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Robert D. Mecum, Acting Administrator
National Marine Fisheries Service
Alaska Regional Office
P.O. Box 21668
Juneau, AK 99802

Dear Mr. Mecum:

On behalf of the Pacific Seafood Processors Association ("PSPA"), At-Sea Processors Association ("APA"), and United Catcher Boats (UCB"), I am pleased to submit these comments on the Draft Environmental Impact Statement/Regulatory Impact Review/Initial Regulatory Flexibility Analysis for Bering Sea Chinook Salmon Bycatch Management dated December 2008 ("DEIS"). Collectively, APA, PSPA, and UCB represent the vast majority of the catcher vessels, catcher-processors, motherships, and on-shore processors involved in the Bering Sea Aleutian Islands ("BSAI") pollock fishery. Their members rely on the pollock fishery for their economic livelihood.

The issues presented by the proposals pending before the North Pacific Fishery Management Council ("NPFMC") are extraordinarily complex. APA, PSPA, and UCB each recognize the importance of, and are dedicated to, reducing salmon bycatch. Indeed, the pollock fishery has had a long history of working to reduce the incidental bycatch of Chinook salmon. In 1996, the BSAI Groundfish Fishery Management Plan was amended to close three areas to trawling when 48,000 Chinook salmon were incidentally taken. The pollock industry supported this proposal. In 2000, this program was refined through Amendment 58 to the BSAI Groundfish Fishery Management Plan to lower the closure trigger from 48,000 to 29,000 and to refine the closure dates and areas. Again, the industry supported this measure. In 2001, the pollock fleet voluntarily implemented a Voluntary Rolling Hotspot System ("VRHS') in which chum salmon bycatch is monitored on a real time basis so the fleet can move to different areas to avoid bycatch. In 2002, the fleet voluntarily extended VRHS to include Chinook salmon. In 2007, the VRHS program was codified as Amendment 84 to the BSAI Groundfish FMP. Today, the pollock fleet is working on several different fronts to reduce salmon bycatch, including the development of an effective salmon excluder device. Over the last four years, the pollock industry has supported an applied research program regarding salmon excluder devices. One such device is currently being tested pursuant to an Experimental Fishery Permit. In addition, variations of a salmon excluder device are currently being used in normal pollock fishing operations by a number of vessels.

APA, PSPA, and UCB appreciate the very important and unique role subsistence has in the fabric of Alaskan life and the importance of salmon in satisfying subsistence needs. We also understand and respect the place that salmon occupies in the cultural heritage of Native peoples.

APA, PSPA, and UCB are equally aware of the responsibilities they have, and of the important role the pollock fishery has, in the life of Alaska's economically disadvantaged communities that depend on the pollock fishery through the Community Development Quota ("CDQ") program. For the residents of many of these communities, the jobs and income generated by the pollock CDQ program provide an alternative to subsistence.

Beyond CDQ communities, the pollock fishery has a significant role in all parts of Alaska's economy providing jobs, generating income, and generating tax revenue for coastal communities. For many of Alaska's communities, the pollock fishery is a pillar of the local economy.

For the NPFMC and the National Marine Fisheries Service ("NMFS") to make informed decisions about how to balance all of these important interests, they must have a complete environmental analysis that fully and accurately examines all of the issues. As the Supreme Court has said, the National Environmental Policy Act ("NEPA"), 42 U.S.C. § 4331, requires that there be a hard look at all of the issues. *Citizens to Preserve Overton Park, Inc. v. Volpe*, 401 U.S. 402 (1971). Sadly, the DEIS fails to provide decision makers with the information they need to make an informed decision because the DEIS does not take a "hard look" at the issues.

To assist in developing the analyses required by NEPA, PSPA, APA, and UCB requested an extension of the public comment period. Although we appreciate that an extension of the comment period was granted, the overall length of the comment period remains inadequate to prepare analyses on every issue that must be thoroughly examined before the DEIS can be considered compliant with NEPA.

For ease of reference, these comments are divided into sixteen Parts addressing (1) legal issues, (2) the benefits of the proposed action on the salmon resource and the salmon fishery, and (3) the burdens of the proposed action on the pollock resource and the pollock fishery. Part I is an Executive Summary.

I. EXECUTIVE SUMMARY

The Draft Environmental Impact Statement ("DEIS") fails to meet the standard set forth in the National Environmental Policy Act that an environmental impact statement ("EIS") must take a hard look at the issues. The DEIS fails this standard because it ignores critical issues and fails to fully and accurately analyze other issues. Each of the points summarized below are discussed in the detailed comments following the Executive Summary.

- There is no biological need to severely curtail Chinook salmon bycatch in the pollock fishery. Forty-six percent of this bycatch originates in waters outside western Alaska. The DEIS variously describes these stocks as trending "sharply upward," with "escapement goals met or exceeded" in some cases by 125%-265%, and as "rarely taken" in the pollock fishery. As to the 54% of incidentally taken Chinook originating in western Alaska, none of

these stocks has been listed as a stock of concern because of inadequate escapement. Even if there were zero Chinook salmon incidentally taken in the pollock fishery, the increase in the number of fish escaping to spawn would range between 1.9% and 5.5% depending on the river system. These are numbers too small to make a real biological impact on either escapement rates or the species.

- Although the annual Adult Equivalent ("AEQ") mortality (the number of Chinook salmon that would have returned to the natal river had they not been captured in the pollock fishery) ranged from 9,697 to 45,682 fish between 1994 and 2008, that is a relatively small percentage of the Chinook salmon returning to western Alaska. In the same period, the number of Chinook returning to western Alaska was between 393,000 and 1,100,000 fish annually.

- The DEIS states "sufficient opportunities for subsistence harvests have occurred in most areas in recent years." The DEIS also states "there is no indication that any of the alternatives being considered [including the status quo] would result" in a health risk to subsistence users.

- If zero Chinook were incidentally taken in the pollock fishery, it would have added just under one fish per subsistence household in the Kuskokwim area, 1.7 fish per subsistence household in the Yukon River area, one-tenth of a fish per subsistence household in the Norton Sound area, and less than three fish per subsistence permit holder in Bristol Bay. The issue is not the importance of subsistence, which we acknowledge, but whether restricting the pollock fishery makes a real difference in the amount of fish that would be available for subsistence.

- Given the small number of fish that would be added to each subsistence household if 100% of the Chinook salmon bycatch were eliminated, there is no support for the assumption in the DEIS that restricting the pollock fishery will allow subsistence fishermen to take their subsistence catch more quickly and to pursue other subsistence or economic opportunities.

- None of the proposed bycatch reduction plans propose eliminating the entire bycatch as doing so would mean the complete closure of the pollock fishery. Thus, in <u>every</u> instance where these comments provide a number of fish that would be added to escapement or to subsistence, commercial, or sport harvests, that number <u>overstates</u> the benefits of the proposed action because that number is based on what would happen if zero Chinook salmon were taken as bycatch. It should also be noted that the difference in AEQ mortality between a cap of 68,000 and 47,000 is a difference of only 17,640 Chinook salmon. Since only 54% of the Chinook taken in the pollock fishery originate in western Alaska, the total difference to all of western Alaska would be 9,526 fish.

- The DEIS contains no analysis showing that subsistence fishermen are, in fact, taking longer to harvest their subsistence catch and fails to examine the relationship of ichthyophonus infection and other factors to any delay that might be occurring. Ichthyophonus infection rates have been detected as high as 45% in samples of Chinook salmon taken in the Yukon River. Yukon River processors are discarding up to 20% of purchased fish because of tissue damage caused by ichthyophonus. This means that if a subsistence fisherman wants to harvest 100 Chinook, he or she will need to take the time to catch 125.

- Reductions in Chinook salmon bycatch in the pollock fishery will not have a significant measurable impact on commercial salmon fishermen. In the Norton Sound area, only 0.17% of all of the salmon caught by commercial fishermen since 2000 were Chinook. In the Kuskokwim area, only 1.9% of the commercially taken salmon between 2000-2007 were Chinook. In the Yukon, completely eliminating the entire Chinook bycatch in the pollock fishery would add only 1,439 fish to the total average annual Yukon River commercial catch. In Bristol Bay, Chinook salmon comprises only 0.26% of the commercial salmon harvest. Divided by the number of commercial fishermen, the effect of eliminating 100% of the Chinook bycatch in the pollock fishery is minimal, adding between less than one and three fish to each commercial fisherman's annual harvest depending on the region.

- Restricting the Chinook salmon bycatch in the pollock fishery will not have a significant measurable impact on sport fisheries. In the Kuskokwim, Yukon, and Bristol Bay areas, the average annual take of Chinook in the sport fisheries ranged from near 0% to 1% of the salmon taken. In the Norton Sound region, the average annual take of 444 Chinook salmon in the sport fishery is 4.3% of the sport harvest.

- Any non-use value of Chinook salmon, what the General Accountability Office calls the psychological value of "knowing that the resource exists," is fully satisfied if the resource exists. There is no claim in the DEIS or elsewhere that the incidental harvest of Chinook salmon in the pollock fishery threatens the existence of this species. Nor is there any evidence in the DEIS that this incidental take is interfering with the cultural needs of Native peoples.

- The DEIS fails to meet even the minimum accepted and established standards for proper economic analysis.

- The DEIS estimates the impact on the pollock fishery of proposed Chinook salmon bycatch plans by measuring "foregone gross revenue," an estimate of lost wholesale revenue. The DEIS' analysis, which shows an actual loss of up to $500,000,000 to the pollock fishery, understates the loss by 49%-69% because the DEIS uses outdated prices.

- The DEIS confines its analysis of the economic impact on the pollock fishery of bycatch restrictions to lost wholesale revenue. The DEIS never examines the multiplier effects of economic activity. The actual economic impact of the proposed bycatch restrictions is multiples of what is estimated in the DEIS. The actual loss to the nation is over $1 billion using current wholesale prices and accounting for the economic multiplier.

- The DEIS does not examine the job losses that will occur in the pollock fishery and in the related and dependent support, service, and distribution sectors because of foregone product and foregone revenue.

- U.S. companies export close to $1 billion annually in Bering Sea pollock products to countries around the world. The DEIS does not examine the impact on the U.S. trade deficit that will occur because of foregone export product. Nor does the DEIS examine the consumer price impact in the U.S.

- The DEIS does not examine the impact of foregone catch and sudden fishery closures on large end use pollock purchasers who need long term and reliable supply contracts. Nor does the DEIS examine or account for the adverse economic impact of such market disruptions on the desirability and price of Alaska's fishery products.

- The DEIS fails to recognize that the pollock fleet cannot shift to other groundfish fisheries because of legal restrictions governing which vessels can participate in these fisheries.

- The DEIS suggests the pollock fleet will shift to other pollock fishing grounds to mitigate the losses from the proposed restrictions but fails to examine the costs and increased energy use associated with this effort transfer. For example, if the 70 catcher vessels now delivering to shoreside processors make the expected number of trips to the more distant fishing grounds, it will increase fuel consumption by approximately 3,136,000 gallons and increase operational costs for these vessels by $8,153,600, not including increased operational costs for non-fuel items or increased vessel repair costs.

- The DEIS ignores the impact of restricting the pollock fleet on economically dependent CDQ communities. For many residents of these economically disadvantaged communities, the job opportunities from the CDQ program are an alternative to subsistence. In one community alone, $123 million in wages has been paid to community residents because of the CDQ program since 1993. In other communities, pollock CDQ revenue supports educational scholarships, job training programs, infrastructure development, and salmon conservation and management projects. All of these programs and benefits are at risk from restrictions on the pollock fishery.

- The DEIS recognizes that restrictions on the pollock fishery will reduce local tax revenues in non-CDQ communities. However, the DEIS does not examine the impacts that will occur in terms of lost municipal services such as education and health programs.

- The DEIS makes no attempt to measure and weigh the costs and benefits of the proposed alternatives. Such an analysis would reveal that the benefits to the salmon resource and to salmon fishermen are illusory or very small while the costs to the people involved in and dependent on the pollock fishery are real and enormous.

- According to the DEIS, the pollock bycatch reduction program was designed to satisfy a legal interpretation that National Standard 9 of the Magnuson-Stevens Fishery Conservation and Management Act ("MSA") requires that bycatch be reduced "to the maximum extent practicable" and that "every" effort be made to reduce bycatch. The courts have expressly rejected that interpretation of National Standard 9. Alternatives 2-4 were designed to meet a non-existent legal standard.

- According to the DEIS, the pollock bycatch reduction program was designed to meet the requirements of the Pacific Salmon Treaty. The Treaty does not apply to the pollock fishery. Even if the Treaty applied to the pollock fishery, it would be satisfied by the status quo.

- Alternatives 2-4 each violate National Standard 1 of the MSA by preventing the achievement of optimum yield in the pollock fishery.

The reality is that the DEIS is fundamentally flawed legally and analytically. For example, the DEIS assumes that benefits will flow to subsistence users from implementing Alternatives 2, 3, or 4 but fails to analyze if the facts support that assumption. They do not. Similarly, the DEIS adopts a crabbed and inaccurate interpretation of the burdens on the pollock fishery and either severely underestimates those burdens or refuses to analyze them. The end result is that this 762 page DEIS has emphasized quantity over quality. It has failed to provide decision makers with the necessary information and tools to make an informed decision as required by the National Environmental Policy Act. Consequently, it does not comply with that Act.

II. THE DEIS AND THE PROPOSED ACTION ARE FUNDAMENTALLY FLAWED BECAUSE THEY PROCEED FROM AN INCORRECT BASIS REGARDING THE LEGAL REQUIREMENTS OF NATIONAL STANDARD 9

The proposed restrictions on the pollock fishery to reduce Chinook salmon bycatch were crafted to satisfy a strict legal standard that is nowhere found in the law. Therefore, the legal premise that the NPFMC must take these actions to reduce bycatch is wrong. National Standard 9 of the Magnuson-Stevens Fishery Conservation and Management Act ("MSA"), 16 U.S.C. § 1851(a)(9), provides:

> Conservation and management measures shall, to the extent practicable, (A) minimize bycatch and (B) to the extent bycatch cannot be avoided, minimize the mortality of such bycatch.

The Chinook salmon bycatch plan was developed to meet the objectives of National Standard 9. However, what is required by National Standard 9 has been hotly debated before the courts with various parties offering different interpretations. According to the DEIS, the interpretation of National Standard 9 used to justify the proposed bycatch reduction proposal is that National Standard 9 "expressly requires that bycatch be avoided to the maximum extent practicable" and that "every" practicable effort be made to avoid bycatch. DEIS at 688-689. This interpretation of National Standard 9 has been expressly rejected by the courts as unnecessarily and unlawfully strict.

National Standard 9 only requires that bycatch be minimized "to the extent practicable...." Contrary to the DEIS, National Standard 9 does not "expressly" require that bycatch be avoided to the "maximum" extent practicable. The word "maximum" is nowhere found in National Standard 9. Courts interpreting the term "to the extent practicable" in National Standard 9 have held that the words mean exactly that. "NMFS is required to minimize bycatch only 'to the extent practicable . . . . '" *National Coalition for Marine Conservation v. Evans,* 231 F.Supp.2d 119, 137 (D.D.C. 2002).

In enacting National Standard 9, Congress did not say that the goals of National Standard 9 are to be met to the "maximum" extent practicable. Congress also did not say that the Secretary is to use "every" practicable means to achieve National Standard 9's objective. The imperative to employ "every" practicable means is used in statutes such as the NEPA which requires that federal agencies use "all practicable means" to comply with the requirement of that law that the environmental consequences of a proposed action be fully examined before a decision is made. 42 U.S.C. § 4331(b). Similarly, in the Endangered Species Act ("ESA"),

Congress provided that the impacts of an action on protected species must be minimized "to the maximum extent practicable." 16 U.S.C. § 1539(a)(2)(B)(ii). In the MSA, Congress used a lesser mandate requiring only that the goal of National Standard 9 be met "to the extent practicable."

It is also important to understand that "practicable" is not the same thing as "possible." In the preamble to the Guidelines interpreting National Standard 9, the National Marine Fisheries Service ("NMFS") stated:

> For the purposes of this national standard, the term "practicable" is not synonymous with the term "possible," because not all reductions that are possible are practicable.

63 Fed. Reg. 24,212, 24,226 (May 1, 1998).

This view is supported by the courts. In *Conservation Law Foundation v. Evans,* 360 F.3d 21 (1st Cir. 2004), the plaintiffs argued that the word "practicable" should be interpreted to mean "possible." The issue arose with respect to compliance with National Standard 9 as well as compliance with section 303(a)(7), 16 U.S.C. § 1853(a)(7), which requires that a fishery management plan ("FMP") minimize adverse effects on essential fish habitat "to the extent practicable."

> [T]he plaintiffs essentially call for an interpretation of the statute that equates "practicability" with "possibility," requiring NMFS to implement virtually any measure that addresses [essential fish habitat] and bycatch concerns so long as it is feasible. Although the distinction between the two may sometimes be fine, there is indeed a distinction. The closer one gets to the plaintiffs' interpretation, the less weighing and balancing is permitted. We think by using the term "practicable" Congress intended rather to allow for the application of agency expertise and discretion in determining how best to manage fishery resources.

Id. at 28.

National Standard 9 also does not require the elimination of gear types causing bycatch. In the preamble to the Guidelines interpreting National Standard 9, NMFS noted that one commenter had argued that National Standard 9 encourages, if not requires, the elimination of non-selective gear types. NMFS rejected this view stating:

> [T]he legislative history [of National Standard 9] includes a floor statement by Congressman Young that "it is not the intent of Congress that the [Councils] ban a type of fishing gear or a type of fishing in order to comply with this standard."

63 Fed. Reg. at 24,224 *citing* 142 Cong. Rec. H11437 (daily ed. Sept. 27, 1996).

Again, the courts have concurred. In *National Coalition for Marine Conservation v. Evans,* conservation groups claimed that regulations governing the Atlantic highly migratory species fishery violated National Standard 9 by failing to adequately address billfish bycatch. Plaintiffs sought gear and other restrictions effectively closing the fishery to one gear type. The agency's defense was that the FMP needed to minimize bycatch only "to the extent practicable" and that eliminating all fishing was not reasonable. The court agreed with NMFS that to guarantee the bycatch reductions sought by plaintiffs NMFS would have to eliminate all pelagic longline fishing – an unreasonable alternative not required by the MSA. 231 F.Supp.2d at 137.

Finally, and critically important for the proposed Chinook salmon bycatch plans, the courts have not found failed compliance with National Standard 9 simply because NMFS could have done more to reduce bycatch. In *The Ocean Conservancy v. Gutierrez,* 394 F.Supp.2d 147 (D.D.C. 2005), *aff'd,* 488 F.3d 1020 (D.C. Cir. 2007), the court rejected the plaintiffs' arguments that National Standard 9 was to be given the top priority among the National Standards. Instead, the court noted that "[a]lthough the NMFS *might* have done more to reduce bycatch, '*more*' is not the standard that NMFS must follow." *Id.* (Emphasis in original.)

In sum, according to the DEIS, the proposed action was developed to meet a legal standard requiring that bycatch be reduced to the "maximum" extent practicable and that "every" practicable effort must be adopted to achieve that goal. That legal standard is nowhere found in the statute. Indeed, that standard has been rejected by the courts. National Standard 9 does not require that these bycatch reduction measures be adopted.

III. THE DEIS AND THE PROPOSED ACTION ARE FUNDAMENTALLY FLAWED BECAUSE THEY PROCEED FROM AN INCORRECT BASIS REGARDING THE LEGAL REQUIREMENTS OF THE PACIFIC SALMON TREATY

The DEIS states the proposed action is an element of the NPFMC's efforts to "ensure" compliance with the Pacific Salmon Treaty ("Treaty"). DEIS at 19. The Problem Statement adopted by the NPFMC states salmon bycatch "must" be reduced in order to meet the U.S. "obligation" under the Treaty and its associated Yukon River Annex. DEIS at 1. The legal position is that additional actions to address bycatch are required by the Treaty. As is the case with National Standard 9, that supposition is incorrect.

The Treaty sets forth objectives only with respect to "Fisheries." A "Fishery" is defined as "the activity of harvesting or seeking to harvest salmon." Pacific Salmon Treaty, Article I. Nowhere in the Treaty documents or implementation precedents is there any hint that the term "fishery" applies to anything other than directed salmon fishing. Given that the pollock fisheries do not target salmon, the Treaty's general provisions do not apply to activities of the pollock fleet. While there are Treaty provisions not limited to "Fisheries" that do relate to "incidental mortality" or "bycatch," these provisions relate only to estimating and reporting incidental mortality and/or bycatch. *See* Annex IV, Chapter 1, ¶ 3(a)(1)(iv)b; Annex IV, Chapter 1, ¶ 3(a)(2)(iii)b; Appendix to Annex IV, Chapter 3, ¶ 1(b)(ii); Appendix to Annex IV, Chapter 3, ¶ 3(c); Appendix to Annex IV, Chapter 3, ¶ 3(e); Appendix to Annex IV, Chapter 3, Understanding on the Application of Annex IV, Chapter 3 relating to assignments for the Chinook Technical Committee, section (1); Appendix to Annex IV, Chapter 5, ¶ 6(d)(3); Appendix to Annex IV, Chapter 6, ¶ 12.

Only two Treaty provisions impose affirmative obligations regarding bycatch reduction for "fisheries." The first relates to test fishing sanctioned by the Fraser River Panel of the Pacific Salmon Commission and states that such activities are to be conducted in a manner that "minimizes Coho bycatch mortalities." Pacific Salmon Treaty, Appendix to Annex IV, Chapter 5, Southern Coho Management Plan, February 14, 2002. That section is inapplicable here. The second provision addressing bycatch reduction in "fisheries" applies directly to bycatch of Yukon River origin salmon. That provision states:

> The [United States and Canada] shall maintain efforts to increase the in-river run of Yukon River origin salmon by reducing marine catches and bycatches of Yukon River salmon. They shall further identify, quantify and undertake efforts to reduce these catches and bycatches.

Pacific Salmon Treaty, Annex IV, Chapter 8, ¶ 12. Recall that a "fishery" within the meaning of the Treaty is one that targets salmon. Therefore, this provision is only applicable to the fisheries it governs. The pollock fishery is not a fishery governed by the Treaty or by this provision. Nevertheless, and for the sake of argument, assume for a moment that the pollock fishery is a fishery as that term is defined in the Treaty.

The issue is what obligations are imposed on the United States by the Treaty's Yukon River Annex. First, the U.S. and Canada are to "maintain efforts" to increase the in-river run of Yukon River origin salmon. Pacific Salmon Treaty, Annex IV, Chapter 8, ¶ 12. This obligation requires the continuance of equivalent programs to those existing when the Annex was signed in December 2002. Second, the U.S. and Canada "shall further identify, quantify, and undertake efforts to reduce these catches and bycatches." Nowhere is a specific activity identified, let alone required.

Even if the Treaty were applicable to the pollock fishery, the salmon bycatch reduction measures for that fishery existing when the Annex was signed have been continued and improved upon, thereby satisfying the Treaty's requirement to "maintain" efforts. In January 1996, NMFS approved Amendment 21b to the BSAI Groundfish Fishery Management Plan that established measures to control the amount of Chinook salmon taken as bycatch in the BSAI trawl fisheries. Specifically, the management measure closed three areas to trawling when 48,000 Chinook salmon were taken as bycatch. In February 2000, this amendment was modified with the approval of Amendment 58 to the BSAI Groundfish Fishery Management Plan, which reduced the Chinook salmon bycatch trigger level to 29,000 Chinook salmon, refined the closure dates, and refined the closure areas based on more recent data. These measures, though modified to improve them, remain in effect.

Moreover, even if the Treaty were applicable to the pollock fishery, additional bycatch reduction actions taken since 2002 satisfy the standard regarding "further ... efforts." In 2005, the NPFMC recommended and in 2007 NMFS approved Amendment 84 to the BSAI Groundfish Fishery Management Plan modifying salmon bycatch management measures by establishing a Voluntary Rolling Hotspot System. The VRHS provides real-time salmon bycatch information so that the fleet can avoid areas of high chum and Chinook salmon bycatch rates. Prior to implementation of this amendment, the pollock fleet voluntarily implemented a VRHS program starting in 2002 for Chinook salmon and in 2001 for chum salmon.

Even if the pollock fishery fell within the definition of a "fishery" covered by the Treaty, the statute implementing the Treaty provides for a determination of when the U.S. may be in violation of its Treaty obligations and when further actions need to be taken to comply with the Treaty. No determination of non-compliance has been made. Therefore, there is no legal foundation for the NPFMC assertion that bycatch restrictions must be imposed on the pollock fishery to satisfy U.S. treaty obligations.

The statute implementing the Treaty provides that if the Secretary of State determines the United States "is in jeopardy of not fulfilling its international obligations under the Treaty" the Secretary of State shall so notify the U.S. Section. The certification shall include the reasons for the Secretary of State's determination and specify a date by which action by the U.S. Section "is desired." 16 U.S.C. § 3632(g)(8). Absent a certification by the Secretary of State, the U.S. must be considered to be in compliance with the Treaty, including the bycatch reduction objectives of the Yukon River Annex. While some may argue or wish for more to be done, absent a certification by the Secretary of State, U.S. compliance with the Treaty is presumed. The assumption that the Treaty requires more action to reduce salmon bycatch in the pollock fishery is legally incorrect.

Furthermore, even if a certification is issued by the Secretary of State, that certification is not that the U.S. is in violation of its obligations under the Treaty, only that the U.S. is in jeopardy of being in violation. Also note that even if a certification is issued, no action is required. The Secretary of State simply provides a certification to the U.S. Section together with a date by which action "is desired," as opposed to required. If the U.S. Section fails to act, the recourse given the Secretary of State is to report the matter to the President who is under no obligation to take further action. 16 U.S.C. § 1632(g)(8). Again, the legal premise that the NPFMC or NMFS are somehow required by the Treaty to impose additional restrictions to reduce salmon bycatch is incorrect.

Finally, even if the pollock fishery were governed by the Treaty, it is factually impossible to argue that new restrictions on pollock fishing are required to meet some presumed deficiency in U.S. compliance with the Treaty. The DEIS admits the Chinook salmon escapement target set by the Yukon River Panel for the Canadian portion of the Yukon River has been exceeded "each year" from 2001-2005, exceeding the average escapement in the 1989-1998 period by 42%. DEIS at 212, 222. In 2006, the escapement goal was essentially met in that 27,990 Chinook salmon spawned compared to the goal of 28,000. Joint Technical Committee of the Yukon River U.S./Canada Panel, Summary and 2008 Season Outlook Alaska Department of Fish and Game, Regional Information Report No. 3A08-01. Escapement goals for Canada were not met in 2007 or 2008 when Chinook salmon runs in the Yukon River were relatively small, ADFG 2008, and when the U.S.-Canada Joint Technical Committee had established new and higher escapement goals.

Assuming that the pollock fishery is a "fishery" covered by the Treaty, the events of 2007 and 2008 do not provide justification for severe restrictions on the pollock fishery. Chinook salmon bycatch in the pollock fishery is not a significant contributing factor to whether escapement goals into Canada are or are not met. The DEIS calculates the adult equivalent ("AEQ") mortality of Chinook salmon. The AEQ mortality is the number of fish that would have returned to the natal river had they not been captured in the pollock fishery. The AEQ number is less than the total bycatch because some of the salmon captured in the pollock fishery would

have died naturally before returning to freshwater. If zero Chinook salmon bycatch were taken in the pollock fishery, then the total AEQ mortality for Canadian origin fish in 2007 would have been 608 fish. DEIS at 140, Table 3-14; Gregory T. Ruggerone (Natural Resources Consultants); Effects of Chinook Salmon Bycatch in the Bering Sea Pollock Fishery on Salmon Harvests, Escapements, and Abundances in Western Alaska; February 10, 2009 ("NRC 2009"), attached hereto as Appendix 1. This was less than 1% of the total run of Canada bound Chinook salmon. NRC 2009. While some of these fish would have escaped in-river fisheries and reached the spawning grounds in Canada, the magnitude of the increase in the spawning population would have been almost unnoticeable.

In short, Chinook salmon bycatch in the pollock fishery has virtually no impact on Canadian origin fish. There is no factual basis for arguing that the Treaty, even if it were applicable to the pollock fishery, requires the imposition of severe restrictions on the pollock fishery.

Indeed, genetic sampling during 2005-2007 indicates that Alaska origin Yukon River stocks represent about 97% of the total Yukon River AEQ Chinook mortality in the pollock fishery with only 3 % coming from Canadian origin Yukon River stocks. DEIS at 125, Table 3-12; NRC 2009. This suggests that the Upper Yukon Canadian origin stock has a unique distribution in the ocean. This in turn suggests that the actual result of forcing the pollock fleet to change fishing patterns and areas may be adverse to Canadian interests and, therefore, contrary to the objective set forth in the NPFMC Problem Statement.

IV. THE DEIS AND THE PROPOSED ACTION ARE FUNDAMENTALLY FLAWED BECAUSE THEY VIOLATE NATIONAL STANDARD 1

The new Chinook salmon bycatch plans being considered by the NPFMC and evaluated in the DEIS violate National Standard 1 in four separate ways. To understand the nature and extent of the violations, these comments will first review what is required by National Standard 1.

A. National Standard 1 Requires That Optimum Yield Shall Be Achieved

National Standard 1 requires that "[c]onservation and management measures shall prevent overfishing while achieving, on a continuing basis, the optimum yield from each fishery for the United States fishing industry." 16 U.S.C. § 1851(a)(1). At the outset, note the difference between National Standard 1 and National Standard 9. The objectives of National Standard 1 "shall" be met while the objectives of National Standard 9 are to be met only "to the extent practicable."

Although the MSA gives the Secretary of Commerce ("Secretary") broad authority to manage and conserve fisheries, *The Ocean Conservancy v. Gutierrez,* 394 F.Supp.2d 147, 156 (D.D.C. 2005), *aff'd,* 488 F.3d 1020 (D.C. Cir. 2007), the ultimate goal of any fishery management plan ("FMP") is to establish conservation and management measures that allow a fishery to produce its optimum yield – and <u>each</u> National Standard is to be implemented with that goal in mind. *Recreational Fishing Alliance v. Evans*, 172 F.Supp.2d 35 (D.D.C. 2001), *A.M.L. International Inc. v. Daley,* 107 F.Supp.2d 90 (D. Mass. 2000).

To achieve the MSA's ultimate purpose, the statute sets out ten National Standards with which FMPs "shall be consistent." 16 U.S.C. § 1851(a). However, the courts have recognized that the different goals of these standards may be in conflict and the tension among the different standards necessarily requires that each goal be sacrificed to some extent to meet the others. *National Coalition for Marine Conservation v. Evans,* 231 F.Supp.2d 119, 132 (D.D.C. 2002).

> Congress, while aware of the potential conflicts among the Magnuson-Stevens Act's provisions, nevertheless "required [NMFS] to exercise discretion and judgment in balancing among the conflicting national standards . . . ."

Id. at 141, *quoting Alliance Against IFQs v. Brown,* 84 F.3d 343, 350 (9th Cir. 1996).

In *The Ocean Conservancy v. Gutierrez,* 394 F.Supp.2d at 159, the court was more direct noting: "Simply stated, National Standard 9 is not entitled to greater weight than any of these other Standards." The court cited *National Coalition for Marine Conservation v. Evans,* 231 F.Supp.2d at 137, for the proposition that:

> [B]ecause bycatch could only be entirely avoided by eliminating *all* commercial activity in the fishery, National Standard 9 only made sense within the larger context of the Magnuson-Stevens Act if it was interpreted as requiring the NMFS to find the combination of regulations that would best meet the statute's various objectives.

The Ocean Conservancy v. Gutierrez, 394 F.Supp.2d at 159. The court concluded:

> All ten of the national standards were promulgated to influence and shape the NMFS rule-making process. When viewed in this context, fishery regulations issued by the NMFS must undoubtedly minimize bycatch, but also promote safety on the high seas (National Standard 10) and minimize the economic impact of regulations on fishing communities (National Standard 8).

Id. at 158-59.

However, in finding the appropriate balance among the different National Standards, it must be recognized that Congress awarded some National Standards a higher priority than others. The objectives of National Standard 9 and certain other National Standards are to be achieved only "to the extent practicable." In contrast, other National Standards are stated as an imperative. National Standard 1 provides that FMPs "shall" prevent overfishing and achieve optimum yield. National Standard 2 provides that FMPs "shall" be based on the best scientific information available. National Standard 4 provides that FMPs "shall not" be discriminatory, etc. National Standard 6 requires that FMPs "shall" allow for variation among and contingencies in fisheries. The requirements of these National Standards are not modified by the "to the extent practicable" clause Congress inserted into National Standard 9. When Congress created the National Standards, it did so using words that gave some standards a higher priority than others.

National Standard 9 was added to the MSA years after National Standard 1 was enacted. That fact alone demonstrates the two standards have very different purposes. Equally important, it is clear that when Congress enacted National Standard 9, it did so with the intent that bycatch management not undermine the objective of National Standard 1. Senator Breaux, a member of the reporting Committee, in discussing the new National Standard 9 stated that preventing bycatch had to be done "without destroying the fishermen who are going after a targeted species." 142 Cong. Rec. S10818 (daily ed. Sept. 18, 1996). The Senate Report on the bill adding National Standard 9 to the MSA stated National Standard 9 was intended to minimize bycatch only "where possible." S. Rep. No. 104-276 (1996) at 14, *reprinted in*, 1996 U.S.C.C.A.N. 4073, 4086.

In summary, when considering the requirements of National Standard 1 and then what is required by the term "to the extent practicable" in National Standard 9, it is important to bear in mind the complete statutory context. First, the ultimate goal of the MSA is to conserve and manage fisheries to achieve their optimum yield. Reducing bycatch is not the MSA's top priority. Second, in seeking to realize the objective of achieving optimum yield, the goals of the different National Standards may be in conflict given the facts of a particular fishery. This means that the goals of one National Standard may be sacrificed to some extent in order to achieve the goals of another National Standard. Third, in striking the overall balance, not all National Standards are created equally and National Standard 1 provides a mandate that optimum yield be achieved.

B. Optimum Yield Shall Be Achieved On A Continuing Basis

National Standard 1 also requires that optimum yield be achieved on a continuing basis. Thus, in *J.H. Miles & Co., Inc. v. Brown,* 910 F. Supp. 1138 (E.D. Va. 1995), the court stated:

> Moreover, as National Standard One expressly states, management measures must aim to achieve, on a *continuing* basis, the optimum yield from each fishery, not the optimum yield in a single year. *See also* 50 C.F.R. § 602.11(b) ("most important limitation on the specification of [optimum yield] is that the choice of [optimum yield]-and the conservation and management measures proposed to achieve it-must *prevent overfishing*")

Id. at 1148. (Emphasis in original).

The same issue regarding National Standard 1's requirement to achieve optimum yield in the regulated fishery "on a continuing basis" was considered in *North Carolina Fisheries Ass'n, Inc. v. Daley,* 16 F.Supp.2d 647 (E.D. Va. 1997). The court stated:

> Furthermore, optimum yield is measured on a continuing basis, therefore management measures must aim to achieve, on a continuing basis, the optimum yield from each fishery, not the optimum yield in a single year.

Id. at 654-655.

Similarly, in *Northwest Environmental Defense Center v. Brennan,* 958 F.2d 930, 932 (9th Cir. 1992), the U.S. Court of Appeals for the Ninth Circuit found:

> The Magnuson Act contemplates maximum utilization of fishery resources consistent with the long-term health of the fishery. The National Standards prescribe achievement of "optimum yield" on a continuing basis. 16 U.S.C. § 1851(a)(1). Optimum yield is the amount of fish "which will provide the greatest overall benefit to the Nation, with particular reference to food production and recreational opportunities;" it is calculated "on the basis of the maximum sustainable yield ... as modified by any relevant economic, social, or ecological factor." 16 U.S.C. § 1802(21).

Id. at 935. The key point is that optimum yield is to be achieved "on a continuing basis."

C. The Proposed Action Will Prevent The Achievement Of Optimum Yield On A Continuing Basis

The process by which the optimum yield and the annual Total Allowable Catch ("TAC") for each of the BSAI groundfish species is established is a careful and rigorous one. Each fall, the Bering Sea Groundfish Management Plan Team, comprised of federal and state scientists, fishermen, managers, and other experts, meets to review the most current biological and management data. After that review, the Plan Team recommends an Overfishing Level ("OFL") and an Allowable Biological Catch ("ABC") for each species in the groundfish fishery. This recommendation is forwarded to the NPFMC's Scientific and Statistical Committee ("SSC") comprised of scientific experts. The SSC conducts a scientific peer review of the Plan Team's recommendations, makes whatever revisions it deems appropriate, and forwards the revised recommendations to the NPFMC. Based on the SSC's recommendations, public testimony, and any other scientific input from the SSC, the NPFMC selects an OFL, ABC, and TAC for each of the 18 groundfish species in the BSAI groundfish complex.

In making its TAC decisions, the NPFMC is constrained by the overall boundaries on optimum yield set forth in the BSAI Groundfish Fishery Management Plan. That FMP provides that, subject to a lower limit of 1.4 million metric tons and an upper limit of 2.0 million metric tons, the optimum yield for the BSAI groundfish fishery is the sum of the 18 individual species TACs. Thus, in a given year, the optimum yield equals the sum of the individual species TACs, but it cannot exceed 2.0 million tons or fall below 1.4 million tons.

The critical point is that the optimum yield for the groundfish fishery has been set after a very careful and rigorous process. The optimum yield has been established based on "prevailing ecological and environmental conditions." 50 C.F.R. § 602.11(d)(i). This optimum yield is what the fishery is capable of producing on a continuing basis. However, adoption of the additional Chinook salmon bycatch reduction plans considered in the DEIS will prevent the optimum yield from being achieved, violating National Standard 1 in three ways.

First, as the DEIS readily admits through its calculations of foregone catch and revenue, the bycatch reduction measures will prevent the harvest of the pollock TAC. Achieving the optimum yield for the BSAI groundfish fishery depends on fully harvesting the pollock TAC. The

optimum yield for the BSAI groundfish fishery cannot be achieved if the pollock TAC is not harvested. In 2007, the optimum yield and TAC for the 18 species that comprise the BSAI groundfish fishery was 2.0 million metric tons. The pollock TAC was 1.413 million metric tons, 71% of the TAC and optimum yield. 72 Fed Reg. 9453 (March 2, 2007). It is axiomatic that management measures that prevent the harvest of the pollock TAC will prevent the achievement of optimum yield and violate National Standard 1.

Second, adopting additional Chinook bycatch reduction measures will prevent the fishery from achieving the optimum yield on a continuing basis. The DEIS admits that Alternatives 2-4 will cause a shift in fishing patterns that "will result in ... harvesting pollock of smaller sizes...." DEIS at 165. The DEIS then states that fishing more concentrated on younger and smaller fish "could result in lower ABC and TAC...." *Id.* at 165. Two paragraphs later, the DEIS concludes that adopting additional salmon bycatch restrictions will "likely" cause the pollock fleet to fish more heavily on juvenile pollock and that will "likely result in smaller [pollock] TACs...." *Id.* at 166. Thus, adopting Alternatives 2-4 will change fishing patterns in a way that changes the age and size composition of the harvest. *Id.* at 165-166. The DEIS concludes that this result will harm the pollock resource, forcing a reduction in the ABC and the TAC. In other words, Alternatives 2-4 will prevent the achievement of the optimum yield of which the fishery is capable of producing on a continuing basis by forcing the harvest of less biologically acceptable age and size classes, all in violation of National Standard 1.

Third, food production is a key element of achieving optimum yield. 16 U.S.C. § 1802(33). Preventing the full harvest of the pollock TAC because of bycatch induced fishery closures will deprive the U.S. of substantial quantities of protein. If one assumes an average of four ounces of fish per meal, then for every 100,000 metric tons of pollock lost because of fishery closures, the U.S. foregoes approximately 250 million meals. That is enough to provide the combined populations of Anchorage, Dallas, Detroit, Indianapolis, Seattle, and San Francisco with one meal per week for an entire year. Given that food production is a key element of achieving optimum yield, restrictions on food production caused by Alternatives 2-4 violate National Standard 1.

V. THE DEIS AND THE PROPOSED ACTION ARE FUNDAMENTALLY FLAWED BECAUSE THEY RELY ON INAPPLICABLE STATUTORY AUTHORITY

The DEIS notes that Title VIII of the Alaska National Interest Lands Conservation Act ("ANILCA") creates a priority for subsistence uses of fish and wildlife over other purposes on public lands. DEIS at 18, *citing* 16 U.S.C. § 3114. The DEIS contains numerous statements regarding the need to implement this subsistence priority. The DEIS cites this priority as a legal rationale for restricting the offshore harvest of pollock.

No caring person would ever diminish the importance of protecting subsistence users. However, the legal argument advanced in the DEIS for doing so is without merit. The United States Supreme Court has ruled that ANILCA does not apply to the outer continental shelf ("OCS") of the United States. *Amoco Production Co. v. Village of Gambrell,* 480 U.S. 531, 546-47 (1987). *See also,* 16 U.S.C. § 3102(3), 50 C.F.R. 100.3 and 100.4. The action area for the proposed Chinook salmon bycatch management plan is the OCS region. DEIS at 18. ANILCA is not legally applicable, a fact the DEIS admits. DEIS at 18.

Nevertheless, the DEIS asserts that NMFS intends to implement ANILCA by using NEPA and the MSA. DEIS at 18. There are two legal defects with NMFS' approach. First, if ANILCA does not apply in the OCS region, it is not another applicable law under the MSA as that term is used in 16 U.S.C. § 1854(a). Thus, the MSA does not provide a legal basis to implement ANILCA. Second, NEPA does not provide the authority to enforce the substantive provisions of any statute, including ANILCA. The Supreme Court has ruled on at least four occasions that NEPA is a procedural statute only. *Kleppe v. Sierra Club*, 427 U.S. 390 (1976); *Vermont Yankee Nuclear Power Corp v. Natural Resources Defense Council, Inc.*, 435 U.S. 519, 558 (1978); *Strycker's Bay Neighborhood Council, Inc. v. Karlen*, 444 U.S. 223 (1980); *Robertson v. Methow Valley Citizens Council*, 490 U.S. 332 (1989). It requires that issues be examined. It does not provide the authority for a particular result to be reached or enforced. Contrary to the legal position set forth in the DEIS, neither the MSA nor NEPA can be used to enforce ANILCA.

VI. THE DEIS OVERESTIMATES THE BIOLOGICAL ADVANTAGES OF THE PROPOSED ACTION TO CHINOOK SALMON

A. Overview

A careful analysis of the facts reveals no support for the argument that there is a biological need to severely curtail Chinook salmon bycatch in the pollock fishery. Forty-six percent of this Chinook bycatch originates in waters outside western Alaska. The DEIS variously describes these non-western Alaska stocks as trending "sharply upward," with "escapement goals met or exceeded" in some cases by 125%-265%, and as "rarely taken" in the pollock fishery. As to the 54% of the incidentally taken Chinook salmon originating in western Alaska, the DEIS notes that none of these stocks has been listed as a stock of concern because of inadequate escapement. Even if there were zero Chinook salmon incidentally taken in the pollock fishery, the increase in the number of fish escaping to spawn would be between 1.9% and 5.5% depending on the geographic area and whether one uses sonar data or mark recapture data to measure fish runs. These are numbers too small to make a measurable biological impact on either escapement rates or the species. Although the annual AEQ mortality for western Alaska stocks Chinook salmon ranged from 9,697 to 45,682 fish between 1994 and 2008, that is a relatively small percentage of Chinook salmon returning to western Alaska. In the same period, the number of Chinook salmon returning to western Alaska was between 393,000 and 1,100,000 fish annually. NRC 2009. The pollock fishery is simply not responsible for the swings in Chinook salmon abundance in western Alaska rivers over the past 15 years.[1]

Each of these points will be discussed in more detail below. Virtually none of these points are examined in the DEIS. For that reason alone, the DEIS fails to meet the requirement

[1] While the focus of the DEIS is Chinook salmon bycatch, it is also useful to step back and to put the overall bycatch rate of the pollock fishery into a larger perspective. In 2003-2007, the fish discard rate for the BSAI pollock fishery was only 1.3%. NMFS; Stock Assessment and Fishery Evaluation Report for the Groundfish Fisheries of the Gulf of Alaska and the Bering Sea Aleutian Islands: Economic Status of the Groundfish Fisheries Off Alaska; November 5, 2008 ("Economic SAFE Report"), at 28, Table 6. From that standpoint, the pollock fishery is one of the cleanest fisheries in the world.

set forth in *Citizens to Preserve Overton Park v. Volpe* that an EIS take a hard look at the issues.

B. The Pollock Fishery Is Not Adversely Affecting Escapement For Chinook Salmon Stocks Generally

The focus of the DEIS and of the Proposed Action is on the impacts in western Alaska of the incidental bycatch of Chinook salmon in the pollock fishery. However, it is important to understand that not all of the incidentally taken Chinook originate in western Alaska. Only 54% of those Chinook salmon originate in western Alaska (Arctic, Yukon, Kuskokwim, Bristol Bay) based on genetic data. Four percent originate in Cook Inlet, 2% in southeast Alaska transboundary rivers, 23% in British Columbia/Pacific Northwest, 13% in the North Alaska Peninsula, 2% in Russia, and 3% in a variety of other areas. DEIS at 125, Table 3-12. While the DEIS focuses on western Alaska, it is useful to briefly review other areas in order to provide a complete perspective.

Focusing first on the 4% of the bycatch involving Cook Inlet stocks, the DEIS admits these stocks "continue to trend sharply upward and most escapement goals are being met or exceeded...." DEIS at 530. The DEIS concedes that Chinook salmon bycatch in the pollock fishery is not adversely affecting the health of these stocks. *See also* DEIS at 241.

Turning to the 2% of the Chinook bycatch originating in southeast Alaska's transboundary rivers and to the 3% originating in other areas (which largely includes Alaska's southeast rivers), the DEIS again documents the absence of any adverse biological impact from Chinook bycatch in the pollock fishery. For the 11 southeast Alaska rivers reviewed in the DEIS, Chinook salmon escapement in the 2000-2004 period was 156% of the escapement goal. DEIS at 242, Table 5-18. In fact, escapement rates have increased steadily over the past 40 years. During the 1977-1979 period, Chinook salmon escapement on those 11 southeast Alaska rivers was only 74% of the escapement goal. In the 1980-1989 period, escapement rose to 113% of the goal. In the 1990-1999 period, escapement was 149% of the goal. In the 2000-2004 period, Chinook salmon escapement in these 11 southeast Alaska rivers was 156% of the escapement goal. *Id.* As to southeast Alaska, there is no conservation basis for the bycatch reduction plan. A closer look at the two major rivers in southeast Alaska confirms this fact.

The Taku River is the largest producer of Chinook salmon in southeast Alaska. The 1990-1999 escapement for Chinook salmon on the Taku River was 154% of the escapement goal. The 2000-2004 escapement was 125% of the escapement goal. DEIS at 242, Table 5-18. Unfortunately, in presenting this data, the writers of the DEIS chose to emphasize the relative escapement rates of the 1990-1999 and the 2000-2004 periods stating that the 2000-2004 escapement rate on the Taku River was low relative to the 1990-1999 rate. *Id.* at 530. That presentation neglects to acknowledge that Chinook salmon escapement in each period far exceeded the planned escapement goal. For the Stikine River, the other major river in southeast Alaska, the DEIS notes escapement has "increased greatly" since 1999. *Id.* In 2000-2004, Chinook salmon escapement on the Stikine River was 265% of the escapement goal, up from 166% in the 1990-1999 period. *Id.* at 242, Table 5-18. In fact, Stikine River Chinook salmon have met the escapement goal every year 1984-2008. McPherson, S., J. H. Clark, D. R. Bernard, J. Der Hovanisian, E. Jones, K. Pahlke, P. Richards, J. Weller, T. Johnson, R. Chapell, B. Elliot, and C. Hendrich; Chinook Salmon Status and Escapement Goals for

Stocks in Southeast Alaska, Alaska Department of Fish and Game Special Publication No. 08-18.

Turning to the Pacific Northwest, there are 26 salmon evolutionary significant units ("ESUs") designated under the Endangered Species Act ("ESA"), 17 for Chinook salmon. Chinook salmon from only two of these ESUs are taken incidentally in the BSAI groundfish fishery. DEIS at 530. For these two, the 2007 biological opinion issued under the ESA concluded that the BSAI groundfish fisheries, including the pollock fishery, were not likely to jeopardize these stocks or adversely modify their critical habitat. *Id.* at 242. One reason for this no jeopardy finding is that Chinook salmon from the two ESUs (Upper Willamette River and Lower Columbia River) are "rarely taken" in the BSAI groundfish fisheries. *Id.* at 243. In fact, since 1984, only 87 fish from these two ESUs were taken incidentally in the BSAI groundfish fisheries. *Id.* at 244, Table 5-19. Furthermore, since not all Chinook salmon incidentally taken in the BSAI groundfish fishery would necessarily return to spawn due to natural mortality, the DEIS estimates that only 52-87 of the 87 Chinook salmon taken in the BSAI groundfish fishery from these two ESUs since 1984 would have returned to spawn. *Id.* at 245. This is approximately 1.5 fish per year on average, divided between two rivers.

As to the North Alaska Peninsula, no escapement goals have been established for most of the rivers and streams in this area. For the one river for which a biological escapement goal has been set, the Nelson River, the Chinook salmon goal has been met during all recent years. Nelson, P. A., J. J. Hasbrouck, M. J. Witteveen, K. A. Bouwens, and I. Vining; Review of Salmon Escapement Goals in the Alaska Peninsula and Aleutian Islands Management Areas, Alaska Department of Fish and Game Fishery Manuscript No. 06-03.

Neither the DEIS nor these comments address the 2% of the Chinook salmon bycatch that is taken from Russian waters. Including that 2% with Chinook originating in areas outside western Alaska, there is no conservation rationale based on escapement goals for a bycatch reduction program with respect to 46% of the Chinook salmon incidentally caught in the pollock fishery.

Turning to the 54% of the incidentally taken Chinook salmon that originates in western Alaska, it is important to clarify the impact of bycatch on the health and biology of the resource. The DEIS notes that western Alaska salmon runs have experienced declines. However, the DEIS reports that weaker runs "have been attributed to reduced productivity in the marine environment rather than an indication of low levels of ... escapements...." DEIS at 196. In other words, reduced runs of Chinook salmon in western Alaska are not caused by bycatch. The DEIS goes on to cite the "evidence that salmon are food limited" in their ocean environment and notes this is the factor generally responsible for weaker runs. *Id.*[2] *See also* DEIS at 199.

Another indicator of the biological status of western Alaska's Chinook salmon is found in the stock status designations made under Alaska's Sustainable Salmon Fisheries Policy. That Policy establishes conservation categories for Alaska's salmon stocks. The first division is

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[2] Chinook salmon consume predominantly nekton. DEIS at 196. Nekton populations are sensitive to ocean temperatures and the documented increase in ocean temperatures is impacting those populations.

based on whether there is any conservation issue. A stock for which such a concern exists is designated as a "stock of concern." DEIS at 203.

The DEIS divides western Alaska Chinook salmon stocks into four major geographic areas: (1) Norton Sound, (2) Yukon, (3) Kuskokwim, and (4) Bristol Bay. DEIS at 205. Only two of these stocks, Norton Sound and Yukon, are designated as stocks of concern. *Id.*, Table 5-3. This means that for the other two, Kuskokwim and Bristol Bay, there are no special conservation measures required and bycatch in the pollock fishery is not a conservation issue in terms of meeting escapement goals.

Regarding Norton Sound and Yukon stocks, once a stock is designated a stock of concern it is placed into one of three categories, a stock of (1) yield concern, (2) management concern, or (3) conservation concern. A conservation concern is more severe than a management concern which is more severe than a yield concern. DEIS at 203. The Norton Sound and Yukon stocks have been assigned the lowest level of concern and are designated only as stocks of yield concern. *Id.* at 205, Table 5-3.

A stock of yield concern is one for which there are problems with maintaining a harvestable surplus above a stock's escapement needs. DEIS at 203. In other words, there is no biological issue in terms of meeting escapement but there is an issue of providing more fish for harvest.

In sum, a review of western Alaska Chinook salmon stock status demonstrates that under the State's current conservation program, no western Alaska Chinook salmon stock is deemed to be one of biological concern. The next subsections of this Part provide a closer look at western Alaska Chinook salmon stocks by region.

C. Norton Sound Chinook Salmon

In Norton Sound, escapement goals have been established for three rivers. That goal is 1,600-3,250 Chinook. DEIS at 205. The average annual escapement throughout the Norton Sound area between 2000 and 2008 was 3,941 and the 2008 escapement was 2,712. NRC 2009. In considering the impact of Chinook salmon incidentally caught in the pollock fishery on these escapement numbers, it is useful to compare them to the actual AEQ mortality. The average annual AEQ mortality between 2000 and 2008 was 266 fish. *Id.* If none of those 266 fish were taken by terminal users, average annual escapement would have increased only 6.7%. However, the average annual in-river harvest rate for Norton Sound Chinook salmon between 2000 and 2008 was 52%. *Id.* If that harvest rate is applied to the 266 AEQ mortality fish, then only 48% of the returning fish, or 128 fish per year on average, would have been added to escapement. In other words, if 100% of the Chinook salmon bycatch in the pollock fishery was eliminated, it would add only 4.7% to the average annual escapement in Norton Sound.

However, none of the proposed bycatch reduction plans propose eliminating the entire bycatch as doing so would mean the complete closure of the pollock fishery. Thus, in <u>every</u> instance where these comments provide a number of fish that would be added to escapement or to subsistence, commercial, or sport harvests, that number <u>overstates</u> the benefits of the

proposed action because that number is based on what would happen if zero Chinook salmon were taken as bycatch.

D. Yukon River Chinook Salmon

Chinook salmon escapement goals in the Alaska portion of the Yukon River were generally met 2003-2007. DEIS at 211. Between 1996-2007, there were 49 escapement observations and in 39 (80%) escapements were met or exceeded. *Id.* at 212. For the seven rivers in the Yukon area with established escapement goals, those goals were met in every year 2002-2007 except for one river in 2005. NRC 2009, *citing* Hayes, S.J., D.F. Everson, and G.J. Sandone, Yukon River Chinook Salmon Stock Status and Action Plan: A Report to the Alaska Department of Fisheries, Alaska Department of Fish and Game Special Publication 06-38, Feb. 2, 2007; and Joint Technical Committee of the Yukon River US./Canada Panel, Summary and 2008 Season Outlook, Alaska Department of Fish and Game Regional Information Report 3A08-05.[3]

Between 2000 and 2008, the average annual AEQ mortality for Yukon River Chinook in the pollock fishery was 9,790 fish. NRC 2009. If 100% of this fish had been added to escapement, then average annual escapement would have increased only 5.6% using mark recapture data and only 9.4% using Pilot Station sonar reports. *Id.* However, if one assumes that the 42% in-river harvest rate that existed between 2000 and 2007 will continue, then 58%, or only 5,678 Chinook, would have been added to the average annual escapement. *Id.* This is an addition of only 3.2% or 5.5% depending on whether one uses mark recapture or sonar data, and assuming that 100% of the bycatch of Chinook salmon in the pollock fishery stops.

E. Kuskokwim Area Chinook Salmon

Escapement goals for Chinook salmon in the Kuskokwim area have been set for 14 rivers and total 25,050-59,730 fish in monitored streams. DEIS at 230, Table 5-11. These escapement goals are being met. *Id.* at 205, Table 5-3. Between 2000 and 2007, the average annual Chinook salmon escapement for the entire Kuskokwim area was 229,623. NRC 2009.

Between 2000 and 2008, the average annual AEQ mortality was 6,363. NRC 2009. The average annual escapement 2000-2007 was 229,623 Chinook. *Id.* If 100% of the AEQ mortality was added to escapement, it would have increased annual escapement an average of only 2.8%. However, the average in-river harvest rate 2000-2007 was 31%. *Id.* That means 69% of the fish would have been available for escapement. Thus, annual escapement would have increased by 4,390 fish, or 1.9%, assuming 100% of the Chinook salmon bycatch in the pollock fishery ends.

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[3] In 2008, high water levels hampered salmon counts in most rivers such that counts in all but two of the seven rivers in the Yukon area cannot be compared with prior years. NRC 2009, *citing* Alaska Department of Fish and Game, 2008 Preliminary Yukon River Summer Season Summary, October 20, 2008.

F. Bristol Bay Chinook Salmon

There are three escapement goals for Bristol Bay Chinook salmon. The cumulative goal is for escapement of at least 54,300 fish. DEIS at 236. Bristol Bay escapement goals are being met. *Id.* at 205, Table 5-3. Between 2000 and 2008, the average annual Chinook salmon escapement throughout the Bristol Bay area was 109,029. NRC 2009.

The AEQ mortality for Chinook salmon in the Bristol Bay area associated with the pollock fishery averaged 8,322 fish between 2000-2008. NRC 2009. If 100% of this AEQ had been added to the average annual escapement 2000-2008, escapement would have increased only 7.6%. However, the average annual in-river harvest rate 2000-2007 was 40%. *Id.* Assuming the same in-river harvest rate, then 60% of the fish would have been available for escapement. This means that only 4,993 Chinook would have been added to escapement. This represents an average annual increase of only 4.5%, assuming there is absolutely no Chinook bycatch in the pollock fishery.

G. Conclusion

Proponents of imposing additional restrictions on the pollock fishery to reduce Chinook salmon bycatch can find no biological basis for such restrictions based on escapement rates. The vast majority of the Chinook salmon stocks interacting with the pollock fishery are meeting or exceeding escapement goals. Even where runs are weaker, the number of Chinook incidentally taken in the pollock fishery is so small that it cannot be responsible for changes in salmon abundance. The fact that the DEIS glosses over and fails to examine these issues makes the DEIS legally inadequate. The DEIS simply fails to provide decision makers with a basis on which to make an informed decision.

Not only does the DEIS fail to undertake this broad overview analysis, but the DEIS fails to provide decision makers with the necessary refinement showing, for example, the relative impact of a bycatch salmon cap of 68,000 versus 47,000. This difference of 21,000 fish would result in an AEQ of returning fish of only 17,640. NRC 2009. However, since only 54% of the Chinook salmon taken in the pollock fishery originate in western Alaska, the total difference to all of western Alaska would be 9,526 fish. An addition of only 9,526 fish throughout western Alaska is a miniscule number when one considers the actual percentages that would be available for escapement by river system, let alone for subsistence and other uses as discussed below. The DEIS does none of this analysis.

VII. THE DEIS OVERESTIMATES THE ADVANTAGES OF THE PROPOSED ACTION TO SALMON SUBSISTENCE FISHERMEN

A. Overview

The Problem Statement adopted by the NPFMC states salmon bycatch “must be reduced” to address concerns about subsistence fishermen in rural areas who depend on local fisheries for their sustenance and livelihood. DEIS at 1. Recognizing the very real and important role that subsistence has in the life of many Alaskans, the sad reality is that restricting the pollock fishery will have not have the positive benefits for subsistence that the DEIS implies. In fact, the central problem with the DEIS is that it assumes these benefits will occur without

doing the analysis necessary to determine if the facts support that assumption. Absent such analysis, the DEIS fails to meet the requirement in *Citizens to Preserve Overton Park v. Volpe* that an EIS take a hard look at the issues. If the DEIS had done so, it would have found that even if 100% of the Chinook salmon bycatch was eliminated, the subsistence harvest would have increased by only one-tenth of one fish per household in the Norton Sound area, just over one fish per household in the Kuskokwim area, 1.7 fish per household in the Yukon, and less than three fish per permit holder in Bristol Bay.

B. The Availability of Chinook Salmon for Subsistence

At the outset, two facts must be recognized. First, the DEIS states "there is no indication that any of the alternatives being considered [including the status quo] would result" in a health risk to subsistence users. DEIS at 443, n. 27. Second, the DEIS admits that "sufficient opportunities for subsistence harvests have occurred in most areas in recent years...." *Id.* at 531. In other words, the DEIS, admits there is no need to restrict the pollock fishery in order to ensure adequate subsistence opportunities. An analysis by individual river system confirms that adequate opportunities for Chinook salmon subsistence harvests exist under the status quo.

Along the Alaska Peninsula, Chinook salmon accounted for 3% or less of the salmon subsistence harvest between 1985 and 2005. DEIS at 456. In the Aleutians, Chinook salmon accounted for 0% of the salmon subsistence harvest between 1985 and 2005. *Id.* In the Kotzebue District, which includes all waters from Cape Prince of Wales to Point Hope, Chinook salmon comprised 1% or less of the salmon subsistence harvest between 1994 and 2005. *Id.* at 456. Over 90% of the subsistence salmon harvests in the Kotzebue area are chum salmon and there are "no indications that subsistence chum salmon harvest opportunities are lacking in this region." *Id.* at 533.

In the Norton Sound region, extending from Point Romanoff to Cape Prince of Wales, Chinook salmon accounted for only 3% of subsistence meat and fish consumption. DEIS at 453. For the Port Clarence District within this region Chinook salmon accounted for between 0% and 2% of the subsistence salmon caught between 1994 and 2005. *Id.* at 456. In the Norton Sound District within this region, Chinook salmon accounted on average for only 4.9% of the subsistence salmon harvest in the last five years. *Id.* at 539, Table 10-16.

While admitting that Chinook salmon is not a major component of the subsistence harvest in the Norton Sound area, the DEIS fails to undertake any analysis of the actual impact on subsistence of additional bycatch restrictions on the pollock fishery. Had the DEIS done the analysis, it would have discovered the following facts. The annual average Chinook salmon subsistence harvest of Chinook salmon in the Norton Sound region 2000-2007 was 4,146 fish. NRC 2009. The average annual AEQ mortality of fish that would otherwise return to Norton Sound between 2000 and 2008 was 266. *Id.* if 100% of these 266 fish were taken for subsistence purposes, it would add only 6.4% more fish to the total subsistence harvest of Chinook salmon. However, in-river fishermen do not take 100% of the run. In the Norton Sound area, the average annual in-river harvest between 2000 and 2008 was 52% of the run. *Id.* Assuming the same level of in-river harvest, then only 138 additional fish (52% of 266) would have been taken by in-river fishermen. But not all in-river harvesters are subsistence fishermen. In the years 2000-2008, 97% of the average annual Norton Sound in-river harvest was for subsistence. *Id.* Applying that percent to the 138 additional AEQ fish that would have

been available means that eliminating 100% of the Chinook salmon bycatch in the pollock fishery would have increased the average annual subsistence harvest of Chinook salmon by only 130 fish per year, or 3.1%. Another way to look at this is that there were 935 subsistence households in the Norton Sound area in 2002. NRC 2009. If zero Chinook salmon were caught in the pollock fishery, it would add just over one-tenth of a fish to the subsistence harvest of each household annually.

Within the Kuskokwim region, the DEIS identifies two subsistence areas. In the Kuskokwim River, subsistence fishing was not restricted from 2003 to 2007. DEIS at ES-21-22; 560. In short, the salmon runs, including Chinook, have been sufficient in the last five years to support a full subsistence harvest. Similarly, in the Quinhagak and Goodnews Bay areas of Kuskokwim Bay, the DEIS reports that subsistence harvests were adequate and the Chinook salmon run has been such that "amounts necessary for subsistence use" were expected to be achieved. *Id* at 561.

After admitting that there is no need to restrict the pollock fishery to provide a full subsistence harvest in the Kuskokwim region, the DEIS conducts no analysis of the actual impact on subsistence of additional bycatch restrictions on the pollock fishery. Had such an analysis been done, the following facts would have been revealed. The average annual Chinook salmon subsistence harvest in the Kuskokwim area 2000 to 2007 was 73,728. NRC 2009. The average annual AEQ mortality for fish that would otherwise return to the Kuskokwim area between 2000 and 2008 was 6,363 Chinook. *Id.* If 100% of these fish were available for subsistence use, it would add only 8.6% more fish to the subsistence harvest. However, the average annual in-river harvest is not 100% of the returning fish, it is 31%. *Id.* Assuming the same level of in-river harvest in the future, it means that an annual average of only 1,973 fish (31% of 6,363) would become available for subsistence harvest if subsistence accounted for 100% of the in-river harvest. However, between 2000 and 2007, the subsistence harvest was only 76% of the total average annual in-river harvest. *Id.* Assuming the same allocation of harvest in the future, only 1,499 (76% of 1,973) of the AEQ fish would be used for subsistence. This means that if zero Chinook salmon were caught in the pollock fishery, it would add only 2% to the total Kuskokwim area average annual subsistence harvest. Another way to look at this is that there were 1,696 households in the Kuskokwim area that fished for subsistence purposes in 2002. NRC 2009. Thus, if no Chinook salmon were caught in the pollock fishery, it would add just under one fish each year to each subsistence household.

Regarding the Alaska portion of the Yukon River, subsistence fishing was not restricted 2003 to 2007. In other words, salmon runs, including Chinook, have been sufficient for the last five years to support a full subsistence harvest. DEIS at ES-21-22. For 2008, although the DEIS notes the 2008 Chinook salmon run was anticipated to be sufficient to provide for a normal subsistence harvest (*Id.* at 591), subsistence harvest levels were reduced because of the weak Chinook salmon run.

Although the DEIS assumes that restricting the pollock fishery would measurably improve the subsistence harvest in the Yukon River area, the DEIS conducts no analysis to determine if the facts support that assumption. If the DEIS had conducted the analysis required by NEPA, it would have found the following facts. In the Yukon River area, the average annual Chinook salmon subsistence harvest between 2000 and 2007 was 56,492 fish. NRC 2009. The average annual AEQ mortality for fish that would otherwise return to the Yukon area

between 2000 and 2008 was 9,790 fish. *Id.* If 100% of these fish were available for subsistence use, it would add only 17% more fish to the subsistence harvest. However, the in-river harvest of the Yukon River Chinook run is not 100% of the returning fish, it is 42%. *Id.* Assuming the same level of in-river harvest in the future, this means that an annual average of only 4,112 fish (42% of 9,790) would be available for subsistence harvest if subsistence accounted for 100% of the in-river harvest. But subsistence fishermen do not take 100% of the in-river harvest. Between 2000 and 2007, the subsistence harvest was only 62% of the in-river harvest. *Id.* Assuming the same allocation of harvest in the future, only 2,549 of the AEQ fish would be used for subsistence. This means that eliminating 100% of the Chinook salmon bycatch in the pollock fishery would add only 4.5% to the total Yukon River average annual subsistence harvest.

Another way to look at this is that an estimated 1,479 households in the Yukon River participated in subsistence harvests during 2005. NRC 2009, *citing* Busher, W. H., T. Hamazaki, and A. M. Marsh; Review of Subsistence and Personal Use Salmon Harvests in the Alaskan Portion of the Yukon River Drainage, 2005; Alaska Department of Fish and Game Fishery Manuscript 06-05. If only 2,549 Chinook salmon will likely be available for additional subsistence harvest then, each year, each subsistence household will get approximately 1.7 additional Chinook if 100% of the Chinook salmon bycatch is stopped.

In the Bristol Bay management area, which includes nine major river systems, the subsistence salmon harvest is comprised principally of sockeye salmon. DEIS at 598. Between 1997 and 2006, Chinook salmon comprised an average of only 11.9% of the total salmon subsistence harvest. *Id.* at 605. The important point is that from 2003 to 2007, subsistence fishing was not restricted in the Bristol Bay area. This means that salmon runs, including Chinook, were sufficient for the last five years to support a full subsistence harvest. *Id.* at ES 21-22.

In considering the relative importance of subsistence harvesting in Bristol Bay, recognize that every resident of Alaska is deemed to be a subsistence fishermen for purposes of fishing in Bristol Bay. DEIS at 601. A Bristol Bay subsistence salmon permit is given "to any Alaska resident who requests one." *Id.* From the richest state resident to the poorest, from residents of downtown Anchorage to residents of economically depressed rural villages, all are subsistence fishermen.

Leaving aside the issue of who is a truly subsistence dependent fishermen, the DEIS contains no analysis of the actual effect of restricting the pollock fishery on the availability of Chinook salmon for subsistence. Had the DEIS attempted such an analysis, it would have found the following. In the Bristol Bay area, the average annual Chinook salmon subsistence harvest between 2000 and 2007 was 14,131 fish. NRC 2009. The average annual AEQ mortality for fish that would otherwise return to the Bristol Bay area between 2000 and 2008 was 8,322 fish. *Id.* If 100% of these fish were available for subsistence use, it would add 59% more Chinook to the subsistence harvest. However, the average annual in-river harvest of the Bristol Bay Run is not 100% of the returning fish, it is 40%. *Id.* Assuming the same level of in-river harvest in the future, this means that an annual average of 3,329 fish would become available for subsistence harvest if subsistence accounted for 100% of the in-river harvest. But subsistence is not 100% of the in-river harvest. Between 2000 and 2008, it was only 19% of the total in-river harvest. *Id.* Assuming the same allocation of harvest in the future, only 1,581 of

the AEQ fish would be used for subsistence. This would add 19% to the total average annual statewide subsistence harvest in Bristol Bay. Another way to look at this is that 93% of the Chinook harvest comes from the westside Bristol Bay Districts. NRC 2009. There are 556 subsistence permits issued to fish in the westside Districts. *Id.* In other words, if these 556 permit holders took all of the 1,581 additional fish that would be available if the Chinook salmon bycatch was zero fish, it would increase the average annual subsistence harvest by less than three fish per permit holder.

While rightfully expressing concern about the needs of subsistence fishermen, the DEIS fails to evaluate the actual benefits these fishermen will derive from restrictions on the pollock fishery.[4] As noted above, the actual benefits are small.

In lieu of analysis, the DEIS points to the importance of subsistence. The DEIS asserts that fish comprise as much as 85% (by weight) of the subsistence fish and wildlife harvested in western Alaska and, of that amount, salmon contributes as much as 53%, or 650 pounds per capita.[5] DEIS at 531. The issue here is not the importance of subsistence but whether restricting the pollock fishery makes a real difference in the amount of fish that would be available for subsistence.

C. There Are No Lost Opportunity Costs For Subsistence Fishermen

The DEIS asserts if there were more Chinook salmon in Alaska's rivers, the time and resources expended by subsistence fishermen to meet their subsistence needs would be reduced thus allowing subsistence fishermen to pursue other subsistence or income producing activities. DEIS at 531, ES 21. Again, the DEIS contains no analysis to support this conclusion. Given that the benefit of catching subsistence fish faster is the principal benefit relied upon to justify severe restrictions on the pollock fishery, it is curious that the DEIS offers no proof to support the existence of this benefit. The DEIS does not, for example, provide even the most basic data to show that subsistence fishermen are actually needing more time to catch their

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[4] In considering the issue of meeting the need for food among economically disadvantaged people, it should also be noted that salmon bycatch in the pollock fishery is often used for this exact purpose. Because salmon incidentally caught in the groundfish trawl fisheries is a prohibited species that must be discarded, the Prohibited Species Donation ("PSD") program was initiated in 1996 to reduce the amount of protein being lost. The PSD program allows salmon bycatch to be retained and distributed to economically disadvantaged individuals by non-profit hunger relief organizations. While these individuals are not subsistence fishermen in Alaska, the facts are that during the 12 years the PSD program has been in place, the non-profit group administering the program has received a Marine Stewardship Award and has distributed 2 million pounds of steaked and finished salmon to poor and homeless people. DEIS at 527-529. This program provides nearly 650,000 meals each year to people who have access to "meagre and often inadequate food." *Id.* at 529. Over its 12 year life, the PSD program has provided approximately 7.8 million meals to the poor and homeless.

[5] This assertion strains credibility. If salmon subsistence consumption is 650 pounds per year, the average salmon consumption per capita per day is 1.8 pounds per day. It seems unlikely that every man, woman, and child who depends on subsistence is eating almost two pounds of salmon 365 days a year.

subsistence harvest, let alone that any such delay is caused by the loss of between one-tenth of a fish and three fish a year to pollock bycatch.

Nor does the DEIS provide the basic data about how many subsistence fishermen actually have commercial salmon limited entry permits in order to support the assumption in the DEIS that subsistence fishermen could enter the commercial fishery if they could finish their subsistence harvest in less time. At the outset, the claim that this benefit exists hardly seems supportable when it is likely that eliminating the entire Chinook bycatch by the pollock fleet would increase the subsistence harvest by between one-tenth of a fish and 1.7 fish per household in the Norton Sound, Kuskokwim and Yukon regions, and by less than three fish per permit holder in Bristol Bay.

The DEIS' assumption of benefits is further eroded by the fact that a person can participate in the commercial salmon fishery only if that person holds a limited entry salmon commercial fishing permit. If one compares the number of subsistence households with the number of commercial fishing permits, one finds little support for the DEIS' assumption that subsistence fishermen can shift into the commercial salmon fishery.

In the Norton Sound area, there are about 935 subsistence households and, between 2001 and 2005, the mean number of active commercial salmon limited entry permits was 34. NRC 2009. Even if each subsistence household was comprised of just one person, and if 100% of the limited entry permits were held by subsistence fishermen, then approximately 3.6% of subsistence fishermen would be allowed to enter the commercial fishery – again assuming that catching the additional one-tenth of a fish they would be able to harvest if zero Chinook salmon were taken in the pollock fishery allowed subsistence fishermen to finish their subsistence harvest faster.

In the Kuskokwim area, the mean number of active commercial limited entry salmon fishing permits between 2000 and 2003 was 496. NRC 2009. The number of subsistence households in the Kuskokwim region approximates 1,696. *Id.* Again, if catching the additional one fish per subsistence household that would occur if there were no Chinook bycatch in the pollock fishery enabled these subsistence households to finish their subsistence harvest earlier, not many members of these subsistence households would be able to enter the commercial fishery, even assuming 100% of the commercial fishing permits are held by subsistence fishermen.

The same situation obtains on the Yukon River where between 2002 and 2004 the mean active number of limited entry commercial fishing permits was 574. However, there are 1,479 subsistence households, whose subsistence catch would increase about 1.7 fish if all Chinook bycatch were stopped. NRC 2009. Again, absent any Chinook salmon bycatch, very few subsistence fishermen could have entered the commercial salmon fishery, assuming of course that adding 1.7 fish to each household's subsistence harvest would enable these fishermen to complete their subsistence fishery in a shorter timeframe.

Finally, as to Bristol Bay, there are about 556 subsistence households but the mean active number of limited entry salmon permits between 1996 and 2005 was 2,474. NRC 2009. Only here is it even possible that there could be some validity to the DEIS' assumption that there are enough commercial fishing permits that every subsistence fishermen could enter the

commercial fishery if they could finish their subsistence harvest in less time. Of course, the DEIS does not examine the all-important question of just how many of these subsistence fishermen actually have a commercial limited entry permit. And assuming 100% of the Chinook salmon bycatch stops, the DEIS does not explain how increasing the subsistence harvest by less than three fish per subsistence permit holder really shortens the time needed to complete the subsistence harvest for a subsistence fishermen.

D. Ichthyophonus and Other Issues

Not only does the DEIS offer no proof to support its assumption that it is taking subsistence fishermen longer to catch their subsistence harvest and that bycatch is the cause of any such delay, but the DEIS studiously ignores, and does not analyze, other factors that might be contributing to any slower subsistence harvest that may be occurring. Rather than examining these factors to determine if they are the real cause of any increased time required to take the subsistence harvest, the DEIS just assumes any problem is caused by the pollock fishery.

The DEIS admits that the cause of any weaker Chinook runs in western Alaska is not bycatch in the pollock fishery but food limitations for salmon in the ocean. DEIS at 196, 199. The food Chinook salmon rely on, nekton, is very sensitive to rising ocean temperatures. The DEIS contains no analysis of this issue and its effect on the availability of Chinook salmon for subsistence harvest.

Chinook salmon, like all species, are sensitive to water pollution and habitat degradation. The DEIS offers no analysis of these issues and how they affect subsistence harvests.

The DEIS fails to consider the effect of ichthyophonus on the availability of fish for subsistence harvest. Ichthyophonus is an infection that can render the fish unusable. Of the 762 pages in the DEIS, exactly 21 lines are devoted to ichthyophonus infection and none of this rather abbreviated text discusses the impact of the disease on subsistence. DEIS at 228.

The DEIS does cite Alaska Department of Fish and Game statistics that the ichthyophonus infection rate on the Yukon River averaged 20%, 2004-2007. DEIS at 228. However, the DEIS also cites a study by Dr. Richard Kocan as providing the “baseline” analysis of the extent to which the disease is present in Yukon River Chinook salmon. *Id.* After admitting the Kocan study establishes the baseline, the DEIS neglects to mention that the “baseline” showed the infection rate had already reached “about 45%” in the Yukon River by 2003. Kocan, R., P. Hershberger, J. Winton; Ichthyophoniasis: An Emerging Disease of Chinook Salmon in the Yukon River; Journal of Aquatic Animal Health, 2004 (“Kocan 2004”) at 58. The DEIS also cites Hayes, *et al.* 2006 as documenting the ichthyophonus infection rate on the Chena River, but fails to mention that this study showed a 37% infection rate. DEIS at 228.

The DEIS also neglects to mention that the Kocan study reports ichthyophonus is “firmly established” in the Yukon River, “increasing to levels that impact subsistence and commercial fishing, as well as the resource itself.” Kocan 2004 at 68. In that regard, the DEIS fails to mention that middle Yukon River fish processors are discarding up to 20% of purchased fish because of tissue damage caused by ichthyophonus. *Id.* at 58.

Assume a subsistence fisherman sought to catch 100 Chinook salmon. If 20% must be discarded because of ichthyophonus infection, then a harvest of 100 yields only 80 fish. To get to 100, an additional 25 fish need to be caught. In other words, ichthyophonus alone would be causing a 25% increase in time and effort for subsistence fishermen.

The DEIS never even mentions ichthyophonus as an issue for subsistence fishermen. The DEIS just assumes that any additional time required to take the subsistence harvest is caused by bycatch. Assumptions supported by no analysis, assumptions made in the face of contrary factual evidence, fail to comply with NEPA. Equally important, the Proposed Action is attacking the wrong problem.

VIII. THE DEIS OVERESTIMATES THE ADVANTAGES OF THE PROPOSED ACTION TO COMMERCIAL FISHERMEN

This section examines what benefits may accrue to commercial fishermen because of reductions in the Chinook salmon bycatch in the pollock fishery. The DEIS assumes such benefits will flow and bases the bycatch reduction plan, in part, on that assumption. However, the DEIS contains no analysis to support that assumption and, therefore, cannot meet the analytical standards required by NEPA. If the DEIS had done the analysis required to satisfy NEPA's "hard look" standard, the DEIS would have found the facts do not support the assumption that commercial salmon fishermen will benefit from restrictions on the pollock fishery. Apparently doubting whether the facts support its assumption, the strongest statement in the DEIS on this issue is that an increased number of in-river Chinook "may" enhance commercial fishery opportunities. DEIS at 629.

The assumption that commercial fishermen will benefit from Chinook salmon bycatch reduction fails for three reasons. First, the AEQ mortality by river system is so small that eliminating 100% of the chinook bycatch in the pollock fishery will offer little benefit to commercial salmon fishermen. In fact, the increase in the number of fish taken by commercial fishermen would be less than one to under three fish annually per commercial fisherman depending on the area. This is hardly the economic boom assumed in the DEIS. Second, in many river systems commercial Chinook salmon fisheries "have not occurred in recent years." DEIS at 626. There can be no expectation that a commercial fishery will suddenly become a possibility if a bycatch reduction plan is implemented, particularly given the low numbers of additional Chinook that would return to rivers. Third, Chinook salmon is simply not a large contributor to the in-river commercial fishery and to the income of commercial fishermen relative to income from other salmon fisheries. Reductions in Chinook salmon bycatch in the pollock fishery will, even under the most optimistic hopes, have only limited effects on the income of in-river commercial fishermen. Even then, it is difficult to see how successful a commercial fishery for Chinook salmon could be given the high levels of ichthyophonus infestation in western Alaska rivers such as the Yukon.

The final point in the preceding paragraph merits further discussion. An examination of the revenue earned by western Alaska commercial salmon fishermen from Chinook salmon is instructive. Those numbers by Alaska census district using a five-year average (2003-2007) are as follows: Aleutians East (0.4%); Aleutians West (0%); Bethel (8.8%); Bristol Bay (0%); Dillingham (2.4%); Lake and Peninsula (0.2%); Nome (7.8%); Northwest (0.4%); Wade Hampton (89.2%); and Yukon-Koyukuk (14.6%). DEIS at 458, Table 9-3.

The relative importance of Chinook salmon is also reflected in the actual revenue western Alaska commercial fishermen derive from it. Using a five-year average (2003-2007) for Alaska census districts, the annual income number from Chinook harvests for each commercial salmon fisherman are: Aleutians East ($727); Aleutians West ($296); Bethel ($1,323); Bristol Bay ($44); Dillingham ($1,975); Lake and Peninsula ($169); Nome ($596); Northwest ($33); Wade Hampton ($8,058); and Yukon-Koyukuk ($1,494). DEIS at 458, Table 9-4. The average annual value of the commercial Chinook salmon fishery in the last five years was $1,471.50 per fishermen.

In reviewing the alleged benefits to commercial fishermen from the Chinook salmon bycatch program, the DEIS mentions five geographic areas. These pages in the DEIS further demonstrate the weakness of its assumption that commercial salmon fishermen will experience measurable gains from a Chinook bycatch reduction program. For example, the DEIS introduces a table described as summarizing the Kotzebue area commercial salmon fishery. DEIS at 533. Chinook salmon is never mentioned. The only species described is chum salmon. *Id.* at 535, Table 10-14. It is hard to understand how there will be benefits to Kotzebue area commercial salmon fishermen from reductions in Chinook salmon bycatch when there is no commercial Chinook salmon fishery. Even if there was a commercial Chinook fishery, the DEIS identifies the factor limiting growth in any commercial fishery in the Kotzebue area as the lack of "buyer capacity," not the lack of Chinook salmon. *Id.* at 533.

In the Norton Sound District, 702,955 salmon have been caught by commercial fishermen since 2000. Of that number, 1,164, or 0.17%, were Chinook salmon. DEIS at 544, Table 10-18. The minor role of Chinook salmon in this area's commercial fishery is also reflected in the fact that the value of the Chinook salmon commercial harvest relative to the entire Norton Sound commercial salmon fishery since 2000 has averaged 2.3%. *Id.* at 545, Table 10-19. It is important to put these numbers into perspective regarding what it would mean in terms of actual fish for commercial fishermen if zero Chinook salmon were incidentally taken in the pollock fishery.

In Norton Sound, the average annual AEQ mortality of fish that would otherwise have returned to the Norton Sound area 2000-2008 was 266. NRC 2009. The average annual total in-river harvest Chinook salmon 2000-2008 was 4,430 and the percentage of the total harvest taken by commercial fishermen 2000-2007 was 3.3%, or 146, fish. *Id.* Assuming the same in-river harvest percentages continue, an additional 9 fish (266 x 3%) would have been added to the commercial harvest in the absence of any bycatch. That represents a 0.6% increase in the 2000-2007 average annual commercial harvest of 146 Chinook. *Id.* Given that the mean number of active limited entry commercial salmon fishing permits in Norton Sound in the 2001-2005 period was 34, *id.*, this means the average commercial fishermen could have added less than one third of one fish to his or her harvest if no Chinook were taken in the pollock fishery.

In the Kuskokwim River, the subsistence, commercial, sport, and test fish harvest of Chinook salmon totaled 578,762 fish between 2000 and 2007. DEIS at 562, Table 10-28. Of that amount, 10,804, or 1.9%, were taken by commercial fishermen. *Id.* Since 2000, Chinook salmon has comprised an average of only 0.5% of the total value of the total commercial salmon fishery. *Id.* at 563, Table 10-29. Again, it is important to place these numbers into context in terms of what it would mean to each commercial fishermen if 100% of the Chinook salmon bycatch ended.

Had there been no Chinook salmon bycatch in the pollock fishery, the average annual AEQ mortality for fish that would otherwise return to the Kuskokwim area 2000-2008 was 6,363 Chinook. NRC 2009. However, the average annual in-river harvest is 31% of the returning Chinook and given that between 2000-2007 commercial fishermen accounted for an average of 23% of the total average in-river harvest, ending all Chinook bycatch would have added 454 fish to the commercial harvest. *Id.* Since the average annual commercial harvest of Chinook salmon 2000-2007 was 22,351, *id.*, adding 454 to the total represents an increase of 2%. Between 2000 and 2003, the mean number of active limited entry commercial salmon fishing permits in the Kuskokwim region was 496. *Id.* In other words, if the entire Chinook bycatch in the pollock fishery ended, each commercial fisherman could expect to increase his or her catch by a little less than one fish.

In the Yukon River, the average annual commercial Chinook salmon harvest between 2000 and 2007 was 31,955 fish. NRC 2009. The average annual AEQ mortality for fish that would otherwise return to the Yukon area between 2000 and 2008 was 9,790 fish. *Id.* Between 2000 and 2007, the average annual in-river harvest of Chinook salmon by all users was 42%. *Id.* In other words, one could expect that the total in-river harvest of the saved AEQ fish would equal 4,112 fish. But 100% of these fish would not be taken by commercial fishermen. The 2000-2007 average annual commercial catch was only 35% of the total in-river harvest. *Id.* This means that if the bycatch of Chinook in the pollock fishery was reduced to zero fish, only 1,439 fish would be added to the average annual commercial catch. This would add exactly 4.5% on average to the total in-river commercial catch. To put these numbers into perspective for each commercial fisherman, recognize that between 2002-2004 the mean active commercial limited entry permits was 574. *Id.* In other words, if no Chinook salmon were taken in the pollock fishery it would have increased the harvest of each commercial fisherman by under three fish.

In Bristol Bay, over the 20-year period 1987-2006, the average annual commercial salmon harvest has been 24,000,000 sockeye salmon, 937,000 chum salmon, 231,000 pink salmon, 98,000 coho salmon, and 67,000 Chinook salmon. DEIS at 598. Chinook salmon comprises only 0.26%. Historically, the commercial value of Chinook salmon has never exceeded 2% of the total value of the commercial salmon fishery in Bristol Bay. *Id.* at 609. In fact, using the 1997-2006 average, the Chinook salmon comprised only 0.79% of the value of the Bristol Bay salmon commercial fisheries. *Id.* at 612, Table 10-46. Again, to place these numbers into perspective, had there been no Chinook bycatch the average annual AEQ mortality 2000-2008 in Bristol Bay would have been 8,322 Chinook. NRC 2009. Of that amount, the 2000-2007 average in-river harvest was 40%, or 3,329. *Id.* Commercial fishermen accounted for 77% of the in-river harvest or 2,563 fish. *Id.* Between 1996-2005, the mean active commercial salmon permits was 2,474. *Id.* This means that each commercial fisherman would have increased his or her catch by just over one fish if there were no Chinook salmon taken in the pollock fishery.

The DEIS, without explanation or analysis, states Chinook bycatch reduction could be "quite important" to commercial fishermen. DEIS at 629. Given the minimal contribution of Chinook salmon to western Alaska commercial salmon fisheries, and the small amount of AEQ fish that would actually return to western Alaska, the DEIS' optimism is without factual foundation.

IX. THE DEIS OVERESTIMATES THE ADVANTAGES OF THE PROPOSED ACTION TO SPORT FISHERMEN

This section examines the potential benefit of a Chinook salmon bycatch reduction plan to sport fishermen. As is the case with subsistence and commercial fisheries, the DEIS assumes there are benefits to the sport fisheries without conducting any analysis to determine if the facts support that assumption. Again, the DEIS fails to meet the standard that it take a hard look at the issues. If the DEIS had done the analysis required by NEPA, it would have discovered there is no factual basis to support the assumption that sport fishermen will derive measurable benefits from restricting the pollock fishery.

In the Kotzebue region, sport fishing is "relatively light" because of geographic limitations. DEIS at 534. When the DEIS presents data on the Kotzebue salmon harvest, the discussion is confined to chum salmon. *Id.* at 535, Table 10-14. That portion of the DEIS titled "Sport Fishery Situation and Outlook" which purports to describe the species taken in the sport fishery never mentions Chinook salmon. *Id.* at 534.

In the Norton Sound District, the DEIS reports that the number of Chinook salmon taken in the sport fishery averaged 444 in the last five years, or 4.3% of the average number of all Chinook salmon taken in the area's sport fisheries. DEIS at 551, Table 10-22.

For the Kuskokwim River and Bay, the DEIS' analysis of the sport fishery is confined to nine lines, four of which describe the geographic area and none of which discuss the effect of the bycatch reduction plan on sport Chinook fishing. DEIS at 565. That said, Table 10-28 reveals that 578,762 Chinook salmon were harvested in the Kuskokwim River between 2000 and 2007 of which 6,160, or 1%, were taken by sport fishermen. *Id.* at 562, Table 10-28. To suggest that Chinook salmon is an important sport fish in this region is not consistent with the facts.

Similarly, in the Alaska portion of the Yukon River, between 2000 and 2006, 559,228 Chinook salmon were harvested of which 6,895, or 1%, were taken by sport fishermen. DEIS at 568, Table 10-30. Again, the actual data does not support the assumption that Chinook salmon is a significant part of the sport fishery and that Chinook salmon bycatch in the pollock fishery is a real factor in the health of the sport fishery.

Finally, as to Bristol Bay, between 1987 and 2006, an average of 25,333,000 salmon was harvested. DEIS at 598. Of that amount, between 1994 and 2005 (the only years for which data is given in the DEIS), an average of 13,088 Chinook salmon were taken in the sport fishery, or 0.05%, of the total. *Id.* at 614, Table 10-47. Again, the facts do not justify the DEIS' assumption that Chinook salmon is a major contributor to in-river sport fisheries, let alone that these fisheries will derive measurable benefits from restrictions on the pollock fishery, particularly given the small numbers of AEQ salmon that would return to the rivers and other end uses of these fish.

X. THE DEIS IMPROPERLY ANALYZES NON-USE VALUES

One of the major categories of benefits the DEIS cites as justifying restrictions on the pollock fleet is "passive use (or non-use) benefits." DEIS at 625. There are multiple conceptual and analytical defects in relying on non-use values to justify restricting the pollock fleet.

At the outset, it may be helpful to define exactly what are "passive (or non-use)" values. The DEIS defines this concept as the value of knowing that the resource exists "and will continue to exist in perpetuity." DEIS at 627. The General Accountability Office defines non-use values as the "pleasure of knowing that the resource exists." General Accounting Office, Natural Resource Damages of the Department of Energy, GAO/RCED-96-260R, August 16, 1996, at 19. In short, passive use values are the psychological value of knowing that the resource exists.

The first fundamental problem with relying on existence values to justify restricting the pollock fishery is that there is no threat to the existence of the Chinook salmon resource caused by the pollock fishery. One searches the DEIS in vain for any claim, let alone proof, that the incidental take of Chinook salmon in the pollock fishery threatens the existence of that species. Any psychological existence values that are alleged to exist are satisfied if the resource exists.

The second fundamental problem with relying on existence non-use values to justify restrictions on the pollock fishery is that people generally do not place an existence value on Chinook salmon *per se*. The DEIS admits that "few" people who attribute existence values to marine resources "would likely be able to either explicitly recognize or express" such values for the living marine resources of the Bering Sea. DEIS at 628. If people are unable to "express," or even recognize, non-use values for the living marine resources of the Bering Sea, how can there be an identifiable and distinct existence value for just one species of salmon? The DEIS admits this analytical defect when it states that "isolating a passive-use value unique to Chinook salmon taken in the Bering Sea ... presents conceptual problems." *Id.* The DEIS states that salmon has a cultural existence value to the Native peoples of Alaska. *Id.* at 627. No one disputes, diminishes, or disrespects the cultural values of Alaska's Native Americans. The problem is that the DEIS contains not one shred of evidence that the Chinook salmon bycatch in the pollock fishery prevents Native peoples from harvesting sufficient Chinook salmon to meet their cultural needs.

Compounding these fundamental analytical defects is the statement in the DEIS that non-use values are measured by contingent valuation methodology ("CVM") and that CVM has been "carefully reviewed and accepted (when employed appropriately) by the federal courts." DEIS at 627, *citing Ohio v. United States Department of the Interior,* 880 F.2d 432 (D.C. Cir. 1989). The argument appears to be that non-use values must exist as to Chinook salmon because the courts have said CVM is a way to measure non-use values. Such logic begs the question of whether non-use values actually exist as to Chinook salmon. In fact, the DEIS admits there has been no study of non-use values for Chinook salmon and, therefore, non-use values "cannot be further analyzed." *Id.* at 628.

Even if a CVM study were undertaken, there would be serious doubts about the results. The DEIS, after admitting that the *Ohio* court found CVM a valid procedure only "when employed appropriately," neglects to mention that no court reviewing a CVM study has found it

was employed appropriately. In the only two court cases flowing from the *Ohio* decision where CVM was employed as a separate basis for damage claims, the courts rejected the results because the CVM analysis produced such unrealistic valuations.

The problem is inherent in the methodology. CVM studies are conducted by asking people what they are willing to pay to preserve a resource for the psychological value of knowing that it exists. That number is multiplied by the applicable population. Thus, if the survey showed that people might be willing to spend one dollar, and, if it is a national resource, the non-use value would be $1 times the population of the United States, or approximately $300 million. Such results are not based in reality.

For example, one leading CVM study showed the non-use value of 168 endangered whooping cranes to be $3.72 billion per bird. To suggest people are willing to support the expenditure of $625 billion in public money to preserve 168 birds strains credibility. The gap between CVM valuations and reality was also demonstrated by a recent state of the art CVM study by the Netherland's Institute for Environmental Studies. That study sought to determine the willingness of airline travelers to pay a fee that would be used to offset air pollution caused by airline travel. The CVM study revealed that 75% of the public would voluntarily pay such a fee. The CVM study then estimated that over $29 billion would be generated from implementing this policy. When such a voluntary payment policy was instituted based on the CVM study, only 0.5% of the public was actually willing to pay the fee. The difference between what the CVM study showed (75% of the public would pay) and actual results (0.5% paid) is striking. The reality is that CVM analysis typically produces inflated and incorrect valuations.

The DEIS states that the damage to non-use values is one of the pillars upon which a Chinook salmon bycatch program can be premised. DEIS at 625. However, the DEIS offers no proof that such values exist as to Chinook salmon specifically and, if they exist as to Chinook, that they are damaged, and if they are damaged, by how much. Nevertheless, the DEIS concludes, without analysis, evidence, or support that non-use values can be used to justify bycatch restrictions. Such "analysis" does not comply with NEPA.

XI. THE DEIS FAILS TO MEET THE MINIMUM STANDARDS FOR ADEQUATE ECONOMIC ANALYSIS

Societies must make choices of how to use their scarce resources. The branch of economics that deals with how economists evaluate the effects of social choices about resource use is known as welfare economics. Welfare economics focuses on using resources optimally so as to achieve the maximum well-being for the individuals in society. The objective of welfare economics is to help society make better choices.

The purpose of the DEIS is to provide decision-makers and the public with an evaluation of the environmental, social, and economic effects of alternative measures to minimize Chinook salmon bycatch in the Bering Sea pollock fishery. As such, it's theoretical basis and methods should correspond to those generally accepted and employed by practitioners of applied welfare economics. The literature on the theory and application of welfare economics is vast. However, Just, R.E., D. L. Hueth, and A. Schmitz, Applied Welfare Economics and Public Policy, 1982, provide a useful text which outlines the main theoretical foundations and analytical methods of

applied welfare economics. The major emphasis is on concepts that have empirical possibilities.

The main components of welfare economics can be summarized as the concepts of producer and consumer welfare and the development of methods for their measurement. Producer welfare concepts include producer surplus, economic rent, and profits. Consumer welfare concepts include primarily product demand curves, consumer willingness to pay, and consumer surplus. The DEIS contains very little of substance concerning these concepts and their measurement. On these grounds alone, it simply cannot be considered a sufficient or satisfactory accounting of the changes in producer and consumer welfare that are likely to accompany the alternative management measures contemplated to reduce Chinook salmon bycatch. It provides very little if any useful input into the policy-making process as regards potential welfare changes to U.S. citizens.

The DEIS adopts foregone pollock revenue as its measure of the costs and benefits to the pollock fishery of the alternative bycatch management options under consideration. Adoption of foregone pollock revenue as a measure of costs and benefits is misleading because the measure is neither a cost nor a benefit. Additionally, this measure bears no direct relationship to generally accepted concepts of producer welfare that have been in use since the 1940s. *See* Hicks, J.R, The Foundations of Welfare Economics, The Economic Journal, 49 (196): 696-712, 1939; Kaldor, N., Welfare Propositions of Economics and Interpersonal Comparisons of Utility, The Economic Journal, 49 (195): 549-552, 1939.

Even the most introductory text on welfare economics will point to profits as the most obvious measure of producer welfare, given that maximizing profit is the assumed objective of any business enterprise. No discussion of pollock producer profits or their relationship to foregone revenues appears in the DEIS. Instead, what appears is the following statement:

> A benefit/cost framework is the appropriate way to evaluate the relative economic and socioeconomic merits of the alternatives under consideration in this RIR. When performing a benefit/cost analysis, the principal objective is to derive informed conclusions about probable net effects of each alternative under consideration (*e.g.*, net revenue impacts). However, in the present case, necessary empirical data (*e.g.*, operating costs, capital investment, debt service, opportunity costs) are not available to the analysts, making a quantitative net benefit analysis impossible. Furthermore, empirical studies bearing on other important aspects of these alternative actions (*e.g.*, subsistence-use values, domestic and international seafood demand) are also unavailable, and time and resource constraints prevent their preparation for use in this analysis.
>
> The following regulatory impact review, initial regulatory flexibility analysis, and supporting text use the best available information and quantitative data, combined with accepted economic theory and practice, to provide the fullest possible assessment (both

> quantitative and qualitative) of the potential economic benefits and presumptive costs attributable to each alternative action.

DEIS at 264. Evidently it is the opinion of the DEIS that this statement is sufficient to support the omission of any serious discussion of producer welfare concepts and changes other than foregone pollock revenues.

An alternative to profit, defined by Marshall as the excess of gross receipts over their prime cost — that is, over the extra cost that the firm incurs in order to produce those things which it could have escaped if it had not produced them, is termed rent. Marshall. A., Principles of Economics, 1930.

The concept is called rent because it is a rent on fixed factors employed by the firm but, unlike factor rent, may not persist over a long period of time. Specifically, rent is defined as the excess of gross receipts over total variable costs. Marshall went on to suggest the area below the price line and above the supply curve, commonly called producer surplus, as a measure of this benefit. The discussion of variable cost changes in the DEIS contains no discussion of this concept as it relates to changes in producer welfare. DEIS at 695-697.

If the DEIS had informed the public as to the nature and composition of producer welfare measures, then it might have been discovered that the pollock CDQ groups collect royalty payments from the lease of pollock harvest privileges, and that these royalty payments could be used as a basis for approximating changes in producer welfare (profits or rent) due to the alternative management measures. A very simple assumption in this regard would be that producer rents are approximately twice the annual per-ton pollock lease values received by the CDQ groups (*i.e.*, it could be assumed that a competitive negotiation leads to an approximate splitting of the rents). NMFS has access to information on pollock lease values received by the CDQ groups to fulfill its responsibilities as regards CDQ program administration and oversight. The advantage of this approach is that it does not mislead the public by (1) declaring that a revenue is a cost, and (2) stating that the analysis is based on the best available science and data.

Although changes in producer profits are a useful measure of changes in producer welfare for many regulatory changes, this is not the case for a policy change that prevents a firm from producing during a period. In such case, a firm would be willing to pay more than its current profits to remain in production because its fixed costs cannot be avoided even if production is shut down. The DEIS discussion regarding fixed costs contains no discussion of this concept as it relates to changes in producer welfare. DEIS at 693.

The DEIS provides even less information about changes in consumer welfare than it does about producer welfare. The only mention of consumer surplus is a brief summary of the results of several studies on the estimated values of subsistence and sport catches of salmon. DEIS at 532. Apparently, the results are dismissed simply because they show very low implicit values (consumer surplus) for subsistence and sport-caught salmon. The only mention of consumer benefits is the single occurrence within a brief discussion about costs to consumers. DEIS at 702. As such, the DEIS contains no information about the potential for and/or scale of the changes in consumer welfare that may accompany the bycatch management alternatives.

The entire economic analysis of changes in consumer welfare is contained in the following sentence:

> Provisions of the proposed Chinook salmon bycatch minimization actions could reduce the value consumers of seafood (and associated fish products) receive from the fisheries for several reasons, including 1) consumers may be supplied fewer fish products; 2) consumers may have to pay a higher price for the products they do consume; and 3) the quality of fish supplied by the fishing industry may be reduced and, thus, the value consumers place on (and receive from) them will decline.

DEIS at 702. In particular, the DEIS contains no mention of the suspected size of the changes in U.S. consumer welfare for any alternative of lower pollock catches, or how these changes might compare to changes in the welfare of salmon users due to assumed increases in Chinook-salmon returns to western Alaska river systems.

The DEIS goes on to state that:

> The second part, corresponding to a reduction in consumer benefits because consumers have to pay higher prices for the fish they continue to buy, would be offset by a corresponding increase in revenues to industry (i.e., producers' surplus gains). While a loss to consumers, this is not a loss to society. It is a measure of the benefit that consumers used to enjoy, but that now accrues to industry in the form of increased prices and additional revenues.

DEIS at 702. However the market conditions under which this assertion could be considered even approximately correct are so restrictive that the statement does nothing but mislead the public (*e.g.*, see Just, Hueth, and Schmitz, Chapter 9 Multimarket Analysis and General Equilibrium Considerations).

Another incorrect and misleading statement is that:

> The actual loss to society cannot be measured with current information about the fisheries. Estimation would require better empirical information about domestic consumption of the different fish species and products, and information about the responsiveness of consumers to the reduction in the supply (*e.g.,* their willingness and ability to substitute other available sources of protein). In addition in the present case, because, under the status quo, society is already in a suboptimal state (*i.e.,* incurring a welfare loss associated with the externalities imposed by salmon bycatch), actions taken to reduce these externalities(*i.e.,* minimizing pollock trawl fishing impacts on salmon) will result in an aggregate welfare improvement to society, offsetting any apparent welfare reduction in the retail/wholesale domestic

> seafood/fish products commercial marketplace (*i.e.,* no deadweight loss is incurred).

DEIS at 702. With this statement, the reader is led to believe that welfare changes cannot be measured with current information about the demand for different fish species and products. Yet, for the past 30 years NMFS has collected and analyzed information about fish prices and the quantities consumed by the public. Indeed, NMFS is the nation's pre-eminent source for information about seafood markets and trade. The current version of the Economic Status of the Groundfish Fisheries Off Alaska, 2008, produced by the NMFS Alaska Fisheries Science Center, is approximately 300 pages and documents the prices paid and catch quantities landed for all groundfish off Alaska (Hiatt et al. 2008). The current Fisheries of the United States 2007 (NMFS 2008) includes data and information on U.S. commercial fishery landings, world fisheries, U.S. production of processed fishery products, U.S. imports, U.S. exports, and the U.S. supply fishery products, including per-capita estimates of consumption and value added. It is not correct to state that welfare changes cannot be measured with the available information. The DEIS simply does not do the analysis.

Given all that is missing from the putative analysis of costs and benefits contained in the analysis, it strains credulity to read that any action taken to reduce salmon bycatch in the pollock fishery" will result in an aggregate welfare improvement to society, offsetting any apparent welfare reduction in the retail/wholesale domestic seafood/fish products commercial marketplace." DEIS at 702.

While welfare economists typically focus their analyses on measures of consumer and producer welfare, many decision makers as well as members of the public are equally interested in the changes in economic activity that are anticipated to accompany regulatory changes. Changes in economic activity are typically measured in the context of an economic impact analysis and rely on the tracking and analysis of expenditures on inputs used to catch and produce seafood products. Seung, C., Estimating Dynamic Impacts of Seafood Industry in Alaska, Marine Resource Economics, 23:87-104, 2008; Seung, C. K., and E. C. Waters, A Review of Regional Economic Models for Alaska Fisheries, AFSC Processed Report 2005-01, National Marine Fisheries Service, 2005.

The economic impacts of expenditures are estimated using a regional economic model (*e.g.,* input-output model, economic base model, general equilibrium model) that is often supplemented with baseline information useful for assessing community impacts. *See* Seung and Waters 2005; Norman, K., Sepez, J., Lazrus,H., Milne, N., Package, C., Russell, S., Grant, K., Lewis, R. P., Primo, J., Springer, E., Styles, M., Tilt, B. and I. Vaccaro, 2007, Community Profiles for West Coast and North Pacific Fisheries–Washington, Oregon, California, and Other U.S. States, NOAA Technical Memorandum NMFS-NWFSC-85. In general, the largest economic impacts are created via employment and, in particular, payments to labor (Northern Economics 2009).

Unfortunately, the quality and comprehensiveness of the economic impacts analysis included in the DEIS is on a par with the welfare analysis in the DEIS. That is to say, it is simply omitted. No changes in employment or economic impacts are provided for any of the alternatives for any of the locations in Alaska or Seattle that are likely to be affected. No changes in employment or investment values are provided for any of the CDQ groups in

western Alaska that have substantial ownership investments and gain employment opportunities in the pollock fishery (*e.g., see* Coastal Villages Regional Fund 2008, p.24). No changes in economic activity are estimated or presented for any of the commercial salmon fisheries that are likely to be affected by reduced salmon bycatch in the pollock fishery.

The DEIS fails to meet even the minimum standards of adequacy for economic analysis. It certainly fails the "hard look" standard required by NEPA. The next four Parts of these comments will examine additional specific issues that the DEIS has failed to examine.

XII. THE DEIS UNDERESTIMATES THE COSTS OF THE PROPOSED ACTION ON THE POLLOCK FISHERY

A. Overview Of The Pollock Fishery

Pollock accounts for more than one-third of all U.S. fisheries landings by volume. Northern Economics Inc., The Seafood Industry in Alaska's Economy, January 2009 ("Northern Economics 2009") at ES 2, 18. In 2007, the first wholesale value of the pollock harvest was $1.248 billion. DEIS at ES 2. However, this number does not reflect the multiplier effect of additional economic activity generated by the pollock fishery. The U.S. seafood industry generates an additional $600,000 in direct and indirect outputs for every $1 million of wholesale value. Northern Economics 2009 at 44. Thus, the 2007 dollar value of Alaska's pollock fishery to the nation was $2.029 billion. And that number understates current value because wholesale pollock prices increased in 2008.

B. The DEIS Grossly Underestimates The Foregone Revenue Loss And Fails To Examine Job Losses

The DEIS confines its analysis of the impacts on the pollock fishery of bycatch reduction plans by estimating foregone revenue based on the wholesale price of pollock. The DEIS' computations grossly underestimate the revenue loss to the pollock fishery caused by Alternatives 2-4.

First, the DEIS' estimate of foregone wholesale revenue understates the loss by 49%-69% because the DEIS uses prices that no longer reflect the marketplace. The Urner Barry Price Report, a widely respected and relied upon data source, shows that pollock fillet block prices have increased 49% since 2006 and 69% since 2005. This increase is confirmed by the rise in prices for exported product. The two largest European destinations for pollock fillets are Germany and the Netherlands. Between 2005 and 2008, the price of Alaska pollock fillets exported to the Netherlands FOB Alaska increased from $0.99 to $1.53 per pound (63%). In Germany, the price FOB Alaska increased in the same years from $1.05 to 1.65 per pound (64%). These export prices understate the price of pollock fillet blocks because there are piece block and lower price items included. In other words, the DEIS computation of foregone wholesale revenue is significantly underestimated because the DEIS fails to use the best and most current data. Even using outdated prices that underestimate foregone revenue by 49%-69%, the DEIS states that the proposed bycatch reduction measures could cost up to $500,000,000. DEIS at 656-687.

The second reason the DEIS grossly underestimates the actual foregone revenue caused by adopting Alternatives 2-4 is that the DEIS does not include all the items that must be accounted for in calculating revenue loss to the nation. The DEIS completely ignores the multiplier effects of economic activity. The DEIS defines the term "foregone lost revenue" as the "revenue that the fleet, or sectors within it, would be allowed to earn...." DEIS at 656. This definition alone documents the incomplete and inadequate analysis in the DEIS. The DEIS fails to recognize, and therefore excludes, the economic multipliers associated with this revenue loss. Applying these multipliers, the loss to the nation approaches $1 billion using the DEIS' outdated wholesale revenue calculations. Using current wholesale prices, the loss to the nation is well over $1 billion.

Compounding this error is the fact that the DEIS makes no effort to examine the job losses that will occur because of lost revenues. It is elementary economics that when employers have less product to harvest, process, and sell (*i.e.,* foregone revenue) they need fewer workers. Foregone revenue is not some abstract figure. It is a figure that means lost jobs. The DEIS, so concerned about increasing the subsistence harvest by one or two fish per household, ignores the fact that the price of that gain is that thousands of men and women will lose their jobs in the pollock industry and in the related and dependent support, service, and distribution sectors. And many of these people will be in economically stressed CDQ communities. The insensitivity of the DEIS to this aspect of Alternatives 2-4 is appalling.

Having chosen to ignore the human impact of "foregone gross revenue," the DEIS also ignores the cascading impact of higher unemployment in terms of lower income tax revenues, reduced governmental services, increased unemployment compensation claims, and associated social costs.

After admitting the DEIS will result in foregone catch, the DEIS fails to examine the economic impact of lost harvest on the economics of catcher vessels, catcher processors, and onshore processors. For example, many processing facilities were constructed based on economic assumptions associated with a certain product throughout. Reductions in the pollock harvest forced by salmon bycatch restrictions could fundamentally alter the basic economic viability of many parts of the pollock fishery – and that too will be reflected in lower wages and lost jobs.

The DEIS also fails to recognize, let alone analyze, the inflationary and consumer impact of "foregone revenue." Revenue is foregone because there is less product to sell. Basic supply and demand principles suggest the consumer is the victim in that the consumer will now pay higher prices.

The DEIS then ignores the fact that the U.S. exports close to $1 billion of Bering Sea pollock products annually to countries around the world. "Foregone revenue" comes from less product, and fewer exports means an increased U.S. trade deficit. The DEIS does not analyze this issue.

The Supreme Court has said an EIS is inadequate if it fails to take a hard look at the relevant issues. This DEIS fails to even mention basic and critical issues. And when it does mention an issue, the DEIS either does not analyze the issue or uses old data that severely underestimates impacts. The DEIS cannot be considered a legally sufficient document. The

DEIS cannot be considered adequate to inform decision makers of the consequences of a decision until it identifies and examines those consequences.

C. The DEIS Fails To Analyze The Revenue And Job Loss Impacts Of Market Disruptions

Not only does the DEIS fail to analyze the job losses associated with "foregone revenue," but the DEIS also fails to analyze the job loss and revenue implications of the market disruption that will occur because of additional bycatch restrictions. The DEIS ignores the fact that "foregone revenue" comes from foregone product – and foregone product means end use purchasers will need to secure alternative sources of supply. Foregone product of the magnitude envisioned by Alternatives 2-4 will cause end use purchasers to turn away from the Alaska market as a source of supply, multiplying the economic impacts and hardships caused by Alternatives 2-4. Again, the DEIS does not even recognize the issue, much less analyze it.

The two principal market destinations for Alaska pollock fillets are Europe and the United States. Both markets feature two principal customers: (1) large volume customers that bread or batter the product for retail sale; and (2) large fast food restaurant chains, primarily in the United States. These large purchasers typically spend millions of dollars on advertising and other marketing programs. Often these marketing programs are planned 12-18 months in advance. Buyers must be confident in their sources of supply. Their business model and success depend on a steady and assured supply of raw product.

Alaska pollock has become the product of choice for these end users, in large part because of its reliability of supply. The Alaska pollock fishery is viewed as being subject to careful management and oversight such that there is a high degree of confidence that the TAC, once set, will be harvested and available to end use purchasers. This perceived reliability has supported higher pollock prices and resulted in long-term purchase contracts.

Implementing additional Chinook salmon bycatch limits will disrupt the pollock market, forcing end users to seek other sources of supply. The DEIS is replete with calculations of the dates on which the pollock fishery would have closed had Alternatives 2-4 been in effect in prior years – and the amount of the pollock TAC that would not have been harvested. The real world impact of such a management system is that purchasers will not know how much of the TAC will be harvested and available to them, and purchasers will not know when their supply will be suddenly cut off. For large end use purchasers, this uncertainty destroys the reliability of the Alaska pollock market. It is this reliability that has been the foundation of higher prices for Alaska pollock and for long-term supply contracts.

End use purchasers will have little choice but to adjust their product purchasing strategy to protect against likely disruptions in supply. This will provide a new marketing edge for Russian pollock suppliers, who are now seeking a Marine Stewardship Council certification. Suppliers of aquaculture products such as tilapia and pangasius will also tout their products as alternatives to Alaska pollock. Each of these suppliers will be able to offer one thing that end use purchasers must have, a reliable source of supply. While large end use purchasers of pollock fillets have come to accept some level of supply uncertainty because the pollock TAC changes annually, bycatch generated closures introduce a new level of uncertainty. Large volume end use purchasers will now be faced with the prospect that their supply contracts will

not be fulfilled because of fishery closures and that they will have little or no notice of when these closures will occur. Those facts will drive many end use purchasers to seek more assured sources of supply.

The net result for Alaska, its workers, and the nation, is that Alaska's fish products will not be as desirable as they are today. Simple supply and demand economics means prices for Alaska's fish will fall. The well settled business principle that end users need assured supplies to support production lines and marketing programs means less demand and fewer purchase orders. Lower prices and less demand means fewer jobs. It also means lower revenue for those who remain in the fishery. Finally, it means lower revenue for CDQ communities and for other communities that depend on fish taxes. And absolutely none of these issues are considered in the DEIS.

XIII. THE DEIS UNDERESTIMATES THE COSTS OF THE PROPOSED ACTION BY NOT PROPERLY EVALUATING THE COSTS AND OTHER IMPACTS OF EFFORT TRANSFER

The DEIS compounds the analytical deficiencies discussed above by blithely asserting the pollock fleet will find a way to make up for some or all of the lost catch by shifting to different fishing grounds. The discussion in the DEIS of whether such an effort transfer is possible and, if so, the economic effects of any such effort transfer is inadequate for the informed decision making required by NEPA. However, before proceeding further, it is important to stop and recognize that the assertion in the DEIS that the pollock will likely shift to other fishing grounds is a recognition that the effects of Alternatives 2-4 are so onerous that the industry will have no choice but to seek alternative fishing grounds.

A. The Pollock Fleet Cannot Mitigate Losses By Transferring To Another Fishery

The DEIS suggests that pollock fishing vessels, catcher processors and/or motherships can mitigate losses imposed by salmon bycatch caps by shifting to other groundfish fisheries. DEIS at 692. The DEIS is wrong. The opportunities for pollock vessels to participate in non-pollock fisheries have been severely limited by (1) the "sideboard" restrictions imposed on pollock fishing vessels and processors by Section 211 of the American Fisheries Act ("AFA"), 16 U.S.C. § 1851, Note, (2) restrictions imposed by the license limitation provisions of the BSAI Groundfish Fishery Management Plan, (3) the provisions of Amendments 80 and 85 that allocate opportunities to participate in non-pollock groundfish fisheries to vessels that do not also fish for pollock, and (4) Steller sea lion mitigation measures that establish seasonal restrictions on the fishery.

The sideboard provisions were inserted into the AFA in response to concerns by non-pollock fishermen and processors dependent on non-pollock groundfish fisheries (*e.g.*, fisheries for cod, atka mackerel, sablefish, and various flatfish fisheries). It was argued that without limits, termed "sideboards," on the ability of pollock vessels to participate in other fisheries the system that Congress was planning to provide to the pollock fleet and processing plants (*e.g.,* the opportunity for pollock vessels and plants to obtain a specific amount of pollock quota by joining a harvesting co-operative) would give AFA vessels and plants an operational advantage over non-pollock vessels. The concern was that a rationalized pollock industry could stage their

pollock fishing and processing activities at such times and places so as to allow them to "poach" or "cherry pick" from other fisheries. It was argued this would be unfair because other participants in those non-pollock fisheries would be precluded by the AFA from fishing for and/or processing pollock. As a result, the AFA contains specific restrictions on the ability of AFA vessels and plants to fish for or process non-pollock species. Generally speaking, the "sideboards" limited an AFA vessel (and processing plant) to its historical levels of activity in non-pollock groundfish and crab fisheries. 16 U.S.C. § 1851, Note.

In addition to these restrictions in the AFA, the NPFMC has imposed other restrictions limiting the participation of pollock vessels and processors in non-pollock groundfish fisheries. For example, Amendment 80 to the BSAI Groundfish Fishery Management Plan generally allocates most of the BSAI TACs for non-pollock groundfish species (other than restricted amounts of cod and yellow fin sole) to vessels that do not fish for pollock. Amendment 85 allocates significant portions of the BSAI cod fishery to fixed gear fishermen and other non-pollock fishing vessels. Other regulations that restrict or prohibit AFA catcher vessels from entering other Bering Sea fisheries include six day stand-down time periods for vessels that transfer between the Gulf of Alaska and the Bering Sea, daily harvest amounts in the Gulf of Alaska, and exclusive seasonal area registrations that force AFA vessels to choose to fish in either the Gulf of Alaska or the Bering Sea on a seasonal basis.

The net effect of these "sideboards" and other restrictions is that pollock vessels and processors cannot make up lost pollock harvest by transferring to new groundfish fisheries.

B. The DEIS Does Not Examine The Costs And Energy Impacts Of Transferring To New Pollock Fishing Grounds

The DEIS assumes pollock fishermen will move to new pollock fishing grounds if Alternative 2, 3, or 4 is adopted. DEIS at 165. Since the pollock fleet is already fishing the most productive and economic areas, it goes without saying that Alternatives 2-4 will impose additional costs on the fleet, but the DEIS does not analyze these costs. Nor does it examine the impacts of increased energy consumption.

In the "A" season, catcher vessels will likely travel an additional 100 miles to find fish because the alternative fishing grounds they will now be forced to use are that distant. In the "B" season, the trip will be about 400 miles. This means an additional 10 hours of travel time each way, each trip during the "A" season and 30-40 hours each way, each trip during the "B" season. A typical Bering Sea trawl catcher vessel consumes one gallon of fuel per each horsepower per day, or an average of about 40 gallons per hour when steaming to and from the fishing grounds based on engine horsepower ranges of between 850 hp to 5000 hp. This means that during the "A" season, for each trip, a catcher vessel can expect to consume an additional 800 gallons of fuel. In the "B" season that number jumps to 2,400-3,200 gallons. There are approximately 90 catcher vessels currently participating in the pollock fleet, of which 70 are delivering their catch to shoreside processors and 20 are delivering to at-sea mothership processors. If each of the 70 vessels delivering to shoreside processors made just one trip to these more distant fishing grounds in the "A" season and just one trip in the "B" season, it would increase the consumption of diesel fuel by up to 4,000 gallons per vessel, or 280,000 gallons for the inshore fleet. Obviously, these vessels will make more than one trip. On average, the 70 inshore vessels will make eight trips during the "A" season and twelve trips during the "B"

season. The total increase in fuel consumption due to the increased travel time would be as much as 3,136,000 gallons. At the current Dutch Harbor price of $2.60 per gallon, this equates to an additional annual cost of $8,153,6000. The DEIS fails to consider the enormously increased energy usage that will flow from Alternatives 2-4 at a time when energy conservation is a national priority, and these additional energy costs do not include all the additional operational and repair costs associated with longer trips.

The DEIS also fails to consider the loss in value of the raw fish due to decreases in fish quality caused by the extended travel time that would be required to deliver the fish to the processor. Generally, a catcher vessel seeks to deliver its fish within 48 hours of its first tow on the fishing grounds. If this delivery time is extended beyond 48 hours, the value of the fish is reduced because of the quality or grade of final product the processor can produce. This is particularly true in the "A" season when roe quality decreases with the additional time fish are held on the vessel.

These economic costs, never examined by the DEIS, represent only one part of the overall costs of being forced to travel long distances to fish. The economic costs pale in comparison to the possible human costs. The Bering Sea is a dangerous place at any time of the year. In the winter "A" season, it is particularly forbidding. Forcing fishermen to travel farther in freezing temperatures and icing conditions increases the risk of injury and loss of life, issues the DEIS does not examine except to say this might be an issue. Human safety is indeed an issue, codified in National Standard 10 of the MSA, 16 U.S.C. § 1851(a)(10).

Finally, the DEIS does not consider the potential problem of increased interactions with other species, such as non-pollock groundfish, squid, sharks, seabirds, etc., that may be encountered on these more distant fishing grounds.

The DEIS assumes the pollock fleet will move to new pollock fishing grounds and then fails to examine the economic and other costs that will flow from that result. The DEIS does not provide the basis for making an informed decision regarding these issues because the DEIS has no analysis of these issues.

XIV. THE DEIS UNDERESTIMATES THE IMPACT OF THE PROPOSED ACTION ON CDQ COMMUNITIES

The DEIS almost totally ignores the adverse impact on CDQ communities of additional Chinook salmon bycatch actions. The DEIS characterizes CDQ communities as special needs communities, and rightly so. Many of these communities are in rural areas where job opportunities are poor or non-existent. The poverty level in those communities is unacceptably high. These communities and their residents are economically disadvantaged in almost every way. The DEIS admits that in many of these communities "unemployment is chronically high ... and the potential for economic diversification [beyond fisheries] ... is very limited." DEIS at 705. For many residents of CDQ communities, the opportunities from the CDQ program are an alternative to subsistence. Adoption of restrictions on the pollock fishery of the magnitude under consideration threaten that alternative. Rather than helping subsistence fishermen, Alternatives 2-4 may create subsistence fishermen. In something of an understatement, the DEIS concedes that "[a]nything that tends to diminish economic activity [in these communities] ... can do

disproportionate harm...." *Id.* at 706. Nevertheless, the DEIS conducts no analysis of, and fails to account for, these acknowledged harms that will flow from restrictions on the pollock fishery.

Sixty-five communities along the Bering Sea are eligible to participate in the CDQ program. Northern Economics 2009 at 62. The total net income generated from pollock fishery payments to CDQ communities from 1992 through 2005 (the most recent year for which data are available) was approximately $362 million. *Id.* In those same years, an additional $92 million in revenue was generated from CDQ program payments. *Id.* The majority of this revenue is from pollock.

Significantly, employment opportunities have been one of the most tangible benefits of the CDQ program. The CDQ program has created in excess of $123 million in wages for residents of CDQ communities since 1993. In 2005, the CDQ program resulted in the direct employment of approximately 2000 people in these communities. Northern Economics 2009 at 66. The DEIS emphasizes the importance of subsistence harvests, but the DEIS ignores the fact that the CDQ program provides an alternative to subsistence dependency for many people in CDQ communities, an alternative threatened by the proposed restrictions on the pollock fishery.

The DEIS also ignores the substantial support that pollock CDQ income provides to salmon-related projects in western Alaska communities. For example, the Norton Sound Economic Development Council ("NSEDC") has provided money for a variety of salmon-related projects, including (1) a joint management arrangement with the State of Alaska where NSEDC provides significant in-season management support for the fishery, (2) capital and operational expenditures for the construction and manning of several observation towers and for sonar equipment used to count salmon as they make their way up the river each season, (3) the operation of buying stations to provide markets for in-river salmon fishermen, including seasonal buying stations in Golovin and Shaktoolik for salmon and in Savoonga for halibut, (4) the construction of two processing plants, one in Unalakleet and one in Nome, to process salmon, crab and halibut, (5) loans for the purchase of vessels and gear, (6) habitat restoration projects to improve salmon spawning areas, (7) the operation of a "mist incubation, eyed egg implantation program" that places fertile eggs into spawning area stream beds, (8) the conduct of a lake fertilization program to rehabilitate red salmon habitat, and (9) $100,000 annually to each of 15 communities to build and maintain infrastructure projects. Between 80%-90% of the money for these projects is derived from NSEDC's investments in and royalties from the pollock fishery. NSEDC Report, available at http://www.nsedc.com.

The Coastal Villages Region Fund, a CDQ association of 20 communities in the Kuskokwim Bay area, also derives significant benefits from its partnership with and participation in the pollock industry. Major investments in salmon fishery support infrastructure, including processing plants, fishery support centers, and fishing vessels result from the CDQ program which provides approximately 85% of the funding for these programs. In 2007 alone, 98 community residents received $544,000 in education scholarships, construction of a new salmon plant was begun, over $183,000 was dedicated to salmon research projects, new fisheries support centers were constructed, job training programs were provided to community residents, and a halibut processing plant was replaced, to name but a few of the benefits of the CDQ program to these rural communities. Coastal Villages Region Fund, 2007 Annual Report.

The DEIS is rightfully concerned about the needs of subsistence fishermen. However, the DEIS substantially overstates the benefits these fishermen will derive from restricting the pollock fishery and virtually ignores the hardships and job losses that will befall economically disadvantaged rural CDQ communities. This failure of analysis renders the DEIS inadequate to fulfill NEPA's requirement that an EIS take a hard look at the consequences of a proposed action.

Before leaving the issue of the importance of the pollock fishery to CDQ communities, it is important to address the claim in the DEIS that Alaskan ownership in the Bering Sea pollock harvesting sector is less than 1%. DEIS at 498. The DEIS is wrong. Overall, CDQ groups own between 30%-40% of the at-sea processing fleet that operates in the Bering Sea pollock fishery. Another way to state the involvement of CDQ communities with the pollock fleet is that CDQ groups have some level of ownership interest in approximately 80% of the catcher processor vessels and motherships participating in the pollock fishery. In some cases, the ownership interest is substantially greater. For example, CDQ communities own almost 50% of American Seafoods and 37.5% of Glacier Fish Company, two of the largest catcher/processor companies in the pollock fishery.

XV. THE DEIS UNDERSTATES THE IMPACT OF THE PROPOSED ACTION ON LOCAL GOVERNMENTS

Alaska levies two taxes on the state's fishing industry, a Fisheries Business Tax applied to shoreside processors and a Fisheries Resource Landings Tax applied to vessels. DEIS at 501. Fifty percent of these state taxes are shared with local governments which can also impose municipal taxes on the fishing industry.

The dependence of different communities on fish taxes to provide essential services to community residents will vary but, for many communities, it is very significant. Although the DEIS admits that these fishery dependent communities "rely heavily upon tax revenues associated with fishing activities" (DEIS at 705-706), the DEIS makes no effort to quantify or evaluate the impacts notwithstanding the fact that data is available. For example, in the City of Unalaska, the fishing industry accounts for over 90% of all jobs and, in FY 2006, the city's share of the two state fishery taxes plus the city's raw fish tax totaled $11,371,533, or 43% of the city's general revenues. Northern Economics 2009 at 55. In Akutan, over 70% of the community's tax revenue is pollock related. In King Cove that number is 20% and in Sand Point it is 50%.

A salmon bycatch cap that could close the Bering Sea pollock fishery will have significant economic impacts on Alaskan communities, particularly villages in rural areas that have no way to offset revenue losses from the closure of such a significant fish as pollock. The impact of a drop in fish harvests is amply demonstrated by what happened to the City of St. Paul in the Pribilof Islands when Bering Sea snow crab landings fell. In 1999, the operating revenue for St. Paul was $11,672 per capita. When the snow crab fishery collapsed in 2000, St. Paul's operating revenue fell almost 50% to $6,491 per capita. Northern Economics 2009 at 55. The impact of that revenue loss on the City and its residents was enormous and some of the effects are felt in the community even today.

Salmon bycatch limits that prematurely close the pollock fishery or otherwise reduce landings and associated tax revenues will be felt throughout Alaska, but particularly in rural

areas that depend on the pollock industry. Between 2000 and 2007, the two state fisheries taxes applied to the pollock fishery generated an average of $9,875,000 in annual revenue to the State from landings in the Aleutians/Pribilof region alone. DEIS at 502, Table 10-4. Although the DEIS admits that implementation of Alternative 2 could have resulted in lost tax revenue to the State of up to $5.8 million in 2007, and that implementation of Alternative 4 could have resulted in lost tax revenue to the State of up to $3.5 million in 2007 (*Id.* at 708, Table 10-114; 709, Table 10-115), the DEIS makes no effort to examine the impacts on local governments and their residents of revenue reductions of this magnitude. Local governments provide a wide array of services including schools and pubic health programs. All of those programs could be at risk from limitations on the pollock harvest. And none of these consequences are considered in the DEIS.

XVI. CONCLUSION

This DEIS is fundamentally flawed. As discussed in the preceding Parts, the DEIS fails to provide decision makers with the facts and analyses necessary to make an informed decision. The DEIS analyzes only a small number of the issues that must be considered so that decision makers will have the information they need. Those issues that are reviewed are analyzed in an incomplete or inaccurate way.

Perhaps the most telling statement in the DEIS is the admission that the bycatch of Chinook salmon in the pollock fishery "may" be affecting stocks of western Alaska Chinook and associated subsistence, commercial and sport fisheries. DEIS at 625. In a 762 page document, the DEIS can only conclude there "may" be an effect. Had the DEIS done a complete analysis, it would have found that the adverse effects it assumes "may" exist are illusory or of no measurable significance.

In stark contrast, the DEIS admits that the proposed restrictions on the pollock fishery will have clear and identifiable adverse impacts that reach up to $500,000,000 in lost revenue. However, had the DEIS done a complete and accurate analysis, it would have found that these adverse economic impacts were significantly and measurably understated in the DEIS. The actual impact to the nation is well over $1 billion. Had the DEIS done a complete analysis as required by NEPA, it would have found that these numbers mask the impact of job losses. Had the DEIS done a complete and accurate analysis, it would also have found that the proposed restrictions on the pollock fleet will impose severe hardships on economically disadvantaged CDQ communities, many residents of which find CDQ related jobs as an alternative to subsistence.

The DEIS is legally, factually, and analytically inadequate.

Sincerely,

George J. Mannina, Jr.

APPENDIX 1

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Effects of Chinook Salmon Bycatch in the Bering Sea Pollock Fishery on Salmon Harvest, Escapement, and Abundance in Western Alaska

Prepared for:

At-Sea Processors Association
Pacific Seafood Processors Association
United Catcher Boats

Prepared by:

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February 21, 2009

Summary

Chinook and other salmon are captured incidentally by the pollock fishery in the Bering Sea, leading to concerns in western Alaska villages that this offshore fishery is significantly affecting harvests and runs of Chinook salmon. In response, the North Pacific Fishery Management Council (NPFMC 2008) prepared a draft environmental impact statement (DEIS) to evaluate, in part, effects of the existing (status quo) pollock fishery and several alternative management scenarios on Chinook salmon returning to Alaska. However, NPFMC did not directly compare numbers of Chinook salmon captured in the recent pollock fishery on the harvests, spawning escapements, and runs of Chinook salmon returning to western Alaska. Therefore, the pollock industry asked Natural Resources Consultants (NRC) to examine effects of Chinook salmon bycatch in the Bering Sea pollock fishery on terminal area harvests, escapements, and total abundances of Chinook salmon in western Alaska. This analysis relied upon Chinook salmon stock composition and adult equivalent (AEQ) mortality data provided in the DEIS. More recent estimates of salmon abundance and escapement in western Alaska were provided by the Alaska Department of Fish and Game (ADFG).

The percentage of annual western Alaska Chinook salmon runs captured in the pollock fishery (based AEQ mortality estimates) was relatively constant from 1994 through 2004, averaging 2.0 ± 0.4% (SD) per year. The percentage of the run taken by the pollock fishery increased from 2.7% in 2005 to a maximum of 6.3% in 2007. AEQ mortality of western Alaska Chinook salmon was positively correlated with abundance of Chinook salmon returning to western Alaska during 1994-2004, but bycatch in 2005-2007 was high relative to abundance of western Alaska Chinook salmon. Although the AEQ mortality represents a large number of Chinook salmon each year (range: 9,697 to 45,682 western Alaska salmon), it is a relatively small percentage of the abundance of adult Chinook salmon returning to western Alaska (avg. 818,000; range: 393,000 to 1,100,000 fish). This observation is important because it implies that the pollock fishery was not responsible for the wide swings in Chinook salmon abundance returning to western Alaska during the past 15 or more years.

The effect of the pollock fishery on Chinook salmon runs and harvests in each region of western Alaska was estimated. Prior to 2005, the percentage of the Chinook salmon run to the Yukon, Kuskokwim, Bristol Bay, and Norton Sound watersheds was less than approximately 5.3% (avg. 2.3% per stock). During this period, the foregone harvest and spawning escapement was less than 5% (avg. 2.3% per stock). These values assumed harvest rates would have remained unchanged if the salmon had not been captured in the pollock fishery because the percentage of the run taken in the pollock fishery was relatively small. During 2005 to 2007, bycatch of Chinook salmon increased relative to terminal area harvests and runs. In 2007, the year of highest bycatch, the percentage of the Chinook salmon runs taken in the pollock fishery was approximately 8% in the Yukon, 3.8% in the Kuskokwim area, 9% in Bristol Bay, and 6.3% in Norton Sound. Foregone harvests and escapements in 2007 were approximately 8% in the Yukon, 4% in the Kuskokwim area, 10% in Bristol Bay, and 7% in Norton Sound. Genetic and abundance data indicated that <1% of the Canada-bound run of Chinook salmon was captured in the pollock fishery, 1994-2007, indicating this genetically-distinct stock might have a unique distribution at sea such that it is not readily captured in the pollock fishery. Thus, reduced bycatch would have relatively little effect on achievement of escapement objectives in Canada.

Although Chinook salmon captured in the pollock fishery would have contributed to spawning escapements and harvests in western Alaska, these analyses indicate that the percentage increase in harvest or escapement would have been small in most years.

Introduction

Chinook and other salmon are captured incidentally by the pollock fishery in the Bering Sea. Many of the captured Chinook salmon would have returned to western Alaska where they would contributed to subsistence, commercial or sport harvests, or to the spawning population. Chinook salmon abundance in western Alaska has been low, especially since the 1997/1998 El Nino event that had a significant effect on the southeastern Bering Sea (Kruse 1998).

The North Pacific Fishery Management Council (NPFMC 2008) prepared a draft environmental impact statement (DEIS) in order to evaluate, in part, effects of the existing (status quo) pollock fishery and several alternative management scenarios on Chinook salmon returning to Alaska. However, NPFMC (2008) did not directly compare numbers of Chinook salmon captured in the existing pollock fishery on harvests, spawning escapements, and runs of Chinook salmon returning to western Alaska.

The pollock fishing industry (At-Sea Processors Association, Pacific Seafood Processors Association, United Catcher Boats) contacted Natural Resources Consultants (NRC) in late December and asked NRC to perform technical analysis to help the industry develop comments on the NPFMC DEIS by February 23, 2008. Specifically, NRC was asked to examine effects of Chinook salmon bycatch in the Bering Sea pollock fishery on terminal area harvests and total abundances of Chinook salmon in western Alaska. Objectives of this investigation were to:

1) Estimate the percentage of the total adult catch or run (catch and spawning escapement) of western Alaska Chinook salmon represented by the adult equivalent (AEQ) mortality of western Alaska Chinook salmon in the Bering Sea pollock fishery.

2) Estimate the percentage of Chinook salmon returning to each region of western Alaska (Yukon, Kuskokwim, Bristol Bay, Norton Sound) represented by the adult equivalent mortality of these fish in the Bering Sea pollock fishery.

3) Examine effects of Chinook salmon bycatch on subsistence and commercial harvests in western Alaska.

4) Examine effects of Chinook salmon bycatch on attainment of Chinook salmon spawning escapement goals in western Alaska.

Methods

Stock Composition Chinook salmon stock composition in the bycatch was obtained from NPFMC (2008), who relied upon genetic data collected during 2005-2007. The genetic data allowed identification and enumeration in the pollock bycatch of Chinook salmon that would have returned to coastal areas of western Alaska (lower Kuskokwim, lower Yukon, Bristol Bay, Norton Sound), the middle Yukon River (Alaska), and the upper Yukon River (Canada; Table 1). Stocks of Chinook salmon that would have returned to the north Alaska Peninsula, central Alaska, southeast Alaska, the Pacific Northwest, and Russia were also identified in the pollock harvests, but analyses presented here focus on bycatch of Chinook salmon that would have returned to the Arctic-Yukon-Kuskokwim (AYK) and Bristol Bay regions, e.g., western Alaska excluding the north Alaska Peninsula. NPFMC (2008) provided details regarding the sampling of Chinook salmon for genetic analyses and the way in which catch-weighted estimates of stock composition were developed.

Identification of stocks within western Alaska region was based on the scale pattern analysis findings of Myers et al. (2004) that were utilized by NPFMC (2008). For bycatch sampling during 1997-1999, the estimated stock composition of Chinook salmon returning to western Alaska averaged approximately 40% Yukon, 34% Bristol Bay, and 26% Kuskokwim Chinook salmon. Scale analysis did not differentiate Norton Sound Chinook from other stocks. For this analysis, AEQ mortality of Norton Sound Chinook salmon was based on the annual abundance of Norton Sound Chinook salmon compared with total abundance of western Alaska Chinook salmon. Thus, the analyses below assume that the AEQ bycatch of western Alaska Chinook salmon was comprised of 40% Yukon, 34% Bristol Bay, and 26% Kuskokwim Chinook salmon less a small fraction of the total that would have returned to Norton Sound (Table 2).

As in the DEIS, this analysis assumes that genetic data collected during 2005-2007 and scale pattern data collected during 1997-1999 provide reasonable estimates of Chinook salmon stock composition in the pollock fishery from 1994 to 2008. Actual stock composition in the bycatch would vary with annual abundances of stocks contributing to the bycatch and annual or seasonal shifts in stock distribution in the ocean. Genetic-based stock composition of the Chinook salmon bycatch since 1994 is shown in Table 1. Stock composition of the fraction that would have returned to specific watersheds in western Alaska is shown in Table 2.

It is worthwhile to note that genetic material present on Chinook salmon scale samples collected from the pollock fishery could be used to estimate annual stock composition of Chinook salmon in the pollock fishery during previous years. Furthermore, it may be possible to use genetic data to identify two or possibly three stocks within western Alaska if one was willing to accept lower classification accuracy of these stocks (e.g., ~80%; J. Seeb, University of Washington, pers. comm.). Presently, genetic stock groupings are based on classification accuracy that exceed 90%. Collection of genetic baseline data is continuing and resolution of stocks within the Pacific Northwest stock complex is likely to improve in the near future.

Adult Equivalent Mortality AEQ mortality of Chinook salmon is the number of fish that would have returned to the natal river had they not been captured in the pollock fishery. This value is less than the total bycatch estimate because some of the Chinook salmon captured in the pollock

fishery would have died naturally before returning to freshwater. Natural mortality of Chinook salmon during each year at sea is rarely quantified and there are no direct measurements of this mortality for Chinook salmon in the Bering Sea. The AEQ mortality values used in this investigation were obtained from NPFMC (2008), who described a modeling approach to estimate AEQ mortality of Chinook salmon. Stock-specific AEQ mortality values were based on genetic and scale stock identification data and age composition, as described above and in the DEIS. AEQ mortality values do not include Chinook salmon that were captured in the Russian pollock fishery in the Bering Sea.

AEQ mortality values for the adult salmon return in 2008 were not provided by NPFMC (2008). The number of Chinook salmon that would have returned to the natal rivers in 2008 had they not been captured in the pollock fishery is an important value because bycatch was exceptionally high in 2007, but exceptionally low in 2008. Bycatch during 2007 and during the 2008 A-season would have contributed to the adult return of salmon to western Alaska in 2008. Therefore, 2008 AEQ mortality values were estimated from multi-variate regressions of AEQ mortality on total bycatch (all stocks) in the A-season (y) and total bycatch during the previous year (y-1):

$$\text{Western AK AEQ}_y = 3{,}273 + 0.343\ (\text{A-season bycatch}_y) + 0.211\ (\text{total bycatch}_{y-1})$$

$$\text{Total AEQ}_y = 5392 + 0.495\ (\text{A-season bycatch}_y) + 0.431\ (\text{total bycatch}_{y-1})$$

The amount of variability explained by the independent variables (years 1994-2007) exceeded 96% (each variable partial $P < 0.001$, $n = 14$). The models predicted that 33,236 additional Chinook salmon would have returned to western Alaska in 2008 if they had not been captured in the pollock fishery. An estimated 65,540 additional Chinook salmon would have returned to all regions combined in 2008 (i.e., Pacific Northwest, Gulf of Alaska, and other regions).

Chinook Bycatch Relative to Terminal Area Harvests and Runs

Stock-specific AEQ mortality values were compared with terminal area harvests and runs in order to approximate the effect of Chinook bycatch on fish returning to western Alaska. AEQ mortality, total catch, and total abundance estimates were used to calculate the percentage of total catch (inriver and AEQ mortality) and total run (inriver and AEQ mortality) represented by the AEQ mortality estimates for western Alaska (total) and each region of western Alaska. The total harvest rate (% of total run harvested by all fisheries including the pollock fishery) was calculated.

Details about the statistics used for each region are described below. The run size values in each area represent recent estimates of total Chinook salmon abundance. These values exceed the minimum abundance estimates presented by Myers et al. (2004), who did not attempt to expand monitored escapement counts to all Chinook salmon rivers. In a few years, spawning escapement estimates were not available, therefore harvest rate was predicted from the regression of harvest rate on Log_e Catch. Values calculated in this manner were italicized in the tables. Values during recent years are preliminary.

Foregone harvests and escapements of Chinook salmon caused by the pollock fishery were estimated. These estimates assumed that the harvest rate (percentage of total run taken by salmon fishermen) would not have changed from the observed harvest rate. This assumption appears to be reasonable because, as discussed below, the percentage of total abundance taken by the pollock fishery was typically low, indicting that it was unlikely that fisheries management and inriver fishing effort would have significantly changed if these foregone fish had returned to western Alaska.

Yukon Catch and escapement data for Alaska and Canada were obtained from Hayes et al. (2006), JTC (2008), and ADFG (2008). Two estimates of total abundance of Chinook salmon in the Yukon watershed were utilized. The "sonar-based" estimates were obtained from Table 5-9 in NPFMC (2008). Sonar-based run size included harvests and escapement in the mainstem and tributaries downstream from the Pilot Station sonar, including relatively small harvests in adjacent coastal villages (JTC 2008).

The second estimates of total Yukon Chinook salmon were based on radio-telemetry mark-recapture (MR) estimates during 2000, 2002, 2003, and 2004 (Spencer et al. 2002, 2005, 2006, 2007). Abundance was calculated in 2001, but the 2001 estimate appeared to be biased high in response to a different sampling approach that year (T. Spencer, ADFG, pers. comm.). A linear regression relationship between the MR and sonar-based total abundance estimates was used to extend the MR-based estimates back to 1994 (Fig. 1).

Nearly 50% of the Chinook salmon entering the Yukon River are destined to habitats in Canada. Recent sampling indicated that the Canadian mark-recapture estimates were biased low. The Joint Technical Committee (JTC 2008) recommended adoption of the Eagle sonar counts, which began in 2005 (Hayes et al. 2006), as the more accurate count of Chinook salmon entering Canada. During 2002-2004, Chinook salmon passing into Canada were estimated with mark-recapture of Chinook salmon using radio tags and these estimates also indicated greater abundance of Chinook salmon entering into Canada (Hayes et al. 2006). The new passage estimates, based on Eagle sonar and MR, were correlated with the original Canadian estimates ($r = 0.62$). Therefore, for this investigation, the revised passage estimates were regressed on the earlier Canadian passage estimates in order to estimate total passage into Canada prior to 2002 (Fig. 2).

Harvests of Canada-bound Chinook salmon in Alaska and Canada were calculated by re-arranging the brood table for Canada-bound salmon by year of return rather than by brood year (Table A8 of JTC 2008). Harvest of Chinook salmon returning to Alaska streams was calculated as the difference between total harvest (utilization) in the Yukon River (and coastal villages) and the harvest of Canadian-bound fish. Total spawning escapement in the entire Yukon River was calculated from the difference in total abundance (based on sonar or radio-tag approaches) minus total catch reported by JTC (2008) and ADFG (2008). Escapement of Chinook salmon in Alaska streams was calculated as the difference between total escapement in the Yukon drainage and the estimated spawning escapement in Canada (mainstem border passage minus harvest).

The revised spawning escapement estimates for Canada were utilized with the MR-based estimates of total Yukon Chinook salmon abundance, whereas the original spawning escapement

estimates for Canada were utilized with the Pilot Station sonar estimates. It is noteworthy that the combined use of Pilot Station abundance estimates and the revised Canadian spawner estimates would have led to unreasonably low escapements in Alaska streams in some years (e.g., 2000, 2001), indicating that the Pilot Station sonar estimates of total abundance were too low or that the revised Canada passage estimates were too high in some years. The Pilot Station sonar estimates appeared too low in 2000 because the calculated harvest rate was exceptionally high (81%) on Alaska-bound Chinook salmon (see Table 5).

Kuskokwim Preliminary estimates of total abundance and escapement of Chinook salmon returning to the Kuskokwim River were obtained from D. Molyneaux (ADFG, pers. comm.), who has a research project with B. Bue to reconstruct total Chinook salmon abundance in the Kuskokwim River since 1981. A report on these new estimates should be available by spring 2009. Earlier values from this effort were presented by NPFMC (2008) but those values were approximately 20% less than the current estimates. The study by Molyneaux and Bue indicates that Kuskokwim River Chinook salmon abundance was greater than previously assumed. The Kuskokwim area statistics presented here include Molyneaux's Kuskokwim River estimates and values from District 4 and District 5, e.g., Brannian and Molyneaux 2006, Molyneaux (pers. comm.). Together, these data represent Chinook salmon runs to the Kuskokwim Area.

Bristol Bay Catch, escapement, and abundance of Chinook salmon returning to the Nushagak and Togiak districts of Bristol Bay were obtained from NPFMC (2008). These values did not include the somewhat small harvests and escapements of Bristol Bay Chinook salmon in Naknek, Kvichak, Ugashik, and Egegik areas. Total escapement of Chinook salmon into these watersheds are not always monitored. These data could be added to the calculations at a later date.

Norton Sound Total abundance of Chinook salmon returning to the Unalakleet River, the major Chinook salmon stock in Norton Sound, were obtained from Menard and Kent (2008). These values include their estimate for the unmonitored portion of the Unalakleet River. Escapement to five other rivers and catch in Norton Sound districts (outside the Unalakleet District) were included in the totals (Menard and Kent 2008).

Results and Discussion

Western Alaska (all stocks)

The percentage of annual western Alaska Chinook salmon runs captured in the pollock fishery (based on AEQ mortality estimates) was relatively constant from 1994 through 2004, averaging 2.0 ± 0.4% (SD) per year (Fig. 3, Table 3). The percentage of the run taken by the pollock fishery increased from 2.7% in 2005 to a maximum of 6.3% in 2007. Except for 2005-2007, the percentage of the Chinook run taken in the pollock fishery was relatively constant regardless of run size of Chinook salmon in western Alaska.

AEQ mortality of western Alaska Chinook salmon was positively correlated with abundance of Chinook salmon returning to western Alaska during 1994-2004 (Fig. 4). Approximately 55% of the variability in bycatch was explained by abundance of western Alaska Chinook salmon. Thus,

except for 2005-2007, greater bycatch was associated with greater Chinook salmon run size. This type of a relationship is analogous to a Type I predator response to prey (Hollings 1959), and it is less controlling of the Chinook population compared with depensatory mortality in which percentage mortality increases at lower abundances of Chinook salmon. Identification of factors contributing the higher than expected bycatch in 2005-2007 is important to the ability to minimize bycatch.

Although the AEQ mortality represents a large number of Chinook salmon each year (range: 9,697 to 45,682 western Alaska salmon), it is a relatively small percentage of the abundance of adult Chinook salmon returning to western Alaska (avg. 818,000; range: 393,000 to 1,100,000 fish). This observation is important because it implies that the pollock fishery is not responsible for the wide swings in Chinook salmon abundance returning to western Alaska during the past 15 or more years. For example, the total abundance of Chinook salmon returning to western Alaska in 2000 was the lowest run since 1994 (393,000 salmon) and the AEQ mortality of western Alaska Chinook salmon was also the lowest (9,697 salmon). Total abundance of Chinook salmon returning to western Alaska was low in 2008, but subsistence harvests and spawning escapements of Chinook salmon have yet to be reported in all western Alaska areas.

The percentage of total harvests of western Alaska Chinook salmon taken in the pollock fishery increased over time from approximately 3.7% during 1994-1998 to 5.6% during 1999-2004, and to as much as 14.3% in 2007 (Fig. 3, Table 3). The percentage of total harvests taken in the pollock fishery increased over time because greater restrictions (primarily commercial fisheries) have been placed on the terminal area fisheries since the late 1990s when Chinook abundance declined.

The influence of the pollock fishery on subsistence harvests and escapement goals in each region of western Alaska is discussed below. It is worthwhile to note that the accuracy of stock-specific bycatch estimates declines as one attempts to examine smaller components of the Chinook salmon runs in western Alaska because these estimates require an additional level of estimation. Nevertheless, it is worthwhile to examine the effect of bycatch on specific stocks in order to evaluate whether bycatch effects might be relatively great for some stocks or less for others.

Genetic stock identification data were not available prior to 2005, therefore a worse case scenario was examined in which 100% of the bycatch was assumed to have originated in western Alaska. During 1994-2004, total AEQ bycatch represented 3.5 ± 0.6% (SD) of the total abundance of Chinook salmon returning to western Alaska. During 2005-2007, a period when bycatch increased, total AEQ bycatch represented 7.1 ± 3.0% (SD) of the total abundance of Chinook salmon returning to western Alaska. Thus, bycatch levels were not sufficiently high to cause the observed wide swings in Chinook salmon abundance during the past 15 years even if one incorrectly assumes all Chinook salmon captured in the pollock fishery were destined for western Alaska.

<u>Yukon River (all stocks)</u>

The percentage of Yukon Chinook salmon runs captured in the pollock fishery was relatively constant from 1994 through 2004, averaging 2.2 ± 0.5% when abundance was based on the

mark-recapture approach (Fig. 5, Table 4), or 3.1 ± 0.9% when abundance was based on Pilot Station sonar (Fig. 6, Table 5). The percentage of the run taken in the pollock fishery increased from 3.6-5.0% in 2005 (depending on abundance methodology) to a maximum of 6.6-9.3% in 2007. The percentage of the 2008 Chinook run taken in the pollock fishery was approximately 5.6-8.2%, owing to the relatively large bycatch during the 2007 pollock fishery. Bycatch in the 2008 pollock fishery was exceptionally low (20,273 Chinook from all stocks; http://www.fakr.noaa.gov/sustainablefisheries/bycatch/default.htm).

The percentage of total harvests of Yukon Chinook salmon taken in the pollock fishery increased over time from approximately 4.0% during 1994-1999 to 6.6% during 2000-2004, and to as much as 29% in 2008 (Fig. 5, Table 4). During 2008, direct commercial fishing on Chinook salmon was not allowed and subsistence fishing was restricted, leading to relatively low inriver harvests. Therefore, the percentage of the total harvest taken by the pollock fishery was relatively high in 2008.

Total abundance of Chinook salmon returning to the Yukon River during 1994-2008 ranged from a minimum run of 114,000 (MR estimate) or 68,000 salmon (sonar estimate) in 2000 to a maximum run of 380,000 (MR estimate) or 333,000 salmon (sonar estimate) in 2003 (Tables 4 and 5). The estimated AEQ mortality of total Yukon Chinook salmon during these years was approximately 3,792 fish in 2000 and 8,196 fish in 2003. The AEQ mortality estimates are smaller than the error associated with abundance estimates provided by sonar versus radio tag mark-recapture studies. In other words, although the AEQ mortality estimates are actual fish that would have returned to the Yukon River, their presence would not have changed the total abundance estimates to the extent that harvest managers would have altered decisions during the course of the fishing season.

Subsistence harvests in the Yukon watershed (Alaska and Canada) averaged approximately 58,274 Chinook salmon or 54% of the total Chinook salmon harvest from 1994 to 2007 (Table 6). Commercial harvests varied considerably from year to year depending on total abundance of Chinook salmon.

If Chinook salmon had not been captured in the pollock fishery, it is reasonable to assume that these additional fish would have been harvested at the same rate as fish that actually returned to the river each year. Based on this assumption[1], total harvests of Chinook salmon in the Yukon River (all fisheries) would have increased by approximately 3% (3,762 fish per year), on average, or up to 7,710 fish in 2007 (Table 6). Likewise, spawning escapement would have increased 3% (4,405 fish per year), on average, or up to 8% in 2007. Attainment of escapement goals is discussed below.

[1] For these calculations, harvest rate was based on the mean rate calculated from the two estimates of Chinook salmon abundance, i.e., sonar and mark-recapture.

Yukon River (Alaska stocks)

During 1994-2008, Yukon Chinook salmon returning to spawning areas in Alaska represented approximately 59 ± 8% of the total run based on the MR approach, or 54 ± 8% of the total run based on Pilot Station Sonar and the original Canadian passage estimates. However, the Alaska stocks represented 97% of the total Yukon AEQ mortality in the pollock fishery, based largely on genetic sampling during 2005-2007. The genetic data indicate that the Alaska component of the Yukon run is captured at a much higher rate than the Canadian component of the run, suggesting that the upper Yukon stock may have a unique distribution in the ocean.

The percentage of Yukon Chinook salmon runs (Alaska stocks) captured in the pollock fishery was relatively constant from 1994 through 2004, averaging 3.8-5.7% depending on the abundance methodology (Figs. 5 and 6, Table 4 and 5). The percentage of the run taken in the pollock fishery increased from 5.9-7.8% in 2005 to a maximum of 10.7-17.1% in 2007 (depending on abundance methodology).

The percentage of harvests of Yukon Chinook salmon (Alaska stocks) taken in the pollock fishery increased over time from approximately 8.8% during 1994-1999 to 13.3% during 2000-2004, and to as much as 50% in 2007 and 2008. No directed commercial fishing was allowed in 2008 (4,641 fish taken incidentally in other salmon fisheries) and subsistence fishing was restricted (ADFG 2008) (Fig. 5, Table 4). The 2008 value is preliminary and it assumes the 2008 subsistence harvest was 50% of the recent three-year average.

Subsistence harvests in the Alaskan Yukon have been relatively stable, averaging 51,200 ± 5,800 fish from 1994-2007 (Hayes et al. 2006, JTC 2008). An estimated 1,479 households participated in subsistence harvests of salmon during 2005 (Busher et al. 2007). From 1993-2002, a reported 2,986 household subsistence permits were issued and 1,333 permits were returned to ADFG (Fall et al. 2003). Subsistence harvests have only been restricted in 2000 and 2008 when run size was unusually low. In 2001, the Alaska Board of fisheries identified the "amount necessary for subsistence" (ANS) in the Yukon River as 45,500 to 66,704 Chinook salmon (Hayes et al. 2006). Based on this range, subsistence needs were met in all years since the late 1980s except for 2000, 2002, and 2008. The reason for low subsistence harvests in 2002 (43,742 fish) is unknown (Hayes et al. 2006).

The ability of subsistence fishermen to capture Chinook salmon is dependent, in part, on the abundance of Chinook salmon in the river. The above analyses show that bycatch in the pollock fishery did not cause the wide fluctuations in Chinook salmon returning to the Yukon River. In most years, approximately 2-3% of the run to the Yukon (Alaska stocks) was taken by the pollock fishery, and the maximum amount was approximately 11-17% in 2007. Changes in the ability of subsistence fishermen to capture Chinook salmon likely reflect the relative magnitude (% of run) in which Chinook abundance was altered. Therefore, in most years, the average increase in effort needed to achieve the desired numbers of Chinook salmon for subsistence is likely small (e.g., < 5%). In 2007, the pollock fishery captured approximately 11-17% of the Alaska run, therefore the increase in effort would have been more than in most previous years. However, this potential increase would have been offset to some extent by the interception of Canada-bound Chinook salmon that is minimally influenced by bycatch in the pollock fishery

(see below). Commercial harvests in the Yukon River would also be a key factor affecting effort by subsistence fishermen to meet their goals because subsistence effort likely increases in years when commercial fishing removes a significant number or proportion of Chinook salmon. However, many commercial fishermen are also subsistence fishermen. Commercial harvests of Chinook salmon in the Yukon River exceeded that of subsistence fishermen until the late 1990s when abundance declined. During 2002-2004, there were 574 active commercial salmon permits per year (all species) in the Alaska portion of the Yukon River (Hayes et al. 2008).

ADFG and the Board of Fisheries has classified Yukon Chinook salmon as a Stock of Yield Concern because it is not producing the harvests that it did during 1989-1997 (see Appendix Figure B2 of JTC (2008)). The decline in harvests (and run size) corresponded with the 1997/98 El Nino event that had a significant influence on the southeastern Bering Sea (Kruse 1998, Hunt et al. 2002). Based on the analyses presented above, it is evident that bycatch in the pollock fishery was not a key factor causing the substantial Chinook decline beginning in 1998.

Alaska Chinook Escapement Goals Escapement goals of Chinook salmon for the seven rivers in Alaska with established goals were achieved during 2002, 2003, 2004, 2005, 2006, and 2007, except for the Nulato River in 2005 when only 553 spawners were counted (goal: 940-1900 fish) (Hayes et al. 2006, JTC 2008). In 2008, high water levels hampered surveys in most tributaries such that counts in all but two tributaries cannot be directly compared with previous escapements or with spawner goals (ADFG 2008). Of the two stocks with reasonable survey conditions in 2008, the Nulato River was 2% below the lower goal and the Gisasa River was 16% above the lower goal. Escapement counts in the other tributaries were below the lower goal, but these counts were low because survey conditions were poor according to ADFG (2008). ADFG (2008) suggested that the lower end of the escapement goals of the Chena and Salcha rivers, the largest producers of Chinook in the Alaska portion of the Yukon, were met in 2008 even though the total run size was small and high water hampered survey conditions.

If Chinook salmon had not been captured in the pollock fishery, it is likely that they would have been harvested at the same rate as fish that actually entered the Yukon watershed. Based on this assumption, overall spawning escapements would have increased 3%, on average, or up to 8% in 2007 if they had not been captured in the pollock fishery (Table 6).

<u>Yukon River (Canada stocks)</u>

Approximately 41% to 46% of all Chinook salmon entering the Yukon River are destined for Canadian streams, on average (Tables 4 and 5). Many Canada-bound fish are harvested in Alaska and the JTC (2008) has estimated Canada-bound Chinook salmon harvested in Alaska in addition to salmon harvested in Canada.

Genetic analyses have shown that Chinook salmon returning to the Canadian mainstem and tributaries of the Yukon River are genetically distinct from other stocks in the lower river and in western Alaska. The AEQ mortality of Chinook salmon that would have returned to the Canada averaged approximately 288 fish per year and reached a maximum of 645 fish in 2005 (Table 2). The percentage of the Canada-bound Chinook salmon taken in the pollock fishery was less than 1% each year, based on the two abundance methods described above. AEQ mortality of

Chinook salmon as a portion of total catch of Canada-bound Chinook salmon was 2% or less (Tables 4 and 5).

Based on the 2005-2007 genetic data, Canada-bound Chinook salmon are less abundant in the bycatch than expected based on their relatively abundance. These initial genetic data suggest these fish may have a unique distribution in the ocean.

Canada Chinook Escapement Goal The escapement goal for Chinook salmon returning to Canada via the Yukon mainstem is currently under review by the JTC because recent evidence suggests more salmon have been passing into Canada than previously estimated. Previously, the interim escapement objective was 33,000-43,000 Chinook salmon (Fig. B15 of JTC 2008). However, the escapement target for "stabilization and rebuilding" during 1996-2006 (2002: 25,000 fish) was 28,000 Chinook salmon. The spawning objective in 2008, based on Eagle sonar counts, was 45,000 fish. The spawning objectives for the Canadian Yukon have not been consistently met during recent years.

Based on the genetic data, relatively few Canada-bound Chinook salmon were captured in the pollock fishery. These data suggest that bycatch of Canada-bound Chinook salmon in the pollock fishery has had a relatively small effect on spawning escapements in Canada. For example, the percentage of spawning escapement represented by total AEQ mortality of upper Yukon Chinook salmon was 0.6% to 1.1%, on average, depending on the method of estimating escapement (Tables 4 and 5). The maximum value occurred in 2007 (1.7% to 3.5%).

Kuskokwim Area

Total abundance of Chinook salmon returning to the Kuskokwim River during 1994-2007 ranged from a minimum run of 192,000 in 2000 to a maximum run of 493,000 in 1994 (Fig. 7, Table 7). The estimated AEQ mortality of Kuskokwim Chinook salmon during these years was approximately 2,465 fish in 2000 and 5,697 fish in 1994. The percentage of Kuskokwim Chinook salmon runs captured in the pollock fishery was relatively constant from 1994 through 2004, averaging 1.2 ± 0.3% (Fig. 7, Table 7). The percentage of the run taken in the pollock fishery increased from 1.6% in 2005 to a maximum of 3.8% in 2007.

The percentage of total harvests of Kuskokwim Chinook salmon taken in the pollock fishery increased over time from approximately 3.2% during 1994-2001 to 5.2% during 2002-2005, and to as much as 9.9% in 2006 and 2007 (Fig. 7, Table 7).

Subsistence harvests in the Kuskokwim area averaged approximately 79,845 Chinook salmon or 73% of the total harvest from 1994 to 2007 (Table 6). Approximately 4,339 households occur in 38 communities within the Kuskokwim area but not all of these households rely upon salmon for subsistence (Fall et al. 2003, Whitmore et al. 2008). In 2002, at least 1,696 households (39% of total) were identified as harvesting salmon for subsistence. In recent years, commercial harvests of Kuskokwim River Chinook salmon typically occur as incidental harvests in other directed salmon fisheries. Kuskokwim Chinook salmon were classified as a Stock of Yield Concern but this classification was removed in 2007. Approximately 496 commercial salmon permits were

utilized per year (2000 to 2003) to capture all species of salmon in the Kuskokwim area (Whitmore et al. 2008).

If Chinook salmon had not been captured in the pollock fishery, it is reasonable to assume that these additional fish would have been harvested at the same rate as fish that actually returned to the river each year. Based on this assumption, total harvests of Chinook salmon in the Kuskokwim area (all fisheries) would have increased by approximately 2% (1,646 fish per year), on average, or up to 3,916 fish in 2007 (Table 6). Thus, it is possible that each household, on average, might have harvested one additional Chinook salmon per year (assuming 1,696 households) if the fish had not been captured in the pollock fishery. In 2007, each household may have captured 2.3 additional Chinook salmon, on average, if the fish had not been captured in the pollock fishery.

Kuskokwim Area Chinook Escapement Goals The Kuskokwim area has spawning escapement goals for Chinook salmon returning to 14 drainages. Escapement goals have been met in each of these drainages during at least 80% of the past six or more years examined by Molyneaux and Brannian (2006). In 2008, spawning escapement goals were achieved in 8 of 11 monitored tributaries (Linderman and Clark 2008). Goals were not met in three tributaries, in part, because the run appeared to be adequate in the lower river (nearly all inseason subsistence reports were "very good" or "normal") and normal fishing operations were allowed.

If the pollock fishery had not captured Kuskokwim area Chinook salmon, then spawning escapement may have increased approximately 2% (3,663 fish per year), on average, during 1994 to 2007, or up to 4% in 2007, assuming harvest rates remained unchanged (Table 6).

Bristol Bay (Westside stocks)

The percentage of Bristol Bay Chinook salmon runs captured in the pollock fishery was relatively constant from 1994 through 2005, averaging 3.1 ± 0.8% (Fig. 8, Table 8). The percentage of the run taken in the pollock fishery increased from 4.4% in 2006 to a maximum of 9% in 2007.

The percentage of total harvests of Bristol Bay Chinook salmon taken in the pollock fishery increased over time from approximately 6.6% during 1994-2005 to 15.9% in 2007, and to as much as 35% in 2008 when harvests were curtailed in response to a moderately small run (Fig. 8, Table 8).

Subsistence harvests represent approximately 18% of the total harvests of Chinook salmon (Table 6). Approximately 556 subsistence permits were issued to people living in the westside of Bristol Bay (Nushagak and Togiak) where more than 90% of Chinook salmon were harvested in 2002 (Fall et al. 2003). A total of 1,093 subsistence permits were issued for all of Bristol Bay. Commercial fishing took 72% of the total Chinook salmon harvest, on average, whereas other fisheries (mostly sport) took 10% of the total Chinook harvest in the westside districts. Approximately 2,474 commercial salmon permits per year (drift and set gillnet) were utilized in Bristol Bay to harvest all species of salmon (mostly sockeye salmon) during 1996 to 2005.

Assuming the harvest rate remained unchanged, the foregone harvest of Chinook salmon caused by the pollock fishery was approximately 3,349 fish per year, or approximately 4% of the observed catch (all fisheries). Foregone catch peaked at 8,066 fish in 2007 (10% of total).

Bristol Bay Chinook Escapement Goals Escapement goals for Togiak and Nushagak Chinook salmon have been achieved in each of the last 10 years or more (Baker et al. 2006). Escapement goals for the smaller Chinook runs on the eastside were met in 80% of the past 10 years (Naknek, Alagnak) or 50% of the past 10 years (Egegik, the smallest monitored Chinook stock). If the pollock fishery had not captured Bristol Bay Chinook salmon, then spawning escapement in westside districts may have increased approximately 4% (3,593 fish per year), on average, during 1994 to 2007, or up to 10% in 2007, assuming harvest rates remained unchanged.

Norton Sound District

Norton Sound supports small runs of Chinook salmon compared with the Yukon, Kuskokwim, and Bristol Bay. Stock-specific estimates of Norton Sound Chinook salmon captured in the pollock fishery have not been made. The analysis here assumed that bycatch of Norton Sound Chinook salmon was equivalent to their abundance relative to other western Alaska stocks.

Chinook runs to Norton Sound averaged approximately 12,600 fish per year since 1994 (Table 9). The percentage of Norton Sound Chinook salmon runs captured in the pollock fishery was relatively constant from 1996 through 2004, averaging 2.1 ± 0.3% (Fig. 9, Table 9). The percentage of the run taken in the pollock fishery increased from 3.9% in 2006 to a maximum of 6.3% in 2007. The run of Chinook salmon to Norton Sound in 2008 was considered to be the smallest run on record (Menard and Scott 2008). Preliminary analyses suggest approximately 5.7% of the run was taken in the pollock fishery.

Subsistence harvests represent approximately 74% of the total harvests of Chinook salmon since 1994, but nearly all harvests in recent years are for subsistence (Table 6). In 2002, there were approximately 935 households in the Norton Sound District (Fall et al. 2003). Chinook salmon harvests in the Shaktoolik and Unalakleet subdistricts have been classified as a Stock of Yield Concern since 2004 because they have not been producing sufficient harvests. Approximately 34 commercial salmon fishing permits per year were utilized in Norton Sound District during 2001 to 2005 (all species of salmon; Banducci et al. 2007). Assuming the harvest rate remained unchanged, the foregone harvest of Chinook salmon caused by the pollock fishery was approximately 182 fish per year, or approximately 3% of the observed catch. Foregone catch peaked at approximately 549 fish in 2007 (7% of total).

Norton Sound Chinook Escapement Goals Escapement goals have been developed and evaluated for North River (tributary to Unalakleet River) and Kwiniuk River. The escapement goal in the North River was achieved from 2001-2003 and 2007, but it was not met in 2004-2006 and in 2008. The escapement goal in the Kwiniuk River was met during 2002-2005 but it has not been met during 2006-2008. Poor weather has reduced the quality of aerial escapement surveys on the Shaktoolik River, therefore the counts could not be compared with the escapement goal in recent years.

If the pollock fishery had not captured Norton Sound Chinook salmon, then the spawning escapement may have increased by approximately 3% (135 fish per year), on average, during 1994 to 2007, or up to 7% in 2007, assuming harvest rates remained unchanged. Addition of these fish to the escapement fish would have brought the total escapement count closer to the lower end of the escapement goal ranges.

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Table 1. Estimated AEQ mortality of Chinook salmon in the pollock fishery by year of return to natal watersheds. The upper Yukon stock represents salmon in Canada, whereas the middle Yukon stock was included in the Alaska portion of the Yukon total. The average percent contribution of each stock to the total AEQ bycatch is shown. See methods for estimating values in 2008. Source: Table 3-14 of NPFMC (2008).

Year of return	BC, WA, OR, and CA	Coastal W. AK	Cook Inlet	Middle Yukon	N. Alaska Peninsula	Other	Russia	Upper Yukon	Transboundary SEAK	Total
1994	5,198	21,518	242	201	4,898	714	147	194	198	33,310
1995	5,635	14,084	415	104	3,302	532	112	96	279	24,559
1996	6,974	17,025	520	154	3,939	632	142	137	364	29,886
1997	11,376	16,895	1,276	413	3,364	715	277	343	783	35,442
1998	10,967	14,218	1,110	103	3,382	696	165	87	711	31,439
1999	6,429	15,099	573	297	3,193	561	188	245	387	26,973
2000	2,815	9,383	219	167	2,106	330	99	147	152	15,418
2001	3,694	10,473	349	260	2,141	375	149	221	238	17,899
2002	6,236	14,516	509	106	3,467	609	117	96	341	25,997
2003	5,743	20,065	398	356	4,424	679	207	311	292	32,475
2004	10,164	21,904	1,018	466	4,592	859	305	393	685	40,386
2005	11,169	25,462	1,203	767	5,107	923	439	645	772	46,487
2006	12,719	36,337	892	363	8,355	1,348	290	339	633	61,275
2007	18,079	44,380	1,597	694	9,743	1,688	485	608	1,069	78,344
2008		*33,236*		*524*				*454*		*65,540*
Avg. %	23%	56%	2%	1%	12%	2%	1%	1%	1%	

Table 2. Approximate AEQ mortality of Chinook salmon in the pollock fishery by year of return to each western Alaska watershed. The values are based on those presented in Table 1. The average percent contribution of each stock to the total AEQ bycatch is shown for years 1996-2007. See methods for description of the values for Norton Sound and for all 2008 values. The approach utilized scale stock identification data presented in NPFMC (2008).

Year of return	Yukon (AK)	Yukon (Canada)	Kuskokwim	Bristol Bay	Norton Sound	Total Western AK
1994	8,571	194	5,697	7,451		21,913
1995	5,618	96	3,714	4,857		14,284
1996	6,649	137	4,411	5,768	350	17,316
1997	6,473	343	4,430	5,794	611	17,651
1998	5,518	87	3,643	4,764	396	14,408
1999	5,867	245	3,973	5,195	361	15,641
2000	3,645	147	2,465	3,223	216	9,697
2001	4,086	221	2,799	3,661	188	10,954
2002	5,684	96	3,757	4,913	268	14,718
2003	7,885	311	5,327	6,966	243	20,732
2004	8,634	393	5,867	7,673	197	22,763
2005	10,028	645	6,937	9,072	192	26,874
2006	14,378	339	9,566	12,510	246	37,039
2007	17,446	608	11,734	15,346	549	45,682
2008	13,114	454	8,819	11,533	295	34,215
Avg. %	38%	1%	26%	33%	1.7%	

Table 3. Western Alaska Chinook salmon statistics that incorporate AEQ mortality estimates from the Bering Sea pollock fishery. Harvest rate includes AEQ mortality.

Year	Terminal Catch	Escapement	Terminal Run	AEQ Mortality	AEQ Mortality % of total catch	AEQ Mortality % of total run	Harvest Rate
1994	478,993	624,340	1,103,333	21,913	4.4%	1.9%	45%
1995	502,911	539,362	1,042,273	14,284	2.8%	1.4%	49%
1996	383,150	448,535	831,685	17,316	4.3%	2.0%	47%
1997	441,049	566,768	1,007,817	17,651	3.8%	1.7%	45%
1998	405,300	424,710	830,010	14,408	3.4%	1.7%	50%
1999	289,186	332,859	622,045	15,641	5.1%	2.5%	48%
2000	188,727	204,721	393,448	9,697	4.9%	2.4%	49%
2001	222,211	398,061	620,272	10,954	4.7%	1.7%	37%
2002	226,276	411,875	638,151	14,718	6.1%	2.3%	37%
2003	277,474	555,953	833,427	20,732	7.0%	2.4%	35%
2004	382,002	630,381	1,012,383	22,763	5.6%	2.2%	39%
2005	304,521	647,358	951,879	26,874	8.1%	2.7%	34%
2006	325,538	578,485	904,024	37,039	10.2%	3.9%	39%
2007	274,786	399,044	673,831	45,682	14.3%	6.3%	45%
2008				34,215			

Table 4. Yukon River Chinook salmon statistics that incorporate AEQ mortality estimates from the Bering Sea pollock fishery. Total abundance statistics were based on the radio telemetry mark-recapture study (see methods).

Year	Terminal Catch	Escapement	Terminal Run	AEQ Mortality	AEQ Mortality % of total catch	AEQ Mortality % of total run	Harvest Rate
Total Yukon Chinook salmon							
1994	192,852	*183,222*	*376,074*	8,765	*4.3%*	*2.3%*	*52%*
1995	200,632	157,308	357,940	5,714	2.8%	1.6%	57%
1996	160,539	*178,151*	*338,690*	6,786	*4.1%*	*2.0%*	*48%*
1997	192,292	179,352	371,644	6,816	3.4%	1.8%	53%
1998	105,697	117,578	223,275	5,605	5.0%	2.4%	49%
1999	137,895	163,474	301,369	6,112	4.2%	2.0%	47%
2000	50,749	62,959	113,708	3,792	7.0%	3.2%	46%
2001	66,759	127,293	194,052	4,307	6.1%	2.2%	36%
2002	78,267	165,017	243,284	5,780	6.9%	2.3%	34%
2003	110,619	269,336	379,955	8,196	6.9%	2.1%	31%
2004	125,608	188,188	313,796	9,027	6.7%	2.8%	42%
2005	97,726	187,875	285,601	10,673	9.8%	3.6%	37%
2006	105,139	207,601	312,740	14,717	12.3%	4.5%	37%
2007	92,600	164,071	256,671	18,054	16.3%	6.6%	40%
2008	*33,189*	*193,643*	*226,832*	*13,568*	29.0%	5.6%	19%
Alaska origin Chinook salmon							
1994	76,396	*134,555*	*210,951*	8,571	*10.1%*	*3.9%*	*39%*
1995	81,512	100,752	182,264	5,618	6.4%	3.0%	46%
1996	52,095	*127,170*	*179,265*	6,649	*11.3%*	*3.6%*	*32%*
1997	84,413	117,152	201,565	6,473	7.1%	3.1%	44%
1998	52,911	83,132	136,043	5,518	9.4%	3.9%	41%
1999	64,633	134,181	198,814	5,867	8.3%	2.9%	34%
2000	23,776	35,222	58,998	3,645	13.3%	5.8%	44%
2001	33,666	61,097	94,763	4,086	10.8%	4.1%	38%
2002	39,140	129,240	168,380	5,684	12.7%	3.3%	26%
2003	41,235	183,285	224,520	7,885	16.1%	3.4%	21%
2004	54,334	135,338	189,672	8,634	13.7%	4.4%	32%
2005	42,101	117,325	159,426	10,028	19.2%	5.9%	31%
2006	48,283	142,359	190,642	14,378	22.9%	7.0%	31%
2007	17,458	127,683	145,141	17,446	50.0%	10.7%	21%
2008	*11,043*	*160,307*	*171,350*	*13,114*	54.3%	7.1%	13%
Canadian origin Chinook salmon							
1994	116,456	48,667	165,123	194	*0.2%*	*0.1%*	*71%*
1995	119,120	56,557	175,677	96	0.1%	0.1%	68%
1996	108,444	50,982	159,426	137	*0.1%*	*0.1%*	*68%*
1997	107,879	62,200	170,079	343	0.3%	0.2%	64%
1998	52,786	34,446	87,232	87	0.2%	0.1%	61%
1999	73,262	29,293	102,555	245	0.3%	0.2%	72%
2000	26,973	27,737	54,710	147	0.5%	0.3%	49%
2001	33,093	66,196	99,289	221	0.7%	0.2%	33%
2002	39,127	35,777	74,904	96	0.2%	0.1%	52%
2003	69,384	86,051	155,435	311	0.4%	0.2%	45%
2004	71,274	52,851	124,125	393	0.5%	0.3%	58%
2005	55,625	70,550	126,175	645	1.1%	0.5%	44%
2006	56,856	65,242	122,098	339	0.6%	0.3%	47%
2007	75,142	36,388	111,530	608	0.8%	0.5%	68%
2008	*22,146*	33,336	55,482	454	2.0%	0.8%	40%

Table 5. Yukon River Chinook salmon statistics that incorporate AEQ mortality estimates from the Bering Sea pollock fishery. Total abundance statistics were based on the Pilot Station sonar counts (See NPFMC 2008).

Year	Terminal Catch	Escapement	Terminal Run	AEQ Mortality	AEQ Mortality % of total catch	AEQ Mortality % of total run	Harvest Rate
Total Yukon							
1994	192,852	*117,262*	*310,114*	8765	*4.3%*	*2.7%*	*63%*
1995	200,632	92,758	293,390	5714	2.8%	1.9%	69%
1996	160,539	*109,721*	*270,260*	6786	*4.1%*	*2.4%*	*60%*
1997	192,292	125,013	317,305	6816	3.4%	2.1%	61%
1998	105,697	42,422	148,119	5605	5.0%	3.6%	72%
1999	137,895	83,361	221,256	6112	4.2%	2.7%	63%
2000	50,749	17,623	68,372	3792	7.0%	5.3%	76%
2001	66,759	58,751	125,510	4307	6.1%	3.3%	55%
2002	78,267	86,912	165,179	5780	6.9%	3.4%	49%
2003	110,619	222,307	332,926	8196	6.9%	2.4%	35%
2004	125,608	109,367	234,975	9027	6.7%	3.7%	55%
2005	97,726	107,049	204,775	10673	9.8%	5.0%	50%
2006	105,139	128,809	233,948	14717	12.3%	5.9%	48%
2007	92,600	84,387	176,987	18054	16.3%	9.3%	57%
2008	33,189	*117,811*	*151,000*	*13568*	29.0%	8.2%	28%
Alaska origin Chinook salmon							
1994	76,396	*91,352*	*167,748*	8571	*10.1%*	*4.9%*	*48%*
1995	81,512	60,496	142,008	5618	6.4%	3.8%	59%
1996	52,095	*81,311*	*133,406*	6649	*11.3%*	*4.7%*	*42%*
1997	84,413	87,329	171,742	6473	7.1%	3.6%	51%
1998	52,911	25,671	78,582	5518	9.4%	6.6%	69%
1999	64,633	71,999	136,632	5867	8.3%	4.1%	49%
2000	23,776	6,279	30,055	3645	13.3%	10.8%	81%
2001	33,666	16,313	49,979	4086	10.8%	7.6%	70%
2002	39,140	46,767	85,907	5684	12.7%	6.2%	49%
2003	41,235	174,821	216,056	7885	16.1%	3.5%	22%
2004	54,334	72,202	126,536	8634	13.7%	6.4%	47%
2005	42,101	75,781	117,882	10028	19.2%	7.8%	41%
2006	48,283	100,819	149,102	14378	22.9%	8.8%	38%
2007	17,458	67,061	84,519	17446	50.0%	17.1%	34%
2008	11,043	*85,311*	*96,354*	*13114*	54.3%	12.0%	22%
Canadian origin Chinook salmon							
1994	116,456	25,910	142,366	194	0.2%	0.1%	82%
1995	119,120	32,262	151,382	96	0.1%	0.1%	79%
1996	108,444	28,410	136,854	137	0.1%	0.1%	79%
1997	107,879	37,684	145,563	343	0.3%	0.2%	74%
1998	52,786	16,751	69,537	87	0.2%	0.1%	76%
1999	73,262	11,362	84,624	245	0.3%	0.3%	87%
2000	26,973	11,344	38,317	147	0.5%	0.4%	71%
2001	33,093	42,438	75,531	221	0.7%	0.3%	44%
2002	39,127	40,145	79,272	96	0.2%	0.1%	49%
2003	69,384	47,486	116,870	311	0.4%	0.3%	59%
2004	71,274	37,165	108,439	393	0.5%	0.4%	66%
2005	55,625	31,268	86,893	645	1.1%	0.7%	64%
2006	56,856	27,990	84,846	339	0.6%	0.4%	67%
2007	75,142	17,326	92,468	608	0.8%	0.7%	81%
2008	*22,146*	32,500	54,646	*454*	2.0%	0.8%	41%

Table 6. Chinook salmon harvests (subsistence, commercial, other) in each region of western Alaska, harvest rate, AEQ mortality in the Bering Sea pollock fishery, and the estimated foregone harvest and spawning escapement associated with the AEQ mortality of Chinook salmon. Foregone values assume harvest rates remain unchanged with additional fish. Values during recent years are considered preliminary.

	Harvests				Inriver	AEQ	Foregone	Foregone	Foregone
Year	Subsistence	Commercial	Other	Total	Harvest Rate	Mortality	Catch	Escapement	(%)
Yukon River									
1994	62,399	125,165	5,288	192,852	56%	8,765	4,927	3,838	3%
1995	59,358	133,874	7,400	200,632	62%	5,714	3,520	2,194	2%
1996	54,188	99,835	6,516	160,539	53%	6,786	3,578	3,208	2%
1997	66,816	118,152	7,324	192,292	56%	6,816	3,805	3,011	2%
1998	58,910	44,008	2,779	105,697	57%	5,605	3,190	2,415	3%
1999	62,223	72,435	3,237	137,895	53%	6,112	3,225	2,887	2%
2000	40,522	8,518	1,709	50,749	56%	3,792	2,114	1,678	4%
2001	63,605	1,351	1,803	66,759	42%	4,307	1,799	2,507	3%
2002	51,068	24,836	2,363	78,267	38%	5,780	2,215	3,565	3%
2003	63,253	43,110	4,256	110,619	31%	8,196	2,544	5,652	2%
2004	62,488	59,936	3,184	125,608	46%	9,027	4,132	4,894	3%
2005	60,179	36,095	1,452	97,726	40%	10,673	4,254	6,419	4%
2006	54,664	48,161	2,314	105,139	38%	14,717	5,661	9,057	5%
2007	56,158	33,634	2,808	92,600	43%	18,054	7,710	10,344	8%
2008						13,568			
Kuskokwim Area									
1994	97,895	27,345	3,251	128,491	26%	5,697	1,482	4,215	1%
1995	99,733	72,352	2,017	174,102	36%	3,714	1,324	2,389	1%
1996	81,663	22,959	1,892	106,514	30%	4,411	1,329	3,082	1%
1997	85,459	47,990	1,723	135,172	30%	4,430	1,349	3,082	1%
1998	86,023	44,192	2,234	132,449	38%	3,643	1,375	2,268	1%
1999	77,232	25,019	764	103,015	43%	3,973	1,702	2,270	2%
2000	68,600	26,115	488	95,203	50%	2,465	1,222	1,243	1%
2001	77,386	14,384	661	92,431	31%	2,799	879	1,920	1%
2002	70,139	12,531	1,036	83,706	31%	3,757	1,164	2,593	1%
2003	72,335	16,014	1,491	89,840	29%	5,327	1,557	3,770	2%
2004	84,745	30,330	1,548	116,623	25%	5,867	1,447	4,420	1%
2005	74,296	30,515	1,180	105,991	25%	6,937	1,719	5,218	2%
2006	69,286	25,758	796	95,840	27%	9,566	2,577	6,989	3%
2007	73,034	23,160	1,981	98,175	33%	11,734	3,916	7,817	4%
2008						8,819			
Bristol Bay (westside stocks)									
1994	16,394	129,962	11,294	157,650	61%	7,451	4,516	2,935	3%
1995	14,149	91,923	5,533	111,605	54%	4,857	2,643	2,213	2%
1996	16,412	80,613	6,181	103,206	66%	5,768	3,794	1,974	4%
1997	15,985	70,226	4,706	90,917	49%	5,794	2,856	2,937	3%
1998	13,040	131,196	6,604	150,840	56%	4,764	2,656	2,108	2%
1999	11,301	22,812	4,881	38,994	37%	5,195	1,912	3,283	5%
2000	10,586	19,913	6,487	36,986	36%	3,223	1,174	2,050	3%
2001	13,372	21,505	22,084	56,961	37%	3,661	1,342	2,319	2%
2002	11,984	42,274	3,769	58,027	38%	4,913	1,875	3,039	3%
2003	19,894	45,846	6,296	72,036	45%	6,966	3,140	3,826	4%
2004	16,704	105,844	12,268	134,816	53%	7,673	4,037	3,636	3%
2005	14,057	72,913	10,162	97,132	36%	9,072	3,237	5,834	3%
2006	11,601	101,106	8,537	121,244	45%	12,510	5,641	6,868	5%
2007	14,848	59,105	7,393	*81,346*	53%	15,346	8,066	7,280	10%
2008				*21,720*	15%	11,533	1,781	9,752	8%
Norton Sound									
1994									
1995	7,274	8,860	438	16,572					
1996	7,245	4,984	662	12,891	77%	350	268	82	2%
1997	8,989	12,573	1,106	22,668	65%	611	397	214	2%
1998	8,295	7,429	590	16,314	71%	396	283	113	2%
1999	6,144	2,508	630	9,282	65%	361	233	128	3%
2000	4,148	752	889	5,789	66%	216	143	74	2%
2001	5,576	213	271	6,060	57%	188	107	81	2%
2002	5,469	5	802	6,276	54%	268	145	123	2%
2003	4,728	12	239	4,979	51%	243	124	119	2%
2004	4,420	0	535	4,955	57%	197	111	86	2%
2005	3,305	151	216	3,672	54%	192	104	89	3%
2006	2,876	12	427	3,315	55%	246	136	110	4%
2007	2,646	19		*2,665*	*33%*	549	181	368	7%
2008				*2,162*	*44%*	295	131	164	6%

Table 7. Kuskokwim area (Kuskokwim, Goodnews, Kanetok) Chinook salmon statistics that incorporate AEQ mortality estimates from the Bering Sea pollock fishery.

Year	Terminal Catch	Escapement	Terminal Run	AEQ Mortality	AEQ Mortality % of total catch	AEQ Mortality % of total run	Harvest Rate
1994	128,491	365,392	493,883	5,697	4.2%	1.1%	27%
1995	174,102	314,087	488,189	3,714	2.1%	0.8%	36%
1996	106,514	246,966	353,480	4,411	4.0%	1.2%	31%
1997	135,172	308,884	444,056	4,430	3.2%	1.0%	31%
1998	132,449	218,488	350,937	3,643	2.7%	1.0%	38%
1999	103,015	137,399	240,414	3,973	3.7%	1.6%	44%
2000	95,203	96,871	192,074	2,465	2.5%	1.3%	50%
2001	92,431	202,015	294,446	2,799	2.9%	0.9%	32%
2002	83,706	186,515	270,221	3,757	4.3%	1.4%	32%
2003	89,840	217,595	307,435	5,327	5.6%	1.7%	30%
2004	116,623	356,359	472,982	5,867	4.8%	1.2%	26%
2005	105,991	321,702	427,693	6,937	6.1%	1.6%	26%
2006	95,840	259,963	355,804	9,566	9.1%	2.6%	29%
2007	98,175	195,963	294,139	11,734	10.7%	3.8%	36%
2008				8,819			

Table 8. Bristol Bay (Nushagak & Togiak districts) Chinook salmon statistics that incorporate AEQ mortality estimates from the Bering Sea pollock fishery. Values exclude Naknek, Kvichak, Ugashik, and Egegik Chinook salmon.

Year	Terminal Catch	Escapement	Terminal Run	AEQ Mortality	AEQ Mortality % of total catch	AEQ Mortality % of total run	Harvest Rate
1994	157,650	102,455	260,105	7,451	4.5%	2.8%	62%
1995	111,605	93,456	205,061	4,857	4.2%	2.3%	55%
1996	103,206	53,703	156,909	5,768	5.3%	3.5%	67%
1997	90,917	93,495	184,412	5,794	6.0%	3.0%	51%
1998	150,840	119,703	270,543	4,764	3.1%	1.7%	57%
1999	38,994	66,966	105,960	5,195	11.8%	4.7%	40%
2000	36,986	64,571	101,557	3,223	8.0%	3.1%	38%
2001	56,961	98,457	155,418	3,661	6.0%	2.3%	38%
2002	58,027	94,055	152,082	4,913	7.8%	3.1%	40%
2003	72,036	87,761	159,797	6,966	8.8%	4.2%	47%
2004	134,816	121,432	256,248	7,673	5.4%	2.9%	54%
2005	97,132	175,049	272,181	9,072	8.5%	3.2%	38%
2006	121,244	147,620	268,864	12,510	9.4%	4.4%	48%
2007	81,346	73,421	154,767	15,346	15.9%	9.0%	57%
2008	21,720	118,896	140,616	11,533	34.7%	7.6%	22%

Table 9. Norton Sound Chinook salmon statistics that incorporate AEQ mortality estimates from the Bering Sea pollock fishery. Values in 2008 do not include total subsistence catch.

Year	Terminal Catch	Escapement	Terminal Run	AEQ Mortality	AEQ Mortality % of total catch	AEQ Mortality % of total run	Harvest Rate
1994							
1995	16,572						
1996	12,891	3,931	16,822	350	2.6%	2.0%	77%
1997	22,668	12,207	34,875	611	2.6%	1.7%	66%
1998	16,314	6,519	22,833	396	2.4%	1.7%	72%
1999	9,282	5,077	14,359	361	3.7%	2.5%	66%
2000	5,789	2,988	8,777	216	3.6%	2.4%	67%
2001	6,060	4,567	10,627	188	3.0%	1.7%	58%
2002	6,276	5,340	11,616	268	4.1%	2.3%	55%
2003	4,979	4,776	9,755	243	4.6%	2.4%	52%
2004	4,955	3,812	8,767	197	3.8%	2.2%	57%
2005	3,672	3,145	6,817	192	5.0%	2.7%	55%
2006	3,315	2,697	6,012	246	6.9%	3.9%	57%
2007	2,665	5,431	8,096	549	17.1%	6.3%	33%
2008	*2,162*	*2,712*	*4,874*	*295*	*12.0%*	*5.7%*	*44%*

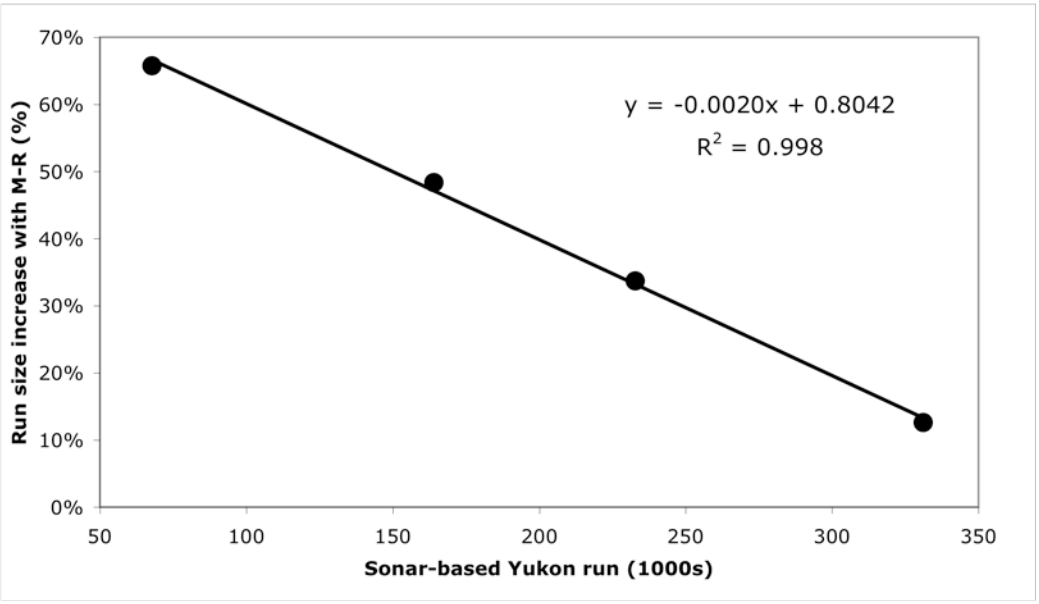


Fig. 1. The relationship between percentage increase in Yukon Chinook run size based on the mark-recapture approach (MR) versus the Pilot Station sonar approach (Y-axis) and run size based on sonar (X-axis). This relationship was used to estimate total run size of Yukon Chinook salmon based on the MR approach during years when only sonar-based values were available.

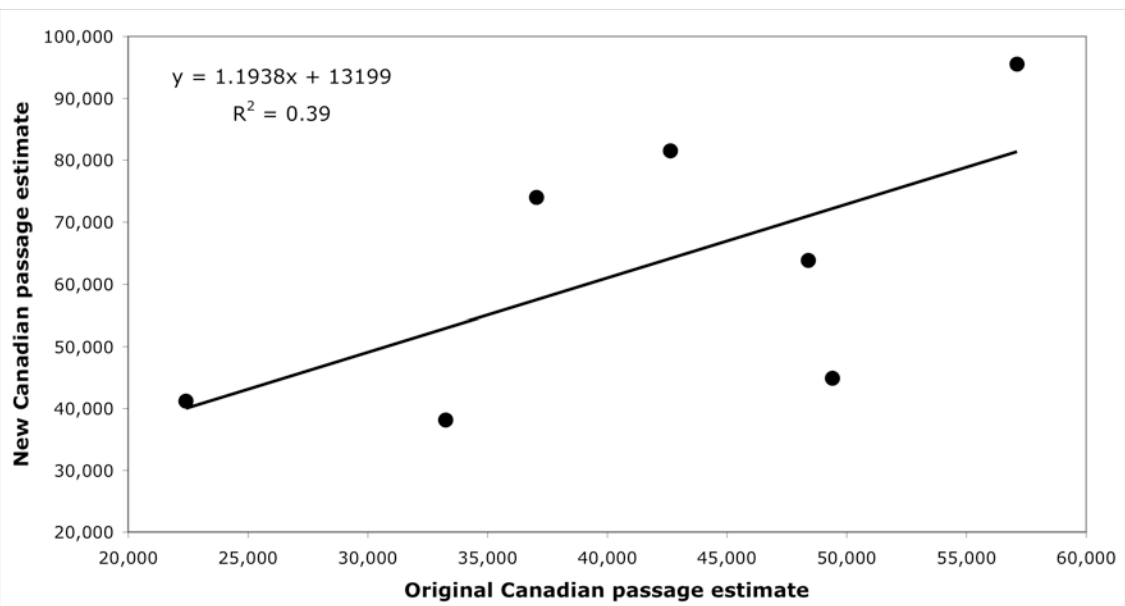


Fig. 2. Relationship between recent estimates of Chinook salmon passage into Canada based on Eagle sonar or radio telemetry tags (Hayes et al. 2006, ADFG 2008) and passage estimates based on the earlier mark-recapture methodology (JTC 2008). This regression was used to extend the Eagle sonar estimates back in time.

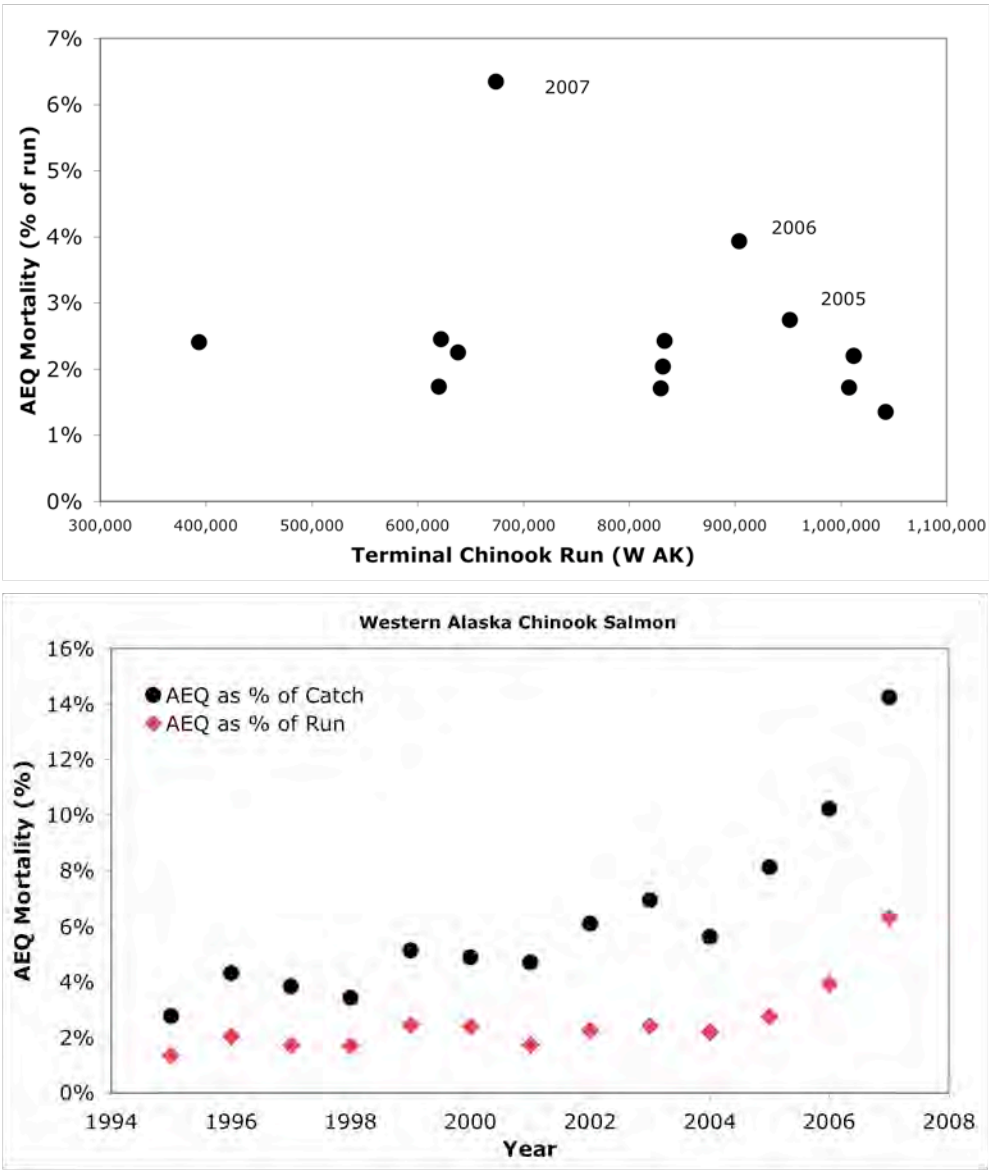


Fig. 3. Adult equivalent mortality of western Alaska Chinook salmon in the pollock fishery in relation to the abundance (catch and escapement) of Chinook salmon returning to western Alaska (upper graph) and in relation to year of return (lower graph). AEQ mortality values are the percentage of total catch or total run that would have returned to the rivers had they not been captured in the pollock fishery.

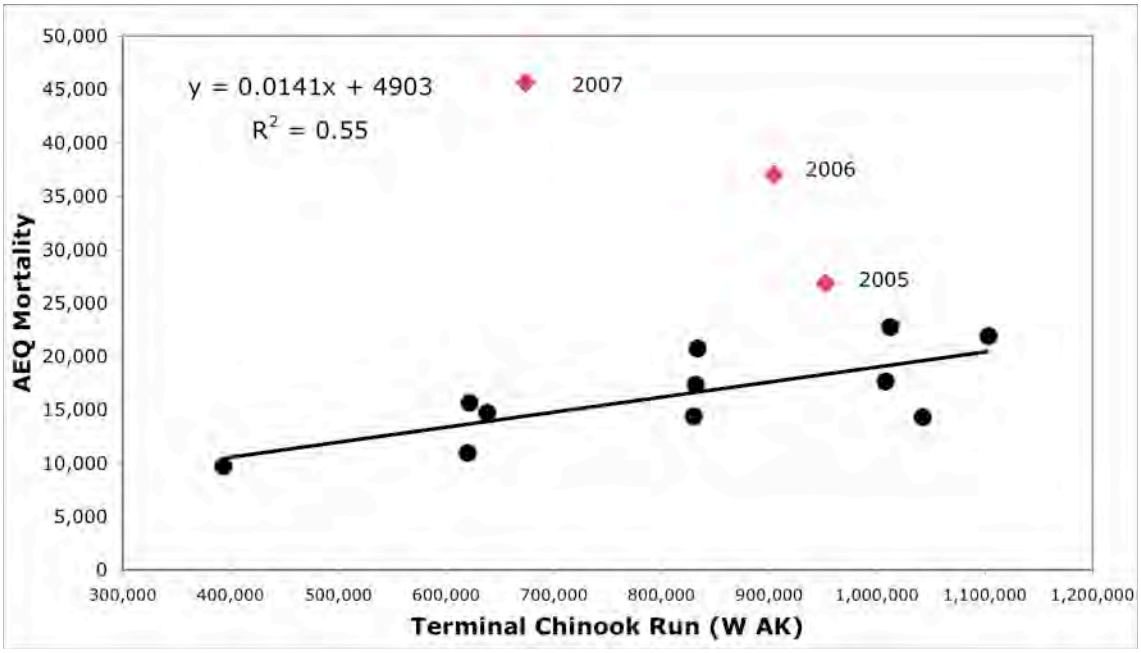


Fig. 4. Relationship between AEQ mortality of western Alaska Chinook salmon and the total abundance of Chinook salmon that would have returned to western Alaska. Linear regression is based on return years 1994-2004. Years 2005-2007 are shown as outlier years when compared with previous years.

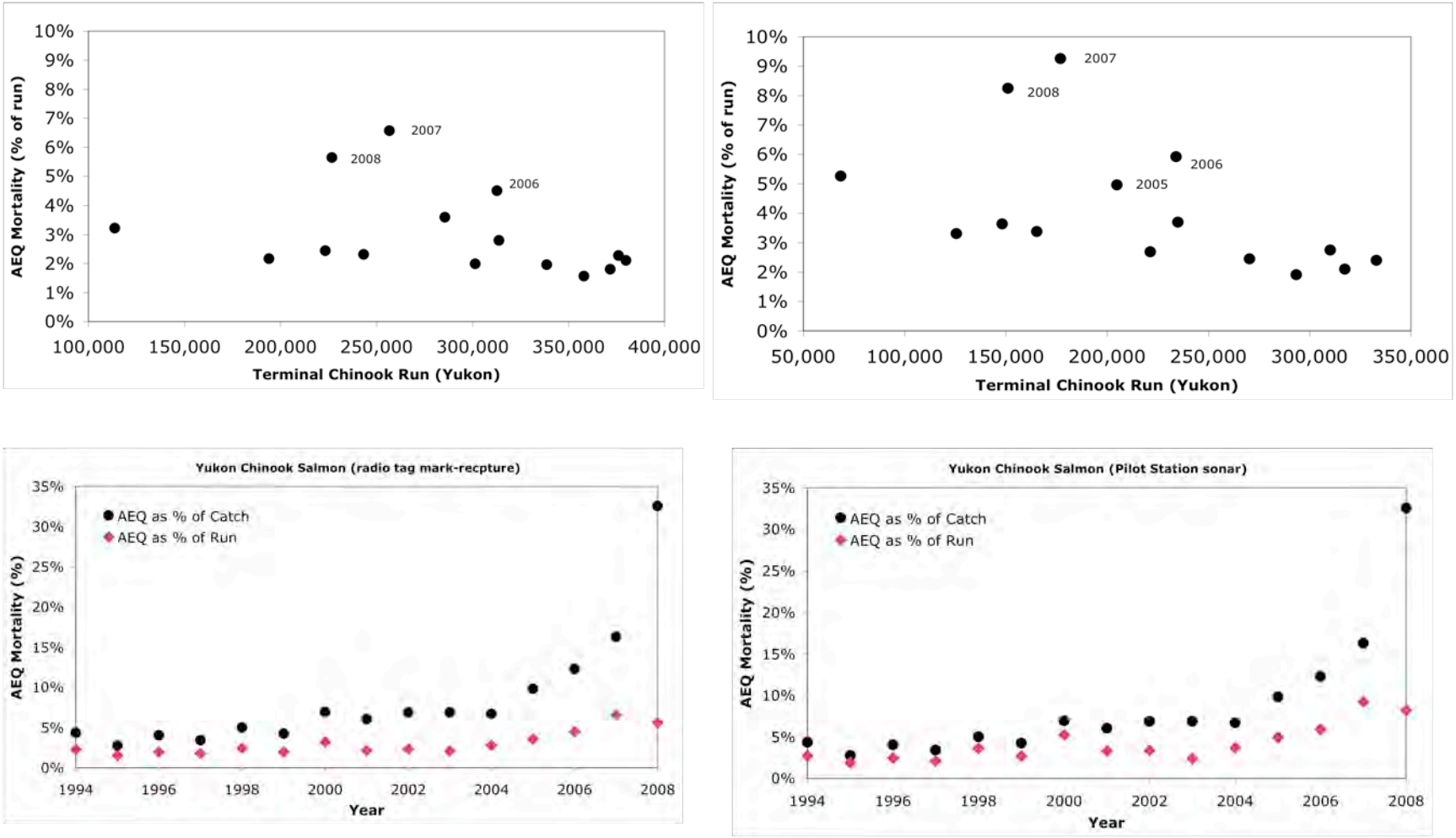


Fig. 5. Adult equivalent mortality of Yukon Chinook salmon in the pollock fishery in relation to the abundance (catch and escapement) of Chinook salmon returning to the Yukon River (upper graphs) and in relation to year of return (lower graphs). Graphs on the left are based on radio tag mark-recapture estimates of total abundance, whereas graphs on the right are based on Pilot Station sonar counts. AEQ values are the percentage of total catch or total run that would have returned to the rivers had they not been captured in the pollock fishery.

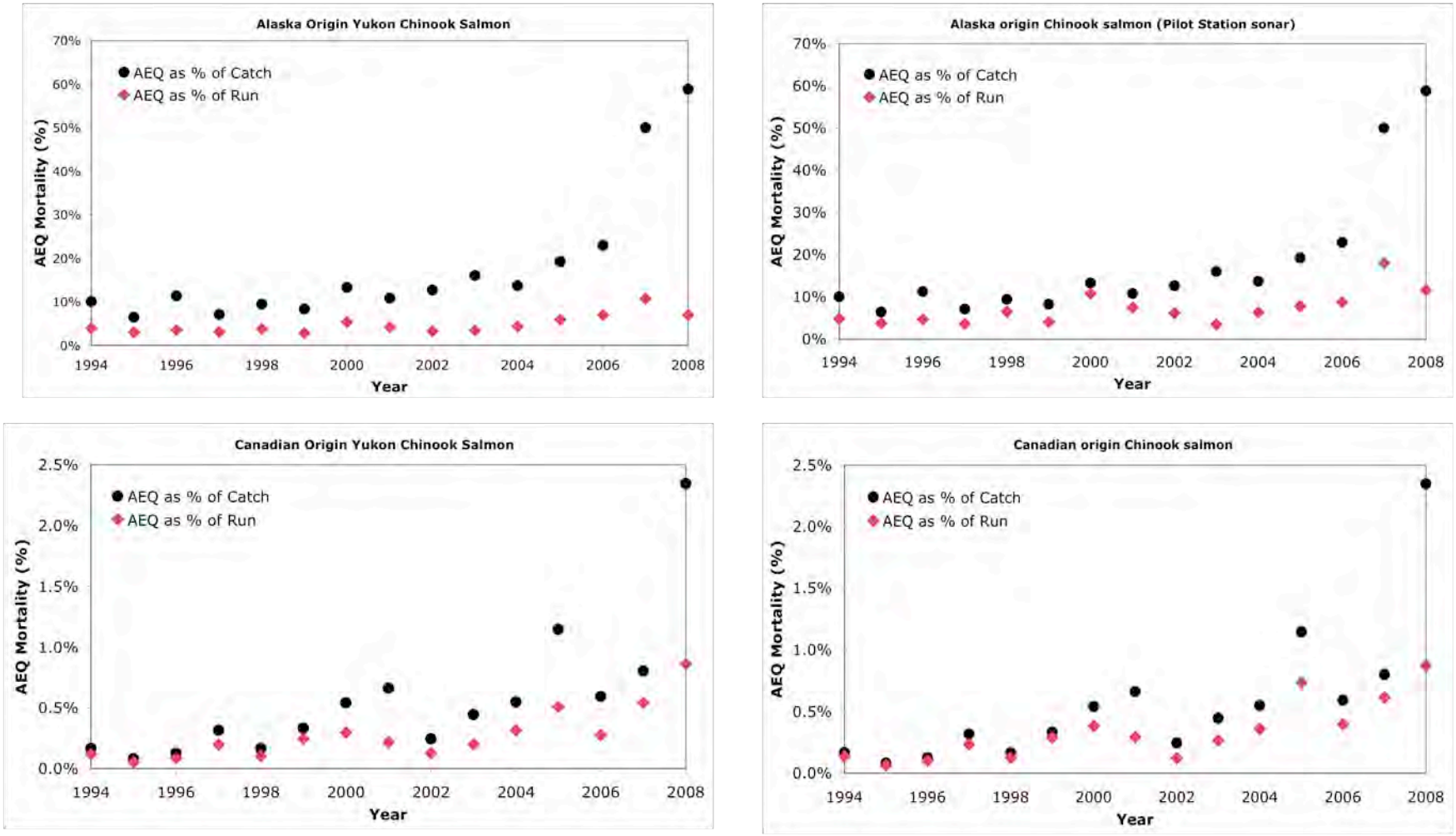
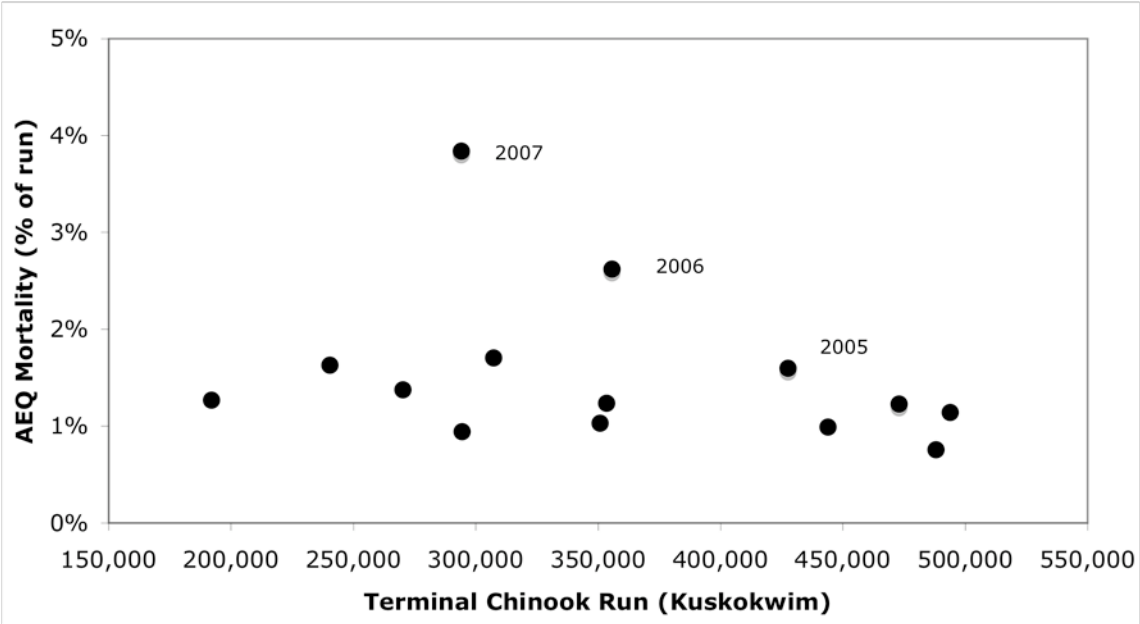


Fig. 6. Adult equivalent mortality of Yukon Chinook salmon originating from Alaska (upper graphs) and Canada streams (lower graphs). Graphs on the left are based on radio tag mark-recapture estimates of total abundance and revised estimates of passage into Canada, whereas graphs on the right are based on Pilot Station sonar counts and original estimates of passage into Canada. AEQ values are the percentage of total catch or total run that would have returned to the rivers had they not been captured in the pollock fishery.



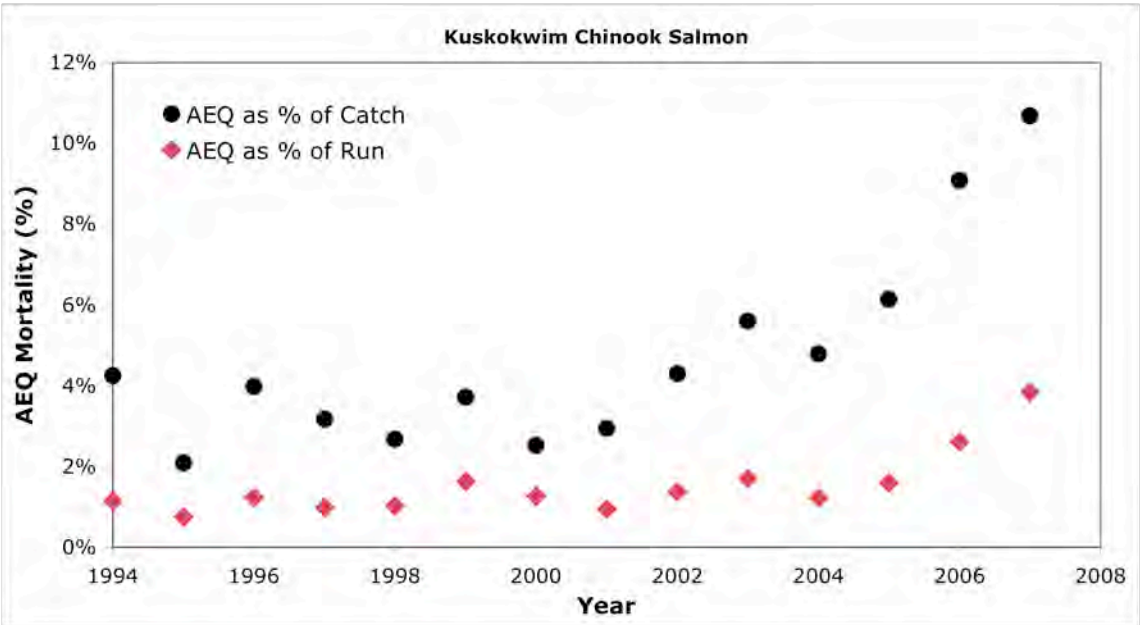
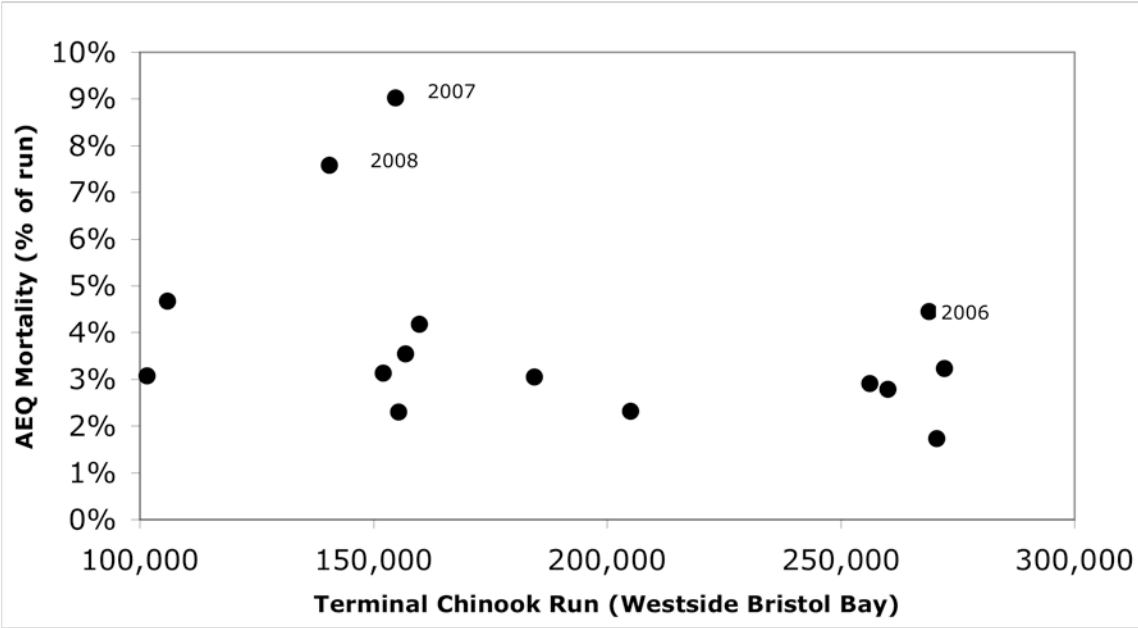


Fig. 7. Adult equivalent mortality of Kuskokwim area Chinook salmon in the pollock fishery in relation to the abundance (catch and escapement) of Chinook salmon returning to the Kuskokwim area (upper graph) and in relation to year of return (lower graph). AEQ values are the percentage of total catch or total run that would have returned to the rivers had they not been captured in the pollock fishery.



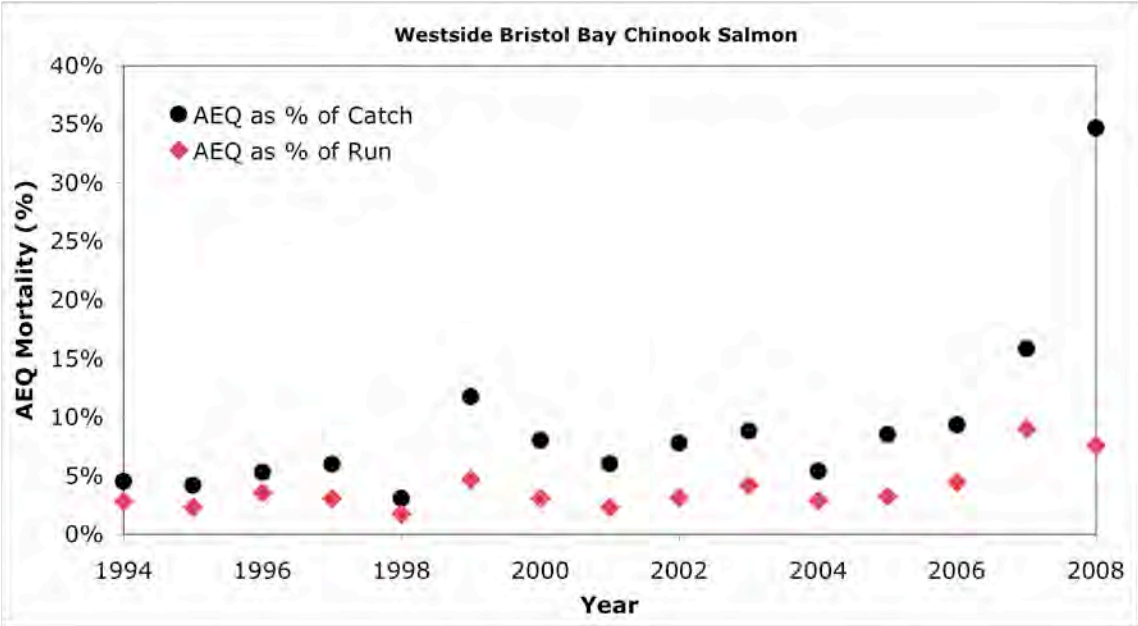
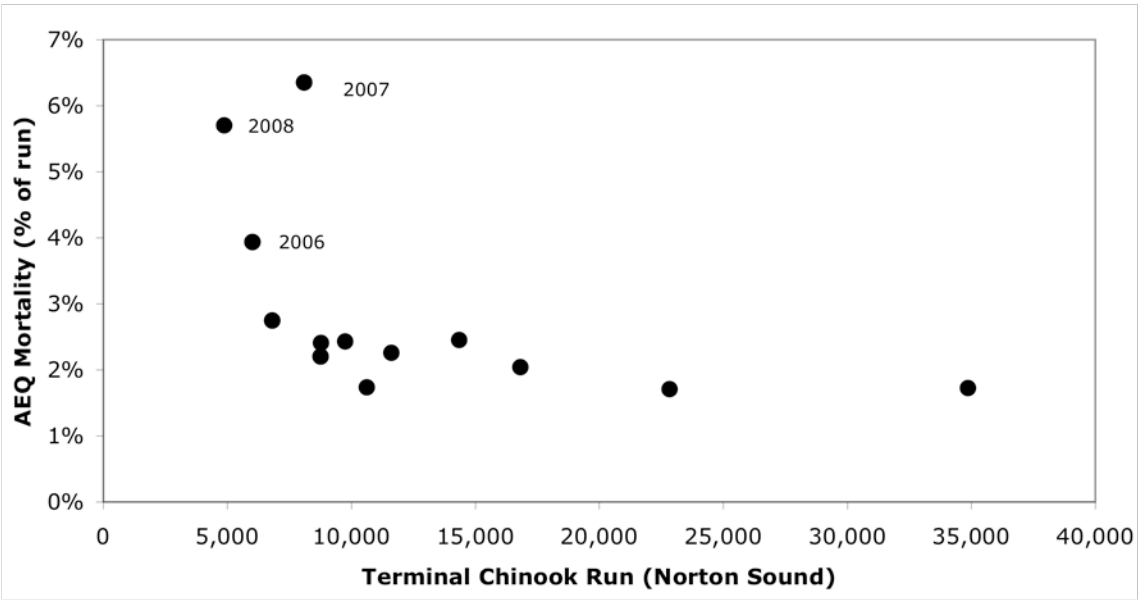


Fig. 8. Adult equivalent mortality of Bristol Bay Chinook salmon in the pollock fishery in relation to the abundance (catch and escapement) of Chinook salmon returning to Bristol Bay (upper graph) and in relation to year of return (lower graph). AEQ values are the percentage of total catch or total run that would have returned to the rivers had they not been captured in the pollock fishery.



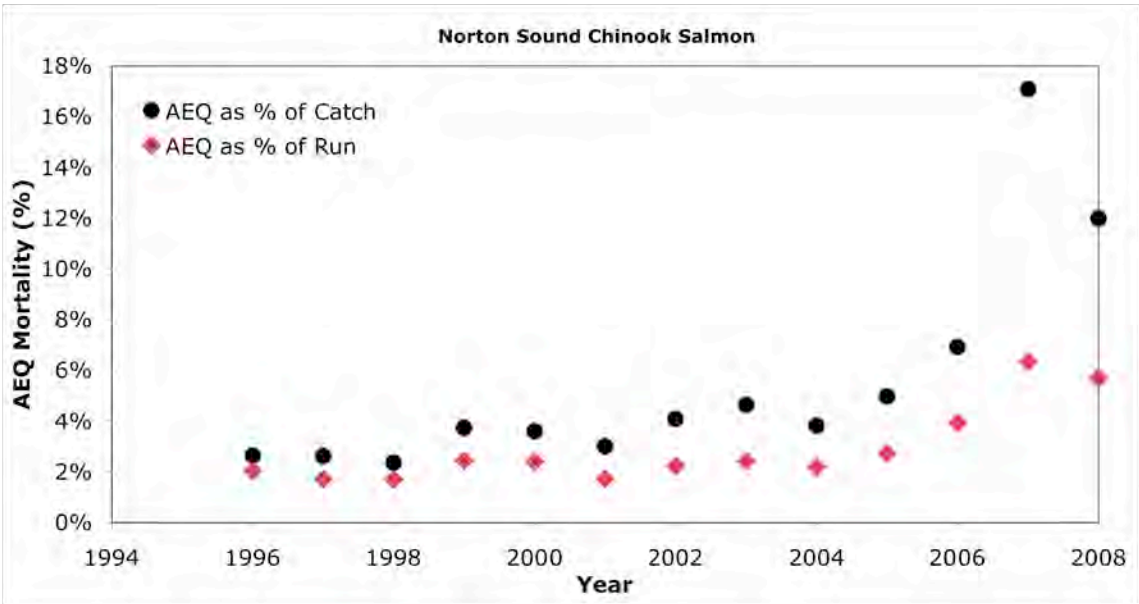


Fig. 9. Adult equivalent mortality of Norton Sound Chinook salmon in the pollock fishery in relation to the abundance (catch and escapement) of Chinook salmon returning to Norton Sound Bay (upper graph) and in relation to year of return (lower graph). AEQ values are the percentage of total catch or total run that would have returned to the rivers had they not been captured in the pollock fishery.