ENVIRONMENTAL ASSESSMENT
For Issuing an Exempted Fishing Permit for the Purpose of Testing a Salmon Excluder Device in the Eastern Bering Sea Pollock Fishery

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Abstract: This Environmental Assessment analyzes alternatives on issuance of an exempted fishing permit for testing a salmon excluder device in the pollock trawl fishery of the Bering Sea. The experiment would be conducted from fall 2008 through spring 2010. The pollock trawl industry has experienced high numbers of salmon bycatch even though salmon bycatch measures are in place. New methods are needed to reduce salmon bycatch in the Alaska groundfish fisheries because of its potential effects on the salmon stocks important to Alaska and Canada and the cost to the pollock fishing industry. The successful development of a salmon excluder device for pollock trawl gear may result in reductions of salmon bycatch, potentially reducing costs associated with the harvest of pollock, and reducing the potential impact of the pollock trawl fishery on the salmon stocks. The proposed action is not expected to have significant impacts on the human environment.

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EXECUTIVE SUMMARY

The purpose of this action is to allow the continued development and testing of a salmon excluder device for the eastern Bering Sea pollock trawl fishery. Chinook salmon *(Oncorhynchus tshawytscha)* and non-Chinook salmon (primarily chum salmon *O. keta)* 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 and non-Chinook salmon taken in the Bering Sea and Aleutian Islands (BSAI) trawl fisheries.

The Chinook salmon prohibited species catch (PSC) limit for the BSAI trawl fisheries is 29,000 fish and the non-Chinook salmon PSC limit in the Catcher Vessel Operating Area is 42,000 fish between August 15 and October 14. Exceeding these limits triggers the closing of salmon savings areas (50 CFR part 679 Fig. 8 and Fig. 9) for certain time periods to protect salmon. Currently, pollock fishery participants are exempt from these closures by voluntarily participating in an intercooperative agreement (ICA) for reducing salmon bycatch. Since the fall of 2006, members of the ICA are required to move out of salmon hot spots to reduce the rate of salmon bycatch. Pollock also occurs in these salmon bycatch hot spots, and closure of these areas may result in added expense to the pollock fishing industry.

In 2007, the pollock fishery had record Chinook salmon bycatch at over 124,000 fish taken, even though the rate of Chinook salmon bycatch was reduced by the ICA salmon hot spot closures. Additional measures are needed to reduce the number of Chinook salmon taken, and the excluder device may provide another tool for the pollock fishery to reduce salmon bycatch. A salmon excluder device would reduce the potential for constraints being placed on the pollock fishery by salmon bycatch closures.

To allow development and testing of the salmon excluder device, federal regulations require an exempted fishing permit (EFP). The applicant for the EFP has worked with the Alaska Fisheries Science Center to develop a scientifically sound experiment to test the excluder device. Exemptions are needed from fishery regulations regarding total allowable catch, PSC limits, observers, and the closures of the salmon savings areas 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. 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 the proposed action determined that the experiment would have no discernable effects on target groundfish species, salmon and herring, and marine mammals. The impact of future actions under Alternative 2 could potentially be beneficial economically to those involved in the pollock fishery; however, 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 in a scientific manner, potentially leading to the reduction of salmon bycatch in the pollock trawl fishery.

1.0 INTRODUCTION

1.1 Proposed Action

The proposed action is the issuance of an exempted fishing permit (EFP) under 50 CFR 679.6 to Gauvin and Associates, LLC, to allow exemptions from certain fishery regulations under 50 CFR 679. These exemptions are necessary to facilitate the continued development and testing of a salmon excluder device for pollock trawl gear in the Bering Sea. The EFP would be effective through March 2010, to provide for testing under fall and winter conditions 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 eastern Bering Sea management area in the portions commonly used by catcher vessels and catcher processors to harvest pollock. Areas where the experiment will be conducted include locations in the Chum Salmon Savings Area (Figure 1.1) and the Chinook Salmon Saving Area. (Figure 1.2). One of the reasons for issuing the EFP is to permit the experimental trawling in the salmon savings areas and Catcher Vessel Operating Area, regardless of closure status. The applicant for the EFP provided Figures 1.3 and 1.4 to show the areas where fishing under the EFP is most likely to concentrate (Gauvin 2008). Fishing in the canyons near the Pribilof Islands is likely to occur in the fall when pollock are dispersed north (Figure 1.4). Fishing in the horseshoe area near Unimak Island may occur in the winter or fall (Figure 1.3).

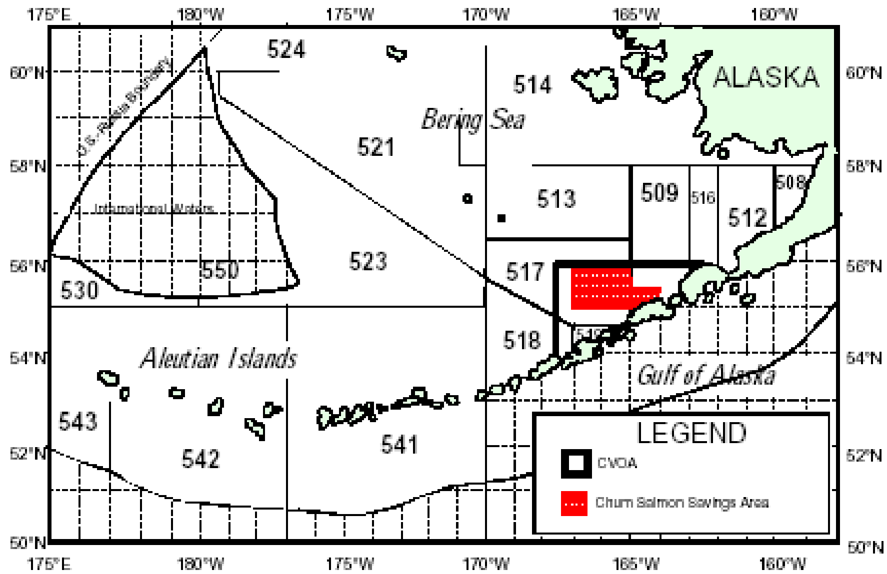

Figure 1.1 Chum Salmon Savings Area (as described in the legend). From Figure 9 to 50 CFR part 679.

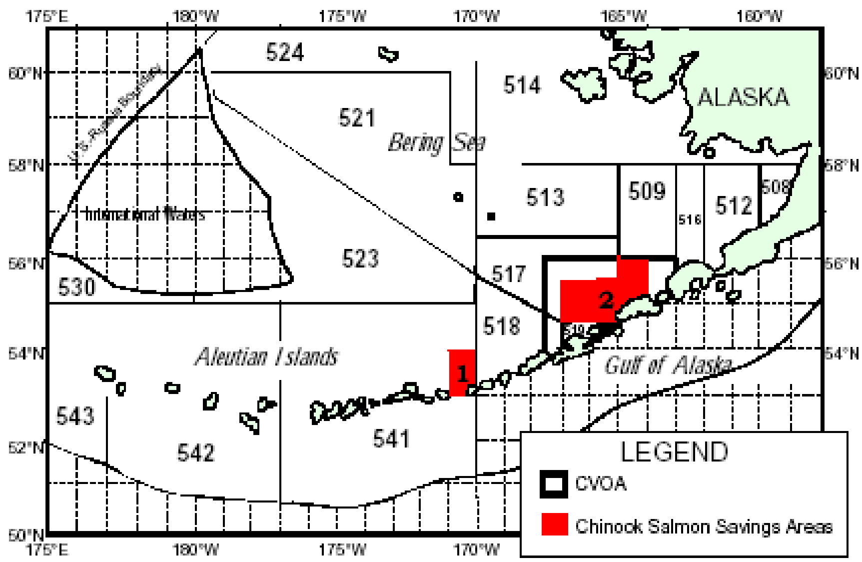

Figure 1.2 Chinook Salmon Savings Areas (as described in the legend). From Figure 8 to 50 CFR part 679.

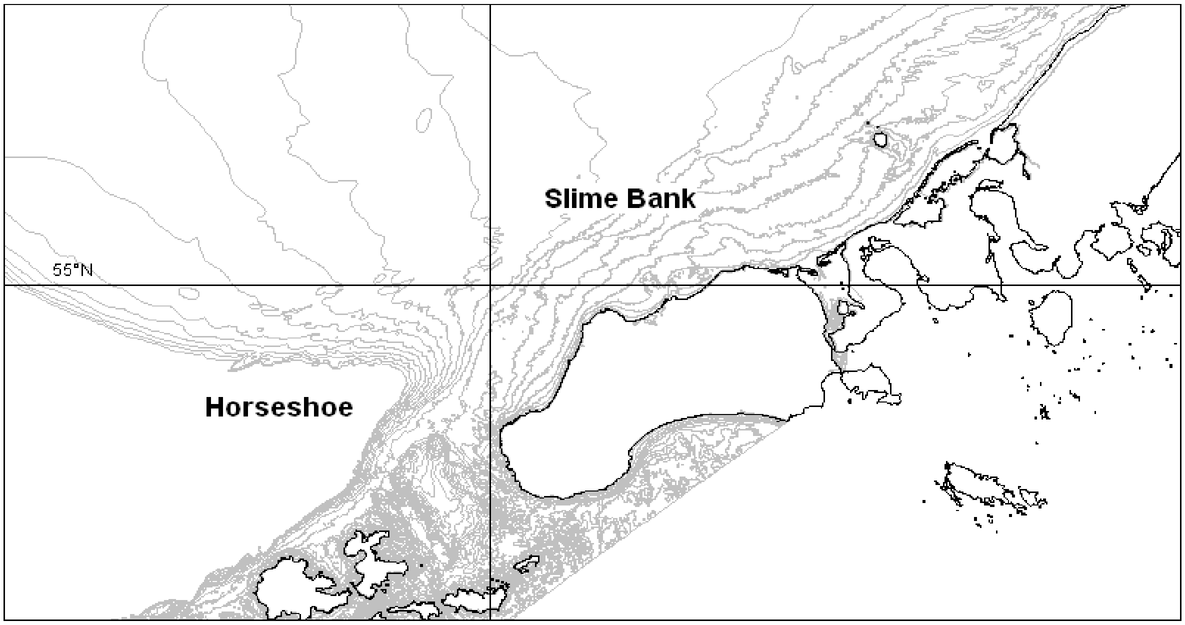

Figure 1.3 Common pollock fishing areas adjacent to Unimak Pass (Gauvin 2008). Large island in center of figure is Unimak Island.

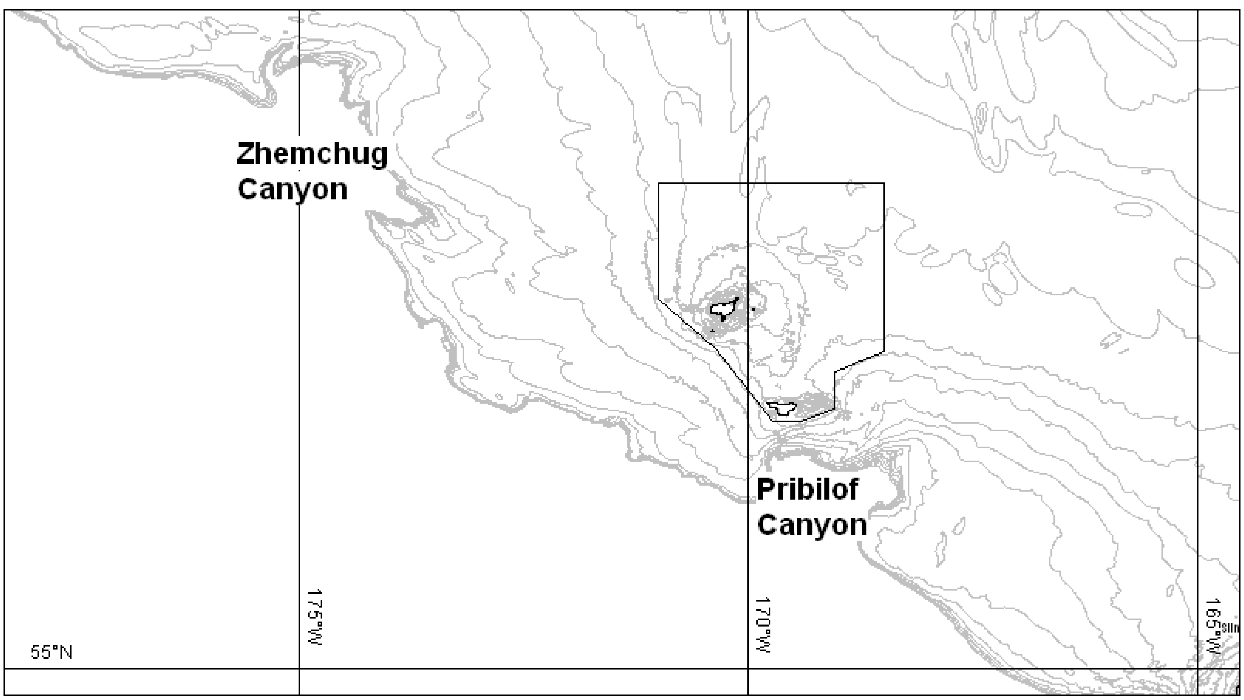

Figure 1.4 Common fishing areas around the Pribilof Islands shown in the box north of the Pribilof Canyon (Gauvin 2008).

1.3 Purpose and Need for Action

The purpose of this action is to allow the continued development and testing of a salmon excluder device for the eastern Bering Sea (BS) pollock trawl fishery. Chinook salmon *(Oncorhynchus tshawytscha)* and non-Chinook salmon (primarily chum salmon *O. keta)* are caught incidentally in Alaska groundfish fisheries, primarily in the walleye pollock (*Theragra chalcogramma)* trawl fishery. This action is needed to develop an additional method for reducing the bycatch of salmon in the BS pollock fishery. The bycatch of salmon in the BS pollock fishery is a great concern to those who depend on salmon resources in Alaska and Canada, and existing management measures have not resulted in low bycatch numbers. Salmon are a prohibited species in the groundfish fisheries (50 CFR 679.21) with annual limits placed on the number of Chinook and chum salmon taken in the Bering Sea and Aleutian Islands (BSAI) trawl fisheries. Exceeding these limits triggers the closing of salmon savings areas (Figures 1.1 and 1.2) for certain time periods to allow for protected areas for the salmon.

In 2007, Amendment 84 to the Fishery Management Plan for Groundfish of the Bering Sea and Aleutian Islands Management Area (FMP) was implemented (72 FR 61070, October 29, 2007) to exempt pollock fishery participants in a voluntary intercooperative agreement (ICA) for salmon bycatch reduction from the salmon savings areas closures. The ICA requires participants to avoid areas of high salmon bycatch rates through a voluntary rolling hot spot program managed by Sea State, Inc. When the rate of Chinook or chum salmon bycatch becomes too high, the ICA requires certain vessels to stay out of areas of high salmon bycatch, depending on the vessel's salmon bycatch rates. Even though the rate of salmon bycatch appears to have been lower with the ICA (Haflinger et al. 2008), the number of Chinook salmon taken in 2007 was exceptionally high. More details on the ICA are in Section 1.4.3.

Approximately 56 percent of the salmon incidentally caught in the BSAI groundfish fishery is from western Alaska, and the majority of the western Alaska salmon taken in the winter originate from the Yukon River (Myers et al. 2003). NMFS and the Council currently are developing and analyzing alternative measures to reduce salmon bycatch. An international environmental group also has contacted NMFS and the U. S. State Department to express its concern regarding the salmon bycatch in the BSAI pollock fishery (Oceana 2008). The pollock industry, NMFS, the Council, users of salmon resources, and environmental organizations all agree that salmon bycatch amounts in the BSAI pollock fishery are too high, and must be reduced. This EFP would address this need for action by supporting the development of one method for reducing 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 1990-2007, an annual average of 49,297 Chinook salmon and 147,813 non-Chinook salmon (over 95% chum salmon) were incidentally caught in BSAI groundfish trawl fisheries (Table 1.1). Bycatch is primarily of juvenile salmon that are one or two years away from returning to the river of origin as adults. The2007 Chinook salmon bycatch was the highest on record since 1990 for all BSAI groundfish fisheries and is estimated at 130,139 fish. Chinook salmon bycatch in the pollock fishery from January 20, 2008, through February 23, 2008, is 13,299 fish (NMFS inseason management data). Approximately 90 percent of this bycatch occurred in the pelagic trawl fishery for pollock. Chinook salmon taken in the BSAI groundfish fisheries comes from a number of salmon stocks along the Pacific Coast, Alaska, Russia, and Asia (Myers et al. 2003). Of interest is the relatively low numbers of non-Chinook salmon (mostly chum) bycatch (97,904 fish) in the BSAI groundfish fisheries compared to previous years, which ranged from 197,000 to over 700,000 fish in 2003 through 2006.

Table 1.1 Bycatch of Pacific Salmon in BSAI Groundfish trawl fisheries

	Numbers of Fish	
Year	Chinook	Non-Chinook
1990	14,085	16,202
1991	48,873	29,706
1992	41,955	40,090
1993	45,964	242,895
1994	44,380	95,978
1995	23,079	20,901
1996	63,205	77,771
1997	50,218	67,349
1998	58,966	69,237
1999	14,586	47,204
2000	8,219	59,306
2001	40,303	60,460
2002	37,507	78,739
2003	52,699	188,838
2004	60,122	447,195
2005	72,856	703,455
2006	85,915	324,601
2007	124,421	90,713
Average	49,297	147,813

Source: NMFS Alaska Region Inseason Management (1/11/08)

Pacific salmon support large commercial, recreational, and subsistence 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 2007 were 562,000 fish

(ADFG 2007a). Chum salmon harvests since 1970 have ranged from 4,323,000 fish (1975) to 24,376,491 fish (2000). Chum salmon commercial harvests in 2007 were approximately 17,337,000 fish (ADFG 2007a). Although reduced salmon runs may be attributable to changes in ocean conditions (Hare and Francis 1995; Kruse 1998), considerable public concern has been raised as to the effect of low salmon returns on fishery dependent communities in western Alaska. Responding to the crisis in the salmon industry, the Governor of Alaska has declared a state emergency on several occasions in the early 2000s. In response to the Governor's concerns 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 Fishery Conservation and Management Act, national standard 9 (NPFMC 1999).

NMFS has published a notice of intent to prepare an environmental impact statement (EIS) on Bering Sea salmon bycatch management (72 FR 72994, December 26, 2007). The proposed action to be analyzed in the EIS is further discussed below in section 1.4.3

Two Chinook salmon stocks from the Pacific Northwest are listed under the Endangered Species Act (ESA) and may be taken in the BSAI groundfish fisheries: the Lower Columbia River and the Upper Willamette River Chinook stocks. On January 11, 2007, the NMFS Northwest Region completed a supplemental biological opinion for the BSAI groundfish fisheries, including an incidental take statement (NMFS 2007a). The 2007 amount of Chinook salmon bycatch (124,421 for trawl fisheries) is well above the recent range of observation cited in the incidental take statement (36,000 to 87,500 Chinook salmon for all BSAI groundfish fisheries). Under Section 7 of the ESA, NMFS Alaska Region is continuing consultation with NMFS Northwest Region on the potential effects of the BSAI groundfish fisheries on the two ESA-listed Chinook salmon stocks (NMFS 2008a).

1.4.2 Past, Present, and Future Salmon Bycatch Reduction Measures

Salmon are listed as a prohibited species in the groundfish fishery management plans, meaning that they cannot be retained and sold. Regulations implemented in 1994 prohibited the discard of salmon taken as bycatch in BSAI groundfish trawl fisheries until the number of salmon has been determined by a NMFS certified observer (59 FR 18757, April 20, 1994). Subsequent regulations allowed for voluntary retention and processing of salmon for donation to NMFS qualified distributors of food to underprivileged individuals (Prohibited Species Donation Program (PSDP) (50 CFR 679.26).

Chinook Salmon Savings Areas (CHSSA) and Chum Salmon Savings Area (CSSA)

Bycatch of Chinook salmon in Alaska groundfish fisheries is generally higher in the winter and chum salmon bycatch is higher in the summer although this trend is not without exceptions. Based on this seasonal pattern, the Council has adopted extensive seasonal cap and closure measures to control bycatch of salmon in trawl fisheries (Witherell and Pautzke 1997). Starting in 1994, regulations established the CSSA, which is an area with historically high non-Chinook salmon bycatch (Fig. 1.1) (50 CFR 679.21(e)(7)(vii)). From 1996 through 1999, regulations were in place to prohibit trawling in the CHSSA (50 CFR 679.21(e)(7)(viii)). More than 48,000 Chinook salmon were taken as bycatch annually from 1996 through 1998, but CHSSA closures were not triggered because bycatch limits were not exceeded before April 15.

In 2000, new regulations to reduce Chinook salmon bycatch in BSAI trawl fisheries were implemented (65 FR 60587, October 12, 2000). The regulations incrementally reduced the bycatch limit for the pollock fishery from 48,000 to 29,000 Chinook salmon over a 4-year period and implemented year-round accounting of Chinook salmon bycatch in the pollock fishery (50 CFR 679.21(e)(1)(vii)) . Additionally, the boundaries of the CHSSA were modified. Under these modifications, in the event the limit is triggered before April 15, the CHSSA closes immediately. The closure would be removed on April 16, but would be reinitiated September 1 and continue through the end of the year. If the limit were reached after April 15, but before September 1, then the areas would close on September 1. If the limit were reached after September 1, the areas would close immediately through the end of the year (50 CFR 679.21(e)(7)(viii)).

Even though the provisions for the CHSSA and CSSA are still in the regulations, nearly all of the pollock vessels are participating voluntarily at this time in the Amendment 84 program, which exempts them from the CHSSA and CSSA closures. The provisions of the Amendment 84 program are explained below.

Amendment 84

Amendment 84 to the 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 Bering Sea to use their ICA to reduce salmon bycatch using the voluntary rolling hotspot system (VRHS). The VRHS uses real-time salmon bycatch information to avoid areas of high chum and Chinook salmon 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 CHSSA and CSSA in the Bering Sea. The Council recognized that regulatory management measures previously established, including a bycatch cap that triggered closure of the CHSSA and CSSA, have not been effective at reducing salmon bycatch.

During the second half of 2006 and in 2007, the provisions of the ICA were implemented using an EFP.   In 2006, the EFP results indicated that for the approximately 40,000 mt of observed groundfish associated with boats that fished inside areas before they were closed, and that also had observers after closures, 1,692 Chinook salmon and 62,732 chum salmon were avoided. These numbers represent reductions in bycatch of 20 percent and 64 percent, respectively, for these species, for the vessels analyzed (Haflinger et al. 2007). Chinook salmon closures appear to have had an associated significant effect in lowering chum salmon bycatch, while chum salmon closures appear to have a negative, but likely insignificant, effect in lowering Chinook salmon bycatch. By applying theVRHS, the 2007 A season Chinook salmon bycatch reduction is estimated at 70 percent (Haflinger et al. 2008). The 2007 B season savings in Chinook salmon bycatch was approximately 54 percent.

Under the ICA, the pollock fleet has developed its own private-sector arrangements to monitor salmon bycatch rates and relay the information back to the fishing vessels while they are at sea. Observer data and other reports are transmitted to analysts associated with the private firm, Sea State, Inc. Some of these reports are transmitted immediately from sea; some are transmitted at the time catcher vessels make their shoreside deliveries. Sea State, Inc., processes the data, identifies locations with high salmon bycatch rates, and informs the fishing vessels. Sea State, Inc., in cooperation with the ICA manager of United Catcher Boats, is authorized by the agreement to restrict fishing operations in high salmon bycatch rate areas if salmon catch exceeds a threshold level (there are limits on the total area that may be restricted in a week). Fishing operations are required, by the terms of their contract in the ICA, to limit their fishing activity in an area that is closed. The vessel limitations differ among the cooperatives; cooperatives whose skippers have been fishing with little salmon bycatch are limited less than those that have had higher bycatch. Cooperatives with high salmon bycatch may be prohibited from fishing in the restricted areas for a full week. The ICA is a contract imposing binding obligations on the cooperatives.

Irrespective of Sea State, Inc., reports, vessel operators will often conduct “test fishing” upon entering new areas. Test fishing involves taking short tows to see if salmon bycatch rates are high. Test fishing adds to the cost of fishing activity.

Future Salmon Bycatch Management

In March 2007, the Council established the Salmon Bycatch Workgroup (SBW). This workgroup is tasked with exploring methods to minimize BS salmon bycatch through triggers for new salmon bycatch closures and time/area closures. The Council intends to incorporate SBW recommendations in an analysis of alternatives to remove the current salmon savings areas, and implement new salmon savings areas based on current salmon bycatch hotspots, or close fisheries when salmon bycatch numbers reach certain levels.

In October 2007, the Council heard a SBW report on recommendations for alternatives. The Council adopted the SBW’s recommendations, and tasked the workgroup with considering the feasibility of several additional options, including an option to allocate salmon bycatch limits among the three pollock sectors (motherships, catcher processors, and the inshore catcher vessel sectors). The SBW met in November 2007 to discuss these options. Based on the SBW’s recommendations, the Council in December further refined alternatives for analysis

Also at its December 2007 meeting, the Council concurred with NMFS’ suggestion that an EIS be prepared for the salmon bycatch reduction action and reviewed a draft Notice of Intent (NOI) to prepare an EIS. The NOI was published December 26, 2007 (72 FR 72992) for a 45-day scoping period ending February 15, 2008. Because the BSAI groundfish fisheries are likely to adversely affect ESA- listed salmon and this would be a change in the action previously consulted on, we anticipate consulting on this action with the NMFS Northwest Region in summer 2008, after the Council has selected a preliminary preferred alternative. Any changes to the salmon bycatch management requirements for the pollock fishery are not likely to be effective until early 2010.

1.4.3 Costs Associated with Salmon Bycatch

The closures of areas to reduce salmon bycatch have the potential to impose significant costs on pollock fishermen operating in the BSAI. There are, first of all, the costs imposed by potential closures of the Chinook and chum salmon savings areas and the salmon hot spots under the ICA. Second, there are the costs imposed on the industry as it takes steps to control its salmon bycatch. In addition, handling salmon bycatch creates costs for inshore fisheries.

Potential closures of Chinook and chum savings areas and salmon hot spots under the ICA

Closed areas prevent the fleet from determining where to fish based on pollock distribution. Pollock also occurs in the salmon savings areas and in the salmon hot spots under the ICA, and closure of these 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 (CPUE). The ICA for reducing salmon bycatch is a voluntary program, which so far has included all pollock catcher vessels. If a vessel owner chooses not to participate in the ICA, then the salmon savings area closures would apply to that vessel.

Based on historical bycatch rates, the Chinook salmon PSC amount will likely be exceeded, resulting in the closure of the Chinook Salmon Savings Area (CHSSA). A salmon excluder device would reduce bycatch thereby lessening the potential for exceeding the PSC limits and reduce the potential for constraints being placed on the trawl fisheries due to exceeding salmon PSC limits.

As shown in Figures 1.1 and 1.2, pollock fishermen are subject to separate savings area closures for Chinook and chum salmon. The separate closures reflect differences in the PSC patterns for the two species. Chinook salmon bycatch tends to be higher in the winter and late fall and lower in the summer. If the Chinook salmon PSC cap is reached before April 15, the CHSSA is closed until April 15, allowed to open between April 15 and September 1, and then closed again for the rest of the year. Reaching the Chinook salmon PSC cap between April 15 and October 31 requires closure of the CHSSA on September 1 for the rest of the year. Reaching the cap after September 1 requires immediate closure of the CHSSA for the rest of the year. The Chinook salmon PSC cap is 26,825 fish for the non-Community Development Quota (CDQ) Bering Sea pelagic trawl pollock fishery.[1]

Non-Chinook (chum) salmon bycatch is a problem during the summer. The Chum Salmon Savings Area (CSSA) is closed to pollock fishermen from August 1 to August 31, irrespective of the level of non-Chinook salmon bycatch. In addition, the CSSA will close immediately if fishermen reach a non-CDQ threshold of 38,850 fish in the catcher vessel operational area (CVOA) between August 15 and October 14.[2] NMFS inseason managers must make "real time" projections of salmon bycatch based on relatively limited information from observers. Not all the vessels in the fleet are observed, so the managers know they have incomplete information. Moreover, in order to avoid exceeding the cap, the managers must project an expected date on which the cap will be reached and close the fishery at that time. This projection is based on apparent PSC rates as the cap is approached, and takes account of the existence of known unobserved harvests.[3]

In the 2006 B season for pollock, June 10-November 1, an EFP was used to implement the VRHS until Amendment 84 could be approved. All pollock catcher vessels participated in the VRHS and were therefore exempt from the CHSSA closure starting in September. It is instructive to compare Chinook salmon bycatch amounts in 2006 and 2007 to this cap to see if it would have resulted in CHSSA closures in those years for vessels not participating in the ICA for salmon bycatch reduction. Any impact of the closure would fall on catcher vessels rather than catcher processors, because a large part of the CHSSA lies within the CVOA from which catcher processors are excluded by regulation from June 10 through November 1 (§§679.22(a)(5) and 679.23(e)(2))[4].

In 2006, the pollock fleet harvested a total of about 81,549 Chinook in the BSAI. The fleet exceeded the 26,825 Chinook limit in February 2006, resulting in the closing of the CHSSA to non-CDQ pollock fishing from February 15 to April 15 and from September 1 through December 31, 2006.[5] The savings area closure would have forced the catcher vessels to fish elsewhere.

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[1]The total BS pelagic trawl Chinook salmon PSC cap is 29,000 fish. This is divided between the CDQ fishermen and the AFA fishermen. The CDQ fishermen receive 7.5% of the cap. The discussion in this analysis pertains to the AFA fishermen. Development of a successful excluder device would undoubtedly help CDQ operations deal with their bycatch problems as well.

[2]The chum PSC cap is 42,000 fish, 7.5% of which is allocated to the CDQ groups, and the remainder of which (38,850 fish) is allocated to the AFA.

[3]Furuness, Mary. NOAA Fisheries, 709 W. 9th St., Juneau, AK 99802-1668. NOAA in-season manager. Personal communication, 5-20-03.

[4]Although part of the Chinook salmon savings area lies outside of the CVOA, it is within the Aleutian Islands, where very little pollock fishing occurs.

[5]NMFS Information Bulletin 06-10.

In 2007, the BSAI pollock fleet incidentally caught a total of 116,482 Chinook salmon. The fleet exceeded the 26,825 Chinook limit even earlier in February than in 2006. The CHSSA was closed to non-CDQ pollock fishing February 6 through April 15 and September 1 through December 31. Because all of the pollock catcher vessels were participating in the ICA, none of the vessels were prevented from fishing in the CHSSA by this closure alone.

The pollock fishery vessels not participating in the VRHS also has to operate within a non-Chinook salmon cap of 38,850 fish in the CVOA between August 15 and October 14 (§679.21). In 2005, the pollock fishery exceeded the non-Chinook limit of 42,000 fish by taking 54,088 fish in the CVOA between August 15 and October 14. The CSSA falls completely inside the CVOA. Since no catcher-processors are allowed to fish in the CVOA during the B season (June through October) the restriction on savings area fishing would have fallen entirely on catcher vessels. The CSSA was not closed in 2005 because the limit was exceeded near the end of the fishing season[6]. In 2006, the pollock fleet did not exceed the non-Chinook limit of 42,000 fish in the CVOA between August 15 and October 14, and thus did not trigger the closure in the CSSA. In 2007, all pollock vessels participated in the VRHS and were exempt from any closure of the CSSA.

The conclusions from this analysis are:

> (1) If a pollock vessel operated outside of the VRHS, it could be closed out of the CHSSA or CSSA due to the pollock fleet reaching either the Chinook or non-Chinook salmon PSC cap in a year and triggering the closure of one or both of the savings areas,
>
> (2) Closures are likely to be triggered during the second half of the year, and
>
> (3) The closures are most likely to affect the catcher vessel component of the pollock fleet, since both savings areas lie predominately in the CVOA, and catcher processor vessels are kept out of this area by regulation during the second half of the year.

By forcing catcher vessels off their preferred fishing grounds, the VRHS closures and CHSSA and CSSA closures can reduce revenues or increase costs. Even if catcher vessels can continue to harvest as many pollock as before, they may face increased travel costs if the closures force them to move to new fishing grounds (which may be further from their delivery ports). They may have to fish for pollock in areas where catch per unit of effort (CPUE) is lower, or they may be forced to fish on pollock stocks of lower quality (maybe on smaller fish). CPUE may be particularly affected by closure of the CHSSA or hot spot areas within the CHSSA because this reaches further south than the CSSA and affects the north side of the productive horseshoe fishing grounds. Pollock quality and its ex-vessel price can be reduced if fishermen in catcher vessels are forced by closures to fish further from delivery ports. Increased running time and increased time between harvest and processing can reduce the desirability of pollock. The

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[6] Mary Furuness, NMFS inseason management, personal communication, February 5, 2008

quality of surimi grades for shoreside-processed pollock begin to decline as the time between harvest and delivery increase. Processors producing fillets prefer larger pollock than processors producing surimi. A vessel fishing for a processor with a size preference may be forced off of desirable sized pollock and forced to fish for unsuitably sized pollock by an area closure.[7] Reductions in salmon bycatch rates during normal fishing activities (prior to closures) may also 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 will impose costs on pollock fishermen similar to those costs involved in the closures of CHSSA and CSSA (borne by both catcher processors and catcher vessels). 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 would reduce the salmon catch associated with initial inadvertent discovery of hot spots. Excluder devices also will slow the rate of salmon catch in hot spots in the interval between the time the hot spot is identified and the time the fleet can be notified of the salmon hotspot and directed away from it or 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 hot spots. 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 those waters. Returning salmon are used in subsistence, commercial, 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 U.S. inshore uses for two reasons: the increased return to U.S. 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. Genetic studies of chum salmon in the Bering Sea conducted on samples from Bering Sea research trawl surveys indicated that the estimated stock composition for maturing chum salmon was 70% Japanese, 10% Russian, and 20% North American stocks, while immature fish were estimated as 54% Japanese, 33% Russian, and 13% North American (Urawa et al. 2004). Data suggest a much lower percentage of Chinook salmon originate from Asia. (Witherell et al. 2002,

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[7] Gruver, John. Intercoop Manager, United Catcher Boats. Fisherman's Terminal, 4005 20th Ave. W - Suite 110, Seattle, WA 98199. Personal communication, May 29, 2003.

pages 59-60). Witherell et al. (2002) found that Chinook salmon were one to two years away from returning to spawn when taken as bycatch; they assumed Chinook salmon natural mortality rates of 10% to 20% a year (Witherell et al. 2002, page 61).[8]

A study completed in 2003 estimated age and stock composition of Chinook salmon in the 1997 through 1999 BSAI groundfish fishery bycatch samples, from the NMFS observer program database (Myers et al. 2004). Results indicated that bycatch samples were dominated by younger (age 1.2) fish in summer, and older (age 1.3 and 1.4) fish in winter (Myers et al. 2004). The stock structure was dominated by western Alaskan stocks, with the estimated Chinook salmon stock composition of 56% Western Alaska, 31% Central Alaska, 8% Southeast Alaska-British Columbia-Columbia River Basin-Oregon, and 5% Russia.

Fishing Industry Concerns Regarding Salmon Bycatch In 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. From a practical perspective, the pollock industry believes that one of the biggest problems with salmon avoidance is that areas of salmon concentration 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. Overall, hotspot avoidance and other approaches have provided some success, but these efforts can only achieve success to the degree that salmon movements (and hence bycatch) follow some sort of predictable pattern (UCBA 2003).

The challenges of salmon bycatch avoidance itself, particularly in the context of the restrictive bycatch management measures in place, create costs for the pollock industry. This situation will undoubtedly be even more acute if salmon populations increase or environmental conditions change in the future to increase the overlap of Chinook and chum salmon feeding and migration routes with pollock fishing grounds. The potential effects of existing management controls on salmon bycatch can be seen in the analysis prepared in support of the decision to reduce the Chinook salmon bycatch cap. That analysis determined that had the cap of 36,000 salmon (an amount far in excess of the current 29,000 cap) been in place during the 1994-1997 period, closures would have been triggered in three of the four years for which data were available. This would have been expected to reduce the pollock catch in those years by 7-28% (NPFMC 1999).

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 avoid harvesting more than the allowable amount of pollock in Steller sea lion protection areas, fishing areas must be selected outside of Steller sea lion protection areas, even when salmon bycatch was relatively low in those areas. In some cases, this tradeoff can mean higher bycatch rates of

[8] Age specific information was not as good for chum salmon.

salmon.

Trawl skippers have informally developed and tested excluder devices for bottom trawls for many years. Little or no informal effort has been focused on designing a salmon excluder device for pelagic trawls used in the BSAI pollock fishery. One explanation for this is that up until recently, the industry did not have access to the technical expertise and equipment to capture video images *in situ* where low-light conditions make this difficult. Another may be that the bycatch rates are usually lower in the pelagic trawl fishery compared to the bottom trawl fishery.

1.4.4. 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 rigorous experimental design. In the experience of the fishing industry, informal efforts to test net modifications in an *ad hoc* manner are not efficient because a fisherman working independently typically does not test modification ideas systematically. While fishermen often possess a strong grasp of technical aspects of fishing gear in combination with outstanding ingenuity for adaptation, the coordinated and systematic approach of testing gear modifications through an EFP collaboration of science and industry is a more productive way to develop bycatch reduction devices (BRDs).

EFPs are advantageous because of the relatively high cost of chartering large research vessels like those used in the BS pollock fishery. Additional fishing opportunities can be used to help fund research and development costs of conservation engineering without significant biological effects on stocks. 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 be otherwise allowed under the groundfish regulations. For these reasons, an EFP is considered the best method for developing a salmon excluder device.

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

The EA for EFP 05-02 to support the development of a salmon excluder device (NMFS 2005a) and the final report for the work under EFP 05-02 (Gauvin and Gruver 2008) 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 Alaska Fisheries Science Center 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. Several years of testing have resulted in the current design of the salmon excluder device that includes a flapper that remains open during fishing but closes during slow down to keep pollock from escaping and to allow salmon at the top of the net to escape. This is the device to be tested and potentially modified under this action (Figure 1.5).

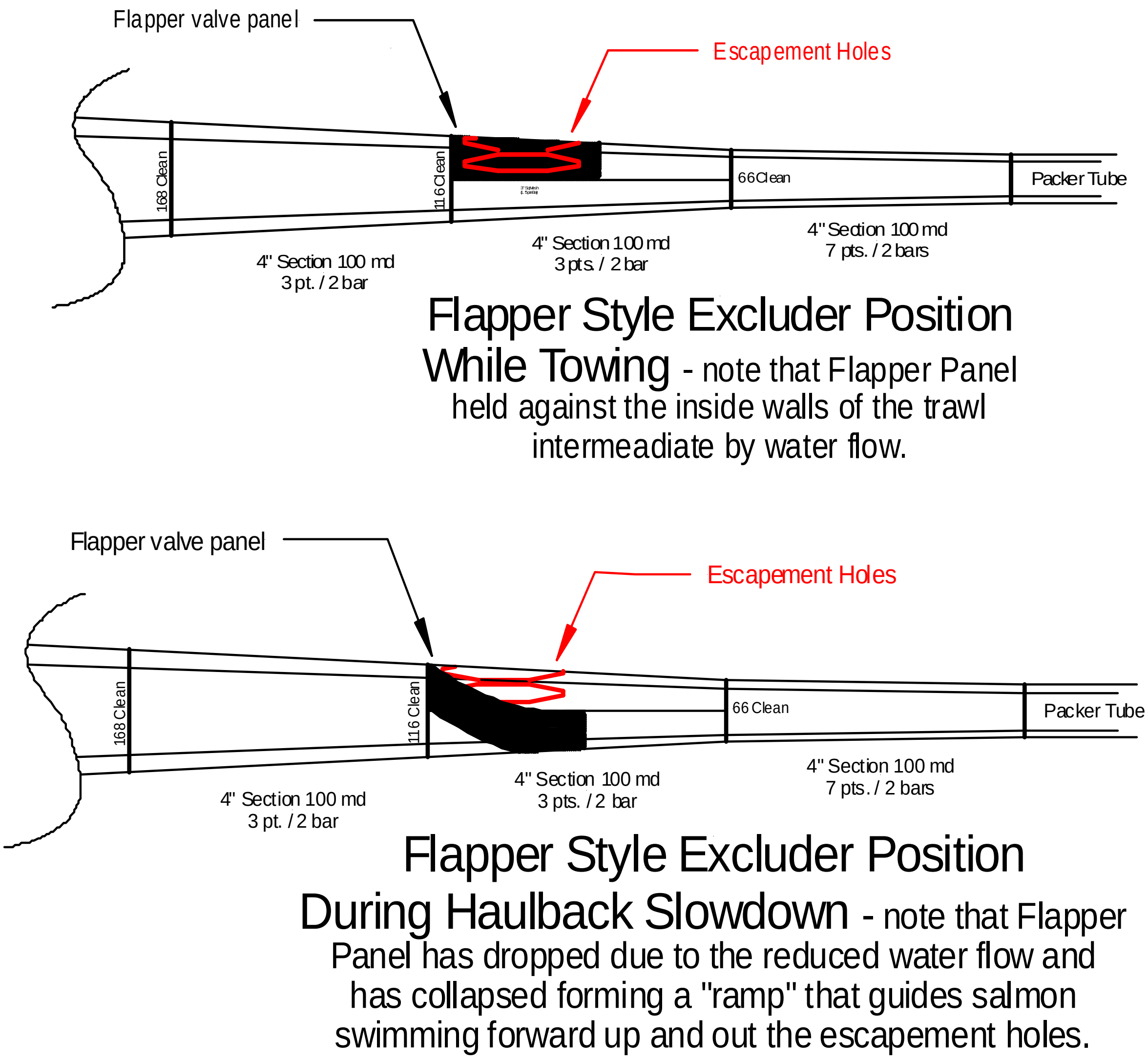

Figure 1.5 **Flapper Style Salmon Excluder Device** (Gauvin and Gruver 2008)

1.5 Related NEPA Documents

The National Environmental Policy Act (NEPA) 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. These documents contain valuable background for the action under consideration in this EA. The Council on Environmental Quality (CEQ) regulations encourages agencies preparing NEPA documents to incorporate by reference the general discussion from a broader 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 2004). NMFS issued a Record of Decision on August 26, 2004, with the simultaneous approval of Amendments 74 and 81 to the groundfish FMPs. 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.fakr.noaa.gov/sustainablefisheries/seis/default.htm.

The PSEIS brings the decision-maker and the public up to date on the current state of 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 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 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 at http://www.fakr.noaa.gov/analyses/specs/eis/default.htm.

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 Gulf of Alaska and BSAI on Steller sea lions (NMFS 2001). 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 existence of the western population of Steller sea lions nor 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.fakr.noaa.gov/sustainablefisheries/seis/sslpm/default.htm.

The proposed action analyzed in this EA would occur in an area that is Steller sea lion designated critical habitat and harvests an important Steller sea lion prey species (pollock). The Steller sea lion SEIS provides descriptions of the effects of fishing on Steller sea lions which will be incorporated by reference in this EA.

Environmental Assessment / Regulatory Impact Review /Final Regulatory Flexibility Analysis (EA/RIR/FRFA) for Modifying existing Chinook and chum salmon savings areas, Final Rule Implementing Amendment 84 to the Fishery Management Plan for Groundfish of the Bering Sea and Aleutian Islands Management Area.

This October 2007 document (NMFS 2007c) contains recent information regarding the bycatch of Pacific salmon in the BSAI groundfish fisheries and the effects of the VRHS 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.fakr.noaa.gov/analyses/amd84/Am84_EARIRFRFAfr.pdf.

1.6 Public Participation

The notice of receipt of an application for the exempted fisheries permit was published in the Federal Register before the April 2008 Council meeting (73 FR 13210, March 12, 2008). NMFS provided the U. S. Coast Guard and the North Pacific Fishery Management Council copies of the application and draft EA for consultation purposes. The application also was on the agenda for the Council's April 2008 meeting (73 FR 14229, March 17, 2008). The applicant presented the project and NMFS presented this EA to the Council's Scientific and Statistical Committee (SSC) at its April 2008 meeting. The SSC recommended to the Council to issue the EFP and had no comments on the EA. The Council dropped the review of the EFP and EA from their agenda due to time constraints. One comment was received from an environmental organization during the Council meeting concerning the issuance of an EFP that allow harvest over the acceptable biological catch level. The impacts of allowing catch over the acceptable biological catch amounts for groundfish are described in section 3.2 of this EA.

An additional public comment was received in response to the notice of receipt of application for the EFP questioning the effectiveness of the excluder device and recommended not issuing the permit, but provided no specifics regarding the individual's concerns.

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 1.0 of this document described the purpose and need of the proposed action.

The purpose of this action is to allow the continued development and testing of a salmon excluder device for pollock trawl gear in the eastern Bering Sea. The applicant has worked closely with the Alaska Fisheries Science Center (AFSC) in the development of the experimental design, and this design has been approved by the AFSC (DeMaster 2008). The experimental design requires the applicant's exemption from several groundfish fisheries regulations at 50 CFR part 679 including:

§ 679.7(a)(2): Persons are prohibited from conducting any fishing contrary to notification of inseason actions, closures or adjustments under §§ 679.20, 679.21, 679.22, and 679.25. Groundfish taken under the EFP will not be applied to the total allowable catch (TAC) limit specified in the annual harvest specifications (§ 679.20(a)). The EFP would allow for the harvest of up to 10,000 mt of groundfish (2,500 mt for each of 4 seasons). The EFP will allow for the harvest of salmon in the salmon savings areas, even though they may be closed. The salmon harvested will not count towards that annual PSC limits (see below). As the Council and NMFS have approved for past EFP experiments dedicated to bycatch reduction, groundfish and prohibited species taken during the experiment should not be counted against the annual total allowable catch and prohibited species bycatch caps (65 FR 55223, September 13, 2000).

§679.21(e)(1)(vi) and (vii): Salmon taken during the experiment will not be counted against the bycatch limits established for Chinook and non-Chinook salmon. The EFP would allow for the take of up to 10,000 Chinook salmon (2,500 in each of 4 seasons) and 5,000 non-Chinook salmon (2,500 in two fall seasons). These amount are based on the estimated amount of salmon needed by the applicant to meet the experimental design without constraining fishing under the EFP (Gauvin 2008). Taking of the salmon during the experiment is crucial for determining the effectiveness of the device. The potential exists that the amount of pollock trawl salmon bycatch taken by the industry during the EFP period will approach or exceed the salmon bycatch limits. The additional salmon taken during the experiment would create an additional burden on the pollock trawl industry, if the EFP salmon is counted toward the salmon bycatch limits and triggers closure of the salmon savings areas for those vessels that may not be participating in the ICA for salmon bycatch. Any vessel owner participating in the ICA for salmon bycatch (i.e., the VRHS) that may also fish under the EFP would need to ensure the ICA allows for participation in the EFP and that the salmon taken during EFP fishing would not be used in calculating the closure areas for the ICA participants.

§ 679.21(e)(7)(vii) and (e)(7)(viii), and § 679.22(a)(5)(ii), (a)(7)(ii), and (a)(10): Exemptions from closures of the Chinook Salmon Savings Area, the Chum Salmon Savings Area, the Bering Sea Pollock Restriction Area, and the Catcher Vessel Operating Area would be in the EFP. The experiment must be conducted in areas of salmon concentration to ensure a sufficient sample size. These areas have high concentrations of salmon and provide an ideal location for conducting the experiment and ensuring the vessel encounters enough salmon to support the experiment.

§ 679.22(a)(7)(vii): The closure of the Steller Sea Lion Conservation Area (SCA) is based on sector specific limits of no more than 28 percent of the annual TAC taken before April 1. This section also requires the closure of the SCA to vessels greater than 99 feet length overall (LOA) to provide for harvesting by vessels in the inshore sector under 99 feet LOA. Large portions of the Chinook Salmon Savings Area and the Chum Salmon Savings Area occur in the SCA. In order to conduct the experiment where salmon are likely to occur, the EFP will include an exemption from closure of the SCA, as long as the total amount of pollock harvest by all sectors remains below the 28 percent of the annual pollock TAC amount before April 1.

§ 679.50: Vessels harvesting pollock are required to have NMFS certified observers for harvest sampling and monitoring purposes. Sampling under the EFP would be conducted using “sea samplers” who are NMFS trained observers performing sampling and monitoring duties for purposes of the EFP. The sea samplers would account for the groundfish and salmon catch to ensure compliance with the amounts of groundfish and salmon limits specified in the EFP. Whole haul sampling would be used. Because the sea sampler duties under the EFP differ from those duties normally performed by NMFS observers under § 679.50, the EFP would include an exemption from observer regulations.

To accomplish the purpose of this proposed action, within the boundaries of the groundfish regulations (50 CFR part 600 and 679) and ensuring the use of the carefully developed experimental design, an exempted fishing permit under 50 CFR 679.6 would be required. Therefore, the alternatives for this action are limited to:

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 with exemptions from §§ 679.7(a)(2) (regarding 679.20(a); 679.21(e)(1)(vi) and (vii), and (e)(7)(vii) and (viii); and 679.22(a)(10)); 679.21(e)(1)(vi) and (vii); and (e)(7)(vii) and (viii); 679.22(a)(5)(ii), (a)(7)(ii), (a)(7)(vii) and (a)(10); and 679.50. The EFP would allow the applicant to conduct the experiment as designed in cooperation with the Alaska Fisheries Science Center. 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). Therefore, pollock and salmon harvesting 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 for approximately two to four weeks during fall and winter seasons starting in 2008 (B season) and ending in the winter 2010 (A season). Chinook salmon testing would be conducted each season and non-Chinook salmon testing would occur in only the fall. A pollock vessel used in the BSAI trawl fishery that either processes at sea or delivers to a shoreside processor or mothership will be engaged through a Request for Proposal process for the work. The trawl net will be modified to add the salmon excluder device and a recapture device to provide for data collection. The EFP would be subject to modifications pending any new relevant information regarding the 2010 fishery, including pollock harvest specifications or restructuring of the salmon bycatch management program.

Analysis will primarily focus on the estimation of the proportions of pollock and salmon excluded from the catch through 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. If the salmon is of acceptable quality, it will be donated under the Prohibited Species Donation Program (PSDP) (§ 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.

3.0 STATUS OF AND IMPACTS ON THE AFFECTED ENVIRONMENT

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, e.g., effects of gear use and fish processing discards; and (3) entanglement/entrapment of non-target organisms in active or inactive fishing gear. A recent analysis of the effects associated with groundfish harvest on the human environment are discussed in the Alaska Groundfish Harvest Specifications EIS (NMFS 2007b).

Information provided by the applicant for the EFP indicates that harvesting of target groundfish species (primarily pollock) and prohibited species (salmon) 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. Even though this action alone has no impact socioeconomically on the pollock industry, the successful development of a salmon excluder device may affect the efficiency of the pollock fisheries to avoid bycatch and prosecute a fishery with less 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 in previous NEPA analyses (NMFS 2004 and 2007b).

Table 3.1 Resources potentially affected by Alternative 2 beyond Status Quo

Potentially Affected Component							
Physical	Benthic Comm.	Groundfish	Marine Mammals	Seabirds	Other Species	Prohibited Species	Socioeco nomic
N	N	Y	Y	N	N	Y	Y

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

The activities under the EFP would involve fishing activities that would have no effect on the physical environment. The EFP participants will use pelagic trawl gear in the Bering Sea subarea for testing the salmon excluder device. The areas trawled will be areas previously trawled for pollock. Because of the type of gear, amount of fishing, and the location of the fishing in previously trawled area, it is not likely that any effects of the EFP fishing on benthic habitat would be discernable. The evaluation of the potential effects of pelagic trawling on benthic habitat is detailed in the EIS for Essential Fish Habitat Identification and Conservation (NMFS 2005b). After reviewing gear effects analysis specific to the Bering Sea, in June 2007, the Council recommended Amendment 89. This amendment has no conservation measures in the

Bering Sea for pelagic trawling. This gear type was found to not have effects on the bottom habitat that warranted conservation measures (NMFS 2008b).

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. Because the amount of harvest under the EFP is a small fraction of the overall harvest of the groundfish fisheries TACs, and harvesting is limited to one vessel, it is likely that the additional interaction overall with seabirds would be minimal and any potential effects would not be discernable from status quo.

Fishing under the EFP would take primarily pollock and salmon. Approximately 25 mt of species other than pollock and salmon are expected to be taken each season during the EFP (Gauvin 2008) including (in order of highest to lowest quantity) are Pacific cod, arrowtooth flounder, yellowfin sole, rock sole, flatfish species, jellyfish, herring, and prowfish. All of these fish except herring, jellyfish, and prowfish are target groundfish species. Herring is a prohibited species. Since the pollock fishery is primarily pelagic, the bycatch of non-target species is small relative to the magnitude of the fishery (NPFMC 2007a). Jellyfish represent the largest component of the pollock bycatch of non-target species and has been stable at around 5-6 thousand tons per year (except for 2000 when over 9,000 t were caught). The catch of other target species in the pollock fishery represent less than 1% of the total pollock catch (NPFMC 2007a). 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 and prowfish) expected to be taken under the EFP are so small that any effects on other species would not be discernable from the status quo.

The Alaska Groundfish Harvest Specifications EIS also provides a recent description of environmental components, the groundfish fisheries, and potential impacts on the human environment (NMFS 2007b). This EA adopts much of the environmental status description in this EIS because it provides a recent, detailed description. Additionally, the current, detailed status of each target species category, biomass estimates, and ABC specifications for the BSAI are presented annually both in summary and in detail in the annual BSAI SAFE report (NPFMC 2007a). The SAFE reports for the 2008 groundfish fisheries are available through the Council's website at http://www.fakr.noaa.gov/npfmc.

3.1 Status of Managed Groundfish Species

Designated target groundfish species and species groups in the BSAI are walleye pollock, Pacific cod, yellowfin sole, Greenland turbot, arrowtooth flounder, rock sole, other flatfish, flathead sole, sablefish, Pacific ocean perch, other rockfish, Atka mackerel, squid, and other species. This EA cross-references and summarizes the status of the stock information in the SAFE reports (NPFMC 2007). For detailed life history, ecology, and fishery management information regarding groundfish stocks in the BSAI see Section 3.3., in the PSEIS (NMFS 2004) and the Alaska Groundfish Harvest Specifications EIS (NMFS 2007b).

For those stocks with enough information, none are considered overfished or approaching an overfished condition. The BSAI Plan Team met in November 2007 to finalize the SAFE report and to forward acceptable biological catch (ABC) and overfishing level (OFL) recommendations to the Council for action at its December 2007 meeting. The ABC, OFL, and TAC amounts for each target species or species group for 2008 and 2009 were recommended by the Council and specified by NMFS (73 FR 10160, February 26, 2008). Table 3.2 shows the 2008 and 2009 ABC, OFL, and TAC amounts for the BSAI groundfish that may be taken during the EFP activities.

Table 3.2. 2008 and 2009 Overfishing Level (OFL), Acceptable Biological Catch (ABC), and Total Allowable Catch (TAC), of Selected Groundfish in the BSAI

[Amounts are in metric tons]

Species	Area	2008			2009		
		OFL	ABC	TAC	OFL	ABC	TAC
Pollock	BS	1,440,000	1,000,000	1,000,000	1,320,000	1,000,000	1,000,000
Pacific cod	BSAI	207,000	176,000	170,720	207,000	176,000	170,720
Yellowfin sole	BSAI	265,000	248,000	225,000	296,000	276,000	205,000
Rock sole	BSAI	304,000	301,000	75,000	379,000	375,000	75,000
Greenland turbot	BSAI	15,600	2,540	2,540	16,000	2,540	2,540
Greenland turbot	BS	n/a	1,750	1,750	n/a	1,750	1,750
Arrowtooth flounder	BSAI	297,000	244,000	75,000	300,000	246,000	75,000
Flathead sole	BSAI	86,000	71,700	50,000	83,700	69,700	50,000
Other flatfish[1]	BSAI	28,800	21,600	21,600	28,800	21,600	21,600
Alaska plaice	BSAI	248,000	194,000	50,000	277,000	217,000	50,000
Other species[2]	BSAI	104,000	78,100	50,000	104,000	78,100	60,000

[1] "Other flatfish" includes all flatfish species, except for halibut (a prohibited species), flathead sole, Greenland turbot, rock sole, yellowfin sole, arrowtooth flounder, and Alaska plaice.
[2] "Other species" includes sculpins, sharks, skates, and octopus. Forage fish, as defined at § 679.2, are not included in the "other species" category.

The eastern Bering Sea pollock stock has continued to decline substantially since 2003 due to apparently poor recruitment between 2000 and 2006 (NPFMC 2007a). This year's population estimates are significantly lower than last year's estimate. The stock has dropped to below average levels after a number of years of above-average conditions. The biomass of Eastern Bering Sea pollock is projected to continue declining until recent year classes recruit to the spawning biomass. The rate of decline since 2003 has been around 20% per year. The spawning exploitation rate has consequently increased by more than 15% from 2003-2007. Rather than setting the ABC at the maximum permissible, the Council recommended an ABC and TAC that are lower for 2008 and 2009.

3.2 Effects on Groundfish Species

The potential direct and indirect effects of the groundfish fisheries on target species 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 harvest is not likely because the EFP would occur during fall and winter seasons from B season 2008 through A season 2010 using one vessel. Spatial concentration also is not as likely because the harvest during the experiment occurs in various locations that are known for high chum and Chinook salmon bycatch rates but are also common pollock trawling areas. These potential areas cover many square miles, Fig. 1.1 through 1.4, and harvest will be done by only one vessel at a time. The only potential direct effect on target species is fishing mortality on groundfish species during the testing of the salmon excluder devices.

Alternative 1. Status Quo

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 stock to sustain itself 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.

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 when the Chum and/or Chinook Salmon Savings Areas and the CVOA are closed or as vessels are prohibited from fishing in high salmon bycatch areas under the ICA for salmon bycatch. Also the pollock, and other groundfish 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 one percent of the annual TAC for pollock. This may have a slight beneficial effect for stocks which have TAC set at ABC (pollock and other flatfish, Table 3.2) but 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.

Alternative 2. Issue the EFP

The EFP applicant estimated that total harvest of allocated groundfish species is 10,000 mt spread over four seasons. Approximately 99% (9,900 mt) is expected to be pollock and 1% (100 mt) is expected to be other groundfish species such as Pacific cod and flatfish. (Gauvin 2008). The 2008 and 2009 pollock TAC for the Eastern Bering Sea is 1,000,000 mt. The potential harvest under this proposed action of pollock is 0.25% of the TAC in 2008 and 0.5% of TAC in 2009. If the 2010 pollock TAC is the same as the 2008 and 2009 TAC, the harvest under the EFP in 2010 would be 0.25% of TAC. The pollock TAC in 2008 and 2009 are set at the ABC so the harvest of pollock under the EFP would allow for harvest above the ABC in 2008 and 2009. The 2008 and 2009 ABC recommended by the Council is not the maximum permissible ABC (1,170,000 mt), but a lower value (Section 3.1). If ABC and TAC are set the same in 2010, harvest of pollock under the EFP would also result in pollock harvest exceeding the ABC. It is likely that the 2010 TAC and ABC will be higher than TAC and ABC for 2008 and 2009 because the biomass is projected to be more in 2010 than in 2008 and 2009 (NPFMC 2007a). The amount of harvests under the EFP in relation to the total harvest of pollock in the Bering Sea is so small that it is not likely that the EFP harvest would have any discernable effects on the pollock stock or on other species that may depend on pollock[9]. The combination of the EFP fishing and directed pollock fishing is well below the OFL level of 1,440,000 mt and is less than the maximum permissible ABC of 1,170,000 mt (NPFMC 2007a). Because the harvest of pollock under the EFP is such a small amount and the combined harvest of pollock with the directed fisheries is well below the maximum permissible ABC and OFL, it is not likely that harvesting pollock under the EFP would have any discernable effect on the pollock stock compared to status quo fishing.

The BSAI TACs are well below the ABCs for Pacific cod, arrowtooth flounder, yellowfin sole, and rock sole (Table 3.2). The anticipated harvest of 25 mt of groundfish and other species besides pollock per season of testing would likely have no effect on Pacific cod, arrowtooth flounder, yellowfin sole and rock sole stocks because the gap between ABC and TAC for these species is well over 100 mt. If the harvest of species other an pollock is evenly distributed among the seasons of testing under the EFP, 25 mt to 50 mt of other species would be taken each calendar year of testing. 25 mt to 50 mt of any of these species would be a very small portion of the annual TAC (0.001 to 0.006 % of TAC). The TAC for other flatfish is set at ABC, but even if all of the 50 mt was taken in other flatfish in 2009, this amount would be only 0.2 % of the other flatfish TAC. Because the amount of all groundfish anticipated to be harvested during the experiment is very small in relation to the annual harvest, and in most cases 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.

3.3 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

[9] James Ianelli, Alaska Fisheries Science Center, pers. comm. February 13, 2008

Alaska king, Tanner, and snow crabs. In order to control bycatch of prohibited species in the BSAI groundfish fisheries, the Council annually specifies PSC limits. The status of the prohibited species in the BSAI is detailed in section 7.2 of the Alaska Groundfish Harvest Specifications EIS (NMFS 2007b) and in the SAFE report (NPFMC 2007a). 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.

Under the proposed action, salmon and herring are the only PSC species that are expected to be taken 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 herring is provided in this section. Most of the herring taken in the groundfish fisheries is taken by the pelagic trawl fishery (NMFS 2007b). Salmon is the most common PSC species taken in the midwater pelagic trawl pollock fishery (NMFS 2007b).

3.3.1 Salmon

The EA/RIR/FRFA for Modifying Existing Chinook and Chum Salmon Savings Areas Final Rule Implementing Amendment 84 to the Fishery Management Plan for Groundfish of the Bering Sea and Aleutian Islands Management Area (NMFS 2007c) has the latest status information for salmon that may be taken in the BSAI groundfish fisheries. Chapter 3 of that document contains a detailed description of the commercial harvest and hatchery production of Chinook and non-Chinook salmon throughout the Pacific rim. Status of western Alaska salmon stocks are detailed in sections 3.4 and 3.5. Salmon from the Japanese, Russian, Alaskan, and Korean run hatchery programs likely mingle with wild stocks in the Bering Sea and are part of the BSAI groundfish fisheries salmon bycatch.

Salmon species primarily taken in the BSAI groundfish fisheries are Chinook and chum salmon. Table 3.3 shows the estimated number of salmon measured by the observer program in 2007 in the BSAI groundfish fisheries (NMFS 2008b). Because the number of salmon measured 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 BSAI groundfish fisheries. Because the taking of coho, sockeye, and pink salmon is a relatively rare event in the BSAI 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 and chum salmon.

Table 3.3 Estimated Number of Salmon Measured by Observers in 2007

Region	Species_	# measured
BSAI	CHUM SALMON	31,380
BSAI	CHINOOK SALMON	49,804
BSAI	COHO SALMON	63
BSAI	SOCKEYE SALMON	3
BSAI	PINK SALMON	24

3.3.1.1 Chinook Salmon Status

North Pacific Chinook salmon are the target of commercial, subsistence, and recreational fisheries. The majority of the Alaska commercial 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. Approximately 90 percent of the subsistence harvest is taken in the Yukon and Kuskokwim river systems. One study determined that approximately 87% of the Chinook salmon bycatch samples analyzed from the BSAI groundfish fisheries were from western and central Alaska (Myers et. al. 2003).

The Chinook salmon is the most highly prized sport fish on the west coast of North America. In Alaska it is extensively fished by anglers in the Southeast and Cook Inlet areas. The Alaska sport fishing harvest of Chinook salmon is over 76,000 annually, with Cook Inlet and adjacent watersheds contributing over half of the catch. Unlike non-Chinook species, Chinook salmon rear 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 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 U.S./Canada treaty restrictions and declining abundance of Chinook salmon in British Columbia and the Pacific Northwest. Chinook salmon catches have been moderate to high in most regions over the last 20 years (Eggers 2004).

Chinook salmon production in the Yukon River has been declining in recent years. The Yukon River Chinook stocks have been classified as stocks of concern (Eggers 2004), and this classification was continued as a stock of yield concern in February 2007, based on the inability, despite the use of specific management measures, to maintain expected yields, or harvestable surpluses, above the stocks' escapement needs since 1998 (Bue and Hayes 2007).

Combined commercial and subsistence harvests also show a substantial decrease in yield in 1999-2003 for the Yukon Chinook salmon stock, as compared with the average from 1989 through 1998 (Lingnau and Bergstrom 2003). Subsistence harvests remain stable, but commercial harvests have been constrained by managers in order to meet escapement and subsistence needs. There was no commercial fishery in 2001. Since 2002, the run index and harvest indications have been elevated enough to allow for a limited commercial fishery. While average yield goals have been insufficiently maintained despite these management actions, escapement goals have been consistently met throughout most of the Yukon drainage area, since 2000 (Lingnau and Bergstrom 2003). The 2007 Yukon preliminary harvest estimate for Chinook salmon is 34,000 fish (ADFG catch data January 29, 2008).

Kuskokwim River Chinook salmon were discontinued as a stock of yield concern by the Board of Fisheries (BOF) in February 2007 (ADFG 2007b). The BOF discontinued the stock of yield concern designations based on Chinook salmon runs being at or above the historical average each year since 2002. Chinook escapements from 1998 through 2000 were below average, while escapements since 2000 have been average or better (Bergstrom and Whitmore 2004). Poor runs in 1998 through 2000 are believed to be a result of poor ocean conditions, rather than poor parent runs (Bergstrom and Whitmore 2004). Preliminary harvest information for Kuskokwim River commercial Chinook salmon harvest in 2007 was 23,000 fish (ADFG catch data January 29, 2008).

The primary managed Bristol Bay Chinook salmon stocks are in the Nushagak River, although management occurs on rivers within each of the districts comprising Bristol Bay. Abundance estimates have been increasing dramatically in recent years, with the 2004 total run estimate of over 222,000 fish. A total of 160,000 Chinook salmon are forecast to return to the Nushagak River in 2008. This forecast is 1.1% less than the 10-year mean (162,000; range of 77,000 in 2000 to 245,000 in 2005) (ADFG 2008). The preliminary commercial harvest estimate for Bristol Bay Chinook salmon is 63,000 fish (ADFG catch data January 29, 2008). The commercial common property harvest estimate for 2008 is 85,000 Chinook salmon.

3.3.1.2 Chum Salmon Status

Information regarding the origin of chum salmon taken in the BSAI groundfish fisheries is not currently available, but genetic work is currently occurring at the NMFS Ted Stevens Marine Research Institute. Chum salmon fisheries in Alaska occur in 11 management regions which are detailed on the ADFG website at http://www.cf.adfg.state.ak.us/region3/finfish/salmon/salmhom3.php. These include chum salmon fisheries in the Arctic-Yukon-Kuskokwim (AYK) management area and target hatchery runs in Prince William Sound and Southeast Alaska. Chum salmon runs to AYK rivers have fluctuated in recent years. Chum salmon in the Yukon River and in some areas of Norton Sound had been classified as stocks of concern (Eggers 2004). In response to the guidelines established in the Sustainable Salmon Policy, the BOF discontinued the Yukon River summer and fall chum salmon as stocks of concern during the February 2007 work session. (Bue and Hayes 2007).

Yukon summer chum salmon runs have exhibited steady improvements since 2001 with harvestable surpluses in 2002-2006 (Bue and Hayes 2007). However, it appears production has shifted from spawning tributaries in the lower portion of the drainage, such as the Andreafsky and Anvik Rivers over the last 5 years, to higher production in spawning tributaries upstream of the Anvik River such as the Gisasa and Salcha Rivers. Weak returns for chum salmon from 1998 through 2001 were attributed to reduced productivity and not the result of low levels of parent year escapements since 1995 was one of the highest escapements on record. In 2006, a large number of 5-year-old summer chum salmon returns were observed throughout the AYK Region. The 2007 run is anticipated to be near average and provide for escapements and support a normal subsistence and commercial harvest.

The BASIS (Bering-Aleutian Salmon International Survey) study has observed significant increases in juvenile chum in the Bering Sea through 2005. Further, bycatch of adult chum in Bering Sea trawl has increased. Although not all of these fish are bound for Western Alaska, higher bycatch may be an indicator of favorable ocean conditions and chum ocean survival may have increased significantly.

For the Yukon fall chum salmon stocks, considerable uncertainty has been associated with these run projections, particularly recently because of unexpected run failures (1997 to 2002) which were followed by a strong improvement in productivity from 2003 through 2006 (Bue and Hayes 2007). Weak salmon runs prior to 2003 have generally been attributed to reduced productivity in the marine environment and not a result of low levels of parental escapement. Likewise, the recent improvements in productivity may be attributed to the marine environment. The 2007 projected run size supported normal subsistence fishing activities and provided opportunity for commercial ventures.

Kuskokwim River chum salmon are an important subsistence species, as well as the primary commercially targeted salmon species on the Kuskokwim River in June and July (NMFS 2007c). Kuskowim River chum salmon were designated a stock of concern under yield concern in September 2000, and this designation was discontinued in February 2007. Since 2000, chum salmon runs on the Kuskokwim have been improving (Table 3-16 of NMFS 2007c). Declining salmon markets for chum have increased the difficulty of evaluating the abundance of chum salmon in the Kuskokwim (Bergstrom and Whitmore 2004). While a harvestable surplus was identified in 2002 and 2003, no market existed for the fishery in this time period. Preliminary commercial harvest in 2007 was 80,000 fish (ADFG 2007a).

In Bristol Bay, the 2007 chum salmon harvest of approximately 2.0 million fish following the 2.1 million fish harvest in 2006, is indicative of a second consecutive strong chum run and is well above the 20-year average of 998,000 (ADFG 2007c).

Chum salmon also is harvested in the Kotzebue Area. Escapement is monitored by a test fishery project on the Kobuk River (NMFS 2007c). The lowest index recorded was in 1993. In 2002 and 2003, chum salmon runs showed a large increase in abundance as compared with runs from 1999 through 2001. Since the test fishery has been established, 2002 and 2003 have been the third and fourth worst years for CPUE in the test fishery (Menard 2003). Market conditions have impacted the chum fishery in Kotzebue in recent years. A major buyer has not existed for several years and the commercial fishery is limited to a small fleet. Commercial harvests have been low due to weak chum prices (Menard 2003). Preliminary commercial harvest in 2007 was 147,000 fish (ADFG 2007a).

3.3.2 Pacific Herring

Information regarding the status of herring is available in section 7.1 of the Alaska Groundfish Harvest Specifications EIS (NMFS 2007b). Pacific herring are managed by the State of Alaska on a sustained yield principle. Pacific herring are surveyed each year and the State's guideline harvest levels (GHLs) are based on an exploitation rate of 20 percent of the projected spawning biomass. These GHLs may be adjusted in-season based on additional survey information to ensure long-term sustainable yields. The ADFG has established minimum spawning biomass thresholds for herring stocks that must be met before a commercial fishery may occur.

The most recent herring stock assessment for the eastern Bering Sea (EBS) stock was conducted by ADFG in December 2005. For 2006 and 2007, the herring biomass in the EBS was estimated to be 177,000 mt. Additional information on the life history of herring and management measures in the groundfish fisheries to conserve herring stocks can be found in Section 3.5 of the PSEIS (NMFS 2004).

The PSC limit for herring bycatch is set at 1 percent of the estimated herring biomass. The Pacific herring PSC limit in 2007 was 1,787 mt for all BSAI trawl fisheries. The BSAI pollock trawl fishery in 2007 took 342 mt of herring. For 2007, the BSAI trawl fishery took 23% of the herring PSC limit of which 19% was taken in the pollock fishery (NMFS Inseason Management data at http://www.fakr.noaa.gov/2007/car120_bsai_with_cdq.pdf). Herring taken in the BSAI groundfish fisheries are from the Bering Sea area and are not likely to include herring from the Gulf of Alaska (http://www.cf.adfg.state.ak.us/geninfo/finfish/herring/herrhome.php)

Herring commercial fisheries are managed by the ADFG in eight areas of the AYK area. Projections from postseason escapement estimates suggest that the 2008 spawning biomass for northeastern Bering Sea herring stocks (Security Cove to Norton Sound Districts) will be 58,891 tons, with an anticipated allowable harvest of 11,703 tons (ADFG 2007d). If the return is as expected, a small reduction in biomass will be observed in most districts. The most abundant age classes expected to occur in the herring biomass are age 6 (35%), age 11 (22%), and age 7 (8%). Age 9 and older herring are expected to comprise 41% of the returning biomass. ADFG does not anticipate a commercial herring fishery in the AYK Region in 2008 because of a lack of commercial herring market and processor interest. Similar market conditions existed in 2007 resulting in no sac-roe harvest and only a small harvest of 33 tons of bait in the Norton Sound District. The Togiak herring population in Bristol Bay is commercially fished and considered by ADFG to be "healthy and sustainable" (ADFG 2007e).

3.4 Effects on Salmon and Herring

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 herring are the primary PSC species of concern in the BS pollock fishery (NMFS 2007b), and are potentially impacted by the proposed action. Other PSC species are not likely to be taken during the EFP activities because of the use of pelagic trawl gear. 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 over a limited time period by one 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 herring reproduce in habitats where groundfish fishing is not conducted, the EFP fishing is unlikely to have any effect on reproductive success (NMFS 2007b).

3.4.1 Alternative 1 Status Quo Effects on Salmon

The effects of the groundfish fisheries on salmon are described in detail in the Alaska Groundfish Harvest Specifications EIS (NMFS 2007b, section 7.2) and in the EA/RIR/FRFA for Amendment 84 (NMFS 2007c). Much of the discussion in these documents is incorporated here by reference.

The absolute numbers of salmon in the observed trawl bycatch that are presumed to originate from western Alaska stocks of Chinook salmon are small, relative to the size of the Chinook salmon biomass present in the eastern Bering Sea (NMFS 2007c). The current BS pollock fishery is considered to have limited impact on these stocks although the actual impacts are difficult to determine. There are recent indications (as noted in section 3.3.1) of increasing returns to Chinook salmon stocks in western Alaska. Thus, the bycatch of Chinook salmon by the BSAI trawl fisheries is not thought to be detrimental to the health and viability of those stocks. However, with the lack of complete knowledge on many of the salmon stocks, coupled with the uncertainty regarding the impact of trawl caught salmon bycatch on the viability of these stocks, it is difficult to ascertain the extent of the impact on these stocks (NMFS 2007c).

Regarding mortality effects, the bycatch of Chinook and chum salmon has increased dramatically in recent years (Table 1.1). However escapement in excess of minimum needs has generally increased in recent years as well, allowing for subsistence use, recreational fishing, and commercial fishing activities (NMFS 2007b). NMFS also tracks the recovery of coded-wire tagged fish in the BSAI groundfish fisheries. Two ESA-listed salmon stocks have surrogate coded-wire tagged fish that may be taken in the BSAI groundfish fisheries (NMFS 2008a). Taking of these surrogate fish appears to be a rare event (NMFS 2007a). NMFS is currently consulting on the potential effects of the groundfish fisheries on ESA-listed Pacific salmon from the Lower Columbia River and Upper Willamette River stocks based on the high amount of Chinook salmon bycatch in 2007 (NMFS 2008a). To date, no coded-wire tag surrogates for these stocks have been detected in the salmon bycatch samples from the 2007 BSAI groundfish fisheries (NMFS 2008a). While chum and Chinook salmon bycatch has increased in recent years, this increased mortality does not appear to have adversely impacted these salmon stocks because of the populations sufficient to conduct fisheries in western and central Alaska, and no increase in coded wire tag recovers for ESA-listed stocks in 2007.

Some data are available regarding the spatial and temporal catch of Chinook salmon stocks in the BSAI groundfish fisheries. The NMFS Auke Bay Laboratory is currently conducting genetic analysis of chum salmon taken in the BSAI groundfish which may provide information regarding spatial and temporal catch of chum salmon stocks. Myers et al. (2005) determined that bycatch of Chinook salmon from subregions of western Alaska stocks (Yukon, Kuskokwim, and Bristol Bay) vary with brood year, time, and area. Yukon River Chinook are the dominant stock for age 1.2 fish in the BSAI in winter, especially west of 170 degrees longitude west and for age 1.4 fish in the eastern BSAI. The Yukon River Chinook tend to range further west in the Bering Sea than other stocks. Bristol Bay and Cook Inlet Chinook stocks are dominate for age 1.2 salmon in the eastern BSAI in the fall. Age 1.1 Chinook salmon in the eastern BSAI in the fall are mostly Gulf of Alaska stocks. Myers et al. (2005) concluded that immature Chinook salmon are more abundant along the outer shelf break and maturing Chinook salmon are more abundant along the inner shelf break (east of 170 degrees west longitude). The adult equivalents of the Yukon River Chinook salmon bycatch in the BSAI groundfish fisheries from 1997 to 1999 was from 2,721 to 7,510 fish, having a greater impact on the Canadian escapement and catch than on the Alaska escapement and catch (Myers et al. 2005). Because no indication exists that the quantity and pattern of bycatch of Chinook salmon has affected the genetic structure of the population, the Alaska Groundfish Harvest Specifications EIS concluded that the BSAI groundfish fisheries have a small impact on salmon genetic structure (NMFS 2007b).

3.4.2 Alternative 2 Issue the EFP Effects on Salmon

In order to have sufficient sample sizes to support the statistical analysis, the experimental design calls for a minimum of 2500 chum salmon for two fall seasons and 2500 Chinook salmon for each fall and winter season of the EFP project. In total from fall 2008 till March 2010, up to 10,000 Chinook salmon and 5,000 chum salmon may be harvested. The most Chinook salmon harvested in a calendar year would be 5,000 fish in 2009. This amount would be equivalent to 4% of the 2007 Chinook salmon bycatch amount (124,000 fish in Table 1.1). The 5-year average (2003-2007) of Chinook salmon bycatch in the BSAI trawl fishery is 79,202 fish, and the 5,000 Chinook salmon under the EFP in 2009 would be approximately 6% of this 5-year average. The most chum salmon harvest in a year under the EFP would be 2,500 fish which is 2.5% of the amount of non-Chinook salmon bycatch in the 2007 BSAI groundfish fisheries or 0.7% of the 5-year average (2003-2007).

The amount of chum and Chinook salmon taken during the EFP compared to the amount taken in the groundfish fisheries is very small and not likely to have a discernable effect on mortality on individual salmon stocks over the status quo. Chinook salmon taken during the EFP in the winter would likely be from the western Alaska area, while Chinook salmon taken in the fall would be from the Gulf of Alaska. This dispersion of catch would reduce the potential impact on stocks from a particular region. Because the levels of salmon bycatch under the EFP are such small amounts, and the harvest is dispersed over area and over different regional stocks, it is not likely there would be any discernable effects on the genetic structure of any Chinook or chum salmon stocks.

If the salmon excluder device could be successfully implemented, the reduction in any potential effects on salmon stocks would create some expected benefits for commercial, recreational, and subsistence fishermen; salmon management; and conservation goals. In years where salmon returns are relatively low, the reduction in bycatch effects on salmon runs, would be avoided to the timely benefit of those runs.

3.4.3 Alternative 1 and Alternative 2 Effects on Herring

As shown in section 3.2.2, the amount of herring harvested overall in the pollock fishery is well below the 1 percent of biomass limit. Herring may be present in a very small portion of the other species taken in the EFP fishing. Any potential additional harvest of herring under the proposed action is likely to be well below the one percent biomass limit for herring because of the small amount of herring that is normally taken in the pollock fishery and therefore any effects of Alternative 2 are likely not discernable from any effects of Alternative 1. The EFP has no exemptions from the herring PSC limit or the Herring Savings Area closures (§ 679.21(e)(7)(vi)). No impact on herring resources is expected under the EFP beyond those already analyzed (NMFS 2007b). The Alaska Groundfish Harvest Specifications EIS found that the status quo fishery has very low mortality for herring in relation to the biomass and that it is unlikely there would be any impact on genetic structure of herring stocks (section 7.2 of NMFS 2007b).

3.5 Status of Marine Mammal Populations

The BSAI 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 polar bear), 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).

The PSEIS (NMFS 2004) describes the range, habitat, diet, abundance, and population status for marine mammals. The most recent marine mammal stock assessment reports (SARs) for nearly all marine mammals occurring in the BSAI were completed in 2005 based on 2002 though 2004 data (Angliss and Outlaw 2007). Northern elephant seals, and marine mammals under U. S. Fish and Wildlife Service (USFWS) jurisdiction, were assessed in 2002 (Angliss and Outlaw 2005). 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 status of ESA Section 7 consultations (Section 8.2 of NMFS 2007b). For Bering Sea marine mammals, ESA Section 7 consultation has been completed for all ESA-listed marine mammals. NMFS is currently consulting on the effects of the groundfish fisheries on sperm whales, humpback whales, and Steller sea lions and their designated critical habitat (NMFS 2006). A draft biological opinion is expected to be available in May 2008.

Direct and indirect interactions between marine mammals and groundfish harvest occur due to overlap in the size and species of groundfish harvested in the fisheries that are also important marine mammal prey, and due to temporal and spatial overlap in marine mammal foraging and commercial fishing activities. This discussion focuses on those marine mammals that may interact or be affected by the pollock pelagic trawl fishery in the BSAI. These species are listed in Table 3.4. Steller sea lions and northern fur seals are the only marine mammals that may compete with the pollock fishery for prey. Marine mammals species listed in Table 3.5 are taken incidentally in the BSAI pollock trawl fishery.

Table 3.4 Marine Mammals Potentially Affected by the BSAI Pollock Fishery.

NMFS Managed Species		
Pinnipedia	***Species***	***Stocks***
	Steller sea lion*	Western U.S (west of 144E W long.) and Eastern U.S. (east of 144E W long.)
	Northern fur seal**	Eastern Pacific
	Harbor seal	Southeast Alaska, Gulf of Alaska, Bering Sea
	Spotted seal	Alaska
	Ringed seal	Alaska
	Ribbon seal	Alaska
Cetacea	***Species***	***Stocks***
	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
	Dall's porpoise	Alaska
	Humpback whale*	Western North Pacific, Central North Pacific
	Fin whale*	Northeast Pacific
	Minke whale	Alaska
Source: Angliss and Outlaw 2007. *ESA-listed species. **Listed as depleted under the Marine Mammal Protection Act.		

The Steller sea lion inhabits many of the shoreline areas of the BSAI, using these habitats as seasonal rookeries and year-round haulouts. The Steller sea lion has been listed as threatened under the ESA since 1990. In 1997 the population was split into two stocks or distinct population segments (DPS) based on genetic and demographic dissimilarities, the western and eastern stocks. Because of a pattern of continued decline in the western DPS, it was listed as endangered on May 5, 1997 (62 FR 30772), while the eastern DPS remained under threatened status. The western DPS inhabits an area of Alaska approximately from Prince William Sound westward to the end of the Aleutian Island chain and into Russian waters. Steller sea lions present in the action area would be primarily from the Western DPS.

Throughout the 1990s, particularly after critical habitat was designated, various closures of areas around rookeries and haulouts and some offshore foraging areas affected commercial harvest of pollock, an important component of the western DPS of Steller sea lion diet. In 2001, a biological opinion was released that provided protection measures to ensure that the groundfish fisheries would not jeopardize the continued existence of the Steller sea lion nor adversely modify its critical habitat; that opinion was supplemented in 2003. After court challenge, these protection measures remain in effect today (NMFS 2001, Appendix A). A detailed analysis of the effects of these protection measures is provided in the *Steller Sea Lion Protection Measures Supplemental EIS* (NMFS 2001).

The Bering Sea subarea has several closures in place for Steller sea lions including no transit zones, rookeries, haulouts, and the Steller Sea Lion Conservation Area. The proposed action would not change the pollock fishery, and groundfish closures associated with the five Steller sea lion sites located at Sea lion Rock, Bogoslof Island/Fire Island, Adugak Island, Pribilof Islands, and Walrus Islands. The harvest of pollock in the Bering Sea subarea is temporally dispersed (§ 679.20) and spatially dispersed through area closures (§ 679.22). These harvest restrictions on the pollock fishery decrease the likelihood of disturbance, incidental take, and competition for prey to ensure the groundfish fisheries do not jeopardize the continued existence or adversely modify the designated critical habitat of Steller sea lions (NMFS 2000 and NMFS 2001).

Northern fur seals forage in the pelagic area of the Bering Sea and reproduce on the Pribilof and Bogoslof Islands. On June 17, 1988, NMFS declared the northern fur seal stock of the Pribilof Islands, Alaska (St. Paul and St. George Islands), to be depleted under the Marine Mammal Protection Act (MMPA). The Pribilof Islands population was designated depleted because it declined to less than 50 percent of levels observed in the late 1950s, and no compelling evidence suggested that carrying capacity has changed substantially since the late 1950s (NMFS 2007d). Recent pup counts show a continuing decline in the number of pups surviving in the Pribilof Islands. NMFS researchers found approximately nine percent decrease in the number of pups born between 2004 and 2006. The pup estimate decreased most sharply on Saint Paul Island. Saint George Island showed a small increase over 2004, though it still registered a decrease of three percent from the 2002 estimate. (Available from http://www.fakr.noaa.gov/newsreleases/2007/fursealpups020207.htm).

3.6 Effects on Marine Mammals

3.6.1 Incidental Takes

The Alaska Groundfish Harvest Specifications EIS contains a detailed description of the effects of the groundfish fisheries on marine mammals (Chapter 8 of NMFS 2007b) and is incorporated by reference. Potential take in the groundfish fisheries is well below the potential biological removal (PBR) for all marine mammals, except killer whales and humpback whales. 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 3.5 provides the marine mammals taken in the BSAI pollock fishery as published in the List of Fisheries for 2008. Table 3.6 provides more detail on the levels of take based on the most recent Stock Assessment Report (SAR) (Angliss and Outlaw 2007). The BSAI pollock fishery is a Category II fishery because it has annual mortality and serious injury of a marine mammal stock greater than 1 percent and less than 50 percent of the PBR level (72 FR 66048, November 27, 2007).

Table 3.5 Category II BSAI Pollock Fishery with documented marine mammal takes from the List of Fisheries for 2008 (72 FR 66048, November 27, 2007)

Fishery	Marine Mammal Stocks Taken
Category II	
BSAI pollock trawl	Dall's porpoise, AK Harbor seal, Bering Sea Killer whale, Eastern North Pacific, GOA, Aleutian Islands, and Bering Sea transient Steller sea lions, Western U. S Humpback whale, Central and Western N. Pacific Minke whale, AK Ribbon seal, AK Spotted seal, AK

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 BSAI pollock trawl fishery listed in Table 3.6. Animals that may be taken by the BSAI pollock trawl fishery are Steller sea lions, ringed and ribbon seals, minke whale, GOA and BSAI transient killer whale, and Dall porpoise (Angliss and Outlaw 2007 and 2008 List of Fisheries, 72 FR 66048, November 27, 2007).   The listing for ringed and spotted seals in Table 3.6 are not the same as those in Table 3.5, due to the 2008 List of Fisheries being based on the SAR dating back to 1996 through the draft 2008 SAR dated June 2007.

Table 3.6 Estimated mean annual mortality of marine mammals from observed BSAI pollock fishery compared to the total mean annual human-caused mortality and potential biological removal 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. Groundfish fisheries mortality calculated based on Angliss and Outlaw (2007).

Marine Mammal	Mean annual mortality, from BSAI pollock fishery	Total mean annual human-caused mortality *	PBR
**Steller sea lions (western)	2.26	215.6	234
Northern fur seal	0	756	15,262
Harbor seal (BSAI)	0	176.2	603
Spotted seal	0	5,265	Undetermined
Ringed seal	0.71	9,567	Undetermined
Ribbon seal	0.2	193	Undetermined
Killer whale Eastern North Pacific AK resident	0	1.5	11.2
Killer whale Eastern North Pacific Northern resident	0	0	2.16
Killer whale GOA, BSAI transient	0.41	0.4	3.1
Dall's porpoise	1.89	29	Undetermined
**Humpback whale Western North Pacific	0	0.2	1.3
**Humpback whale Central North Pacific	0	5.0	12.9
Minke whale Alaska	0.3	0.3	Undetermined
**Fin whale Northeast Pacific	0	0.2	11.4

* Does not include research mortality. Other human-caused mortality is predominantly subsistence harvests for seals and sea lions.
** ESA-listed stock

All of the incidental takes are 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 very small and the harvest is by one vessel in the same locations where pollock fishing already occurs. The EFP vessel will be required to comply with Steller sea lion protection measures, 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.

3.6.2 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 and northern fur seals for which potential prey competition with the groundfish fisheries may be a concern. Both of these species depend on pollock as a principal prey species (NMFS 2007b).

Under Alternative 2, the EFP would allow harvests of pollock that exceed the ABC by 0.25 to 0.5 % each year. These amounts of pollock are so small, that harvest under Alternative 2 is not likely to have an effect on the overall availability of pollock to fur seals or Steller sea lions. Because the harvest would be conducted with one vessel, over several seasons, outside of protection areas for Steller sea lions and for fur seals in the Pribilof Island Area Habitat Conservation Zone and dispersed over a large area (Figure 1.3 and 1.4); it is unlikely the pollock harvest under Alternative 2 would have any discernable effect on prey availability for northern fur seals or Steller sea lions.

The exemption from the sector closures of the SCA is not expected to have an impact on Steller sea lions. In 2005 through 2007, 60,000 mt to 100,000 mt of sector combined pollock quota was left unharvested in the SCA before April 1 (Mary Furuness, NMFS Inseason Management, pers. comm., February 12, 2008). The amount of groundfish expected to be taken during EFP fishing before April 1 is no more than 2,500 mt. The goal of the Steller sea lion protection measures for harvest in the SCA is to prevent the temporal concentration of harvest before April 1. This is accomplished by limiting harvest to 28% of the annual TAC. The SCA has not been closed since 1999 because the American Fisheries Act allowed for the establishment of pollock cooperatives which monitor their own fishing, generally leaving the SCA before quotas are exceeded. The SCA exemption under the EFP would only apply as long as the combined amount of pollock taken from the SCA does not exceed the 28 percent annual TAC before April 1, as specified in the Steller sea lion protection measures (§ 679.20(a)(5)(i)(B)). Because this exemption ensures the temporal harvest of pollock remains dispersed as specified in the Steller sea lion protection measures, this exemption is not expected to have an impact beyond those already identified in previous analysis (NMFS 2001, Appendix A).

Salmon is also a prey species of Steller sea lions (NMFS 2001) and of northern fur seals (NMFS 2007d) . Sea lions eat salmon primarily in May and where salmon congregate for migration based on geography. Alternative 2 will be conducted in a manner that will not likely affect salmon prey availability for Steller sea lions. The harvesting of salmon would occur in August or September and in March when Steller sea lions are concentrating on eating other types of prey (Lowell Fritz, National Marine Mammals Laboratory, pers. comm. February 14, 2008). EFP fishing would be conducted outside of protection areas (except the SCA), and the salmon harvest would be limited to one vessel over a large area, and dispersed over two seasons each year.

Under the status quo, the Northern Fur Seal Conservation Plan recommends gathering information on the effects of the fisheries on fur seal prey, including measuring and modeling effects of fishing on prey (both commercial and noncommercial) composition, distribution, abundance, and schooling behavior, and evaluate existing fisheries closures and protected areas (NMFS 2007d). The Alaska Groundfish Harvest Specifications EIS analyzed the effects of the groundfish fisheries on fur seal prey (section 8.3.2 of NMFS 2007b). The EIS for the annual subsistence harvest of fur seals determined that the groundfish fisheries in combination with the subsistence harvest may have a conditional cumulative effect on prey availability if the fisheries were to become further concentrated spatially or temporally in fur seal habitat, especially during June through August (NMFS 2005a).

The harvest of pollock under the EFP would occur in the northern area of the Bering Sea in September or October (Figure 1.4). Fur seals are likely to be in the same area at the same time as the EFP fishery would be occurring (NMFS 2007d). No more than 2,500 mt of pollock are likely to be harvested in this northern area due to the seasonal distribution of fishing under the EFP. No more than 2,500 Chinook and 2,500 non-Chinook salmon would be taken in the B season and in the area that may overlap with fur seals. The frequency of occurrence of salmon occurring in fur seal scat collected from Bering Sea rookeries range from 3 to 16 percent (NMFS 2007d). Salmon does not appear to be as important in the fur seal diet as pollock and squid which occur much more frequently in scat samples analyzed. Because the harvest of pollock and salmon is such a small proportion of the total annual pollock and salmon harvest, occurs over a short time period, and is limited to one vessel, it is not likely to have a discernable effect on fur seal prey.

3.6.3 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 one vessel outside of areas closed to protect Steller sea lions and northern fur seals and the time period of fishing is limited, it is not likely that any discernable disturbance of marine mammals would occur. Therefore, Alternative 2 is not likely to result in marine mammal disturbance beyond that which may occur under the status quo.

3.7 Socioeconomic Effects

3.7.1 Background

The operation of the groundfish fishery in the BSAI and the GOA is described by gear type in the PSEIS (NMFS 2004). General background on the fisheries with regard to each species is given in the BSAI and GOA groundfish Fishery Management Plans (FMPs) (NPFMC 2007b and 2006). 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 2006 Economic SAFE report (Hiatt et al. 2007).

The most recent description of the economic aspects of the groundfish fishery is contained in the 2006 Economic SAFE report (Hiatt et al. 2007). 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.

3.7.2 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 will be donated for distribution under the Prohibited Species Donation Program (PSDP) (§ 679.26) or disposed of in accordance with § 679.21(b).

Alternative 1 Status Quo

If the EFP is not issued, the development of an effective salmon excluder device may be more difficult, if not impossible. The pollock fishery is experiencing high salmon bycatch rates that exceed salmon bycatch limits, especially for Chinook salmon. The economic impact to the pollock fishery is the potential closure of hot spots under the voluntary rolling hot spot program, limiting the choices 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.

Alternative 2 Issue the EFP

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 exclude enough pollock to reduce net CPUE. Moreover, the excluder may turn out to be expensive to purchase or operate (perhaps by excluding large numbers of pollock or by increasing the net's drag) 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 and other trawl 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.

4.0 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 Bering Sea. 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 (PSDP). 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 Council on Environmental Quality (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 any target species is expected; and therefore, the proposed action is not likely to jeopardize the sustainability of any target species (EA Section 3.2).

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. 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 and therefore, the proposed action is not likely to jeopardize the sustainability of any non-target species (EA Section 3).

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 3 Introduction).

4) *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 one vessel, harvesting a relatively small amount of fish over several seasons in two large areas of the Bering Sea. The quantity of fish and method of harvest are not likely to have any discernable effects on biodiversity or ecosystem function (EA Section 3).

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

Response: No. The proposed action involves one vessel conducting controlled scientific testing of a bycatch reduction device in a location away from the public; and therefore, no impacts to public health or safety are expected (EA Section 2).

6) Can the proposed action reasonably be expected to adversely affect endangered or threatened species, their critical habitat, marine mammals, or other non-target species?

Response: No. The proposed action is limited to the use of pelagic trawl gear by one vessel, harvesting a relatively small amount of fish over several seasons in two large areas of the Bering Sea. Because of the amount of pollock and salmon harvested, the method of harvest, and compliance with existing closures for Steller sea lions and northern fur seals, no discernable effects are expected on ESA-listed species, critical habitat, marine mammals or other non-target species (EA Section 3.4 and 3.6).

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 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 3.7).

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

Response: No. 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, Western Alaska salmon users, and environmental organizations are in favor of efforts to reduce salmon bycatch (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 on pollock and marine mammals is 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 Section 3.1, 3.3 and 3.5).

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. If no direct or indirect impacts result from an action or alternatives, then analysis of cumulative effects are not necessary. Because no direct or indirect effects were identified from this action on any environmental components, and a cumulative effects analysis requires determining the incremental effects of this and other actions, no cumulative effects analysis for this action was possible (EA Section 3).

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 Bering Sea, and these types of sites do not occur in the Bering Sea. 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 device that may be considered for 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 done 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. No discernable effects are likely from this action and therefore, no cumulative effects are likely for target or non-target species (EA Section 3).

Comparison of Alternatives and Selection of a Preferred Alternative

Alternative 1 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 Bering Sea. 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 continued 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 pollock trawl fishery. Therefore, Alternative 2 is the preferred alternative.

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APPENDIX A

The following is from the application for the EFP (Gauvin 2008).

Experimental Design: The testing methods used for this new EFP would be limited to the use of the specialized recapture net that was developed for our salmon excluder testing under EFP 05-02. The reasons for relying solely on testing with a recapture net are as follows. For a portion of the testing done under previous EFPs, paired comparisons were used to attempt to detect the effects of the excluder on catch rates. These pairs of "standardized tows" (pairs of tows with and without the excluder device attempting to hold all other factors equal) were intended to evaluate performance of the excluder. The objective for testing without a recapture net was to avoid any potential influence of a recapture net on escapement rates. The potential for a recapture net to affect escapement has been noted in other fishing gear modification research. For our work, there was potential for the recapture net to mask problems with pollock escapement from the excluder. This issue was raised by several pollock fishermen during presentations of the results from our testing during the first year of the EFP work in 2003.

In spite of our hope that paired comparisons would help to ground truth our earlier results, our tests with that methodology in the fall of 2005 showed that the degree of ambient variability was simply too great to allow valid comparisons. For this reason following the fall of 2005 test, we focused on reducing potential effects of a recapture net on our test results. This was done through examination of underwater video and work in a flume tank whereby we came up with a plan to improve our recapture net design. Steps here included improved water kites, changes to the method of attachment to the main net, and the use of a one-way funnel to reduce chances for reversed escapes. Due to these improvements and the video footage and sonar images we obtained during use of the recapture net, our confidence has since increased that the tests with recapture net are valid. For this reason, all of our EFP tests since the fall of 2005 have relied on a recapture device.

Experimental design elements in conjunction with testing with a recapture net: For the portions of our previous EFPs where recapture nets were used, we relied on a statistical power analysis described in detail in our 2003 EFP application. This new EFP application relies upon some aspects of the basic power analysis from 2003 so the power analysis and how it was used to come up with the amount of fishing needed to generate the desired sample size is reviewed below. A departure from our original approach to sample size generation is also described as part of our methods for this new EFP. This new approach is based on our experiences with excluder testing in the recent tests wherein we have been able to conduct multiple tests of excluder designs during a given stage of our field work instead of a single test which resulted in our earlier tests. Hence through our experiences since the first tests utilizing the power analysis developed in 2003, we have made some important adjustments to the way the 2003 power analysis is now used. These are explained in detail below.

The basic approach behind testing with a recapture net is to evaluate the proportion of the number of salmon (or weight of pollock) that escapes relative to the total number of salmon (weight of pollock) that are caught during the test. Sample size determination is based on determination of the number of salmon offered the “escapement opportunity” that the excluder provides. Hence the power analysis is the determination of the number of escapement opportunities needed to assess performance at the desired level of precision needed for the statistical power relationship.

The sample size determination portion of our 2003 EFP application was based on the assumption of a proportion of 50%, (probability of 0.50) as the expectation for the proportion of effect of the excluder on salmon escapement. This value maximized sample size for a given set of desired statistical power and desired degree of statistical confidence. So it was a conservative value that avoided under-sampling. Based on our tests of funnel excluders and preliminary work on a flapper excluder, this initial assumption of a 50% escapement proportion still appears to be a reasonable expectation for eventual performance of the excluder. This is because in some of our trials we have been able to achieve average escapement rates of up to 43%. So for our experimental design in our 2003 EFP and in this proposal for continued EFP tests, we have assumed a proportion of effect (salmon utilizing the escapement device, i.e. escaping) of 50% ($\bar{p}$ = 0.5) which still makes good sense in terms of escapement performance potential and practical sampling objectives.

The accompanying statistical power analysis evaluated the tradeoffs associated with different sample sizes and our goal for evaluation of salmon escapement proportion was to design for an 80% percent probability of detecting a 10% difference in proportion of effect from the underlying proportion of 0.5. The preferred level of confidence interval here was a 95% statistical confidence level or alpha of 0.05.

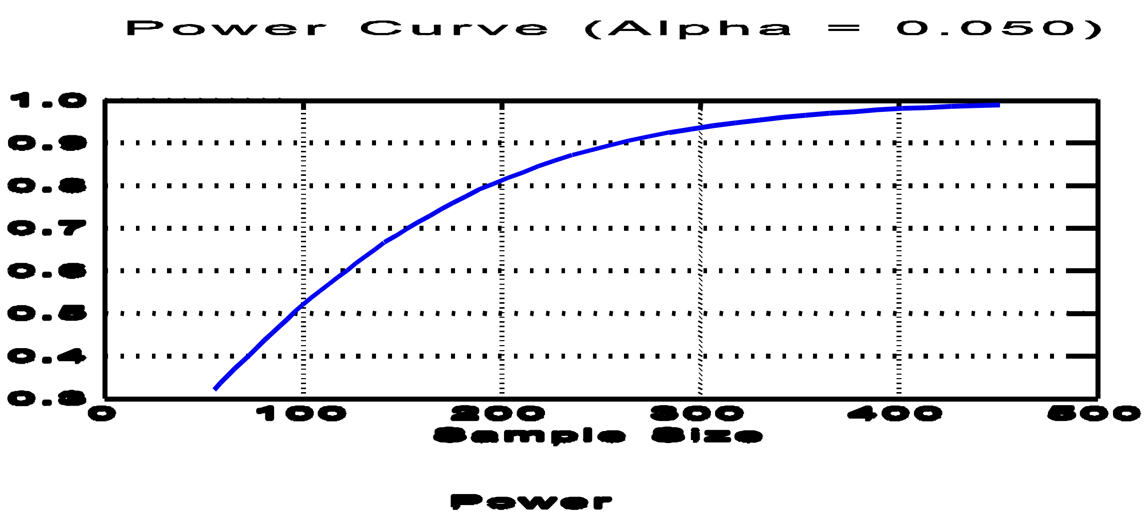

Figure 2 from our 2003 EFP application: Probability of detecting difference from proportion of 0.6, when the underlying proportion is 0.5

Applying these power analysis objectives resulted in a target sample size of 200 salmon subjected to the test (provided the opportunity” of escapement via the excluder). This target was used to estimate the salmon catches necessary for a valid test of each excluder configuration. It is important to recall, however, that this approach was used to generate a target sample size for chum salmon (non-Chinook) only and an alternative approach was used for Chinook back in 2003. This was because achievement of a sample size of 200 Chinook salmon was not feasible at that time. Tow-specific Chinook catch rates per ton of pollock in the winter 2002 pollock fishery data (data obtained from Sea State in 2003) were at that time in the hundredths of Chinook per ton. To have a reasonable expectation of generating a sample size of 200 Chinook salmon back then, a prohibitive amount of pollock fishing would have been needed. This is important to understanding the approach we took in 2003 and how this has evolved over time.

In 2003, Chinook salmon bycatch rates based on the Sea State data we used for the power analysis were actually roughly 0.025 Chinook per ton (during the “A” season for the catcher vessel sector). So based on the bycatch rates at that time, we estimated that as much as 8,000 MT of pollock fishing to generate a sample of 200 Chinook salmon. For this reason, as we reported to the NPFMC’s SSC back in 2002, it was not pragmatic to conduct a test with the more widely accepted 95% confidence level.

For this reason, we eventually decided in consultation with the Alaska Fishery Science Center and the NPFMC’s SSC that for our evaluation of the performance of the excluder for Chinook salmon, we would accept a lower level of statistical confidence (alpha of 0.10 or a 90% confidence interval instead of the more conventional 0.05 or 95% confidence interval). The sample size needed for the alpha = 0.10 test was only 30 Chinook salmon. This reduced the necessary amount of pollock fishing to a more manageable amount but also created a reduction in expected confidence in the test results. This was an unfortunate trade-off given the importance of having a firm assessment of the performance of the excluder on Chinook salmon.

Evaluating how the assumptions used for the 2003 EFP to generate sample size apply to the current pollock fishery: In the years since our 2003 power analysis, Chinook rates per ton have been significantly higher. On a gross level, approximately 130,000 Chinook salmon taken in the Bering Sea pollock fishery in 2007 for a total catch of approximately 1.4 million metric tons. This translates into an overall average rate of about 0.09 Chinook per ton of pollock for 2007. Of course, the time window where the pollock fishery tends to catch Chinook salmon is actually the winter season and the latter portion of the pollock fall season. Hence a more relevant indicator is the monthly bycatch rate for Chinook salmon in months when Chinook salmon bycatch can be expected to be high. For 2007, the number of Chinook taken per ton of pollock in the Bering Sea pollock fishery overall (all sectors) was 0.26, 0.13, 0.05, and 0.28 for the months of January, February, March, and October respectively. Given this, we can comfortably say that average Chinook salmon bycatch rates for that window of time have generally been close to 0.2 Chinook per metric ton of pollock (data provided by Karl Haflinger, Sea State Inc).

So one consequence of the higher Chinook bycatch rates in the pollock fishery today is that we can now make use of the higher, more acceptable alpha= 0.05 level for statistical confidence relationships for evaluating the performance on Chinook salmon.

As we have learned from our testing experiences in recent years, average Chinook bycatch rates in the pollock fishery are not necessarily indicative of rates that can be attained in our EFP testing. EFP testing in areas with concentrations of salmon is most efficient because it allows us to attain the necessary sample size in the shortest time period possible and with a smaller amount of pollock catch in the EFP than would otherwise be possible. This is the reason we have requested an exemption to allow us to conduct testing in the Rolling Hotspot Closure areas (now in place under Amendment 84). This has allowed us to attain higher rates than the fishery on average when this is needed for objectives of our tests. For instance, in March of 2007, the average rate of Chinook per ton of pollock in the regular pollock fishery was 0.05, as reported above. In that same month, we conducted the tests of the flapper device inside the pollock industry's Rolling Hotspot closure areas and achieved Chinook bycatch rates of over 0.2 Chinook per ton of pollock on average. We also had some individual tows well in excess of one Chinook per ton of pollock. The ability to access these areas of higher salmon concentrations is important because it essentially allowed us to conduct effective testing at a time when pollock vessels had mostly finished their regular AFA pollock fishing and were thus available to work as test platforms.

<u>Evolution of our approach to determination of sample size and amount of testing that can be accomplished during a given stage of field work:</u>

Our approach to determining the amount of fishing needed to generate minimum sample size has evolved considerably from the methods developed for the original tests done with a recapture net. So in the portion of our 2005 EFP application that set out to use a recapture net, we explained in our application that we would likely be able to accomplish a suite of tests with a reasonable expectation that each individual test of a given excluder design would achieve at least the desired sample size of 30 Chinook. We also speculated at that time that we could achieve a sample size of 200 Chinook for each of those tests (hence achieving the sample size for the more preferable confidence level for the experiment). And in fact, in most cases, we were able to achieve in excess of 200 Chinook for each of those individual tests. The single factor that appears to have made attainment of the higher number of Chinook salmon needed for the power analysis objective for the 95% confidence level (200 Chinook) was our ability to use the salmon bycatch hotspot areas identified in the fleet's Rolling Hotspot avoidance program.

Hence a more pragmatic approach to testing was to identify the amount of test fishing we felt we could accomplish with a practical amount of pollock and salmon bycatch allowance for the EFP. Under this approach, the main considerations for determining those quantities of pollock and salmon were the amount of time we could staff the field experiments, the minimum amount of fishing necessary for making the opportunity practical for engaging a pollock vessel for the EFP test, and the number of adjustments to the excluder device that we could practically test given that a number of performance outcomes that have to be considered in preparing for field work.

So in conjunction with Dr. Rose at the Alaska Fisheries Science Center, we worked out a plan to optimize the amount of testing that could be done during each stage of the field testing. For each proposed stage in the field, we allocated approximately 2,500 MT of pollock. This amount allowed us to conduct sequential tests of either different excluders or tests of the same excluder with sequential adjustments in the placement or fishing methods with a given excluder. Each of these sequential tests was continued until approximately 200 Chinook salmon were taken. After at least the target sample of Chinook was taken, we moved on to the next test of a different configuration of the same excluder.

In addition to achievement of the minimum sample size, we set some additional guidelines to ensure a sufficient amount of test fishing under various conditions that we expected to affect performance of the excluder (e.g. day versus night fishing, fast pollock fishing versus slow). Therefore, even if the guideline number of Chinook were taken in a given test, we would continue the test until we felt that we had tested the device under a reasonable cross section of fishing conditions. On three occasions, the minimal sample size was achieved in fewer than eight tows and testing continued with the same device until at least 10 tows were completed.

In this manner, we essentially adopted the guideline of 2,500 MT of groundfish catch in the pollock fishery for a given stage of field work. This amount of pollock was sufficient for generating the salmon sample size for trials of approximately two to three different excluder designs or variations in the way vessel slowdowns were conducted. So for each field season under the last EFP two to three different excluder variations were tested such as the amount of weight on the device, location in the net, or the duration of the slowdown to allow the device to collapse. The target amount of catch per tow has been between 60-80 MT, so this typically allowed for between 30 to 40 tows per field testing stage and the salmon sample size was generally achieved in approximately 8-10 tows.

For most pollock vessels, this translates into between two and four weeks of testing depending on catch rates and the distance to the fishing areas with suitable pollock and salmon bycatch rates. For catcher processors, 2,500 MT of groundfish works out to be closer to ten days to two weeks of testing. But on catcher processors, two different excluders can be tested simultaneously if they are placed in separate nets (same net design) and fished in rotation. This is possible because unlike catcher vessels that need to return to port every 2-3 days, these vessels do not have to return to port until their frozen product hold capacity has been reached. Also, catcher processors have the sampling facilities for haul by haul catch accounting and sufficient personnel and deck space to allow two designs to be tested at once.

In 2006 we constructed a second recapture net for simultaneous testing work on catcher processors. With two operational recapture nets, we therefore were able to accomplish more testing per day provided the devices being tested were second or third generation devices that were expected to work reasonably well.

So under this approach to testing, we have been able to test several logical adjustments to a device in a single stage of field work. For each separate test, we held all the testing variables (e.g. towing speed, location and configuration of the device, duration of vessel slow downs etc) constant during each test during a given stage of field testing. Once that test is completed, we then move to what we have anticipated as the next logical step for testing that excluder.

In our experience, catcher vessels are best suited as testing platforms for the basic design work for new excluder concepts. This is because these vessels typically have the flexibility to break off from testing and resume the work when we are ready. Asking the testing vessel to curtail testing and make a partial trip or do multiple starts and stops of the testing is generally workable for catcher vessels. The potential need to break off testing as well as work with the EFP personnel to repair the recapture net before test fishing can recommence is made clear in the contract that engages vessels for testing. As long as the potential applicant knows this may be needed and plan for that eventuality when they are apply for the EFP work, problems and misunderstandings are avoided.

For catcher processors, this flexibility is not really feasible given their schedules and the costs of slowdowns due to the number of people on board and the economics of those vessels. At different stages in the development a proofing of a given excluder device do need to utilize catcher processors because they provide excellent catch sampling facilities as well as a platform that can offer the advantage of being able to accomplish multiple tests simultaneously. So the selection of the best vessel for a given stage of testing essentially depends on the degree of confidence we have in the basic performance expectation for a given excluder design. Once we have sufficient confidence that a given excluder works under most conditions that can be expected in the fishery, we can move to testing on catcher processors. On the catcher processor vessels, the larger towing force and water flow and mesh opening parameters are also of specific interest for understanding how the excluder functions.

<u>Considerations for the relative merits of this sequential approach to testing compared to earlier methods</u>

The advantage to being able to multiple excluder variations at each stage of field work is that this likely allows for faster progress in the development of a viable excluder than was possible before. But the downside is that we are relying on what many might consider to be a relatively small amount of test fishing to make decisions about the performance of changes in the excluder. This raises the question of the applicability of the test to a broad range of fishing conditions given that performance is typically evaluated from testing that comprises 8-10 tows. The specter of Type II error is also a consideration here. Results from one test to another might vary more from differences in the ambient testing conditions (pollock catch rates, proportion of day versus night) than from actual differences in the excluder design. For this reason, we cannot eliminate the possibility that over the course of our tests, we may have made decisions about the factors affecting escapement rates that were driven more by the conditions affecting testing that by actual performance differences from variations in those facts.

So our decisions on excluders along the path of development of salmon excluder could have taken some wrong turns or at least abandoned some excluder variations that had at least as much promise as the ones we have continued to work on. However, the tradeoff here is that increasing sample sizes and testing over a wider range of conditions for each excluder variation would decrease our ability to evaluate promising excluder configurations and identification of a truly effective device.

The underlying issue here relates to the relative amount of certainty we can have regarding our results. But this issue should be considered in the proper context. In fact, most of our work to date has concentrated on modifications to funnel and tunnel excluders to resolve problems with bulges in the net and other factors affecting pollock fishing. During the tests of adjustments to the excluder to resolve these problems, we have generally achieved Chinook salmon escapement rates in the range of 30-40%. Our tests were not designed to allow us to tell whether the different average escapement rates of those tests are statistically different from one another. But the repeated findings of Chinook escapement in that range suggest that what we have detected is probably real. Additionally, we have attempted to conduct tests with methods other than using a recapture net to help ground truth those results but the use of paired comparisons was not successful. Finally, we have received feedback from pollock fishermen who have conducted informal trials of our different excluders in the regular fishery. While this feedback has confirmed our findings regarding deployment issues and problems with pollock becoming entrained in the intermediate ahead of the excluder, it is not as useful in terms of confirming salmon escapement rates. Fishermen's impressions of salmon escapement rates are of limited value because without are recapture net, it is unlikely that they would have any way of detecting a difference in their salmon bycatch rates.

Our EFP results will probably never be able to adequately address the criticism that our methods do not include independent replications of test results and other standard practices for laboratory science. But in reality most of our work to date has concentrated small adjustments to funnel and tunnel excluders and we have tested several versions of these excluders with enough of our salmon and pollock escapement rate results falling into the same general range to suggest that we are likely seeing a real effect of the excluder. As we move to testing the flapper excluder, a relatively new design, the importance of testing over a larger range of fishing conditions before modifying the design is clear. This issue is therefore taken into consideration in the plan for testing the flapper excluder under the new EFP.

In October of 2007, we presented to the NPFMC and its advisory bodies the results of our tests over the last two years, covering several adjustments to the funnel device and the first test of the flapper excluder. After considering the results and our methods, the NPFMC's SSC pointed out that while the development of the excluder through our EFP certainly suggests that there is potential for the device most recently tested (the flapper), it would be worthwhile to repeat the test with the same exact device and testing conditions to the extent possible. This is clearly a helpful suggestion at this of work on this new excluder design. For this reason, we have incorporated the SSC's suggestion for repeating our test of the first flapper excluder into the testing plan for this EFP. The plan for repeating the flapper test will utilize the same testing vessel, same net and the same flapper excluder but unfortunately due to timing constraints will not allow testing to occur at the same time of year as the 2007 flapper test.

Detailed plan for testing over the years covered by the EFP application.
We propose the following suite of excluder tests over next three calendar years:

September/October 2008: Test 1: A “repeat” of March 2007 “square mesh” flapper test with same test vessel, same net, same excluder, same recapture net; Test 2: Repeat test 1. Test 3: If sufficient groundfish and salmon bycatch allowance remains for a third test, test an appropriate adjustement to the same flapper or possibly different flapper. Ideas for the most promising adjustments to the flapper excluders for Test 3 will be developed in consultation with pollock fishermen prior to the September/October 2008 field tests. This will occur from captains’ meetings conducted prior to the B season this summer. Quantity of pollock needed for fall 2008 testing: up to 2,500 MT of groundfish in pollock target and allowance of up to 2,500 Chinook salmon and 2,500 chum salmon.

Winter (late February to March) 2009: Additional testing of flapper device tested in fall of 2008. Some design adjustments to the flapper will be considered depending on the results of the fall 2008 testing. Once a baseline test of the flapper is conducted, the remaining tests will evaluate the effects of adjustments to the excluder or fishing methods for its use such as duration of the slowdown, manner in which slowdown is conducted (during turns versus regular towing). Ideas for adjustments to the excluder or manner in which it is used will come from informal meetings with captains following the 2008 “B” season. The type of vessel needed for this stage of the continuing work from fall of 2008 will depend on the stage of development of the excluder. If following the fall 2008 testing we have an excluder that is working reasonably well and the objective is to ground truth this performance on a vessel that can do this most efficiently, then a catcher processor vessel might be the preferred vessel for this test. If we are still struggling with design issues and cannot reasonably assume that the excluder will work without disruptions to the testing and the need to repair the excluder or the recapture net, then we will focus on a catcher vessel for this stage of the testing. The vessel will be selected by NMFS AFSC review panel and applications will be solicited through an RFP process as was done in previous EFPs. Catch needed for this test is 2,500 MT of groundfish in the pollock target fishery, up to 2,500 Chinook salmon.

Fall 2009: Additional testing of device or devices tested in winter of 2009. After baseline tests to replicate the performance obtained from the most promising design tested from the winter of 2009 are completed, additional tests with adjustments to the excluder or fishing methods will be done. These will include adjustments such as duration of slowdown, manner in which slowdown is conducted (during turns versus regular towing), or other factors such as how far back in the net the excluder is placed. Prioritization for adjustments to the device of interest will come from informal meetings with captains following the 2009 “A” season. Depending on the stage of development of the excluder, a catcher vessel or catcher processor may be used for these tests. The test vessel will be selected by NMFS panel through RFP process as was done in previous EFPs (see 2003 or 2005 EFP application) Catch needed for test is 2,500 MT of groundfish in the pollock target fishery, up to 2,500 Chinook and 2,500 chum (non-Chinook) salmon.

Winter (February/March) 2010: Testing of the most promising devices from the testing from fall 2008-fall 2009 with the objective of improving/optimizing salmon escapement performance. Ideas here might include using artificial light or other attractants to improve performance of those excluders. Another approach might be place additional weight an earlier flapper excluder panel such that it would remain partially open during regular towing. This could potentially optimize escapement by allowing some salmon to exit during towing and additional escapement during periodic slowdowns. This design might also avoid the bulge problem encountered with funnel excluders because the over-weighted panel would be designed to push back up (to close) when a large concentration of fish is moving through the intermediate where the excluder is installed. Depending on the stage of development of the excluder, a catcher vessel or catcher processor may be used for these tests. Vessel will be selected by NMFS panel through RFP process as was done in previous EFPs (see 2003 or 2005 EFP application). The decision of what gear designs to test to optimize salmon escapement will be made follow a meeting with the pollock captains and interested gear manufacturers will be conducted during the Pacific Marine Expo in November of 2009. This meeting will solicit feedback on the results of our earlier testing and design features that appear to work the best. Feedback from that meeting will be used to prioritize ideas for modifications to the flapper excluder to optimize performance. Catch needed for test is 2,500 MT of groundfish in the pollock target fishery, up to 2,500 Chinook salmon.