states, due to the relatively greater importance of marine transportation to Alaska's economy.

4.4.6 Summary of Effects

There are incidental catch of salmon and halibut in the Central GOA district. Under both of the alternatives salmon and halibut PSC will continue to occur in the GOA and small amounts of mortality of salmon and very small amounts of halibut mortality would occur under the EFP. Any mortality to prohibited species under Alternative 2 would result in a small impact compared to the fisheries Alternative 1; however, reducing mortality to salmon with the use of a salmon excluder device could be beneficial compared to the status quo.

The amounts of salmon and halibut expected to be taken under Alternative 2 is not a substantial increase over PSC amounts experienced in the commercial pollock fishery. Because the pelagic trawl fleet typically is careful to not approach the GOA halibut PSC limit, halibut harvested under both alternatives is expected to remain below the halibut PSC limit in the GOA trawl fisheries. The additional harvest of salmon under Alternative 2 in combination with the harvests in the pollock fishery is expected to be within the PSC limits for Chinook salmon. **For these reasons, the direct, indirect and cumulative impacts to salmon and halibut are predicted to be not significant for these species under Alternatives 1 and 2.**

4.5 Status of Marine Mammal Populations

A number of concerns may be related to marine mammals and potential impacts of fishing. For individual species, these concerns include—

- listing as endangered or threatened or considered a candidate species under the ESA;
- protection under the Marine Mammal Protection Act (MMPA);

- declining populations in a manner of concern to state or federal agencies;
- being vulnerable to direct or indirect adverse effects from some fishing activities.

Marine mammals have been given various levels of protection under the current FMPs of the Council, 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 2007b) and the Amendment 93 EA/RIR/IRFA (NMFS 2012b) provide the most recent status information on marine mammals that may be impacted by the action. The status descriptions in that EIS and EA are incorporated here by reference.

The GOA supports one of the richest assemblages of marine mammals in the world. Twenty-five species are present from the orders Pinnipedia (seals, sea lion, and walrus), Carnivora (sea otter), and Cetacea (whales, dolphins, and porpoises). Marine mammals occur in diverse habitats, including deep oceanic waters, the continental slope, and the continental shelf (Lowry et al. 1982). Marine mammals that are likely to occur in the action area and their status under the ESA are listed in Table 4.6.

The most recent published stock assessments for marine mammals occurring in the GOA is available in the 2011 Marine Mammal Stock Assessment Reports (SARs) (Allen and Angliss 2012, available from http://www.nmfs.noaa.gov/pr/pdfs/sars/ak2011.pdf). Reported mean estimates of fisheries take for each of the species found in the action area are from the updated and draft version of this document at, http://www.nmfs.noaa.gov/pr/sars/draft.htm

All of the species listed in Table 4.6 are managed by NMFS, with the exception of Northern sea otters, which are managed by the United States Fish and Wildlife Service (USFWS). ESA Section 7 consultations with respect to the actions of the federal Alaska 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; NMFS 2010a).

Table 4.6 Marine mammals likely to occur in the action area.

	Species	Stocks
NMFS Managed Species		
Pinnipedia	Steller sea lion[1]	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
	Humpback whale	Western North Pacific, Central North Pacific
	Fin whale	Northeast Pacific
	Minke whale	Alaska
	North Pacific right whale[2]	North Pacific
USFWS Managed Species		
Mustelidae	Northern sea otter[3]	Southeast Alaska, Southcentral Alaska, Southwest Alaska

Source: Allen and Angliss 2011.
[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

In 2006, NMFS reinitiated a FMP-level Section 7 consultation on the effects of the groundfish fisheries on ESA-listed species under NMFS jurisdiction, (including Steller sea lions, humpback whales, fin whales, and sperm whales) to consider new information on these species and their interactions with the fisheries (NMFS 2006a). The resulting 2010 Biological Opinion found that the groundfish fisheries were not likely to jeopardize the continued existence of humpback, fin, or sperm whales.

GOA pollock fishery was also one of the groundfish fisheries that has been evaluated for potential effects on ESA-listed species of Pinniped and Carnivora stocks (see Table 4.7, including Steller sea lions, Harbor seals, Ribbon seals, and Northern sea otters), and Cetacea stocks (Table 4.8).

Table 4.7 Status of Pinniped and Carnivora Stocks Potentially Affected by the GOA Pollock Fishery.

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.
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 2012
Northern fur seal pup data available from http://www.alaskafisheries.noaa.gov/newsreleases/2007/fursealpups020207.htm.

Table 4.8 Status of Cetacea Stocks Potentially Affected by the GOA Pollock Fishery.

Cetacea species and stock	*Status under the ESA*	*Status under the MMPA*	*Population Trends*	*Distribution in action area (Some updates needed in this column)*
Killer whale – AT1 Transient; Eastern North Pacific transient, GOA, AI, and BS transient; West Coast transient; Eastern North Pacific Alaska Resident, and Southern Resident	Southern Resident: Endangered. Remaining Stocks: none	AT1 Transient ,– Depleted & a strategic stock Southern Resident: Depleted	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 residents have declined by more than half since 1960s and 1970s.	Transient-type killer whales from the Aleutian Islands and Bering Sea are considered to be part of a single population that includes Gulf of Alaska transients. Killer whales are seen in the northern Bering Sea and Beaufort Sea, but little is known about these whales. Southern Resident killer whales do not occur in BSAI.
Dall's porpoise – Alaska	None	None	Reliable data on population trends are unavailable.	Found in the offshore waters from coastal western Alaska to Bering Sea.
Harbor porpoise – Bering Sea	None	Strategic	Reliable data on population trends are unavailable	Primarily in coastal waters, usually less than 100 m.
Humpback whale – Western North Pacific 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 Alaskan waters and may mingle in the North Pacific feeding area. Humpback whales in the Bering Sea (Moore et al. 2002) cannot be conclusively identified as belonging to the western or Central North Pacific stocks, or to a separate, unnamed stock.
North Pacific right whale Eastern North Pacific	Endangered	Depleted & a strategic stock	Abundance not known, but 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 BSAI (Brownell et al. 2001). Critical habitat near Kodiak Island in the GOA
Baird's, Cuvier's & Stejneger's beaked whale	None	None	Reliable data on population trends are unavailable.	Occur throughout the GOA.
Pacific white-sided dolphin	None	None	Reliable data on population trends are unavailable.	Found throughout 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 Bering Sea and coastal waters of the Aleutian Islands and Alaska Peninsula. Most sightings in the central-eastern Bering Sea occur in a high productivity zone on the shelf break.
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.
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. Males inhabit Bering Sea in summer.
Beluga Whale – Cook Inlet	Cook Inlet: Endangered. Remaining Stocks: None	Cook Inlet: Depleted & a strategic stock	Abundance estimate is 3,710 animals and population trend is not declining for the eastern Chukchi Sea stock. Minimum population estimate for the eastern Bering Sea stock is 14,898 animals and population trend is unknown. The minimum population estimate for the Bristol Bay stock is 2,467 animals and the population trend is stable and may be increasing. Cook Inlet 2008 abundance estimate of 375 whales is unchanged from 2007. Trend from 1999 to 2008 is not significantly different from zero.	Summer in the Arctic Ocean and Bering Sea coastal waters, and winter in the Bering Sea in offshore waters associated with pack ice. Cook Inlet belugas do not occur in BSAI.

Source: Allen and Angliss 2012

The 2010 Biological Opinion found that authorization of the Alaska groundfish fisheries could not ensure that they were not likely to cause jeopardy of continued existence or adverse modification or destruction of critical habitat (JAM) for the Western Distinct Population Segment (WDPS) of Steller sea lions. A reasonable and prudent alternative (RPA) was included in the 2010 Biological Opinion which changed the groundfish fishery management primarily in the Aleutian Islands where Steller sea lion numbers are declining (NMFS 2010b). These protection measures were implemented 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 which continue to temporally and spatially disperse the harvest of Steller sea lion prey species (pollock, Atka mackerel, and Pacific cod) in the GOA. Incidental take statements for Steller sea lions, humpback whales, fin whales, and sperm whales were completed on February 10, 2011 (Balsiger 2011b).

The PSEIS (NMFS 2004) describes the range, habitat, and diet for marine mammals. The most recent marine mammal SARs for nearly all marine mammals occurring in the GOA were completed for 2011 (Allen and Angliss 2012). The SARs provide the most recent information on abundance, population, status, and human caused injury and mortality for marine mammal stocks. The USFWS has management authority for sea otters and walrus. The stock assessment for walrus was last revised on January 1, 2010, and stock assessments for sea otters were last revised in 2008 (USFWS 2011). This information is incorporated by reference. The Alaska Groundfish Harvest Specifications EIS also provides recent information on the effects of the groundfish fisheries on marine mammals including a detailed description

of the history of ESA Section 7 consultations (Section 8.2 of NMFS 2007b). For the GOA, ESA Section 7 consultation has been completed for all ESA-listed marine mammals.

Steller sea lion inhabit many of the shoreline areas of the GOA, using these habitats as seasonal rookeries and year-round haulouts. Steller sea lion have 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 WDPS, was listed as endangered on May 5, 1997 (62 FR 30772), while the eastern distinct population segment remains listed as threatened. NMFS issued a proposed rule to remove the eastern distinct population segment from the List of Endangered and Threatened Wildlife on April 18, 2012 (77 FR 23209). The WDPS 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 WDPS 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 (see Appendix A of NMFS 2001a),, NMFS 2003). A detailed analysis of the effects of these protection measures is provided in the Steller Sea Lion Protection Measures Final Supplemental EIS (NMFS 2001b).

A detailed discussion of Steller sea lion population trends in the GOA is included in the most recent Biological Opinion (NMFS 2010a) and is summarized here. Based on non-pup counts of Steller sea lions on trend sites throughout the range of the WDPS in the GOA and Aleutian Islands, the overall population trend for the WDPS 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). A pup and non-pup counts in the Western Aleutian Islands continues to decrease from previous counts in 2008 and 2010. In contrast, nonpup counts in the Central GOA are stable between 2000 and 2010 (Demaster 2012a).

As previously noted, the 2010 Biological Opinion evaluated the effects of federal groundfish fisheries in the exclusive economic zone EEZ of Alaska as a whole on the WDPS of Steller sea lions (NMFS 2010c). It concluded that the existing Central GOA SSL protection measures, made up of closed areas, seasonal TAC apportionments, and other restrictions were unlikely to adversely affect Steller sea lions in the GOA. In addition, the EA for Amendment 93 included an extensive evaluation of the effects of Chinook salmon bycatch in the pollock fishery of the Gulf of Alaska over several years, including some years when the Central GOA pollock fishery caught more than ten times the amount of Chinook salmon than the upper limit amount of 2,400 Chinook salmon requested for this EFP. The EA for Amendment 93 also examined effects of salmon bycatch on ESA-listed species in the GOA including Steller sea lion.

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 (73 FR 62919, October 22, 2008). In 2012, NMFS estimated the Cook Inlet beluga whale population to be 315 individuals (Allen and Angliss 2012). Historical abundance is estimated at approximately 1,300 whales (NMFS 2008b). 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).

The DPS of Southern Resident killer whales was listed as endangered under the ESA on November 18, 2005 (70 FR 69903). Southern Resident killer whales range from the Queen Charlotte Islands to Central California. The population declined from historical abundance estimates of 140 to200 whales in the 1960s and 1970s to fewer than 90 whales in recent years. A 5-year status review was completed in 2010 (FORD 2010). Numerous factors have likely caused the decline, including a reduction in availability of preferred prey. 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, the diet of Southern Resident Killer Whales consists of 82% Chinook salmon during May through September (Hanson et al. 2010). Stock of origin investigations have found that Southern Resident Killer Whales forage on Chinook salmon from the Fraser River, Puget Sound runs, and other Washington and Oregon runs. There have been recent observational reports of Southern Resident Killer Whales 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 Southern Resident Killer Whales. In 2009, NMFS released a Biological Opinion that evaluates the effects of the ocean salmon fisheries off Washington, Oregon, and California on Southern Resident Killer Whales, and found that the proposed action is not causing jeopardy or adverse modification (NMFS 2009c). 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 Southern Resident Killer Whales, which may have implications for salmon fisheries and other activities that affect Chinook salmon abundance.

4.6 Effects on Marine Mammals

The Alaska Groundfish Harvest Specifications EIS provides information on the effects of the groundfish fisheries on marine mammals (NMFS 2007b) and is incorporated by reference. Direct and indirect interactions between marine mammals and groundfish harvest activity may occur due to overlap of groundfish fishery activities and marine mammal habitat. These interactions also occur due to overlap in the size and species of fish harvested in the groundfish fisheries that are also important marine mammal prey, and due to temporal and spatial overlap in marine mammal foraging and commercial fishing activities. Fishing activities may either directly take marine mammals through injury, death, or disturbance, or indirectly affect these animals by removing prey important for growth and nutrition or cause sufficient disturbance that marine mammals avoid or abandon important habitat. Fishing also may result in loss or discard of equipment such as fishing nets and line that may ultimately entangle marine mammals causing injury or death.

This discussion focuses on those marine mammals that may interact with or be affected by the pollock pelagic trawl fishery in the GOA. These species are listed in Table 4.7 and 4.8. Steller sea lions, resident killer whales, beluga whales, and northern fur seals are the only marine mammals that may compete with the pollock fishery for prey. The Southern resident killer whale 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. Marine mammals species listed in Table 4.10 are taken incidentally in the GOA pollock trawl fisheries.

Table 4.9 contains the significance criteria for analyzing the effects of the proposed action on marine mammals. These criteria are from the EA for the Bering Sea EFP (NMFS 2010d). 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. That EA provided the latest ideas on determining the significance of effects on marine mammals based on similar information that is available for this EA. The first criterion under the prey species column and the third criterion under the disturbance column in the table address impacts on prey species by both harvesting and potential impacts on the habitat that support prey species. 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 hook-and-line gear. In this example, the prey availability is enhanced for these animals because they need less energy for foraging.

Table 4.9 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.

4.6.1 Incidental Takes

Potential take in the groundfish fisheries is well below the potential biological removal (PBR) for all marine mammals. This means that predicted take would be below the maximum number of animals that may be removed from a marine mammal stock while allowing that stock to reach or maintain its optimum sustainable population.

Table 4.10 provides the marine mammals taken in the GOA pollock fishery as published in the List of Fisheries for 2012. Table 4.11 provides more detail on the levels of take based on the most recent SAR (Allen and Angliss 2012) based on 2007 through 2009 data. The GOA pollock fishery is a Category III fishery because it has annual mortality and serious injury of a marine mammal stock less than or equal to 1 percent of the PBR level (76 FR 73912, November 29, 2011).

Table 4.10 Category III GOA Pollock Fishery with documented marine mammal takes from the List of Fisheries for 2012 (76 FR 73912, November 29, 2011).

Fishery Category III	Marine Mammal Stocks Taken
GOA pollock trawl	Fin Whale, Northeast Pacific Northern elephant seal, North Pacific Steller sea lion, Western U.S.

Based on the most recent information, under Alternatives 1 and 2, the potential incidental take of marine mammals are limited to the species taken by the GOA pollock trawl fishery listed in Table 4.11. Animals that may be taken by the GOA pollock trawl fishery are Steller sea lions, fin whales, and northern elephant seal (Allen and Angliss 2012; 2012 List of Fisheries, 76 FR 73912, November 29, 2011). The estimated mean annual mortality for Steller sea lions and fin whales in the SARs is based on 2007 through 2009 data. Data from 2000 to 2004 was used for the northern elephant seal SAR which is available from http://www.nmfs.noaa.gov/pr/pdfs/sars/po2007sene-ca.pdf.

Table 4.11 Estimated mean annual mortality of marine mammals from observed GOA pollock fishery compared to the total mean annual human-caused mortality and potential biological removal.

Marine Mammal	Mean annual mortality, from GOA pollock fishery	Total mean annual human-caused mortality *	PBR
**Steller sea lions (western)	0	232	275
**Fin whale Northeast Pacific	0	0.5	11.4
***Northern elephant seal	0	9	4,382

Mean annual mortality, expressed in number of animals, includes both incidental takes and entanglements, as data are available, and averaged over several years of data. Years chosen vary by species (Allen and Angliss 2012).
* Does not include research mortality. Other human-caused mortality is predominantly subsistence harvests for sea lions.
** ESA-listed stock

All of the incidental takes are rare and very small numbers in comparison to the total mean annual human caused mortality and/or in comparison to the PBR. The additional pollock fishing under the EFP is not likely to result in discernable additional interaction with marine mammals because the quantity of pollock is small, in relation to the commercial pollock fishery and the harvest is by no more than two vessels in the same locations where pollock fishing already occurs. The EFP vessel will be required to comply with most Steller sea lion protection measures, including all area closures, reducing the potential for interaction with this species. Therefore, under Alternative 2, no discernable effect on the amount of incidental takes of marine mammals is expected beyond the effects of the status quo fishery.

4.6.2 Harvest of Prey Species

The Alaska Groundfish Harvest Specifications EIS determined that competition for key prey species under the status quo fishery is not likely to constrain foraging success of marine mammal species or cause population declines (NMFS 2007b). The exceptions to this are the Steller sea lions, beluga whales and resident killer whales for which potential prey competition with the groundfish fisheries may occur. These species depend on pollock and salmon prey species (NMFS 2007b).

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 (baleen whales) are less likely to be impacted than those that eat primarily pollock and salmon, such as northern fur seals. Resident killer whales and beluga whales have shown a preference for Chinook salmon (Salveson 2009 and NMFS 2008d). Table 4.12 shows the GOA marine mammal species and their prey species that may be impacted by the GOA pollock fishery. Pollock and salmon prey are in bold.

Table 4.12 Prey species used by GOA marine mammals that may be impacted by the GOA pollock fishery

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**)
Minke whale	Pelagic schooling fish (including herring and **pollock**)
Beluga whale	Wide variety of invertebrates and fish including **salmon and pollock**
Resident Killer whale	herring, halibut, **salmon**, and cod.
Ribbon seal	Cod, **pollock**, capelin, eelpout, sculpin, flatfish, crustaceans, and cephalopods.
Northern fur seal	**Pollock**, squid, herring, **salmon**, capelin
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: NMFS 2011b, NMFS 2004b; NMFS 2007b; Nemoto 1959; Tomilin 1957; Lowry et al. 1980; and http://www.adfg.state.ak.us/pubs/notebook/marine/orca.php

Alternative 1 and 2: Pollock as prey for marine mammals

To evaluate potential effects of the proposed EFP on Steller sea lions, NMFS draws from the discussion in the 2010 Biological Opinion for the effects of the Alaska groundfish fisheries on ESA-listed species, including the WDPS of Steller sea lions (NMFS 2010b) and the EA in support of Amendment 93 (NMFS 2012b) (establishing GOA Chinook salmon PSC limits). These documents provide current information on the effects of the Central GOA pollock fishery on the environment, marine mammals and other ESA-listed species.

The 2010 Biological Opinion evaluated the effects of federal groundfish fisheries in the EEZ of Alaska as a whole on the WDPS of Steller sea lions, as well as the recommended RPAs, that have been implemented since 2011(75 FR 77535, December 13, 2010). The groundfish fisheries as managed with the Steller sea lion protection measures is Alternative 1 in this EA. Pollock is a recognized prey item for Steller Sea lions in the Central GOA according to the 2010 Biological Opinion. The Biological Opinion concluded that the existing Central GOA SSL protection measures, made up of closed areas, seasonal TAC apportionments, pollock trip limits and other restrictions were not likely to result in JAM for the WDPS of Steller sea lions (NMFS 2010b). The RPA did not change the Steller sea lion protection measures implemented in the GOA since 2004 (69 FR 75865, December 20, 2004). In addition, the EA for Amendment 93 (NMFS 2012b) provides important analysis on the aggregate effect of all groundfish removal in the GOA trawl fishery over several years, including context from all of the other sources of fishing and non-fishing mortality on Steller sea lion prey species in the Central GOA. The 2010 Biological Opinion's review of existing measures in the GOA focuses on the current set of closed areas, TAC setting process, and safeguards built into the TAC setting process for reducing exploitation rates if prey species stocks fall below the biomass set equal to 20% (B_{20}) threshold. The GOA pollock stock level has not decreased to B_{20} and therefore the pollock fishery has not been closed based on this threshold. Considering that (1) pollock are one of several prey species for Steller sea lions, (2) increasing populations of Steller sea lions in the GOA , the current regulations for managing trawl catch of pollock

and salmon PSC was assessed to not be likely to result in JAM for the WDPS of Steller sea lions and their critical habitat.

Because the harvest would be conducted with one to two vessels, over several seasons, outside of protection areas for Steller sea lions (Figure 1.2 and 1.3), it is unlikely the pollock harvest under Alternative 2 would have any discernable effect on prey availability for marine mammals dependent on pollock. This is because the EFP fishing will spread evenly between winter/spring and fall of 2013 and 2014, amounting to several weeks in each season. For this reason, the EFP fishing is unlikely to have any discernable effect independently or in combination with the regular pollock fishery or result in population level effect on marine mammals that are also dependent on pollock as a prey species.

Steller sea lions pollock prey is protected by the Steller sea lion protection measures implemented for the GOA pollock fishery. These closures are likely to also protect foraging locations for harbor seals and sea otters which occur in the near shore areas that are closed to pollock harvests and in some cases groundfish harvest out to 3 nm around rookeries. The baleen whales and ribbon seals have a varied diet and are not likely to be dependent on pollock to a level that the groundfish harvest would impact prey availability for baleen whales. Beluga whales do not leave Cook Inlet and therefore are not likely dependent on the pollock harvested outside of Cook Inlet in the GOA pollock fishery.

Pollock prey occurrence in northern fur seal stomachs from the GOA showed that pollock was a very small portion of the prey species detected, which were mostly Pacific herring, capelin, and sand lance (NMFS 2007d). Even though pollock is an important overall prey species for the wide ranging northern fur seal, it is not likely that pollock in the GOA is as important to northern fur seals in the GOA as it is in the Bering Sea. The northern fur seal diet in the GOA appears to be mostly other small schooling fish. Therefore, the GOA pollock fishery is not likely to have a population level effect on northern fur seals based on prey competition.

Impacts of Alternatives 1 and 2 on Steller sea lion prey

Under Alternative 1, extensive closures to directed fishing for pollock are in place for Steller sea lions including 3 nm no transit zones near rookeries and closures of critical habitat around rookeries and haulouts. These area closures also would apply under Alternative 2.

The harvest of pollock in the GOA is temporally dispersed into four seasons (§ 679.23). Based on the 2010 Biop, these harvest restrictions on the pollock fishery decrease the likelihood of disturbance, incidental take, and competition for prey to ensure the groundfish fisheries are not likely to jeopardize the continued existence or adversely modify the designated critical habitat of Steller sea lions (NMFS 2010a).

Under Alternative 2, the proposed EFP would allow harvests of pollock that would represent a small portion of the 2013 and 2014 estimated biomass. For Steller sea lions, the amount of EFP groundfish harvest (96% of which is expected to be pollock) by the two EFP vessels operating in each of the two EFP field seasons in 2013 and 2014 is limited to 2,400 mt for each year[5]. To put that amount of catch into context, it is important to recognize that the Central GOA Pollock biomass was estimated to be greater than 650,000 mt in the 2011–2012 pollock stock assessment. Additionally, the recommended OFL for that same time period was approximately 155,402 in 2013. Therefore, the EFP would result in

[5] The EFP applicant requests that EFP fishing be allowed in any of the four GOA pollock seasons in 2013 and 2014. The applicant anticipates that most if not all of the EFP trips will occur during the A, B and D seasons.

pollock removals of approximately 0.3% of the total Central GOA pollock biomass and approximately 1.5% of the GOA pollock OFL. Because these amounts of pollock are small in comparison with the available resource, the EFP independently or in combination with the pollock fishery is not likely to have an effect on the overall availability of pollock to marine mammals, including Steller sea lions.

Because the harvest would be conducted with one to two vessels, over several seasons, outside of protection areas for Steller sea lions (Figure 1.2 and 1.3), it is unlikely the pollock harvest under Alternative 2 would have any discernable effect on prey availability for marine mammals dependent on pollock. This is because the EFP fishing will spread out between the A, B and D pollock seasons of 2013 and 2014, amounting to several weeks in each season. For this reason, the EFP fishing is unlikely to have any discernable effect independently or in combination with the regular pollock fishery, which the 2010 Biological Opinion concluded did not require further restrictions beyond the TAC setting, seasonal apportionments, and closed area measures already in place to protect Steller sea lions (NMFS 2010b).

Alternative 2 does not request an exemption from areas that are closed to protect Steller sea lions, and most other aspects of the Steller sea lion regulations; and is unlikely to have any implications on whether the pollock stock in the GOA will dip down to the stock biomass threshold set equal to 20% (B_{20}), which would close the directed pollock fishery. In fact, based on the last three stock assessments, GOA pollock stocks are increasing in abundance (Dorn et al. 2011).

One Steller sea lion protection measure that would be included in the exemptions under the EFP is the pollock trip limit. Pollock trip limits established at 50 CFR 679 would directly interfere with the sampling protocol for the EFP, because of the likelihood that any individual trip may exceed 136 mt, particularly if a vessel has already completed one haul, and has one or more partially filled RSW tanks.

The trip limits established in 2009 were necessary to eliminate a loophole in GOA groundfish regulations that allowed over 240 individual events of exceeding the maximum amount of groundfish that many vessels operating in the GOA could deliver to a processor in a day. The concern expressed in the final trip limit rule was that large removals of pollock in a relative short period of time may contribute to a temporary decline in pollock availability to some life stages of Steller sea lions. In 2009, NMFS approved the GOA pollock trawl trip limit to (among other goals) to temporally disperse pollock fishing in the GOA (74 FR 18156, April 21, 2009).

Over the duration of the proposed EFP, an exemption from groundfish trip limits will allow the participants to exceed the daily 136 mt pollock trip limit. The maximum size of the groundfish delivery from any individual trip may approach the RSW tank capacity of the largest vessel. This could include as much as 500 mt of groundfish for a single trip. Given the total allocated pollock for this EFP will be 2,400 mt, it is anticipated that only a few individual occurrences of landings may exceed 136 mt. Thus, this exemption will not interfere with the original objectives of the trip limit, which has likely prevented a number of times that the limit of 136 mt of pollock would have been exceeded since the implementation of trip limits. Thus, it is unlikely that this exemption would have any discernable effect on pollock prey distribution or availability for Steller sea lions or other marine mammals that use pollock as a food source.

Given the above analysis, the proposed EFP is unlikely to result in measurable effects on the WDPS of Steller sea lions. This conclusion is based primarily on:
1. the small scale of EFP catches relative to the much larger removals analyzed in the biological opinion and EA referred to above.
2. the pollock stock in the GOA is not overfished, and is managed in a conservative manner.

3. EFP removals in addition to the regular pollock fishery add up to a small fraction of pollock biomass and ABC.
4. EFP fishing will not occur in Central GOA Steller sea lion protection areas.
5. The one exemption with a direct link to SSL protection measures would not impede the effectiveness of the trip limit as a constraint to frequent large deliveries.

Sea lions eat salmon primarily in May and where salmon congregate for migration based on food availability and run timing for access to spawning grounds. Alternative 2 will be taking a limited amount of salmon that will not likely affect salmon prey availability for Steller sea lions. EFP fishing would be conducted outside of protection areas, and the salmon harvest would be limited to one to two vessels over a large area, and dispersed over a period of up to four seasons in 2013 and four seasons in 2014.

Impacts of Alternatives 1 and 2 on Cook Inlet beluga whale prey

Cook Inlet belugas are opportunistic feeders and prey on a wide variety of animals,[6] focusing on specific species when they are seasonally abundant. Eulachon (locally referred to as hooligan or candlefish) is an important early spring food resource for beluga whales in Upper Cook Inlet, as evidenced by the stomach content analysis (NMFS 2008e). In the summer, as eulachon runs begin to diminish, belugas rely heavily on several species of salmon as a primary prey resource (NMFS 2010d). In the fall, as anadromous fish runs begin to decline, belugas again return to consume the fish species found in nearshore bays and estuaries. This includes cod species observed in the spring diet as well as other bottom-dwellers such as Pacific staghorn sculpin, and flatfishes such as starry flounder and yellowfin sole.

The groundfish fisheries directly harvest and incidentally catch several species that are 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 (NMFS 2008e), 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.

Even though the GOA pollock fishery takes Cook Inlet salmon as PSC, it is not likely that the number of salmon taken under Alternative 1 would have a measurable effect on Cook Inlet beluga whales. NMFS completed informal ESA Section 7 consultations on the effects of the groundfish fisheries and Amendment 93 to the GOA FMP on Cook Inlet beluga whales and their critical habitat and determined that the incidental harvest of Chinook salmon in the groundfish fisheries was not likely to adversely affect Cook Inlet beluga whales or their critical habitat (Brix 2010). Based on the data available for salmon bycatch, the potential amount of Cook Inlet Chinook salmon or chum salmon harvested in the BSAI and

[6] Stomach content analyses have shown that Cook Inlet belugas eat octopus, squid, crabs, shrimp, clams, mussels, snails, sandworms, polychaetes, and various fish such as cod, herring, smelt (such as capelin and eulachon), flounder, sole, sculpin, pollock, lamprey, lingcod and salmon (NMFS 2008e).

GOA is likely small, and there is not likely to be a measurable direct effect to prey otherwise available to the Cook Inlet beluga whales. For these reasons, the anticipated reduction in salmon associated with the Alaska groundfish fisheries and proposed Amendment 93 would result in an insignificant reduction in prey resources provided by critical habitat for Cook Inlet beluga whales. Under Amendment 91 and under Amendment 93, salmon bycatch management in the groundfish fisheries is likely to reduce potential effects on salmon availability to beluga whales by restricting the level of Chinook salmon bycatch in years of high salmon occurrence.

Under Alternative 2, the maximum allowable catch of salmon from this EFP would be 2,400 salmon for each year in 2013 and 2014, which represents approximately 12 % of the Central GOA Chinook salmon annual limit implemented under Amendment 93. The amount of Chinook salmon taken in the groundfish fisheries is not likely to have a discernable effect on mortality of individual salmon stocks because data are not available at the individual stock level. Salmon bycatch in the Alaska groundfish fisheries is dispersed over area and over different regional stocks; therefore, it is not likely there would be any discernable effects on the genetic structure of any Chinook salmon stocks. In addition, the salmon potentially caught from Cook Inlet would be distributed in the inlet over space and time as they return to their natal streams. Because the Chinook salmon that may be taken under this EFP are likely a small proportion of overall Cook Inlet Chinook salmon returns, it is not likely that the Chinook salmon caught under the EFP would have a measurable effect on the availability of Chinook salmon prey to Cook Inlet beluga whales.

ESA section 7 consultations on the effects of issuing the EFP on Cook Inlet Beluga whales and their critical habitat will be initiated and completed before the issuance of this EFP.

Alternatives 1 and 2 impacts on Southern Resident Killer Whale Prey

Chinook salmon PSC 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 from the status quo GOA groundfish fishery under Alternative 1 or under Alternative 2. In January 2012, the NMFS Alaska Region requested that the NMFS Northwest Region consult on the effects of the Alaska groundfish fisheries and Amendment 93 to the GOA FMP on Southern Resident Killer Whales (Balsiger 2011). In February 2012, the NMFS Regional Administrator for the Northwest Region concurred with the Alaska Regional Administrator's conclusion that the Alaska groundfish fisheries and Amendment 93 may affect, but are not likely to adversely affect, the Southern Resident killer whale distinct population segment (Stelle 2012).

The Northwest Regional Administrator noted that any effect on the Southern Resident killer whales from the status quo groundfish fisheries were limited to indirect effects on prey availability. The Alaska groundfish fisheries and Amendment 93 were not likely to adversely affect Southern Resident killer whales because based on the best available information, minimal impacts are likely on some portion of Chinook salmon, which might otherwise be potential prey for Southern Resident killer whales. The February 2012 decision memo (Stelle 2012), developed an analysis, that combined Chinook salmon PSC from the BSAI catch, GOA PSC limit, and other non-pelagic trawl catch and compared that with the Chinook salmon prey considered to be available to Southern Resident killer whales. This comparison concluded that "Given the total quantity of prey available to Southern Residents in coastal waters, the anticipated reduction in prey is extremely small, and although measurable is anticipated to be less than a 1% reduction under all scenarios."

Chinook salmon stocks from British Columbia and the Pacific Northwest have been documented in the GOA groundfish fisheries. Until the samples have been collected and genetic analysis completed for GOA Chinook salmon bycatch, it is not possible to determine the stock composition for the Chinook salmon intercepted as bycatch in the GOA fisheries. It is likely that a fraction of the Chinook salmon that are taken as bycatch in the Alaska groundfish fisheries are from the Southern Resident killer whale range and only a fraction of those fish are likely to become prey. Based on the data available for Chinook salmon PSC in the Alaska groundfish fisheries, the potential amount of Chinook salmon that may be prey for Southern Resident killer whales that may be harvested in the GOA fisheries is likely low. Currently, there is not a measurable reduction in prey otherwise available to the Southern Resident killer whales.

Given the total quantity of prey available to Southern Resident killer whales throughout their range and the quantity of the Chinook salmon PSC that is likely to occur in the GOA groundfish fisheries, the anticipated reduction in prey is likely minimal. This The indirect effects of the GOA groundfish fisheries on prey availability constitute a relatively small contribution to the overall effects on prey availability from other actions, including fishery authorizations and actions that affect the riparian habitat of Chinook salmon. Moreover, any indirect effects on prey availability are likely to be diffuse, both temporally and spatially. While the removal of Chinook salmon by this action may have a marginal effect on the overall availability of prey, because the fisheries intercept salmon from several different stocks and different year classes far from the streams of origin, the effect is spread across space and time. Therefore, these fisheries have very different effects than the instant removal of a large number of fish in close proximity to a pod of whales, as seen by a salmon fishery in the range of Southern Resident killer whales. The GOA pelagic trawl fishery is not likely to have an acute effect on the availability of prey in a particular location at a particular time. These indirect effects are not likely to affect the fitness of individual Southern Resident killer whales or to result in take of any whales.

The Findings from the NMFS Secretarial decision memo of February 9, 2012, for the Section 7 consultation on ESA-listed Southern Resident killer whales in the Alaska Groundfish Fisheries (NMFS 2012) are used as the basis for assessing the effects of this EFP on Southern Resident Killer Whales. Alternative 2 will be taking a limited amount of salmon that is a small portion of the total Chinook salmon harvested in the GOA, and is not likely affect salmon prey availability for Southern Resident killer whales. EFP fishing would be limited to one to two vessels over a large area of the GOA, and dispersed over a period of up to four seasons in 2013 and up to four seasons in 2014. As previously described, salmon stocks taken as bycatch in the GOA pollock fishery are of mixed origin, with CWT recoveries showing that Chinook salmon bycatch in the GOA pollock fishery originate from a large geographic area in Alaska and the Pacific Rim. The Southern Resident killer whale stock depends on Chinook salmon returning the area of occurrence of the Southern Resident killer whale in the Vancouver, Puget Sound Region. The amount of Chinook salmon harvested under the EFP is so small that is not possible to measure a potential effect on the prey availability for Southern resident killer whales. As previously noted, based on the analysis used by the Northwest Region (Stelle 2012) projected maximum annual Chinook salmon PSC removal from the entire BSAI and GOA groundfish fishery of approximately 48,800 fish, would contribute less than 1% of the annual Chinook salmon prey available for Southern Resident killer whales. Thus, the additional catch of approximately 2,400 Chinook salmon from this EFP per year (representing less than 5% of the total groundfish catch used for that analysis) is not anticipated to change the conclusions that the BSAI and GOA groundfish fisheries are not likely to adversely affect the Southern Resident killer whale DPS or the designated critical habit for the Southern Resident killer whales.

ESA section 7 consultations on the effects of issuing the EFP on Southern Resident killer whales will be initiated and completed before the issuance of the EFP. The amount of Chinook salmon harvested under the EFP is sufficiently small that is not possible to measure a potential effect on the prey availability for these ESA-listed marine mammal stocks.

4.6.3 Disturbance

The Alaska Groundfish Harvest Specifications EIS analyzed the potential disturbance of marine mammals by the groundfish fisheries (Section 8.3.3 of NMFS 2007b). The EIS concluded that the status quo fishery does not cause disturbance to marine mammals that may cause population level effects and fishery closures limit the potential interaction between the fishing vessels and marine mammals. Because the EFP fishing would be conducted by up to two vessels outside of areas closed to protect Steller sea lions and the time period of fishing is limited, it is not likely that any discernable disturbance of marine mammals would occur. In addition, much of the fishing activities under the EFP would be conducted at the same time as the pollock fishery with vessels that otherwise would participate in the pollock fishery so that no additional marine mammal and vessel interaction is likely to occur at those times. Therefore, Alternative 2 is not likely to result in marine mammal disturbance beyond that which may occur under the status quo.

4.6.4 Cumulative Effects

The following reasonably foreseeable future actions may have a continuing, additive, and meaningful relationship to the effects of the alternatives on marine mammals. Some of these actions are broadly based on the potential changes to the groundfish fisheries that may result in impacts on marine mammals.

Ecosystem-sensitive management

Increased attention to ecosystem-sensitive management is likely to lead to more consideration for the impact of the pollock fishery on marine mammals and more efforts to ensure the ecosystem structure that marine mammals depend on is maintained, including prey availability. Increasing the potential for observers collecting information on marine mammals and groundfish fisheries interaction under the restructured observer program, and any take reduction plans, may lead to less incidental take and interaction with the groundfish fisheries, thus reducing the adverse effects of the groundfish fisheries on marine mammals.

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. Listing any of the ice seals and designating critical habitat would require Section 7 consultation for the groundfish fisheries to determine if they are likely to adversely affect the listed species or designated critical habitat. Change to the fisheries may be required if it is determined that the fishery are likely to result in JAM for any ESA-listed species or their critical habitat. Fishery measures would be needed to ensure the fisheries were not likely to result in JAM.

Modifications to Steller sea lion protection measures will result in Section 7 consultations. These changes may be a result of recommendations by the Council based on a review of the current protection measures, potential state actions, changes in fisheries management, or new information. Any change in protection measures likely would have insignificant effects because any changes would be unlikely to

result in the PBR being exceeded and would ensure the fisheries are not be likely to result in jeopardy of continued existence or adverse modification or destruction of designated critical habitat.

Ongoing research efforts are likely to improve our understanding of the interactions between the harvest of pollock and salmon and the impacts on marine mammals in the GOA. NMFS is conducting or participating in several research projects, which include understanding the ecosystems and fisheries interactions. These projects will allow NMFS to better understand the potential impacts of commercial fisheries, the potential for reducing salmon bycatch, and the GOA ecosystem. The results of the research will be useful in managing the fisheries with ecosystem considerations and is likely to result in reducing potential effects on marine mammals. For more information see http://www.afsc.noaa.gov/.

Traditional management tools

The cumulative impact of the annual harvest specifications in combination with future harvest specifications may have lasting effects on marine mammals. However, as long as future incidental takes remain at or below the PBR, the stocks will still be able to reach or maintain their optimal sustainable population. 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. Improved monitoring and enforcement through the use of technology would improve the effectiveness of existing and future marine mammal protection measures by ensuring the fleet complies with the protection measures, and thus, reducing the adverse impacts of the alternatives.

Actions by other Federal, State, and International Agencies

Expansion of state pollock or Pacific cod fisheries may increase the potential for effects on marine mammals. However, due to ESA requirements, any expansion of state groundfish fisheries may result in reductions in federal groundfish fisheries to ensure that the total removals of these species ensure that JAM is not likely for any ESA-listed species or adversely modify designated critical habitat, including Steller sea lion critical habitat.

The state manages the salmon fisheries of Alaska and the state's first priority for management is to meet spawning escapement goals to sustain salmon resources for future generations. Subsistence use is the highest priority use under both state and federal law. Surplus fish beyond escapement needs and subsistence use are made available for other uses, such as commercial and sport harvests. The state carefully monitors the status of salmon stocks returning to Alaska streams and controls fishing pressure on these stocks. Even though prey availability is not accounted for in the setting of salmon harvest levels, the management of salmon stocks effectively maintains healthy populations of salmon where possible and may provide sufficient prey availability to marine mammals.

Incidental takes of Steller sea lions and other marine mammals occur in the state managed set and drift gillnet, troll, and purse seine salmon fisheries (76 FR 73912, November 29, 2011 and Allen and Angliss, 2012). The mean annual estimates of marine mammal species taken in the state-managed fisheries and also the all Alaska EEZ federal pollock fisheries are listed in Table 4.13. The Prince William Sound salmon drift gillnet fishery has a mean annual mortality of 18.3 Steller sea lions, and the combined federal fisheries in the GOA have a mean annual mortality of 15.5 Steller sea lions. Northern elephant seals and Fin whales experience no mortality in the state or federal fisheries in the GOA but Northern elephant seals have a mortality estimated from California fisheries.

Table 4.13 Marine Mammals Taken in State-Managed and Federal Pollock Fisheries in the GOA

Marine Mammal Stocks Taken in State Managed and Federal Pollock Fishery*	State Fisheries mean annual mortality*	Federal Fisheries mean annual mortality*
Fin Whale	0	0
Northern elephant seal, North Pacific	0	0
Steller sea lions, western	18.3	15.5

* Allen and Angliss 2012 (preliminary data)- Includes data from 2007 to 2010
List of Fisheries for 2012 (76 FR 73912, November 29, 2011)

The mortalities listed in Table 4.13 are included in the total mean annual human caused mortalities in Allen and Angliss 2012. The combination of the incidental takes in the pollock fishery with takes in the State-managed fisheries for these species is either well below the PBR. It is not likely that EFP fishing would change the pollock fishery in a manner that would greatly increase the overall incidental takes of these marine mammals to where either the PBR would be exceeded or the proportion of fishery mortality in the total mean annual human caused mortality would greatly change.

Private actions

Subsistence harvest is the primary source of direct mortality for many species of marine mammals. Subsistence harvest information is collected for other marine mammals and considered in the stock assessment reports. It is unknown how rates of subsistence harvests of marine mammals may change in the future, but subsistence harvests are not expected to greatly increase as the number of subsistence users is not expected to greatly increase.

Other factors that may impact marine mammals include continued commercial fishing; non-fishing commercial, recreational, and military vessel traffic in Alaska waters; tourism, and population growth that may impact the coastal zone. Little is known about the impacts of these activities on marine mammals in the GOA. However, Alaska's coasts are currently relatively lightly developed, compared to coastal regions elsewhere. Despite the likelihood of localized impacts, the overall impact of these activities on marine mammal populations is expected to be modest.

4.6.5 Summary of Effects

The continuing fishing activity and continued subsistence harvest are potentially the most important sources of additional annual adverse impacts on marine mammals. Both of these activities are monitored and are not expected to increase beyond the PBRs for marine mammals. The extent of the fishery impacts would depend on the size of the fisheries, the protection measures in place, and the level of interactions between the fisheries and marine mammals. However, a number of factors will tend to reduce the impacts of fishing activity on marine mammals in the future, most importantly ecosystem management. Ecosystem-sensitive management and institutionalization of ecosystem considerations into fisheries governance are likely to increase our understanding of marine mammal populations and interactions with fisheries. The effects of actions of other federal, state, and international agencies are likely to be less important when compared to the direct interaction of the commercial fisheries, subsistence harvests, and marine mammals.

Because of the amount of harvest and method under Alternative 2, compared to Alternative 1, no substantial change in direct or indirect effects on marine mammals is expected. There will be no substantial change in incidental take by fishing operations or entanglement in marine debris under Alternative 2. There will be no substantial change in competition for key marine mammal prey species or in disturbance by fishing vessels under the EFP. **For these reasons, the direct, indirect and cumulative impacts to marine mammals are likely not significant under Alternatives 1 and 2.**

4.7 Socioeconomic Effects

4.7.1 Background

The operation of the groundfish fishery in the GOA is described by gear type in the PSEIS (NMFS 2004b). General background on the fisheries with regard to each fish species is given in the GOA FMP (NPFMC 2010d). The pollock trawl and State salmon fishery sectors are the only sectors that may be affected by this proposed action. For detailed information on the fishery participants including vessels and processors in the pollock fishery see Chapter 12 of the Alaska Groundfish Harvest Specifications EIS (NMFS 2007b). Additional information regarding fishery participants can be found in the 2011 Economic SAFE report (Hiatt et al. 2012).

The most recent description of the economic aspects of the groundfish fishery is contained in the 2011 Economic SAFE report (Hiatt et al. 2012).This report, incorporated herein by reference, presents the economic status of groundfish fisheries off Alaska in terms of economic activity and outputs using estimates of catch, bycatch, ex-vessel prices and value, the size and level of activity of the groundfish fleet, the weight and value of processed products, wholesale prices, exports, and cold storage holdings. The catch, fleet size, and activity data are for the fishing industry activities that are reflected in Weekly Production Reports, Observer Reports, fish tickets from processors who file Weekly Production Reports, and the annual survey of groundfish processors. External factors that, in part, determine the economic status of the fisheries are foreign exchange rates, the prices and price indices of products that compete with products from these fisheries, and fishery imports.

4.7.2 Socioeconomic Effects

The potential socioeconomic effects of this proposed action primarily are future benefits that may result from the use of a salmon excluder device in the pollock trawl fisheries. Pollock taken during the testing will be sold to help offset the costs to the vessel operations during the experimental work. Salmon harvested during the testing may be donated for distribution under the Prohibited Species Donation Program (§ 679.26) or disposed of in accordance with § 679.21(b).

4.7.3 Alternative 1 Status Quo Effects

If the EFP is not issued, the development of an effective salmon excluder device may be more difficult, if not impossible. The pollock fishery may experience high salmon bycatch rates that reach salmon bycatch limits, especially for Chinook salmon. The economic impact to the pollock fishery is the potential closure of GOA directed fishing for pollock, potentially reducing the yield for pollock harvest. Limited fishing grounds can result in additional expense in finding areas with sufficient catch rates and quality of fish. In addition, the pollock industry incurs costs in sorting and disposing bycatch. Alternative 1 would not

facilitate the development of a salmon excluder device, eliminating the potential for future socioeconomic benefits identified under Alternative 2.

4.7.4 Alternative 2 Issue the EFP Effects to Groundfish Fishing Industry

The knowledge gained from this experiment may make it possible to reduce the costs of salmon bycatch in the pollock trawl fisheries. However, there are several caveats. The experiment may not be successful; the vessel may not encounter sufficient salmon to support the experimental design. The excluder device may allow enough pollock escapement to reduce net catch per unit effort. Moreover, the excluder may turn out to be expensive to purchase or operate (perhaps by excluding large numbers of pollock, by increasing the net's drag, or by adversely affecting the operation of the trawl gear) and not be widely adopted by the fleet.

Under Alternative 2, the proposed action may allow for the development of an effective salmon excluder device for trawl gear. If such a device were available, trawl vessels could use this device to lower the salmon bycatch which would result in less potential for exceeding the PSC limits or requiring the vessel to move to areas with lower salmon bycatch rates. By not exceeding the PSC limits or by not being closed out of salmon hot spot areas, pollock fisheries would have more locations available for selecting fishing grounds, potentially leading to less harvesting expense and higher quality product. Benefits to consumers and the country overall from the pollock fishery could also increase under the expectation that the benefits of efficiency gains and increased product quality would accrue to consumers and the nation.

These benefits are based on the assumption of minimal injury to salmon utilizing the escapement device. Any evaluation of the performance of salmon bycatch reduction device and its costs and benefits would clearly need to explicitly evaluate the question of long term survival in order to assess actual benefit/cost tradeoffs. The expectation of benefits from a bycatch reduction device also assumes that changes in fishing behavior as a result of widespread use of the device would not increase some other potential environmental costs associated with the fishery. It is also not possible to predict the level of acceptance of using such a device in the pollock trawl fishery though there is great interest in reducing salmon bycatch within and outside the pollock industry.

Issuing the EFP also would provide the pollock industry a way to show those concerned about salmon bycatch that there is a good faith effort by the industry to address the problem. The success of such a device would likely result in benefits to salmon stocks used by subsistence, commercial, and recreational fishermen and those communities that depend on salmon resources.

Selection of Vessels, Costs and Revenue

This is a joint project of the NMFS AFSC and the North Pacific Fishery Research Foundation (NPFRF). The NPFRF is a private non-profit foundation whose main purpose in recent years has been to promote the development of trawls that take fewer salmon PSC during pollock fishing operations (Paine)[7]. The principal investigators will be scientists from the AFSC and a contractor chosen by the NPFRF. This contractor is the applicant for the EFP. Based on previous practice, Requests for Proposals (RFPs) will be issued separately for each of the annual experiments. Vessels will be selected by an AFSC review panel based on criteria described in the RFP (Gauvin 2012).

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[7] Paine, Brent. Executive Director of the United Catcher Boats, Fisherman's Terminal, Seattle, WA. President of the North Pacific Fishery Research Foundation. Phone call on March 21, 2011.

The vessel operations selected under the RFP will be able to sell the groundfish harvested under the EFP and retain the proceeds (although, as noted below, the EFP may impose some requirements on delivery). The value of the revenues in the 2013 A through D seasons cannot be determined with any precision at the current time (October 2012). For the purposes of this analysis, price of $364 has been used to provide a rough estimate of possible revenues to catcher vessels participating in this EFP.[8] This assumed price produces a gross revenue estimate of about $839,000. There is a great deal of uncertainty associated with this revenue estimate; however, it is not possible to quantify this with a confidence interval.[9] The value received by fishing operations would be quite a bit less. In this case the pollock would be processed on-shore (with associated processing costs) by a firm associated with the catcher vessel, and there would be a wholesale gross earnings received by the processor.

This is an estimate of gross revenue accruing to the program participants. Actual profits will be less than this, depending on the costs of participating in the program. These costs include the normal costs of fishing for and processing pollock, the additional costs imposed on fishing operations by the need to comply with the requirements of the EFP, the profits foregone by fishing for EFP pollock instead of pursuing other fishing opportunities.

The EFP fishing protocol sets out how many hauls and how many tons per day can be harvested, the criteria used to select fishing areas for the EFP test, the gear the EFP applicant will need to provide for the EFP testing (e.g., nets and catch indicating devices), and the duties of crew members in support of the EFP experiment. These requirements and others are described in the RFP used to solicit applications from interested pollock vessel-owning companies (Gauvin 2011).

The costs of fishing under the EFP may vary from the costs of fishing for pollock in the regular fishery. In every stage of salmon excluder EFP fieldwork for past EFPs, and as will be the case for the current application, the EFP protocol constrains harvest amounts per day due to the necessity of collecting more data on the catches than would occur in the normal fishery and due to the need to essentially collect data from two separate nets on each haul (the regular codend and the fish in the recapture net). The EFP also constrains the selection of fishing areas to those that provide sufficient levels of pollock and salmon for the EFP experimental design. In the past this has often forced a vessel to conduct fishing where target catch rates are not optimal and where product quality factors are not the best. As such, EFP applicants need to consider whether they are able to operate under the EFP protocol and recover their operating costs. Profitability is not guaranteed given the constraints of the EFP fishing protocol. The major factor affecting production under the EFP may be frequent slowdowns from the need to handle and account for EFP catches. This is very problematic when a large quantity of catch occurs in the recapture net as this can damage that secondary net, and it must be repaired before EFP testing can resume. Malfunctions in camera and sonar equipment that are needed during the EFP are also common, and these must be resolved before EFP fishing can resume. The EFP vessel cannot switch to its non-EFP fishing opportunities during the EFP because once the EFP commences, only EFP fishing is allowed. (Gauvin 2012).

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[8]These are not wholesale prices, but values, estimated by dividing the wholesale value of the wholesale production of all pollock products, by the round weight volume of pollock harvested.

[9] Among the factors contributing to the uncertainty are the use of 2012 prices as a proxy for unknown 2013 and 2014 prices and the potential impact of EFP project requirements on product quality and price.

Past EFPs have not been evaluated to determine whether or not they were profitable for the successful applicants. In the past, EFPs may have resulted in losses (failures to recover operating costs) when participating vessels relocated to areas where salmon bycatch rates were sufficient for the objectives of the EFP or fishing operations were suspended because of equipment breakdowns. Past RFPs specifically informed applicants of this possibility. NMFS' application review panel considers the applicants' responses to questions in the RFP about their ability to accommodate slowdowns and unanticipated occurrences during the EFP. Possible scenarios include equipment failure requiring the vessel to return to port for parts, or difficulty finding fishing locations that meet EFP objectives, leading to days of searching with few or no hauls (Gauvin 2012).

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5.0 SUMMARY AND CONCLUSIONS

Context: The action would issue an EFP to allow for the continued development and testing of a salmon excluder device for pollock trawl gear in the GOA. Any effects of the action are limited to areas commonly used by the pollock trawl fishery. The effects on society within these areas are on individuals directly and indirectly participating in the pollock fisheries, those participating in the experiment, those who depend on salmon resources, and those who may receive the small amount of salmon through the Prohibited Species Donation Program. Because this action may affect the efficiency of pollock fishing and the bycatch of salmon in the future, this action may have impacts on society as a whole or regionally.

Intensity: National Oceanic and Atmospheric Administration Administrative Order (NAO) 216-6 (May 20, 1999) contains criteria for determining the significance of the impacts of a proposed action. In addition, the CEQ regulations at 40 CFR1508.27 state that the significance of an action should be analyzed both in terms of "context" and "intensity." Each criterion listed below is relevant to making a finding of no significant impact and has been considered individually, as well as in combination with the others. The significance of this action is analyzed based on the NAO 216-6 criteria and CEQ's context and intensity criteria. These include:

1) Can the proposed action reasonably be expected to jeopardize the sustainability of any target species that may be affected by the action?

Response: No. The proposed action would harvest a very small quantity of pollock in relation to the overall annual harvest of pollock. No discernable effect on pollock is expected; therefore, the proposed action is not likely to jeopardize the sustainability of any target species (EA section 4.2).

2) Can the proposed action reasonably be expected to jeopardize the sustainability of any non-target species?

Response: No. A very small quantity of fish species other than pollock and salmon is expected to be taken by the proposed action, dispersed over a two year time period. The amount of salmon taken is a small portion of the annual bycatch of salmon. Any effect from the EFP is not likely discernable over the status quo fishery effects which does not jeopardize the sustainability of any non-target species. Therefore, the proposed action is not likely to jeopardize the sustainability of any non-target species, or PSC such as halibut or salmon (EA section 4.4).

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 FMPs?

Response: No. This action is limited to the use of pelagic trawl gear in a manner which has been found to not cause substantial damage to oceans and coastal habitats or essential fish habitat (EA section 4 Introduction).

4) Can the proposed action reasonably be expected to have a substantial adverse impact on public health or safety?

Response: No. The proposed action involves up to two vessels conducting controlled scientific testing of a bycatch reduction device in a location away from the public. No changes to fishing practices are expected that would impact public health and safety. Therefore, no impacts to public health or safety are expected (EA section 2).

5) Can the proposed action reasonably be expected to adversely affect endangered or threatened species, marine mammals, or critical habitat of these species?

Response: No. The proposed action is limited to the use of pelagic trawl gear by up to two vessels, harvesting a relatively small amount of fish over several seasons in the Central GOA, a relatively large area for dispersal of the fishing activity. Because of the amount of pollock and salmon harvested, the method of harvest, and compliance with existing closures and other management measures for Steller sea lions, no discernable effects are expected on ESA-listed species or critical habitat (EA sections 4.4 and 4.6).

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.)?*

Response: No. This action is limited to the use of pelagic trawl gear by up to two vessels, harvesting a relatively small amount of fish over several seasons, dispersed in the Central GOA. The quantity of fish and method of harvest are not likely to have any discernable effects on biodiversity or ecosystem function (EA section 3.0).

7) Are significant social or economic impacts interrelated with natural or physical environmental effects?

Response: No. The issuance of the EFP would allow for the vessel used in the EFP work to be compensated for expenses through the sale of pollock harvested during the salmon excluder device testing. No significant social or economic impacts interrelated with natural or physical environmental effects are expected from the issuance of the EFP. Successful development and use of the salmon excluder device may result in beneficial economic effects for the pollock industry and for those dependent on salmon resources (EA section 4.7).

8) Are the effects on the quality of the human environment likely to be highly controversial?

Response: No. The potential effects of the action are well understood and not controversial. Any effects on the human environment are not likely discernable due to the limited amount of fish and vessel participation and short time period of the EFP project. The industry, NMFS, Alaska salmon users, and environmental organizations are in favor of efforts to reduce salmon bycatch and experiences with the use of a salmon excluder device in the Bering Sea pollock fishery give a better understanding of the potential effects of this action in the GOA (EA section 1).

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, essential fish habitat, or ecologically critical areas?*

Response: No. This action is limited to the use of pelagic trawl gear in a manner which has been found to not cause substantial damage to oceans and coastal habitats or essential fish habitat (EA Section 3 Introduction).This action is limited to the marine environment so other unique areas listed would not be impacted (EA section 1).

10) Are the effects on the human environment likely to be highly uncertain or involve unique or unknown risks?

Response: No. The potential effects of fishing under the EFP are well understood and the returns of salmon in Alaska are well monitored. Any effects on the human environment are not likely discernable due to the limited amount of fish and vessel participation and short time period of the EFP project (EA sections 4.1, 4.3 and 4.5).

11) Is the proposed action related to other actions with individually insignificant, but cumulatively significant impacts?

Response: No. Each environmental component that may be affected by this action was analyzed for potential direct and indirect impacts. For each of these components, no discernable direct or indirect effects were identified resulting from this action when comparing the potential impacts under Alternative 2 compared to Alternative 1. An analysis of cumulative effects was included to determine the incremental effects of this and other actions on each environmental component affected. The combined direct, indirect, and cumulative impacts were not likely significant for this action (EA section 4).

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?

Response: No. This action is limited to the marine waters of the GOA, and these types of land-based sites do not occur in the GOA. The fishing activities under this action are not likely to result in destruction or loss of significant scientific, cultural, or historical resources because the pelagic trawling occurs in the water column where these resources do not occur. Therefore, this question is not applicable (EA section 1).

13) Can the proposed action reasonably be expected to result in the introduction or spread of a nonindigenous species?

Response: No. This action does not change fishing activities in a manner that would result in the spread or introduction of non-indigenous species (EA section 1).

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?

Response: No. This action allows for the development of a single device that may be considered for manufacture and widespread use by the fishing industry at a later time. No decisions would be made

at this time regarding the future use of the device, and any future actions would be analyzed for potential significant effects (EA section 1).

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?

Response: No. The proposed action would be conducted in accordance with all federal, state, and local laws (EA section 1).

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?

Response: No. The past, present and reasonably foreseeable future actions that may affect environmental components that this action may impact were analyzed in this EA. These cumulative effects in combination with the proposed action are likely to result in beneficial effects for pollock fisheries and salmon species by improving the efficiency of pollock fishing and by minimizing Chinook salmon bycatch to the extent practicable. No cumulative adverse effects are likely for target or non-target species with this action (EA section 4).

Comparison of Alternatives and Selection of a Preferred Alternative

Alternative 1, status quo, does not meet the need or the purpose of this action, to allow for a scientific study to develop a salmon excluder device for pollock trawl vessels in the GOA. The status quo would not meet the need to reduce the amount of salmon bycatch in the pollock trawl fishery. Alternative 2 would provide an EFP that permits the development and testing of such a device in a scientifically valid manner and within groundfish regulations (50 CFR 679 and 600), meeting the need and purpose of this action. Without the EFP, the testing would not be conducted following the carefully conceived experimental design, potentially resulting in no development of the bycatch reduction device and no potential tool for lowering salmon bycatch in the GOA pollock trawl fishery. Therefore, Alternative 2 is the preferred alternative.

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Appendix A Application for GOA Salmon Excluder Exempted Fishing Permit

Request for an exempted fishing permit (EFP) to conduct research on Chinook salmon bycatch reduction device for the Central Gulf of Alaska pollock fishery

Date of Application: October 6, 2012

Name, mailing address, and phone number of applicant:

Signature of Applicant:

EFP Applicant and Principal Investigator:
John R. Gauvin
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Purpose and Objectives of the EFP: This application requests the Alaska Region of the National Marine Fisheries Service (NMFS) issue an exempted fishing permit allowing the applicant to conduct research on a bycatch reduction device (AKA excluder) to reduce catch rates of Chinook salmon in the Central Gulf of Alaska (CGOA) pollock fishery. The primary objective of the research is to make stepwise adjustments to a flapper-design salmon excluder that has been developed for the Bering Sea pollock fishery. This excluder design has been shown to be effective for reducing Chinook bycatch rates in the Bering Sea without significant negative effects on pollock fishing and it is being widely used there. From our Bering Sea experience with excluder development, we expect that differences in vessel horsepower, fishing methods/practices, and relative size differential between pollock and salmon in the CGOA pollock fishery will require adjustments to the excluder to achieve effective selectivity. Additionally, based on the scope of effort it has taken to fashion a workable excluder for Chinook in the Bering Sea, we expect that adaptation of the excluder to the GOA pollock fishery will take more than one year and our EFP application reflects this expectation.

Relevant Background information: In the GOA, Chinook salmon bycatch primarily occurs in the Western and Central Gulf of Alaska pollock trawl fisheries with the majority of Chinook bycatch occurring in the Central Gulf of Alaska. The single year when the Central Gulf region has not been the dominant area for GOA Chinook bycatch was in 2010 when over 31,000 Chinook were reportedly taken in the Western Gulf of Alaska (WGOA) pollock fishery. To illustrate trends in Chinook bycatch in the GOA pollock fishery, Tables 1 and 2 below show annual, region-specific (CGOA, WGOA) Chinook salmon bycatch numbers and rates from 1994 to 2011. These tables were taken directly from the North Pacific Fishery Management Council's (NPFMC) GOA Chinook bycatch 2011 analysis available at: http://www.fakr.noaa.gov/npfmc/PDFdocuments/bycatch/ChinookBycInGOAtrawl1111.pdf).

Table 1. CGOA Chinook PSC and pollock harvests, 1994 - 2011

Area	Year	Chinook PSC	Pollock Harvest (mt)	Chinook/mt pollock
CGOA	1994	6,589	84,130	0.08
	1995	3,051	38,897	0.08
	1996	10,598	26,450	0.40
	1997	8,800	57,862	0.15
	1998	10,464	88,136	0.12
	1999	23,758	68,275	0.35
	2000	15,907	47,691	0.33
	2001	8,234	37,663	0.22
	2002	2,487	31,437	0.08
	2003	3,557	31,290	0.11
	2004	10,655	38,311	0.28
	2005	21,429	46,802	0.46
	2006	11,138	42,299	0.26
	2007	31,647	32,205	0.98
	2008	7,971	30,769	0.26
	2009	2,123	22,700	0.09
	2010	12,334	44,033	0.28
	2011	6,839	56,920	0.12
03-'11 CG Avg.		**11,966**	**38,370**	**0.31**

Table 2. WGOA Chinook PSC and pollock harvests, 1994 - 2011

Area	Year	Chinook PSC	Pollock Harvest (mt)	Chinook/mt pollock
WGOA	1994	591	19,894	0.03
	1995	1,506	30,958	0.05
	1996	565	24,200	0.02
	1997	524	26,141	0.02
	1998	3,448	29,301	0.12
	1999	2,307	23,384	0.10
	2000	2,472	22,074	0.11
	2001	1,237	30,471	0.04
	2002	2,548	17,455	0.15
	2003	738	15,970	0.05
	2004	2,327	23,124	0.10
	2005	5,951	30,756	0.19
	2006	4,529	24,427	0.19
	2007	3,359	17,303	0.19
	2008	2,116	14,828	0.14
	2009	441	14,010	0.03
	2010	31,581	25,766	1.23
	2011	2,049	20,594	0.10
03 - '11 WG Avg.		**5,899**	**20,753**	**0.28**

Reviewing the data in the tables above, it is evident that there is considerable annual variability in both the Western and Central GOA reported Chinook bycatch. Overall, however, GOA Chinook bycatch does not seem to be correlated with amount of pollock harvested annually but does seem to be somewhat cyclical. The pattern appears to be three to four year period of relatively high Chinook bycatch numbers followed by three to four years of relatively low bycatch. This is particularly true for the Central Gulf of Alaska management area and it could reflect trends in salmon abundance and run strength. Other factors such as observer coverage levels and observer sampling methods, however, make the identification of trends or patterns through bycatch data difficult.

Further, according to the NPFMC's 2011 GOA salmon bycatch analysis, the majority of Chinook salmon bycatch is taken in the pollock target fishery – accounting for about 87% of all Chinook salmon bycatch in the Western GOA between 2003 and 2011, and 71% in the Central GOA according to the NMFMC's 2011 GOA Chinook bycatch analysis.

For the CGOA, the North Pacific Council recently approved a hard cap of 18,316 Chinook for the Central GOA pollock fishery. Figure 1 below compares the new cap to the historical bycatch data within the areas to which the cap applies. It is clear that the CGOA hard cap will be potentially constraining to the pollock fishery in the Central Gulf of Alaska assuming historic salmon abundance and bycatch patterns are indicative of what that fishery will encounter following the expected implementation of the hard cap in mid-2012. Specifically, the CGOA bycatch numbers have exceeded the 18,316 annual cap three times over the time series 1994-2011.

In the WGOA, where a hard cap of 6,684 salmon was recently approved by the NPFMC, that level of Chinook catch was exceeded only once in the time series - in 2010 (Figure 2). Both figures below are reproduced from pages 56-57 of the NPFMC's 2011 GOA Chinook bycatch analysis.

Figure 1

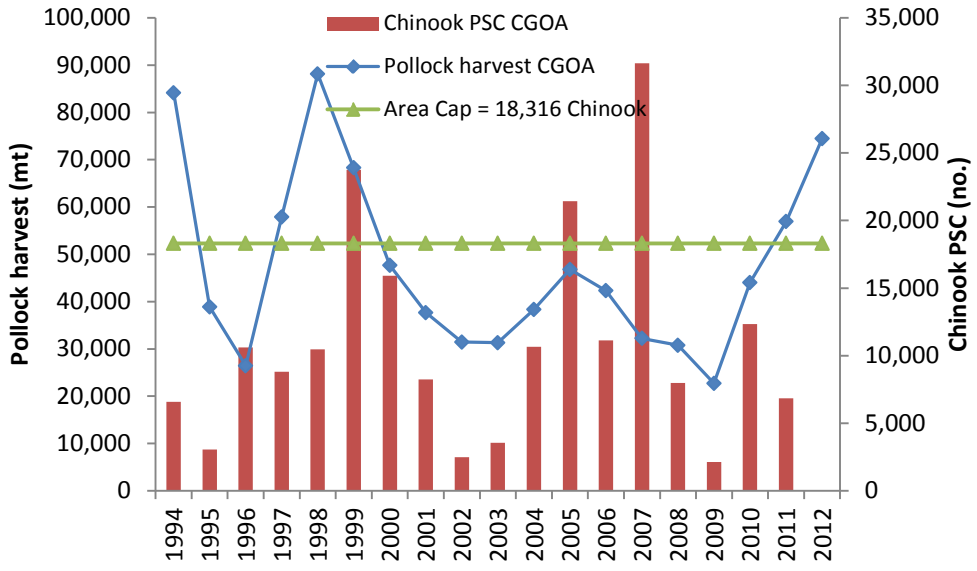
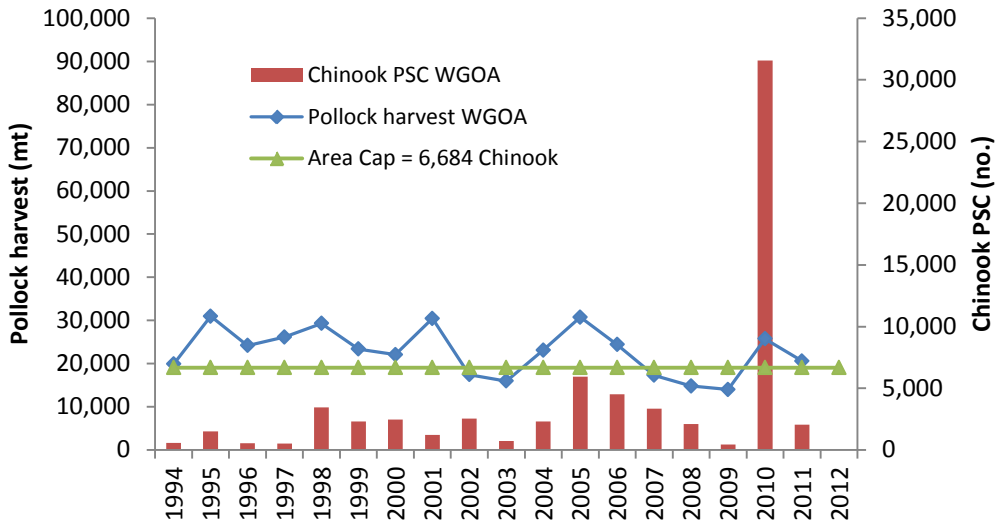


Figure 2



From the above information, it is evident that development of additional tools to help control Chinook bycatch in the Gulf of Alaska should be a high priority. One tool that could be important would be an effective gear modification (a "salmon excluder") if it can allow a significant portion of the Chinook salmon that enter the trawl to escape unharmed. This would provide pollock fishermen a means of reducing bycatch rates thus helping to prevent exceeding the hard cap. An effective excluder could also help mitigate the added costs of bycatch avoidance such as additional fuel usage and running time needed to avoid salmon on the grounds. In the extreme, an effective excluder could even be a plus for vessel safety as it might allow fishermen to conduct fishing closer to port which might not otherwise have been possible due to salmon bycatch rates in those areas.

As in the Bering Sea, the selectivity gains from using an excluder are not expected to remove the need for additional bycatch avoidance measures such as hotspot reporting and avoidance to control salmon bycatch. But if rates can be reduced by the degree shown to occur in the Bering Sea, for example, the economic effects of the hard cap might be reduced thereby preserving profitability in the fishery. To this end, this exempted fishing permit application has been drafted as a logical extension to the work on salmon excluders in the Bering Sea pollock fishery.

Starting in 2003, the principal investigator and EFP applicant on this project has conducted research and field testing to develop an effective and feasible gear modification to reduce salmon bycatch in the Bering Sea pollock fishery. This proposed EFP and the earlier EFP work in the Bering Sea have been done in conjunction with Dr. Craig Rose of the Alaska Fisheries Science Center's RACE Division and Mr. John Gruver of the United Catcher Boats Association. Additionally, all the EFP fieldwork has included a high level of collaboration and input from interested fishermen and gear manufacturers. Following the successful use of collaboration with industry in the Bering Sea, the proposed EFP work in the Gulf of Alaska will work closely with the Alaska Groundfish Data Bank and the Alaska Whitefish Trawlers Association.

The most current research on the Bering Sea salmon excluder has shown a Chinook bycatch reduction range of 25 to 40%. That percent reduction, measured in multiple controlled experiments, is based on what Chinook catches would have been by the same vessel in the same area but without an excluder. The same research has consistently concluded that pollock escapement with the use of the excluder at well under one percent.

Equally encouraging is the finding that the current Bering Sea excluder design appears to create little or no associated problems with pollock fishing under normal fishing conditions. This includes avoiding damage to the net even under high catch rates and requiring little to no maintenance or active behavior such as slowdowns at haulback associated with use of the excluder on a regular basis. Problems of this sort occurred with the early designs of salmon excluders, particularly with larger vessels with greater horsepower. Resolution of these issues through the design advantages of the "flapper style" excluder involved a three year process to develop and field test the flapper excluder in the Bering Sea. At each step, adjustments were made to address problems as they became evident and to increase escapement performance as salmon behavior in response to the excluder became better understood.

The current flapper excluder has been adopted into the regular fishing operations of a large fraction of Bering Sea catcher vessels and catcher processors. Most pollock fishermen feel the device provides an effective tool they can utilize as part of an overall suite of steps they take to remain under the Bering Sea Chinook salmon hard cap implemented in 2011.

With word of the progress in the Bering Sea, considerable interest has been expressed by pollock fishermen in Kodiak regarding development of a flapper excluder for the GOA pollock fishery. Having heard that the effectiveness of the excluder depends on proper weighting, location in the trawl, and other factors such as the length of the flapper panel, we have received numerous enquiries regarding the sizing and other factors that affect performance of the excluder. At this point we are unable to provide informed guidance on these specifics for the Gulf of Alaska.

Our experience with development of the Bering Sea salmon excluder has shown that the excluder design must be specifically adjusted to be effective, based on the specifics of the net, horsepower and towing speed of the vessel using the device. These vessel-size specific differences have required different weighting on the flapper panel as well as in some cases different location of the excluder in the net. Excluder designs prior to the flapper excluder were also highly dependent on vessel size and towing power. In the extreme, we even discovered that larger vessels experienced a high level of problems with one excluder design while smaller vessels reported they were able to use that same excluder with little or no negative effect on fishing.

Testing in the Bering Sea has also underscored that the effectiveness of an excluder design depends greatly on careful and stepwise adjustments and field testing to verify proper shape while deployed. Documentation of salmon and pollock escapement rates with a recapture net appended to the trawl has also been critical to the successful development of the excluder. We feel that had we not used this systematic approach the result might have been abandonment of some excluder designs before their effectiveness was fully evaluated and realized. This systematic approach has also helped us gain the confidence of fishermen who were sometimes skeptical regarding the potential effectiveness and practicality of excluders, paying dividends in terms of getting input from fishermen and gear manufacturers as Beta testing of concepts and different excluder designs was undertaken.

In considering the most effective way forward in the GOA, we fully expect that there will be some important similarities in salmon behavior and factors affecting excluder performance in the GOA pollock fishery. At the same time, we also envision that what has worked in the Bering Sea will require adjustments to take into account differences in horsepower for GOA boats, net size, and towing speed**.** We also expect that there will be differences in the relative swimming ability of pollock and salmon that will need to be factored into the design of the excluder for the Gulf of Alaska. Another difference may result from the fact that a higher proportion of day fishing occurs in the Gulf relative to the Bering Sea. To take into account all these dissimilarities, excluder development in the GOA will need to incorporate what has been learned in the Bering Sea while remaining cognizant that the GOA pollock fishery is different.

The salmon catch data above show that the CGOA Pollock fishery is potentially more likely to be constrained by the new hard bycatch cap that in the WGOA. This was one factor in our decision to focus on the CGOA in this initial effort in the Gulf of Alaska. Another reason for starting in the CGOA is that we expect that experience gained in the Bering Sea will be more easily and directly transferable to Kodiak-size vessels (and nets) than vessels in the Western Gulf of Alaska. While CGOA pollock vessels are generally considerably smaller than even the smaller range of the Bering Sea pollock fleet, Central Gulf pollock boats are still closer in horsepower and net size to Bering Sea boats than Western GOA boats which are mostly 58 foot "limit seiner" vessels that have been converted to trawling.

Additionally, CGOA pollock fishermen, through the Alaska Groundfish Data Bank and Whitefish Trawlers association, have expressed an interest in having our assistance with excluder development. For instance, in winter of 2011 a technician who has been involved in the Bering Sea EFPs was invited to go out on several different Kodiak boats to take underwater video footage of pollock and salmon moving through a pollock net. Some of the vessels were using flapper-style excluders they had installed themselves. This video footage is expected to yield insights into where to start in this GOA EFP in terms of flapper panel location and weighting. Even so, we expect that excluder development will present challenges. This was reinforced when several of the Kodiak vessels that had installed excluders and done some testing on their own reported anomalies in terms of catch rates for pollock, net deployment, and salmon catch rates.

Names of participating vessels, copies of vessel Coast Guard documents, names of vessel masters:
The EFP application incorporates two field testing seasons (winter/spring and fall) during two separate years (2013 and 2014) for a total of four field testing seasons. Testing will be conducted by two test vessels of different sizes in each field season. Vessels for the EFP testing have not been selected yet. A request for proposals (RFP) process will be conducted by the principal investigator (permit holder) to inform potential applicants of the requirements of the EFP testing and other relevant information. Vessel proposals will include general information about the facilities of the vessel and experience level of the crew. Additionally, applications will need to provide specific information on how the applicant would carry out the catch handling and accounting duties of the EFP on that proposed vessel. With this information, a panel of AFSC scientists with experience in reviewing vessel charter applications and knowledge of catch handling and sampling challenges on CGOA trawl vessels will review applications and rank them for suitability/appropriateness for the objectives of the EFP. Individuals from the Alaska Regional Office and NMFS Observer Program (FMA) with expertise on catch sampling and accounting on GOA catcher vessels will also be invited to serve on/provide input in the selection of vessels for the EFP. Following that process and once the EFP vessels have signed an agreement to confirm they will meet the requirements of and participate in the EFP, the principal investigator will notify the Alaska Regional Administrator (or his agent) of the names of the EFP vessels including all required vessel and vessel

owner contact information. The principal investigator will also inform NMFS of the timeline for field testing for each field season.

<u>Exemptions needed to regulations affecting regular pollock fishing during 2013</u>:

1. Exemption from regular observer coverage requirements for vessels selected to participate in our salmon excluder EFP field tests. Vessels engaged in EFP testing will carry one or two sea samplers depending on the data collection requirements of the project, testing schedule and anticipated workload for sea samplers, available accommodations on the EFP vessel, and facilities available for accounting for salmon catches by tow, at-sea versus dockside. The exemption from the regular observer coverage and ability to modify catch sampling procedures has been important to the utility of the data collected in past salmon excluder EFPs.
2. All groundfish and salmon catches during the EFP will not count against the regular groundfish GOA TACs or Chinook salmon bycatch cap (when in place). This is needed to allow the testing to occur in a systematic manner under a prescribed test fishing protocol which is expected to reduce EFP vessel efficiency and will restrict the amount of catch per tow relative to normal fishing operations. For those reasons, the EFP test fishing protocol would be infeasible in the regular pollock fishery especially given the lack of assigned shares (catch share program).
3. Exemption from the 300,000 lb pollock trip limit (50 CFR 679.7(b)(2)) while participating in the EFP testing. The EFP testing protocol will limit catch per tow and other aspects of efficiency for the purpose of increasing the number of test tows and the range of conditions under which testing is done. It is hoped that by removing the trip limit, test vessels will be able to follow the requirements of the testing protocol more efficiently and minimize the cost of field testing and field personnel time in the field. The EFP is outside of the regular fishery and the groundfish and salmon used are not part of the normal pollock fishery and are not subject to the same competitive aspects of the regular fishery. Therefore the management purpose behind the trip limit is not relevant to this project and might unnecessarily constrain our ability to achieve the EFP objectives.
4. Any vessel approved to participate in this EFP, is exempt from a closure prohibiting directed trawl pollock fishing in the Central GOA during the term of this permit. Vessels subject to this exemption may exceed the pollock MRA in Table 11 to 50 CFR 679, during the specified period of the permit.

Proposed catch limits for this salmon excluder EFP

Field work season	MT of groundfish (in pollock target)	Number of Chinook salmon
Winter/Spring 2013 (January 20-May 31)	1,200	1,200
Fall 2013 (August 25-Oct 31)	1,200	1,200
Winter/Spring 2014 (January 20-May 31)	1,200	1,200
Fall 2014 (August 25-Oct 31)	1,200	1,200

Explanation for how the EFP catch allowances were derived:
The proposed amounts of catch shown in the above table per year and per season are what we believe is required to conduct a sufficient number of tows with a standard Pollock net with the excluder and recapture net installed to determine the escapement rates for Chinook salmon and Pollock. The catch amounts are designed to have a high probability of allowing us to estimate excluder performance with meaningful statistical confidence intervals around mean escapement rates for salmon and Pollock. The proposed catch limits for the EFP do not include any "compensation fishing" for the EFP vessels.

The EFP testing plan involves testing the flapper excluder on two different CGOA pollock vessels during two separate testing seasons over a two year period (winter/spring 2013, fall 2013, winter/spring 2014, fall 2014). EFP catch allowances for groundfish are the total amount of catch based on what the two EFP vessels in each field testing season per year would be expected to catch based on doing 12 EFP tows with typical catch amounts of groundfish per vessel in each testing season. It is also important to note that we have designed the testing to include two different size classes because based on our research on salmon excluders in the Bering Sea, we expect there will be differences in excluder shape during towing, water flow rates, and escapement performance between larger and smaller vessels. To ensure we develop an excluder that is effective on both small and large CGOA Pollock vessels, it is imperative that excluder testing occur on vessels typical of the two size classes in the CGOA fishery. For our purposes, the two size classes are in the CGOA are vessels which are in the ≤900 hp and vessels with horsepower of > 900 hp. In terms of how this splits the fleet, we estimate there are approximately 25 vessels in the smaller vessel group and about 10 vessels in the larger vessel group.

Our testing plan incorporates a total of four field testing seasons over a two year period because based on our excluder development work in the Bering Sea, we have seen that multiple field research seasons were needed to arrive at a workable flapper design. The second year of field testing allows us to make adjustments to the excluder based on what was learned during the first year. As mentioned above, we do have a reasonable idea of a starting point for excluder rigging from what was learned in 2011 video work in Kodiak. Relative to research effort needed to develop a workable excluder in the Bering Sea, however, the two years of testing requested in this EFP application is considerably less than the effort that has been needed over eight years with multiple EFPs in the Bering Sea which has finally arrived at an effective excluder. One reason we feel the CGOA excluder can be developed more expeditiously is that the primary salmon bycatch issue facing the CGOA is Chinook salmon whereas in the Bering Sea work on both chum and Chinook has been done over the course of multiple EFPs from 2003-2012. Additionally, the Bering Sea on the flapper excluder is now our starting point for the CGOA pollock fishery and the primary focus in the CGOA is to adapt the excluder to the scale of pollock nets, differences in towing speeds, differences in pollock and salmon catch rates, and other factors that we

have seen can affect excluder performance. Overall, we feel that the adaptation of the excluder to the CGOA is by no means a simple undertaking but the project is expected to be considerably less complicated simply because we now know we can get Chinook salmon to escape a pollock trawl at relatively high rates. The trick is to figure out how to create those water flow and spatial elements in a CGOA polllock net based on the fishing conditions that occur in the CGOA.

Because we are basing the target number of tows for each individual excluder configuration on experimental methods developed for the Bering Sea, some background on the evolution of testing methods is warranted. Our testing in the Bering Sea has relied on different methods over time and those methods have had varying degrees of success. From this experience we have determined that most efficient way to reliably demonstrate the performance of the salmon excluder is to conduct testing with a recapture net. This allows us to measure escapement rates by comparing the number of salmon and weight of Pollock in the recapture net relative to the total number of salmon and weight of Pollock in the tow.

Since the first designs of recapture nets, considerable design improvements to the recapture nets have been made. From numerous tests since then, we feel that these secondary nets appended to the main trawl are the best way to accurately measure escapement rates while minimizing the amount of test fishing needed. We expect that what has been learned in the Bering Sea work about the installation and use of recapture nets is directly and easily transferable to the Gulf of Alaska testing.

<u>How the target number of test tows was derived and expectations for statistical precision:</u>
Prior to 2010, a statistical power analyses were developed to evaluate sample size based on the probability of being able to detect an effect of a predicted magnitude (e.g. a level of reduction in salmon bycatch attributable to the gear modification) at an acceptable level of statistical precision. While rigorous in terms of methods, in retrospect our power analyses likely included inherent bias leading to an overestimation of sample size. This occurred because we lacked good data on the ambient variability in abundance of salmon where EFP testing occurred. Lacking this, proxy values were used based on salmon bycatch rates from the regular pollock fishery. But the regular pollock fishery in all likelihood avoided areas of relatively high salmon abundance. EFP testing, however, was in reality nearly always conducted in areas with relatively high salmon abundance (e.g. inside the rolling hotspots) to increase the chances of being able to measure performance of the excluder.

Testing in areas with higher, more consistent abundance of salmon generally means that there is a higher probability of being able to detect the effect of the excluder on catch rates. This is because haul to haul variability is lower than it would be if salmon abundance were lower and more erratic.

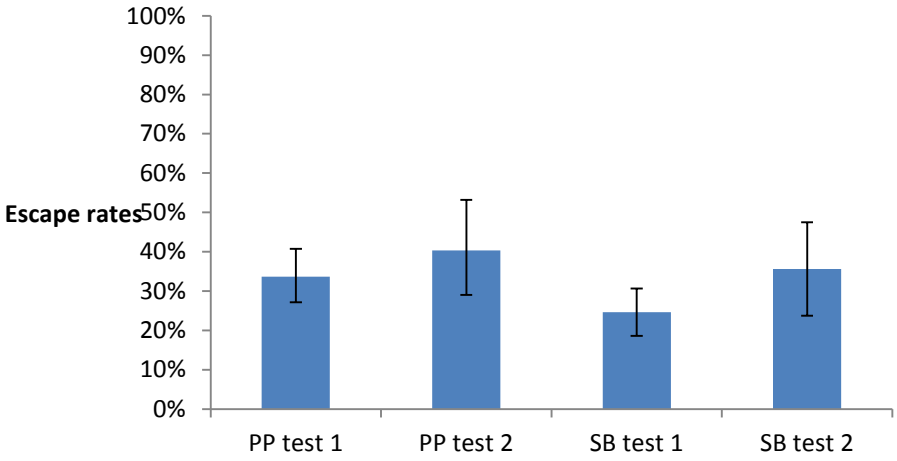
To avoid basing the experiments on a higher sample size than was needed, in our 2010 Bering Sea EFP application (the current Bering Sea EFP salmon excluder permit), we elected to examine recent results to see how many EFP tows it has taken to obtain useful confidence intervals around salmon escapement rates. By incorporating this retrospective examination into the development of the latest Bering Sea salmon excluder EFP application, we modified our approach to sample size estimation based on what we recognized was our “track record” of being able to estimate with reasonable statistical precision escapement rates with approximately 12 test EFP tows with a recapture net.

To illustrate how we came to this conclusion, Figure 3 below shows mean escapement rates and confidence intervals from our testing in winter of 2010. Chinook escapement rates from that winter on CP Starbound and CV Pacific Prince are shown in the figure. The confidence intervals around mean

escapement rates are fairly tight on the first set of tests where 10 tows were done for one EFP vessel and 12 for the other (test results labeled SB test 1 and PP test 1 in the figure). The intervals shown are 95% confidence intervals.

In the second round of tests where eight tows per EFP vessel were done, the wider confidence intervals (for PP test 2 and SB test 2) are illustrative of the likely trade off in precision for measurement of excluder performance in the second round of tests. The second tests were done to evaluate a slightly different excluder configuration.

Figure 3 Chinook escapement rates and confidence intervals for winter 2010 EFP tests



What is meant by an individual test of an excluder "configuration" is that the prescribed number of test tows is made with no (intentional) changes to the excluder device being tested during that set of EFP tows. For example, a configuration would be an amount of weight placed on the flapper panel or a different length of the flapper panel of the excluder. For each test of an excluder configuration, EFP test vessel factors such as towing speed and target amount of pollock per catch per haul are held constant. Because we are interested in how the excluder performs over a range differences in catch rates, however, our testing protocol deliberately incorporates differences in pollock fishing variables such as areas with different target catch rates, day and night fishing conditions, etc. for 12 tows done to test an excluder configuration.

The testing plan for this GOA EFP includes a test of an excluder configuration on a small and large class GOA vessel in the first season and then a second test of a different configuration on each EFP vessel in the second test season based on what was learned in the first test season. Specifically, we intend to conduct testing in the first season and evaluate the escapement rates along with underwater video collected during the test to help us understand fish behavior in response to the excluder. For the second year of the EFP we then would do the testing on an excluder that includes adjustments to the excluder such as changes in the amount of weight on the flapper or the amount of overlap between the flapper panel and escapement portal (affecting how far a salmon or Pollock has to swim forward to escape). Adjustments of this sort would be done to hopefully increase salmon escapement rates or reduce Pollock escapement rates based on the objectives of having an excluder that reduces salmon bycatch rates significantly while being practical in terms of minimizing Pollock escapement as well.

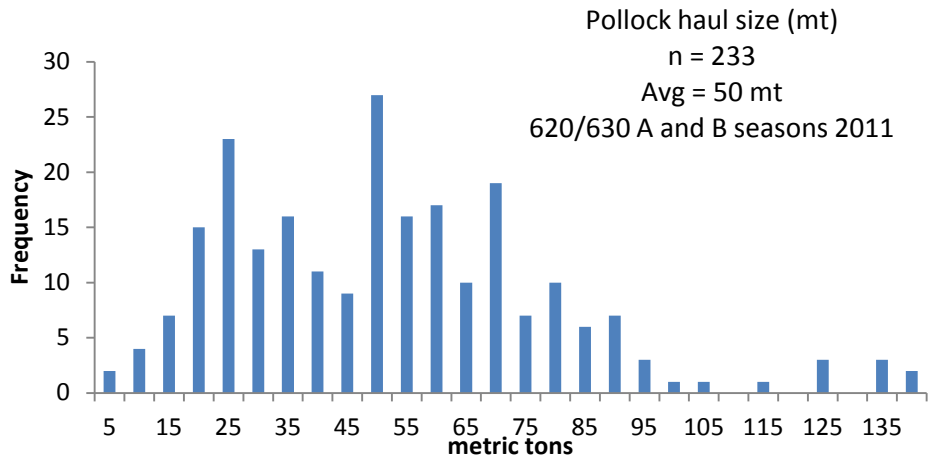
We think this will work in the GOA because based on our experience of multiple field-testing seasons using recapture nets, our testing protocols for the Bering Sea have allowed us to measure escapement in an efficient manner in each test of an excluder configuration using these methods. The desired level of precision in measurement of performance here needs to be understood in the context of applied research. Our methods are not intended to or able to evaluate how every possible covariate affects excluder performance (e.g. day night fishing, high pollock catch rates versus low). The objective is to estimate escapement and present results explaining the set of conditions that were encountered in the testing. An important caveat then is that the captains who may choose to use the device need to know that it may not perform in the same manner as our results depict if fishing conditions different from the ones occurring at the time of the testing.

With all this in mind, our request for what we feel are sufficient pollock and salmon allowances for this Gulf of Alaska EFP application is designed around the catch that would occur while testing the excluder for approximately 12 tows on each of the two EFP vessels for two field seasons during 2013 and 2014.

Catch quantities used to come up with the amounts of groundfish requested in the EFP were based on average catch per tow quantities of groundfish in the regular CGOA pollock fishery in 2011 (source: Alaska Groundfish Databank). We used average catch quantities per haul from the fishery because one of our objectives is to evaluate Pollock and salmon escapement performance under conditions that closely resemble normal fishing conditions. With approximately 50 mt per haul in the CGOA (figure 3), our 1,200 mt of groundfish per testing season allows for approximately 12 tows per EFP vessel per season. Hence 2,400 mt of groundfish is what is needed for the two test vessels per year and two years of EFP testing amounts to a total of 4,800 mt assuming the EFP testing is completed each projected field season.

The distribution of catch amounts per tow in the figure below appears bimodal which likely results from the two vessels size categories described above. During testing, the EFP likely will assign the groundfish somewhat unevenly between the two test vessels in order to accomplish our goal of 12 tows per vessel. This would allow catch per tow amounts to be reflective of what occurs in the regular fishery.

Figure 4 Frequency of pollock haul size in the 2011 Area 630 A/B season pollock fishery



<u>Derivation of the Chinook salmon bycatch allowances requested for the CGOA EFP:</u>

Our expectations for statistical confidence for measuring the salmon escapement performance of the excluder in approximately 12 tows is based on our Bering Sea testing where we deliberately conducted the EFP in areas with above average salmon bycatch rates (generally inside the revolving salmon bycatch hotspot closures). Conducting testing in areas with high salmon bycatch rates is necessary for increasing the chances of having statistical significance for our estimates of mean salmon escapement rates. While a similar formalized program in the Gulf of Alaska is not in place, we intend to use information from fishermen and data from the Alaska Groundfish Databank to target areas with above average changes of salmon bycatch and average catch rates for Pollock in our GOA EFP.

Accordingly, we have come up with a requested number of salmon for the EFP that is an upper bound allowance based on how many Chinook salmon could actually be caught if we are successfully able conduct the test in areas with above average Chinook bycatch rates. At the outset it is important to note that there are recognized problems with observer data estimates of salmon bycatch due to coverage levels and extrapolations. At the same time, however, those data was used by the NPFMC in the setting of the bycatch caps and as far as we know that is the only database that provides estimates of salmon bycatch across a time series of years. Data to look at bycatch rates across a set of years is important because annual variation in salmon bycatch rates occurs.

For our estimate of how many salmon would be needed to accomplish our objectives while avoiding the need for requesting additional salmon for the EFP, we looked at bycatch rates for the CGOA Pollock fishery over the last five years for which data are available (2007-2011, see tables above reproduced from GOA salmon bycatch EA). Total Pollock catch over in the CVOA statistical areas combined during that period was approximately 187,000 metric tons and total estimated Chinook salmon catch was approximately 61,000. That results in an average catch rate of approximately 0.33 Chinook per ton of Pollock catch over that time period. To examine what bycatch rates could be in a high bycatch year, recognizing the limitations to the data, one can look at 2007 where approximately 32,000 metric tons of Pollock were caught in the CGOA and Chinook catch that year was estimated to be 31,000. This comes out to a bycatch rate of approximately <u>one Chinook per ton on average</u> for the CGOA Pollock fishery.

Given the recognized limitations to the observer data on salmon catches in the GOA, we considered how the CGOA's highest annual bycatch rate of one Chinook per ton (2007) compared to the rates in our EFP testing in the Bering Sea Pollock fishery. In our EFP testing in the Bering Sea in 2007 during the Pollock A season, we had a Chinook rate that was close to 0.7 per ton of Pollock in 2007. While the Gulf of Alaska is obviously a different area, we do feel that a rate of one Chinook per ton is likely to be an upper bound in the GOA EFP because it is hard to imagine having bycatch conditions with encounter rates that are as high as in the Bering Sea during the winter of 2007. We were nonetheless able to stay under the one per ton rate in our EFP that year over the course of several weeks of excluder testing.

For the above reasons, we feel that in all likelihood our EFP catches in the GOA EFP will be under the one per ton level. At the same time, using that upper bound rate is appropriate for the environmental analysis (EA) done to evaluate an EFP application because it is a "worst-case scenario" therefore avoiding a situation where the effects of the EFP activities are underestimated. Setting limits for the EFP in this manner also avoids the need to request a change to the EFP permit if bycatch conditions turn out to be at all-time highs over the two years of our excluder testing activities. In past EFPs, NMFS has done all it can to consider and issue modifications to EFPs in a timely fashion. But because test vessels typically have opportunity costs associated with sitting idle over weekends or other periods when NMFS is evaluating requests for modifications, the unfortunate effect can be that the EFP vessel is forced to terminate its EFP activities prematurely. This can result in a failure to achieve sample size objectives and therefore study objectives in spite of all the effort made by the parties collaborating in the EFP.

Disposition of Groundfish and Prohibited Species harvested in conjunction with EFP activities: All retained groundfish caught in conjunction with EFP activities will be delivered to shoreside processing plants in Kodiak and sold. All Chinook salmon caught in conjunction with EFP activities will be retained on the vessel, offloaded at the shoreside processing plant where EFP catches are delivered, and made available for genetic sampling according to the protocols currently in place for the regular GOA Pollock fishery. All salmon that meet the standards of the food bank donation program in place for the GOA will be donated to that program. Any incidental catch of Pacific halibut will be handled in a manner consistent with the regulation pertaining to the GOA Pollock fishery.

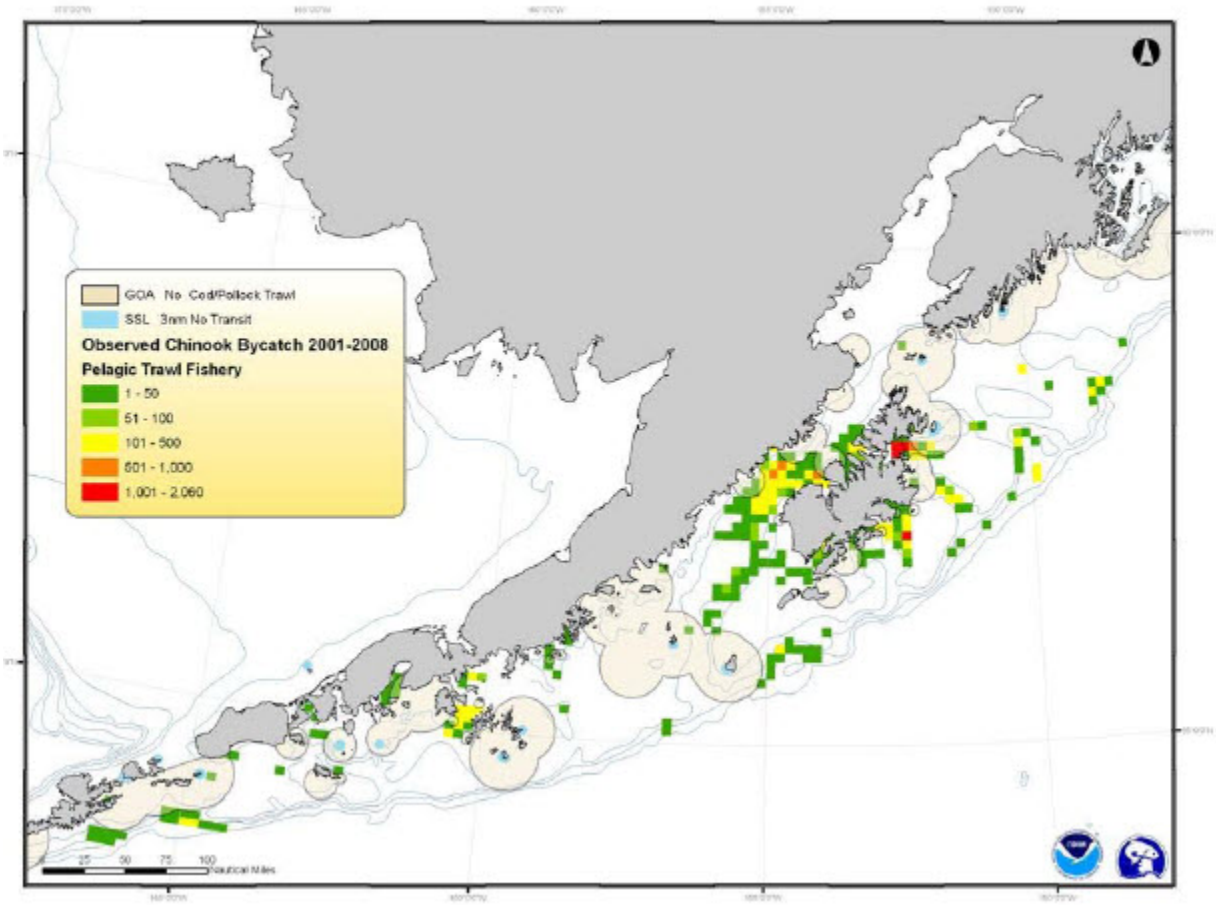
Expected Species Composition for EFP catches: All testing under this EFP will be done with the conventional pelagic Pollock nets used in the Central Gulf of Alaska. Catch composition for Pollock fishing with this net in the CGOA typically results in catches comprised of approximately 96% Pollock and 4% non-pollock groundfish species. We therefore expect catches of non-pollock species will be approximately 4% which would total to about 150 mt of non-pollock groundfish out of the 2,400 mt total catch. The species composition of the non-pollock catches in the EFP is expected to consist of Pacific cod, GOA flatfish species, and squid. Likewise, very low levels of catch of Pacific halibut and crab typically occur in the CGOA Pollock fishery due to the way pelagic Pollock nets are fished in the COA fishery. Our expectation is therefore that EFP catches of halibut and crab will be very low.

Areas where EFP testing is expected to occur during winter/spring and fall 2013 testing: For valid tests of salmon excluders, we need to be able to conduct EFP testing in areas with sufficiently high concentrations of salmon to help ensure that the test will be able to determine the effectiveness of the excluder. We also need to conduct testing where pollock catch rates are representative of actual fishing conditions because we want to evaluate performance in the fishery and in all likelihood pollock catch rates affect excluder performance. Evaluating Pollock escapement rates under normal Pollock catch rates is critical for eventual industry acceptance of the device into their regular fishing activities.

Predicting where adequate concentrations of salmon and pollock will occur from year to year and from season to season is inherently difficult, especially in the Gulf of Alaska. For this reason, it is not possible to specify exactly where the EFP will take place for the two testing seasons in the CGOA (fishing locations in NMFS statistical areas 620 and 630 shown in Figure below).

Prior to testing, the researchers will get input from pollock fishermen as well as examining any available data useful for showing where rates have been highest in the most recently completed pollock fishing season. The figure below from the NPFMC's recent analysis of Chinook bycatch in the GOA pollock fishery shows where salmon bycatch rates on observed hauls have been relatively high over the 20012008 time period.

Observed Chinook salmon prohibited species catch in the pelagic trawl fishery, summed over 2001-2008



<u>EFP Applicant's Assessment of Effects of the EFP on Marine Mammals and ESA-Listed Species</u>

The principle species of concern for effects of harvesting an additional 4,800 mt of groundfish and potential take of up to 4,800 Chinook salmon in the CGOA over the course of 2013 and 2014 are wDPS Steller sea lions, Cook Inlet Beluga whales, southern resident killer whales, and several ESA-listed runs of Chinook salmon in the Pacific Northwest.

To evaluate potential effects, the applicant reviewed the 2010 Biological Opinion for wDPS Steller sea lions and the 2011 Environmental Assessment (EA) done in support of Amendment 93 to the Gulf of Alaska Fishery Management Plan (establishing GOA Chinook bycatch limits). These documents provide current information on the effects of the CGOA Pollock fishery on the environment and the marine mammal and other ESA-listed species mentioned above.

The SSL Bi-op evaluated the effects of federal groundfish fisheries in the EEZ of Alaska <u>as a whole</u> on the WDPS of Steller sea lions. It concluded that the existing CGOA SSL protection measures, made up of closed areas, seasonal TAC apportionments, and other restrictions were adequate in the Gulf of Alaska. Likewise, the EA for Amendment 93 is relevant because it did an exhaustive evaluation of the effects of Chinook bycatch in the Pollock fishery of the Gulf of Alaska over several years including some years when the CGOA Pollock fishery is thought to have caught <u>more than ten times more Chinook</u> than the

2,400 EFP annual upper limit number of Chinook requested for this EFP. The EA for Amendment 93 also examined effects of salmon bycatch on a comprehensive set of ESA-listed species in the GOA, GOA strategic stocks of marine mammals under the MMPA, and effects of Pollock fishing on various salmon species including some "stocks of concern" in Alaska and ESA-listed stocks of the Pacific Northwest.

After reviewing the above analyses, the applicant's conclusion is that the proposed EFP groundfish and salmon bycatch catches, even assuming all of the salmon allowance is taken (an unlikely scenario) would have insignificant and likely too small to be immeasurable effects on wDPS Steller sea lions, Cook Inlet Beluga whales, Southern Resident killer whales, and ESA-listed Chinook salmon from the Pacific Northwest. This conclusion is based primarily on the relatively small scale of EFP catches relative to the much larger removals analyzed in the biological opinion and EA referred to above.

For Steller sea lions, the amount of EFP groundfish harvest (96% of which is expected to be Pollock) by the two EFP vessels operating in each of the two EFP field seasons in 2013 and 2014 amounts to 2,400 mt per year. To put the annual estimated removal into context of the annual estimate of biomass, it is important to recognize that the GOA Pollock biomass was estimated to be approximately 600,000 mt in the 2011-2012 Pollock stock assessment. Additionally, the recommended ABC for that same time period was approximately 125,000 mt. This means that the EFP would result in Pollock removals of a scale that is approximately 0.4% of total GOA Pollock biomass and approximately 2% of GOA Pollock ABC per year in 2013 and 2014.

Pollock is a major prey item for Steller Sea lions in the CGOA according to the 2010 SSL Bi-op. But EFP removals in addition to the regular Pollock fishery still add up to a small fraction of biomass and ABC. Additionally, the EFP fishing will spread evenly between winter/spring and fall in both EFP years (2013 and 2014), amounting to several weeks in each season. For this reason, the EFP fishing is unlikely to have any discernible effect standing alone on in combination with the regular Pollock fishery about which the 2010 Bi-op concluded did not require further restrictions beyond the TAC setting, seasonal apportionments, and closed area measures already in place.

The requested exemption to vessel trip limits of 300,000 lbs for this EFP warrants some consideration because the trip limit regulations are identified as part of the existing SSL protections measures which the Bi-op deemed to be adequately protective for SSL. In reviewing the SSL Bi-op sections relevant to the CGOA, it is evident that the trip limits for Pollock are not a major component of the SSL protection measures in place. Most of the Bi-op's review of existing measures in the GOA focuses on the current set of closed areas, TAC setting process, and safeguards built into the TAC setting process for reducing exploitation rates if stocks fall below the B 20 threshold. The EFP is not requesting any exemptions from the SSL closed areas and other aspects of the SSL regulations and is unlikely to have any implications on whether the Pollock stock in the GOA will dip down to the B20 threshold. In fact, based on the last three stock assessments, it appears GOA Pollock stocks are increasing in abundance. From this, it is important to recognize that GOA Pollock trip limits were not primarily an SSL protection measures and were implemented mostly to resolve equity issues associated with a fishery that is not managed under a catch share program.

Balancing the minor SSL protection aspects of the Pollock trip limits against the need for the exemption for the EFP, the reason the exemption is needed is to improve the EFP's ability to measure the effects of the salmon excluder on Chinook bycatch and Pollock catch rates. In the event that an EFP tow at the end of a trip would exceed the trip limit and require discarding, an exemption allows this outcome to be avoided. Discards during the EFP would prevent good tow by tow accounting of EFP Pollock catches. The means of accounting for Pollock catches per in the vessel's codend against which the Pollock escapement in the recapture net will be compared is explained below.

For the other species of ESA-listed marine mammal and salmon species mentioned above, the effects of interest are for the most part the removal of up to 2,400 Chinook salmon per year in each of the field testing years. While Cook Inlet belugas apparently eat groundfish to some extent, it is the returning salmon that enter the area where Cook Inlet belugas feed that is the potential effect of interest. The GOA groundfish harvests do not affect areas where belugas forage. According to the EA for the GOA Chinook salmon bycatch caps, both Cook Inlet belugas and southern killer whales populations rely heavily on Chinook that are present in the Gulf of Alaska at different life stages. So, for example, if Chinook taken as bycatch or in the EFP in the GOA are bound for the upper Cook Inlet, where runs are at low levels and considered to be a species of concern, (Amendment 93 EA Table 73), then interception of these Chinook in the GOA could have an effect on an important prey for Cook Inlet belugas. Likewise, bycatch of CGOA Chinook could conceivably include Chinook that are prey for southern resident killer whales or could be comprised of Chinook from Pacific Northwest populations which would be a concern.

The Amendment 93 EA evaluates effects on Cook Inlet belugas, southern resident killer whales, and ESA-listed Pacific Northwest salmon runs as well as other effects of GOA salmon bycatch on the species of concern and NMMPA strategic stocks. Table 75 of the EA provides estimates of the proportion of GOA salmon bycatch comprised of the runs bound for the Pacific Northwest and the upper Cook Inlet. Data from coded wire tag (CWT) returns are used to expand these CWT estimates in proportion to overall bycatch numbers in Table 75. The expanded numbers from over 20 years of GOA research surveys are, however, all under 10 with the exception of Willamette River Chinook with totals to 71. Thus according to the conclusions of the EA, the low frequency of CWT returns in GOA Chinook salmon are indicative of a very low probability that GOA Chinook bycatch is comprised of Chinook from these runs. Additionally, the EA analysis includes a discussion of how the numbers include hatchery fish to which the ESA-listing do not necessarily apply.

The overall conclusion in the EA is that the actual numbers of GOA salmon taken as bycatch in the Pollock fishery cannot be determined definitively but is thought to be a rather small number and a small proportion of GOA Chinook bycatch overall. This means that effectively, the GOA Pollock fishery is estimated to take only very small numbers of these salmon species of concern and therefore the downstream effects on belugas and southern resident killer whales is also likely to be proportionally quite small. By extension, the additional possible take of 2,400 Chinook in the GOA per year in 2013 and 2014 seems unlikely to have any measurable effect on the chances of taking additional Chinook from Pacific Northwest runs that are ESA listed or from the stocks that are food for Cook Inlet belugas and southern resident killer whales.

Another consideration in this evaluation is that requested salmon bycatch allowance for the EFP is set based on what could happen if Chinook bycatch abundance is high in 2013 and/or 2014 based on what is thought to have been taken in the Pollock fishery in 2007 and other years of relatively high abundance. As was explained above, the allowance of up to 2,400 Chinoo was designed to be an upper bound annual limit to allow the EFP to occur without needed to request an additional Chinook allowance if 2013 or 2014 are high abundance years for Chinook. In all likelihood, Chinook abundance will be more like the average that has occurred over the 1994-2011 period covered in the EA analysis. In this case, it is highly likely that EFP catches of CGOA Chinook would be considerably lower than 2,400 per year. While the EFP testing will be conducting in areas of relatively high abundance, in years with low or average Chinook abundance, it is still very unlikely that haul by haul Chinook rates in the EFP will be at the one-per ton rate used to derive the limit for the EFP. So in low abundance years for Chinook when an EFP catch allowance of 2,400 Chinook per year might appear to be a large percentage of the Pollock fisheries cap or its actual take, in reality the EFP fishing over just a few weeks in each season is unlikely to catch the 2,400 annual Chinook limit. We have based this conclusion on our EFP testing

experience in the Bering Sea where in 2007 when Chinook abundance in the Bering Sea was very high and spatial overlap of Pollock fishery and Chinook was high, our EFP averaged only 0.7 Chinook per ton. This involved testing on two boats during the peak of Chinook bycatch period for the fishery and in areas deemed to be hotspots based on a bycatch data system that allowed us to zoom in on hotspots.

Administration of the EFP:

The administration of the EFP will follow the same procedures used for the previous salmon excluder EFPs in the Bering Sea. The EFP applicant (permit holder) will be responsible for the overall responsibilities of the EFP including carrying out and overseeing all the field research and associated responsibilities of the EFP. This includes managing the field experiments to make sure that objectives of the EFP are accomplished and staffing field experiments with a qualified field project manager. The EFP applicant will also be responsible for working with the NMFS-certified observer provider companies to ensure the experiments utilize qualified sea samplers. The EFP applicant will ensure that sea samplers are provided with instructions and briefing materials to understand their sampling duties for the EFP.

The EFP applicant (permit holder) will also prepare materials for and conduct periodic meetings to get feedback from GOA pollock captains and gear manufacturers on excluder designs that will be tested during the EFP. The permit holder will present results from the different field work seasons to the pollock industry, North Pacific Fishery Management Council, and other venues to obtain feedback needed for development of the excluder designs. The permit holder will be responsible for data analysis and preliminary and final report drafting in consultation with Dr. Craig Rose of the Alaska Fishery Science Center.

As with the earlier EFPs, decisions on gear modifications to be tested and field testing protocols will be the shared responsibility of the PI and co-investigators. Co-investigators on the overall project to develop a workable salmon excluder are Dr. Craig Rose of the Alaska Fishery Science Center and Mr. John Gruver of the United Catcher Boats Association. The permit holder will be responsible for informing the Alaska Region of National Marine Fisheries Service of field testing dates and required EFP vessel information prior to each field test. Additionally, the permit holder will be responsible for drafting "request for proposals" (RFP) in consultation with AFSC and NMFS Alaska Region personnel involved with the research and other explanatory materials to solicit applications for qualified EFP vessels. The Resource Assessment and Conservation Engineering (RACE) Division of the Alaska Fisheries Science Center will be the lead reviewers of applications by vessel owners interested in providing vessels to conduct the EFP fishing. The Alaska Region of NMFS as well the Fishery Monitoring and Analysis (FMA) Division of the AFSC will also be invited to serve on or otherwise provide input on that review panel.

Testing and catch accounting methods for the CGOA EFP reflecting what is possible on CGOA catcher vessels:

Given the success with excluder development for reducing Chinook bycatch in the Bering Sea, the prospects for successful adaptation in the Central Gulf of Alaska are good. But as our previous experience has underscored, it will be critical to recognize that testing methods need to be rigorous to ensure that we will be able to measure performance differences as we make adjustments based on what is learned in the first testing season.

A critical issue relevant to the success of GOA testing is how to ensure the testing occurs in areas with sufficient salmon bycatch to detect the effectiveness of the excluder. The second issue is how to collect data on GOA boats which tend to be smaller and have considerably less room and more limited

facilities/equipment for collecting data and using video equipment, particularly for data pertaining to individual hauls. These issues are discussed below in the context of how things were done in the Bering Sea testing and the plan for getting as close as we can to haul-specific data collections in the proposed EFP work in the Gulf of Alaska.

One challenge will be using available information to find suitable testing locations. The Bering Sea salmon excluder testing has benefited greatly from the information available from the pollock industry's "hot spot" avoidance program. That program collects and distributes salmon bycatch data on a spatially-specific basis so that areas of relatively high salmon abundance could be located. This has allowed the EFP to locate suitable testing areas efficiently. Having this information allows the testing during the EFP to occur in areas with a relatively high probability of encountering the salmon and pollock catch conditions needed for testing on each EFP tow. This has helped to avoid the problem of using the groundfish provided for EFP testing to explore areas to find suitable testing conditions.

Unfortunately, the CGOA pollock fishery does not have such a system in place and therefore testing will have to depend more on the experience and knowledge of EFP vessel captains for identifying areas with salmon and pollock catch conditions useful for the testing. We will also rely on information from Alaska Groundfish Databank and the Alaska Whitefish Trawlers to locate where fishermen have encountered high salmon catches. Additionally, we will likely conduct excluder testing on the EFP vessels simultaneously whenever possible so that catch data can be shared to help locate areas with good testing conditions. This will be especially important when testing occurs while the regular CGOA pollock fishing is not in operation.

<u>Sampling and Data Collection Activites for the EFP on CGOA Vessels:</u>
To understand the challenges of collecting data on CGOA vessels, it is informative to consider how EFP data have been collected in the Bering Sea salmon excluder testing. In the Bering Sea, we have been able to collect salmon and pollock catch and escapement information on a tow by tow basis. This has been done by accounting for both the escapement from a tow (fish collected in the recapture net) and the total retained catch (fish collected in the regular codend) for each tow. Escapement rates are then determined for that tow by comparing the escapement to the total amount of the Pollock or salmon in that tow. For salmon, escapement performance is the proportion of escapement in terms of number of salmon recovered in the recapture net by species relative to the total number of that species per tow (number in regular codend plus recapture net). For pollock, the weight of pollock in the recapture net has been compared to the total weight of pollock in the tow (recapture net plus regular codend).

In the Bering Sea, accounting for numbers of salmon in the recapture net for each haul has typically been done by dumping the contents of the recapture net into an empty stern tank and accounting for each fish prior to dumping the vessel's codend into a stern tank. Once the recapture net catch is accounted for, the catch in the regular codend is placed in a tank and then moved into the refrigerated storage tanks via a conveyor belt. Salmon are sorted out of the codend catch as they move across the conveyor. In all previous Bering Sea EFPs, this has been done below deck where sea samplers and crew can work in a sheltered area with good lighting and the flow of catch across the conveyor belt can be controlled to allow for accurate identification of salmon in the codend.

To account for the proportion of pollock escapement on each tow, all pollock recovered in the recapture net in Bering Sea experiments have been weighed at the same time the salmon in the recapture net are accounted for. The weight of pollock in the codend is determined by the use of a motion compensated flow scale to weigh all the catch in the codend. To account for catch that is not pollock in the haul, sea

samplers take a normal species composition sample at random intervals and the fraction of non-pollock catch in the ~300 kg random sample has been used to account for the fraction of the main codend catch that is not pollock. We believe these methods allow for an accurate accounting of escapement rates for pollock on a tow by tow basis, especially on catcher processor vessels where similar catch accounting tools are used in the regular pollock fishery.

For Bering Sea catcher vessels, the boats selected for the EFP have generally been vessels with below deck facilities to sort fish on a conveyor belt as the catch is moved to the vessel's refrigerated sea water (RSW) tanks. In many EFP trials on catcher vessels, motion compensated flow scales have been installed for use in the EFP. While not certified by NMFS for catch accounting in the regular fisheries, these flow scale installations are tested on a daily basis during the EFP to ensure reasonable accuracy for the catch accounting objectives of the EFP and overall they have worked fairly well.

The accounting of escapement on a tow by tow basis using the methods described above has provided the opportunity to evaluate escapement rates both under the assumption that tows are independent tests of excluder performance and by pooling catches for EFP tows. This has allowed us to measure variability of the escapement rates and provided the opportunity to informally examine how variables such as time of day, fishing depth, and target catch rates affect escapement rates. In most cases statistical tests have revealed that the escapement results for salmon are only statistically significant across the pooled catch data instead of tow by tow data. The ability to examine escapement data on a tow by tow basis has, however, still been useful for forming hypotheses about covariates affecting escapement such as day versus night differences in escapement rates.

The ability to account for salmon escapement rates on a tow by tow basis has also been useful for removing specific tows where a gear failure occurred such as a torn recapture net. The catch from that specific tow can therefore be removed from the dataset for purposes of data consistency without compromising the integrity of the remaining data from the trip. If collection of tow by tow data were not possible, then the fish from a tow where a gear problem occurred could create problems for using the data from all the catch in the tank.

Based on our assessment of the facilities and practices on catcher vessels in the CGOA pollock fishery, tow by tow data collection presents some challenge but can be undertaken as long as the expectation for precision of data reflects the realities of available facilities on CGOA vessels.

<u>Methods for Accounting for Escapement Of Pollock and Salmon on CGOA Vessels</u>:
Most CGOA catcher vessels have limited deck space relative to Bering Sea catcher vessels but nonetheless these vessels do have sufficient space to account for counts of salmon in the recapture net prior to bringing the codend of the main net on board. An estimate of the weight of pollock escapement (pollock recovered in the recapture net) can be made as well. One way to do this is to place the pollock in observer baskets and count the number of baskets. Very small amounts can even be weighed directly on an observer's scale. For larger amounts of Pollock escapement in the recapture net, volumetric to weight equivalents using totes on deck can be set up prior to the EFP. To do this, an estimate of weight of pollock contained in a tote can be obtained by filling the totes that will be used for the EFP with pollock of the size encountered in the fishery at a shoreside plant prior to the EFP. That full tote can be weighed the pollock on the plant's scales. Precision could be improved if totes are marked with markings corresponding to fill levels and then weighed at the shoreside plant (e.g. quarter ton, half ton etc.).

Two Potential Ways to Account for Salmon in the CGOA Vessel's Codend: In order to account for haul-specific salmon escapement rates, salmon in the codend can be sorted out and counted on each haul. The salmon in the codend are salmon that did not escape (are therefore recovered in the codend instead of the recapture net). Accounting of these salmon on a haul by haul basis allows for comparison of the recapture (escaped) salmon to the total. It will clearly be more difficult to sort out and count salmon in the codend because of the relatively large amount of catch in the codend and the difficulty of sorting them from the pollock and other catch.

For some vessels interested in participating in the EFP, it may be possible to account for salmon in the codend on a haul by haul basis at sea. Candidate vessels with on-deck conveyor belts and sufficient room for running the pollock over the belt on deck prior to dumping the pollock into one of the vessel's RSW tanks might use these sorting belts. Removing salmon from the flow of fish over the belt will require the pace of fish moving over the belt to be relatively slow and will require considerable effort by sea samplers and crew to sort out and account for them.

Alternatively, haul by haul accounting for salmon catches at shoreside plants based on counting salmon by specific tanks corresponding to different hauls may also be feasible for some of the vessels interested in participating in the EFP. This approach may be more workable for vessels that have several separate tanks for holding catch. For EFP applicants proposing to account for salmon catches by tow at the shoreside plant, descriptions of the plan for placing fish into tanks, accounting for which tanks correspond to which hauls, and accounting for salmon by tank (haul) at the shoreside plant will be needed.

Haul-specific estimates of Pollock catch to allow for estimation of Pollock escapement rates by tow. Accounting for catch of pollock in the vessel's codend is the most challenging aspect of EFP catch accounting on CGOA boats. Three approaches are envisioned for estimating tow-specific pollock catches on CGOA vessels. These are described below.

1) No Mixing of Catches from Different Tows Approach: One approach would be not to mix catches from different tows when placing them in tanks and then recording which tows are stored in which tanks. Effectively this would mean that only two or three tows could be made per EFP trip, depending on the number of separate RSW tanks on the vessel. The first tow could be placed in as many tanks as it would take to contain the catch. To do another tow, the EFP vessel would need to have sufficient remaining clean tank space to contain all the catch from the second tow without needing to place any catch in the tank containing fish from the first tow. The same would have to be done for a third tow etc. With this approach, the weight of catch in the tanks corresponding to the different tows would be established at the shoreside plant at the end of the trip. Depending on the number and capacity of the EFP vessel's RSW tanks, using this method for achieving tow by tow catch accounting might be workable on some vessels but difficult to impractical on others.
2) Captain's Hail Approach: A second approach would be to rely on the vessel captain's or sea sampler's hail weight or volumetric estimate of the catch in the codend. Given the relatively short trawl alley on most of the CGOA vessels which require larger codends to be brought up and dumped in sections, this would result in a considerably less precise estimate of total catch than has been used in the Bering Sea EFPs but this still might be useful for gross estimations of pollock escapement rates. In thinking about this approach for our previous experience with Bering Sea salmon excluder EFPs, we have routinely queried captains on an informal basis during the EFP tests to get their estimate of catch amount per tow while the codend is on deck. It has

been interesting to compare these estimates on an *ad hoc* basis to the weight of the groundfish in the codend from the flow scales used for the EFP. While we have not developed any rigorous analyses to look at relative accuracy, generally, captains' estimates have been within 20% of scale weights for typical codend. But notably their estimates have been considerably less precise for smaller and irregularly-shaped codends.

3) Accounting for Pollock Escapement on a Trip Level Approach: Considering the limitations of catch measurement facilities on CGOA vessels, it may be that the only workable approach is to focus our efforts to account for pollock loss rates at the trip rather than tow-specific level. This would involve pooling all Pollock escapement recovered in the recapture net and comparing it to all the Pollock in the trip weighed at the shoreside plant. Collecting data at the trip level could, however, mask some important variability in pollock escapement rates on a tow by tow basis. Likewise we would not be able to look at how salmon escapement rates of different tows related to Pollock escapement on specific tows. This has been an informative in the Bering Sea EFPs where captains are often interested in looking at the results on a tow by tow basis because they can correlate this with the "fish sign" they are seeing on the headrope and downsounders to Pollock escapement percentages on specific tows.

Considering the different methods for accounting salmon and Pollock escapement rates for the EFP in the CGOA, it is important to keep in mind that the most important objective for the EFP is to learn how the excluder affects salmon catches on a tow by tow basis. For that purpose, the focus will be on how vessel's interested in applying to conduct the EFP testing propose to do haul by haul accounting for salmon escapement by either sorting salmon at sea or doing the accounting shoreside by accounting of salmon from tanks used for specific hauls.

Obtaining information on haul by haul escapement rates for Pollock would be highly desirable but each of the three approaches outlined above has potential shortcomings as well as possible feasibility implications for the vessels interested in participation in the EFP. In drafting the request for proposals for this CGOA salmon excluder EFP, the permit holder will work with the scientists and managers who will serve on the application review panel to come up with a ranking of the various approaches to accounting for salmon and Pollock escapement rates at the haul by haul or trip level. In this way, the RFP can help interested applicants understand which methods the review panel feels are workable and how proposals will be scored based on the methods proposed accounting for catches. The EFP will thus be able to select vessels that best achieve the excluder performance data collection objectives of the EFP.