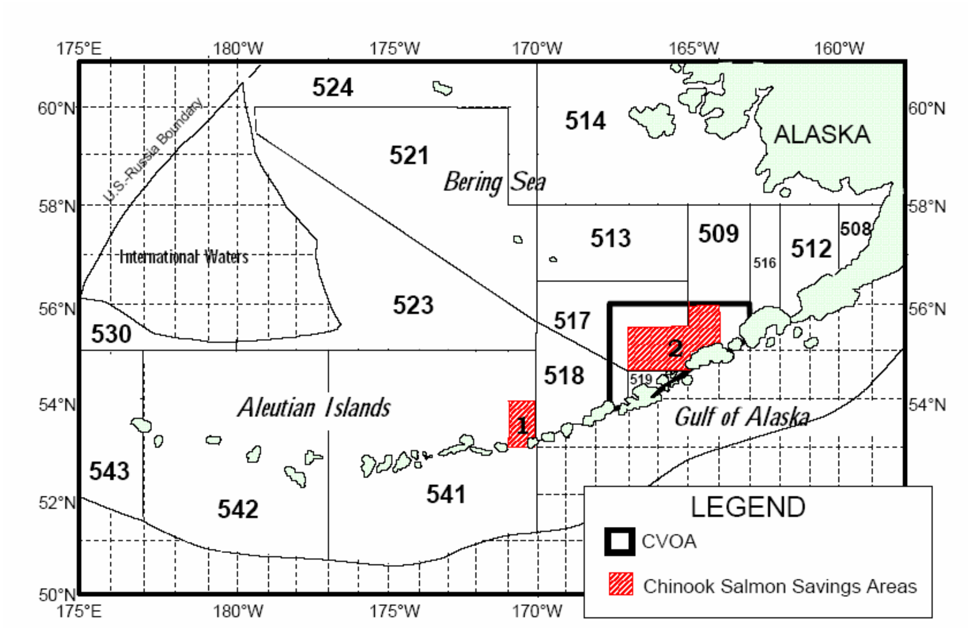
PUBLIC REVIEW DRAFT

ENVIRONMENTAL ASSESSMENT / REGULATORY IMPACT REVIEW /
INITIAL REGULATORY FLEXIBILITY ANALYSIS

for

Modifying existing Chinook and chum salmon savings areas

Proposed **AMENDMENT 84** to the
Fishery Management Plan for Groundfish
of the Bering Sea and Aleutian Islands Management Area



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EXECUTIVE SUMMARY

In the mid-1990s, the Council and NOAA Fisheries implemented regulations to control the bycatch of chum salmon and Chinook salmon taken in the BSAI trawl fisheries. These regulations established closure areas in areas and at times when salmon bycatch had been highest based on historical observer data. Information from the fishing fleet indicates that bycatch may have been exacerbated by the current regulatory closure regulations, as much higher salmon bycatch rates were reportedly encountered outside of the closure areas. Some of these bycaught salmon include Chinook and chum stocks of concern in western Alaska. Further, the closure areas impose increased costs on the pollock fleet and processors. To address this immediate problem, the Council will examine and consider other means to control salmon bycatch that have the potential to be more flexible and adaptive, but still meet Council intent to minimize impacts to the salmon in the eastern Bering Sea.

This analysis considers the following alternatives to address the problem identified above.

Alternative 1. Status Quo

Alternative 1 maintains the existing regulatory measures for Chinook and Chum salmon savings area closures.

Alternative 2. Eliminate the regulatory salmon savings area closures

Under Alternative 2, the catch limits for the Bering Sea subarea trawl Chinook and BSAI trawl chum salmon would be eliminated, and would no longer trigger savings area closures. The annual closure of the Chum Salmon Savings Area would also be eliminated. Salmon would remain a prohibited species under this (and all) alternatives.

Alternative 3. Suspend the regulatory salmon savings area closures and allow pollock cooperatives and CDQ groups to utilize their voluntary rolling hot spot closure system to avoid salmon bycatch

Under Alternative 3, the catch limits for the Bering Sea subarea trawl Chinook and BSAI trawl chum salmon would be suspended, and would no longer trigger savings area closures. The annual closure of the Chum Salmon Savings Area would also be suspended. The suspension will go into effect so long as the pollock cooperatives and CDQ groups have in place an effective salmon bycatch voluntary rolling “hot spot” (VRHS) closure system to avoid salmon bycatch.

Option 1: Reimpose regulatory salmon savings closures if reported non-compliance with agreement merits expedited action

Under this suboption, the Council may recommend re-imposition of the regulatory salmon savings area closures on an expedited basis if the situation merits this recommendation. The Inter Cooperative Agreement (ICA) managers will report to the Council immediately if there is non-participation or non-compliance without effective enforcement action under the VRHS system. In that event, the Council may recommend re-imposition of the regulatory salmon savings area closures on an expedited basis. If the regulatory closure area system is reinstated, it is the Council’s intent that the closure areas be based on the most recent information available and if the analysis of Amendment Package B’s Alternative 1 supports the approach, with regular adjustments.

Option 2: Maintain the regulatory salmon savings area triggers and closures but participants in a cooperative voluntary rolling hotspot (VRHS) system would be exempted from compliance with savings area closures. This exemption is subject to Council approval and review of the effectiveness of a VRHS system.

Under this option, the existing salmon savings area closures would remain in place. Pollock cooperatives and CDQ groups who participate in a voluntary rolling "hot spot" (VRHS) closure system to avoid salmon bycatch will be granted an exemption to the existing closures. Cooperatives or other vessels which are not participating in a VRHS system will be subject to the savings area closures if triggered.

Suboption (applies to option 2): Extend the exemption to the chum salmon savings area closure to vessels in the trawl cod and/or flatfish targets.

Under this suboption, vessels in the trawl cod and/or flatfish target fisheries would be exempt from compliance with the chum savings area closure. Vessels in these target fleets are not required to participate in a VRHS system to obtain the exemption.

Environmental Assessment

Alternative 1

The fishery performance analysis indicates that salmon bycatch may be higher outside the savings areas than inside. However, evidence indicates that the amount of salmon caught incidentally in the groundfish fisheries represents a low overall proportion of salmon abundance and harvest in the directed salmon fisheries (commercial, subsistence, and recreational). The results of an ongoing ESA consultation on ESA-listed Chinook salmon are as yet unknown.

The *Final Alaska Groundfish Fisheries Programmatic Supplemental Environmental Impact Statement* (NMFS 2004b) and the *Final Environmental Impact Statement for Essential Fish Habitat Identification and Conservation in Alaska* (NMFS 2005) have both concluded that there are no significant adverse impacts on the physical and biological environment or the ecosystem from the current groundfish management regime. As a result, Alternative 1 is found to have no significant impacts on these components. The socioeconomic and economic impacts are discussed under the Regulatory Impact Review heading, below.

Alternative 2

Although salmon bycatch may increase under this alternative, as constraints on bycatch in the groundfish fisheries are removed, it is unlikely that this alternative will result in bycatch levels that will present a threat to the sustainability of salmon stocks. Results of the ongoing ESA consultation on listed salmon stocks are as yet unknown.

No significant impact on the pollock stock is anticipated, as harvest levels will continue as under Alternative 1, and as the pollock fishery has a low incidental catch rate of groundfish and other fish stocks, and an extensive monitoring program to ensure accurate catch accounting, neither is a significant impact anticipated on these stocks. Interactions with habitat, marine mammals, and seabirds may decrease under this alternative, as vessels may pursue a lower catch per unit effort for pollock, being unconstrained by salmon bycatch. To the extent this occurs, this may benefit habitat, marine mammals, and seabirds, however the change is unlikely to be detected at a population level. This action has no discernable impacts on the ecosystem. Socioeconomic and economic impacts are discussed under the Regulatory Impact Review heading, below.

Alternative 3

Salmon bycatch is expected to decrease under this alternative, given the flexible system provided by dynamic hot spot management of the pollock fleet. Evidence indicates that the amount of salmon current caught incidentally in the groundfish fisheries represents a low overall proportion of salmon abundance and harvest in the directed salmon fisheries (commercial, subsistence, and recreational).

As with Alternative 2, no significant impact on pollock or other fish stocks is anticipated under this alternative. Impacts on pollock catch per unit effort cannot be predicted, but to the extent that it differs from the status quo, this may benefit or disadvantage habitat, marine mammals, and seabirds. Any change is likely to be small, however, and not discernable at a population level, therefore no significant impacts would result from this alternative. As with Alternative 2, this action has no discernable impacts on the ecosystem. Socioeconomic and economic impacts are discussed under the Regulatory Impact Review heading, below

Alternative 3, Options 1 and 2 and suboption

Implementation of option 1 has no impact other than for the Council to alert the pollock fishery participants of its intent to take remediary measures if this alternative is not effective at controlling salmon bycatch. The Council may, at any time, with the appropriate scientific and analytical support for its decisionmaking, take action to change its bycatch management measures.

Implementation of option 2 has limited impact; it is a variance on the means to efficiently implement the program. The suboption to Option 2 would likely result in positive benefits to the affected fleets in that they would be able to fish inside the Shum savings area closures regardless of their status. This is not anticipated to increase salmon bycatch given the limited contribution by these fleets.

Regulatory Impact Review

The analysis of alternatives presented in the RIR has shown that Alternative 1, the status quo, has resulted in dramatic increases in salmon bycatch in the Bering Sea pollock trawl fishery in recent years. This translates into foregone salmon value, assuming full terminal harvest of salmon bycatch, of nearly $1 million for Chinook and more than $250 thousand for chum in 2003. These values greatly overstate the actual harvest that might have occurred if salmon bycatch had not been taken in the Bering Sea pollock trawl fishery.

Unfortunately, it is not possible to accurately estimate actual harvest value. However, the dramatic increases in salmon bycatch under the status quo likely translate into increases in forgone value and decreased benefits of bycatch reduction. The status quo also bears some risk of future restrictions on the Bering Sea pollock trawl fleet as a result of exceeding the ESA Chinook incidental take permit cap.

Alternative 1 also imposes increased operational costs on the trawl fleet when the salmon savings areas are closed and may adversely affect vessel safety. The closures are also having a detrimental effect on product quality for the CV fleet. The decreased quality appears to have reduced product grade, eliminated fillet production in some cases, and increased shoreside processing facility costs. Alternative 1 also results in some management and enforcement costs to administer the closures and monitor vessel locations.

Alternative 2 would eliminate the salmon savings closure areas altogether. The result would likely be reduced operational costs, improved vessel safety, improved product quality, and reduced management and enforcement costs. However, in the absence of any bycatch reduction measures this alternative may result in further increase in salmon bycatch in the Bering Sea pollock trawl fishery. Were that to occur, the foregone value of such bycatch would increase and the associate benefits of bycatch reduction would decrease, possibly dramatically. This could also result in the Bering Sea pollock trawl fleet significantly exceeding the ESA Chinook incidental take permit cap.

Alternative 3 eliminates the BSAI salmon savings area closures (or exempts vessels from compliance with the closures) but replaces them with a dynamic system of rolling hot spot closures and creates incentives for individual vessels to reduce salmon bycatch by penalizing the worst offenders. This alternative would likely reduce operational costs, improve vessel safety, and improve product quality. Alternative 3 also have the potential to reduce salmon bycatch more than the status quo management measures. If that potential were realized, Alternative 3 would reduce foregone value of salmon bycatch and increase the overall benefits of bycatch reduction. Alternative 3 also provides some mitigation possibilities for Western Alaska fishing organizations.

Alternative 3 would reduce management and enforcement costs for government agencies by transferring much of that cost to industry. However, the industry has volunteered to bear this cost in hopes of reducing operational costs associated with the status quo while at the same time attempting to reduce salmon bycatch. If bycatch is not reduced under alternative 3 and the Bering Sea pollock trawl fleet continues to exceed the ESA Chinook incidental take permit cap, unknown restrictions on the fleet could result. Perhaps the greatest benefit of this suboption is that it increases the incentive for industry to reduce salmon bycatch rates.

Initial Regulatory Flexibility Analysis

The analysis presented in the Initial Regulatory Flexibility Analysis indicates that, in 2003, there were perhaps as many as 116 small trawl CVs in the BSAI and 3 small trawl CPs. NMFS AKR records indicate that 112 BSAI CVs were members of AFA cooperatives; all of these are large entities. Thus, four of the BSAI small trawl CVs and 3 small trawl CPs appear to qualify as “small entities” once AFA affiliation is taken into consideration.

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Chapter 1 Purpose and Need for Action

This Environmental Assessment/Regulatory Impact Review/Initial Regulatory Flexibility Analysis (EA/RIR/IRFA) evaluates an amendment to the Federal Fishery Management Plan for Groundfish of the Bering Sea and Aleutian Islands Management Area (BSAI Groundfish FMP). The proposed action addresses alternative measures to control the incidental catch of salmon species in the Bering Sea pollock trawl fisheries. The proposed measures would repeal or suspend the existing Chinook and Chum Salmon Savings Areas as implemented under Amendments 21b, 35 and 58 to the BSAI Groundfish FMP.

Actions taken to amend fishery management plans must meet the requirements of Federal laws and regulations. These include the Magnuson-Stevens Fishery Conservation and Management Act (Magnuson-Stevens Act), the National Environmental Policy Act (NEPA), the Endangered Species Act (ESA), the Marine Mammal Protection Act (MMPA), Executive Order (E.O.) 12866 and the Regulatory Flexibility Act (RFA).

NEPA, E.O. 12866, and the RFA require a description of the purpose and need for the proposed action, as well as a description of alternative actions which may address the problem. The purpose and need for this action is addressed in Section 1.1 of this document, below. Chapter 2 describes the alternatives considered for analysis as well as alternatives considered but not carried forward. Chapter 3 describes the affected environment. Chapter 4 discusses the biological and environmental impacts of the alternatives, as required by NEPA, as well as impacts on endangered species and marine mammals. Chapter 5 contains a Regulatory Impact Review (RIR) which evaluates the economic impacts of the alternatives. Chapter 6 contains the Initial Regulatory Flexibility Analysis (IRFA) as required under the RFA. Chapter 7 addresses the consistency of the proposed action with other applicable law and policy.

1.1 Purpose and Need

The Magnuson-Stevens Act emphasizes the importance of minimizing bycatch, to the extent practicable, in order to achieve sustainable fisheries. To address this issue, the Council has amended the BSAI Groundfish FMP several times to limit the bycatch of salmon in the groundfish fisheries, through catch limits and time and area closures. Recently, Chinook and chum bycatch have been elevated well above the regulatory limits, causing areas of the fishing grounds to close to directed pollock fishing (Table 1-1). The fleet has consequently been displaced into other parts of the management area.

Table 1-1 BSAI Salmon Bycatch

Year	Chinook	Chum
1990-2001 average	37,819	69,332
2002	36,385	81,470
2003	54,911	197,091
2004	62,493	465,650

Evidence from the “A” season fishery in 2005 indicates that Chinook bycatch is again elevated. According the NOAA Fisheries catch accounting data, as of July 16, 2005, 27,869 Chinook had been taken in the non-CDQ pollock pelagic trawl fishery, representing 104% of the available 26,825 permitted in regulations. The CDQ pollock fishery has taken an additional 1,368 Chinook, representing approximately 63% of the available 2,175 permitted in regulations. This Chinook Salmon Savings Area has exceeded its trigger limit per regulations and will close on Setpember 1, 2005 through the remainder of the year.

Chum salmon bycatch in the beginning of the 2005 B season is already elevated. As of July 31, 399,459 have been taken in the pollock pelagic trawl fishery. None of these counts towards the savings area closure under the existing regulations as the accounting of chum salmon bycatch within the CVOA begins August 15. For comparison, in 2004, by the week ending July 31, 55,339 chum salmon were taken. The total number of chum taken as bycatch for 2004 was 465,650. If the current bycatch trend continues in the Pollock fishery, it is very likely that the Chum Salmon Savings Area closure will be triggered and the savings area will close again on September 14 through October 14.

The Council has approved the following problem statement for this action:

> In the mid-1990s, the Council and NOAA Fisheries implemented regulations to control the bycatch of chum salmon and Chinook salmon taken in the BSAI trawl fisheries. These regulations established closure areas in areas and at times when salmon bycatch had been highest based on historical observer data. Information from the fishing fleet indicates that bycatch may have been exacerbated by the current regulatory closure regulations, as much higher salmon bycatch rates were reportedly encountered outside of the closure areas. Some of these bycaught salmon include Chinook and chum stocks of concern in western Alaska. Further, the closure areas impose increased costs on the pollock fleet and processors. To address this immediate problem, the Council will examine and consider other means to control salmon bycatch that have the potential to be more flexible and adaptive, but still meet Council intent to minimize impacts to the salmon in the eastern Bering Sea.

1.2 Next steps in the process

This action is scheduled for final action at the October 2005 Council meeting. At that time the Council will identify a preferred alternative from the suite of alternatives contained in the analysis. While this timing does not allow for regulations resulting from this action to be in place in time for the 2006 specification process, it would likely allow for regulations changes to go into effect prior to the annual closure of the Chum Salmon Savings Area on August 1, 2006.

Chapter 2 Description of Alternatives

This EA/RIR/IRFA evaluates three alternatives and two options for managing salmon bycatch in the BSAI trawl fisheries. The alternatives are described below.

2.1 Alternative 1: Status Quo

Alternative 1 maintains the existing regulatory measures for Chinook Salmon Savings Area and Chum Salmon Savings Area closures. The savings areas are described in Section 3.2.

2.2 Alternative 2: Eliminate the regulatory salmon savings area closures

Under Alternative 2, the catch limits for the Bering Sea subarea trawl Chinook and BSAI trawl chum salmon would be eliminated, and would no longer trigger savings area closures. The annual closure of the Chum Salmon Savings Area would also be eliminated. Salmon would remain a prohibited species under this (and all) alternatives.

2.3 Alternative 3: Suspend the regulatory salmon savings area closures and allow pollock cooperatives and CDQ groups to utilize their voluntary rolling hot spot closure system to avoid salmon bycatch

Under Alternative 3, the catch limits for the Bering Sea subarea trawl Chinook and BSAI trawl chum salmon would be suspended, and would no longer trigger savings area closures. The annual closure of the Chum Salmon Savings Area would also be suspended. The suspension will go into effect so long as the pollock cooperatives and CDQ groups have in place an effective salmon bycatch voluntary rolling "hot spot" (VRHS) closure system to avoid salmon bycatch.

A full discussion of the VRHS closure system, the Inter Cooperative Agreement (ICA), and how the fleet would be organized within this system, is contained in Section 4.3.

2.3.1 Option1: Reimpose regulatory salmon savings closures if reported non-compliance with agreement merits expedited action

Under this option, the Council may recommend re-imposition of the regulatory salmon savings area closures on an expedited basis if the situation merits this recommendation. The ICA managers will report to the Council immediately if there is non-participation or non-compliance without effective enforcement action under the VRHS system. In that event, the Council may recommend re-imposition of the regulatory salmon savings area closures on an expedited basis. If the regulatory closure area system is reinstated, it is the Council's intent that the closure areas be based on the most recent information available and if the analysis of Amendment Package B's Alternative 1 supports the approach, with regular adjustments.

2.3.2 Option 2: Maintain the regulatory salmon savings area triggers and closures but participants in a cooperative voluntary rolling hotspot (VRHS) system would be exempted from compliance with savings area closures. This exemption is subject to Council approval and review of the effectiveness of a VRHS system.

Under this option, the existing salmon savings area closures would remain in place. Pollock cooperatives and CDQ groups who participate in a voluntary rolling "hot spot" (VRHS) closure system to avoid salmon bycatch will be granted an exemption to the existing closures. Cooperatives or other vessels which are not participating in a VRHS system will be subject to the savings area closures if triggered.

A full discussion of the specifics of the exemption is contained in section 4.3.10.

2.3.2.1 Suboption (applies to option 2): Extend the exemption to the chum salmon savings area closure to vessels in the trawl cod and/or flatfish targets.

Under this suboption, vessels in the trawl cod and/or flatfish target fisheries would be exempt from compliance with the chum savings area closure. Vessels in these target fleets are not required to participate in a VRHS system to obtain the exemption.

2.4 Alternatives considered but eliminated from this analysis

Alternatives which have been considered by the Council for salmon bycatch management measures include new regulatory salmon savings area closures based upon updated information, and vessel bycatch accountability programs. In February 2005, the Council moved to bifurcate the analytical package which contained these alternatives such that the amendment package considered in this analysis might move forward on a faster track given the necessary time lag that would be required to analyze new closures and develop a vessel bycatch accountability program. In April 2005, the Council further moved that analysis of the two amendment packages, proposed Amendment 84 (this analysis) and Amendment Package B (described below) be initiated simultaneously, understanding that the analysis of Amendment Package B would not be available for review by the Council until 2006.

The following problem statement and alternatives have been adopted by the Council for Amendment Package B.

Problem Statement for Amendment Package B

The Council and NOAA Fisheries have initiated analysis of a voluntary rolling hotspot (VRHS) alternative to regulatory salmon savings area closures. Concurrent with that analysis and possible implementation, development will continue on the alternatives that could be implemented if the VRHS approach does not achieve the desired bycatch reduction.

Two possible scenarios under which the VRHS system could produce unsatisfactory results are (1) breach of the Inter Cooperative Agreement (i.e., one or more vessels fail to participate in the VRHS system, or there are substantial violations of VRHS closures that are not effectively halted through penalties or other measures); or (2) compliance what the VRHS system is good, but the VRHS system fails to achieve the Council's desired level of salmon bycatch reduction. In the first scenario, the Council may ask NOAA Fisheries to reinstate, on an expedited basis, the regulatory salmon savings area closure system that is based on the best information available. In the second scenario, the Council intends to consider implementation of an alternative regulatory system from Package B, or consider and evaluate NOAA Fisheries hot spot management authority as an option for salmon bycatch management.

Alternatives to be Analyzed in Amendment Package B

Alternative 1: Establish new regulatory salmon savings area closures taking into account the most recent available salmon bycatch data. This analysis should be completed first and be updated regularly so that it can be implemented on an expedited basis if necessary.

> **Suboption A:** Adjust the Chinook and non-Chinook regulatory closure areas annually based on the most current bycatch data available, such as the 2-3 year rolling average of bycatch rates by species and area.
>
> **Suboption B:** Adjust the Chinook and non-Chinook regulatory closure areas once, inseason, based on the best bycatch information available.

Alternative 2: Develop a regulatory individual vessel salmon bycatch accountability program.

> **Suboption A:** managed at the individual level
>
> **Suboption B:** managed at the cooperative level

Suboption 1 (to both alternatives): Develop an individual vessel accountability program that may be implemented if, after 3 years, it is determined the pollock cooperatives' "hot zone" closure system has not reduced salmon bycatch.

Suboption 2 (to both alternatives): Analyze the need and implementation strategy of an appropriate cap to meet requirements of National Standard 9.

The Council made additional requests for information to be included in the analysis and provided guidance regarding a research program. These additions and the Council motion are available on the Council website at: *http://www.fakr.noaa.gov/npfmc/current_issues/motions/salmonbycatch405.pdf*.

Given that these alternatives are going to be analyzed in a separate analysis, they are not evaluated under proposed Amendment 84.

Chapter 3 Affected Environment

This section provides background information on salmon bycatch in the BSAI groundfish fisheries (Section 3.1), management measures to control salmon bycatch (Section 3.2), Chinook and ‘other salmon’ stocks and the origin of salmon stocks caught in the groundfish fisheries (Sections 3.3, 3.5, and 3.6), the pollock fishery (Section 3.9), interactions of the fishery with threatened or endangered species (Section 3.10), and ecosystem considerations (Section 3.11).

3.1 Salmon Bycatch in the BSAI Groundfish Fisheries

Salmon are taken incidentally as bycatch in the BSAI trawl fisheries, especially in the pollock pelagic trawl fishery. Nearly all salmon taken as bycatch are comprised of Chinook salmon and chum salmon. Table 3-1 illustrates the bycatch of salmon in the pollock pelagic trawl target fishery as a percentage of total bycatch of salmon in the groundfish fisheries. The pollock fishery caught about 85% of Chinook salmon in 2002-2003. In 2003, approximately 8% of Chinook salmon was caught in the Pacific cod trawl target fishery, about 2% in the Atka mackerel fishery, and the remainder in flatfish trawl target fisheries (Hiatt et al. 2004).

Table 3-1 Contribution of the pollock pelagic trawl target fishery to salmon bycatch, 1998-2003

Species	Year	Pollock pelagic trawl target fishery (1000s of fish)	All groundfish fisheries (1000s of fish)	Percent of salmon caught in the pollock pelagic trawl target fishery
Chinook salmon	1998	44.5	50.0	89%
	1999	10.2	12.4	82%
	2000	4.1	7.1	58%
	2001	30.1	37.9	79%
	2002	34.2	39.6	86%
	2003	46.3	55.0	84%
“Other salmon”	1998	46.6	51.2	91%
	1999	44.2	46.6	95%
	2000	56.6	57.6	98%
	2001	52.8	57.3	92%
	2002	78.6	80.7	97%
	2003	190.9	194.7	98%

Source: Hiatt et al. 2004, 2002, 2000.

In both 2002 and 2003, about 97% of the ‘other salmon’ bycatch occurred in the pollock trawl fishery. An overall 140% increase of ‘other salmon’ catch occurred between 2002 and 2003. However, part of the difference in bycatch of ‘other salmon’ bycatch between 2002 and 2003 could be a result of the change to the new catch accounting system (Hiatt and Terry 2004).

Chum salmon are included in the “other salmon” category for reporting, and on average over 95% of all “other salmon” are comprised of chum salmon (ADF&G 1995a). Recent data from 2001-2004 has also shown that by species, chum make up over 98% of the salmon in the “other salmon” category (Table 3-2).

Table 3-2 Bycatch of salmon species comprising the 'other salmon' management category, 2001-2005, in numbers of fish

Year	Sockeye	Coho	Pink	Chum	Total	% Chum
2001	178	584	12	51,152	51,926	98.5
2002	1	143	45	66,975	67,164	99.7
2003	24	111	106	139,421	139,662	99.8
2004	13	135	135	363,019	363,302	99.9
2005*	0	222	2	658	882	74.6
Total	216	1,195	300	621,225	622,936	99.7

*catch data through March 2005
Source: NOAA Fisheries Catch Accounting (note these data are preliminary)

Bycatch numbers included in Table 3-2 are the extrapolated numbers from sampled hauls only. These data represent one of the multiple data sources used to comprise the fully extrapolated bycatch numbers (in order to account for unobserved vessels) and thus should only be used as an indication of the percent contribution of chum salmon to the total other salmon category and not as a measure of the total estimate of other salmon bycatch for those years listed in Table 3-2.

While bycatch of chum salmon is predominantly from the pollock fishery (as shown in Table 3-1), under current regulations the catch of chum salmon in other groundfish trawl fisheries contributes towards the trigger amount for the Chum Salmon Savings Area. The total incidental catch of non-chinook salmon by target fishery in the BSAI from 1998-2004 is shown in Table 3-3. In 2004, the Pacific cod fishery had a much higher incidental catch of chum than in previous years. However, totals for all other fisheries are very small in comparison with the pollock trawl contribution to the total chum salmon incidental catch.

Table 3-3 Incidental catch of non-chinook salmon by target fishery, 1998-2004

Year	Atka mackerel	Pacific cod	Other flatfish	Rockfish	Flathead sole	Rock sole	Arrowtooth flounder	Yellowfin sole	Total
1998	162	669	2	0	93	0	0	239	1,165
1999	505	33	2	0	285	439	0	412	1,676
2000	255	128	1	0	108	0	0	188	680
2001	347	1835	0	171	67	356	46	620	3,442
2002	10	921	15	0	121	31	25	446	1,569
2003	346	988	174	0	0	0	0	520	2,037
2004	142	6,563	45	0	2,369	0	0	233	9,353

Source: NOAA Fisheries Catch Accounting

The majority of chum salmon bycatch occurs later in the year during the pollock “B” season (Figure 3-1), while Chinook is taken as bycatch in both the “A” and “B” seasons (Figure 3-2).

Figure 3-1 2004 BSAI "other salmon" bycatch, and groundfish catch in the pollock trawl fishery, by week

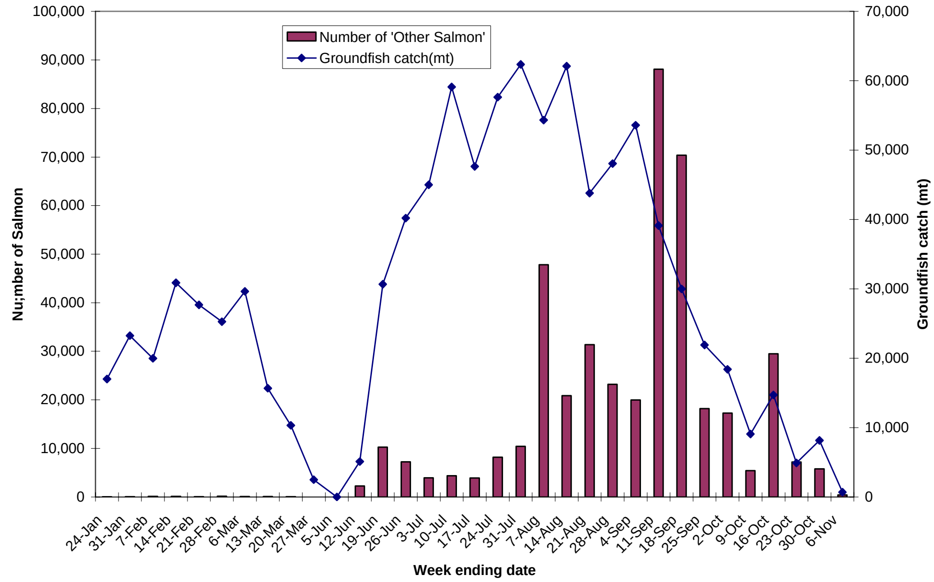
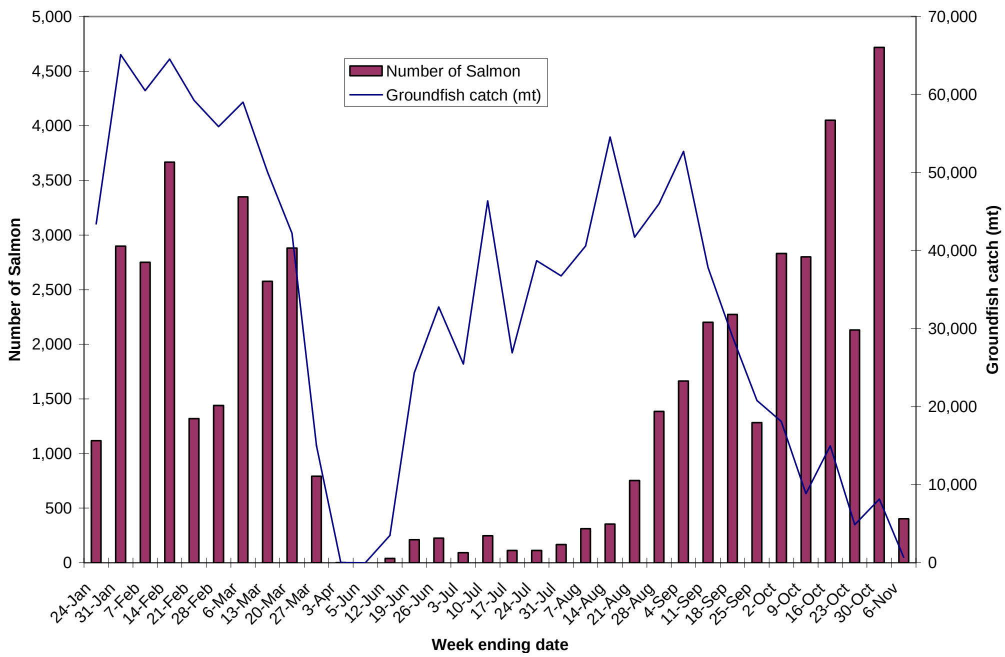


Figure 3-2 2004 BSAI Chinook salmon bycatch, and groundfish catch in the pollock trawl fishery, by week



The survival rate of discarded salmon is thought to approach zero (Hiatt and Terry 2004).

3.2 Management Measures to Control Salmon Bycatch in the BSAI Groundfish Fisheries

The BSAI Groundfish FMP specifies trigger limits for catch of chum and Chinook salmon by the directed pollock fishery. When these limits are reached, the FMP authorizes regulatory measures to close specific areas to directed fishing for pollock.

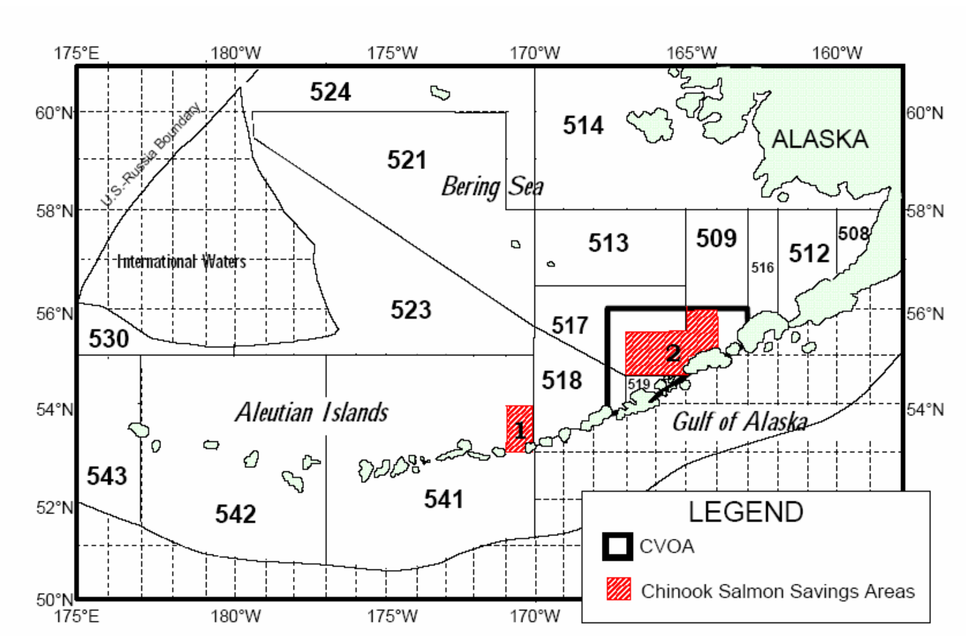
For Chinook salmon, the Chinook Salmon Savings Areas were established under BSAI Amendment 21b (ADF&G 1995a) and revised under BSAI Amendment 58 (NMFS 1999) (Figure 3-3). These areas close to pollock trawling if 29,000[1] Chinook salmon are taken. The timing of the closure depends upon when the limit is reached:

1. If the limit is triggered before April 15, the areas close immediately through April 15. After April 15, the areas re-open, but are again closed from September 1-December 31.
2. If the limit is reached after April 15, but before September 1, the areas would close on September 1 through the end of the year.
3. If the limit is reached after September 1, the areas close immediately through the end of the year.

BSAI amendment 58 modified the initial Chinook salmon savings area measures (established under amendment 21b). Modifications from this amendment in 1999 included: a reduced Chinook limit from 48,000 to 29,000 over a four year period, year-round accounting of Chinook bycatch in the pollock fishery beginning on January 1 of each year, revised boundaries of the savings area closures, and new closure dates. The initial Chinook Salmon Savings Areas included an area south of the Pribilofs (ADF&G 1995). This area was removed as a savings area under amendment 58. The revision to the closure dates under this amendment specified the additional closure from September 1-December 31 under the conditions listed in bullets 1-3 above.

The Chinook Salmon Savings Areas were further modified under Amendment 82, which allocated the Aleutian Islands subarea pollock harvest to the Aleut Corporation. The amendment also established a separate Aleutian Islands subarea Chinook PSC limit, of 700 fish, the attainment of which by the Aleutian Islands pollock fishery will close the Chinook Salmon Savings Area 1 (Figure 3-3) to the directed fishery for pollock in the Aleutian Islands. The Aleutian Islands Chinook PSC limit and closure area is unaffected by this action.

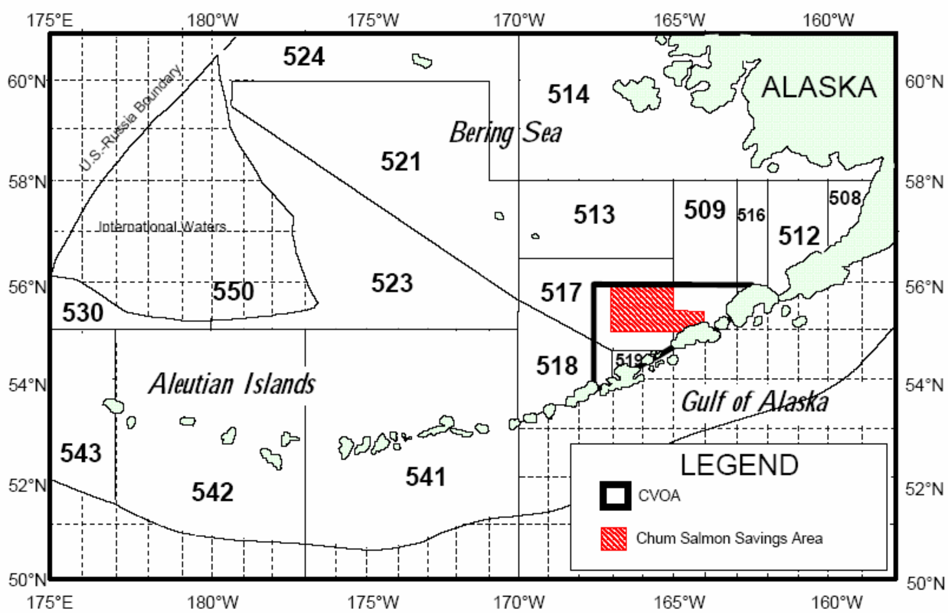
Figure 3-3 Chinook Salmon Savings Area and Catcher Vessel Operational Area (CVOA)



[1] This number is inclusive of the allocation to CDQ groups. Non-CDQ Chinook salmon limit is 26,825.

For Chum salmon, the Chum Salmon Savings Area was established in 1994 by emergency rule, and then formalized in the BSAI Groundfish FMP in 1995 under Amendment 35 (ADF&G 1995b) (Figure 3-4). This area is closed to all trawling from August 1 through August 31. Additionally, if 42,000[2] 'other" salmon are caught in the Catcher Vessel Operational Area (CVOA) during the period August 15-October 14, the area remains closed. As catcher processors are prohibited from fishing in the CVOA during the "B" season, unless they are participating in a CDQ fishery, only catcher vessels and CDQ fisheries are affected by the PSC limit.

Figure 3-4 Chum Salmon Savings Area and Catcher Vessel Operational Area (CVOA)



Since their establishment, the Chinook Salmon Savings Areas have been triggered only in 2003 and 2004. Prior to 2003, the trigger limit of Chinook salmon bycatch was not reached. In 2003, the area closed to directed trawl fishing for non-CDQ pollock on September 1 with the closure remaining in effect until the end of the calendar year. In 2004, the Chinook Salmon Savings Areas closed to directed trawl fishing for non-CDQ pollock on September 5 through the end of the year.

As specified in the regulations, the Chum Salmon Savings Area closes annually from August 1-31, and again if the trigger limit is reached by the directed pollock fishery. Since the establishment of the savings area in 1995, the bycatch of 'other salmon' has triggered an additional closure in 2002, 2003, and 2004. In 2002, the Chum Salmon Savings Area closed to directed trawl fishing for non-CDQ pollock between September 21 and October 14. In 2003, the area was closed between September 24 and October 14; and in 2004, the Chum Salmon Savings Area closed to directed trawl fishing for non-CDQ pollock on September 14 and remained closed through October 14.

3.3 North Pacific Salmon Management Overview

Chum and Chinook salmon stocks are fished commercially throughout the Pacific Rim. Management and hatchery efforts occur in Russia, Korea and Japan as well as for North American stocks in Canada, Alaska and the Pacific Northwest. The following section provides a brief overview of salmon hatchery and commercial catch and management information for those regions as available.

[2] This number is inclusive of the allocation to CDQ groups. Non-CDQ 'other salmon' limit is 38,850.

3.3.1 Hatchery releases and commercial catch by country

Commercial salmon fisheries exist around the Pacific Rim with most countries releasing salmon fry in varying amounts by species. The North Pacific Anadromous Fish Commission summarizes information on hatchery releases by country and by area where available. Table 3-4 and Table 3-6 summarize annual salmon fry releases by species and country for 1999-2003.

Table 3-4 Hatchery releases of juvenile chum salmon in millions of fish

Year	Russia	Japan	Korea	Canada	US	Total
1999	278.7	1867.9	21.5	172.0	520.8	2860.9
2000	326.1	1817.4	19.0	124.1	546.5	2833.1
2001	316.0	1831.2	5.3	75.8	493.9	2722.2
2002*	306.8	1851.6	10.5	155.3	507.20	2831.4
2003*	363.2	1840.6	14.7	1376.7	496.3	4091.5

*preliminary data NPAFC

For Chum salmon, Japanese hatchery releases far exceed releases by any other Pacific Rim country. This is followed by the US and Russia. A further break-out of hatchery releases by area in the US show that the majority of chum salmon fry releases occur in the Alaska region (Table 3-5).

Table 3-5 US west coast hatchery releases of juvenile chum salmon in millions of fish

Year	Alaska	Washington	Oregon	California	Idaho	WA/OR/CA/ID (combined)	Total
1999	460.9	59.9	-	-	-		520.8
2000	507.7	38.8	-	-	-		546.5
2001	465.4	28.4	-	-	-		493.9
2002*	450.8					56.4	507.2
2003*	435.6					60.7	496.3

Source: NPAFC

Recent stock origin analysis (see Section 3.5 for more detailed stock origin information) indicates that the majority of incidentally caught chum salmon in BSAI trawl fisheries is of Asian Origin. Combined Asian hatchery releases in 2003 (Russia, Japan, Korea) account for 78% of the total releases while Alaskan chum releases account for 15% of the total releases. Chum enhancement projects in Alaska are not active in the AYK region.

Chinook salmon hatchery releases by country are shown below in Table 3-6.

Table 3-6 Hatchery releases of juvenile Chinook salmon in millions of fish

Year	Russia	Japan	Korea	Canada	US	Total
1999	0.6	-	-	54.4	208.1	263.1
2000	0.5	-	-	53.0	209.5	263.0
2001	0.5	-	-	45.5	212.1	258.1
2002	0.3	-	-	52.8	222.1	275.2
2003	0.7	-	-	50.2	210.6	261.5

For Chinook salmon fry the United States has the highest number of annual releases, followed by Canada. There are no hatchery releases of Chinook salmon in Japan and Korea and only a limited number in

Russia. Of the US releases however, a breakout by area shows that the highest numbers are coming from Washington State, followed by California and then Oregon (Table 3-7).

Table 3-7 US west coast hatchery releases of juvenile Chinook salmon in millions of fish

Year	Alaska	Washington	Oregon	California	Idaho	WA/OR/CA/ID (combined	Total
1999	8.0	114.5	30.5	45.4	9.7		208.1
2000	9.2	117.4	32.3	43.8	6.8		209.5
2001	9.9	123.5	28.4	45.0	5.4		212.1
2002*	8.4					213.6	222.0
2003*	9.3					201.3	210.6

There are no enhancement efforts for the AYK region. Recent information on origin of Chinook salmon stocks indicates that the majority of intercepted incidentally caught Chinook salmon in the BSAI trawl fisheries is of western Alaskan origin (see Section 3.8 for more information on origin of trawl caught salmon species).

Japan accounts for the majority of commercially caught chum salmon, with the United States accounting for the majority of commercially caught Chinook salmon (Table 3-8 and Table 3-9; source NPAFC website)

Table 3-8 Commercial catch of chum salmon (thousands of fish)

Year	Russia	Japan	Canada	US	Total
1999	7,269	48,170	939	21,236	77,614
2000	9,606	42,551	551	24,595	77,302
2001	8,421	60,668	1,102	17,019	87,210

Table 3-9 Commercial catch of Chinook salmon (thousands of fish)

Year	Russia	Japan	Canada	US	Total
1999	92	10	127	973	1,201
2000	57	10	71	1,144	1,282
2001	58	2	95	649	804

3.4 Western Alaska Chinook Salmon Stock Status

Overview information in this section is extracted from Delaney (1994). Other information on Chinook salmon may be found at the Alaska Department of Fish and Game (ADF&G) website, http://www.cf.adfg.state.ak.us/geninfo/finfish/salmon/salmhome.php.

The Chinook salmon (*Oncorhynchus tshawytscha*) is the largest of all Pacific salmon, with weights of individual fish commonly exceeding 30 pounds. In North America, Chinook salmon range from the Monterey Bay area of California to the Chukchi Sea area of Alaska. In Alaska, it is abundant from the southeastern panhandle to the Yukon River. Major populations return to the Yukon, Kuskokwim, Nushagak, Susitna, Kenai, Copper, Alsek, Taku, and Stikine rivers. Important runs also occur in many smaller streams.

Like all species of Pacific salmon, Chinook salmon are anadromous. They hatch in fresh water, spend part of their life in the ocean, and then spawn in fresh water. All Chinooks die after spawning. Chinook salmon may become sexually mature from their second through seventh year, and as a result, fish in any spawning run may vary greatly in size. For example, a mature 3-year-old will probably weigh less than 4 pounds, while a mature 7-year-old may exceed 50 pounds. Females tend to be older than males at maturity. In many spawning runs, males outnumber females in all but the 6- and 7-year age groups. Small Chinooks that mature after spending only one winter in the ocean are commonly referred to as "jacks" and are usually males. Alaska streams normally receive a single run of Chinook salmon in the period from May through July.

Chinook salmon migrate through coastal areas as juveniles and returning adults; however, immature Chinook salmon undergo extensive migrations and can be found inshore and offshore throughout the North Pacific and Bering Sea. In summer, Chinook salmon concentrate around the Aleutian Islands and in the western Gulf of Alaska (Eggers 2004).

Juvenile Chinooks in fresh water feed on plankton, then later eat insects. In the ocean, they eat a variety of organisms including herring, pilchard, sandlance, squid, and crustaceans. Salmon grow rapidly in the ocean and often double their weight during a single summer season.

North Pacific Chinook salmon are the subject of commercial, subsistence, and recreational fisheries. The majority of the Alaska commercial catch is made in Southeast, Bristol Bay, and the Arctic-Yukon-Kuskokwim areas. Fish taken commercially average about 18 pounds. The majority of the catch is made with troll gear and gillnets. Approximately 90 percent of the subsistence harvest is taken in the Yukon and Kuskokwim rivers.

The Chinook salmon is perhaps the most highly prized sport fish in Alaska and is extensively fished by anglers in the Southeast and Cook Inlet areas. The sport fishing harvest of Chinook salmon is over 76,000 annually, with Cook Inlet and adjacent watersheds contributing over half of the catch.

Unlike “other salmon” species, Chinook salmon rear in inshore marine waters and are, therefore, available to commercial and sport fishers all year. Catches of Chinook salmon in Southeast Alaska are regulated by quotas set under the Pacific Salmon Treaty. In other regions of Alaska, Chinook salmon fisheries are also closely managed to ensure stocks of Chinook salmon are not overharvested.

Directed commercial Chinook salmon fisheries occur in the Yukon River, Nushagak District, Copper River, and the Southeast Alaska Troll fishery. In all other areas chinook are taken incidentally and mainly in the early portions of the sockeye salmon fisheries. Catches in the Southeast Alaska troll fishery have been declining in recent years due to U.S./Canada treaty restrictions and declining abundance of chinook salmon in British Columbia and the Pacific Northwest. Chinook salmon catches have been moderate to high in most regions over the last 20 years (Eggers 2004).

Yukon River Chinook

Chinook salmon production for many stocks in the Yukon River has been declining in recent years. These stocks have been classified as stocks of concern (Eggers 2004). Classification as a stock of concern is a determination which is made by the Alaska Board of Fisheries. This determination for Yukon River Chinook salmon was made at the September 2000 Board of Fisheries (BOF) meeting and was subsequently continued at the January 2004 Board of Fisheries meeting. This determination will next be reviewed in January 2007.

State of Alaska regulations define a "stock of concern" under the Sustainable Salmon Fisheries Policy (SSFP) 5 AAC 39.222 (ADF&G/BOF 2001) as "a stock of salmon for which there is a yield, management or conservation concern". Yukon Chinook salmon and Fall chum salmon stocks were designated as stocks for which there was a yield concern, while Yukon Summer chum salmon was designated as a management concern.

The terms "yield concern", "management concern" and "conservation concern" are defined in state regulations under the SSF policy. Here "yield concern" is defined as "a concern arising from a chronic inability, despite the use of specific management measures, to maintain expected yields, or harvestable surpluses, above a stock's escapement needs". "Management concern" indicates a "concern arising from a chronic inability, despite use of specific management measures, to maintain escapements for a salmon stock within the bounds of the sustainable escapement goal (SEG), the biological escapement goal (BEG), optimal escapement goal (OEG) or other specified management objectives for the fishery". Finally a "conservation concern" is defined as "concern arising from a chronic inability, despite the use of specific management measures, to maintain escapements for a stock above a sustained escapement threshold (SET)". It is further noted that "a conservation concern is more severe than a management concern which is more severe than a yield concern" (ADF&G/BOF 2001).

The SSF policy requires that a management plan and an action plan be developed to address the stock of concern. These are developed by the ADF&G and provided to the BOF and the public for the regulatory process to discuss. A part of the action plan process is to review other fisheries that may be harvesting the stock of concerns and whether any regulatory action may be necessary.

The Yukon River Chinook stock continues to meet the definition of a yield concerns based on low harvest levels from 1998-2002. Commercial and subsistence harvests together with minimum run estimates for Chinook salmon for the Yukon are shown in Table 3-10. Minimum run estimates for the Yukon Chinook are considered as an index of the population rather than an indication of the total run for Chinook salmon. The index is based upon sonar counts at Pilot Station which is more effective at estimating counts of chum salmon than for Chinook. Thus the index is considered a conservative under-estimate of the total run for Chinook salmon. Additional information on mark and recapture data for Yukon Chinook is anticipated to be reported in the near future.

Table 3-10 Yukon River Chinoook Total Run Index 1995-2004

	Harvests below Pilot Station		Pilot Station	Total Run
	Subsistence	Commercial	passage index [a]	Index
1995	11,706	102,820	159,896	274,422
1996[b]				
1997	15,389	95,947	158,898	270,234
1998	14,986	35,942	84,512	135,440
1999	14,507	53,015	148,624	216,146
2000	12,529	7,550	43,590	63,669
2001[c]	16,033		99,486	115,519
2002	12,267	18,325	120,616	151,208
2003	13,941	32,120	269,427	315,488
2004[d]	13,687	36,135	193,823	243,645

a Pilot Station sonar is considered an index for Chinook salmon and is not a total run estimate. Its efficiency is counting chum salmon, not Chinook salmon.
b The Pilot Station sonar project did not operate, therefore, the total run index for 1995 is not available.
c No commercial fishing occurred in 2001.
d Preliminary data.

Combined commercial and subsistence harvests also show a substantial decrease in yield in recent years (1999-2003) as compared with the average from 1989-1998 (lingnau and Bergstrom, 2003). Subsistence harvests remain stable but commercial harvests have been constrained by managers in order to meet escapement and subsistence needs (Table 3-10). There was no commercial fishery in 2001. Since 2002 the run index and harvest indications have been elevated enough to allow for a limited commercial fishery. While average yield goals have been insufficiently maintained despite these management actions, escapement goals have been consistently met throughout most of the Yukon drainage area since 2000 (Lingnau and Bergstrom, 2003).

Yukon river Chinook salmon return primarily as age-5 and age-6 fish (combined freshwater and saltwater age, e.g., age 1.4 and 1.5), although age-4 and age-7 fish also contribute to the run (Bue and Lingnau, 2005). Spawning ground escapements in 1999 (producing 6 year old fish in 2005) were above the upper end of the escapement goals in both Chena and Sacha Rivers but below the escapement objective in Canada (Bue and Lingnau, 2005). The 4-year-old component in 2004 was above average (2000 escapement) while the 5-year-olds component in 2004 (1999 escapements) was below average. Runs in 2003 and 2004 have been near average which indicates good production as compared to the poor runs from 1998-2000 (Bue and Lingnau, 2005).

Kuskokwim River Chinook

Kuskokwim River Chinook salmon are harvested primarily for subsistence use. Directed commercial fishing was discontinued in 1987 by regulation. Incidental harvest of Chinook salmon occurs in the commercial chum fishery during late June and July (Bergstrom and Whitmore, 2004). Kuskokwim River Chinook salmon were classified as a stock of concern for yield concerns by the Board of Fisheries in September 2000, with the classification continued following review in 2003. Chinook escapements from 1998 to 2000 were below average while escapements since 2000 have been average or better (Bergstrom and Whitmore, 2004). The existing SEG for Chinook salmon at the Krogrukluk River weir was met in 2002 and 2003 and was nearly met in 2001 (Figure 3.5) Since 2000, Chinook salmon runs have been improving.

Recent poor runs (1998-2000) are believed to be a result of poor ocean conditions rather than from poor parent runs (Bergstrom and Whitmore, 2004). Recent years of poor runs were from parent year escapements (1992-1995 escapements) that were at average to above average levels Bergstrom and Whitmore, 2004). Chinook salmon escapements are evaluated by aerial surveys during most years in portions of at least 13 drainages of the Kuskokwim River as well as by weirs on six tributary streams (Table 3-11).

	Lower Kuskokwim				Middle Kuskokwim							Upper Kuskokwim	
Year	Eek	Kwethluk Canyon C.	Kisaralik	Tuluksak	Aniak	Kipchuk (Aniak)	Salmon (Aniak)	Holokuk	Oskawalik	Holitna	Kogrukluk Weir	Cheeneetnuk	Salmon (Pitka)
1975			118			94		17	71	1,114			
1976				139		177		126	204	2,571	5,579	1,197	1,146
1977		2,290		291			562	60	276			1,399	1,978
1978	1,613	1,732	2,417	403			289			2,766	13,667	267	1,127
1979		911						113			11,338		699
1980	2,378			725			1,186	250	123				1,177
1981		1,783	672		9,074		894				16,655		1,474
1982	230				2,645		185	42	120	521	10,993		419
1983	188	471	731	129	1,909		231	33	52	1,069		243	586
1984		273	157	93	1,409					299	4,926	1,177	577
1985	1,118	629		135				135	61		4,619	1,002	625
1986					909		336	100		850	5,038	381	
1987	1,739	975		60		193	516	208	193	813		317	
1988	2,255	766	840	188	945		244	57	80		8,506		501
1989	1,042	1,157	152		1,880	994	631				11,940		446
1990	1,983	1,295	631	166	1,255	537	596	143	113		10,218		
1991	1,312	1,002		342	1,564	885	583				7,850		
1992					2,284	670	335	64	91	1,822	6,755	1,050	2,555
1993					2,687	1,248	1,082	114	103	1,573	12,332	678	1,012
1994		848	1,021		1,848	1,520	1,218				15,227	1,206	1,010
1995			1,243		3,174	1,215	1,442	181	289	2,787	20,630	1,565	1,911
1996					3,496		983	85			14,199		
1997			439	173	2,187	855	980	322	1,470	2,093	13,280	345	
1998		27	457		2,239	353							
1999								18	98	741	5,570		
2000					714	182	152	42	62	501	3,181		
2001							598	52	158	4,247	9,298	217	1033
2002		1,795	2,285		1,856	1,615	1,236	513	235	1,741	10,059	730	1,276
2003	1,236	2,628	654	94	3,514	1,493	1,242	528	844		11,760	810	1,371
BEG	1,460[b]	**1,200[e]**	**1,000[e]**	**400[e]**	**1,500[e]**	670[b]	**600[e]**	107[b]	108[b]	**2,000[e]**	**10,000[e]**	1,002[b]	**1,300[e]**

a Estimates are from "peak" aerial surveys conducted between 20 and 31 July under fair, good, or excellent viewing conditions.
b Median of years 1975 through 1994.

Table 3-11 Aerial survey counts of Chinook salmon in Kuskokwim River spawning tributaries and Kognukluk weir Chinook salmon passage, 1975-2003.

Bristol Bay Chinook: Nushagak River

The primary managed Bristol Bay Chinook salmon stocks are in the Nushagak River although management occurs on rivers within each of the districts comprising Bristol Bay. Harvest, escapement, and total run estimates for the Nushagak River are shown in Table 3-12. Management decisions are dependant upon estimates of inriver salmon escapements provided by the sonar counters on the lower Nushagak River.

Table 3-12 Chinook salmon harvest, escapement and total runs in the Nushagak District, 1984-2002

	Harvests by Fishery				Inriver	Spawning	
Year	Commercial	Sport	Subsistence	Total	Abundance [a]	Escapement [b]	Total Run
1982	195,287	1,803	12,100	209,190		147,000	356,190
1983	137,123	2,003	11,800	150,926		161,730	312,656
1984	61,378	2,320	9,800	73,498		80,940	154,438
1985	67,783	1,838	7,900	77,521		115,720	193,241
1986	65,783	4,790	12,600	83,173	43,434	33,854	117,027
1987	45,983	4,458	12,200	62,641	84,309	75,891	138,532
1988	16,648	2,817	10,079	29,544	56,905	50,946	80,490
1989	17,637	3,613	8,122	29,372	78,302	72,601	101,973
1990	14,812	3,486	12,407	30,705	63,955	55,931	86,636
1991	19,718	5,551	13,627	38,896	104,351	94,733	133,629
1992	47,563	4,755	13,588	65,906	82,848	74,094	140,000
1993	62,976	5,899	17,709	86,584	97,812	86,706	173,290
1994	119,480	10,626	15,490	145,596	95,954	83,103	228,699
1995	79,943	4,951	13,701	98,595	85,622	77,018	175,613
1996	72,011	5,390	15,941	93,342	52,127	42,228	135,570
1997	64,156	3,497	15,318	82,971		82,000	164,971
1998	117,079	5,827	12,258	135,164	117,495	108,037	243,201
1999	10,893	4,237	10,057	25,187	62,331	54,703	79,890
2000	12,055	6,017	9,470	27,542	56,374	47,674	75,216
2001	11,568	5,899	26,939	44,406	99,155	83,272	127,678
2002	39,473	3,693	11,281	54,447	87,141	79,790	134,237
2003	42,615	5,590	18,686	66,891	80,028	67,403	134,294
20-Year Ave.	49,478	4,763	13,359	67,599	79,303	73,332	140,931
1984-93 Ave.	42,028	3,953	11,803	57,784	76,490	74,142	131,926
1994-03 Ave.	56,927	5,573	14,914	77,414	81,803	72,523	149,937
2004	93,414	5,000 [c]	20,000	118,414	116,400	103,800	222,214

[a] Inriver abundance estimated by sonar below the village of Portage Creek.

[b] Spawning escapement estimated from the following: 1984-85—correlation between index counts and total escapement estimates when aerial surveys were complete (results rounded to the nearest thousand fish). 1997—comprehensive aerial surveys. 1986-1996, 1998-2004—Inriver abundance estimated by sonar minus inriver harvests.

[c] Guideline harvest level used as estimate.

Abundance estimates have been increasing dramatically in recent years, with the 2004 total run estimate of over 222 thousand. The 2005 run was forecasted to be even higher at 243 thousand which is approximately 1.6 times greater than the previous 10 and 20 year means (ADF&G website).

Norton Sound Chinook

Chinooks salmon stocks in Shaktoolik and Unalakleet subdistricts were classified as stocks of concern in January 2004. These were classified as stocks of yield concern. The classification was in response to decreasing Chinook salmon harvests (Table 3-13).

Chinook salmon outlooks and harvest projections are based on qualitative assessments of parent year escapements, subjective determinations of freshwater overwintering and ocean survival, and projections (for commercial fishery) of local market conditions (Menard, 2005). Limited commercial fishing occurs for Chinook salmon in Norton Sound district. Norton Sound Chinook salmon are fully exploited and management strives to protect the early portion of the return from overharvesting and to provide adequate escapements (Menard, 2005). Escapement estimates were not available for this stock.

Table 3-13 Commercial, subsistence, and sport salmon catch by species, by year for all subdistricts in Norton Sound District, 1966-2004.

	Commercial						Subsistence						Sport					
Year	Chinook	Sockeye	Coho	Pink	Chum	Total	Chinook	Sockeye	Coho	Pink	Chum	Total	Chinook	Sockeye	Coho	Pink	Chum	Total
1966	1,553	14	5,755	12,778	80,245	100,345	269	-	2,210	14,335	21,873	38,687	-	-	-	-	-	-
1967	1,804	-	2,379	28,879	41,756	74,818	817	-	1,222	17,516	22,724	42,279	-	-	-	-	-	-
1968	1,045	-	6,885	71,179	45,300	124,409	237	-	2,391	36,912	11,661	51,201	-	-	-	-	-	-
1969	2,392	-	6,836	86,949	82,795	178,972	436	-	2,191	18,562	15,615	36,804	-	-	-	-	-	-
1970	1,853	-	4,423	64,908	107,034	178,218	561	-	4,675	26,127	22,763	54,126	-	-	-	-	-	-
1971	2,593	-	3,127	4,895	131,362	141,977	1,026	197	4,097	10,863	21,618	37,801	-	-	-	-	-	-
1972	2,938	-	454	45,182	100,920	149,494	804	93	2,319	14,158	13,873	31,247	-	-	-	-	-	-
1973	1,918	-	9,282	46,499	119,098	176,797	392	-	520	14,770	7,185	22,867	-	-	-	-	-	-
1974	2,951	-	2,092	148,519	162,267	315,829	420	-	1,064	16,426	3,958	21,868	-	-	-	-	-	-
1975	2,393	2	4,593	32,388	212,485	251,861	186	11	192	15,803	8,113	24,305	-	-	-	-	-	-
1976	2,243	11	6,934	87,919	95,956	193,063	203	-	1,004	18,048	7,718	26,973	-	-	-	-	-	-
1977	4,500	5	3,690	48,675	200,455	257,325	846	-	2,530	14,296	26,607	44,279	197	0	449	2,402	670	3,718
1978	9,819	12	7,335	325,503	189,279	531,948	1,211	-	2,981	35,281	12,257	51,730	303	0	742	7,399	546	8,990
1979	10,706	57	31,438	167,411	140,789	350,401	747	-	8,487	25,247	11,975	46,456	-	-	-	-	-	-
1980	6,311	40	29,842	227,352	180,792	444,337	1,397	-	8,625	63,778	19,622	93,422	52	0	1,455	7,732	1,601	10,840
1981	7,929	56	31,562	232,479	169,708	441,734	2,021	38	13,416	28,741	32,866	77,082	70	0	1,504	3,101	1,889	6,564
1982	5,892	10	91,690	230,281	183,335	511,208	1,011	8	14,612	54,249	18,580	88,460	409	0	2,986	13,742	2,620	19,757
1983	10,308	27	49,735	76,913	319,437	456,420	-	-	-	-	-	-	687	0	3,823	4,583	2,042	11,135
1984	8,455	6	67,875	119,381	146,442	342,159	-	-	-	-	-	-	247	351	7,582	8,322	1,481	17,983
1985	19,491	166	21,968	3,647	134,928	180,200	-	-	-	-	-	-	239	20	1,177	1,138	1,036	3,610
1986	6,395	233	35,600	41,260	146,912	230,400	-	-	-	-	-	-	1,077	19	3,926	3,172	1,719	9,913
1987	7,080	207	24,279	2,260	102,457	136,283	-	-	-	-	-	-	615	924	2,319	1,304	814	5,976
1988	4,096	1,252	37,214	74,604	107,966	225,132	-	-	-	-	-	-	400	782	5,038	2,912	1,583	10,715
1989	5,707	265	44,091	123	42,625	92,811	-	-	-	-	-	-	203	165	4,158	3,564	1,497	9,587
1990	8,895	434	56,712	501	65,123	131,665	-	-	-	-	-	-	364	198	3,305	7,647	925	12,439
1991	6,068	203	63,647	-	86,871	156,789	-	-	-	-	-	-	404	237	5,800	1,738	1,415	9,594
1992	4,541	296	105,418	6,284	83,394	199,933	-	-	-	-	-	-	204	131	4,671	6,403	523	11,932
1993	8,972	279	43,283	157,574	53,562	263,670	-	-	-	-	-	-	595	10	3,783	2,250	691	7,329
1994	5,285	80	102,140	982,389	18,290	1,108,184	7,374	1,161	22,124	71,066	25,020	126,745	600	18	5,547	7,051	536	13,752
1995	8,860	128	47,862	81,644	42,898	181,392	7,766	1,222	23,015	38,594	43,014	113,611	438	104	3,705	928	394	5,569
1996	4,984	1	68,206	487,441	10,609	571,241	7,255	1,182	26,304	64,724	34,585	134,050	662	100	7,289	5,972	662	14,685
1997	12,573	161	32,284	20	34,103	79,141	8,998	1,892	16,476	27,200	26,803	81,370	1,106	30	4,393	1,458	278	7,265
1998	7,429	7	29,623	588,013	16,324	641,396	8,295	1,214	19,007	51,933	20,032	100,480	590	16	4,441	6,939	682	12,668
1999	2,508	0	12,662	0	7,881	23,051	6,144	1,177	14,342	20,017	19,398	61,078	630	0	5,582	3,039	211	9,462
2000	752	14	44,409	166,548	6,150	217,873	4,149	682	17,062	38,308	17,283	77,485	889	45	7,441	2,886	1,097	12,358
2001	213	44	19,492	0	11,100	30,849	5,576	767	14,543	30,253	20,210	71,349	271	39	4,802	360	1,709	7,181
2002	5	1	1,759	0	600	2,365	5,469	763	15,086	64,354	17,817	103,489	802	0	4,211	4,303	818	10,134
2003	12	16	17,058	0	3,560	20,646	5,290	801	14,105	49,674	13,913	83,783	2003 data not yet available					
2004	0	40	42,016	0	6,296	48,352	3,716	428	9,898	66,718	3,695	84,455	2004 data not yet available					

3.5 Western Alaskan 'Other Salmon' Stock Status

Five species of salmon occur in Alaskan waters. The remaining four species, after Chinook, are managed together in the 'other salmon' management category. The category includes chum salmon (*Oncorhynchus keta*), sockeye salmon (*Oncorhynchus nerka*), coho salmon (*Oncorhynchus kisutch* (Walbaum)), and pink salmon (*Oncorhynchus gorbuscha*). As chum salmon represent over 95% of 'other salmon' caught as bycatch in the groundfish fisheries, this section will focus on chum salmon.

The overview information in this section is extracted from Bukliss (1994). Other information on Chum salmon may be found at the Alaska Department of Fish and Game (ADF&G) website, http://www.cf.adfg.state.ak.us/geninfo/finfish/salmon/salmhome.php.

Chum salmon have the widest distribution of any of the Pacific salmon. They range south to the Sacramento River in California and the island of Kyushu in the Sea of Japan. In the north they range east in the Arctic Ocean to the Mackenzie River in Canada and west to the Lena River in Siberia.

Chum salmon often spawn in small side channels and other areas of large rivers where upwelling springs provide excellent conditions for egg survival. They also spawn in many of the same places as do pink salmon, i.e., small streams and intertidal zones. Some chum in the Yukon River travel over 2,000 miles to spawn in the Yukon Territory.

Chum do not have a period of freshwater residence after emergence of the fry as do Chinook, coho, and sockeye salmon. Chum fry feed on small insects in the stream and estuary before forming into schools in salt water where their diet usually consists of zooplankton. By fall they move out into the Bering Sea and Gulf of Alaska where they spend one or more of the winters of their 3- to 6-year lives. In southeastern Alaska most chum salmon mature at 4 years of age, although there is considerable variation in age at maturity between streams. There is also a higher percentage of chums in the northern areas of the state. Chum vary in size from 4 to over 30 pounds, but usually range from 7 to 18 pounds, with females usually smaller than males.

Chum salmon are the most abundant commercially harvested salmon species in arctic, northwestern, and Interior Alaska, but are of relatively less importance in other areas of the state. There they are known locally as "dog salmon" and are a traditional source of dried fish for winter use. Sport fishers generally capture chum salmon incidental to fishing for other Pacific salmon in either fresh or salt water. After entering fresh water, chums are most often prepared as a smoked product. In the commercial fishery, most chum are caught by purse seines and drift gillnets, but fishwheels and set gillnets harvest a portion of the catch. In many areas they have been harvested incidental to the catch of pink salmon. The development of markets for fresh and frozen chum in Japan and northern Europe has increased their demand.

Chum salmon are generally caught incidental to other species and catches may not be good indicators of abundance. In recent years chum salmon catch in many areas has been depressed by low prices (Eggers 2004). Directed chum salmon fisheries occur in Arctic-Yukon-Kuskokwim area and on hatchery runs in Prince William Sound and Southeast Alaska. Chum salmon runs to Arctic-Yukon-Kuskokwim rivers have been declining in recent years. Chum salmon in the Yukon River and in some areas of Norton Sound have been classified as stocks of concern (Eggers 2004).

Yukon River chum salmon

Yukon River chum salmon consists of an earlier and typically more abundant summer hum run and a later fall salmon run. Yukon chum salmon are harvested in commercial, subsistence and personal use fisheries.

As discussed in section 3.4, both Yukon Fall and Summer chum stocks were designated as stocks of concern in 2003 with the designation continued at the January 2004 Board of fisheries meeting. The Summer chum stock is designated as a management concern while the Fall chum stock is designated as a yield concern. The specific definitions of these terms under the Sustainable Salmon Fisheries Policy is contained in Section 3.4.

The Yukon River Summer Chum Salmon Stock Status and Action Plan Report for the BOF 2004 meeting (Salomone and Bergstrom, 2004) details that the summer chum stock continues to meet the definition of a management concern. Reasons cited for this continued designation include escapement goals generally not being met during the past five years despite specific management actions taken to provide for escapement. Additionally the report notes that subsistence and commercial harvests from 1999 through 2003 were significantly below recent averages. Biological escapement goals were also not met in the East Fork Andreafsky during the past five years except in 2001 which was undeteremined (due to high water prohibiting weir operations for a portion of the season) (Salomone and Bergstrom, 2004).

Commercial, subsistence catch and minimum run estimates for Yukon River summer and fall chum salmon are provided in Table 3-14.

Table 3-14 Yukon River summer chum salmon total estimated run size, 1995-2004

	Harvests below Pilot Station		Andreafsky River Escapement	Pilot Station passage	Total Run Index
	Subsistence	Commercial			
1995	57,586	74,143	344,296	3,556,445	4,032,470
1996[a]					
1997	52,711	15,737	102,278	1,418,443	1,589,169
1998	51,875	4,139	135,182	825,685	1,016,881
1999	43,094	6,484	64,458	973,708	1,087,744
2000	46,198	2,840	45,836	456,271	551,145
2001[b]	47,472			444,391	491,863
2002	45,177	3,018	88,388	1,088,463	1,225,046
2003	35,682	2,308	44,916	1,168,518	1,251,424
2004[c]	45,013	4,513	125,756	1,357,826	1,533,108

a The Pilot Station sonar project did not operate, therefore, the total run index for 1995 is not available.
b No commercial fishing occurred in 2001. Andreafsky weir missed most of return.
c Preliminary data.

Total run index for chum is a more reliable estimate of the run than for Chinook salmon as the sonar is more efficient at counting chum salmon. Run size declined from a high in 1995 to a low in 2001. No commercial fishery occurred in 2001. Since then run sizes have increased to levels approaching the pre-1998.

Summer chum salmon runs in 2005 are dependant upon escapements from 2001 and 2000 which were the poorest runs on record with none of the escapement goals being met in either year (Bue and Lingnau, 2005). Since 2001 however, summer chum salmon runs have exhibited steady improvements with harvestable surpluses in 2002-2004 (Bue and Lingnau, 2005).

Recent modeling efforts have estimated historical abundance of chum salmon for the Yukon River and Kuskokwim summer runs (Shotwell and Adkinson, 2004). These efforts suggest that historical data for the escapement on these rivers produced and incomplete estimation of the total escapement to these drainages (Shotwell and Adkinson, 2004). Prinicpal Componant Analysis (PCA) was utilized to extract a common pattern from data in the Yukon that had been extracted through different methodologies and a basin-wide trend was identified which suggests the influence of a large-scale forcing agenda on the survival of summer chum salmon (Shotwell and Adkinson, 2004). The authors hypothesized that due to the variability in the data which could be explained by this pattern, it is likely that a major source of mortality occurs when fish are in a common environment (e.g., nearshore marine, open ocean) (Shotwell and Adkinson, 2004).

Yukon River fall chum salmon run strength was poor from 1998 through 2002 with dramatic improvements in drainage-wide run size I 2003 (Table 3-15). The drainage-wide optimal escapement goal of 350,000 fall chum salmon was met twice in the last five years, in 2002 and 2003 (Bue et al., 2004). The year 2000 was the worse fall chum salmon run on record with 1998 and 2001 close behind in all time low runs (Bue et al. 2004)

Table 3-15 Yukon River fall chum salmon total estimated run size, 1995-2004

	Alaska and Canada Harvests		Estimated	Estimated
	Subsistence	Commercial	Escapement	Return
1995	170,281	290,866	1,009,155	1,470,302
1996	150,795	110,128	800,022	1,060,945
1997	104,411	65,648	494,831	664,890
1998	70,770	0	263,121	333,891
1999	99,102	31,944	292,315	423,361
2000	27,224	1,319	212,376	240,919
2001	42,468	2,198	337,870	382,536
2002	24,346	3,065	384,932	412,343
2003	59,485	20,026	684,310	763,821
2004[a]	67,524	11,475	504,123	583,122

a Preliminary data.

Yukon River Fall chum salmon are designated as a stock of yield concern. This is the least severe of the three designations (conservation, management and yield). This designation was continued in 2004 due to concerns based on low harvest levels since 1998.

Recent escapement and return estimation show signs of improvement for this stock (Table 3-15). Yukon River fall chum return preimarily as age-4 or age-5 fish although age-3 and age-6 fish also contribute to the run. The major contributor to the 2005 fall chum salmon run is expected to be from the 2001 and 2002 parent years. Escapements in 2001 and 2002 were within the drainage-wide escapement goal but in the lower third of this goal (Bue and Lingnau, 2005). Age-3 fish from the 2001 brood year returned in 2004 in exceptional numbers which may be a further indication of improved conditions in the marine environment (Bue and Lingnau, 2005).

Kuskokwim River chum salmon

Kuskokwim River chum salmon are an important subsistence species as well as the primary commercially targeted salmon species on the Kuskokwim River in June and July (Figure 3-5). Kuskowim River chum salmon were designated a stock of concern under yield concern in September 2000 and this designation was continued in September 2003. Since 2000 however chum salmon runs on the Kuskokwim have been improving (Table 3-16). Escapement is evaluated through enumeration at weirs on six tributary streams, sonar on the Aniak River and in recent years by a mainstream mark and recapture project near the Upper Kalskag River. Escapement information review indicates that chum salmon escapement was below average from 1999-2000 (Table 3-17). However since 2001 escapement has beenavergae or better (Bergstrom and Whitmore 2004). Declining salmon markets for chum have increased the difficulty of evaluating the abundance of chum salmon in the Kuskokwim (Bergstrom and Whitmore, 2004). While a harvestable surplus was identified in 2002 and 2003, no market existed for the fishery.

Figure 3-5 Kuskokwim River chum salmon subsistence and commercial harvests compared to the 1989-1998 average (418,800 fish) and the 1999-2003 average (67,400 fish)

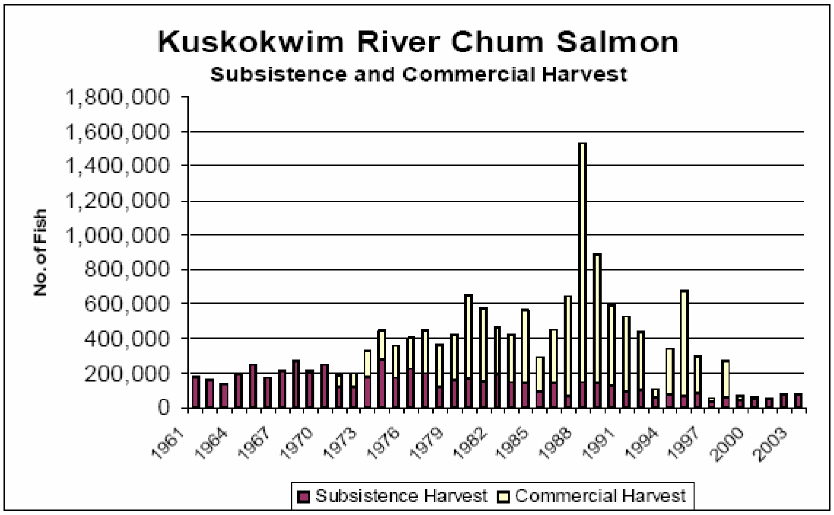


Table 3-16 Kuskokwim River chum salmon escapement estimates, 1976-2003.

	Lower Kuskokwim		Middle Kuskokwim		Upper Kuskokwim		
Year	Kwethluk Weir	Tuluksak Weir	Aniak Sonar [d]	Kogrukluk Weir	George Weir	Tatlawiksuk Weir	Takotna Weir
1976				8,177			
1977				19,443 [c]			
1978				48,125			
1979				18,198 [c]			
1980			1,132,077	[a]			
1981			570,444	57,365			
1982			428,314	64,063 [c]			
1983			125,231	9,407 [c]			
1984			258,440	41,484			
1985			244,960	15,005			
1986			202,395 [a]	14,693 [b]			
1987			186,842	[a]			
1988			388,673	39,540 [c]			
1989			236,123 [a]	39,549 [c]			
1990			224,834	26,765			
1991		697	304,121 [a]	24,188 [b]			
1992	9,675	1,083	81,575	34,105			
1993		2,218	13,427	31,899 [b]			
1994		2,917	375,752 [a]	46,635 [c]			
1995			[a]	31,265			[a]
1996	7,415		302,106	48,495	7,716 [b]		[a]
1997	10,395		262,522	7,958	7,823		1,779
1998	[a]		279,430	36,442 [c]	[a]	[a]	[a]
1999	[a]		177,771 [a]	13,820	3,548 [c]	9,599	
2000	3,547		144,157	11,491	2,960	7,044	1,254
2001	[a]	997 [c]	326,013 [a]	30,569 [c]	3,309	23,718	5,414
2002	8,502	1,346	362,812	51,570	2,444	24,542	4,377
2003	14,470	1,070	359,423	23,400	1,453	[a]	3,120
BEG			250,000 [d]	30,000			

a Field operations were incomplete and no total annual escapement was achieved.
b Field operations were incomplete; 10 to 20 percent of the total annual escapement is based on daily passage estimates.
c Field operations were incomplete; more than 20 percent of the total annual escapement is based on daily passage estimates
d Unapportioned fish counts

Bristol Bay chum salmon: Nushagak and Togiak Rivers
In the Bristol Bar District chum salmon stocks are fished commercially on the Nushagak and Togiak Rivers. Catch and escapement data for these rivers is shown in Table 3-17.

Table 3-17 Catch and Escapement of Chum Salmon Stocks by Year for the Nuskagak and Togiak Districts.

	Nushagak District			Togiak District		
Year	Catch	Escapement [b]	Total Run	Catch	Escapement [c]	Total Run
1984	850,114	362,000	1,212,114	336,660	204,000	540,660
1985	396,740	288,000	684,740	203,302	212,000	415,302
1986	488,375	168,275	656,650	270,057		270,057
1987	416,476	147,433	563,909	419,425	361,000	780,425
1988	371,196	186,418	557,614	470,132	412,000	882,132
1989	523,903	377,512	901,415	203,178	143,890	347,068
1990	378,223	329,793	708,016	102,861	67,460	170,321
1991	463,780	287,280	751,060	246,589	149,210	395,799
1992	398,691	302,678	701,369	176,123	120,000	296,123
1993	505,799	217,230	723,029	144,869	98,470	243,339
1994	328,267	378,928	707,195	232,559	229,470	462,029
1995	390,158	212,612	602,770	221,126	163,040	384,166
1996	331,414	225,331	556,745	206,226	117,240	323,466
1997	185,620	61,456	247,076	47,459	106,580	154,039
1998	208,551	299,443	507,994	67,408	102,455	169,863
1999	170,795	242,312	413,107	111,677	116,183	227,860
2000	114,454	141,323	255,777	140,175	80,860 [d]	221,035
2001	526,602	564,373	1,090,975	211,701	252,610	464,311
2002	276,845	419,969	696,814	112,987	154,360	267,347
2003	740,311	295,413	1,035,724	68,406	39,090 [e]	107,496
20-Year Avg.	403,316	275,389	678,705	199,646	164,733	356,142
1984-93 Avg.	479,330	266,662	745,992	257,320	196,448	434,123
1994-03 Avg.	327,302	284,116	611,418	141,972	136,189	278,161
2004	470,248	283,805	754,053	94,030	103,810	197,840

[a] Escapement estimates supersede those previously reported.
[b] Escapement based on sonar estimates from the Portage Creek site
Estimates for 1984-85 are rounded to the nearest thousand fish.
[c] Escapement estimates based on aerial surveys
Estimates for 1984-88 rounded to the nearest thousand fish.
[d] No escapement counts were made for the Togiak River.
[e] Only a partial count was made for the Togiak River.

Total run sizes for both rivers declined around 1997 from higher run sizes in the mid-1980s. In the Nushagak, 2000 showed low escapement and a total run size that was the second lowest since 1984 (Table 3-17). However run sizes dramatically increased the following year and have remained at much higher levels than in previous years.

Kotzebue River chum salmon
Commercial catch and escapement information for the Kotzebue Area is shown in Table 3-18. Escapement is monitored by a test fish project on the Kobuk River. The lowest index recorded was in 1993. In 2002 and 2003 chum salmon runs showed a large increase in abundance as compared with runs from 1999-2001. Since the test fishery has been established, 2002 and 2003 have been the thurd and fourth worst years for CPUE in the test fishery (Menard, 2003).

Market conditions have impacted the chum fishery in Kotzebue in recent years. A major buyer has not existed for several years and the commercial fishery is limited to a small fleet. Commercial harvests have been low due to weak chum sizes (Menard, 2003).

Table 3-18 Kotzebue Area chum salmon historical catch and escapement information, 1962-2003

	Commercial Catch					Escapement (goals)				
Year	Number Caught	Number Permits	Average Catch per Permit	Total Value [a]	Value per Fishermen	Squirrel R. (11,500)	Salmon R. (7,000)	Tutuksuk R. (2,000)	Upper Kobuk R. (10,000)	Noatak R. (85,000)
1962	129,948	84	1,547	$4,500	$54	5,384	12,936	10,841	9,224	177,080
1963	54,445	61	893	$9,140	$150	2,200	1,535	670	4,535	2,005 [b]
1964	76,449	52	1,470	$34,660	$667	8,009	9,353	2,685	7,985	89,798
1965	40,025	45	889	$18,000	$400	7,230	1,500 [b]		2,750	6,152
1966	30,764	44	699	$25,000	$568	1,350	3,957	1,383	1,474	101,760
1967	29,400	30	980	$28,700	$957	3,332	2,116	169	2,495	29,120 [b]
1968	30,212	59	512	$46,000	$780	6,746	3,367	823	2,370	44,896
1969	59,335	52	1,141	$71,000	$1,365	6,714	2,561	159	7,500	34,013
1970	159,664	82	1,947	$186,000	$2,268	4,418	3,000 [b]	2,000 [b]	13,908	138,145
1971	154,956	91	1,703	$200,000	$2,198	6,628	5,453	1,384	17,202	41,056
1972	169,664	104	1,631	$260,000	$2,500	32,126	2,073 [b]		18,155	67,601 [b]
1973	375,432	148	2,537	$925,000	$6,250	12,345	6,891		2,470 [b]	32,144
1974	627,912	185	3,394	$1,822,784	$9,853	32,523	29,190	8,312	28,120	151,889
1975	563,345	267	2,110	$1,365,648	$5,115	32,256	9,721	1,344 [b]	10,702	97,811
1976	159,796	220	726	$580,375	$2,638	7,229	1,161	758	2,522 [b]	45,779
1977	195,895	224	875	$1,033,950	$4,616	1,964 [b]				11,963 [b]
1978	111,494	208	536	$575,260	$2,766	1,863	814 [b]	368 [b]	1,981 [b]	43,342
1979	141,623	181	782	$990,263	$5,471	1,500 [b]	674 [b]	382 [b]	2,008	17,515 [b]
1980	367,284	176	2,087	$1,446,633	$8,220	13,563	8,456	1,165	11,472	174,751
1981	677,239	187	3,622	$3,246,793	$17,363	9,854	4,709	1,114	8,648	116,352
1982	417,790	199	2,099	$1,961,518	$9,857	7,690	1,821	1,322	14,674	20,871 [b]
1983	175,762	189	930	$420,736	$2,226	5,115	1,677	2,637	33,746	82,817
1984	320,206	181	1,769	$1,148,884	$6,347	5,473	1,471	1,132	10,621	72,900
1985	521,406	189	2,759	$2,137,368	$11,309	6,160	2,884	5,089	6,278	46,380 [b]
1986	261,436	187	1,398	$931,241	$4,980	4,982	1,971	4,257	6,015	41,535 [b]
1987	109,467	160	684	$515,000	$3,219	2,708	3,333	206	8,210	8,295 [b]
1988	352,915	193	1,829	$2,581,333	$13,375	4,848 [b]	6,208	3,122	11,895 [b]	54,569 [b]
1989	254,617	165	1,543	$613,823	$3,720					
1990	163,263	153	1,067	$438,044	$2,863	5,500	6,335	2,275	15,355	26,345
1991	239,923	142	1,690	$437,948	$3,084	4,606	5,845	744	24,525	85,690
1992	289,184	149	1,941	$533,731	$3,582	2,765	1,345	1,162	11,803	35,036 [b]
1993	73,071	114	641	$235,061	$2,062	4,463	13,880	1,196	12,158	30,210 [b]
1994	153,452	109	1,408	$233,512	$2,142					
1995	290,730	92	3,160	$316,031	$3,435	10,605	13,988	3,901	35,725	167,120
1996	82,110	55	1,493	$56,310	$1,024	21,795	21,740	8,200	74,770	336,940
1997	142,720	68	2,099	$187,978	$2,764	4,779 [b]	1,181 [b]	164 [b]	8,513 [b]	
1998	55,907	45	1,242	$70,587	$1,569				906 [b]	5,397 [b]
1999	138,605	60	2,310	$179,781	$2,996	13,513	4,989		27,340	87,494
2000	159,802	64	2,497	$246,786	$3,856					
2001	211,672	66	3,207	$322,650	$4,889				11,640	
2002	8,390	3	2,797	$7,572	$2,524				3,572 [b]	700 [b]
2003	25,763	4	6,441	$26,377	$6,594		1,132		11,175	40,317

[a] Some estimates between 1962 and 1981 include only chum value which in figures represent represent over 99% of the total value. Figures after 1981 represent the chum value as well as incidental species such as char, whitefish and other salmon.

[b] Poor survey conditions or incomplete, early or late survey.

Norton Sound District chum salmon

Chum salmon catch for commercial, subsistence and sport fishing are shown in Table 3-13. Chum salmon commercial catches have been low in recent years with a five-year average considerably lower than the 10-year average catch. The 2005 run was forecast to be close to the five year average or slightly above this average (Menard, 2005). Poor market conditions also exist in this fishery combined with declining runs.

3.6 Bering-Aleutian Salmon International Survey results

A cooperative international salmon research program, the Bering-Aleutian Salmon international Survey (BASIS) was created in 2001. The major goal of the program is to clarify how changes in ocean conditions affect the survival and growth of salmon. The goal of the overall BASIS research plan for 2002-2006 is to collect information on oceanographic conditions, salmon and associated species across the Bering Sea. The intention is for BASIS information to be utilized to advance overall knowledge of the causes of changes in salmon productivity by incorporating BASIS data into spatially-explicit models which also incorporate information on ocean processes, salmon migration, growth and mortality processes (NPAFC, 2004).

Recent BASIS surveys in the eastern and western Bering Sea have provided survey abundance estimates and an overview of the distribution of some size classes of Chinook salmon. Figure 3-6 -11 provide the catch of juvenile and immature Chinook salmon in 2002, 2003 and 2004 based on these survey results.

Chinook juvenile abundance in 2004 appeared much higher than in either of the previous 2 years. Immature Chinook biomass in 2004 is distributed slightly further west than in previous years although the magnitude of catches appears to be relatively similar.

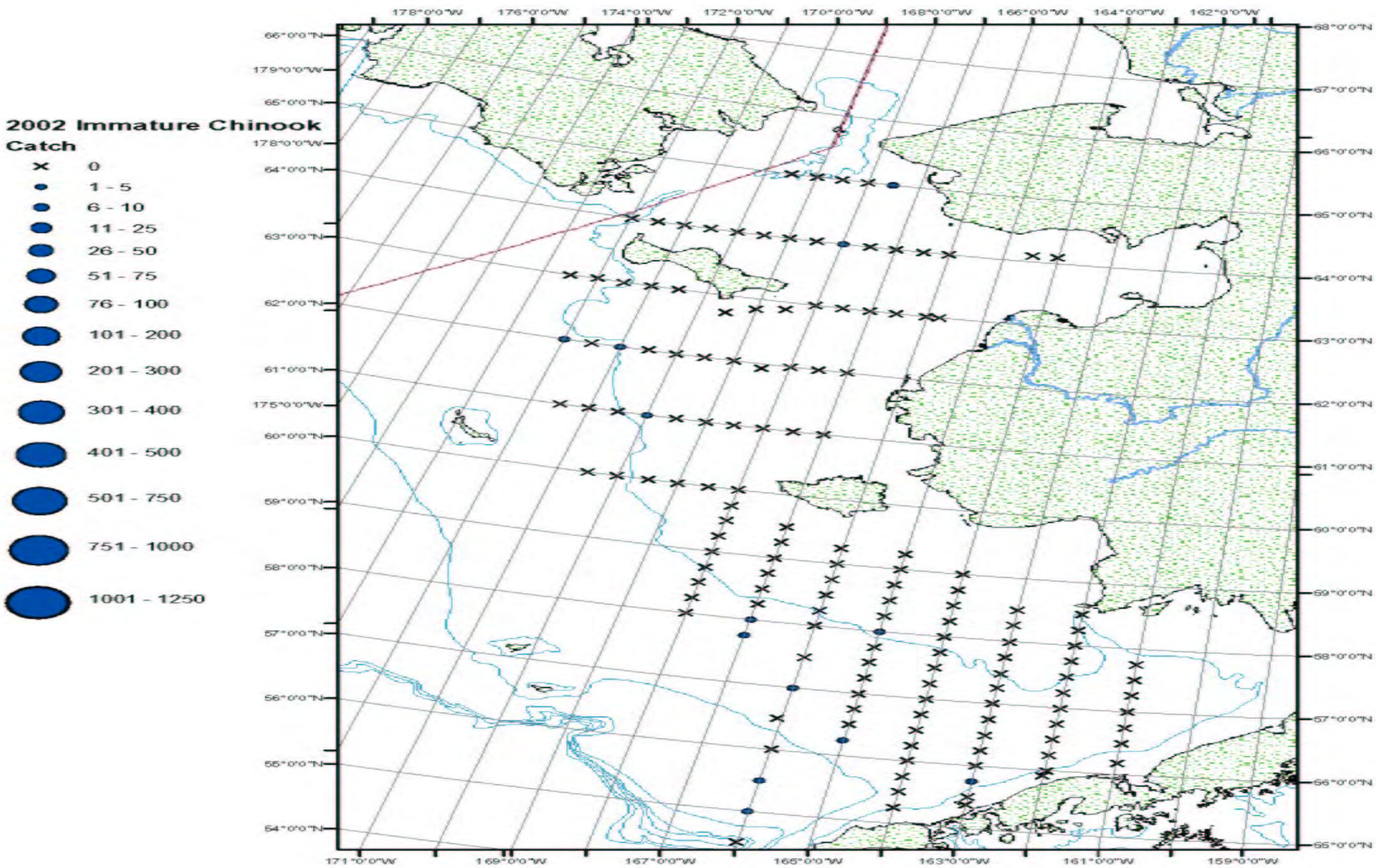


Figure 3-6 BASIS survey in the Eastern and Western Bering Sea for Immature Chinook Catch 2002.

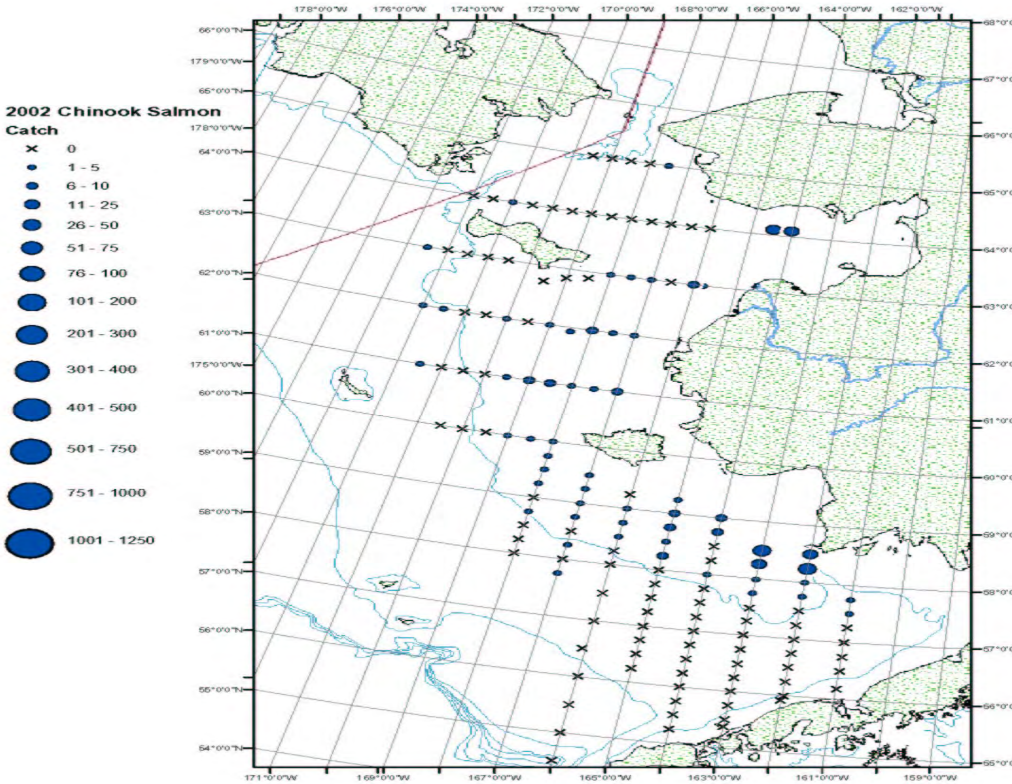


Figure 3-7 BASIS survey in the Eastern and Western Bering Sea for Juvenile Chinook Catch 2002

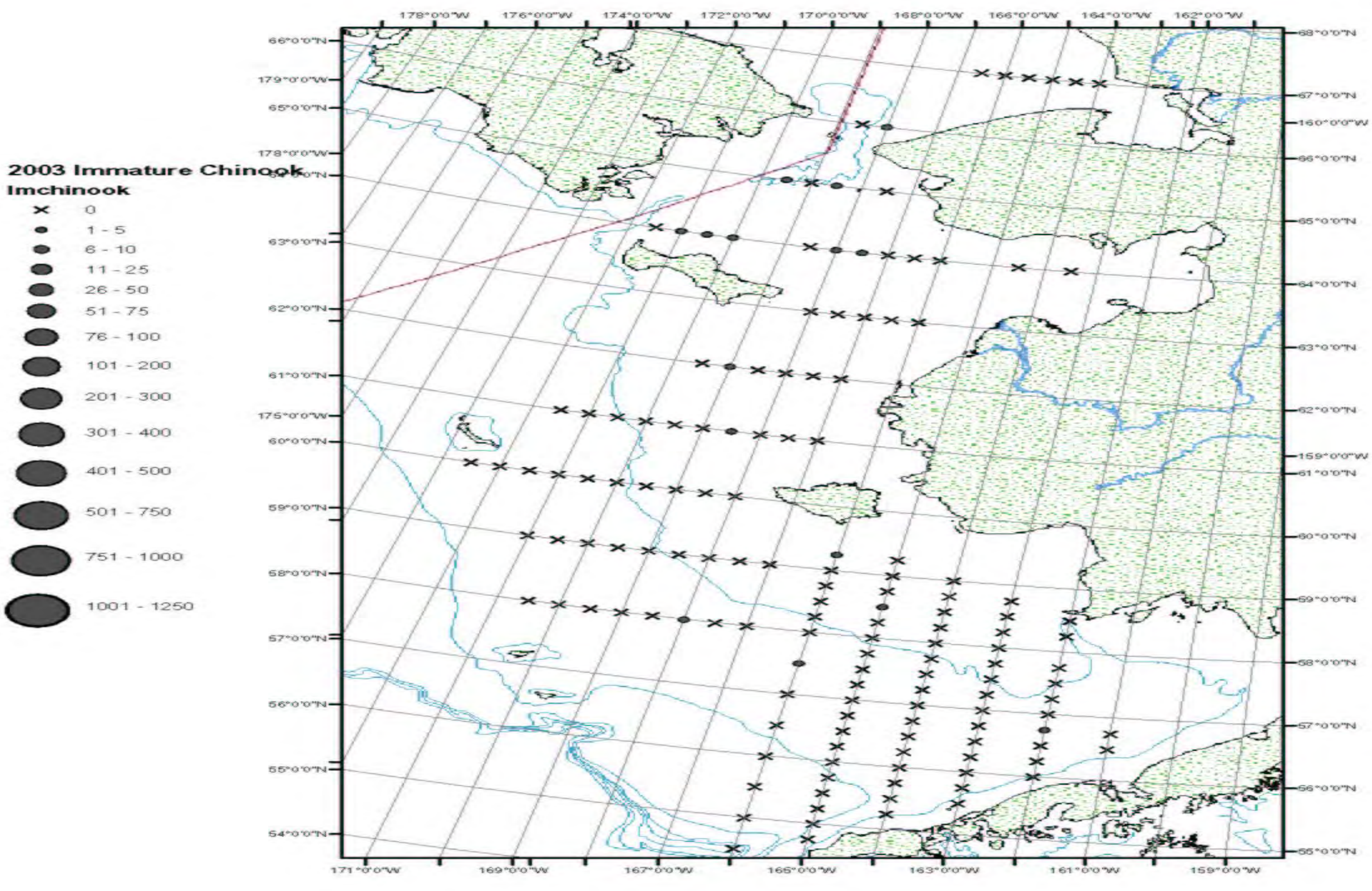


Figure 3-8 BASIS survey in the Eastern and Western Bering Sea for Immature Chinook Catch 2003.

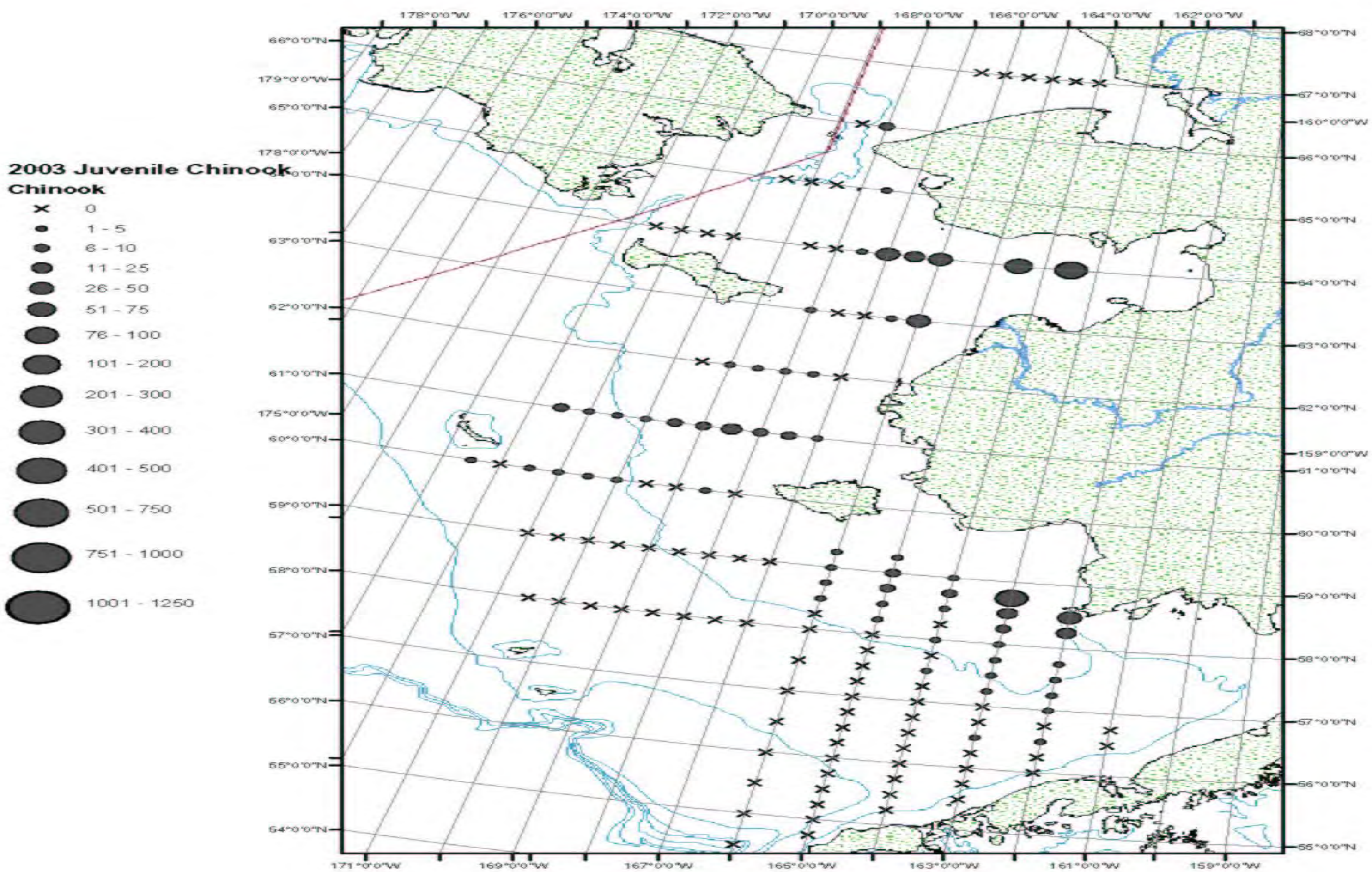


Figure 3-9 **BASIS survey in the Eastern and Western Bering Sea for Juvenile Chinook Catch 2003**

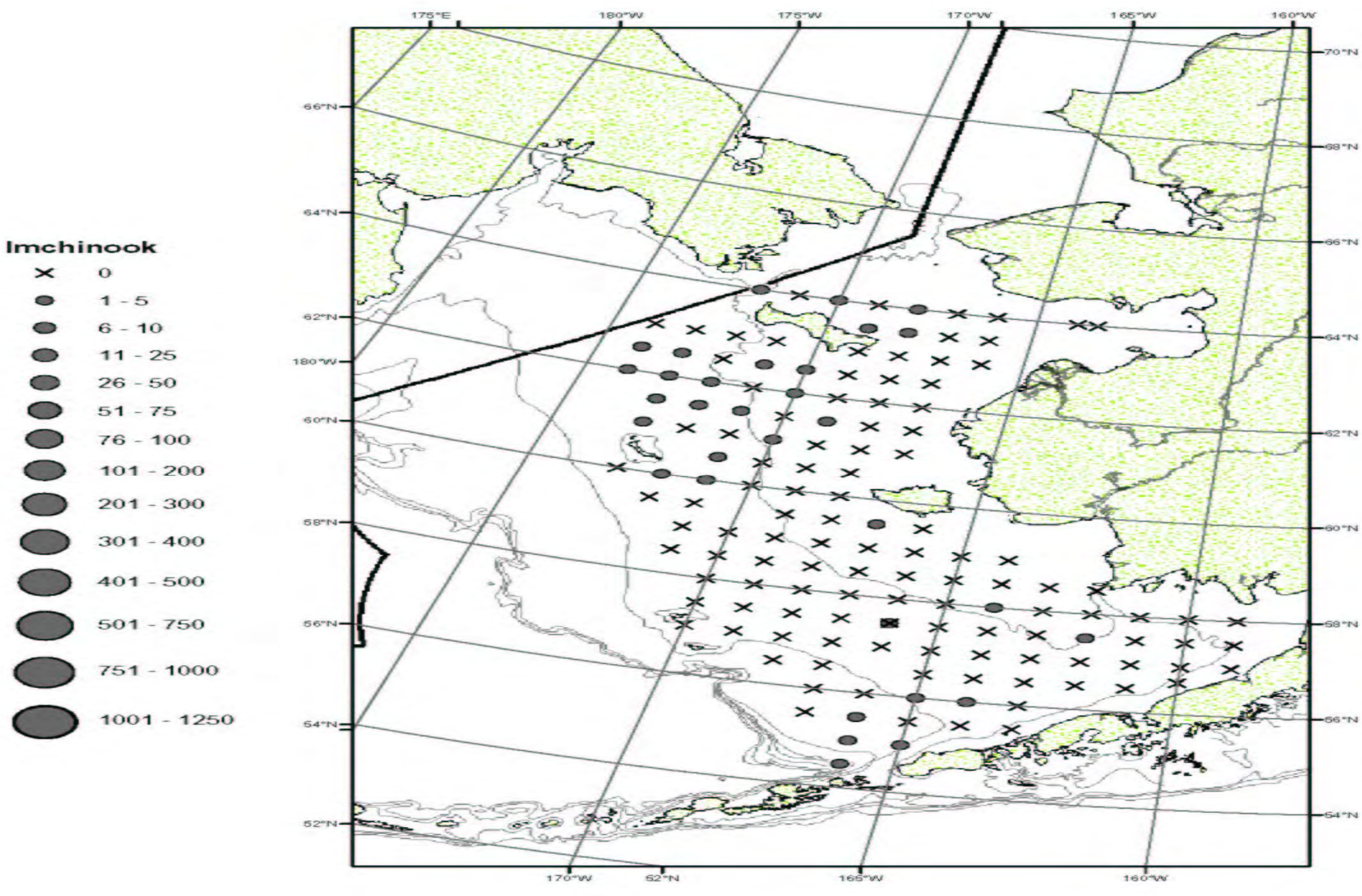


Figure 3-10 BASIS survey in the Eastern and Western Bering Sea for Immature Chinook Catch 2004.

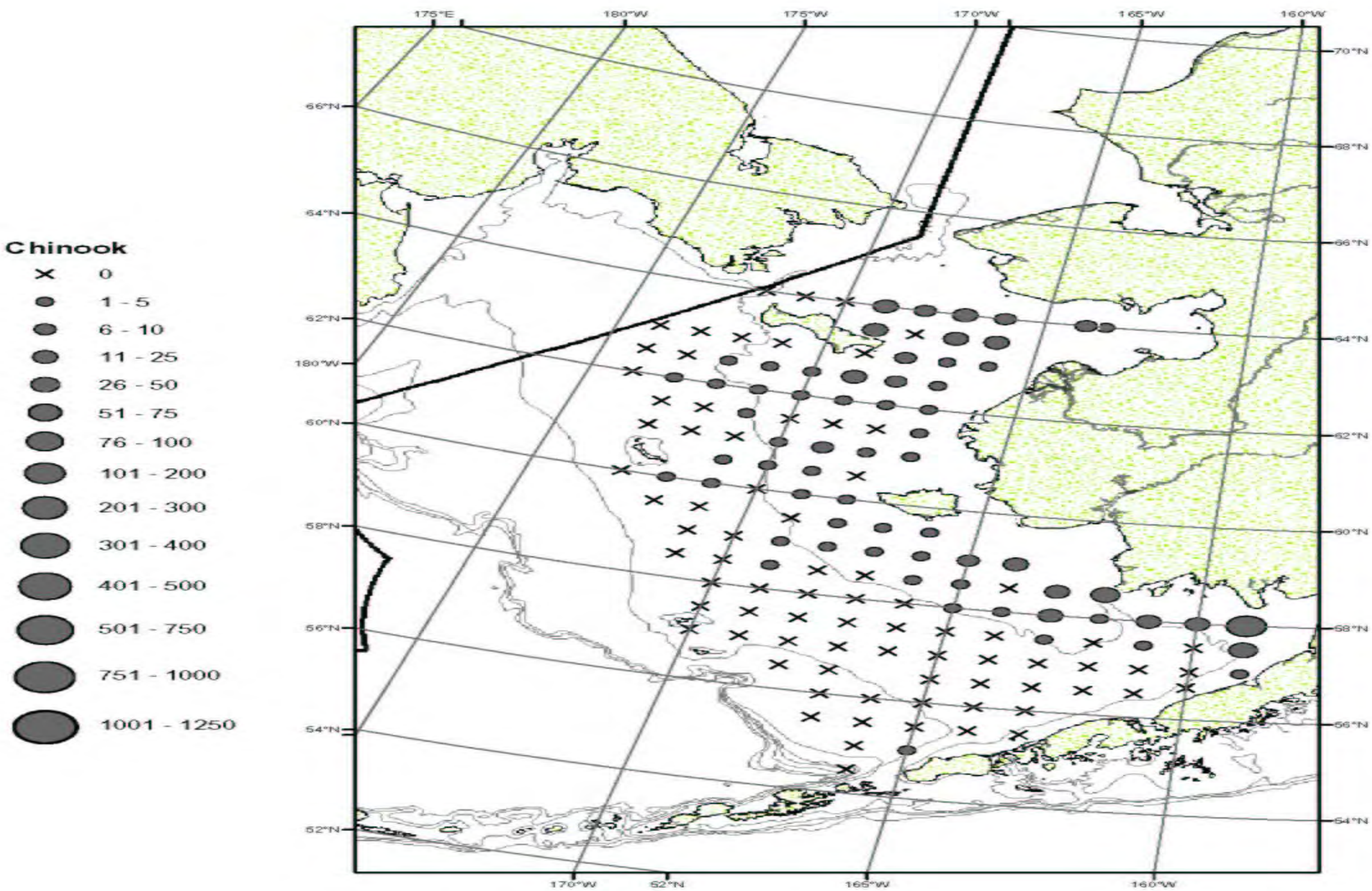


Figure 3-11 BASIS survey in the Eastern and Western Bering Sea for Immature Chinook Catch 2004.

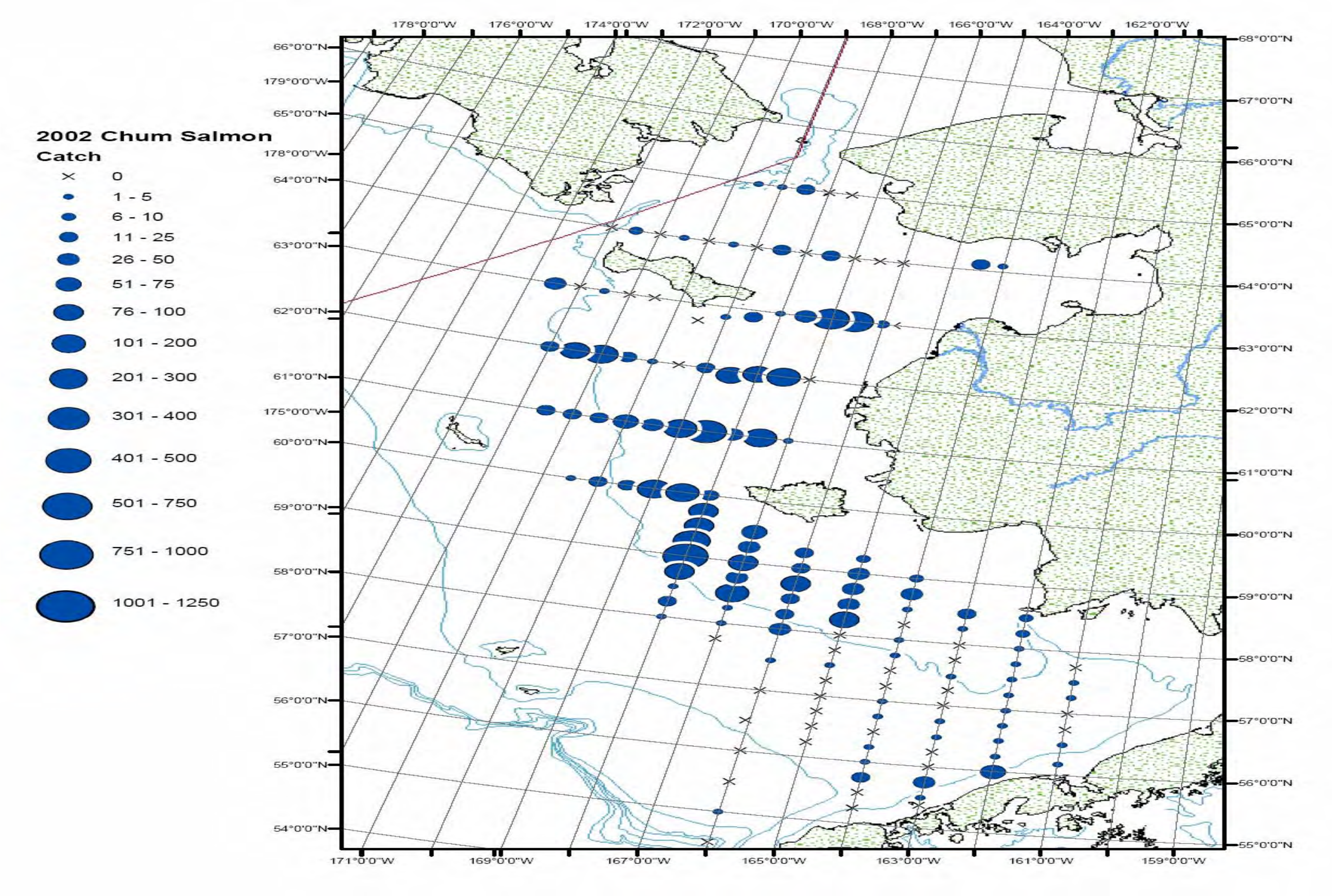


Figure 3-12 BASIS survey in the Eastern and Western Bering Sea for Immature Chum Catch 2002

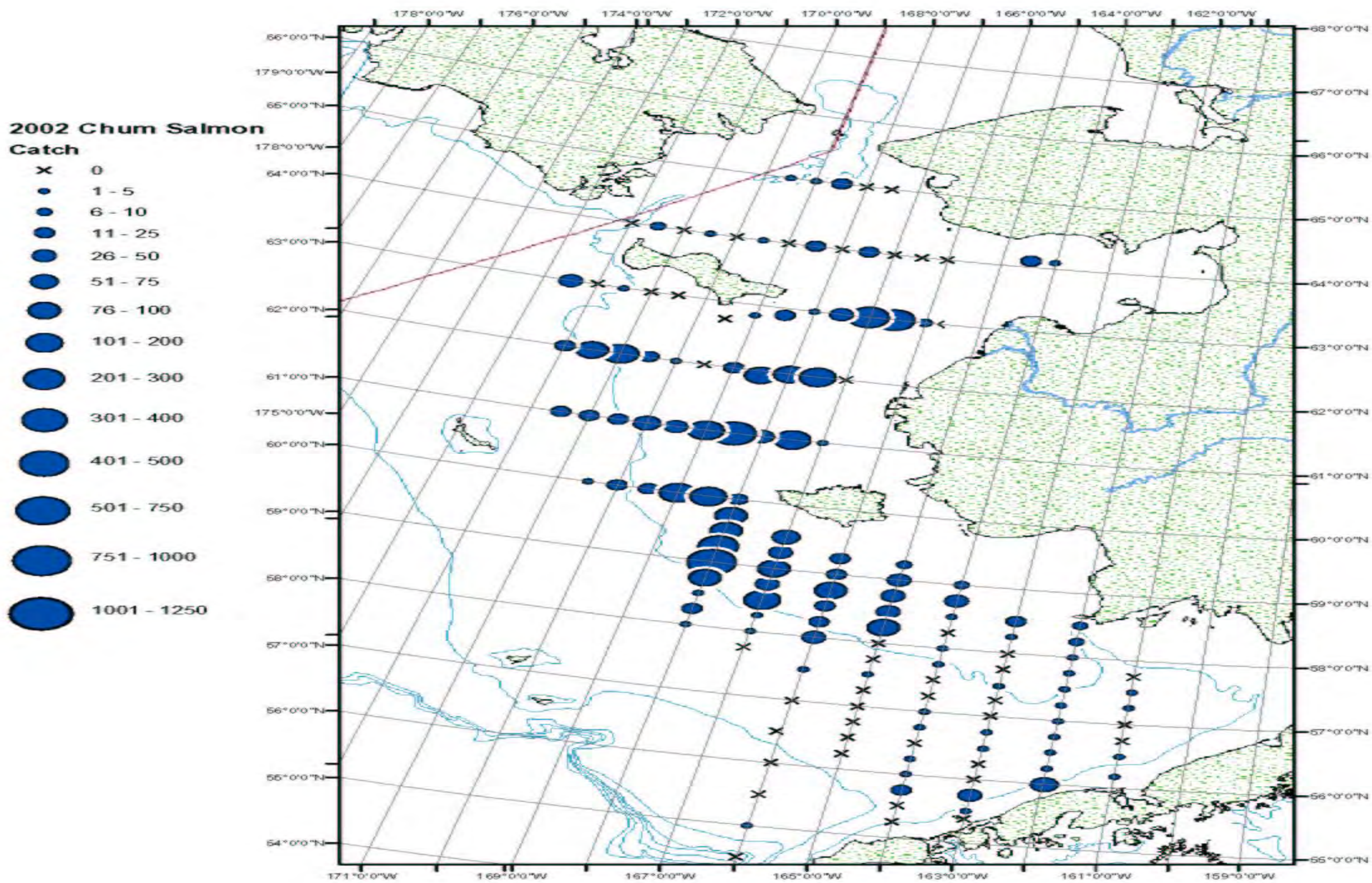


Figure 3-13 **BASIS survey in the Eastern and Western Bering Sea for Juvenile Chum Catch 2002**

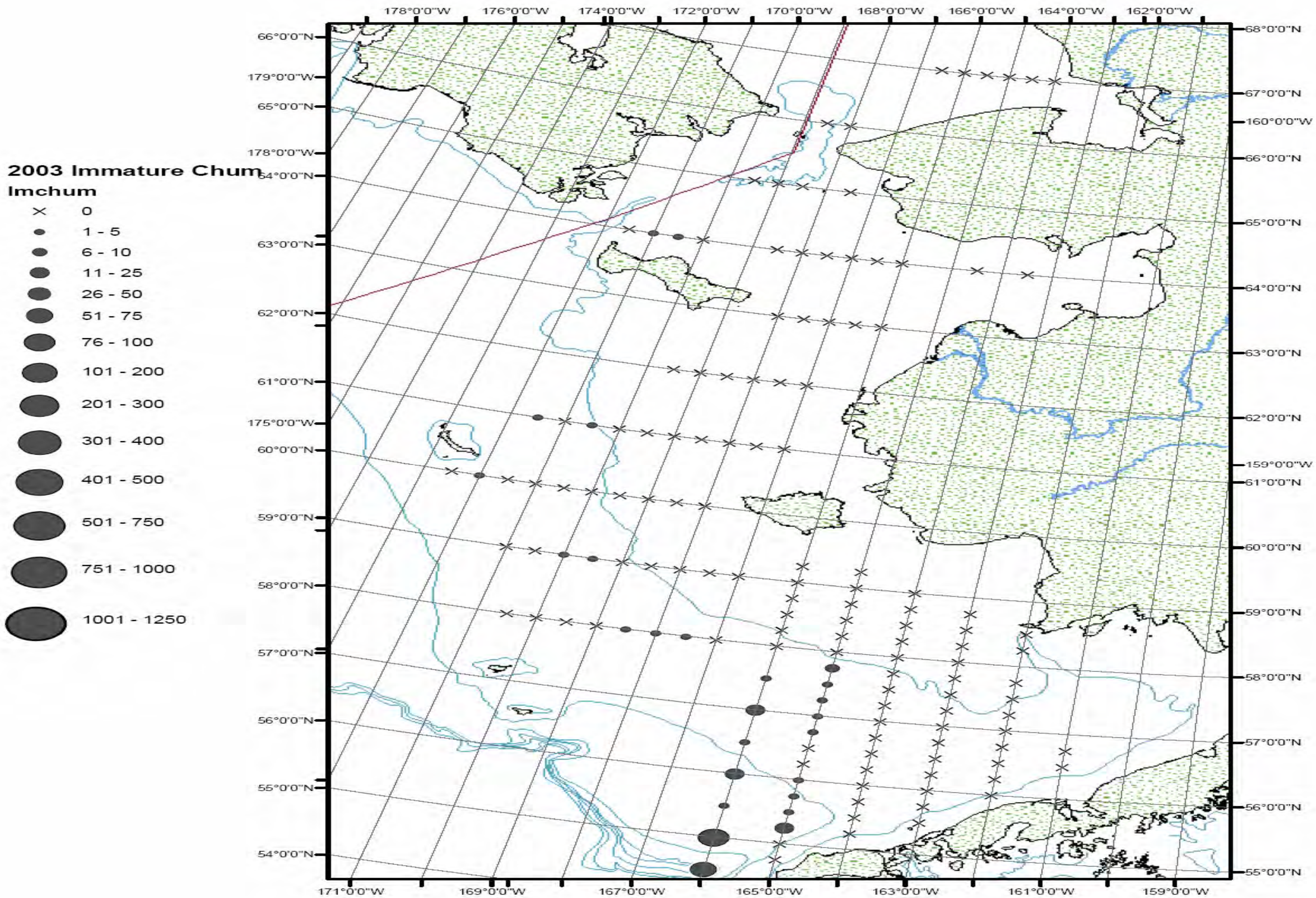


Figure 3-14 BASIS survey in the Eastern and Western Bering Sea for Immature Chum Catch 2003

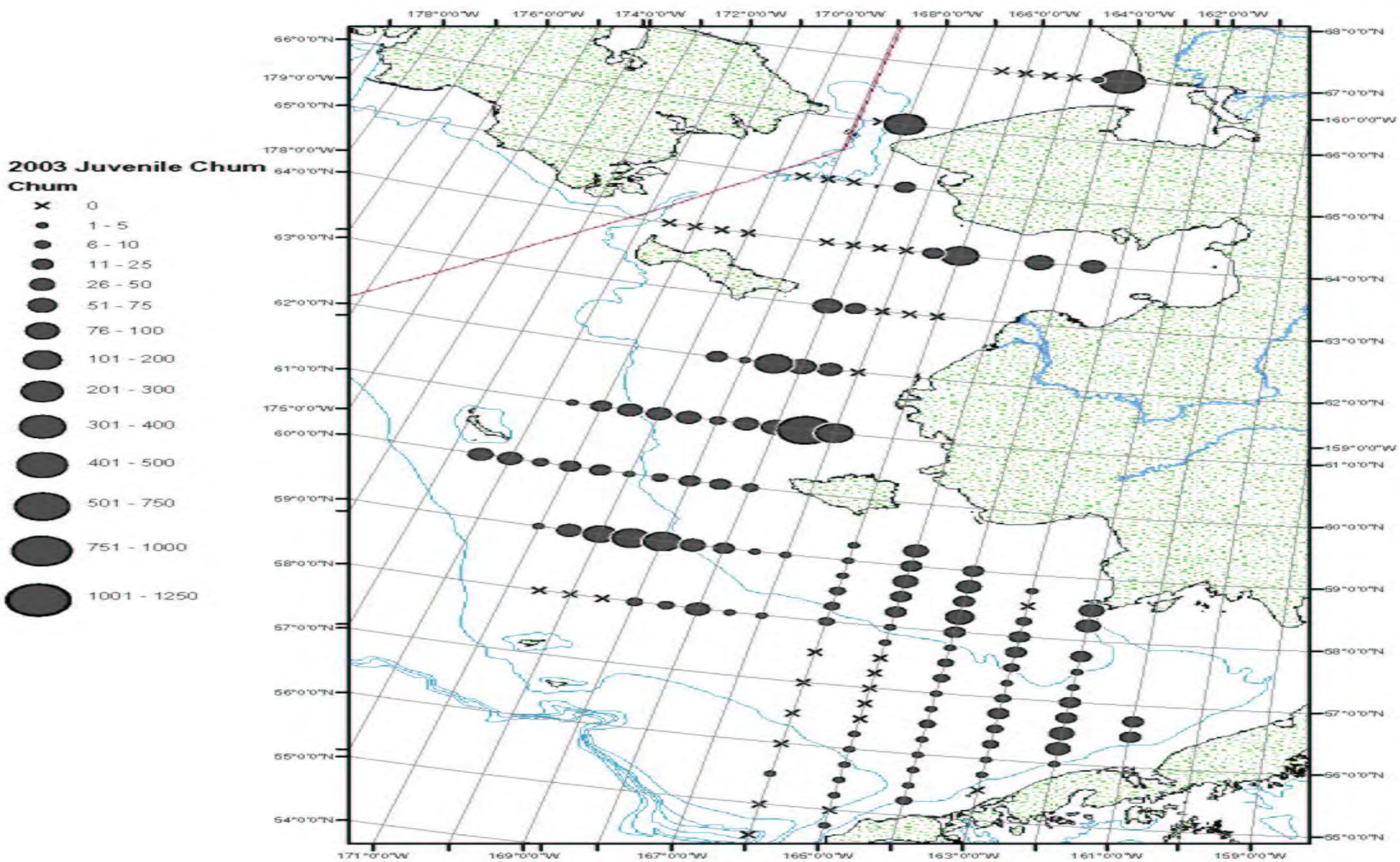


Figure 3-15 BASIS survey in the Eastern and Western Bering Sea for Juvenile Chum Catch 2003

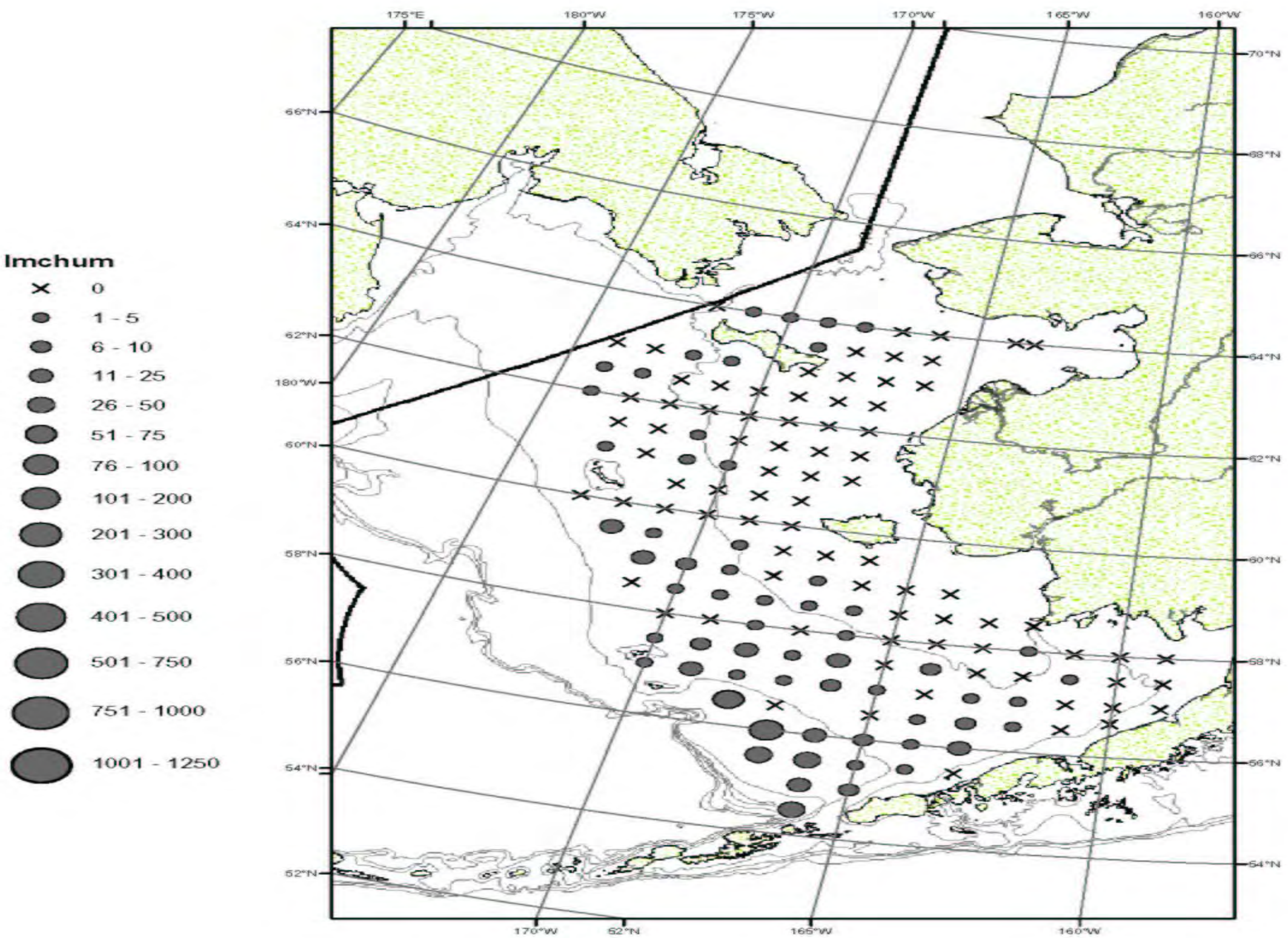


Figure 3-16 **BASIS survey in the Eastern and Western Bering Sea for Immature Chum Catch 2004**

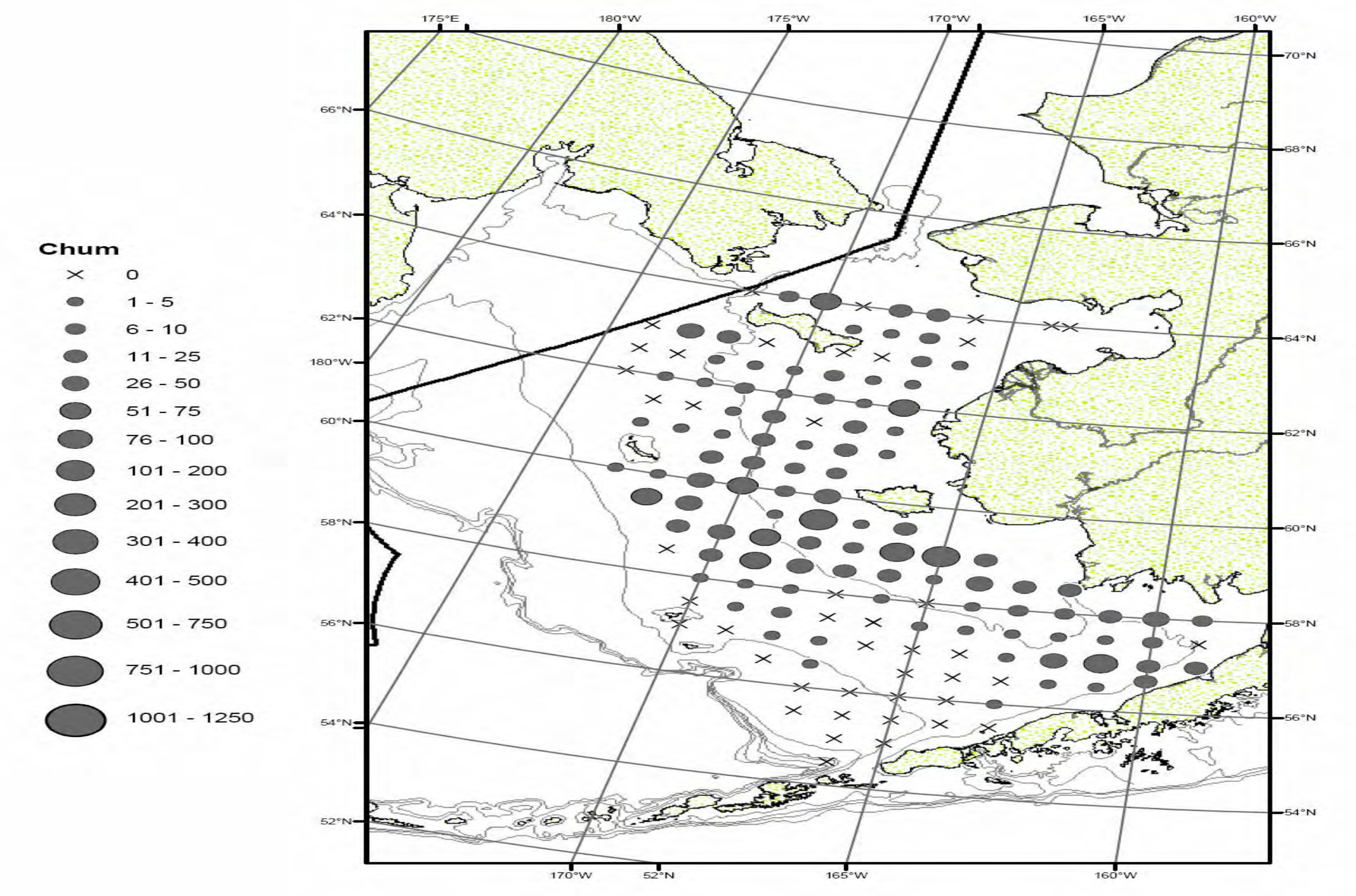


Figure 3-17 BASIS survey in the Eastern and Western Bering Sea for Juvenile Chum Catch 2004.

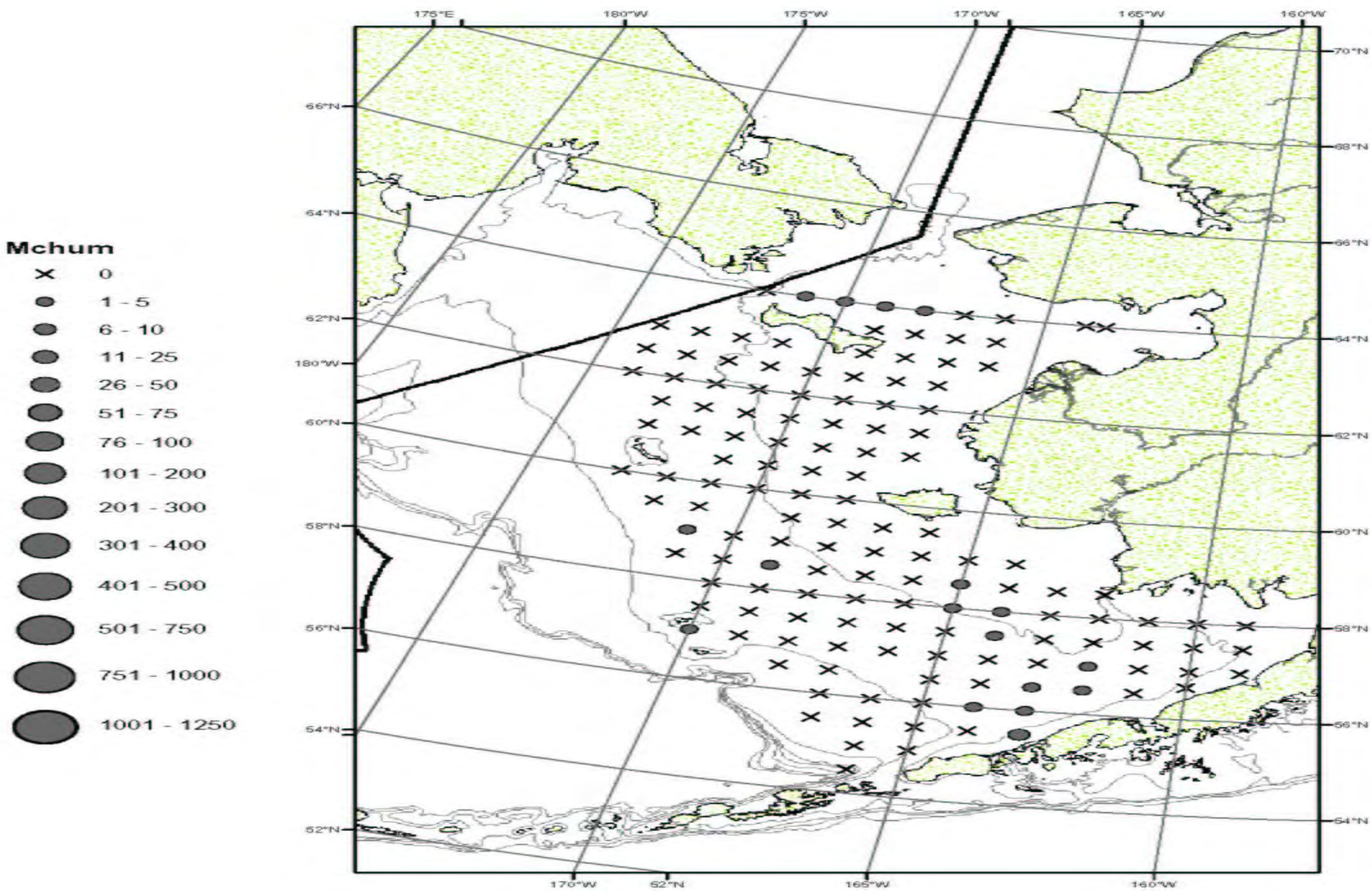


Figure 3-18 BASIS survey in the Eastern and Western Bering Sea for Mature Chum Catch 2004.

Relative abundance for juvenile and immature chum salmon in the Bering Sea increased in 2004 as compared with 2001 and 2002 (E. Farley, pers. comm.). Age-specific differences were noted in the distribution between oldest and youngest groups of salmon. In summer the abundance of small immature chum salmon was high in deep-water areas while larger immature and maturing chum were distributed in shallower shelf zones and shelf break areas (NPAFC, 2004). The overall catch in all areas of the Bering Sea and adjacent North Pacific waters showed the highest biomass of salmon since the survey began and were dominated (74.6% of total catch) by chum salmon (NPAFC, 2004). In the western Bering Sea, the biomass of salmon was the highest recorded since Russian scientists began conducting pelagic trawl surveys of salmon in the 1980s with chum salmon constituting most of this biomass (NPAFC, 2004).

Preliminary modeling efforts by the BASIS program have also indicated a relative abundance increase in juvenile chum salmon during 2002-2004 (E. Farley, pers. comm..). BASIS scientists also note that there has been an increase in the number of Asian chum salmon in the Bering Sea, mainly from Japanese hatchery chum salmn (E. Farley, pers. Comm.). Hypotheses regarding the relative increase in the number of Asian origin chum include possibly abundance-based increases and/or population distribution changes due to surface water warming in the Bering Sea (E. Farley, pers. comm.). Other studies have previously evaluated the migration routes of chum salmon based on oceanographic temperature patterns and found there to be a relationship between temperature patterns and zonal migration (Friedland et al. 2001).

Overall the BASIS program has observed significant increases in chum salmon in their survey area. Trawl bycatch of chum salmon has also continued to increase. While not all of these observed chum salmon are bound for the western Alaska, it provides an indicator that the health of the Bering Sea has improved considerably in recent years and chum salmon productivity might have increased significantly (Bue and Lingnau, 2005).

3.7 Ecological Role of salmon: food habits

Western Alaskan salmon runs experienced dramatic declines from 1997 through 2002 with a record low in stocks in 2000. Weak runs during this time period have been attributed to reduced productivity in the marine environment rather than an indication of low levels of parent year escapements (Bue and Lingnau, 2005). Recent BASIS evaluations have examined the food habits from Pacific salmon in the Bering in an attempt to evaluate potential interactions between salmon species as well as their dependence upon oceanographic conditions for survival.

Ocean salmon feeding ecology is highlighted by the BASIS program given the evidence that salmon are food limited during their offshore migrations in the North Pacific and Bering Sea (Rogers, 1980; Rogers and ruggerone, 1993; Aydin et al., 2000, Kaeriyama, et al., 2000). Increases in salmon abundance in North America and Asian stocks have been correlated to decreases in body size of adult salmon which may indicate a limit to the carrying capacity of salmon in the ocean (Kaeriyama, 1989; Ishida et al., 1993; Helle and Hoffman, 1995; Bigler et al., 1996; Ruggerone et al., 2003). International high seas research results suggest that inter and intra-specific competition for food and density-dependant growth effects occur primarily among older age groups of salmon particularly when stocks from different geoogrpahic regions in the Pacific Rim mix and feed in offshore waters (Ishida et al., 1993; Ishida et al, 1995; Tadokoro et al., 1996; Walker et al., 1998; Azumaya and Ishida, 2000; Bugaev et al., 2001; Davis 2003; Ruggerone et al., 2003).

Results of a fall study to evaluate food habits data in 2002indicated that there was diet overlap between sockeye and chum salmon in the Aleutian Islands when both species consudmed macro-zooplanton but this was reduced when chum salmon consumed mostly gelatinous zooplankton (Davis et al. 2004). Chinook salmon consumed predominatly small nekton and did not overlap their diets with sockeye and chum (Davis et al., 2004). Shifts in prey composition of salmon species between seasons, habitats and among salmon age groups were attributed to changes in prey availability (David et al., 2004).

Stomach sample analysis of ocean age .1 and .2 fish from basin and shelf area Chinook salmon indicated that their prey compoisition was more limited than chum salmon (Davis et al., 2004). Summer Chinook samples contained high volumes of euphausiids, squid and fish while fall stomach samples in the same area contaqined primarily squid and some fish (Davis et al., 2004). The composition of fish in salmon diets varied with area with prey species in the basin primarily northern lampfish, rockfish, Atka mackerel, Pollock, sculpin and flatfish while shelf samples contained more herring, capelin, Pollock, rockfish and sablefish (Davis et al., 2004). Squid was an important prey species for ocean age .1, .2, and .3 Chinook in summer and fall (Davis et al., 2004). The proportion of fish was higher in summer than fall as was the relative proportion of euphausiids (Davis et al., 2004).

Chum salmon diet composition in summer appeared to be primarily euphausiids and pteropods with some smaller amounts of amphipods, squid, fish and gelatinous zooplankton (Davis et al., 2004). Chum from the shelf region contained a higher proportion of pteropods than the other regions while AI chum contained higher proportions of euphausiids and amphipods and basin chum samples had higher amounts of fish and gelatinous zooplankton (Davis et al., 2004). Fish prey species consumed in the bain included northern lampfish and juvenile Atka mackerel, sculpins and flatfish while shelf samples consumed juvenile rockfish, sablefish and Pollock (Davis et al., 2004).

General results from the study found that immature chum are primarily predators of macrozooplankton while Chinook tend to prey on small nektonic prey such as fish and squid (Davis et al., 2004). Prey compositions shifts between species and between seasons in different habitats and a seasonal reduction in diversity occurs in both chum and Chinook diets from summer to fall (Davis et al., 2004). Reduction inprey diversity was noted to be caused by changes in prey availability due to distribution shifts, abundance changes or progression of life-history changes which could be the result of seasonal shift in environmental factors such as changes in water temperature and other factors (Davis et al., 2004).

3.8 Stock origins of salmon caught incidentally in BSAI groundfish trawl fisheries

A historical overview of salmon bycatch in Alaska groundfish fisheries is provided by Witherell et al. (2002). The origin of salmon taken as bycatch in the Bering Sea includes rivers in western Alaska, Southcentral and Southeast Alaska, Asia, British Columbia and Washington (Witherell et al. 2002).

Chum salmon

Recent studies in the Bering Sea have looked at the origin and distribution of chum salmon (Urawa et al. 2004; Moongeun et al. 2004). Genetic stock identification (GSI) with allozyme variation was used to determine the stock origin of chum salmon caught by a trawl research vessel operating in the central Bering Sea from late August to mid September 2002 (Urawa et al. 2004). Results indicated that the estimated stock composition for maturing chum salmon was 70% Japanese, 10% Russian and 20% North American stocks, while immature fish were estimated as 54% Japanese, 33% Russian, and 13% North American (Urawa et al. 2004). Stock composition of North American fish was identified for Northwest Alaska, Yukon, Alaskan Peninsula/Kodiak, Susitna River, Prince William Sound, Southeast Alaska/Northern British Columbia and Southern British Columbia/Washington State. Of these the majority of mature chum salmon for North America stocks came from Southern BC/Washington State and Alaska Peninsula/Kodiak (Urawa et al. 2004). For immature chum salmon, the largest contribution for North American stocks came from Southeast Alaska/Northern BC, followed by Alaska Peninsula/Kodiak and Southern BC/Washington State.

While absolute population effects on Alaskan chum salmon stocks are unknown, using the range of percentages for North American chum origin from Urawa et al. 2004 as described above (13% -20% depending upon the age of the salmon), a rough estimate of percent origin of incidentally caught chum salmon in the BSAI may be estimated. For example, in 2003, ~197,100 'other' salmon were caught as bycatch in all BSAI groundfish fisheries (Table 1-1). Depending on whether these fish were immature chum or maturing chum, this would indicate that somewhere between 25,600 and 39,400 were of North American origin (assuming that these represent predominantly chum salmon). This range would represent the contribution from the aggregate North American stocks. As described above, stock composition for North American fish includes Northwest Alaska, Yukon, Alaskan Peninsula/Kodiak, Susitna River, Prince William Sound, Southeast Alaska/Northern British Columbia and Southern British Columbia/Washington State, with the relative contribution by area varying according to the relative age of the fish.

Chinook salmon

Additional information on the stock origin of salmon in the Bering Sea is available through the High Seas Salmon Research Program at the University of Washington. The High Seas Salmon Research Program of the University of Washington routinely tags and monitors Pacific salmon species. The Coded Wire Tag (CWT) information may not accurately represent the true distribution of hatchery caught salmon however as much of the CWT tagging occurs within the British Columbia hatcheries and thus most of the CWT recovered come from those same hatcheries. CWT tagging does occur in some Alaskan hatcheries, but is currently limited to Southcentral and Southeast Alaska, specifically in Cook Inlet, Prince William Sound, other Kenai region hatcheries as well as in hatcheries in Southeast Alaska (Johnson, 2004). Tagging operations on hatcheries on the Yukon River were in operation in the past but ceased in the 1990's. No tagging occurs for chum salmon in Alaska. The 2003 program report for the High Seas Salmon Research Program details additional data on west coast salmon tag recoveries (Myers et al. 2004). In 2003, 124 tags were recovered in the eastern Bering Sea and GOA. Of these tags, 103 were recovered in groundfish trawl fisheries while 21 were recovered by U.S. and Japanese research vessels. Tagging results in the Bering Sea showed the presence primarily of Yukon River Chinook salmon in the eastern Bering Sea though actual recovered tags were limited (and tagging in recent years from the Yukon River has ceased). Columbia River Basin and Oregon Chinook salmon were also recovered in the eastern Bering Sea though the majority of the tagged recoveries of these salmon occur in the GOA.

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

As indicated in Myers et al. (2004), the origin of salmon differs by season. In the winter, age-1.4 western Alaskan Chinook were primarily from the subregions of the Yukon and Kuskokwim. In the fall, results indicated that age-1.2 western Alaskan Chinook were from subregions of the Kuskokwim and Bristol Bay with a large component of Cook Inlet Chinook salmon stocks as well.

The proportions of western Alaskan subregional stocks (Yukon, Kuskokwim and Bristol Bay) appear to vary considerably with factors such as brood year, time and area (Myers et al. 2004). Yukon River Chinook are often the dominant stock in winter while Bristol Bay, Cook Inlet and other Gulf of Alaska stocks are often the dominant stocks in the eastern BSAI in the fall (Myers et al. 2004). Additional studies from high seas tagging results as well as scale pattern analyses from Japanese driftnet fishery in the Bering Sea indicate that in the summer immature western Alaskan Chinook are distributed further west in the Bering Sea than other North American stocks.

3.9 Pollock Fishery

A detailed description of the pollock fishery can be found in the *Alaska Groundfish Fisheries Final Programmatic Supplemental Environmental Impact Statement* (Groundfish PSEIS; NMFS 2004b). A brief summary of relevant characteristics of the pollock fishery is included below.

In 1998, Congress passed the American Fisheries Act (AFA), which limited the number of harvesting and processing vessels allowed to participate in the Bering Sea pollock fishery. The AFA also modified specific allocations of the Bering Sea pollock quota as follows: 10 percent to the western Alaska CDQ program, with the remainder allocated 50 percent to the inshore sector, 40 percent to the offshore sector and 10 percent to the mothership sector. Also included in the AFA was the establishment of the authority and mechanisms by which the pollock fleet can form fishing cooperatives. Finally, the AFA raised the standards for catch measurement and monitoring in the Bering Sea pollock fishery.

Incidental Catch

The pollock pelagic trawl fishery has a very low level of non-pollock catch. **Error! Reference source not found.** illustrates that over 99% of groundfish caught in the fishery are pollock. Table 3-20 lists the species that were caught incidentally in the pollock fishery in 2003, both groundfish species and prohibited species. By weight, Pacific cod is the most substantial groundfish species that is incidentally caught, although when considered as a percentage of the overall groundfish catch, the pollock fishery incidentally catches over 10% of the flathead sole harvest. In terms of prohibited species, the pollock fishery catches the majority of salmon and herring bycatch of the groundfish fisheries.

Table 3-19 Pollock catch in the pollock pelagic trawl target fishery, 2003

Catch of pollock (mt)	Total catch (mt)	Pollock as percent of total catch
1,440,300	1,453,000	99.1%

Source: Hiatt et al. 2004; note, figures rounded to 100s

Table 3-20 Incidental catch in the pollock pelagic trawl target fishery, 2003, as a proportion of total catch in the BSAI groundfish fisheries

Catch of non-pollock groundfish			Catch of prohibited species		
Species	(mt)	Pollock target fishery incidental catch as percent of total catch	Species	No. of animals (unless noted)	Pollock target fishery incidental catch as percent of total catch
Pacific cod	5,800	2.8%	Chinook	46,300	84%
flathead sole	1,600	11.3%	“other salmon”	190,900	98%
rock sole	1,300	3.6%	halibut	96.6 mt	2.4%
rockfish	800	3.0%	herring	13.8 mt	94%
arrowtooth flounder	600	4.5%	red king crab	100	<1%
Atka mackerel	400	<1%	other king crab	0	<1%
other flatfish	200	1.6%	bairdi crab	800	<1%
yellowfin sole	100	<1%	other tanner crab	800	<1%
Other groundfish	1,800	6.2%			

Source: Hiatt et al. 2004; note, figures rounded to 100s

Monitoring of the pollock fishery

Regulations implemented under AFA require every haul observed on AFA Catcher Processors and motherships, which necessitates each vessel to carry two NOAA Fisheries observers at all times they are fishing for groundfish in the BSAI. AFA Catcher Processors and Mothership must weigh all catch on NOAA Fisheries-approved scales. All AFA Catcher Vessels and Catcher Processors that engage in directed fishing for pollock in the BSAI are also required to install and operative a NOAA Fisheries-approved vessel monitoring system (VMS). NOAA Fisheries also requires that AFA Catcher Processors to have NOAA Fisheries approved observer sampling stations. Finally, no mixing of catch or hauls.

Fishing patterns

The pattern of the pollock pelagic trawl target fishery is to focus on a winter, spawning aggregation fishery (the “A” season) with an opening on January 20th. The first season generally extends into the middle of March. Since the closure of the Bogoslof management district to directed pollock fishing in 1992, the “A” season pollock fishery on the eastern Bering Sea shelf has been concentrated primarily north and west of Unimak Island. Depending on ice conditions and fish distribution, there has also been effort along the 100 m contour (and deeper) between Unimak Island and the Pribilof Islands (Table 3-19). This pattern has varied somewhat during the period 2002-2004. In particular, the 2003 winter fishery was distributed further north than in previous years. This may be due to the warm conditions and anecdotal reports that roe developed earlier than usual (Ianelli et al. 2004).

After 1992, the “B” season, which opens in mid June, the fishery has been conducted to a much greater extent west of 170° W. longitude than it had been prior to 1992 (Ianelli et al. 2004). This shift was due to the implementation of the CVOA (Catcher Vessel Operational Area) in 1992 and also the geographic distribution of pollock by size. The pattern in the past few years (2000-2004) shows consistent concentrations of catch around the Unimak Island area and along the 100 m depth contour to the northwest of the Pribilof Islands (Figure 3-20).

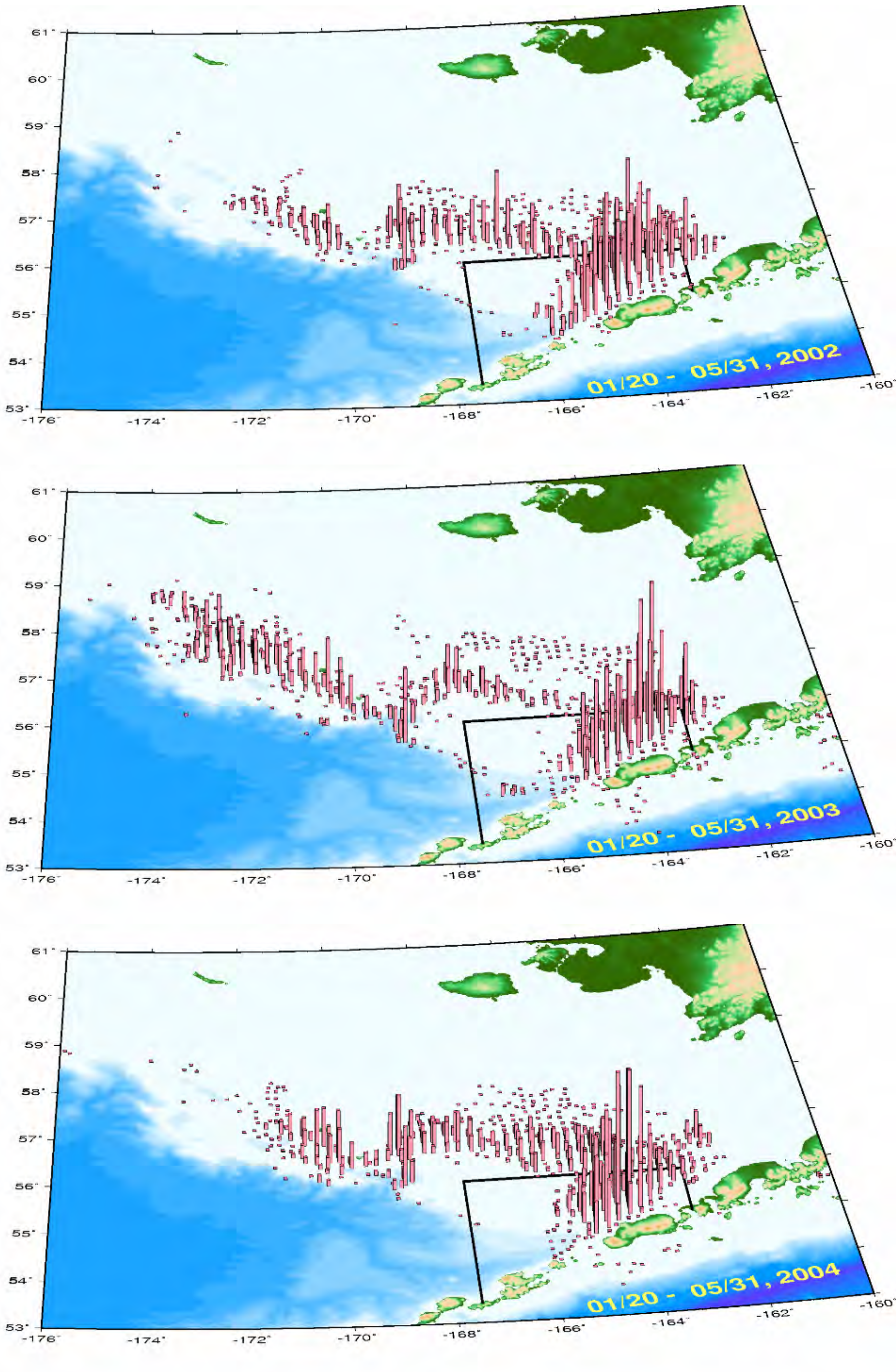


Figure 3-19 Concentrations of the pollock fishery 2002-2004, January - May on the EBS shelf. Line delineates CVOA and the column height represents relative removal on the same scale in all years.

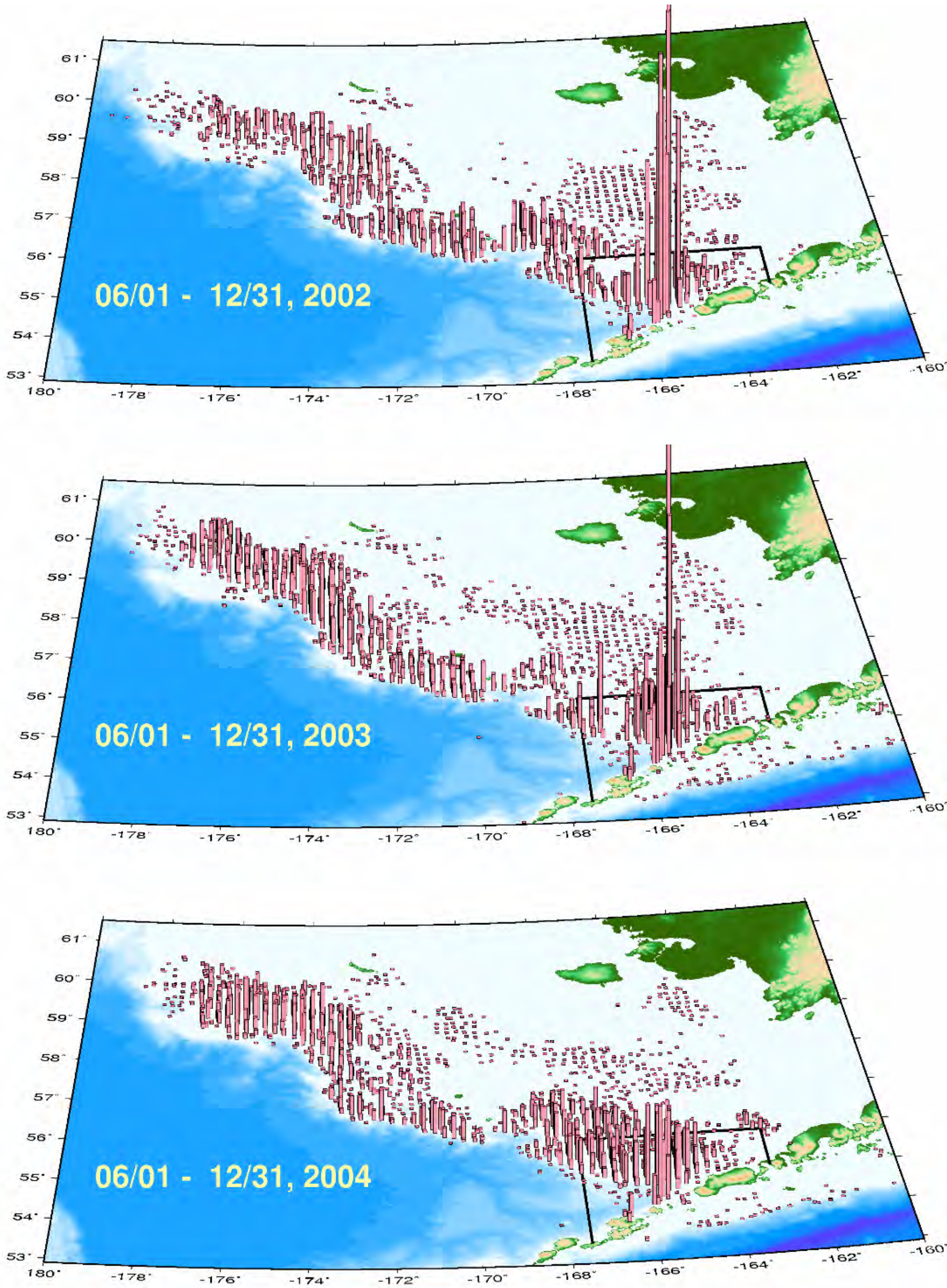


Figure 3-20 Concentrations of the pollock fishery 2002-2004, June – December on the EBS shelf. Line delineates CVOA and the column height represents relative removal on the same scale in all years.

Steller sea lion conservation measures

In response to continuing concerns over the possible impacts groundfish fisheries may have on rebuilding populations of Steller sea lions, the Council and NOAA Fisheries made changes to the pollock fishery in the BSAI. These have been designed to reduce the possibility of competitive interactions with Steller sea lions. For the pollock fisheries, comparisons of seasonal fishery catch and pollock biomass distributions (from surveys) by area in the eastern Bering Sea led to the conclusion that the pollock fishery had disproportionately high seasonal harvest rates within critical habitat that *could* lead to reduced sea lion prey densities. Consequently, the management measures were designed to redistribute the fishery both temporally and spatially according to pollock biomass distributions. The underlying assumption in this approach was that the independently derived area-wide and annual exploitation rate for pollock would not reduce local prey densities for sea lions. Work continues on evaluating the effectiveness of these measures and the potential for adverse fishery and Steller sea lion (or other marine mammal) interactions. These are presented in the ecosystem considerations section below. Three types of measures were implemented in the pollock fisheries:

- Pollock fishery exclusion zones around sea lion rookery or haulout sites,
- Phased-in reductions in the seasonal proportions of TAC that can be taken from critical habitat, and
- Additional seasonal TAC releases to disperse the fishery in time (Ianelli et al. 2004).

Disentangling the specific changes in the temporal and spatial dispersion of the eastern Bering Sea pollock fishery resulting from the sea lion management measures from those resulting from implementation of the AFA is difficult. The reduction of the capacity of the catcher/processor fleet resulting from the AFA reduced the rate at which the catcher/processor sector (allocated 36% of the eastern Bering Sea pollock TAC) caught pollock beginning in 1999, and the fleet as a whole in 2000. Because of some of its provisions, the AFA gave the industry the ability to respond efficiently to changes mandated for sea lion conservation that otherwise could have been more disruptive to the industry.

In 2000, further reductions in seasonal pollock catches from BSAI sea lion critical habitat were realized by closing the entire Aleutian Islands region to pollock fishing and by phased-in reductions in the proportions of seasonal TAC that could be caught from the SCA, an area which overlaps considerably with sea lion critical habitat. In 1998, over 22,000 mt of pollock were caught in the Aleutian Island regions, with over 17,000 mt caught in Aleutian Islands critical habitat. In June 2004, the Council approved a management program for the AI pollock fishery starting in 2005 in order to comply with the 2004 Consolidated Appropriations Act. The Act required the Council to allocate pollock TAC to the Aleut Corporation for a directed pollock fishery in the Aleutian Islands. Only vessels less than 60 ft in length or AFA vessels can fish in this fishery, and only with permission from the Aleut Corporation.

Participants in the Pollock Fishery

A description of the two vessel sectors participating in the directed fishery for pollock in the eastern Bering Sea is included below.

AFA Trawl Catcher Processors

This sector includes vessels that are listed by name in the AFA as eligible to target Bering Sea pollock in the directed fishery. These large factory trawlers have the processing equipment to produce surimi and/or fillets from pollock, Pacific cod, and other groundfish. The large size of these vessels also provides room for equipment to produce fishmeal, minced product, and other product forms. The size of these vessels enables them to operate in the Bering Sea during poor weather. However, they now operate in a pollock cooperative under AFA, which, along with the resulting quasi-property rights, allows them to modify operations in terms of when they fish and what they process to account for changing weather, markets, and management restrictions. The number of catcher/processors in this sector has decreased as a result of a combination of excess capacity, reduced quotas for the offshore sector, and the decommissioning of vessels under the AFA. Pollock is the primary species harvested by this sector, but Pacific cod are also targeted by the AFA trawl catcher/processors and some AFA trawl catcher/processors have produced surimi from yellowfin sole.

AFA Trawl Catcher Vessels

This sector includes all trawl catcher vessels that are issued an AFA permit making them eligible to target Bering Sea pollock. The majority of these vessels rely almost exclusively on pollock harvested in the Bering Sea. Some of these vessels also participate in the summer Pacific whiting fishery off the coasts of Oregon and Washington. In addition, some vessels in this category may tender salmon or undergo maintenance in June and July if they are not engaged in the whiting fishery. The bimodal distribution of groundfish activity of most of the vessels in this sector is a function of the two primary regulatory seasons for pollock—the roe season in the winter and spring and the non-roe season in the summer and fall. Because of the sector’s reliance on the pollock resource, the BS FMP subarea is clearly the most important fishing area. While nearly all of the groundfish harvested by the larger vessels is delivered to shoreside processors, many of the smaller vessels deliver their catch to motherships or catcher/processors. The number of vessels in this sector has declined as a result of the removal of less efficient vessels. Pollock is clearly the most important fishery for the sector, accounting for nearly all of the retained groundfish landings. Pacific cod has been the second most important species in terms of volume.

CDQ Pollock Fishery

CDQ pollock is typically harvested by vessels whose owners contract with CDQ groups, deliver to processors associated with CDQ groups, or are partially owned by CDQ groups. Harvest vessels are typically AFA qualified and participate in the Bering Sea pollock fishery cooperatives. During 2003, CDQ pollock was harvested by the vessels/companies listed inTable 3-21. They represent three of the AFA catcher/processor companies, Trident Seafoods and Aleutian Spray, Inc. through the Golden Dawn harvests, and the harvest fleet of one of the three AFA motherships.

Table 3-21 Companies/Vessels harvesting CDQ pollock

CDQ Group	Pollock Harvesters
Aleutian Pribilof Islands Community Development Assoc.	Golden Dawn[1] (25% owned by APICDA)
Bristol Bay Economic Development Corp.	Arctic Fjord (20% owned by BBEDC)
Central Bering Sea Fishermen’s Assoc.	American Seafoods (unknown ownership by CBSFA)
Coastal Villages Fishermen’s Assoc.	American Seafoods (38.95% owned by CVFA)
Norton Sound Economic Development Assoc.	Glacier Fish Company (50% owned by NSEDA)
Yukon Delta Fisheries Development Assoc.	Golden Alaska[2] (about 20% owned by YDFDA)

[1]The Golden Dawn is also part owned by Aleutian Spray, Inc and Trident Seafoods, Inc.
[2]Catcher vessels in the Golden Alaska fleet actually harvest the CDQ pollock.
Sources: NPFMC, 2002 and CDQ reports from 3rd quarter of 2003.
Note: The ownership data information should be considered estimates, since some of the data have not been updated from 2002 reports.

3.10 Interactions with Threatened and Endangered Species

Species listed under the Endangered Species Act that occur in Alaskan waters include Pacific salmon and steelhead, seabirds, and marine mammals. All of these species interact with the directed pollock pelagic trawl fishery to some extent, and are discussed in the following sections.

3.10.1 ESA-listed Pacific Salmon and Steelhead

Although none of the Alaskan salmon stocks are listed as threatened or endangered under ESA, there are twelve stocks of Pacific salmon and steelhead that are so listed in the Pacific Northwest. These stocks are Snake river fall Chinook, Snake River spring/summer Chinook, Puget Sound Chinook, Upper Columbia river spring Chinook, Upper Willamette River Chinook, Lower Columbia river Chinook, Upper Columbia river steelhead, Upper Willamette River steelhead, Middle Columbia river steelhead, Lower Columbia river steelhead, and Snake river Basin steelhead. These stocks are thought to range into Alaska waters.

NOAA Fisheries initiated formal consultations for these twelve endangered species units in 1999. A Biological Opinion was issued on December 22, 1999, and contained a determination that the Alaska groundfish fisheries are not likely to jeopardize the continued existence of Pacific salmon and steelhead. No critical habitat has been designated for these species within Alaska waters. The opinion was accompanied by an Incidental Take Statement that states that the catch of listed fish will be limited specifically by the measures proposed to limit the total bycatch of Chinook salmon. Bycatch should be minimized to the extent possible and in any case should not exceed 55,000 Chinook per year in the BSAI fisheries or 40,000 Chinook salmon per year in the GOA fisheries. In 2000, a Biological Opinion was issued on the BSAI Groundfish FMP (NMFS 2000), which reaffirmed the finding of the previous opinion, and also the accompanying Incidental Take Statement.

An ESA consultation for Chinook salmon in the BSAI was initiated in 2005 following the 2004 fishery having exceeded the Incidental Take Statement as described above. The consultation upheld the ITS and concluded that the fishery is not likely to further impact ESA-listed salmon at present, however the concultation noted the continued need to monitor Chinook bycatch in the BSAI trawl fisheries as well as actions taken by the Council and industry to minimize this bycatch.

NOAA Fisheries has conducted a coded wire tag study on surrogate stocks of ESA-listed salmon for the Upper Willamette and Lower Columbia rivers nearly annually since 1984. For all the years data have been collected, no more than 3 tagged fish in a year was estimated to be taken in the BSAI groundfish fisheries[21].

3.10.2 ESA-listed Seabirds

Three seabird species are listed under the ESA and occur in Alaskan waters: short-tailed albatross, spectacled eider, and Steller's eider. A Biological Opinion was completed for the BSAI and GOA Groundfish FMP TAC specifications in September 2003. The US Fish and Wildlife Service concluded that the BSAI and GOA groundfish fisheries are not likely to adversely affect either the spectacled eider or the Steller's eider, or to destroy or adversely modify the critical habitat that has been proposed for each of these species. Neither are the fisheries likely to jeopardize the continued existence of the short-tailed

[21]Adrian Celewycz, NOAA Fisheries, Auke Bay Lab, Personal Communication regarding the Coded Wire Tag database, November 14, 2002.

albatross. An incidental take statement included with the Biological Opinion sets a take limit of two short-tailed albatross for the trawl fisheries, upon exceeding which consultation must be reinitiated.

Further information on interactions between the groundfish fisheries and seabirds may be found in the Groundfish PSEIS (NMFS 2004b).

3.10.3 ESA-listed Marine Mammals

ESA-listed Steller sea lions and ESA-listed great whales occur in the BSAI management area. Direct and indirect interactions between marine mammals and the groundfish fisheries occur due to the overlap in the size and species of groundfish that are at once important marine mammal prey and fishery resources.

The Steller sea lion inhabits many of the shoreline areas of the Bering Sea and Aleutian Islands, using these habitats as seasonal rookeries and year-round haulouts. The Steller sea lion has been listed as threatened under the ESA since 1990. In 1997 the population was split into two stocks or Distinct Population Segments based on genetic and demographic dissimilarities, the western and eastern stocks. Because of a pattern of continued decline in the western distinct population segment, it was listed as endangered on May 5, 1997 [62 FR 30772] while the eastern distinct population segment remained under threatened status. This population segment inhabits an area of Alaska approximately from Prince William Sound westward to the end of the Aleutian Island chain and into Russian waters.
Throughout the 1990s, particularly after critical habitat was designated, various closures of feeding areas around rookeries and haulouts, and some offshore foraging areas, were designated to limit commercial harvest of pollock, Pacific cod, and Atka mackerel, which are important components of the western distinct population segment of Steller sea lions' diet. In 2001 a Biological Opinion was released that provided protection measures that would not jeopardize the continued existence of the wSSL nor adversely modify its critical habitat; that opinion was supplemented in 2003, and after court challenge, these protection measures remain in effect today.

Several species of whales use the Bering Sea as summer feeding grounds and then to return to seasonal wintering and calving areas further south. Of these whales, the endangered North Pacific right whale is perhaps of most concern given its very small known population size. This whale moves through the Aleutian Island region annually to occupy feeding habitat in the eastern Bering Sea; it is very rare, and only up to 25 individuals have been seen annually in recent surveys.

The directed pollock fishery in the BSAI has a very minor direct take of all marine mammals, which is likely to have a very minor contribution to total mortality, and is interpreted to be safe in the *Stock Assessment and Fishery Evaluation* report (Ianelli et al. 2004).

Further information on interactions between the groundfish fisheries and marine mammals may be found in the Groundfish PSEIS (NMFS 2004b).

3.11 Ecosystem Considerations

Ecosystems are populations (consisting of single species) and communities (consisting of two or more species) of interacting organisms and their physical environment that form a functional unit with a characteristic trophic structure (food web) and material cycles (movement of mass and energy among groups).

Three natural processes underlie changes in population structure of species in marine ecosystems: competition, predation, and environmental disturbance. Natural variations in recruitment, survivorship, and growth of fish stocks are consequences of these processes. Human activities, such as commercial fisheries, can also influence the structure and function of marine ecosystems. Fishing may affect ecosystems by altering energy flows, changing predator-prey relationships and community structure, introducing foreign species, affecting trophic or functional diversity, altering genetic diversity, altering habitat, and damaging benthic organisms or communities.

An assessment of the ecosystem trends in the BSAI management area was undertaken by Livingston et al. in 1999. The study showed a stable trophic level of catch and stable populations overall. The trophic level of the Bering Sea harvest has risen slightly since the early 1950s and appears to have stabilized as of 1994.

Further information on the ecosystem may be found in the Ecosystems Considerations appendix to the *Stock Assessment and Fisheries Evaluation* report (NPFMC 2004) and the Groundfish PSEIS (NMFS 2004b).

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Chapter 4 Environmental Impacts

This section discusses the potential impacts of management under each of the proposed alternatives. Specific details with respect to the performance of the fishery under Alternative 1 (Section 4.1), Alternative 2 (Section 4.2) and Alternative 3 (Section 4.3) are noted in each section. Impacts are focused primarily on the effect on the bycatch of Chinook and chum salmon in the pollock trawl fisheries. Additional impacts are noted for groundfish stocks, threatened and endangered species, ecosystem impacts, and socio-economic impacts.

4.1 Alternative 1

Alternative 1 is the status quo alternative. Under this alternative management measures for Chinook and chum salmon savings area regulatory closures as currently applied would remain in effect. These measures have been described in Section 3.2.

4.1.1 Methodology for data analysis

Data from the North Pacific Groundfish Observer program was utilized to summarize the weekly and annual bycatch rates within the pollock trawl fisheries between 1998 and 2005 (2005 data is preliminary). This information was used to depict the spatial location of incidental take of Chinook and “other salmon” The observed locations of the pollock fishery were depicted by the latitude and longitude of the haul retrieval position to allow for display in a Geographical Information System (GIS). The pollock fishery was separated by year for the study period.

The GIS spatial analysis displays the location of salmon bycatch as a numeric rate of salmon per metric ton of observed total groundfish. The data were categorized by an ArcGIS9.0 function of natural breaks to display the salmon bycatch in four groups representing differing degrees of bycatch concentrations (ESRI 2002). This method identifies breakpoints between groups using a statistical formula (Jenk’s optimization) that minimizes the sum of the variance within each of the groups (ESRI 2002). This method was selected since bycatch does not have a normal distribution. Once this rate was calculated for each year, the data were separated by CDQ and AFA Cooperative sectors and displayed on a weekly basis. Since the weekly bycatch rates differ from each other, the annual bycatch rate was applied to each week ending date, to keep the scale of bycatch consistent within a year. Histograms were also constructed for each week to represent the amount of bycatch rates relative to the annual rate. Frequency diagrams were calculated by week-ending dates to contrast individual hauls bycatch rates within a week. Tables of average bycatch rates inside and outside the savings and CVOA areas were calculated. Tables were prepared by sector and seasons. The tables are presented in raw rates as well as log-transformed rates.

4.1.2 Fishery Performance with respect to Chinook Salmon Bycatch

Fishery performance for the period 2002 to 2005 is evaluated in two ways: (1) an overview of the absolute bycatch numbers by year, target fishery and by season; and (2) an overview of the spatial and temporal nature of the salmon bycatch in the directed pollock fishery (non-CDQ trawl fleet and CDQ trawl fleet).

4.1.2.1 Overview of seasonal Chinook bycatch in the pollock trawl fishery

As described in Section 3.1, Chinook bycatch in the BSAI trawl fisheries has been increasing in recent years. Table 4-1 shows overall Chinook numbers for all groundfish fisheries for 2002 – 2005 (data for 2005 is preliminary through July 16) as compared to a long term average for Chinook bycatch from 1990-2001.

Table 4-1 Overall Chinook bycatch for all BSAI groundfish fisheries, 2002-2005

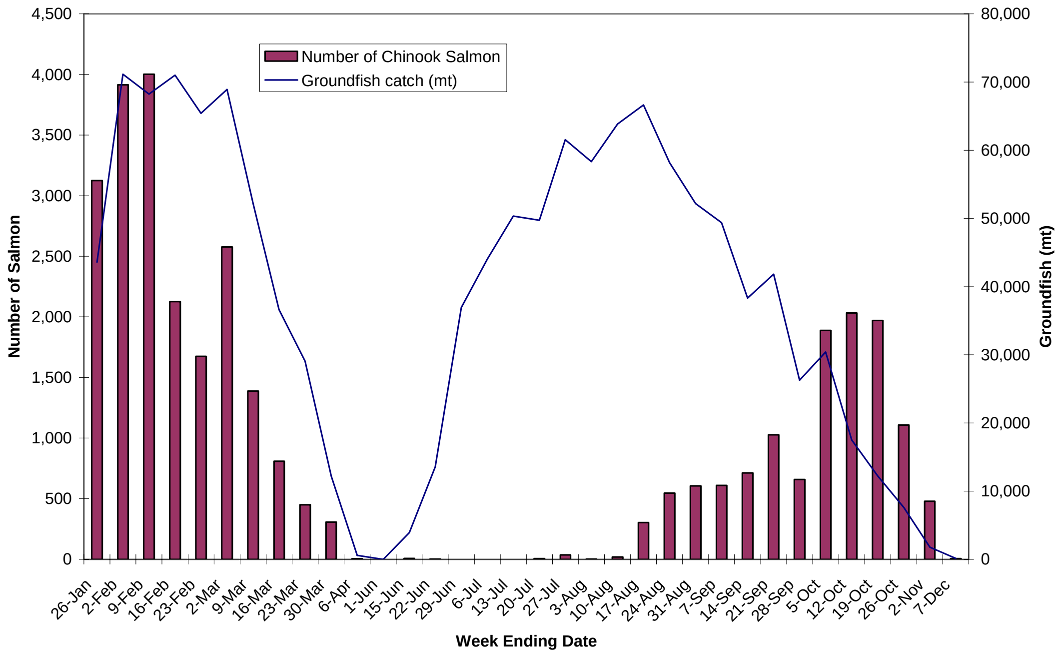
Years	Chinook salmon bycatch all BSAI groundfish fisheries(numbers of fish)
1990-2001 (average)	37,819
2002	36,385
2003	54,911
2004	62,493
2005	28,193

*data through 7/16/05

Annual numbers for 2002 were close to the long-term average from 1990-2001. However since that time Chinook numbers for the groundfish fisheries have been much higher and increasing annually. As described in Table 3-1, the majority of Chinook bycatch derives from the directed pollock trawl fishery. Bycatch in the directed pollock fishery generally follows a predictably seasonal pattern with high bycatch throughout the “A” season, low bycatch in the beginning of the “B” season and higher bycatch towards the latter part of the “B” season. Bycatch by week over the course of each year from 2002-2004 (and “A” season 2005) are shown in the following figures with the associated catch of pollock in order to determine the highest weeks for bycatch by numbers as well as to give an indication of the relative rate of bycatch according to the associated pollock catch.

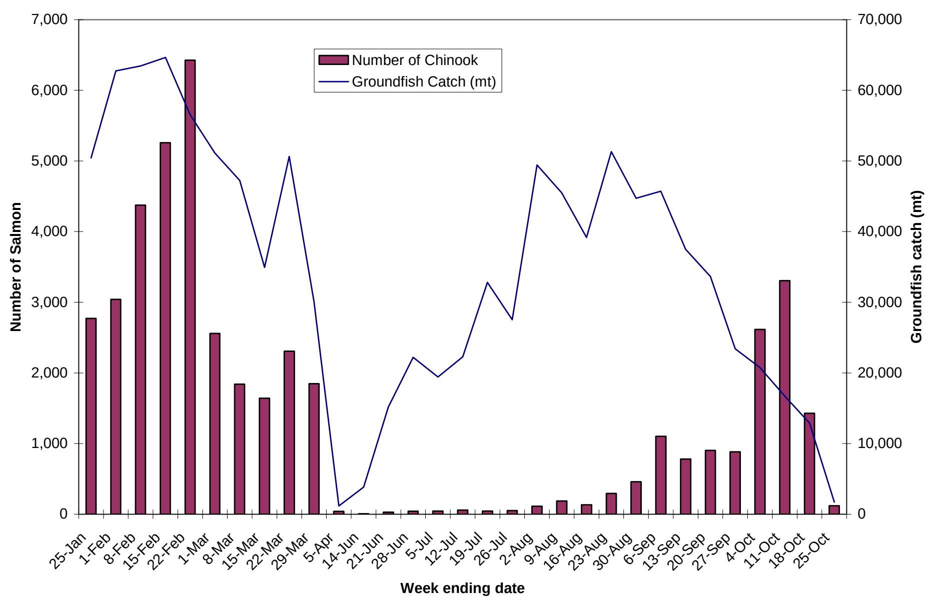
In 2002, Chinook bycatch in the pollock fishery was highest in the early part of the “A” season and remained high through mid-March (Figure 4-1). The Chinook closure was not triggered in the “A” season. The average bycatch rates both inside and both the Chinook SSA and CVOA were roughly the same (Table 4-2 a,c and Table 4-3 a,c) when comparing log transformed average bycatch rates within the A season. In the “B” season, bycatch did not increase until late in August and was highest for the “B” season in early to middle of October. The annual closure for the Chum Salmon Savings Area occurred from August 1-31, and this area closed again from September 21 to October 14. The Chinook SSA closure was not triggered in the ‘B” season. Within 2001 the catcher processor sector (Table 4-2b) and 2003-4 the catcher vessel sectors bycatch were lower inside the Chinook SSA in the B season (Table 4-2d) and in when observing log transformed average bycatch rates. Within 2003 the average bycatch rates was lower inside the entire CVOA as well (Table 4-3d).

Figure 4-1 2002 BSAI Chinook salmon bycatch, and groundfish catch in the pollock trawl fishery, by week



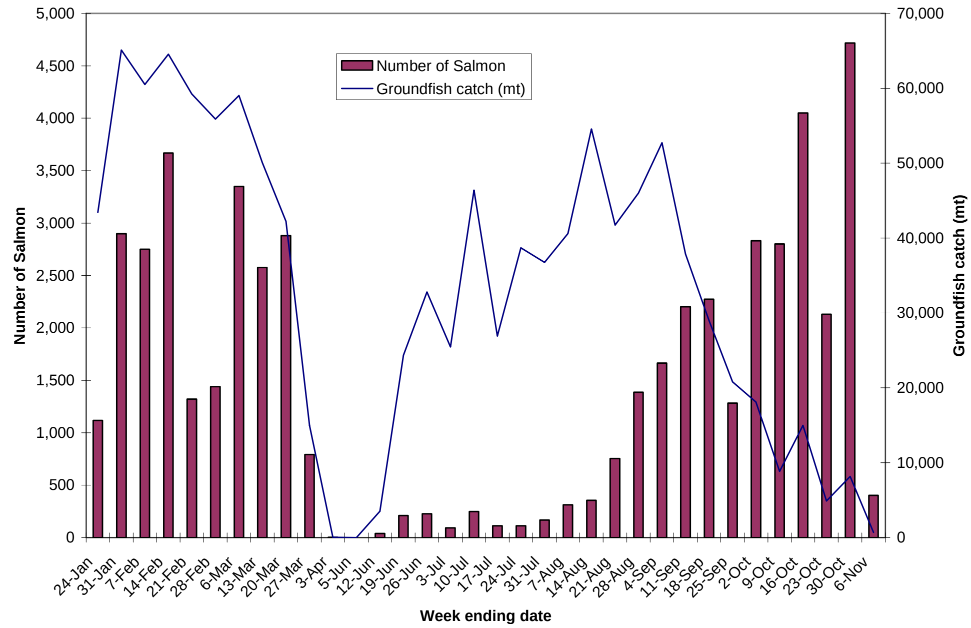
In 2003, a similar pattern was observed with high bycatch in the "A" season then decreasing to low amounts through August (Figure 4-2). The Chinook closure was not triggered in the "A" season. In the "B" season, the Chinook Salmon Savings Area closed on September 1 until the end of the year, and the Chum Salmon Savings Area closed from September 23rd to October 14. Highest numbers by week in the "B" season for Chinook bycatch in 2003 are seen in early October.

Figure 4-2 2003 BSAI Chinook salmon bycatch, and groundfish catch in the pollock trawl fishery, by week



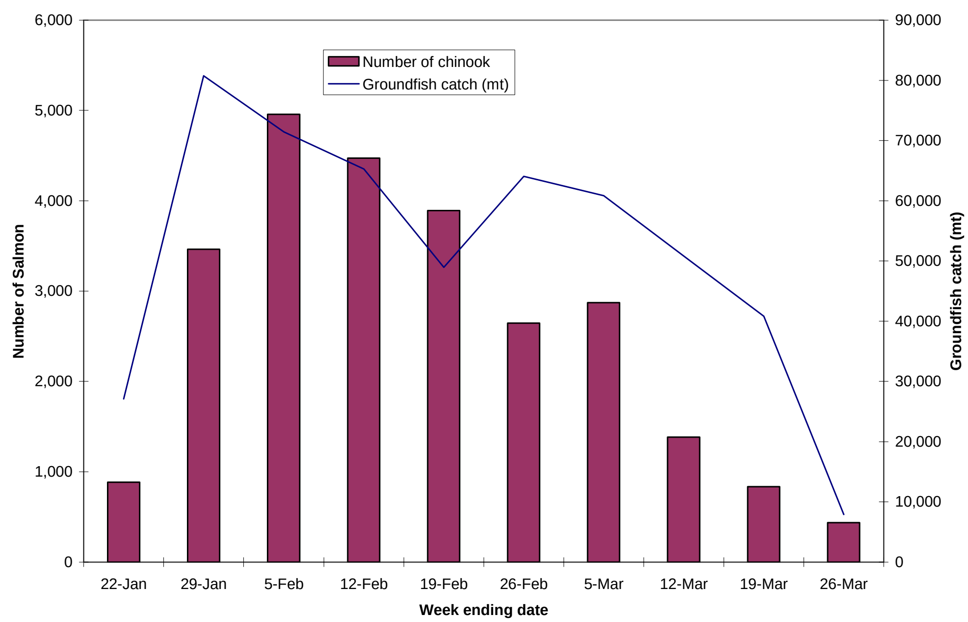
In 2004, a similar pattern is again observed (Figure 4-3). The Chinook closure was not triggered in the "A" season. In the "B" season, the Chinook Salmon Savings Area closed on September 5 through the end of the year while the Chum Salmon Savings Area closed September 14 through October 14. Highest bycatch amounts by week for 2004 are in early to late October.

Figure 4-3 2004 BSAI Chinook salmon bycatch, and groundfish catch in the pollock trawl fishery, by week



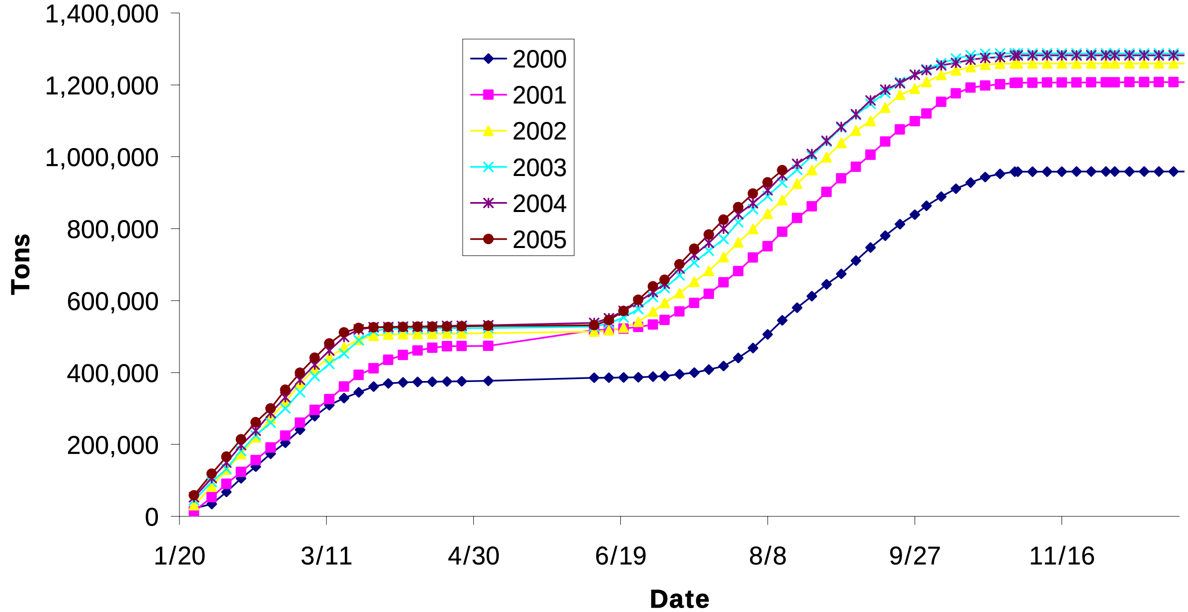
In 2005, bycatch of salmon was again predictably high throughout the "A" season (data available through March 30, 2005; Figure 4-4) The highest time period for bycatch was the week ending February 12, 2005. The Chinook closure was not triggered in the "A" season.

Figure 4-4 2005 BSAI Chinook salmon bycatch, and groundfish catch in the pollock trawl fishery, by week, preliminary data through April 9, 2005



4.1.2.2 Overview of annual Chinook bycatch with Pollock CPUE (2000-2005)

Cumulative Pollock catch was examined with associated cumulative Chinook salmon catch for years 2000-2005 (Figure 4-5)



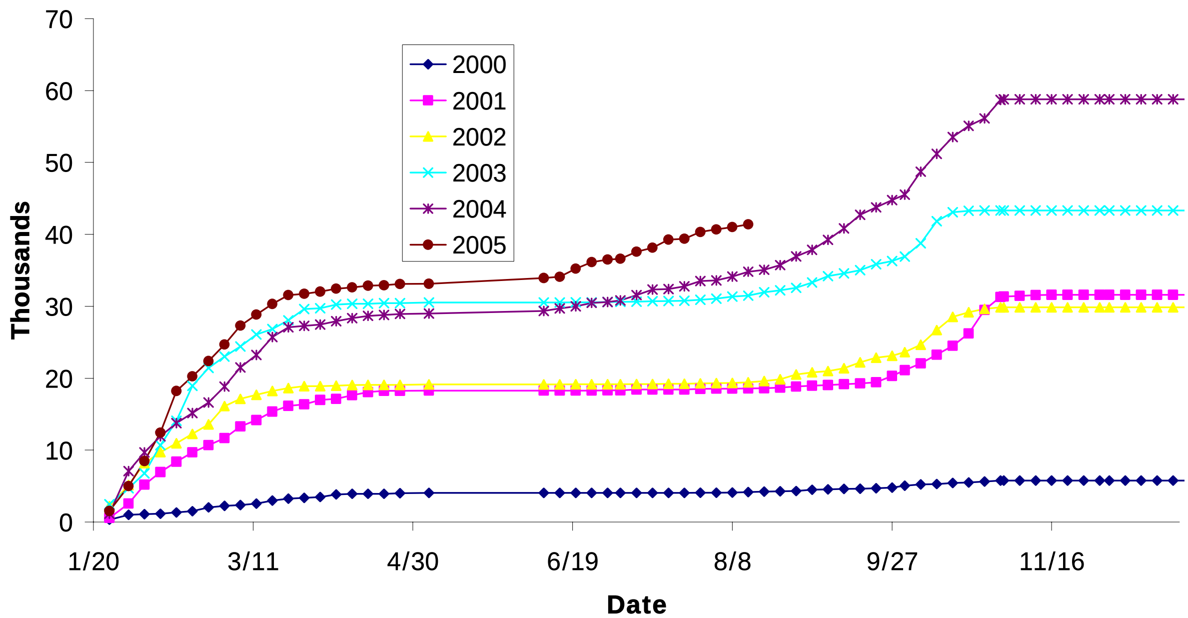


Figure 4-5 Cumulative pollock catch (tons; top panel) and cumulative chinook salmon catch (thousands of fish; bottom panel) based on observed vessels only (2000-2005, 5-day intervals). Data for 2005 are preliminary and extend to Aug. 13, 2005.

Higher catch rates have been observed in recent years (2002-2005) with the 2005 A season rate the highest of all 6 years examined and trending higher at the start of the B season. A similar pattern is observed in the cumulative salmon catch rates for these years.

Chinook catch rates were also examined for this time period Figure 4-6. This gives an indication of the relative magnitude of higher bycatch rate weeks (5-day intervals) on the cumulative rate of bycatch over the season. Highest rates by week were observed in 2004 and 2005, as well as highest cumulative rates, but incidences of high weekly rated did not always equate with an increase in the overall rate.

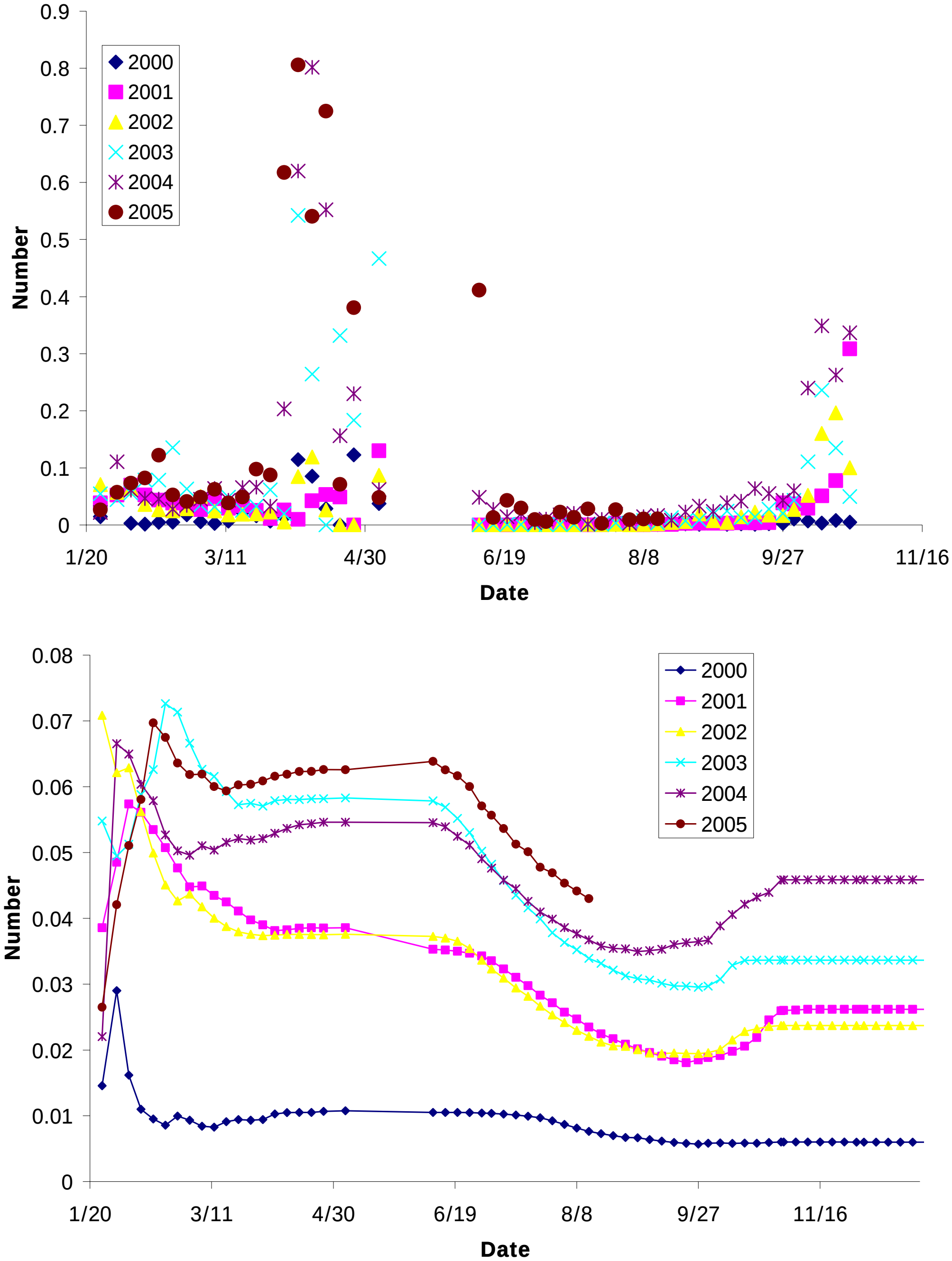


Figure 4-6 Chinook salmon catch rate (number per ton of pollock) based on observed vessels only (2000-2005). Top panel represents the average bycatch at 5-day intervals while the bottom panel represents the cumulative number per ton of pollock. Data for 2005 are preliminary and extend to Aug. 13, 2005.

Table 4-2 Average bycatch (#/mt) rates of Chinook Salmon within the Chinook Salmon Savings Area (CHSSA), outside the CHSSA by a) Catcher Processors in the A season b) Catcher Processors in the B season c) Catcher Vessels in the A season and d) Catcher Vessels in the B season.

a)

Year	Mean Inside	S.D	Outside	S.D	log(x+1) Mean Inside	S.D	log(x+1) Mean Outside	S.D
2000	0.158	0.405	0.139	0.327	0.119	0.198	0.112	0.163
2001	0.165	0.295	6.252	10.238	0.059	0.072	0.176	0.830
2002	0.113	0.356	0.106	0.496	0.095	0.120	0.078	0.153
2003	0.170	0.296	0.171	0.384	0.139	0.167	0.135	0.182
2004	0.121	0.160	0.116	0.292	0.108	0.108	0.095	0.143

b)

Year	Mean Inside	S.D	Outside	S.D	log(x+1) Mean Inside	S.D	log(x+1) Mean Outside	S.D
2000	-	-	0.048	0.061	-	-	0.045	0.049
2001	-	-	13.868	29.720	-	-	0.342	0.868
2002	-	-	0.171	1.181	-	-	0.089	0.231
2003	-	-	0.289	3.534	-	-	0.117	0.258
2004	0.050	0.060	0.064	0.130	0.047	0.054	0.058	0.080

c)

Year	Mean Inside	S.D	Outside	S.D	log(x+1) Mean Inside	S.D	log(x+1) Mean Outside	S.D
2000	0.045	0.214	0.023	0.026	0.035	0.109	0.022	0.025
2001	0.062	0.221	5.705	22.012	0.023	0.043	0.082	0.326
2002	0.078	0.237	0.042	0.042	0.066	0.111	0.040	0.038
2003	0.085	0.146	0.086	0.216	0.076	0.091	0.073	0.113
2004	0.082	0.315	0.059	0.183	0.068	0.110	0.051	0.095

d)

Year	Mean Inside	S.D	Outside	S.D	log(x+1) Mean Inside	S.D	log(x+1) Mean Outside	S.D
2000	0.128	0.003	0.021	0.089	0.128	0.003	0.019	0.051
2001	0.086	0.368	0.039	0.059	0.026	0.072	0.016	0.022
2002	0.084	0.158	0.063	0.147	0.074	0.105	0.056	0.091
2003	0.010	0.009	0.127	0.265	0.010	0.009	0.105	0.153
2004	0.032	0.115	0.221	0.520	0.029	0.061	0.165	0.226

Table 4-3 Average bycatch (#/mt) rates of Chinook Salmon within the Cathcer Vessel Operating Area (CVOA), outside the CSSA by a) Catcher Processors in the A season b) Catcher Processors in the B season c) Catcher Vessels in the A season and d) Catcher Vessels in the B season.

a)

Year	Mean Inside	S.D	Outside	S.D	log(x+1) Mean Inside	S.D	log(x+1) Mean Outside	S.D
2000	0.141	0.337	0.170	0.408	0.113	0.168	0.130	0.196
2001	0.226	1.149	0.144	0.404	0.063	0.101	0.047	0.081
2002	0.108	0.332	0.116	0.605	0.090	0.121	0.080	0.168
2003	0.237	0.146	0.191	0.444	0.141	0.124	0.146	0.204
2004	0.121	0.203	0.121	0.203	0.104	0.123	0.104	0.123

b)

Year	Mean Inside	S.D	Outside	S.D	log(x+1) Mean Inside	S.D	log(x+1) Mean Outside	S.D
2000	0.048	0.061	0.048	0.061	0.045	0.049	0.045	0.049
2001	0.736	1.204	0.323	0.843	0.178	0.209	0.089	0.136
2002	0.054	0.026	0.175	1.203	0.053	0.024	0.091	0.235
2003	0.269	0.172	0.294	3.609	0.184	0.138	0.116	0.261
2004	0.047	0.042	0.047	0.042	0.046	0.038	0.046	0.038

c)

Year	Mean Inside	S.D	Outside	S.D	log(x+1) Mean Inside	S.D	log(x+1) Mean Outside	S.D
2000	0.033	0.148	0.019	0.023	0.028	0.077	0.018	0.022
2001	0.083	0.334	0.072	0.277	0.027	0.063	0.024	0.062
2002	0.071	0.212	0.040	0.040	0.061	0.101	0.039	0.036
2003	0.085	0.154	0.087	0.255	0.076	0.090	0.071	0.132
2004	0.076	0.279	0.076	0.279	0.065	0.100	0.065	0.100

d)

Year	Mean Inside	S.D	Outside	S.D	log(x+1) Mean Inside	S.D	log(x+1) Mean Outside	S.D
2000	0.021	0.088	0.021	0.092	0.019	0.051	0.019	0.053
2001	0.074	0.323	0.048	0.020	0.024	0.064	0.020	0.008
2002	0.080	0.158	0.066	0.085	0.071	0.104	0.062	0.066
2003	0.081	0.256	0.164	0.232	0.064	0.141	0.140	0.143
2004	0.165	0.361	0.165	0.361	0.124	0.212	0.124	0.212

Table 4-4 Average bycatch (#/mt) rates of Other Salmon within the Chum Salmon Savings Area (CSSA), outside the CSSA by a) Catcher Processors in the A season b) Catcher Processors in the B season c) Catcher Vessels in the A season and d) Catcher Vessels in the B season.

Year	Mean Inside	S.D	Outside	S.D	log(x+1) Mean Inside	S.D	log(x+1) Mean Outside	S.D
2000	0.051	0.005	0.061	0.128	0.050	0.005	0.054	0.085
2001	0.044	0.032	0.128	0.192	0.043	0.030	0.109	0.140
2002	0.035	0.019	0.043	0.070	0.035	0.018	0.040	0.057
2003	0.349	1.707	0.099	0.294	0.129	0.393	0.082	0.126
2004	0.034	0.016	0.048	0.042	0.033	0.016	0.046	0.037

Year	Mean Inside	S.D	Outside	S.D	log(x+1) Mean Inside	S.D	log(x+1) Mean Outside	S.D
2000	-	-	0.113	0.326	-	-	0.091	0.148
2001	-	-	0.348	1.268	-	-	0.197	0.339
2002	-	-	0.231	2.004	-	-	0.124	0.252
2003	-	-	0.390	2.904	-	-	0.164	0.357
2004	1.686	3.576	0.464	1.774	0.571	0.771	0.255	0.382

Year	Mean Inside	S.D	Outside	S.D	log(x+1) Mean Inside	S.D	log(x+1) Mean Outside	S.D
2000	0.007	0.000	0.005	0.003	0.007	0.000	0.005	0.003
2001	0.011	0.010	0.062	0.339	0.011	0.010	0.038	0.168
2002	0.093	0.480	0.043	0.252	0.050	0.225	0.028	0.135
2003	0.036	0.238	0.026	0.120	0.024	0.118	0.023	0.064
2004	0.015	0.020	0.014	0.016	0.015	0.019	0.013	0.016

Year	Mean Inside	S.D	Outside	S.D	log(x+1) Mean Inside	S.D	log(x+1) Mean Outside	S.D
2000	1.218	1.499	0.216	0.454	0.655	0.492	0.159	0.237
2001	141.418	1.334	0.140	0.523	72.733	0.445	0.095	0.214
2002	0.630	1.148	0.206	0.466	0.378	0.408	0.150	0.236
2003	0.218	0.356	0.598	2.194	0.174	0.193	0.341	0.403
2004	1.105	2.646	1.529	3.106	0.423	0.650	0.562	0.725

Table 4-5 Average bycatch (#/mt) rates of Other Salmon within the CVOA, outside the CVOA by a) Catcher Processors in the A season b) Catcher Processors in the B season c) Catcher Vessels in the A season and d) Catcher Vessels in the B season

a)

Year	Mean Inside	S.D	Outside	S.D	log(x+1) Mean Inside	S.D	log(x+1) Mean Outside	S.D
2000	0.064	0.138	0.046	0.037	0.056	0.091	0.044	0.034
2001	0.137	0.177	0.103	0.197	0.119	0.131	0.087	0.141
2002	0.041	0.058	0.029	0.009	0.039	0.048	0.029	0.008
2003	0.191	0.886	0.070	0.072	0.114	0.245	0.066	0.061
2004	0.034	0.016	0.049	0.043	0.033	0.016	0.047	0.039

b)

Year	Mean Inside	S.D	Outside	S.D	log(x+1) Mean Inside	S.D	log(x+1) Mean Outside	S.D
2000	0.215	0.266	0.113	0.326	0.179	0.201	0.091	0.148
2001	0.268	0.475	0.353	1.300	0.194	0.266	0.198	0.343
2002	0.196	0.244	0.234	2.079	0.163	0.174	0.121	0.257
2003	0.479	1.488	0.385	2.967	0.229	0.438	0.160	0.351
2004	1.686	3.576	0.405	1.618	0.571	0.771	0.240	0.346

c)

Year	Mean Inside	S.D	Outside	S.D	log(x+1) Mean Inside	S.D	log(x+1) Mean Outside	S.D
2000	0.006	0.002	0.007	-	0.006	0.002	0.007	-
2001	0.015	0.024	0.066	0.363	0.015	0.022	0.040	0.180
2002	0.069	0.377	0.012	0.013	0.040	0.186	0.012	0.013
2003	0.030	0.175	0.023	4.075	0.024	0.088	0.022	3.863
2004	0.015	0.020	0.012	0.013	0.015	0.019	0.012	0.013

d)

Year	Mean Inside	S.D	Outside	S.D	log(x+1) Mean Inside	S.D	log(x+1) Mean Outside	S.D
2000	0.574	1.024	0.206	0.439	0.346	0.407	0.152	0.230
2001	0.200	0.734	0.144	0.361	0.121	0.273	0.111	0.185
2002	0.270	0.635	0.158	0.286	0.184	0.282	0.131	0.160
2003	0.507	2.093	0.488	0.839	0.297	0.368	0.307	0.377
2004	1.105	2.646	1.569	3.148	0.423	0.650	0.584	0.719

Annual Chinook catch (observed only) was compared with Pollock CPUE for the same time period (Figure 4-7, 4-8). A season CPUE consistently concentrates in the area north of Unimak Island, with higher relative scale of Chinook bycatch within the Chinook SSA designated are since 2003. Effort in 2005 A season appears similar to previous years with the exception of more concentrated effort near the Pribilofs resulting in high bycatch of salmon in this area. On an annual basis much of the concentrated bycatch of Chinook in the A season appears to fall within and just outside of the Chinook Salmon Savings Area while B season Chinook bycatch averaged annually falls outside of the savings area (with the exception of 2002) (Figure 4-22).

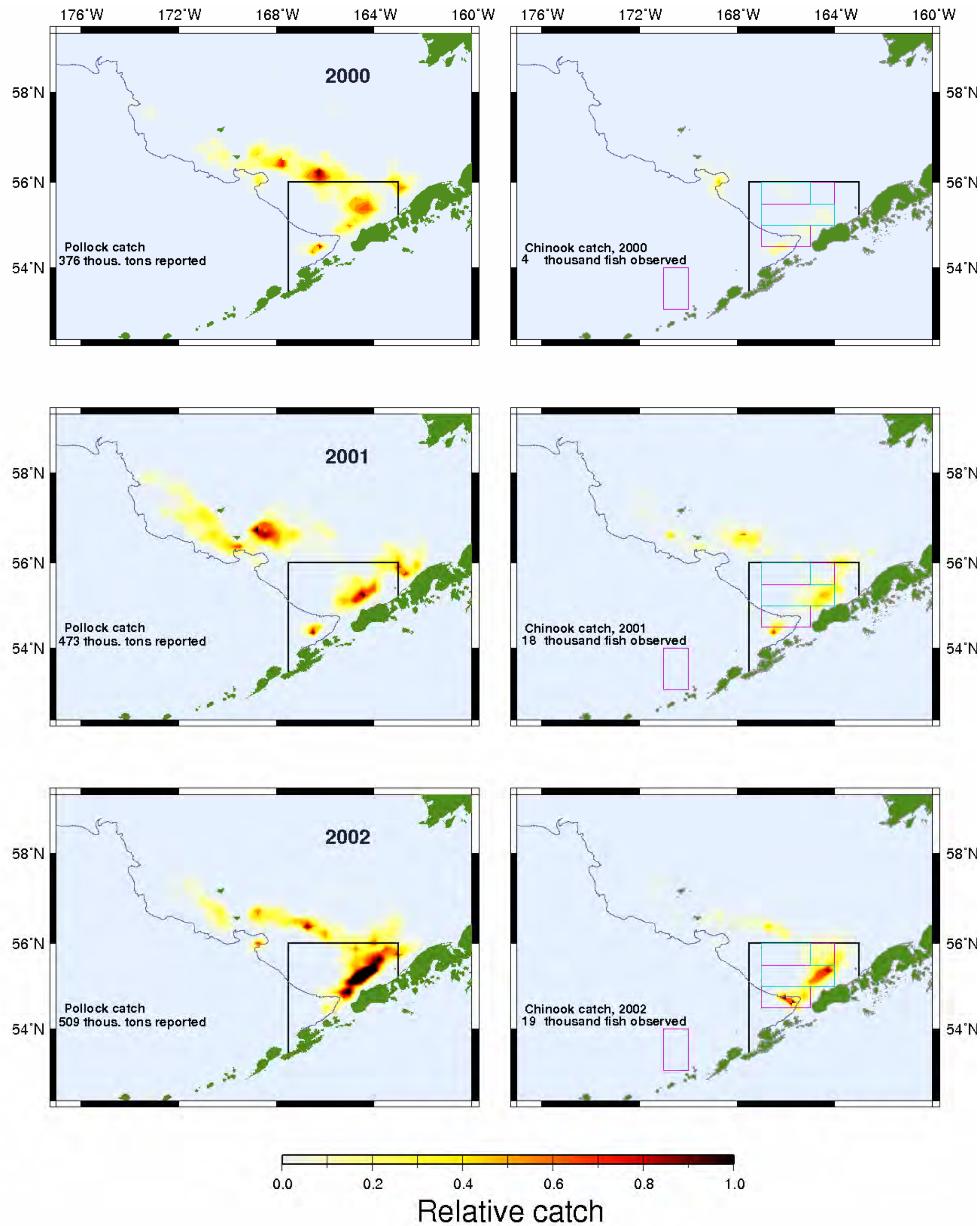


Figure 4-7 **Pollock catch during the "A" season (Jan – May; left column) compared to chinook salmon catch for the same period (right column). Source: NMFS Observer database. The scale of the relative catch is constant for each species over different years.**

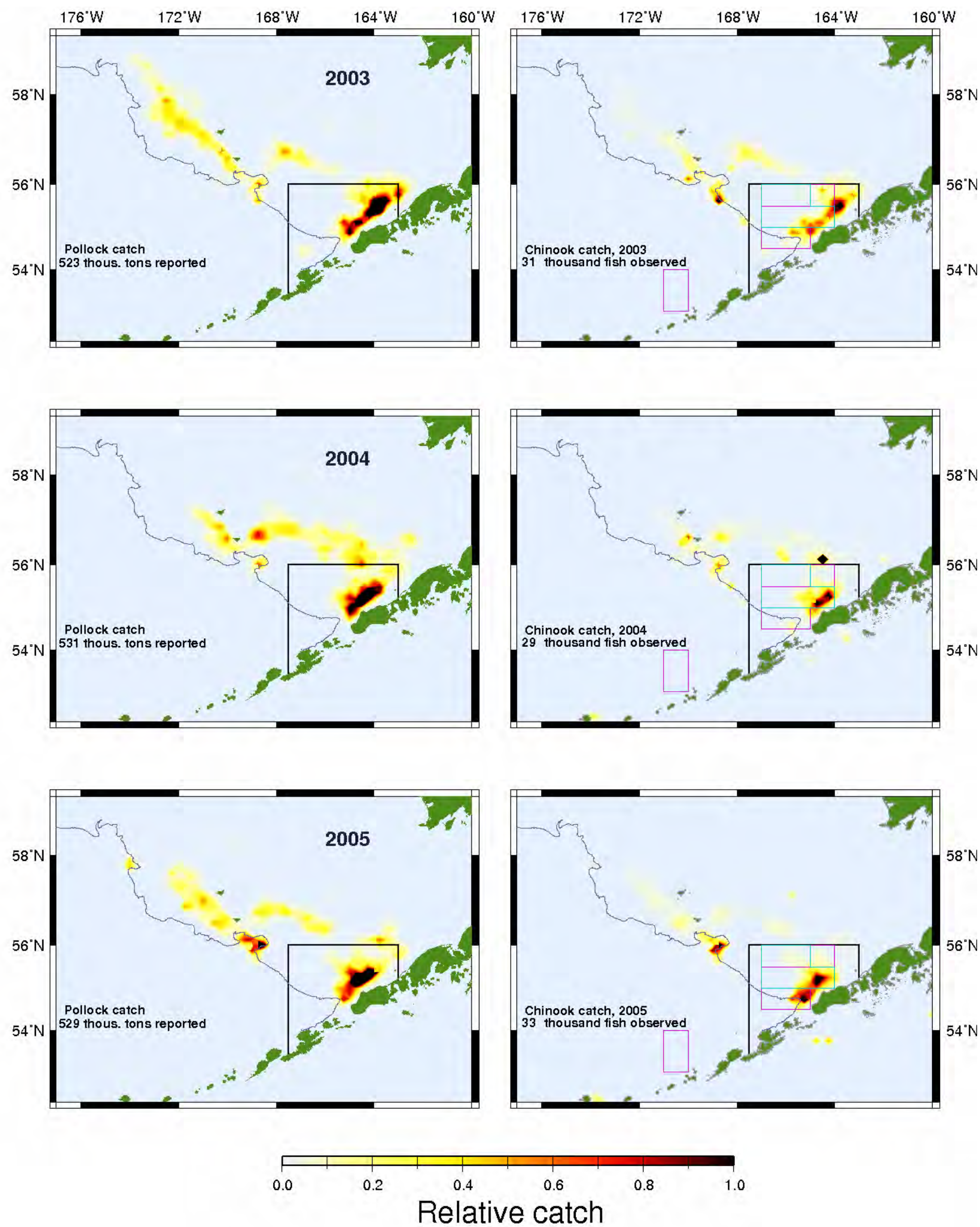


Figure 4-8 Pollock catch during the "A" season (Jan – May; left column) compared to chinook salmon catch for the same period (right column). Source: NMFS Observer database. The scale of the relative catch is constant for each species over different years.

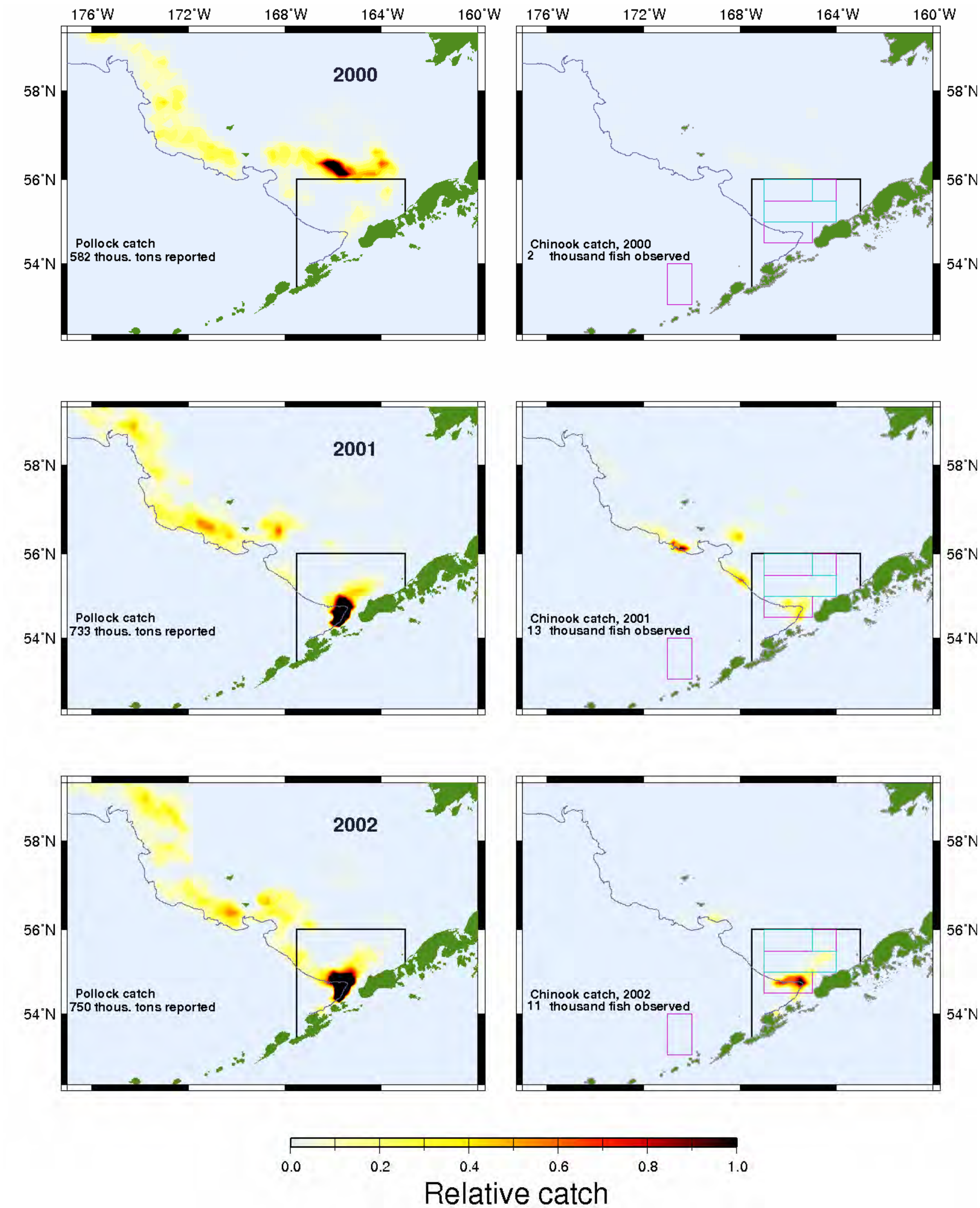


Figure 4-9 Pollock catch during the "B" season (Jun – Dec; left column) compared to chinook salmon catch for the same period (right column). Source: NMFS Observer database. The scale of the relative catch is constant for each species over different years.

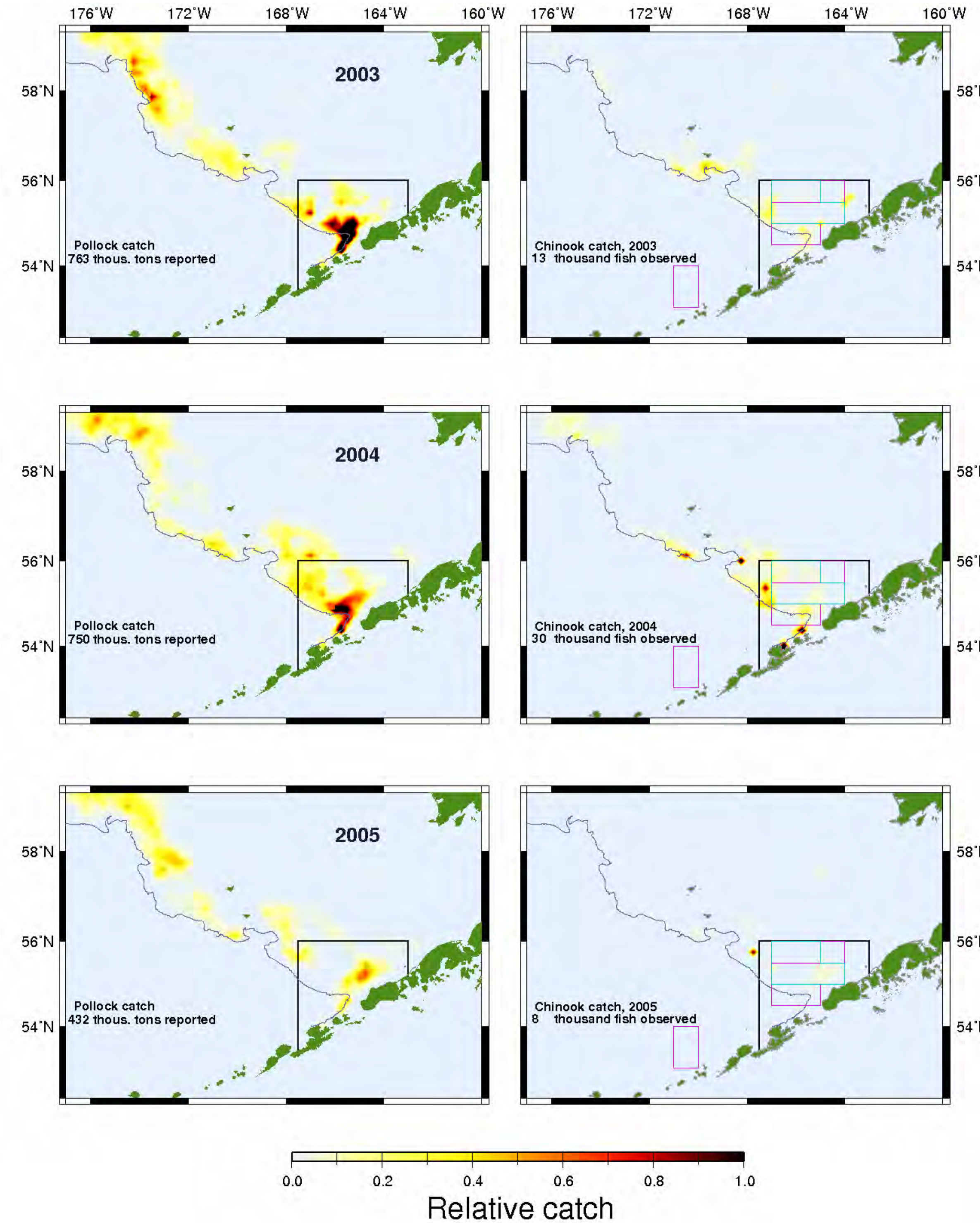


Figure 4-9(cont). **Pollock catch during the "B" season (Jun – Dec; left column) compared to chinook salmon catch for the same period (right column). Source: NMFS Observer database. The scale of the relative catch is constant for each species over different years.**

4.1.2.3 Spatial and temporal overview of bycatch since 2002[3]

Figures 4-10 through 4-15 show the bycatch rate in number of salmon per metric ton of groundfish for selected weeks in 2002 through 2004, "A" and "B" season. An overview is provided below of the fishery and the spatial and temporal nature of Chinook bycatch by year for this time period. Where weeks are mentioned histograms and frequency diagrams to accompany the figures are included in Appendix 4. Where regulatory closures were instituted for Chinook (2003 and 2004) and chum salmon (2002, 2003 and 2004), a comparison is made between non-CDQ fleet which is subject to the closures and the rates from CDQ vessels fishing inside of the closure. CDQ data are not available for all time periods analyzed.

2002

The "A" season opened on January 20, and from the opening through the week ending February 2, the fleet was concentrated in the area north of Unimak Island. Bycatch rates during this period were in the lowest category of the range used in this analysis for comparison of relative magnitude of rates. The highest rates for this time period were located in the northern portion of the Chinook Salmon Savings Area (Chinook SSA) The Chinook SSA was open throughout 2002.

By the week of February 9 (Figure 4-10a) the fleet moved slightly further north. Here the highest rates were found within the Chinook SSA continuing through the following week (Figure 4-10b, Appendix 4 Figure 2). By late February to early March fishing effort continued north of Unimak Island and toward the Pribilofs. The higher bycatch rates for the weeks in February were based on only a few high hauls (Appendix 4 Figures 1-2, 4-5) compared to that in March where it was more evenly dispersed (Appendix 4 Figure 3). Again the highest rates during this period are located with the Chinook SSA and towards the Pribilofs (Figure 4-10 c).

By late March through early April the fishery is dispersed with some higher rates north west of Unimak Island in the Chinook SSA before dropping down to low rates and dispersed effort in early April at the end of the "A" season (Figure 4-10 d).

The early "B" season in July showed disperse effort and low bycatch rates. Bycatch rates are low through early August, with disperse effort north of Unimak Island and to the north west of the Pribilofs. Through August (Figure 4-11 a) and into early September fishing is more concentrated to the north west of Unimak, while bycatch rates remain consistently low (Appendix 4-6- 4-8) with relatively few higher bycatch hauls. Note that the Chum Salmon Savings Area closed from August 1-31, forcing the fleet to fish outside of this area. Overall Chinook bycatch remained low during this period.

Mid-to late September the fleet is concentrated in the southern portion of the Chinook SSA (Figure 4-11 b). Highest bycatch rates in this period are varied, appearing both inside and outside the Chinook SSA area and southeast of the Pribilofs. The Chum Salmon Savings Area (Chum SSA) closed September 21 through October 14. Bycatch rates for Chinook are the highest for the "B" season at this time (Figures 4-11 c, d, e Appendix 4 Figures 4-9 through 4-15). By late September to early October, the highest bycatch rates are concentrated to the north of Unimak Island in the Chinook SSA and south of the Pribilofs. Following the reopening of the Chum SSA in mid-October through early November, the highest rates are again both within the Chinook SSA and nearshore to the west of Unimak Island (Figures 4-11 f, g Appendix 4 Figure 16).

In general rates for 2002 tend to be concentrated both in "A" and "B" seasons within and to the south of the area delineated by the Chinook SSA as well as south of the Pribilofs. The regulatory closure was not triggered in 2002 for Chinook. Annual bycatch numbers for Chinook in 2002 for all groundfish fisheries were 36,385, close to the long-term average (1990-2000) of 37,819. Of this number, 34,200 were taken in the directed pollock fishery. While Chinook SSAs were not triggered in 2002, the fleet responded to chum closures in August and September by moving into available areas which may have had higher Chinook bycatch.

2003

Bycatch rates were higher in this year compared to 2002, leading to a higher overall scale for Chinook bycatch numbers per metric ton of groundfish. The applicable spatial figures are shown in Figures 4-12 through 4-13 and the frequency diagrams on a haul by haul basis for each weekend ending date are within Appendix 4, Figures 17-39.

From the start of the fishery on January 20, the fleet remained concentrated north of Unimak Island with consistent bycatch rates for this period. By mid-February, a portion of the fleet moved north and west and encountered much higher bycatch rates in those areas (Figure 4-12 a, b). During a few of the week's these high bycatch rates are attributed to only a few hauls in the week (Appendix 4 Figures 17-22). By late March, the highest rates were within the Chinook SSA, along the fringes of the Chinook SSA and west of the Pribilofs (Figure 4-12 c). The regulatory closure was not triggered in the "A" season in 2003 so the Chinook SSA remained open during this period.

Early "B" season showed disperse fishing throughout June and July and low bycatch rates. The annual chum closures moved the fleet outside the Chum Salmon Savings Area from August 1-31. By mid-to late-August, bycatch rates are higher, with the highest rates in the areas far northwest of the Pribilofs (Figure 4-13 a, b). Within week ending August 23rd had one hauls with a very high bycatch rate (Appendix 4 Figure 23) with a few larger than the average hauls within August 30th (Appendix 4 Figure 24). The Chinook SSA regulatory closure was triggered on September 1 through the remainder of the fishing year (December 31) thus all fishing for the non-CDQ fleet from September 1 on was outside of the Chinook SSA region. Higher rates are seen to the north west of the Pribilofs with lower rates within the Chinook SSA (Figure 4-13 c) (Appendix 4-25 thru 4-27). The week ending September 13 (Figure 4-13 d) shows lower rates inside of the Chinook SSA than to the north and outside of it and much lower rates than are seen west of the Pribilofs (Appendix 4 Figures 28-29). This is even more pronounced the following week with highest rates observed to the west of the closure and north and south of it (Figure 4-13 e) (Appendix 4 Figures 30 -31).

The Chum closure was also triggered on September 24 and remained closed until October 14. The fleet thus responded to both closures. The CDQ fleet is eligible to fish with the savings areas until the CDQ triggers for each species are exceeded by the fleet. The fleet had not exceeded it's CDQ trigger in 2003 thus they were eligible to fish during this time period. A comparison of rates inside and outside of the Chinook SSAs during this period allow for some understanding of the impact of the closure. This comparison is complicated by the fact that the Chum closure is also triggered during this time period and the fleet must respond to both closures. The fleet was only able to fish outside of the Chum annual closure and prior to the Chinook trigger on September 1 for 24 hours (noon on August 31 to noon on September 1). Data are aggregated by week so that 24 hour period is not available for analysis but we are able to evaluate the relative changes in bycatch rates by week in comparison to CDQ rates when available. CDQ rates inside the closure showed lower rates than cooperative bycatch rates outside the closure (Figure 4-13 f).

Late September though early October showed highest rates along the edges of the Chinook SSA and outside of it to the west and northwest and towards the Pribilofs (Figure 4-13 g, h). For the week ending October 11, the highest rates are again outside of the closure to the east. Some higher rates are located inside of the closure but the vast majority is along the fringes and outside of the closure (Appendix 4 Figures 32-35). The differences between rates inside and outside are more pronounced with a smaller range of bycatch rates shown (Table 4-2 and Appendix 4 Figure 36). The Chum SSA reopened partway through the following week, with data from the week ending October 18 showing higher rates outside of the Chinook SSA than inside for the period this was fished, although no CDQ data is available during the actual closure (Figure 4-13 i).

In general for 2003 the closure became more complicated for the fleet with the Chinook closure following the annual Chum closure by 24 hours, then 3 weeks later the Chum closure was re-imposed for an additional 3 week period. There is more evidence of higher bycatch rates located outside of the Chinook SSA than was apparent in 2002, possibly due to the forced movement of the fleet in responding to the combined closures.).

2004

Bycatch rates in 2004 for Chinook are shown in Figures 4-14-4-15 and frequency distributions on a haul by haul basis are in Appendix 4 Figures 4-40 thru 4-58. The scale of the bycatch rate is lower than in 2003. The "A" season fishery was again concentrated to the north of Unimak island, with highest bycatch rates for late January to early February to the north of Unimak Island and along the southern edge of the Chinook SSA (Figure 4-14 a) and toward the Pribilofs. Mid-February rates are highest south of the Pribilofs with scattered high rates around and to the north and east of the Chinook SSA (Figure 4-14 b). Early March, lower rates are observed within the Chinook SSA area with higher rates observed south and southeast of the Pribilofs and south east of the Chinook SSA (Figure 4-14c) By the end of March lower rates are observed near the Pribilofs and higher rates observed within the Chinook SSA (Figure 4-14 d). No Chinook savings area closures were triggered in the 2004 A season.

Early "B" season (June through early August) the fishery is dispersed and the highest rates are found generally outside of the Chinook SSA. Again the Chum Salmon Savings Area closes from August 1-31 and the fleet must move outside of it. Rates are shown on a smaller scale here to highlight differences. Throughout late August (Figure 4-15 a) and into early September (Figure 4-15b), the highest rates are to the north of the Chinook SSA and within the Chum SSA area and west of the Pribilofs, with rates inside the Chinook SSA generally lower (Figure 4-15 b). The Chinook SSA closure was triggered on September 5 and the area closed for the remainder of the year. The Chum Salmon Savings Area likewise closed on September 14 through October 14. There were approximately 6 days (from noon August 31 to noon September 5) that the fleet was able to fish without closures. After September 5 the fleet first had the Chinook closure then on the 14^{th} the combination of both Chinook and Chum closures.

By the week of September 11, the Chinook SSA is now closed, and the highest rates are along the south east edge of the Chinook SSA (north of Unimak), to the northwest of the Chinook SSA and to the south and west of the Pribilofs (Figure 4-15 c). The following week lower rates are observed near the closure area with higher rates observed outside (Figure 4-15 d). For the remainder of the "B" season, highest rates are found in late September (following the Chum closure September 14) where lower CDQ rates are observed inside of the Chinook SSA when closed in contrast to higher rates outside of the closure area (Figure 4-15 e). In early October, Chum SSA remains closed, and higher rates are observed nearshore (south of the closed area) and to the south of the Pribilofs (Figure 4-15 f, g). Here the bycatch rate scale no longer shown on a smaller scale (as with the previous figures). High rates are located nearshore, south of the Chinook SSA as well as to the west and northwest of the Pribilofs. During this time period, both Chum and Chinook SSAs are closed and the fleet is forced to operate outside of both areas. Mid to late October, with the Chinook area still closed but the Chum SSA now open, highest rates are observed north, south and west of the Chinook SSA and to the west and far northwest of the Pribilofs (Figure 4-15 h, i).

4.1.3 Fishery Performance with respect to Chum Salmon Bycatch

As with Chinook bycatch, fishery performance for the period 2002 to 2004 is evaluated in two ways: 1) an overview of the annual bycatch numbers by year, target fishery and by season; and 2) an overview of the spatial and temporal nature of the chum salmon bycatch in the directed pollock fishery (non-CDQ trawl fleet and CDQ trawl fleet).

4.1.3.1 Overview of chum bycatch in the pollock trawl fishery

As described in Section 3.2, "other salmon" bycatch in the BSAI trawl fisheries has been increasing in recent years. Table 4-6 shows overall "other salmon" numbers for all groundfish fisheries for 2002 – 2004 as compared to a long term average for "other salmon" bycatch from 1990-2001.

Table 4-6 Overall other salmon bycatch for all BSAI groundfish fisheries, 2002-2005

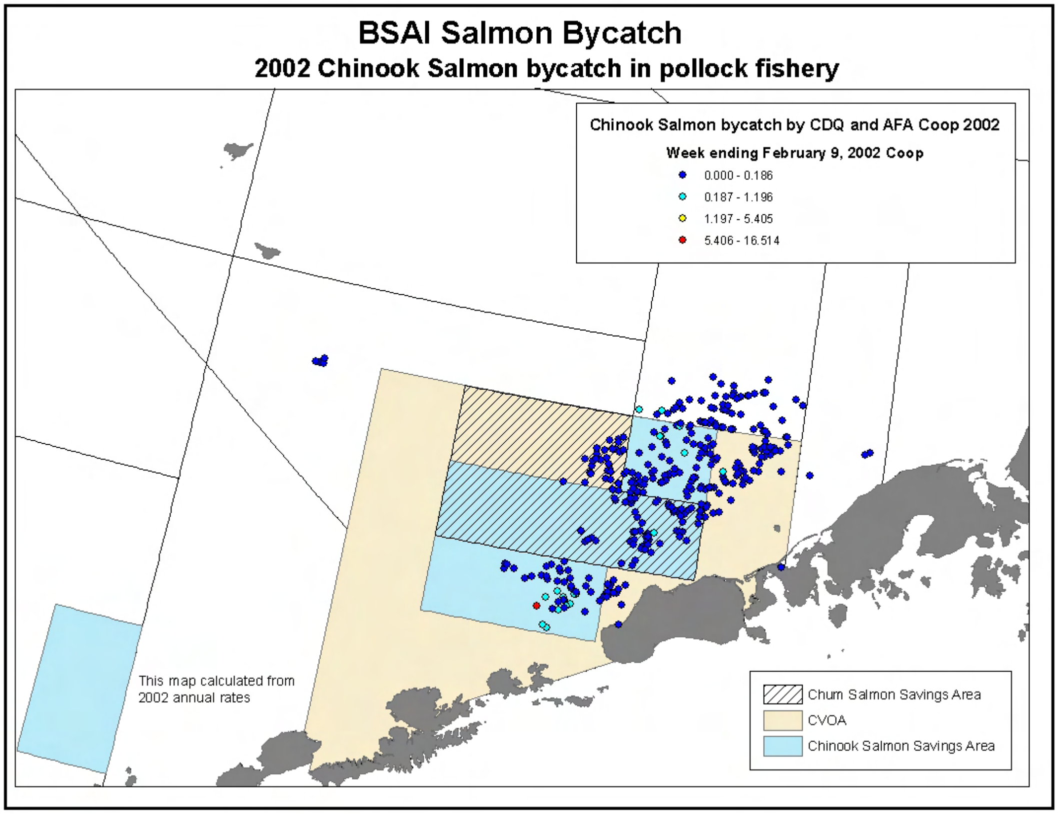
Years	"Other salmon" bycatch all BSAI groundfish fisheries (numbers of fish)
1990-2001 (average)	69,332
2002	81,470
2003	197,091
2004	465,650

Annual numbers for 2002 were elevated as compared to the long-term average from 1990-2001. However since that time "other salmon" bycatch numbers for the groundfish fisheries are significantly higher and increasing annually. As described in Table 3-1, on page 6, the majority of "other salmon" bycatch is made up of chum salmon and this bycatch derives predominantly from the directed pollock trawl fishery. Bycatch in the directed pollock fishery generally follows a predictably seasonal pattern with high bycatch throughout the "B" season only. Bycatch by week over the course of each year from 2002-2004 are shown in the following figures with the associated catch of pollock in order to determine the highest weeks for bycatch by numbers as well as give an indication of the relative rate of bycatch according to the associated pollock catch.

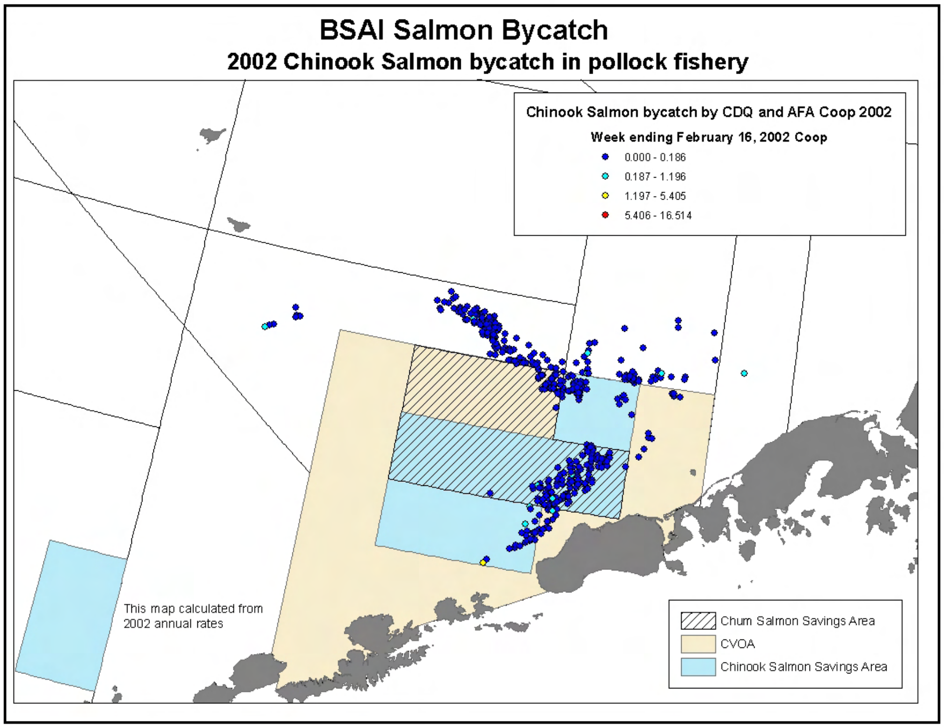
Generally, other salmon bycatch follows a predictably seasonal pattern with high bycatch throughout the "B" season (Figure 4-21). In 2002, Chum bycatch in the pollock fishery was highest in mid-to-late September. The annual closure for the Chum Salmon Savings Area occurred from August 1-31, and this area closed again from September 21 to October 14. No additional Chinook closures were triggered in 2002.

Figure 4-10 2002 Chinook Salmon Bycatch in the non-CDQ Pollock Fishery “A” Season, selected weeks in February-March

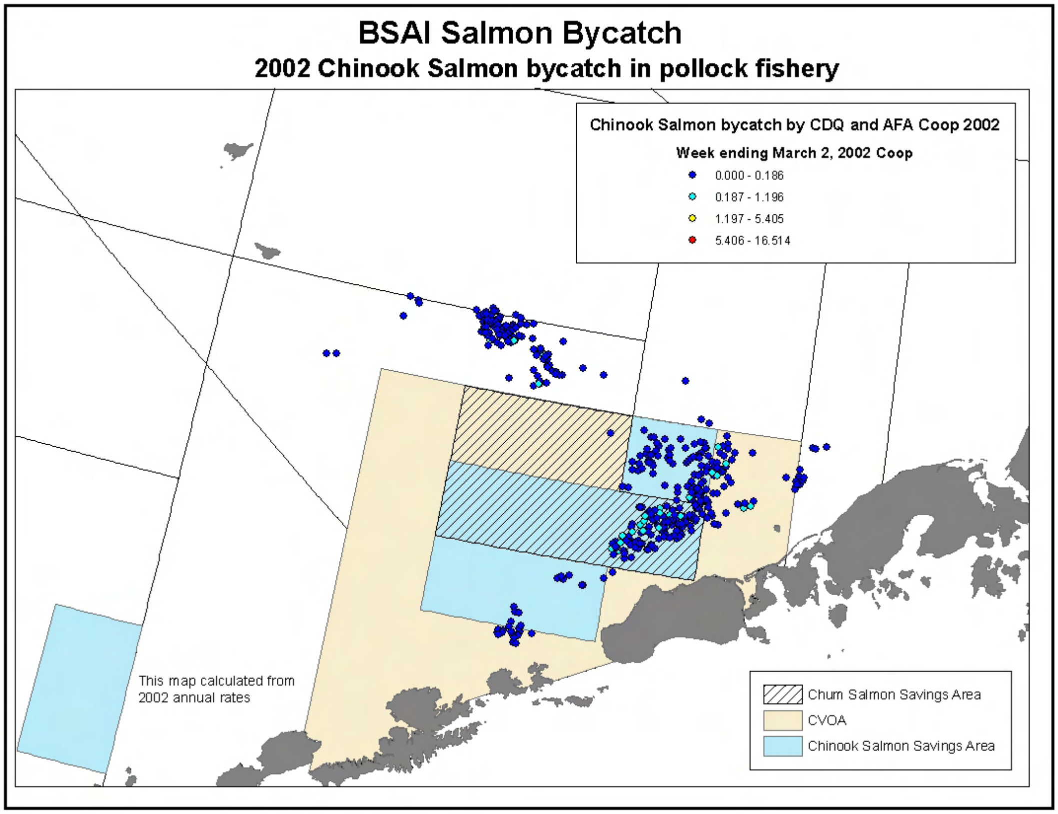
a)



b)



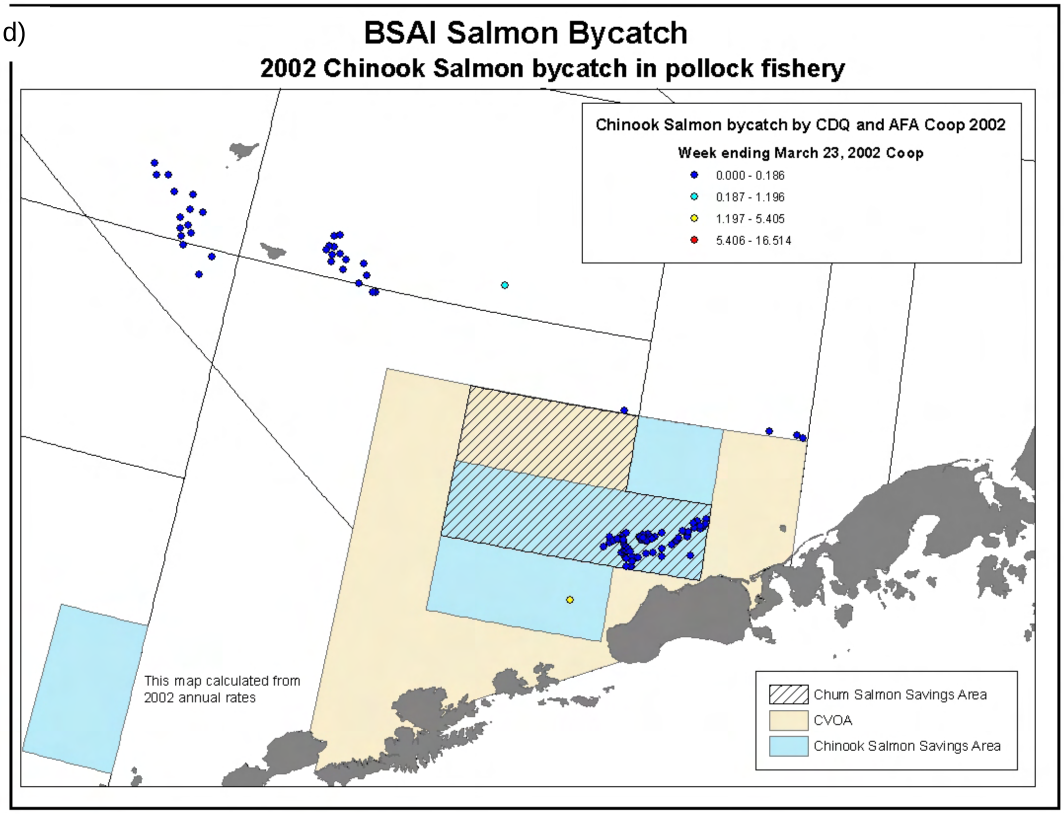
c)



BSAI Salmon Bycatch
2002 Chinook Salmon bycatch in pollock fishery
Chinook Salmon bycatch by CDQ and AFA Coop 2002
Week ending March 2, 2002 Coop
0.000 - 0.186
0.187 - 1.196
1.197 - 5.405
5.406 - 16.514
This map calculated from 2002 annual rates
Chum Salmon Savings Area
CVOA
Chinook Salmon Savings Area

c)

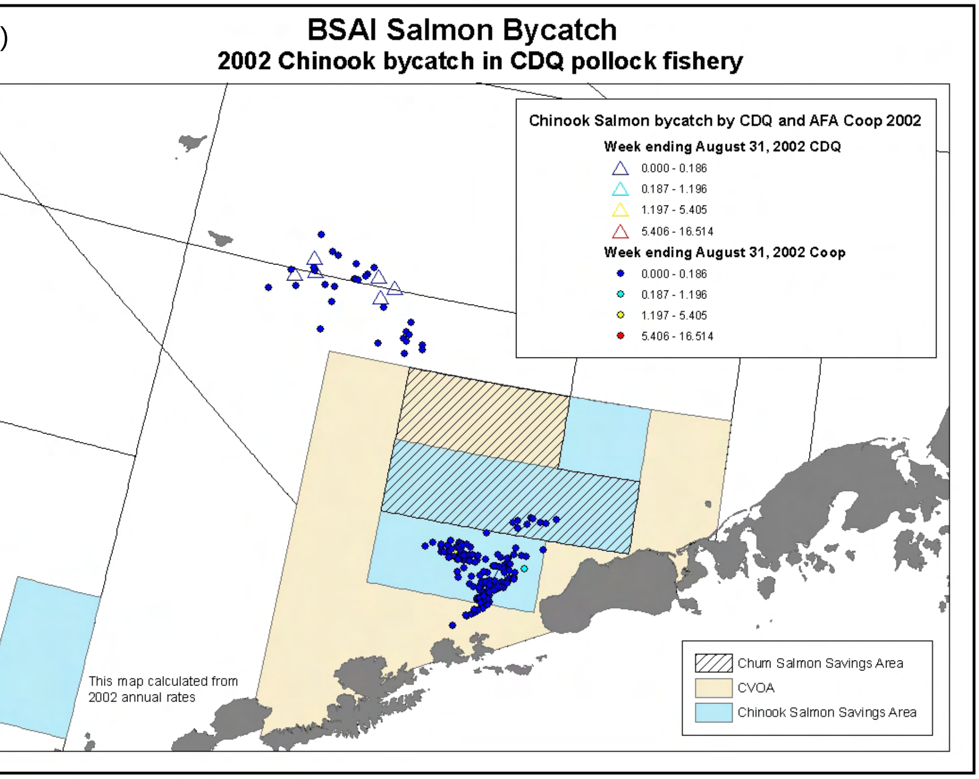
d)



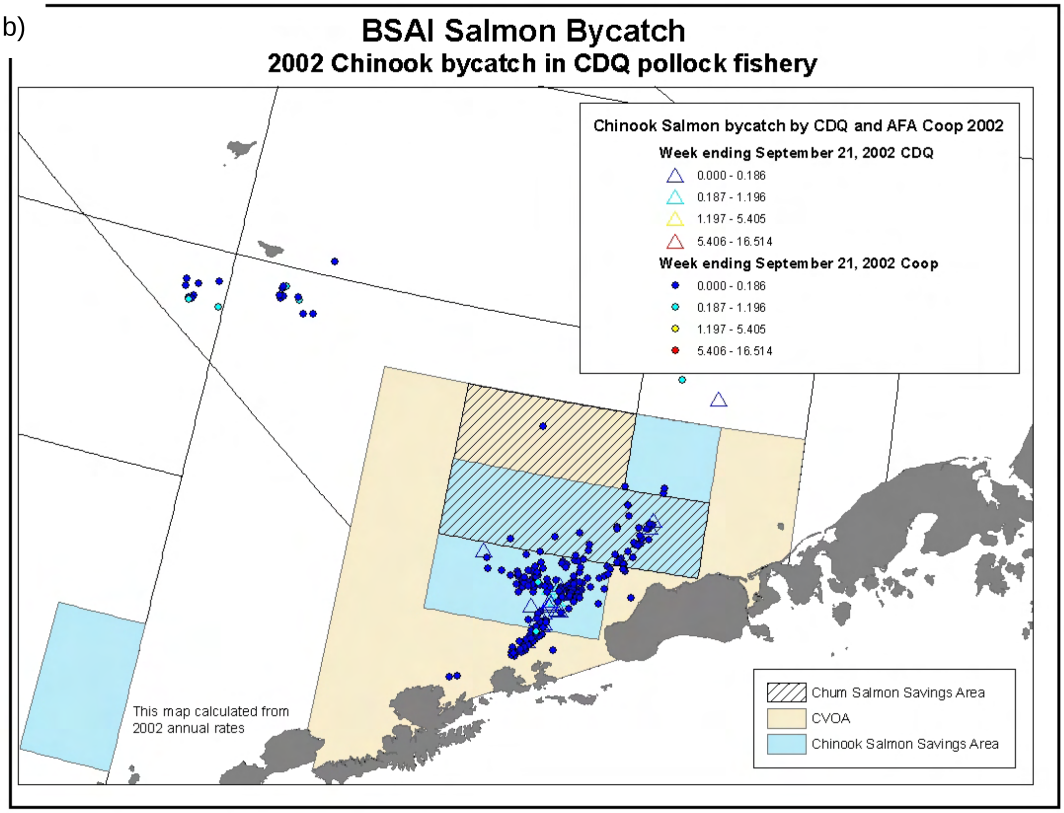
BSAI Salmon Bycatch
2002 Chinook Salmon bycatch in pollock fishery
Chinook Salmon bycatch by CDQ and AFA Coop 2002
Week ending March 23, 2002 Coop
0.000 - 0.186
0.187 - 1.196
1.197 - 5.405
5.406 - 16.514
This map calculated from 2002 annual rates
Chum Salmon Savings Area
CVOA
Chinook Salmon Savings Area

Figure 4-11 2002 Chinook Salmon Bycatch in the CDQ and non-CDQ Pollock Fisheries, "B" Season, selected weeks in September-October

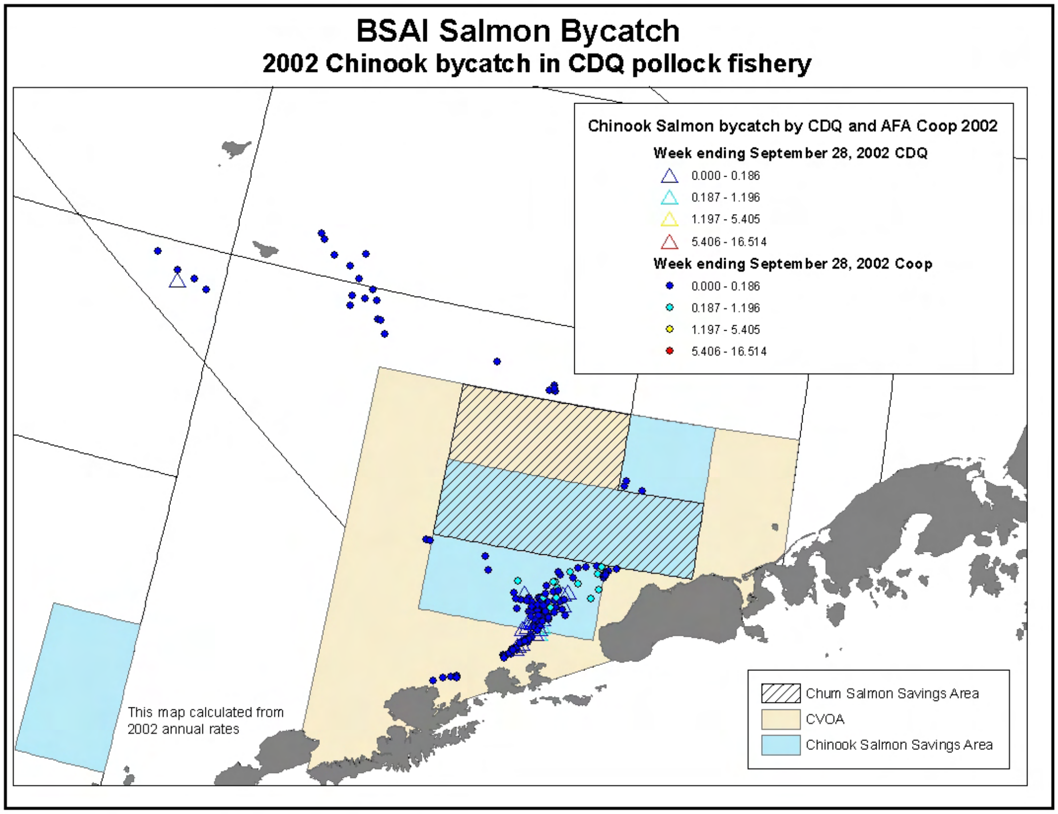
a)



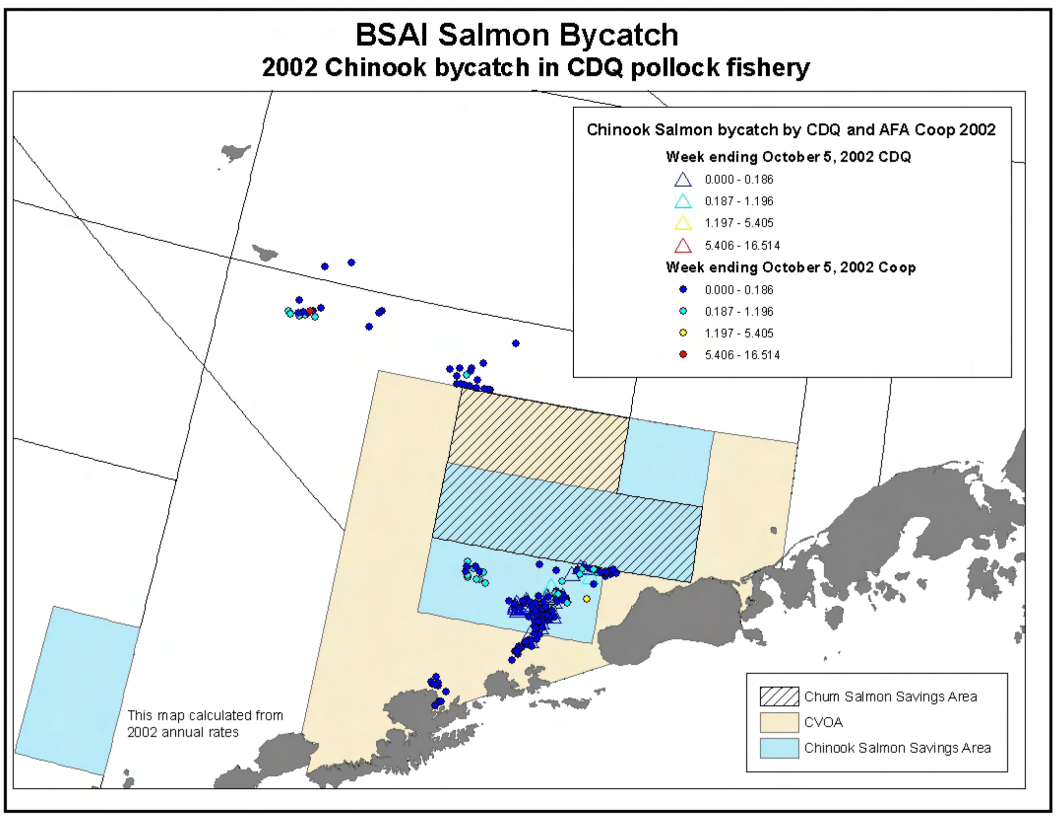
b)



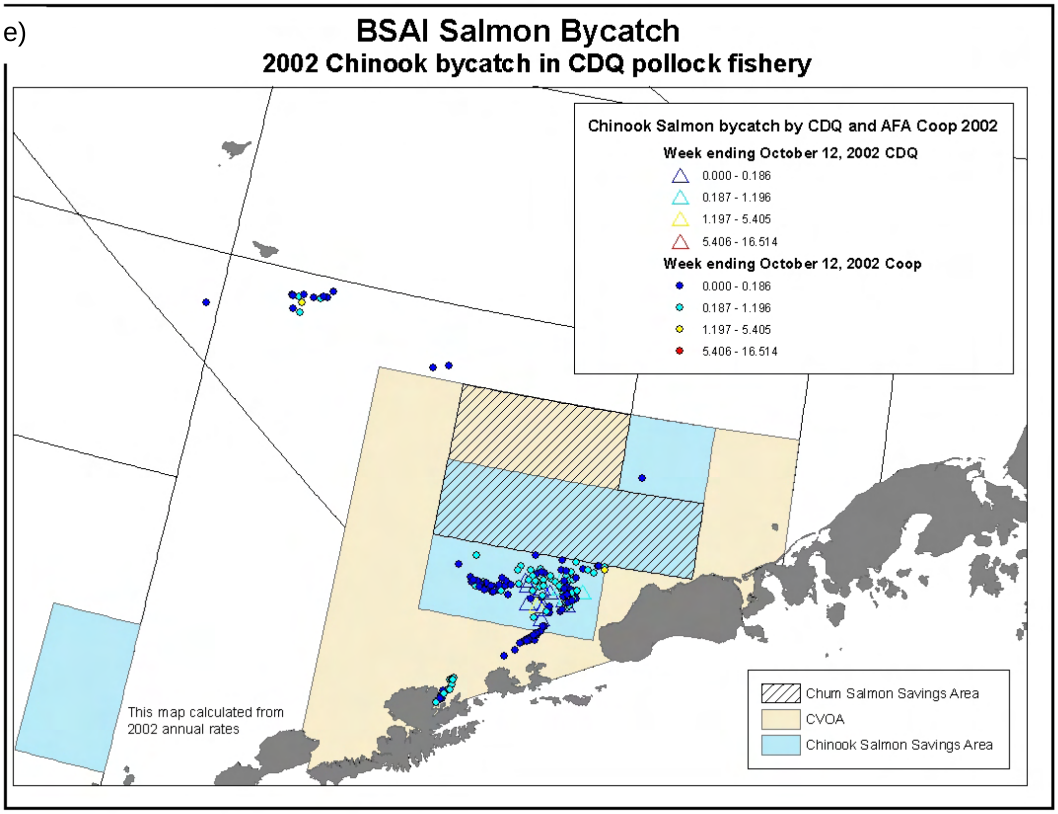
c)


BSAI Salmon Bycatch
2002 Chinook bycatch in CDQ pollock fishery
Chinook Salmon bycatch by CDQ and AFA Coop 2002
Week ending September 28, 2002 CDQ
0.000 - 0.186
0.187 - 1.196
1.197 - 5.405
5.406 - 16.514
Week ending September 28, 2002 Coop
0.000 - 0.186
0.187 - 1.196
1.197 - 5.405
5.406 - 16.514
Chum Salmon Savings Area
CVOA
Chinook Salmon Savings Area
This map calculated from
2002 annual rates

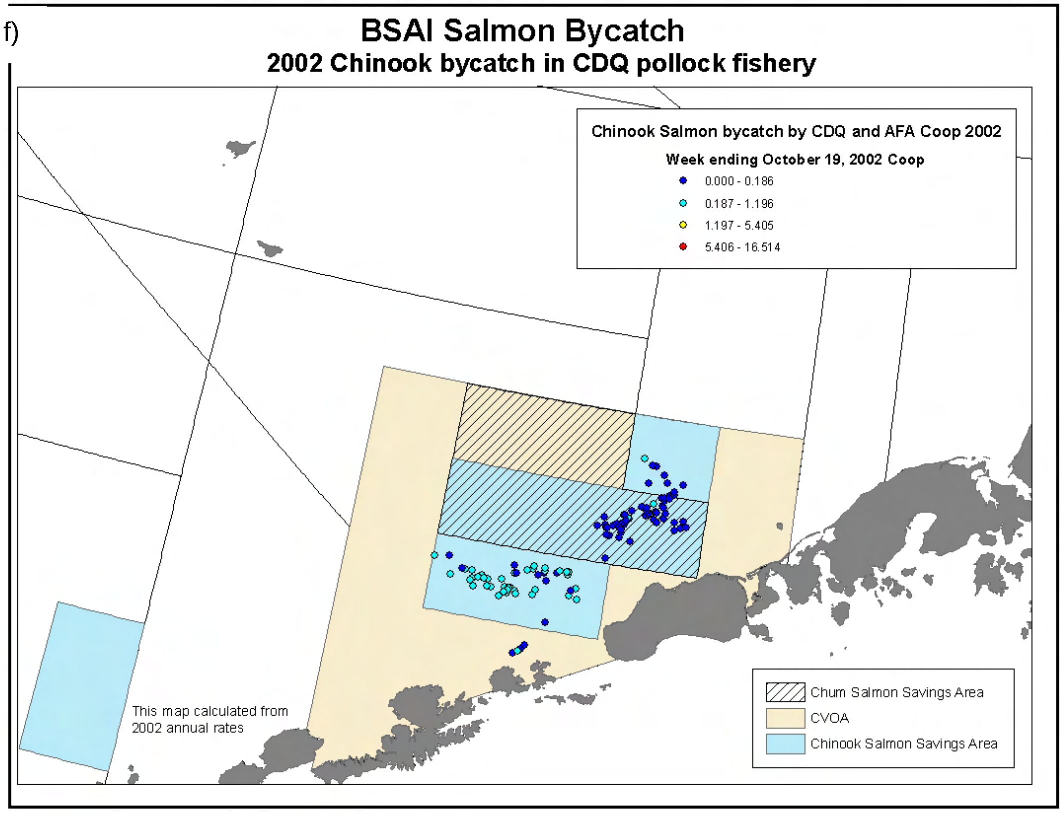
d)


BSAI Salmon Bycatch
2002 Chinook bycatch in CDQ pollock fishery
Chinook Salmon bycatch by CDQ and AFA Coop 2002
Week ending October 5, 2002 CDQ
0.000 - 0.186
0.187 - 1.196
1.197 - 5.405
5.406 - 16.514
Week ending October 5, 2002 Coop
0.000 - 0.186
0.187 - 1.196
1.197 - 5.405
5.406 - 16.514
Chum Salmon Savings Area
CVOA
Chinook Salmon Savings Area
This map calculated from
2002 annual rates

e)


BSAI Salmon Bycatch
2002 Chinook bycatch in CDQ pollock fishery
Chinook Salmon bycatch by CDQ and AFA Coop 2002
Week ending October 12, 2002 CDQ
0.000 - 0.186
0.187 - 1.196
1.197 - 5.405
5.406 - 16.514
Week ending October 12, 2002 Coop
0.000 - 0.186
0.187 - 1.196
1.197 - 5.405
5.406 - 16.514
This map calculated from
2002 annual rates
Chum Salmon Savings Area
CVOA
Chinook Salmon Savings Area

f)


BSAI Salmon Bycatch
2002 Chinook bycatch in CDQ pollock fishery
Chinook Salmon bycatch by CDQ and AFA Coop 2002
Week ending October 19, 2002 Coop
0.000 - 0.186
0.187 - 1.196
1.197 - 5.405
5.406 - 16.514
This map calculated from
2002 annual rates
Chum Salmon Savings Area
CVOA
Chinook Salmon Savings Area

g)

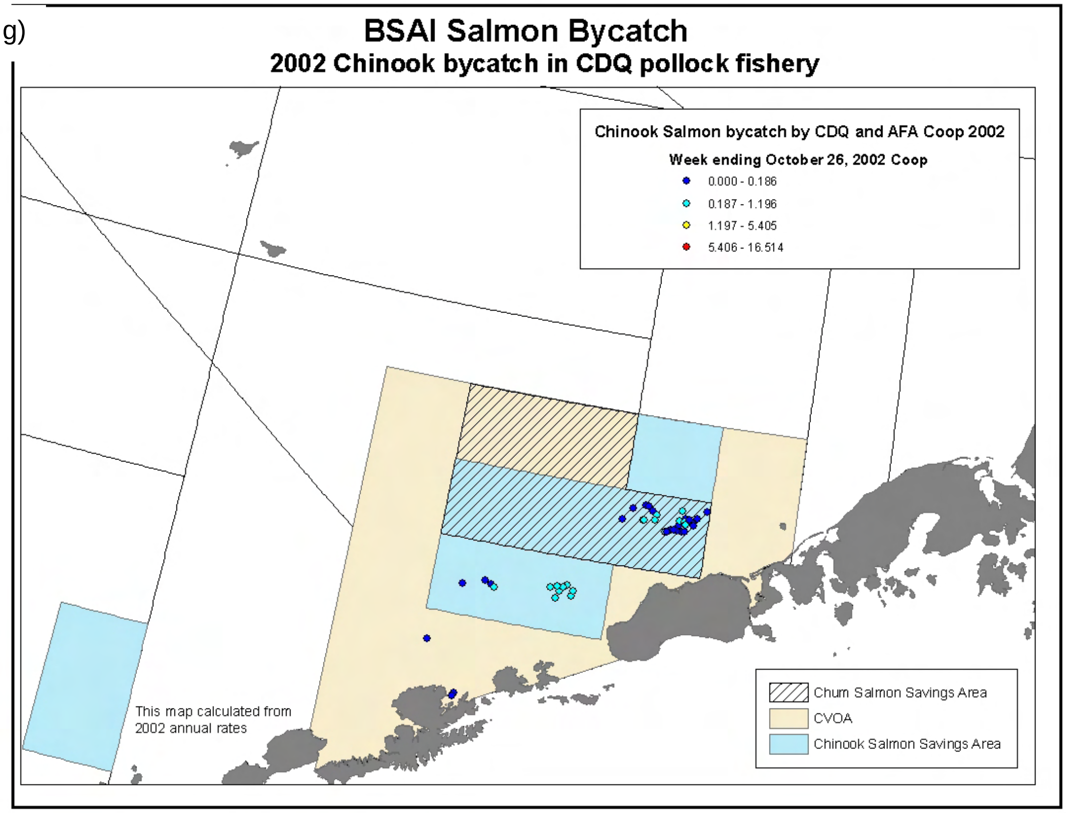
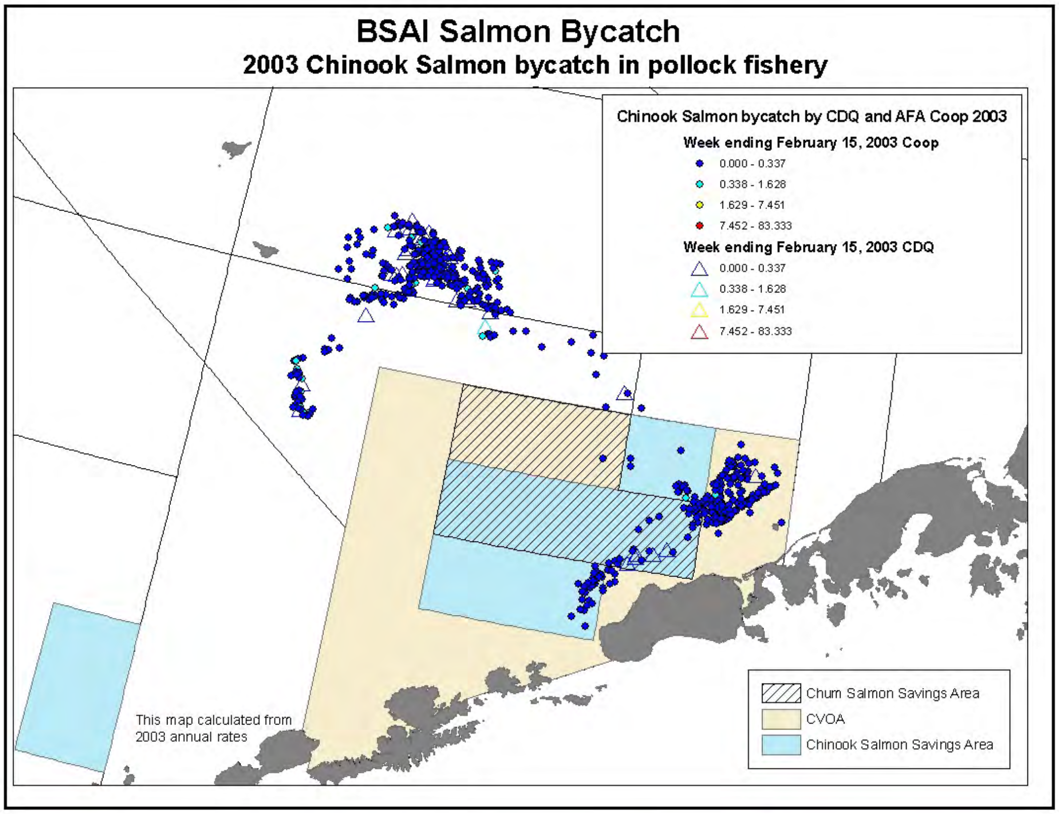
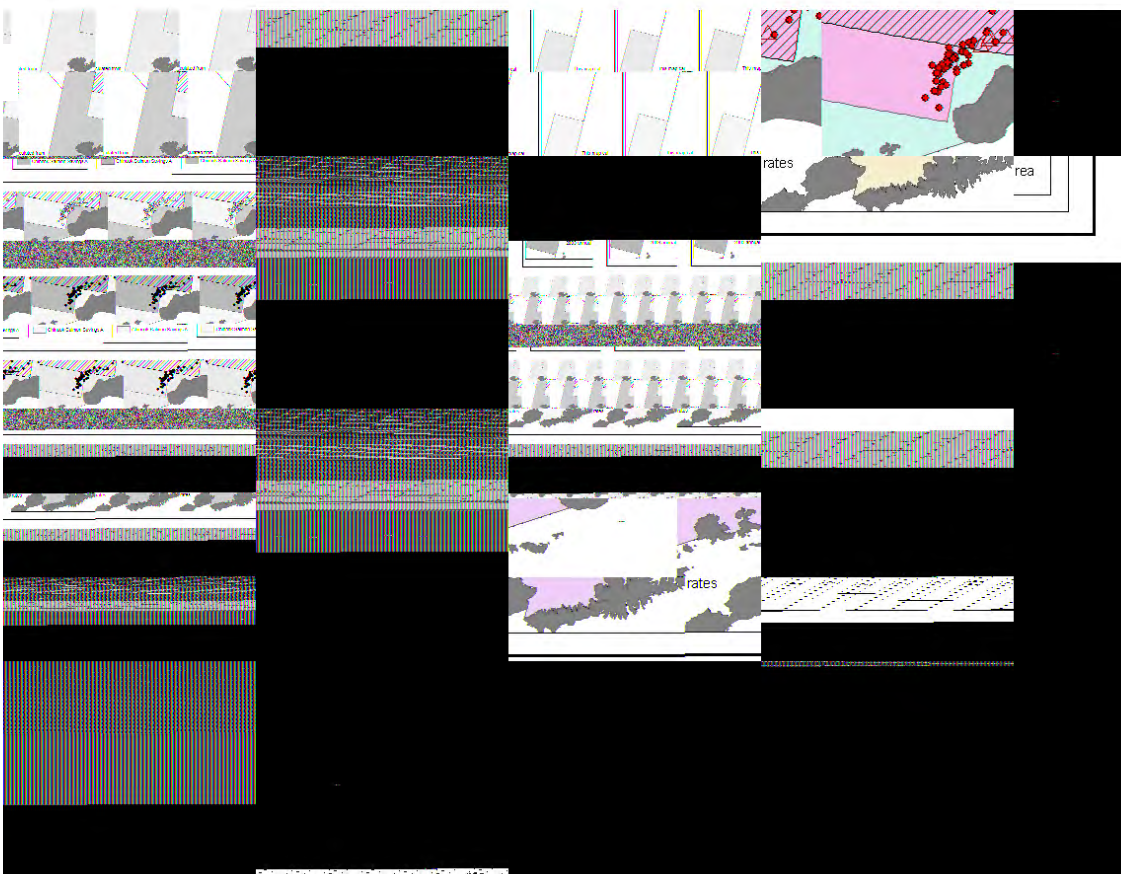

BSAI Salmon Bycatch
2002 Chinook bycatch in CDQ pollock fishery
Chinook Salmon bycatch by CDQ and AFA Coop 2002
Week ending October 26, 2002 Coop
0.000 - 0.186
0.187 - 1.196
1.197 - 5.405
5.406 - 16.514
This map calculated from
2002 annual rates
Chum Salmon Savings Area
CVOA
Chinook Salmon Savings Area

Figure 4-12 2003 Chinook Salmon Bycatch in the non-CDQ Pollock Fishery "A" Season, selected weeks in February-March

a)



b)



c)

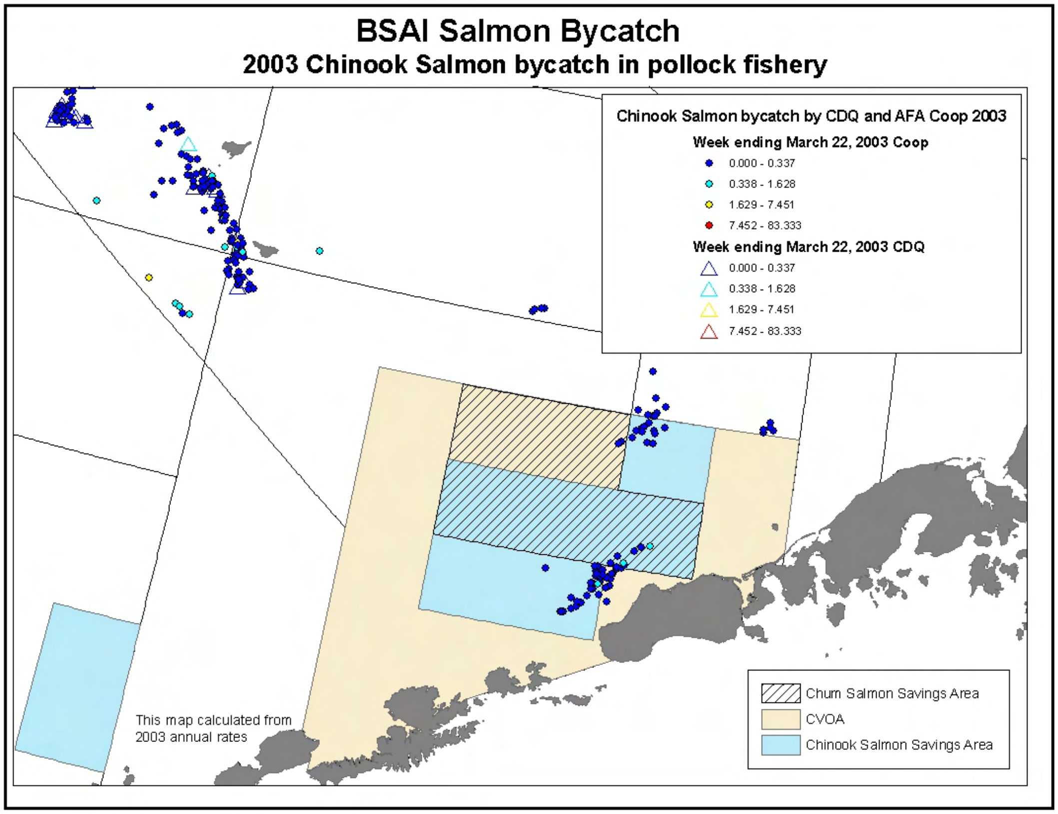
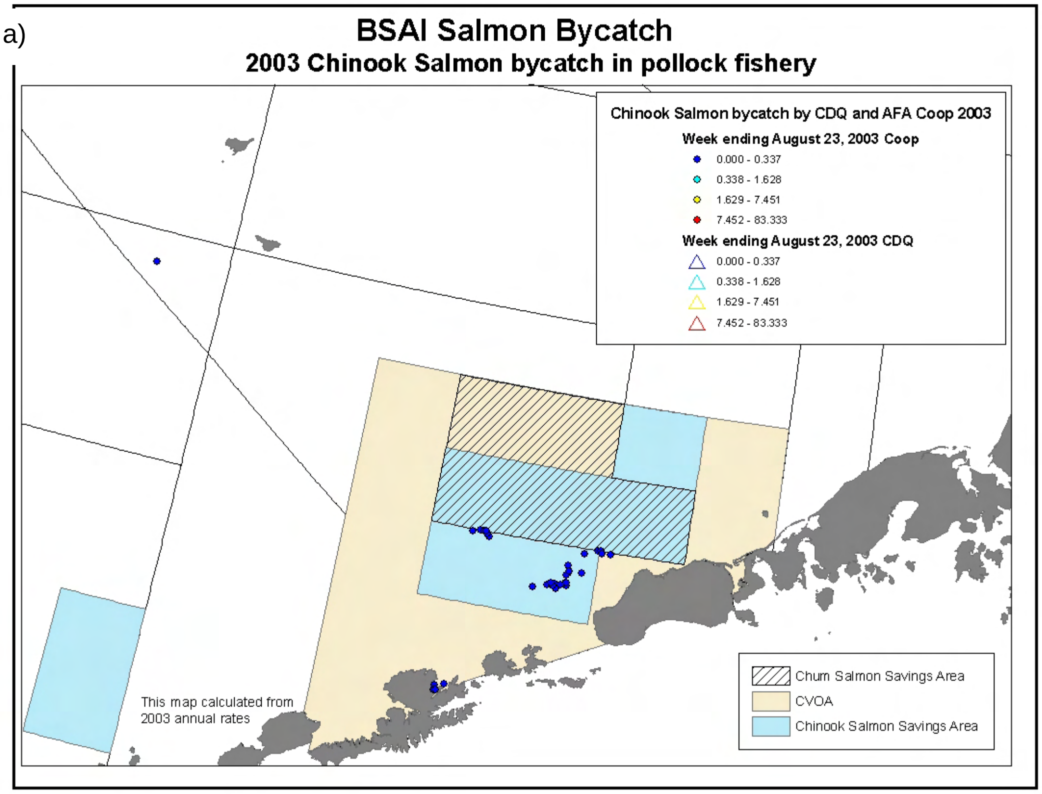
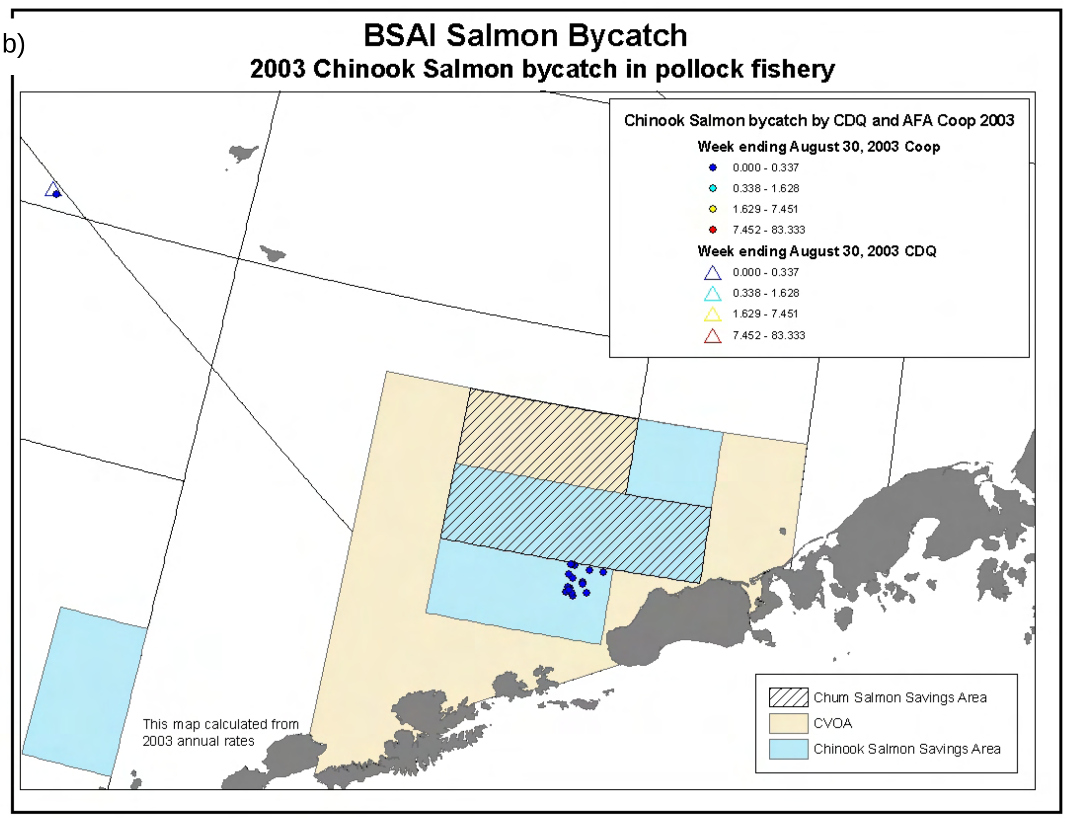

BSAI Salmon Bycatch
2003 Chinook Salmon bycatch in pollock fishery
Chinook Salmon bycatch by CDQ and AFA Coop 2003
Week ending March 22, 2003 Coop
0.000 - 0.337
0.338 - 1.628
1.629 - 7.451
7.452 - 83.333
Week ending March 22, 2003 CDQ
0.000 - 0.337
0.338 - 1.628
1.629 - 7.451
7.452 - 83.333
This map calculated from
2003 annual rates
Chum Salmon Savings Area
CVOA
Chinook Salmon Savings Area

Figure 4-13 2003 Chinook Salmon Bycatch in the CDQ and non-CDQ Pollock Fisheries, "B" Season, selected weeks in September-October

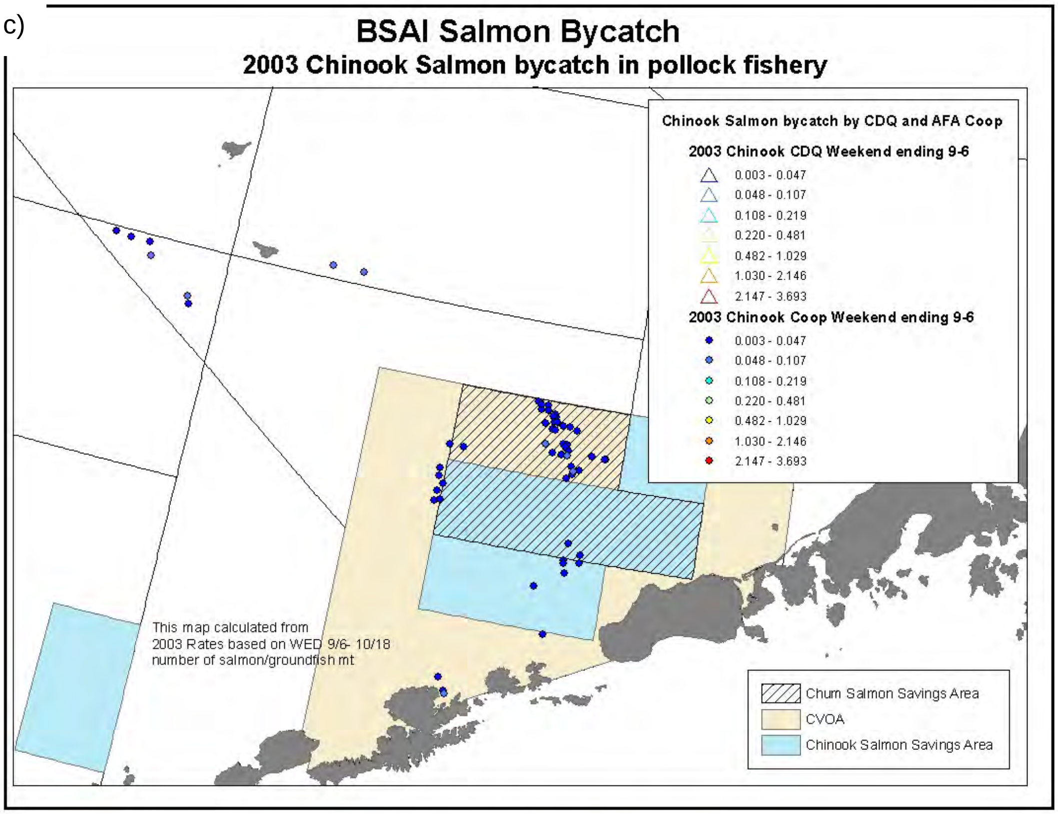
a)



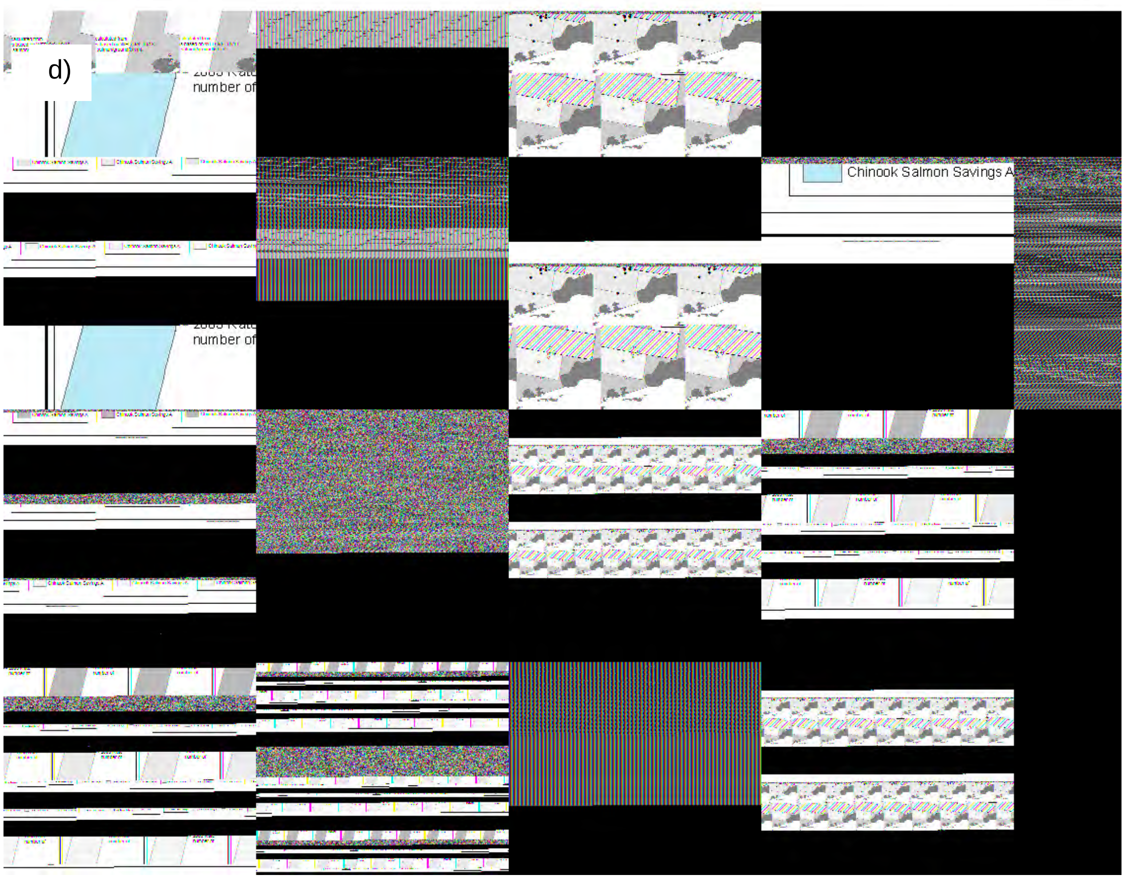
b)



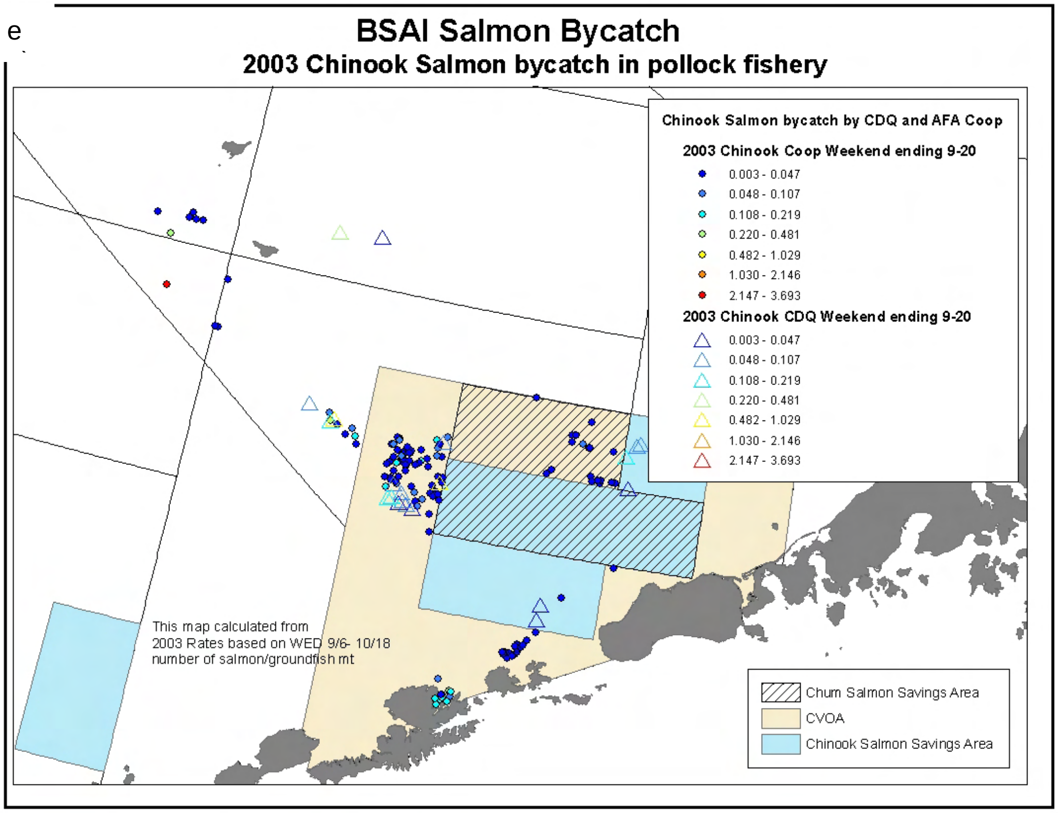
c)


BSAI Salmon Bycatch
2003 Chinook Salmon bycatch in pollock fishery
Chinook Salmon bycatch by CDQ and AFA Coop
2003 Chinook CDQ Weekend ending 9-6
0.003 - 0.047
0.048 - 0.107
0.108 - 0.219
0.220 - 0.481
0.482 - 1.029
1.030 - 2.146
2.147 - 3.693
2003 Chinook Coop Weekend ending 9-6
0.003 - 0.047
0.048 - 0.107
0.108 - 0.219
0.220 - 0.481
0.482 - 1.029
1.030 - 2.146
2.147 - 3.693
This map calculated from
2003 Rates based on WED 9/6- 10/18
number of salmon/groundfish mt
Chum Salmon Savings Area
CVOA
Chinook Salmon Savings Area

d)

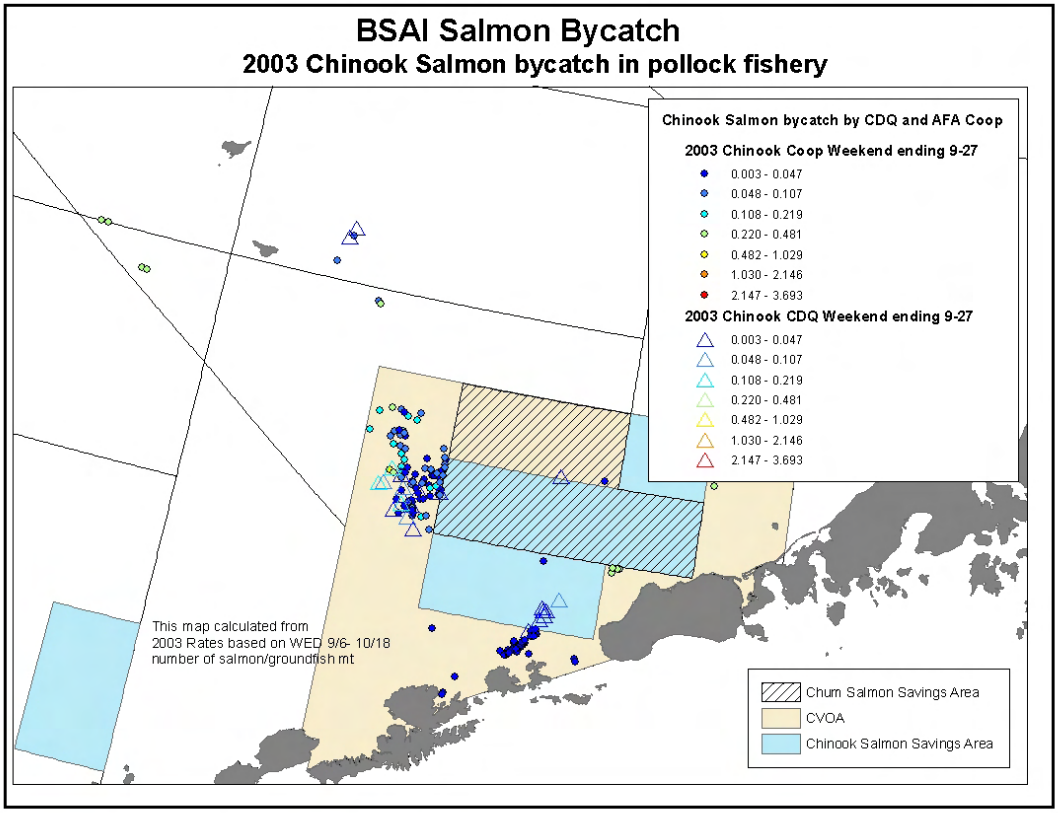


e



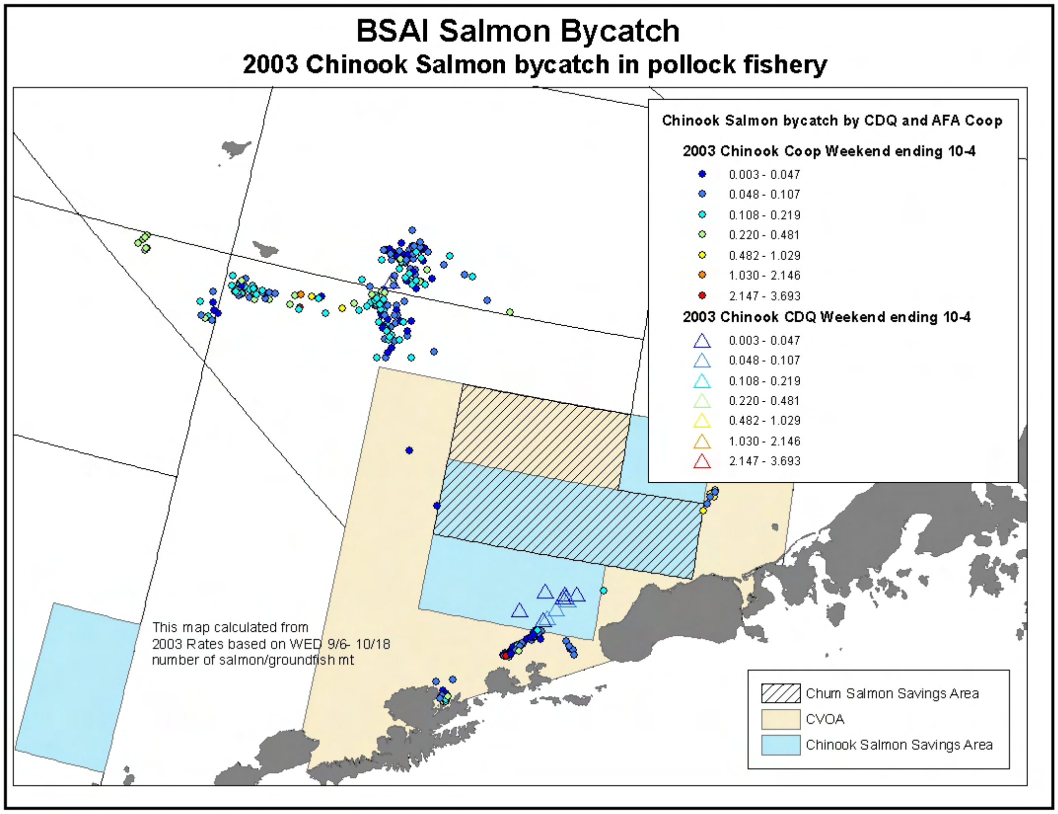
BSAI Salmon Bycatch
2003 Chinook Salmon bycatch in pollock fishery
Chinook Salmon bycatch by CDQ and AFA Coop
2003 Chinook Coop Weekend ending 9-20
0.003 - 0.047
0.048 - 0.107
0.108 - 0.219
0.220 - 0.481
0.482 - 1.029
1.030 - 2.146
2.147 - 3.693
2003 Chinook CDQ Weekend ending 9-20
0.003 - 0.047
0.048 - 0.107
0.108 - 0.219
0.220 - 0.481
0.482 - 1.029
1.030 - 2.146
2.147 - 3.693
This map calculated from
2003 Rates based on WED 9/6- 10/18
number of salmon/groundfish mt
Chum Salmon Savings Area
CVOA
Chinook Salmon Savings Area

f)

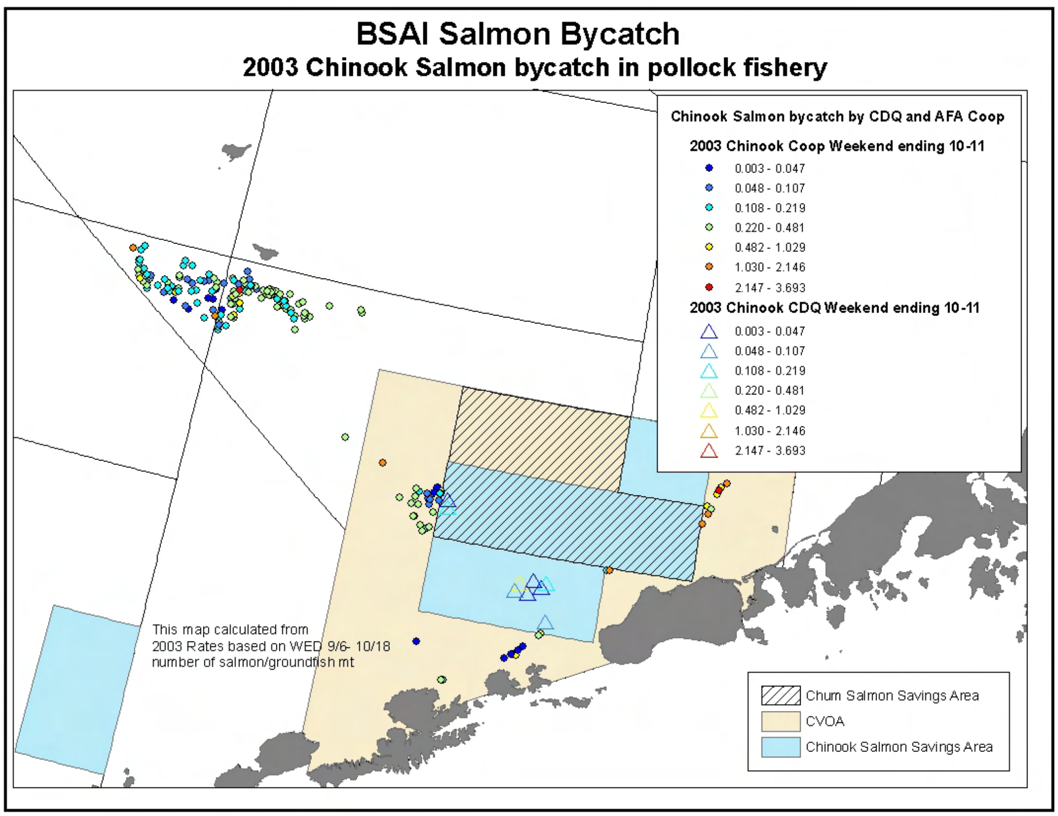


BSAI Salmon Bycatch
2003 Chinook Salmon bycatch in pollock fishery
Chinook Salmon bycatch by CDQ and AFA Coop
2003 Chinook Coop Weekend ending 9-27
0.003 - 0.047
0.048 - 0.107
0.108 - 0.219
0.220 - 0.481
0.482 - 1.029
1.030 - 2.146
2.147 - 3.693
2003 Chinook CDQ Weekend ending 9-27
0.003 - 0.047
0.048 - 0.107
0.108 - 0.219
0.220 - 0.481
0.482 - 1.029
1.030 - 2.146
2.147 - 3.693
This map calculated from
2003 Rates based on WED 9/6- 10/18
number of salmon/groundfish mt
Chum Salmon Savings Area
CVOA
Chinook Salmon Savings Area

g)


BSAI Salmon Bycatch
2003 Chinook Salmon bycatch in pollock fishery
Chinook Salmon bycatch by CDQ and AFA Coop
2003 Chinook Coop Weekend ending 10-4
0.003 - 0.047
0.048 - 0.107
0.108 - 0.219
0.220 - 0.481
0.482 - 1.029
1.030 - 2.146
2.147 - 3.693
2003 Chinook CDQ Weekend ending 10-4
0.003 - 0.047
0.048 - 0.107
0.108 - 0.219
0.220 - 0.481
0.482 - 1.029
1.030 - 2.146
2.147 - 3.693
This map calculated from
2003 Rates based on WED 9/6- 10/18
number of salmon/groundfish mt
Chum Salmon Savings Area
CVOA
Chinook Salmon Savings Area

h)


BSAI Salmon Bycatch
2003 Chinook Salmon bycatch in pollock fishery
Chinook Salmon bycatch by CDQ and AFA Coop
2003 Chinook Coop Weekend ending 10-11
0.003 - 0.047
0.048 - 0.107
0.108 - 0.219
0.220 - 0.481
0.482 - 1.029
1.030 - 2.146
2.147 - 3.693
2003 Chinook CDQ Weekend ending 10-11
0.003 - 0.047
0.048 - 0.107
0.108 - 0.219
0.220 - 0.481
0.482 - 1.029
1.030 - 2.146
2.147 - 3.693
This map calculated from
2003 Rates based on WED 9/6- 10/18
number of salmon/groundfish mt
Chum Salmon Savings Area
CVOA
Chinook Salmon Savings Area

i)

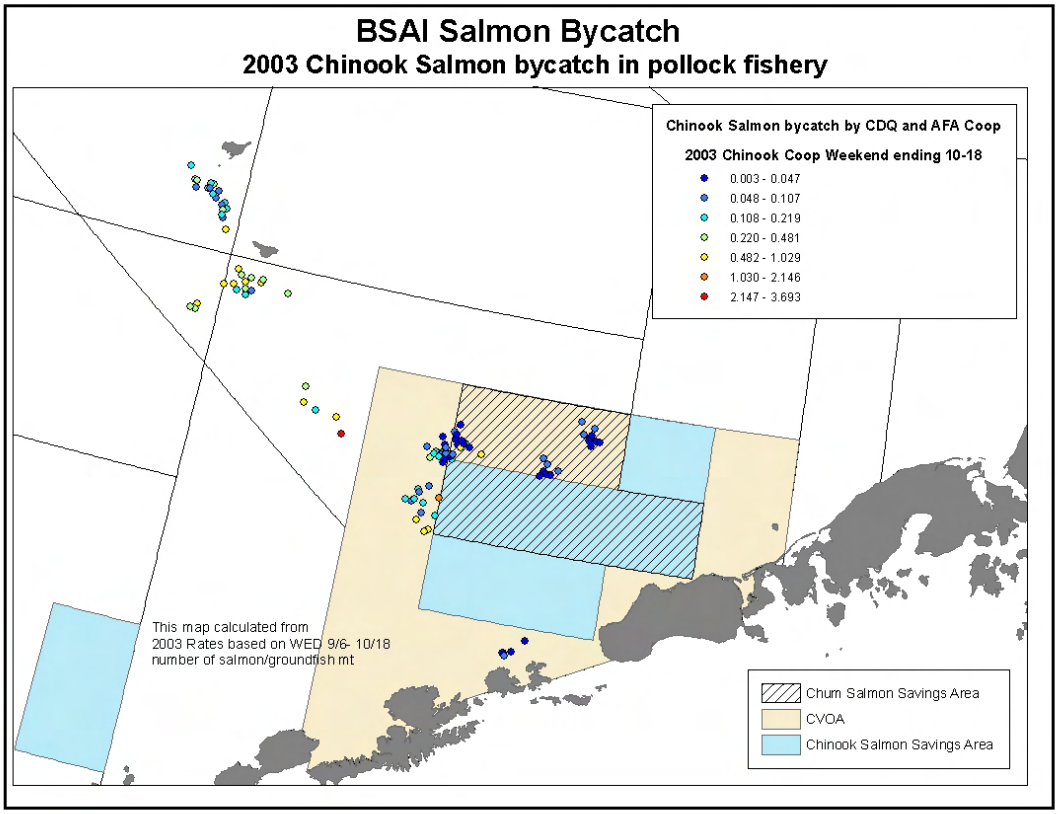
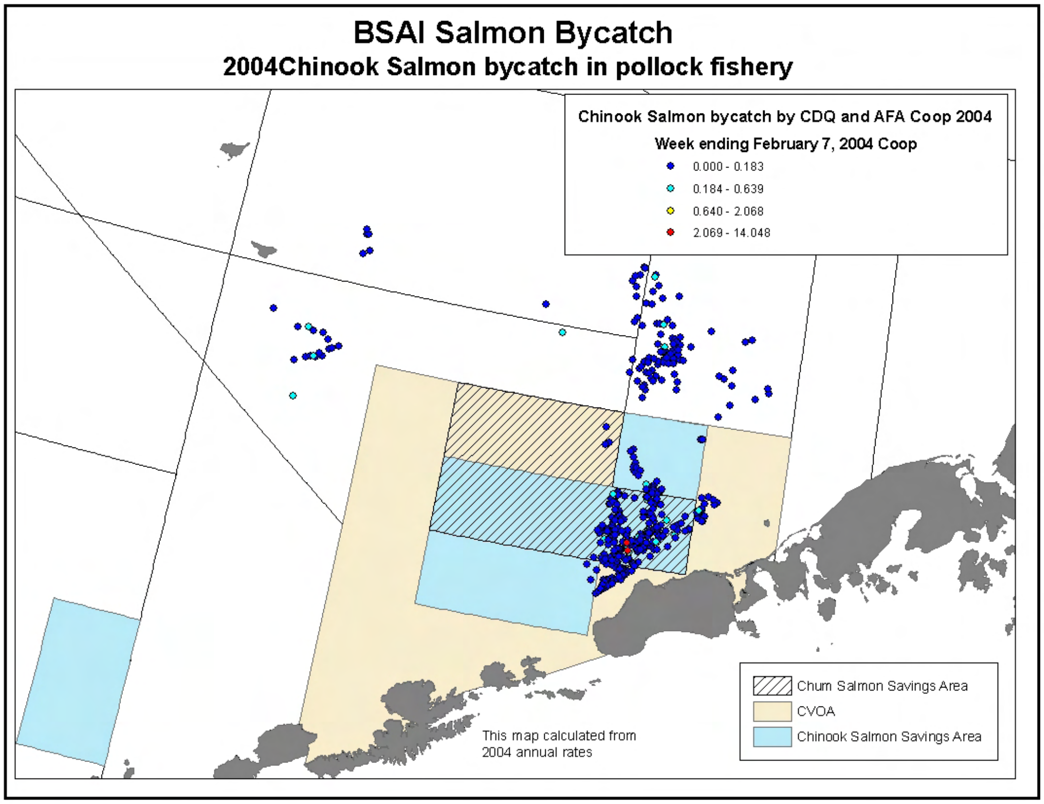
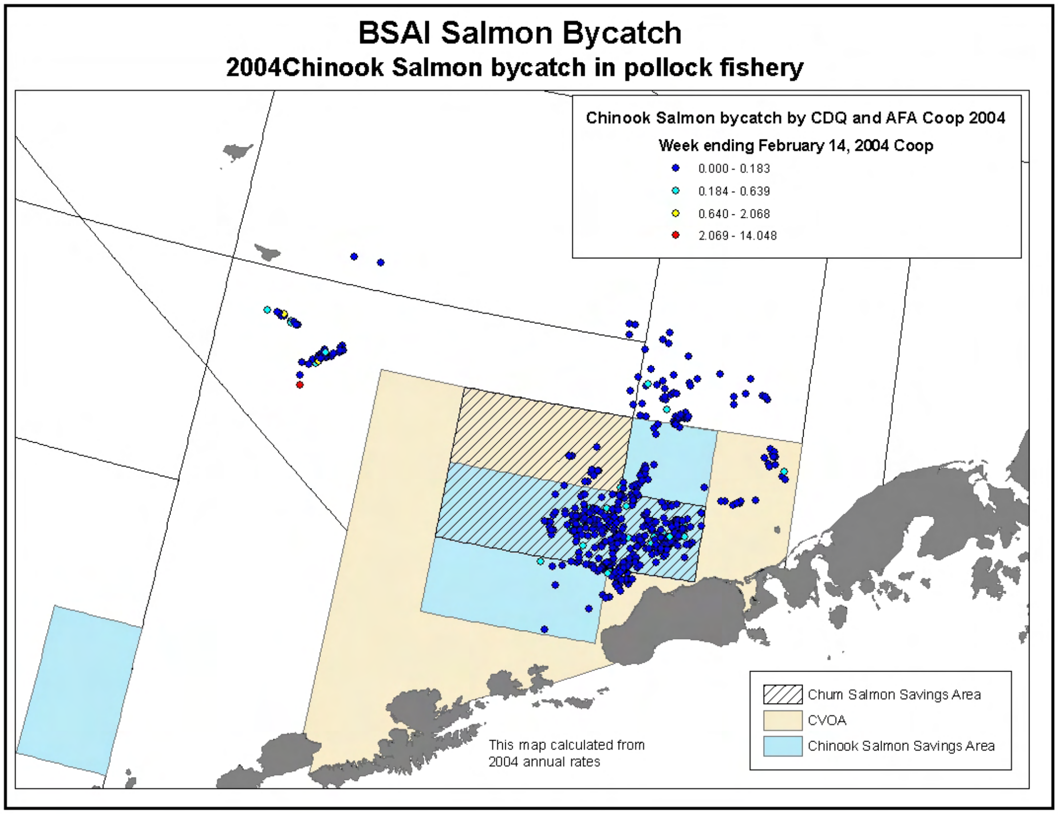

BSAI Salmon Bycatch
2003 Chinook Salmon bycatch in pollock fishery
Chinook Salmon bycatch by CDQ and AFA Coop
2003 Chinook Coop Weekend ending 10-18
0.003 - 0.047
0.048 - 0.107
0.108 - 0.219
0.220 - 0.481
0.482 - 1.029
1.030 - 2.146
2.147 - 3.693
This map calculated from
2003 Rates based on WED 9/6- 10/18
number of salmon/groundfish mt
Chum Salmon Savings Area
CVOA
Chinook Salmon Savings Area

Figure 4-14 2004 Chinook Salmon Bycatch in the non-CDQ Pollock Fishery "A" Season, selected weeks in February-March

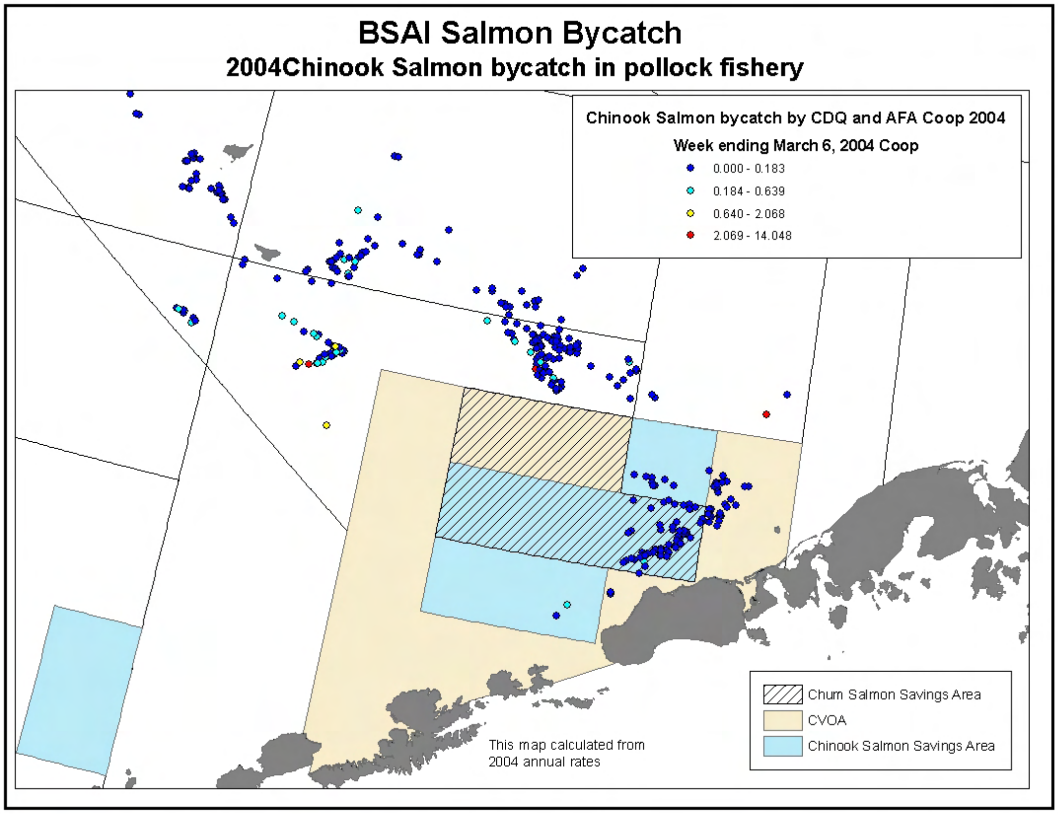
a)



b)



c)


BSAI Salmon Bycatch
2004Chinook Salmon bycatch in pollock fishery
Chinook Salmon bycatch by CDQ and AFA Coop 2004
Week ending March 6, 2004 Coop
0.000 - 0.183
0.184 - 0.639
0.640 - 2.068
2.069 - 14.048
Chum Salmon Savings Area
CVOA
Chinook Salmon Savings Area
This map calculated from
2004 annual rates

d)

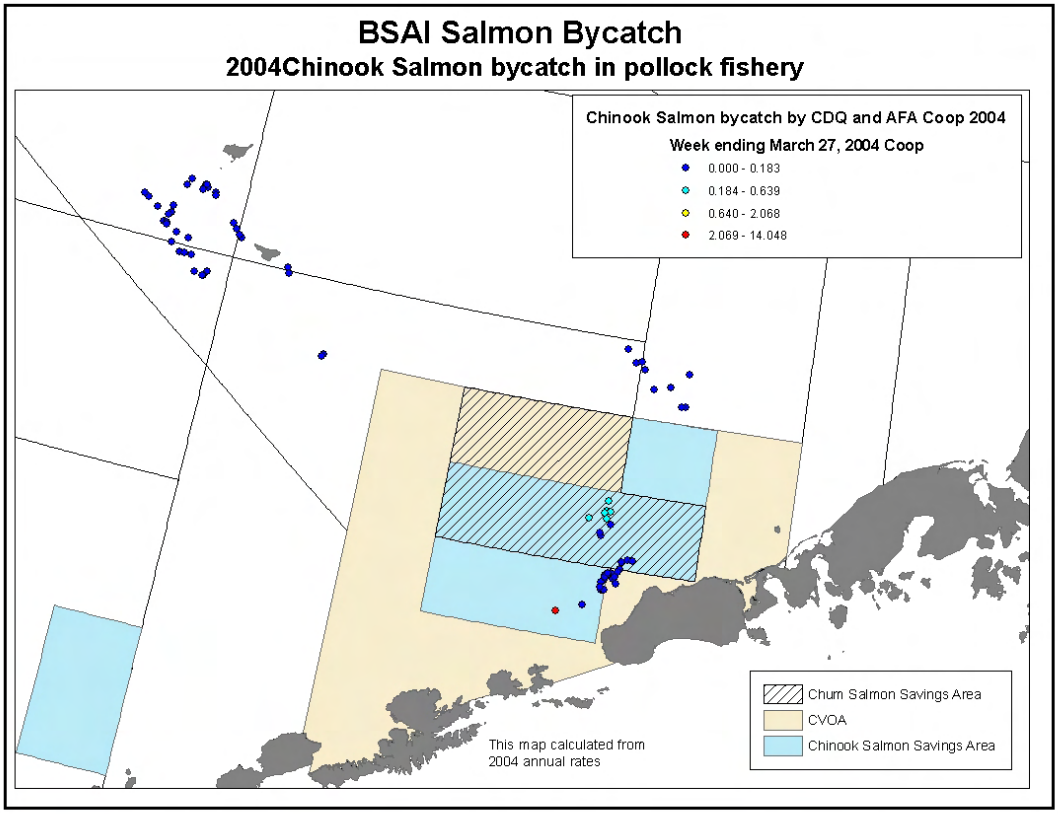
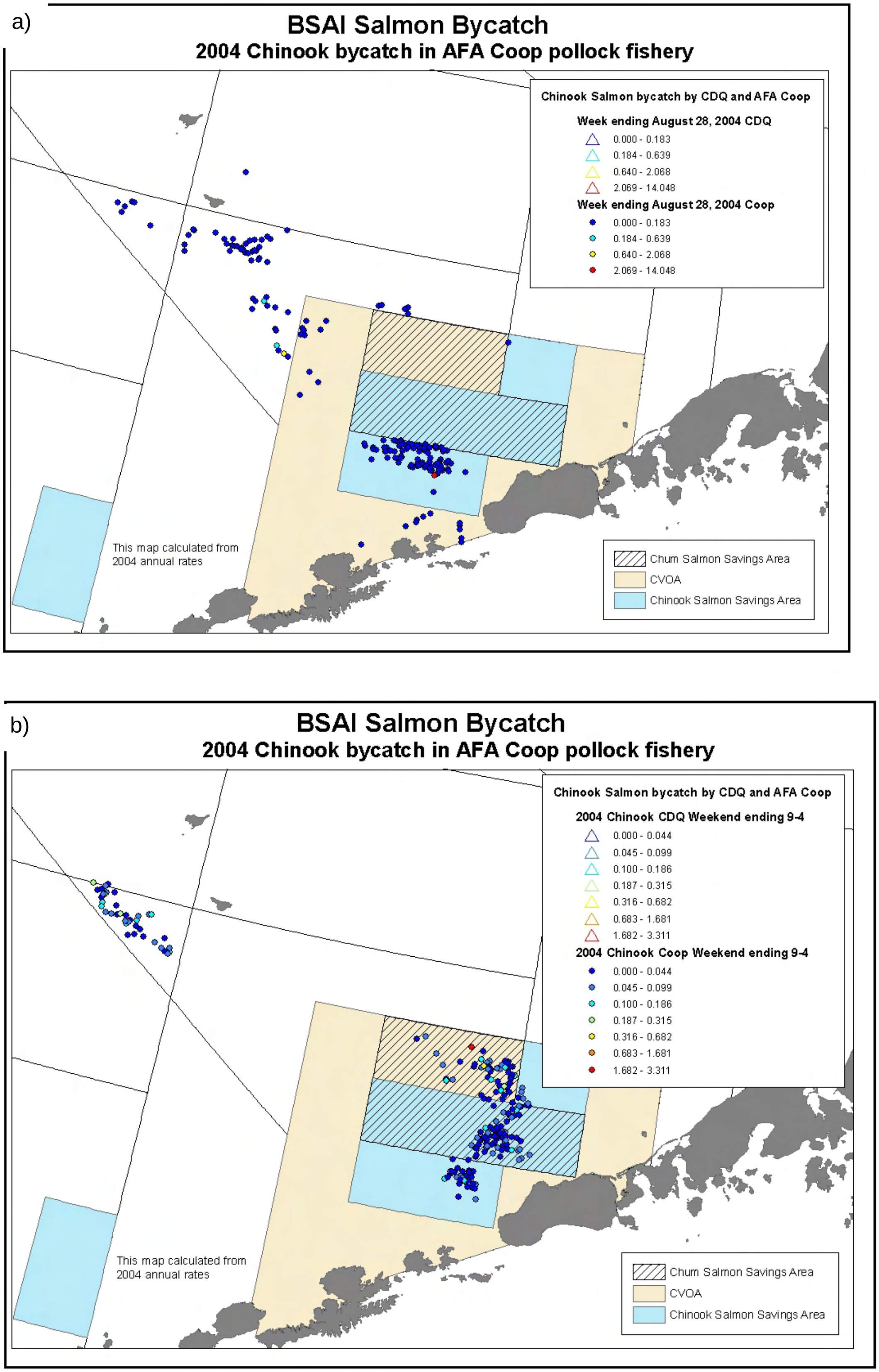
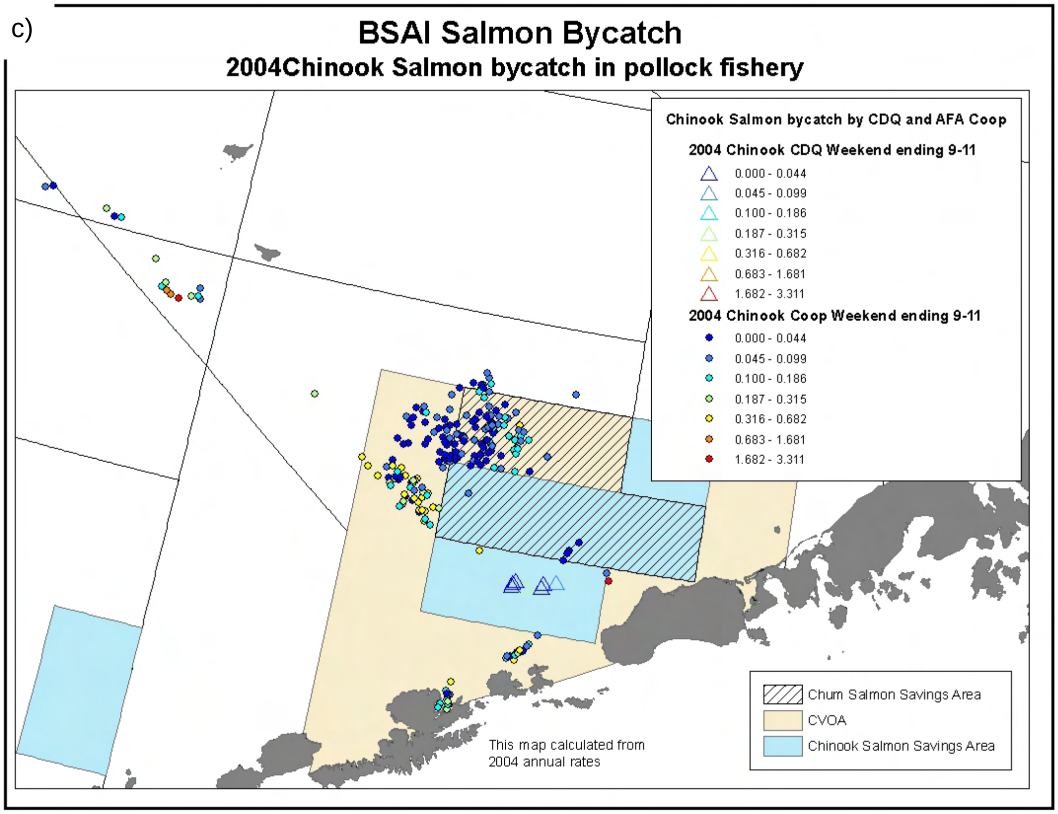

BSAI Salmon Bycatch
2004Chinook Salmon bycatch in pollock fishery
Chinook Salmon bycatch by CDQ and AFA Coop 2004
Week ending March 27, 2004 Coop
0.000 - 0.183
0.184 - 0.639
0.640 - 2.068
2.069 - 14.048
Chum Salmon Savings Area
CVOA
Chinook Salmon Savings Area
This map calculated from
2004 annual rates

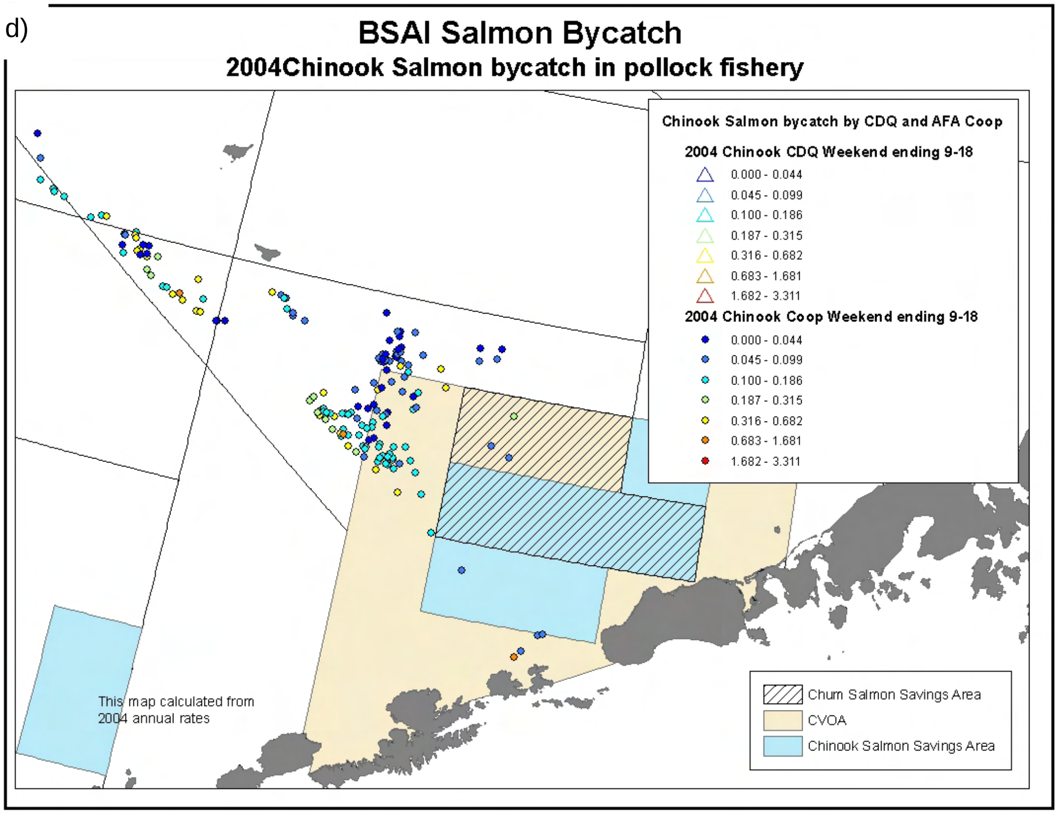
Figure 4-15 2004 Chinook Salmon Bycatch in the CDQ and non-CDQ Pollock Fisheries, "B" Season, selected weeks in September-October



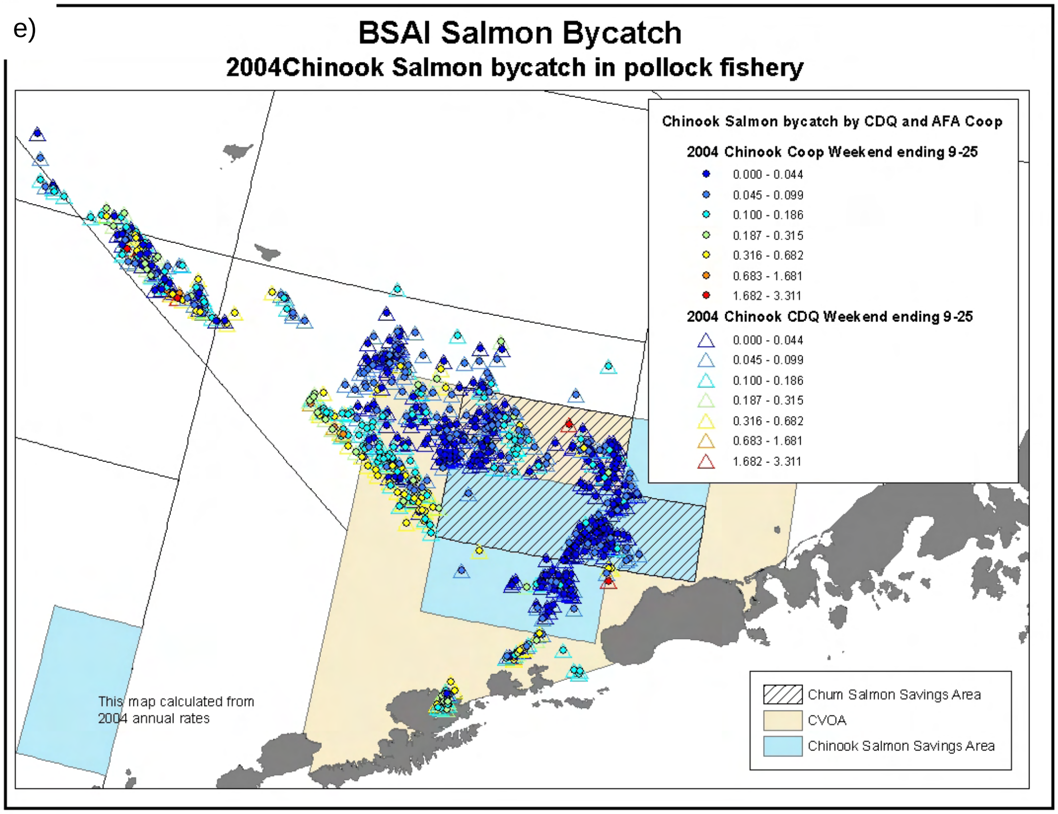
c)


BSAI Salmon Bycatch
2004Chinook Salmon bycatch in pollock fishery
Chinook Salmon bycatch by CDQ and AFA Coop
2004 Chinook CDQ Weekend ending 9-11
0.000 - 0.044
0.045 - 0.099
0.100 - 0.186
0.187 - 0.315
0.316 - 0.682
0.683 - 1.681
1.682 - 3.311
2004 Chinook Coop Weekend ending 9-11
0.000 - 0.044
0.045 - 0.099
0.100 - 0.186
0.187 - 0.315
0.316 - 0.682
0.683 - 1.681
1.682 - 3.311
Chum Salmon Savings Area
CVOA
Chinook Salmon Savings Area
This map calculated from
2004 annual rates

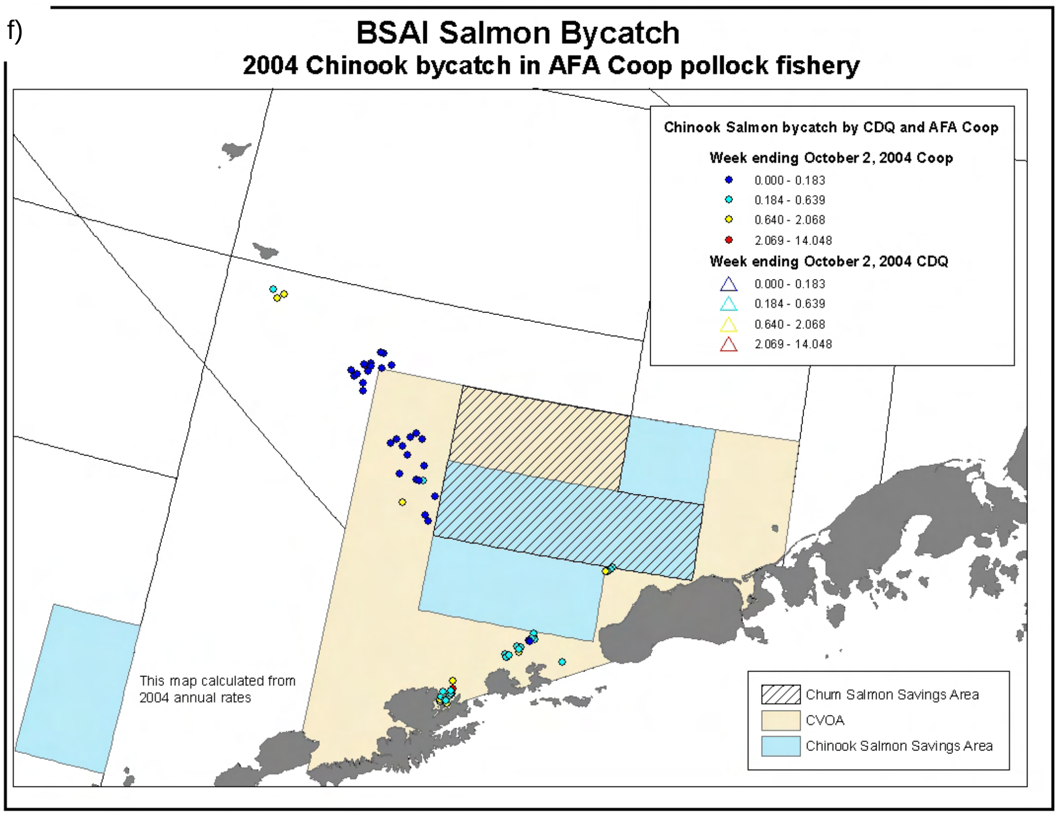
d)


BSAI Salmon Bycatch
2004Chinook Salmon bycatch in pollock fishery
Chinook Salmon bycatch by CDQ and AFA Coop
2004 Chinook CDQ Weekend ending 9-18
0.000 - 0.044
0.045 - 0.099
0.100 - 0.186
0.187 - 0.315
0.316 - 0.682
0.683 - 1.681
1.682 - 3.311
2004 Chinook Coop Weekend ending 9-18
0.000 - 0.044
0.045 - 0.099
0.100 - 0.186
0.187 - 0.315
0.316 - 0.682
0.683 - 1.681
1.682 - 3.311
Chum Salmon Savings Area
CVOA
Chinook Salmon Savings Area
This map calculated from
2004 annual rates

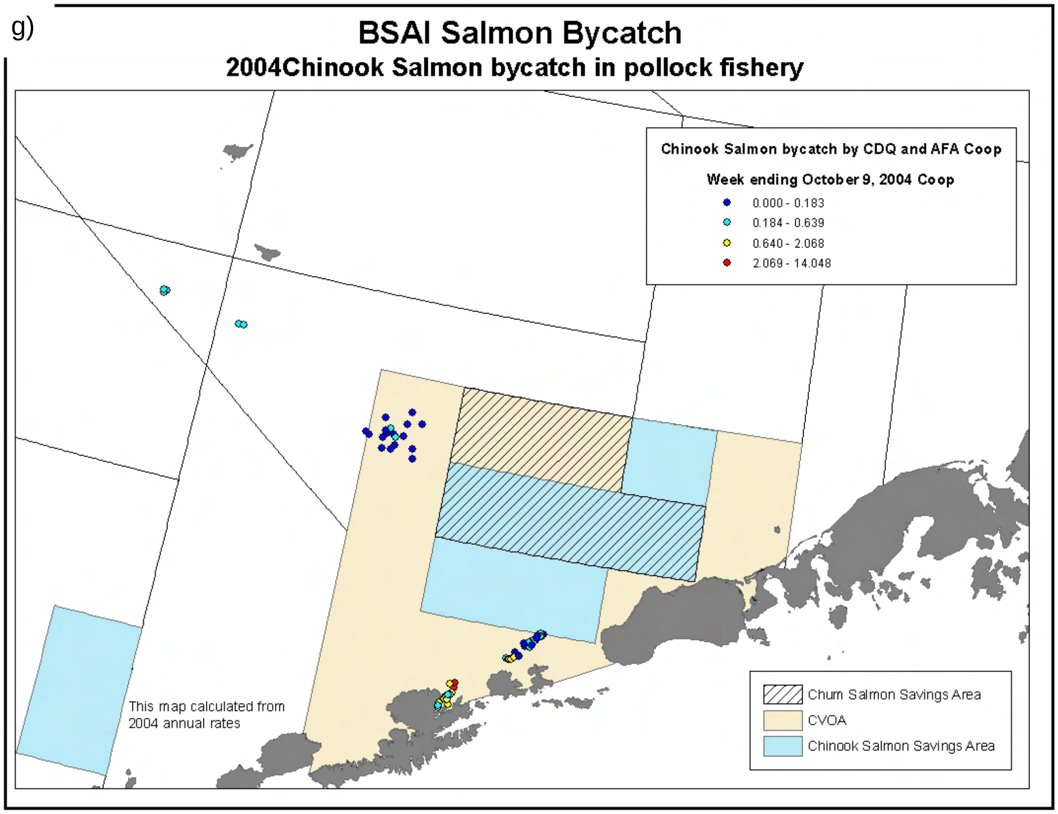
e)


BSAI Salmon Bycatch
2004Chinook Salmon bycatch in pollock fishery
Chinook Salmon bycatch by CDQ and AFA Coop
2004 Chinook Coop Weekend ending 9-25
0.000 - 0.044
0.045 - 0.099
0.100 - 0.186
0.187 - 0.315
0.316 - 0.682
0.683 - 1.681
1.682 - 3.311
2004 Chinook CDQ Weekend ending 9-25
0.000 - 0.044
0.045 - 0.099
0.100 - 0.186
0.187 - 0.315
0.316 - 0.682
0.683 - 1.681
1.682 - 3.311
This map calculated from 2004 annual rates
Chum Salmon Savings Area
CVOA
Chinook Salmon Savings Area

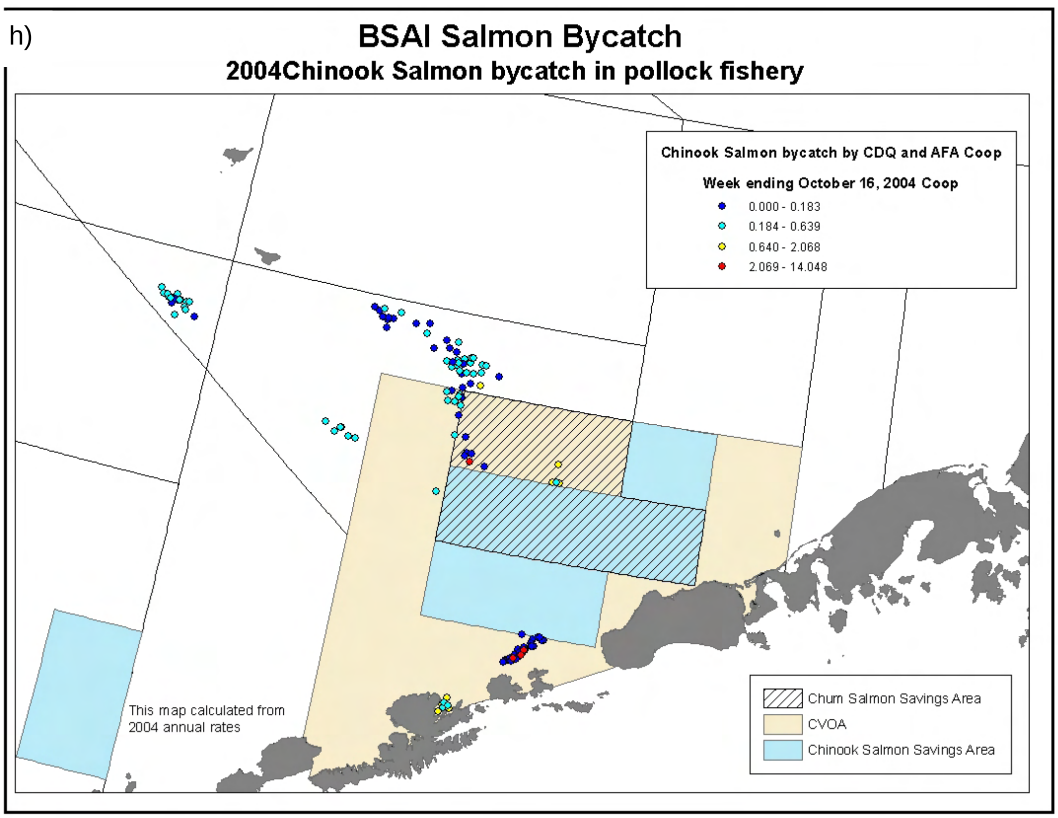
f)


BSAI Salmon Bycatch
2004 Chinook bycatch in AFA Coop pollock fishery
Chinook Salmon bycatch by CDQ and AFA Coop
Week ending October 2, 2004 Coop
0.000 - 0.183
0.184 - 0.639
0.640 - 2.068
2.069 - 14.048
Week ending October 2, 2004 CDQ
0.000 - 0.183
0.184 - 0.639
0.640 - 2.068
2.069 - 14.048
This map calculated from 2004 annual rates
Chum Salmon Savings Area
CVOA
Chinook Salmon Savings Area

g)


BSAI Salmon Bycatch
2004Chinook Salmon bycatch in pollock fishery
Chinook Salmon bycatch by CDQ and AFA Coop
Week ending October 9, 2004 Coop
0.000 - 0.183
0.184 - 0.639
0.640 - 2.068
2.069 - 14.048
This map calculated from
2004 annual rates
Chum Salmon Savings Area
CVOA
Chinook Salmon Savings Area

h)


BSAI Salmon Bycatch
2004Chinook Salmon bycatch in pollock fishery
Chinook Salmon bycatch by CDQ and AFA Coop
Week ending October 16, 2004 Coop
0.000 - 0.183
0.184 - 0.639
0.640 - 2.068
2.069 - 14.048
This map calculated from
2004 annual rates
Chum Salmon Savings Area
CVOA
Chinook Salmon Savings Area

i)

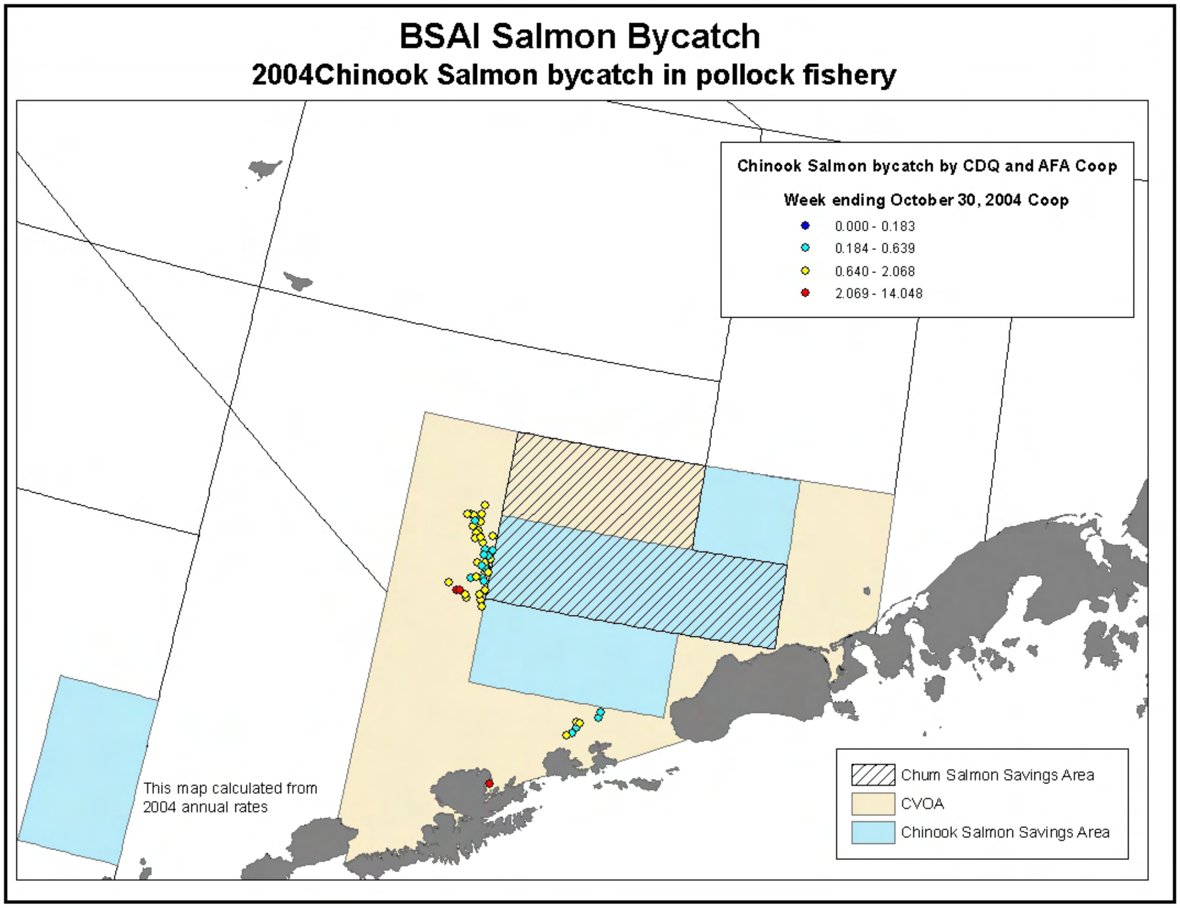
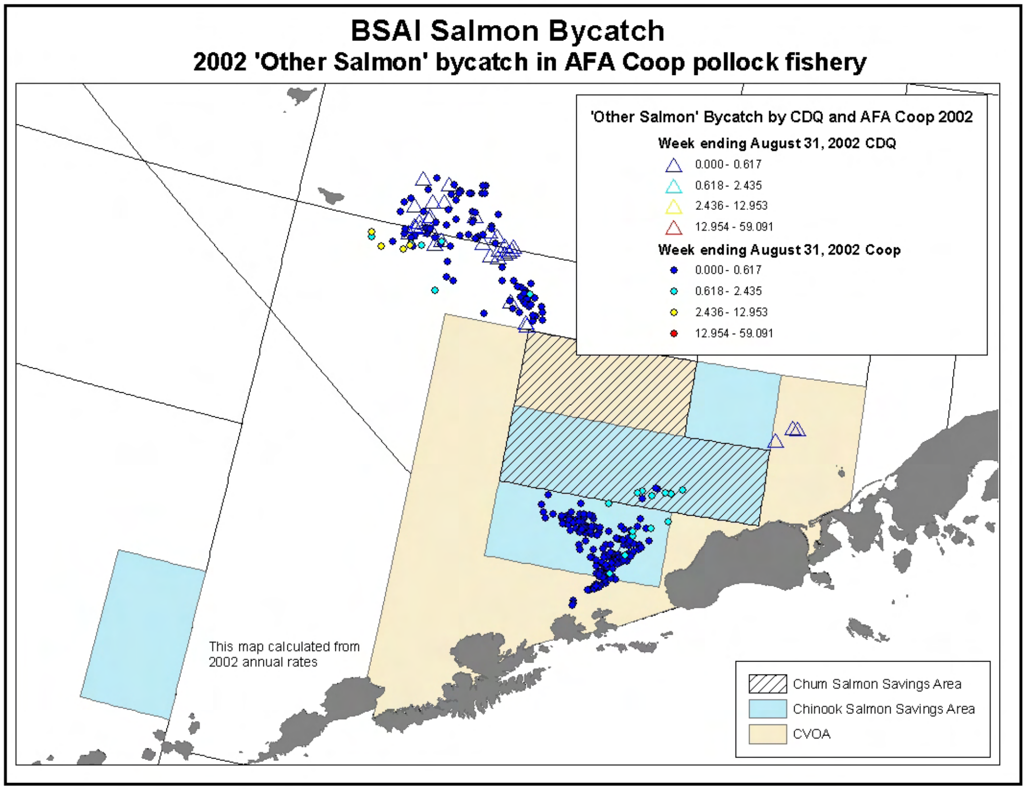
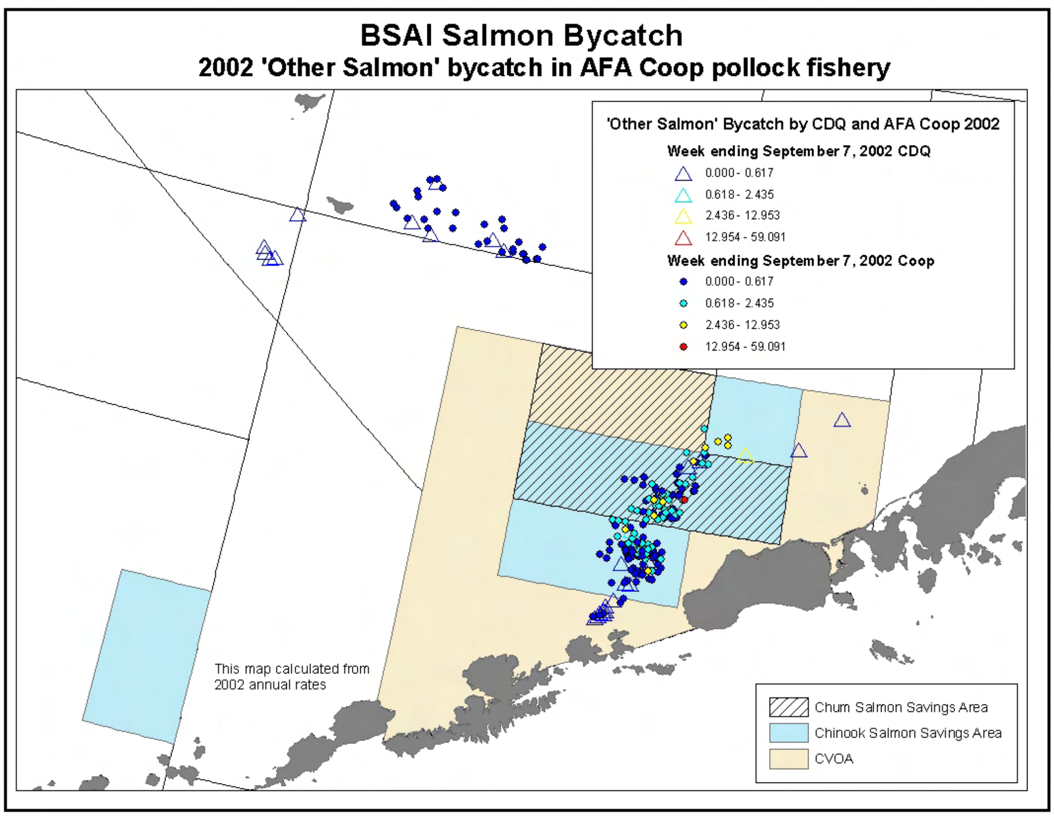

BSAI Salmon Bycatch
2004Chinook Salmon bycatch in pollock fishery
Chinook Salmon bycatch by CDQ and AFA Coop
Week ending October 30, 2004 Coop
0.000 - 0.183
0.184 - 0.639
0.640 - 2.068
2.069 - 14.048
This map calculated from
2004 annual rates
Chum Salmon Savings Area
CVOA
Chinook Salmon Savings Area

Figure 4-16 2002 'Other Salmon' Bycatch in the Pollock Fishery "B" Season, selected weeks in August-October

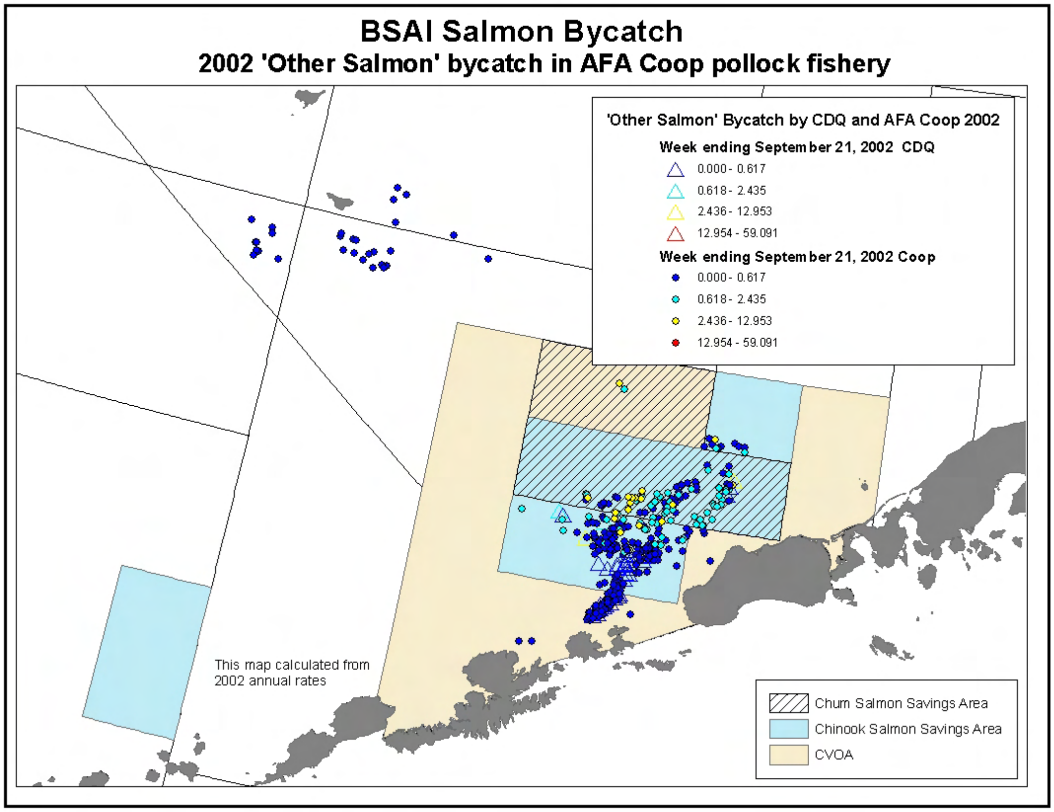
a)



b)



c)


BSAI Salmon Bycatch
2002 'Other Salmon' bycatch in AFA Coop pollock fishery
'Other Salmon' Bycatch by CDQ and AFA Coop 2002
Week ending September 21, 2002 CDQ
0.000 - 0.617
0.618 - 2.435
2.436 - 12.953
12.954 - 59.091
Week ending September 21, 2002 Coop
0.000 - 0.617
0.618 - 2.435
2.436 - 12.953
12.954 - 59.091
This map calculated from
2002 annual rates
Chum Salmon Savings Area
Chinook Salmon Savings Area
CVOA

d)

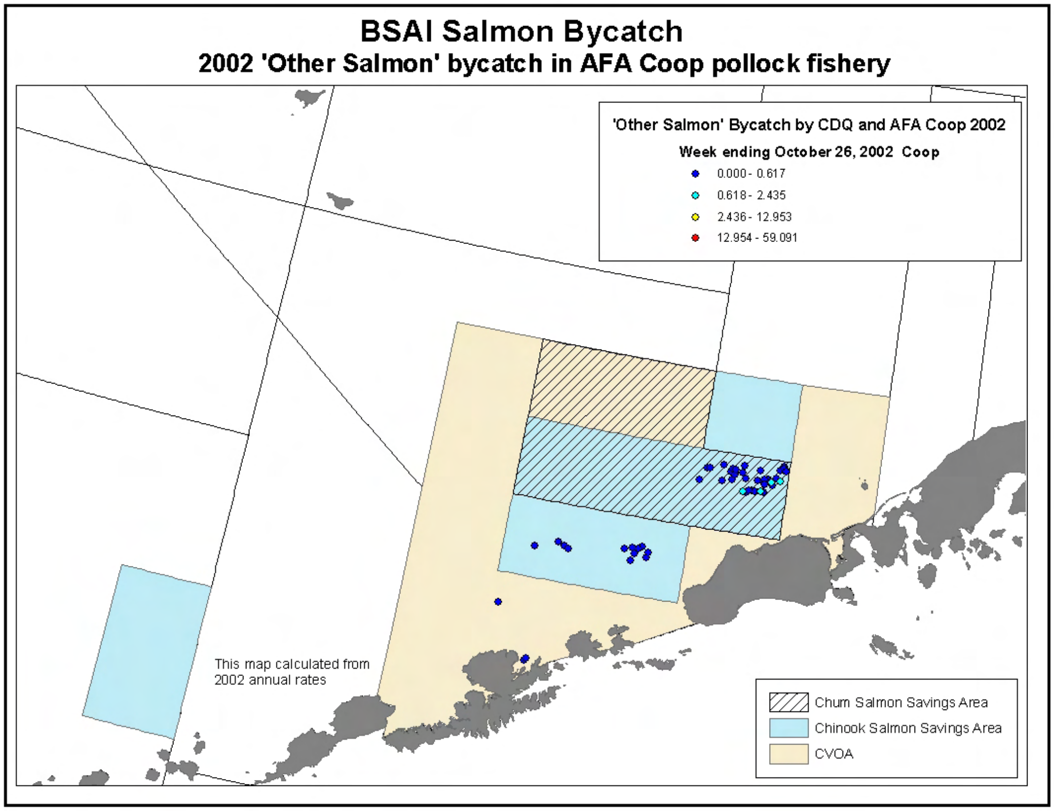
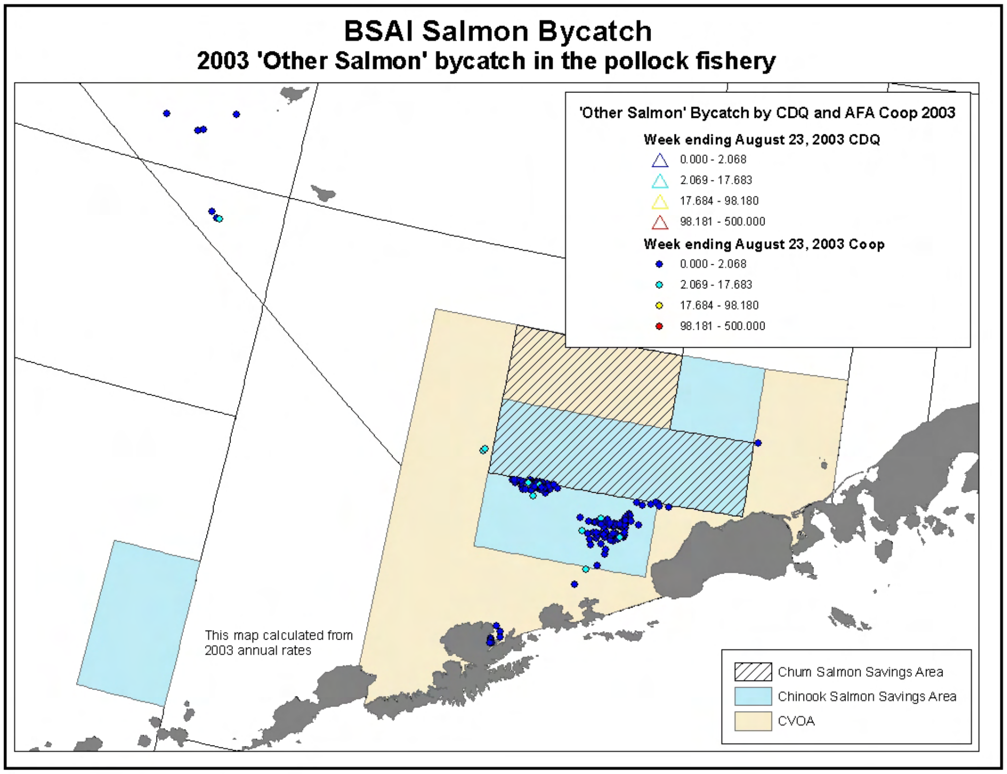
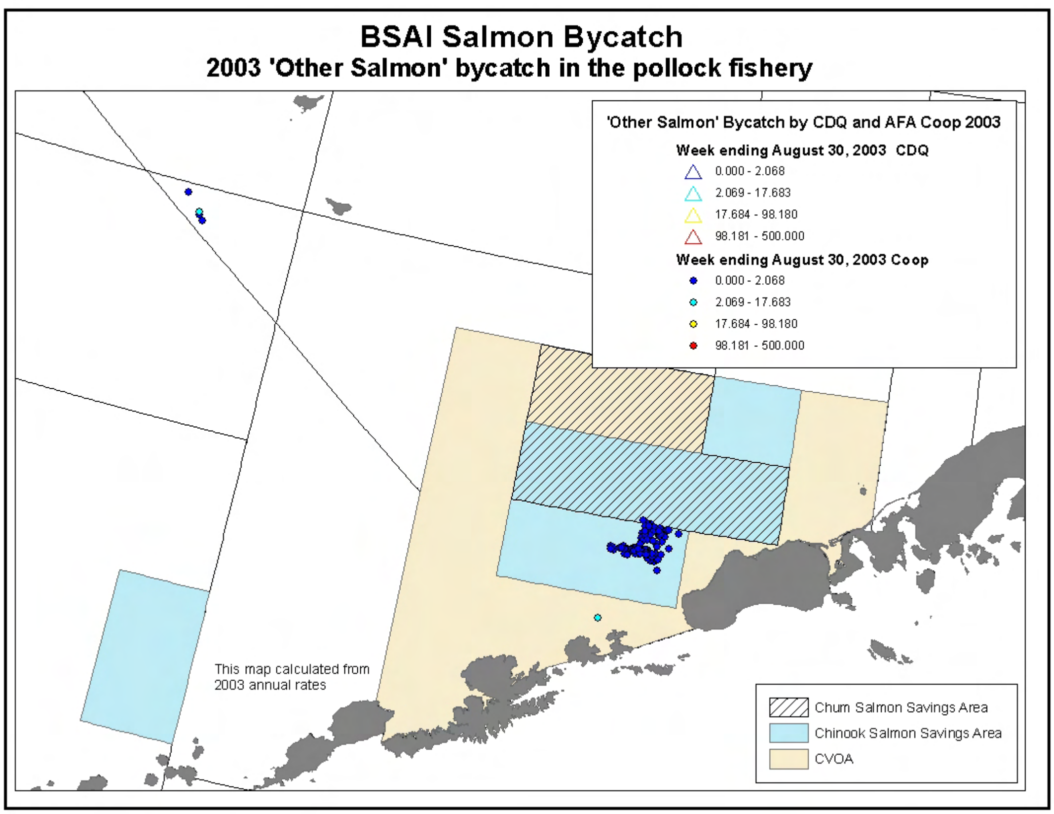

BSAI Salmon Bycatch
2002 'Other Salmon' bycatch in AFA Coop pollock fishery
'Other Salmon' Bycatch by CDQ and AFA Coop 2002
Week ending October 26, 2002 Coop
0.000 - 0.617
0.618 - 2.435
2.436 - 12.953
12.954 - 59.091
This map calculated from
2002 annual rates
Chum Salmon Savings Area
Chinook Salmon Savings Area
CVOA

Figure 4-17 2003 'Other Salmon' Bycatch in the Pollock Fishery "B" Season, selected weeks in August-October

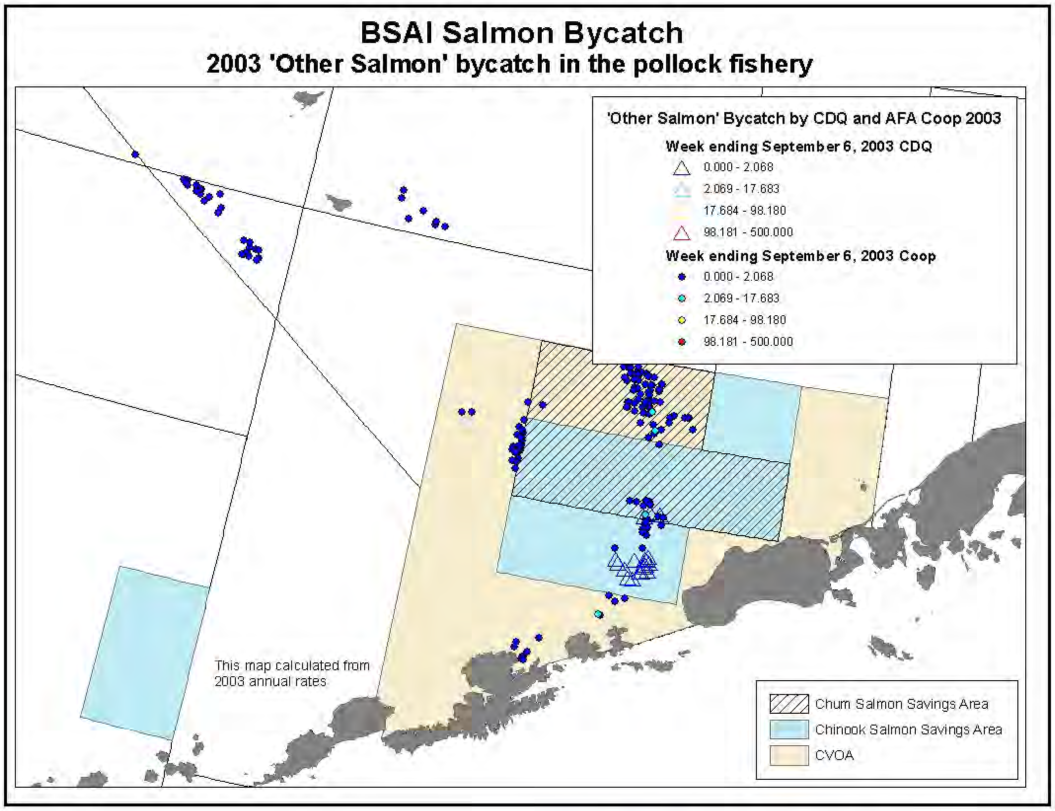
a)



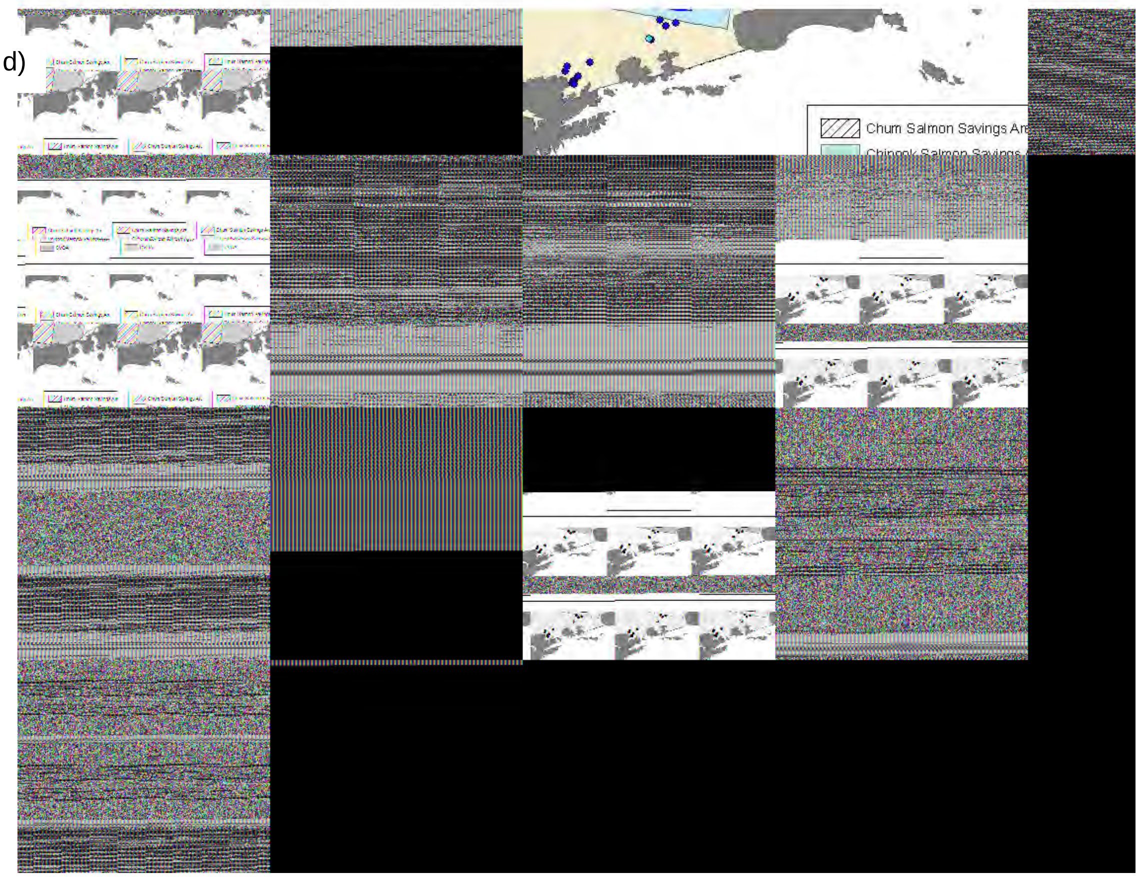
b)



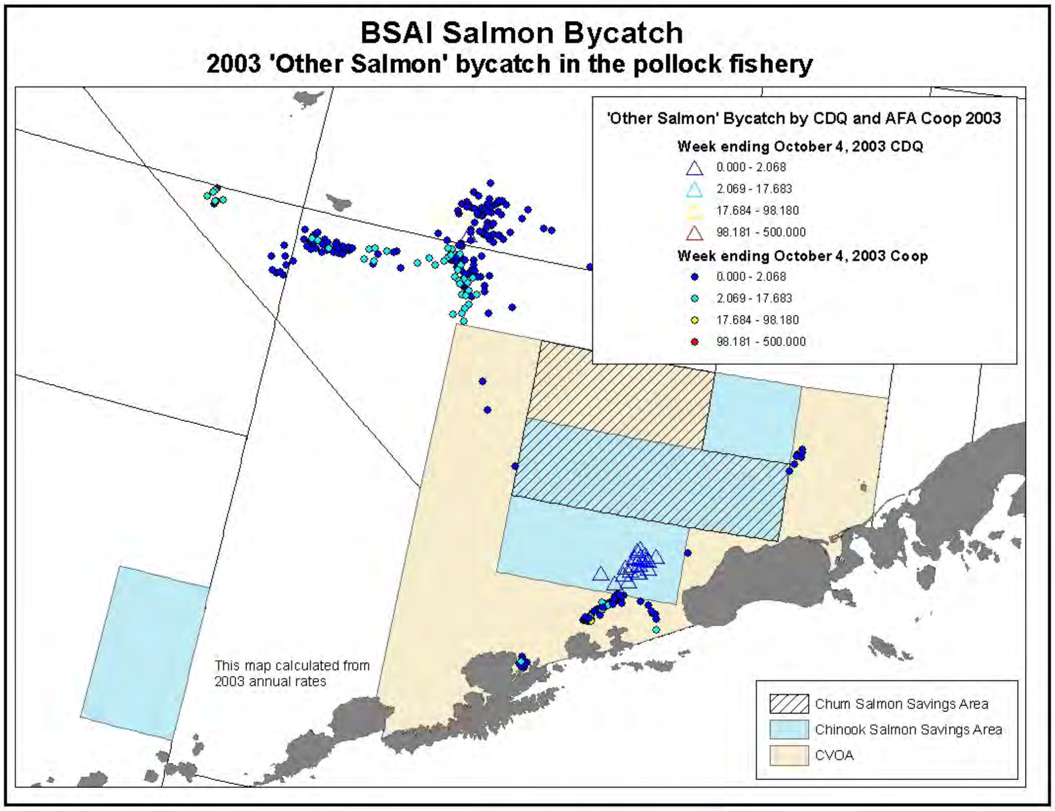
c)


BSAI Salmon Bycatch
2003 'Other Salmon' bycatch in the pollock fishery
'Other Salmon' Bycatch by CDQ and AFA Coop 2003
Week ending September 6, 2003 CDQ
0.000 - 2.068
2.069 - 17.683
17.684 - 98.180
98.181 - 500.000
Week ending September 6, 2003 Coop
0.000 - 2.068
2.069 - 17.683
17.684 - 98.180
98.181 - 500.000
This map calculated from
2003 annual rates
Chum Salmon Savings Area
Chinook Salmon Savings Area
CVOA

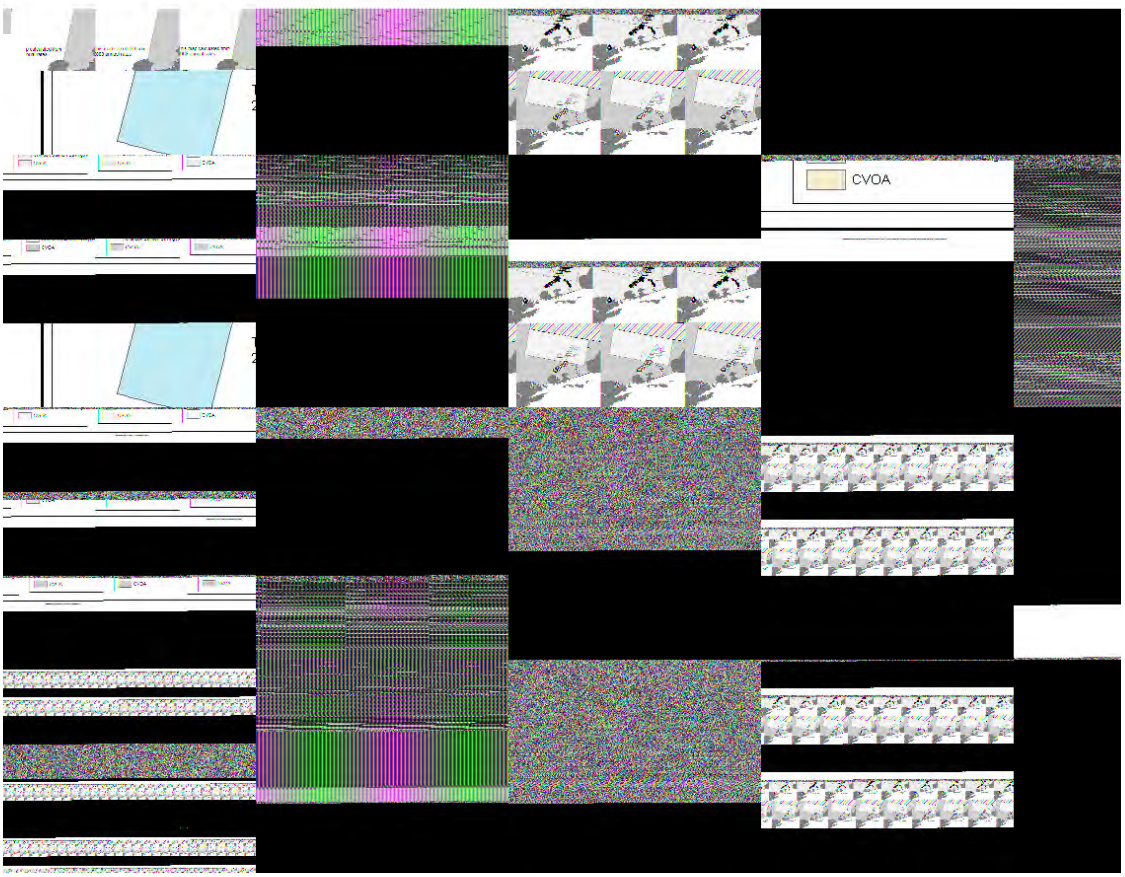
d)



e)


BSAI Salmon Bycatch
2003 'Other Salmon' bycatch in the pollock fishery
'Other Salmon' Bycatch by CDQ and AFA Coop 2003
Week ending October 4, 2003 CDQ
0.000 - 2.068
2.069 - 17.683
17.684 - 98.180
98.181 - 500.000
Week ending October 4, 2003 Coop
0.000 - 2.068
2.069 - 17.683
17.684 - 98.180
98.181 - 500.000
This map calculated from 2003 annual rates
Chum Salmon Savings Area
Chinook Salmon Savings Area
CVOA

f)


CVOA

g)

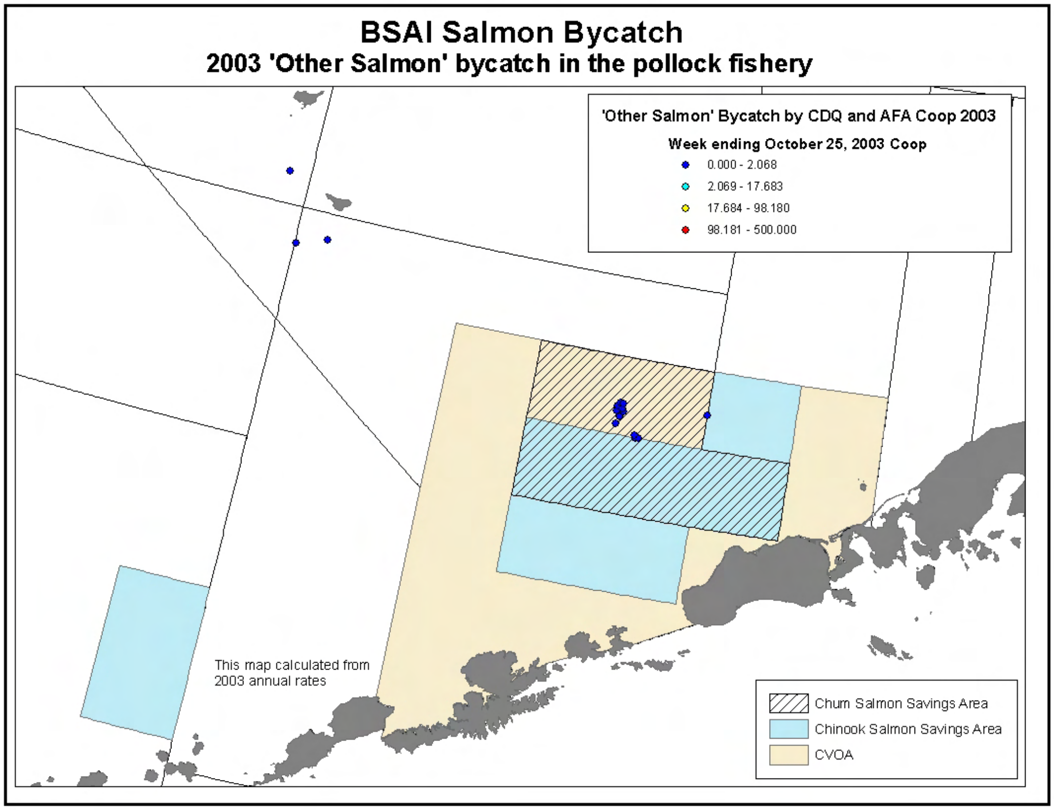
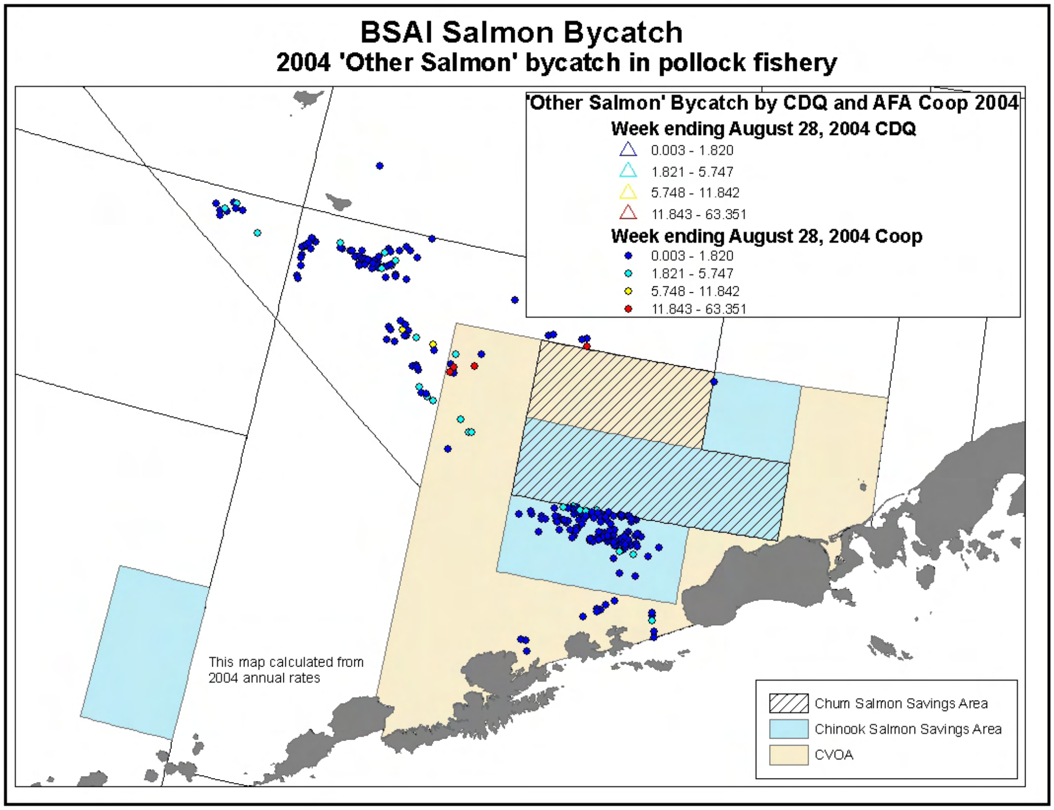
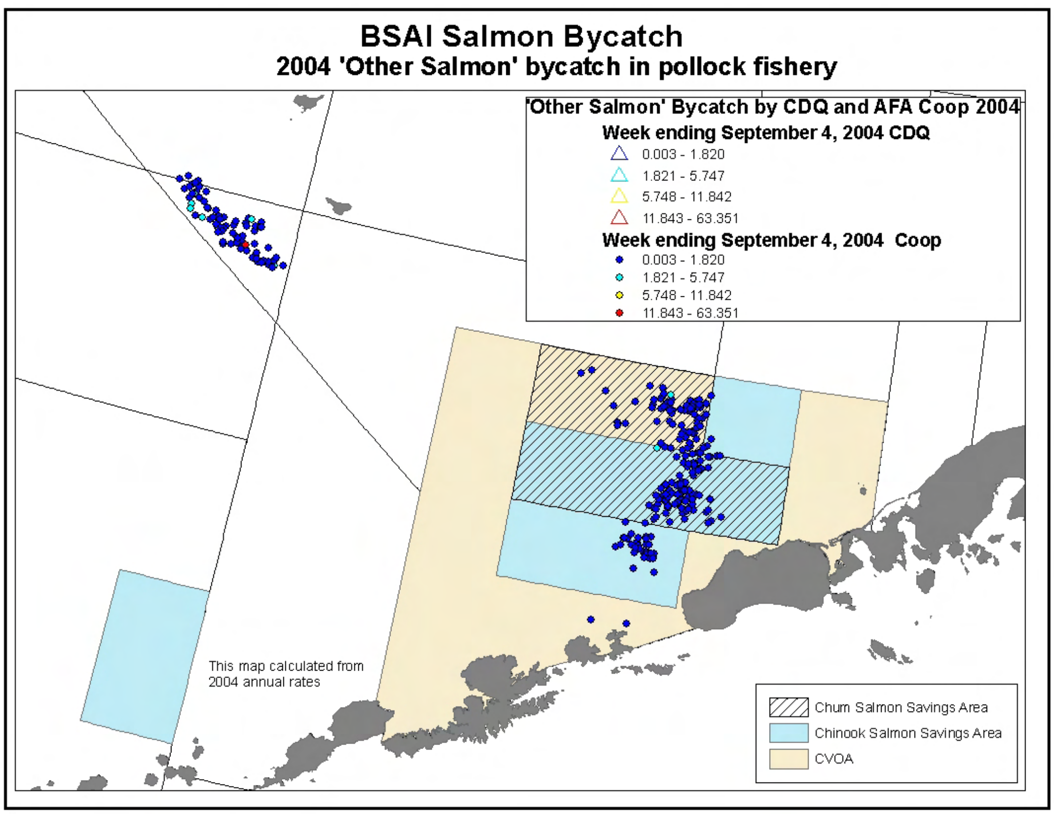

BSAI Salmon Bycatch
2003 'Other Salmon' bycatch in the pollock fishery
'Other Salmon' Bycatch by CDQ and AFA Coop 2003
Week ending October 25, 2003 Coop
0.000 - 2.068
2.069 - 17.683
17.684 - 98.180
98.181 - 500.000
This map calculated from
2003 annual rates
Chum Salmon Savings Area
Chinook Salmon Savings Area
CVOA

Figure 4-18 2004 'Other Salmon' Bycatch in the Pollock Fishery "B" Season, selected weeks in August-October

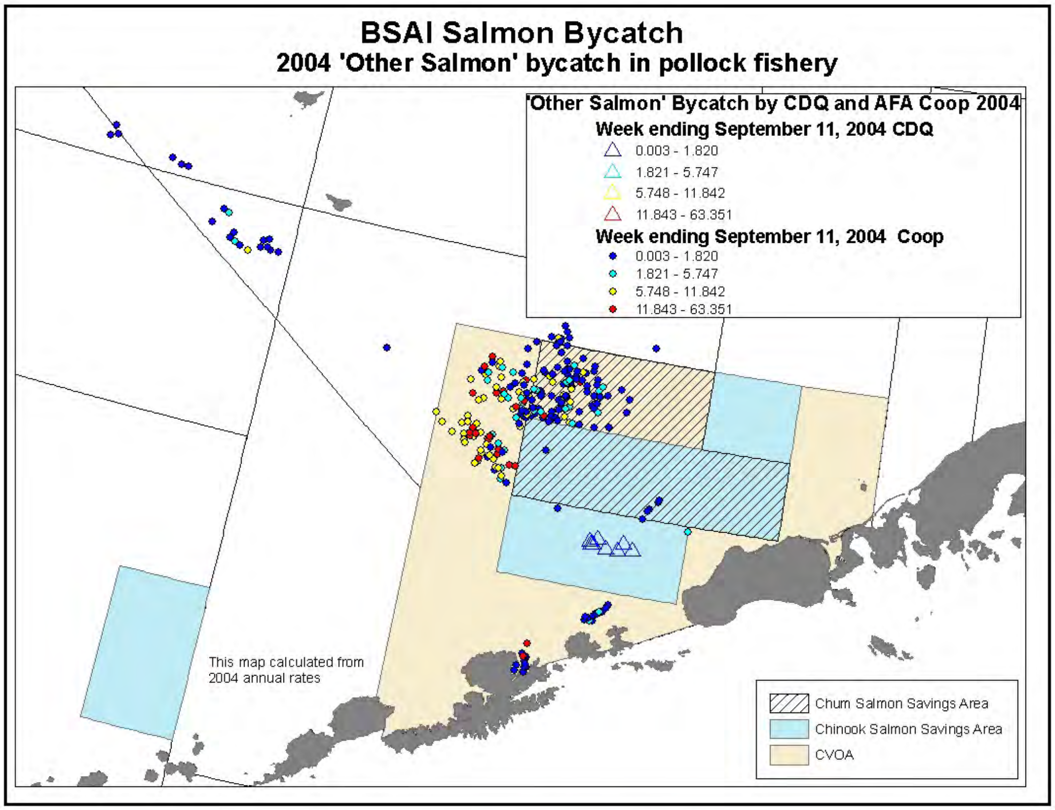
a)



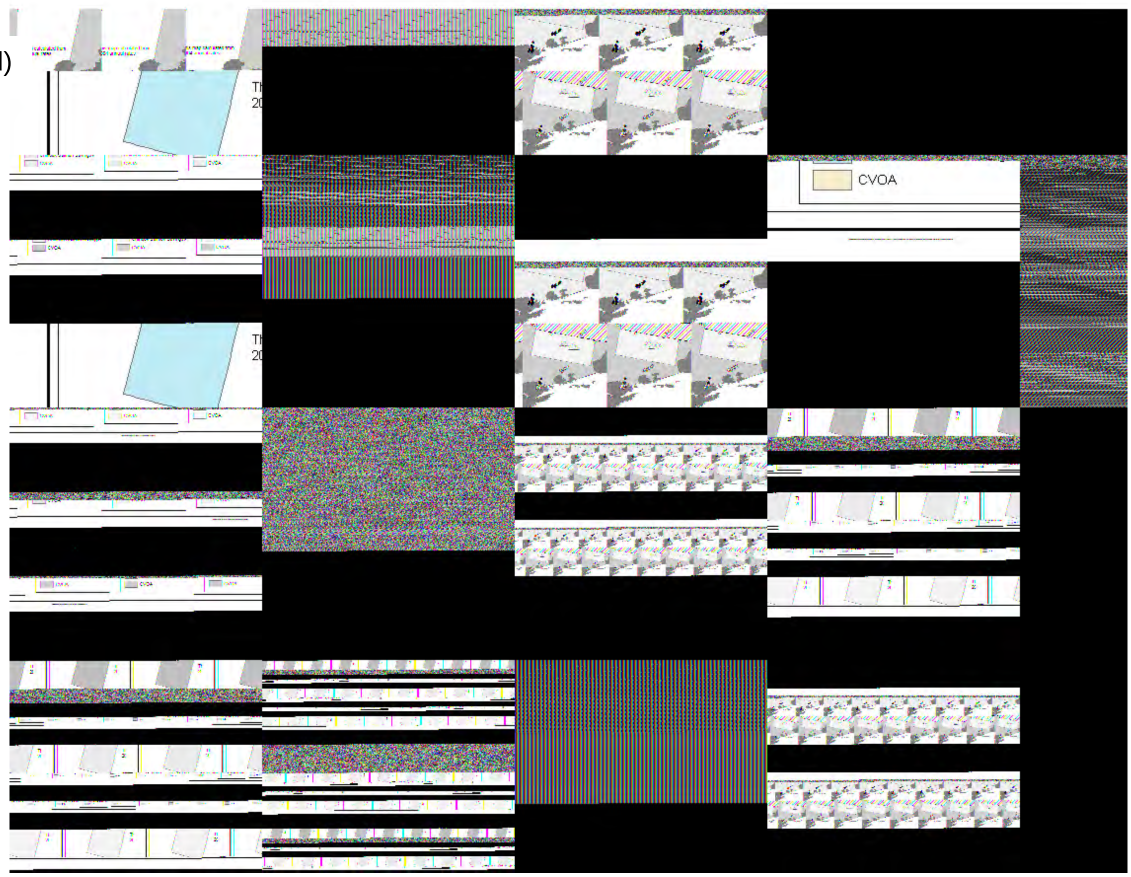
b)



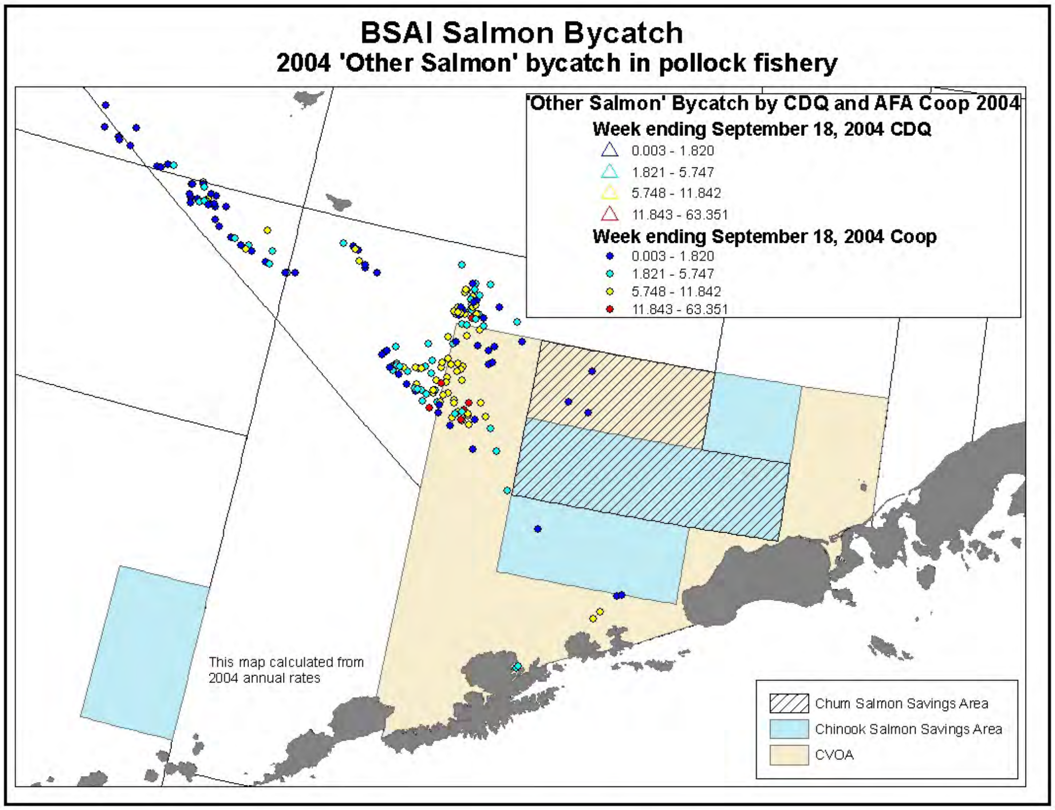
c)


BSAI Salmon Bycatch
2004 'Other Salmon' bycatch in pollock fishery
'Other Salmon' Bycatch by CDQ and AFA Coop 2004
Week ending September 11, 2004 CDQ
0.003 - 1.820
1.821 - 5.747
5.748 - 11.842
11.843 - 63.351
Week ending September 11, 2004 Coop
0.003 - 1.820
1.821 - 5.747
5.748 - 11.842
11.843 - 63.351
This map calculated from
2004 annual rates
Chum Salmon Savings Area
Chinook Salmon Savings Area
CVOA

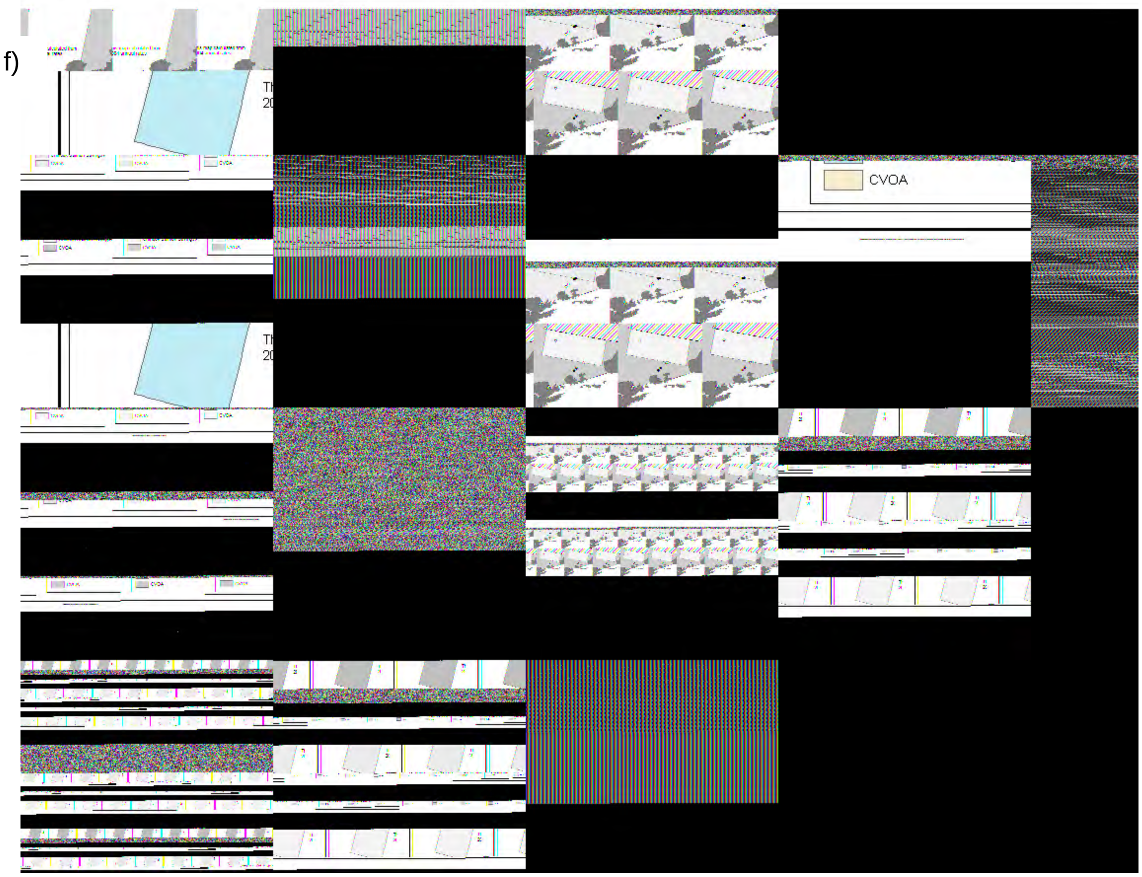
d)


CVOA

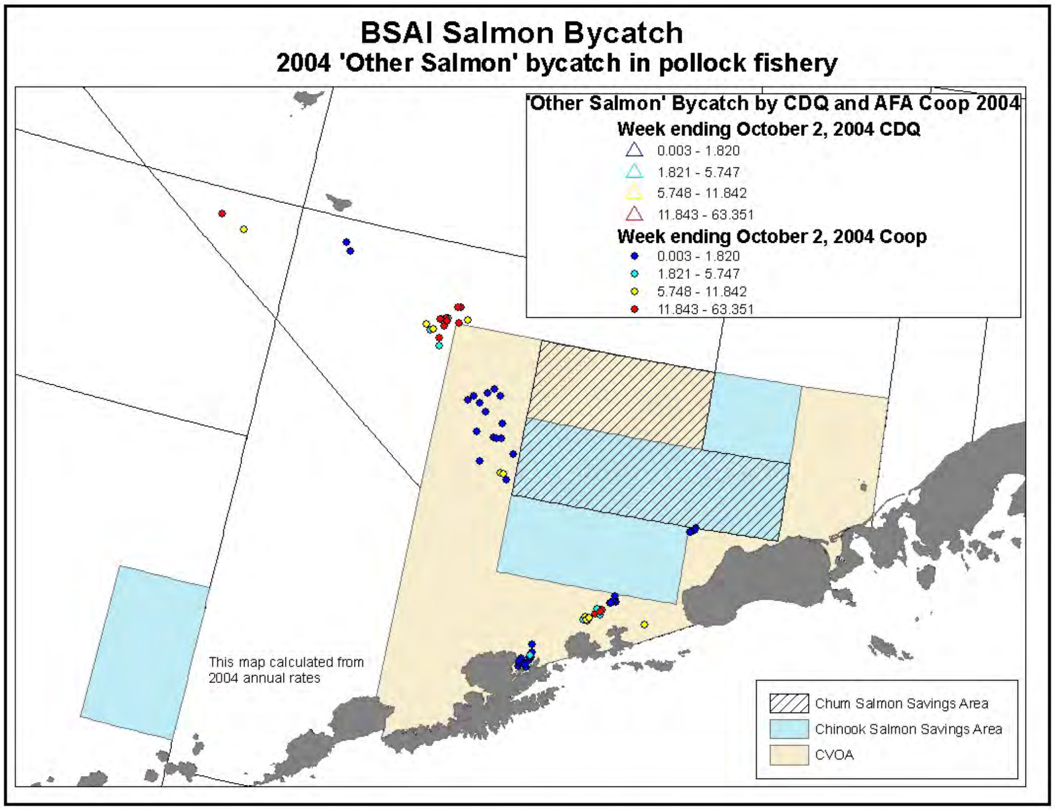
e)


BSAI Salmon Bycatch
2004 'Other Salmon' bycatch in pollock fishery
'Other Salmon' Bycatch by CDQ and AFA Coop 2004
Week ending September 18, 2004 CDQ
0.003 - 1.820
1.821 - 5.747
5.748 - 11.842
11.843 - 63.351
Week ending September 18, 2004 Coop
0.003 - 1.820
1.821 - 5.747
5.748 - 11.842
11.843 - 63.351
This map calculated from
2004 annual rates
Chum Salmon Savings Area
Chinook Salmon Savings Area
CVOA

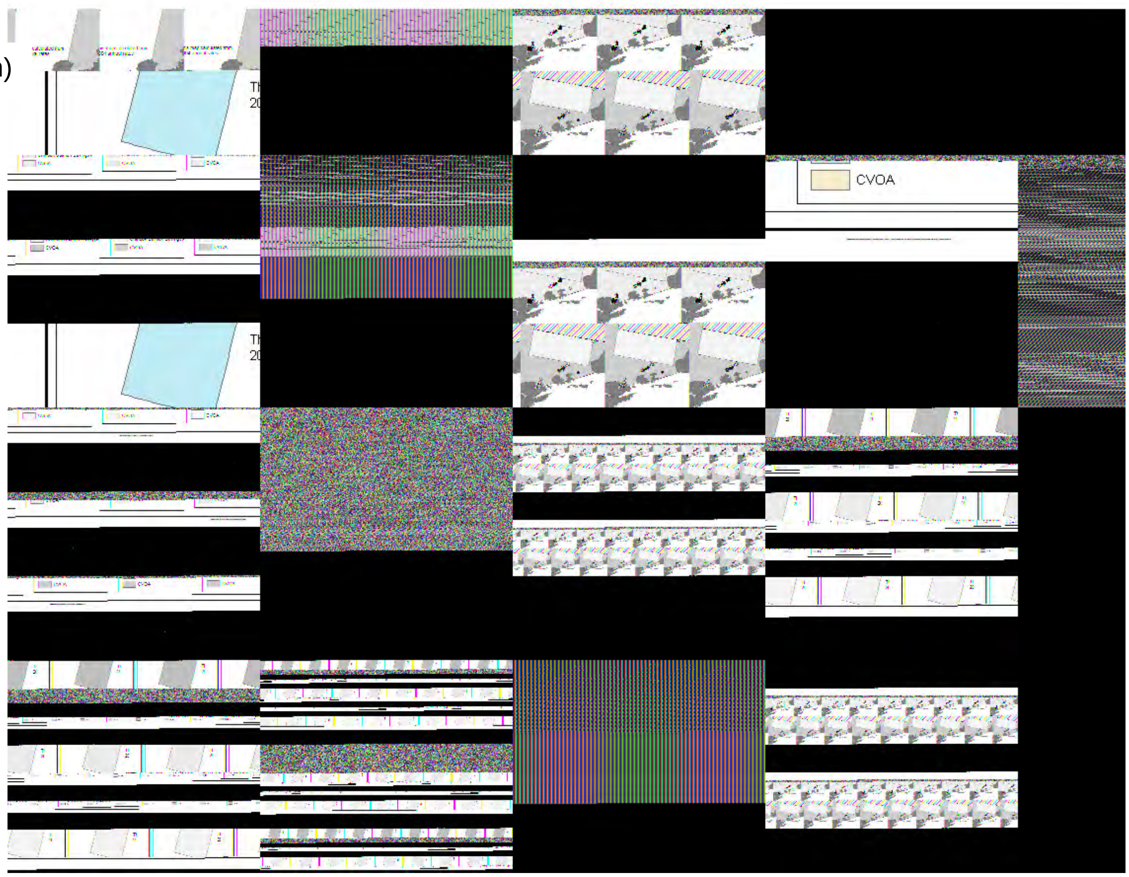
f)


CVOA

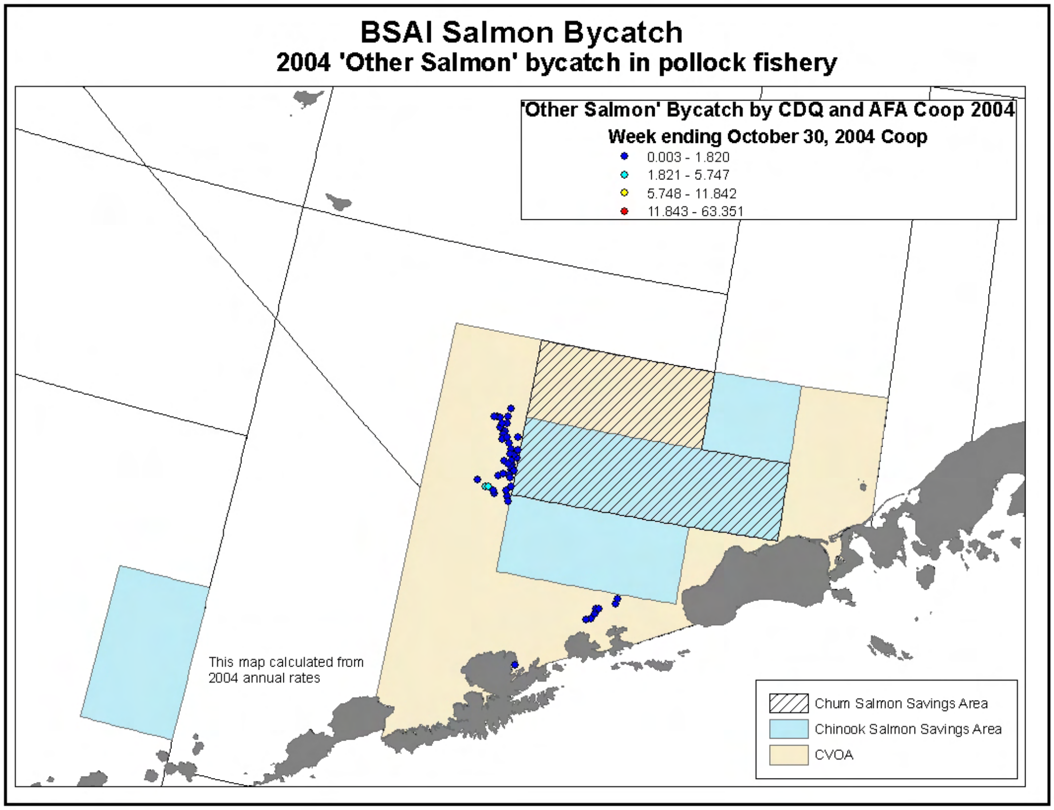
g)


BSAI Salmon Bycatch
2004 'Other Salmon' bycatch in pollock fishery
'Other Salmon' Bycatch by CDQ and AFA Coop 2004
Week ending October 2, 2004 CDQ
0.003 - 1.820
1.821 - 5.747
5.748 - 11.842
11.843 - 63.351
Week ending October 2, 2004 Coop
0.003 - 1.820
1.821 - 5.747
5.748 - 11.842
11.843 - 63.351
This map calculated from
2004 annual rates
Chum Salmon Savings Area
Chinook Salmon Savings Area
CVOA

h)


CVOA

i)


BSAI Salmon Bycatch
2004 'Other Salmon' bycatch in pollock fishery
'Other Salmon' Bycatch by CDQ and AFA Coop 2004
Week ending October 30, 2004 Coop
0.003 - 1.820
1.821 - 5.747
5.748 - 11.842
11.843 - 63.351
This map calculated from
2004 annual rates
Chum Salmon Savings Area
Chinook Salmon Savings Area
CVOA

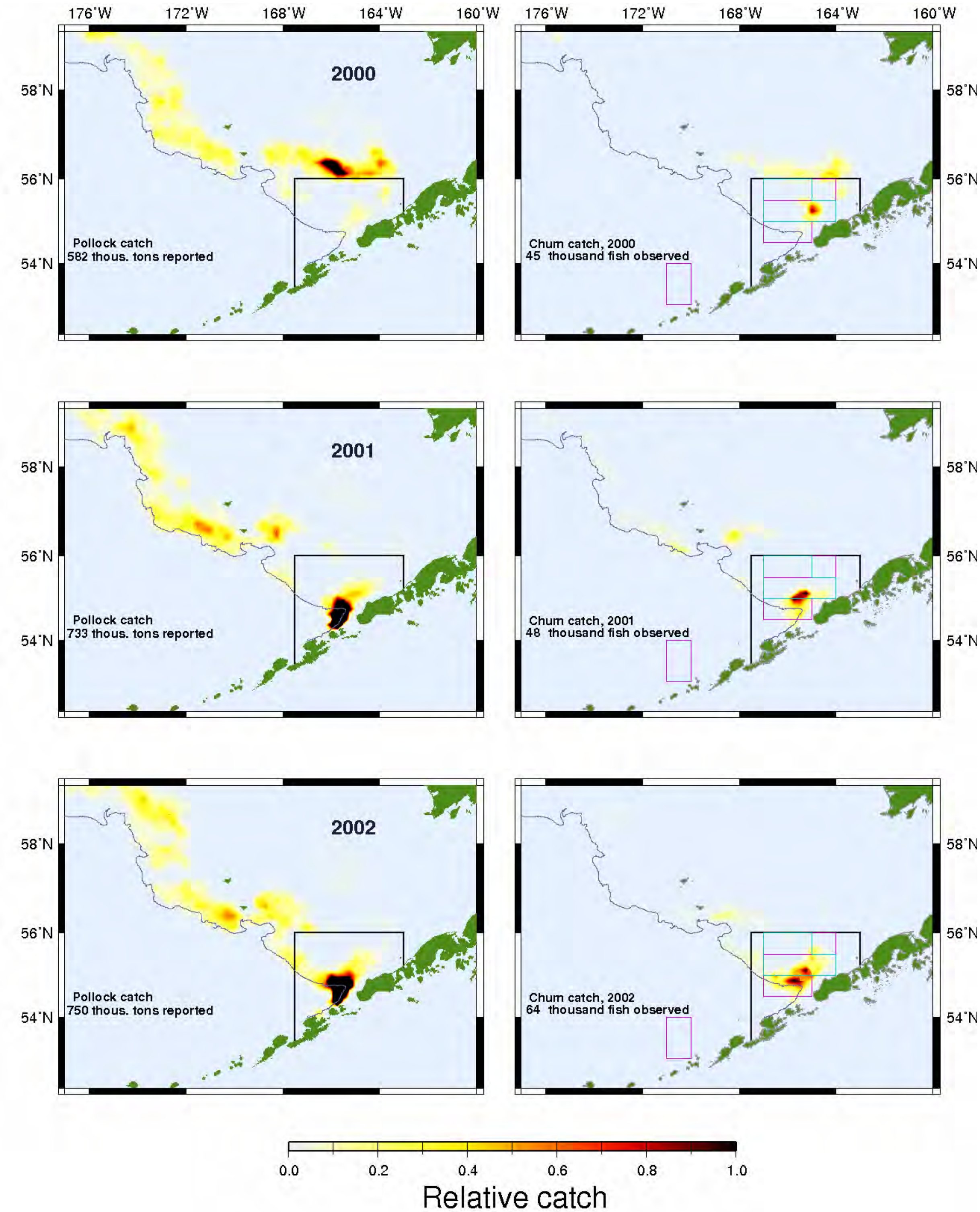


Figure 4-19 Pollock catch during the "B" season (June – Dec; left column) compared to non-chinook (labeled as chum) salmon catch for the same period (right column). Source: NMFS Observer database. The scale of the relative catch is constant for each species over different years.

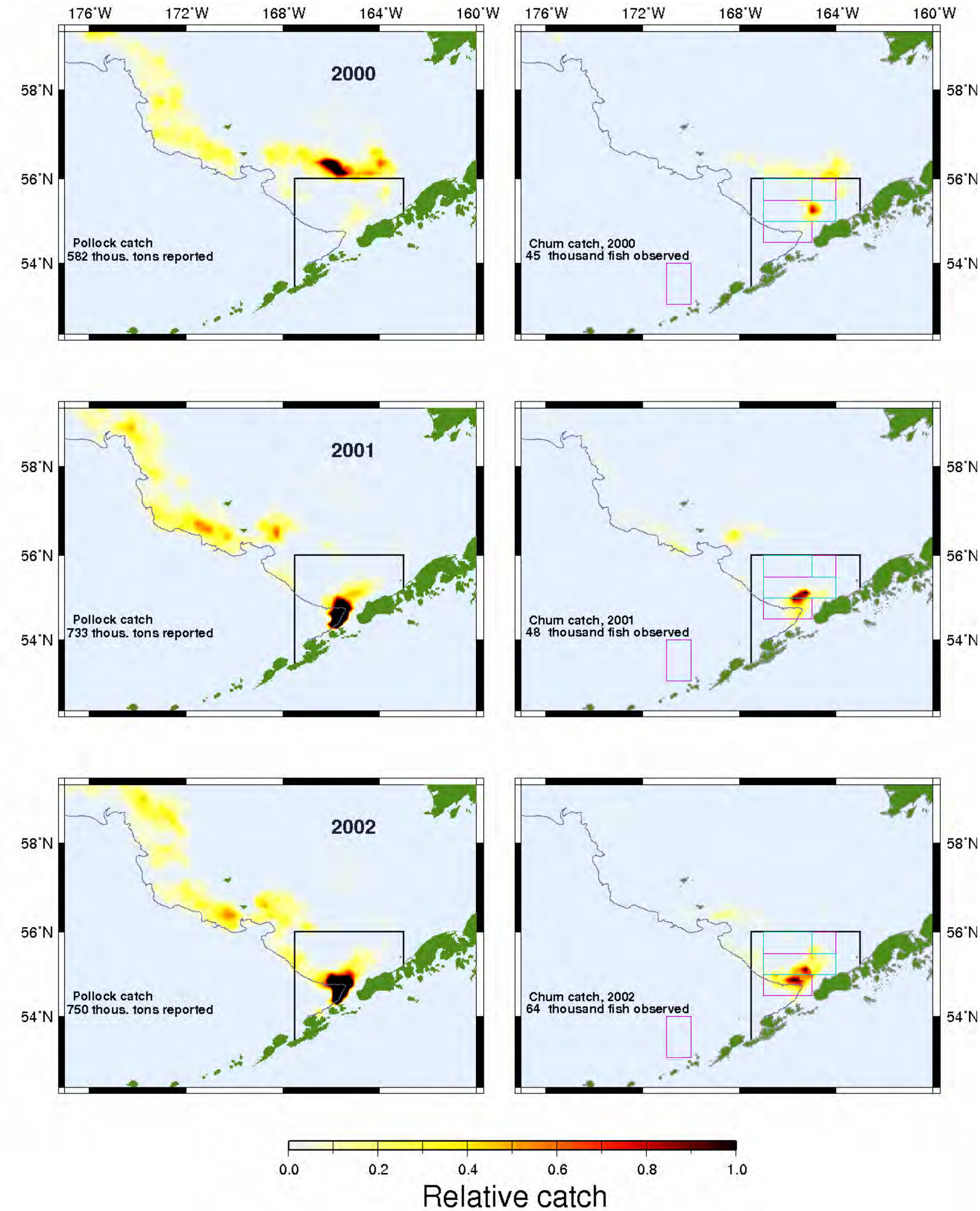
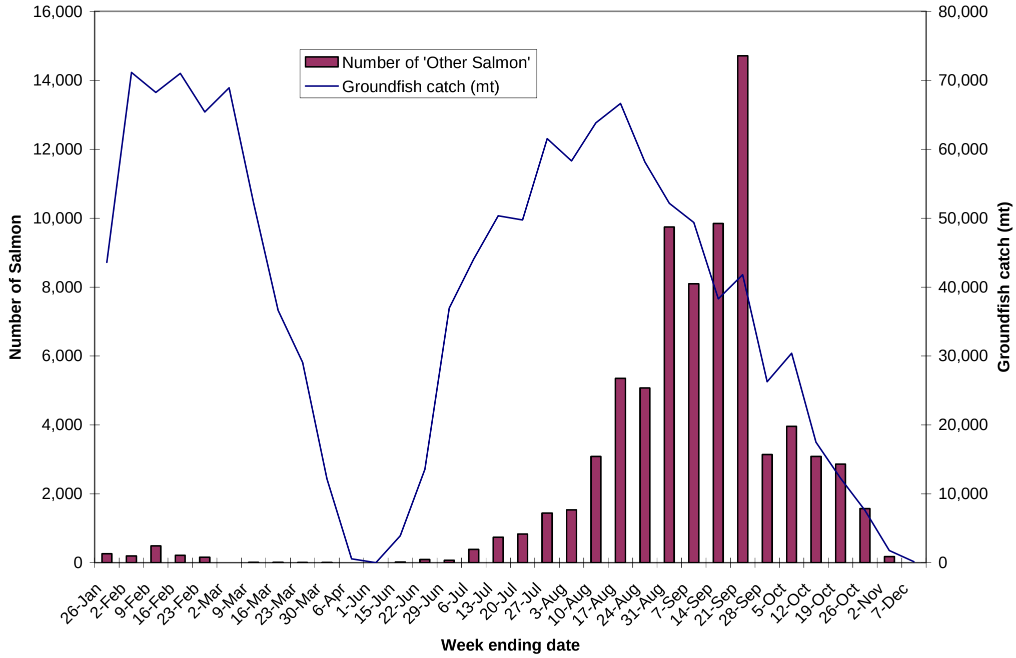


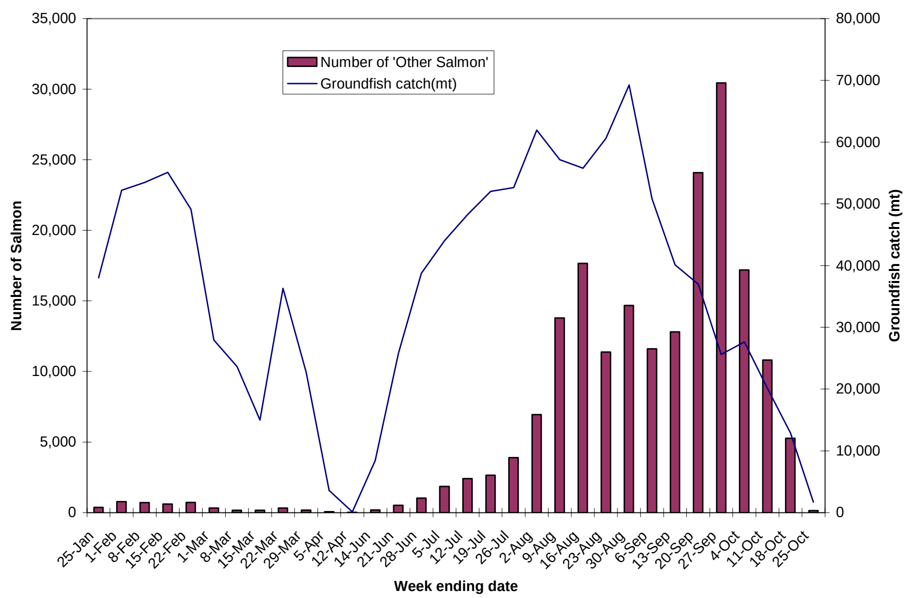
Figure 4-20 Pollock catch during the "B" season (June – Dec; left column) compared to non-chinook (labeled as chum) salmon catch for the same period (right column). Source: NMFS Observer database. The scale of the relative catch is constant for each species over different years.

Figure 4-21 2002 BSAI "other salmon" bycatch, and groundfish catch in the pollock trawl fishery, by week



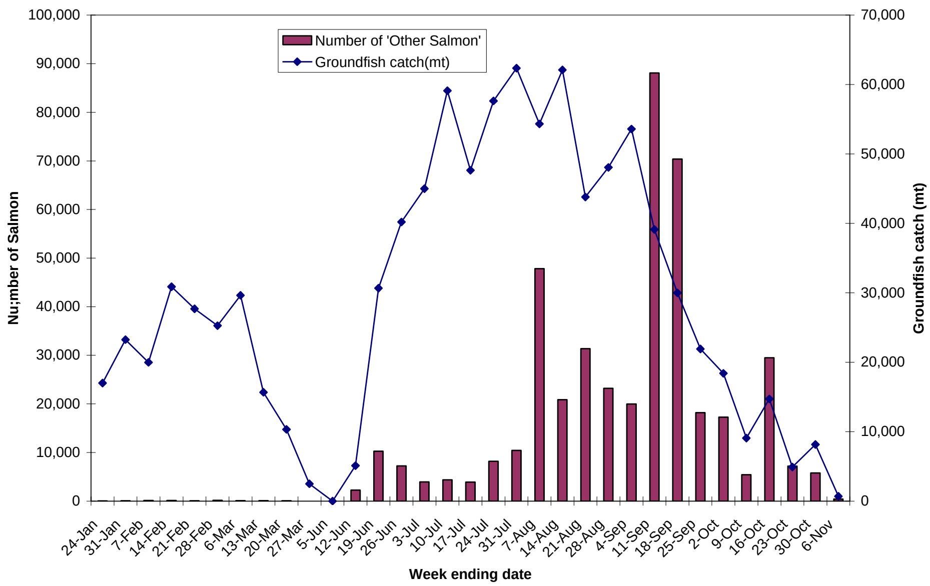
In 2003, a similar pattern was observed with high bycatch in the "B" season (Figure 4-22). The Chinook Salmon Savings Area closed on September 1 to the end of the year, and the Chum Salmon Savings Area closed from August 1-31 and again from September 24 to October 14.

Figure 4-22 2003 BSAI "other salmon" bycatch, and groundfish catch in the pollock trawl fishery, by week



In 2004, a similar pattern was observed (Figure 4-23). In the "B" season, the Chinook Salmon Savings Area closed on September 5 through the end of the year while the Chum Salmon Savings Area closed annually from August 1-31 and again from September 14 through October 14.

Figure 4-23 2004 BSAI "other salmon" bycatch, and groundfish catch in the pollock trawl fishery, by week



4.1.3.2 Overview of annual chum salmon bycatch with Pollock CPUE (2000-2005)

Annual cumulative chum salmon bycatch was compared with cumulative Pollock catch for 2000-2005 (Figure 4-24). Cumulative Pollock catch again shows higher rates in recent years, with 2002-2005 similar for B season catch rates. Cumulative chum (or non-Chinook) salmon catch have a much faster increase in rate in recent years with 2005 displaying the fastest incremental rate increase from July to early August.

Non-Chinook catch rates by 5 day increments were compared with the cumulative non-Chinook bycatch rate (Figure 4-25). This gives an indication of the relative magnitude of higher bycatch rate weeks (5 day intervals) on the cumulative rate of bycatch over the season. Here higher weekly rates in 2005 seem to directly correlate to an increase in the cumulative rate. High weekly rates in 2004 in late September also seem to correlate to an increase in the cumulative bycatch rate.

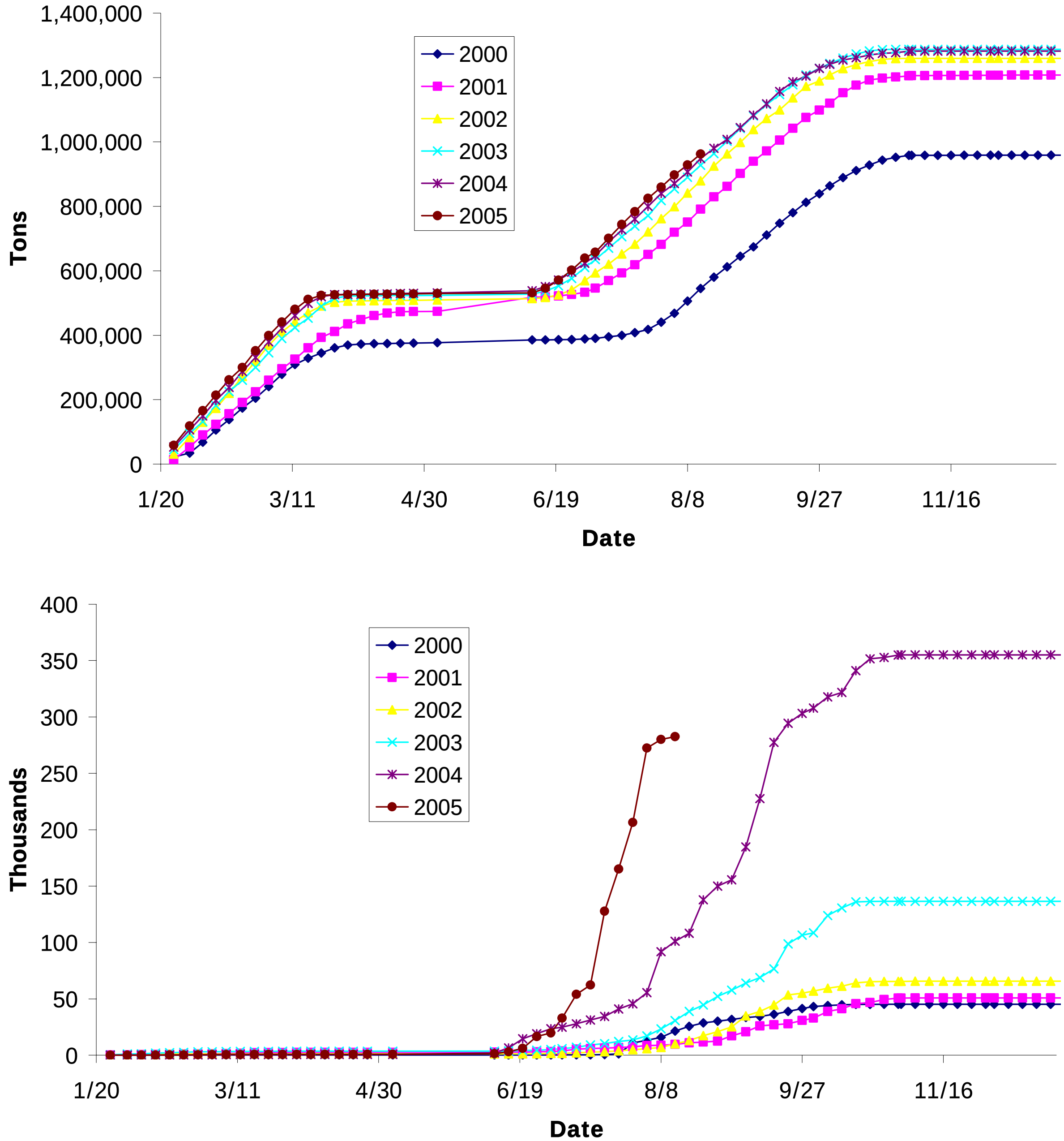


Figure 4-24 Cumulative pollock catch (tons; top panel) and cumulative non-chinook salmon catch (thousands of fish; bottom panel) based on observed vessels only (2000-2005, 5-day intervals). Data for 2005 are preliminary and extend to Aug. 13, 2005.

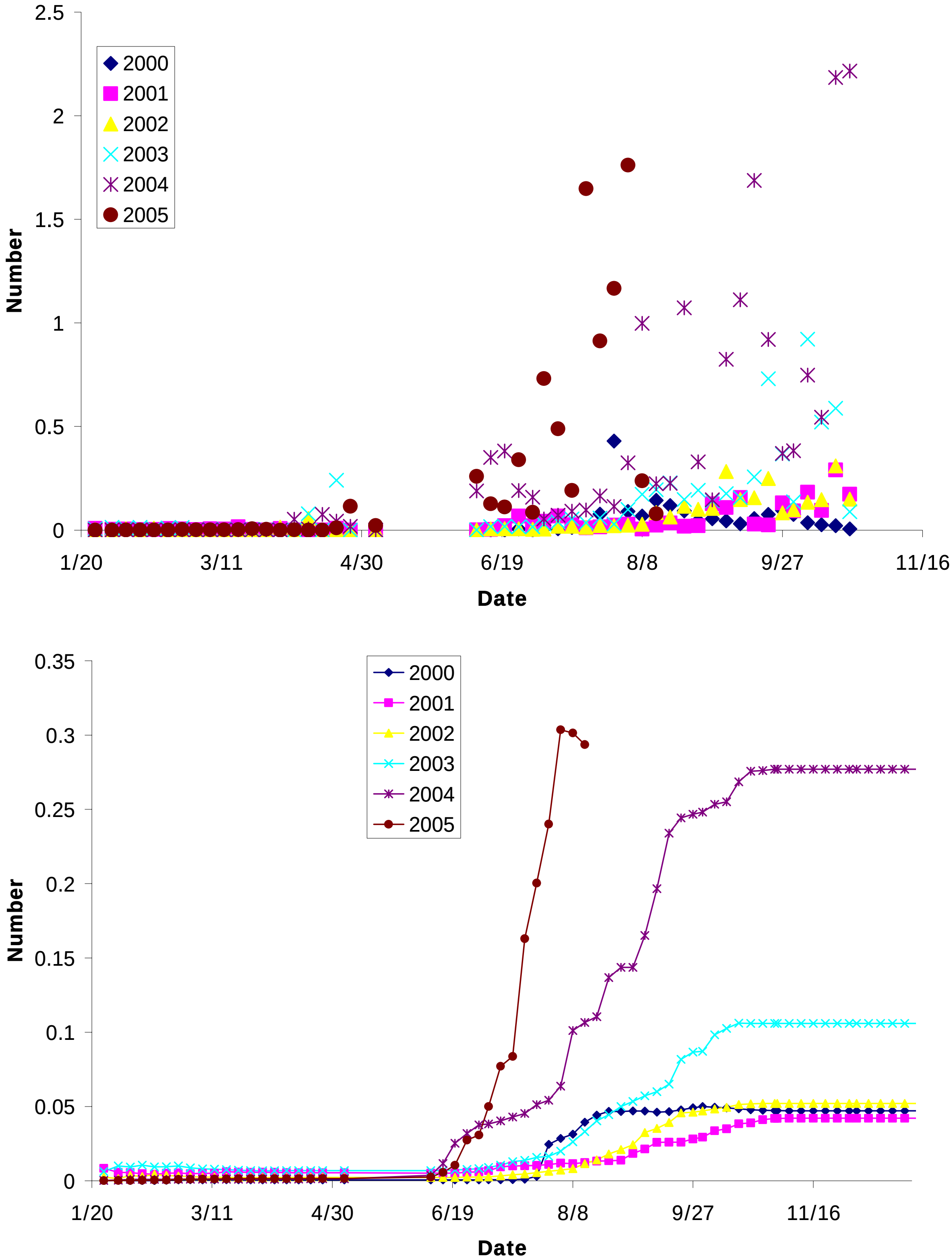


Figure 4-25 Non-chinook salmon catch rate (number per ton of pollock) based on observed vessels only (2000-2005). Top panel represents the average bycatch at 5-day intervals while the bottom panel represents the cumulative number per ton of pollock. Data for 2005 are preliminary and extend to Aug. 13, 2005.

Annual observed chum salmon catch over the B season was compared with Pollock CPUE for the same time period (Figure 4-19). Fishery effort is concentrated primarily north of Unimak Island. Chum bycatch annually from 2000-2002 appears to be concentrated within the Chum and Chinook savings areas, but in more recent years (2003-2005) moves to the west and north of both savings areas. Preliminary data from 2005 shows concentrated bycatch both inside of the Chum Savings Area as well as to the northwest.

4.1.3.3 Spatial and temporal overview of bycatch since 2002:

Figures 4-16 through 4-18 show the bycatch rate in number of salmon per metric ton of groundfish for 2002 through 2004 "B" seasons where chum bycatch is highest. An overview is provided below of the fishery and the spatial and temporal nature of chum bycatch by year. Where weeks are mentioned additional information are included in Appendix 4. Annual regulatory closures and additional Chum and Chinook SSA closures when triggered in the fall are shown with comparison with CDQ rates where possible in order to compares rates outside of the Chum and Chinook SSAs with rates from CDQ vessels fishing inside of the closure.

2002

Low bycatch rates are observed through the end of July (Figure 4-21). Late July to early August the fishery is dispersed along the continental shelf with generally low bycatch rates. Some higher rates are found concentrated north of the Chum Salmon Savings Area for the week ending August 3.

The Chum SSA closed per annual regulations from August 1-31. During this time period highest rates were found scattered along the southern and periphery of the Chum SSA and to the north west and south east of the Pribilofs (Figure 4-16a Appendix 4 Figures 59-60). No CDQ data were available from fishing within the Chum SSA so there was no comparison possible with rates outside of the closure for this time period.

The annual closure ended at noon on August 31, thus data from the week of September 7 are available for vessels fishing both inside and outside of the Chum SSA. Highest rates for this week are found within the Chum SSA with both CDQ rates and non-CDQ rates (Figure 4-16 b Appendix 4 Figures 61-62). By mid to late September higher rates are found along the southern edge of the Chum SSA, to the north east of Chum SSA (Figure 4-16 c,d).

The closure was triggered and the Chum SSA again closed from September 21-October 14 (see Appendix 1 for notices of closures) individual rates can be viewed in Appendix 4 Figures 65-71. Here the closure includes both CDQ and non-CDQ vessels. The highest rates during this period and through the remainder of the "B" season were found primarily south of the Chum SSA and also towards the Pribilofs (Figure 4-16 d,e). Following the reopening of the closure on October 14, fishing inside Chum SSA yielded lower bycatch rates than rates outside of it had been in previous weeks (Figure 4-16 f, Appendix 4 Figures 73-75). No additional Chinook closures occurred in 2002.

2003

Bycatch for 2003 are shown in Figure 4-17. General bycatch rates in 2003 were higher than the previous year, thus the relative scale range on the following figures is adjusted accordingly, though the relative color scheme of high to low rates remains the same.

Some data was available for rates during the "A" season to early "B" season, and these data show predictably low rates through mid-July. Higher rates begin to appear mid-July through early August. Rates in these areas are still low in comparison to the remainder of the "B" season (Figure 4-22, Appendix 4 Figures 76-79).

The annual closure was imposed from August 1-31. No CDQ data is available within the closure during this time period. Highest rates in this period are located south of the Chum SSA closure and north west of the Pribilofs (Figure 4-17 a,b). In September when the area re-opened, highest rates were found both within and to the south of the Chum SSA as well as in the north west quadrant of the Bering Sea management area (Figure 4-17 c). The fleet was only able to fish outside of the Chum annual closure and prior to the triggered Chinook SSA closure (on September 1) for 24 hours (noon on August 31 to noon on September 1). Data are aggregated by week so that 24 hour period is not available for analysis but we are able to evaluate the relative changes in bycatch rates by week in comparison to CDQ rates when available.

The Chum SSA closure was again triggered on September 24 through noon on October 14. The closure applied to only non-CDQ vessels. The fleet is now responding to closures of both the Chum SSA and the Chinook SSA and is constrained accordingly. Following the additional closure, highest rates are found concentrated to the west of the Chum SSA, to the south of the Chum SSA (Figure 4-17 d). Early October, the highest rates are observed nearshore (west of Unimak Island) and to the south east of the Pribilofs (Figure 4-17 e). As the Chum SSA re-opens, rates inside the area closure are low (Figure 4-17 f) and rates remains low throughout the rest of the season (Figure 4-17 g, Appendix 4 Figures 82-87)

2004

Figure 4-18 shows bycatch rates for the 2004 fishery. The scale of bycatch rates for this time period is lower than the relative scale in 2003. Histograms and frequency diagrams of these rates are provided in Appendix 4 Figures 88-101.

“A” season data again showed low bycatch rates through March. By June higher rates are seen south of the Pribilofs but are still low in comparison to rates observed later in the “B” season. This pattern remains the same through June and July, with higher rates to the northwest of the Chum SSA and near the Pribilofs.

The annual closure is again triggered August 1-31. During this time period highest bycatch rates are seen to the west of the Chum SSA in early August and to the north and west by late August (Figure 4-18 a, Appendix 4 Figures 88-89).

There were approximately 6 days (from noon August 31 to noon September 5) that the fleet was able to fish without either Chum or Chinook closures. The first week in September shows decreases rates of chum bycatch with fishing concentrated primarily within the Chum SSA (Figure 4-18 b, Appendix 4 Figures 90-91). After September 5 the fleet first had the Chinook closure then on the 14 the combination of both Chinook and Chum closures. The week of September 11, lower rates are generally observed within the Chum SSA with higher rates found nearshore and to the west of the Chum SSA (Figure 4-18 c, Appendix 4 Figures 92-93). The following week the chum closure was triggered on September 14 with the Chum SSA closing to non-CDQ fishing with trawl gear from September 14 -October 14.

Following the additional closure, fishing was concentrated outside of the Chum SSA with the highest rates observed to the west and south (Figure 4-18 d). Late September showed fishing concentrated near the Chum SSA with the highest rates to the northwest of the Chum SSA and south of the Pribilofs (Figure 4-18 e). Early October the rates rose even higher, and are still observed concentrated to the northwest of the Chum SSA (outside of the CVOA) and south of the Chinook SSA (Figure 4-18 f).

The week of October 16 (including 2 open days of the Chum SSA) showed some lower rates inside the Chum SSA and higher rates to the northwest of the Chum SSA (Figure 4-18 g). Effort was dispersed with lower rates continuing low and variable through the end of the “B” season (Figure 4-18 h).

4.1.4 Status Quo Voluntary Rolling Hot Spot System

The AFA cooperatives have been operating under an inter-cooperative bycatch management agreement since 2001 (for chum salmon) and 2003 (for Chinook salmon). This agreement is a voluntary legal association of pollock cooperatives whereby a binding agreement is signed between members to supply bycatch information to Sea State Inc and abide by regulations set out in the Inter-Cooperative Agreement each year. Under this agreement, in addition to being subject to regulatory closures where applicable, the cooperatives participate in voluntary rolling hot spot closures by week for cooperatives whose bycatch rates placed them into tiers subject to closures. More information on the tier structure for the VRHS system is described under Alternative 3 as the current preferred alternative is structured based on the current ICA (with modifications as explained under Section 4.3). The current agreement does not include the CDQ groups. Vessels fishing CDQ quota are subject only to regulatory closures if triggered for CDQ rates.

In 2000, the inshore cooperatives designed a verbal agreement for a hot spot location program which tracked bycatch by cooperatives and included a seasonal "Dirty 20" list. A Chinook agreement was designed for the 2002 "A" season. This agreement did not include closures but contained advisory and voluntary avoidance information with hot spots identified by Sea State. In 2002, the "B" season included a hot spot closure system for chum salmon for all cooperatives. The 2003 "A" season included a hotspot closure agreement for Chinook. This agreement was not extended to the "B" season for Chinook. In 2003 the chum salmon agreement was continued in the "B" season. In 2004, the "A" season hot spot closure system was utilized for Chinook while in the 2004 "B" season hot spot closures were instituted for chum salmon management and "core" closures were utilized for Chinook bycatch management (John Gruver, pers. communication).

For Chinook salmon, the "A" season agreements utilized in 2003 and 2004 included a "stand-down" period whereby bycatch accounting, tier determination and hot spot closures were not instituted until 40% of the trigger limit for the non-CDQ pollock trawl fleet were taken. In the "B" season, (2004 only) core closures were closures applied to the entire fleet based upon the fleet exceeding a target bycatch rate in specified areas (determined by Sea State).

For Chum salmon since 2002 hot spot closures have been used to manage fleet bycatch according to specified bycatch tier levels (more information on the general structure of the tiers and ICA is described in Section 4.3). However, bycatch management under this agreement for both Chinook and chum salmon was tied to the regulatory closures. Once these closures were triggered, the non-CDQ fleet was barred from fishing inside the closures as described in Sections 4.1.2 and 4.1.3. Outside of the closed areas, the fleet continued to abide by the voluntary closure system and was moved out of additional areas according to the provisions of the weekly closures. Without this agreement the fleet could have continued to take increased amounts of Chinook and chum salmon bycatch with no additional penalty (save the triggering of the closures as described above). The fact that the fleet continued to move away from hot spots indicated that additional salmon (both Chinook and chum) would have been incidentally caught in the absence of adherence to this agreement and bycatch in these years could have been substantially larger.

It was estimated that given the chum salmon bycatch rate prior to regulatory closure in 2004 (of ~0.1 salmon per mt of groundfish), that up to 250,000 "other salmon" were caught due to the necessity of moving the fleet outside of the regulatory closure areas and into regions where bycatch rates were higher (Karl Haflinger, pers. communication). This was estimated by multiplying the pollock caught by the catcher vessel fleet from July 25 to October 1 (218,734 mt) by the expected bycatch rate prior to closures, equaling 21,873 salmon. This is the number anticipated to be caught if bycatch rates had remained similar to those prior to the closure (K. Haflinger, pers. communication). Instead the actual bycatch of salmon over this time period was 276,041. The actual number of salmon estimated to be avoided is difficult to calculate as we lack the ability to hindcast the true bycatch rate in the absence of the regulatory closures.

4.1.5 Impacts on Chinook and Chum Salmon Stocks

Fishery performance and salmon bycatch information under Alternative 1 is discussed in Sections 4.1.2 and 4.1.3 of this document. Information in these sections indicates that imposing the savings area closures for Chinook and chum salmon, especially in years where both areas are triggered, may in fact increase the pollock fishery's bycatch rates of those species, compared to what bycatch rates would have been in the areas closed.

The potential impact of the numbers of incidentally caught salmon in recent years on the stocks of Alaskan origin may be evaluated using the information in Section 3.6 of this document, beginning on page 27, which provides an assessment of the stock origin of salmon caught in the pollock fishery. The section includes estimates of the number of salmon of western Alaskan origin caught in the pollock fishery, based on data from 2002 to 2004.

Low numbers of salmon in the observed trawl bycatch are presumed to be originating from western Alaskan stocks of both Chinook and chum, particularly in the case of chum stocks where the majority of bycatch appears to be of Asian origin. Further, there are recent indications (as noted in Chapter 3) of increasing returns to chum and Chinook stocks in western Alaska. Thus the incidental catch of chum and Chinook salmon by the BSAI trawl fisheries is not thought to be extremely detrimental to the health and viability of those stocks. However, given the lack of absolute knowledge on many of the salmon stocks, coupled with the uncertainty regarding the actual impact of trawl caught bycatch on the viability of these stocks it is difficult to ascertain the actual impact on these stocks.

An ESA consultation for Chinook salmon in the BSAI was initiated in 2005 following the 2004 fishery having exceeded the Incidental Take Statement. The consultation upheld the ITS and concluded that the fishery is not likely to further impact ESA-listed salmon at present, however the consultation noted the continued need to monitor Chinook bycatch in the BSAI trawl fisheries as well as actions taken by the Council and industry to minimize this bycatch.

4.1.6 Impacts on groundfish stocks

The pollock fishery, as discussed in Section 3.6, is a relatively clean fishery with low incidental catch of other target and non-target groundfish stocks. Under this alternative, the pollock fishery is forced to move out of certain fishing grounds due to regulatory closures. As a result, the fishery may move to grounds that have a lower catch per unit effort (CPUE) for pollock, and higher salmon bycatch rates. The fleet behavior for the years 2002-2004 with respect to Chinook and chum salmon bycatch has been discussed in Sections 4.1.2 and 4.1.3.

Incidental catch species in the pollock fishery are listed in Table 3-20. Incidental catch of non-salmon species for 2002-2004 was examined in conjunction with the closure dates for the savings areas. No obvious relationship was observed between the catch of non-salmon species and the imposition of savings area closures. However a detailed spatial and temporal analysis would be necessary in order to better understand the impact, if any, of fleet movement outside of the closure areas and the incidental catch of non-salmon species.

However, the pollock fishery is closely monitored with an extensive fishery observer program. Pollock and other groundfish species that are caught in the fishery are counted against each species' total allowable catch (TAC). These harvest quotas are set at acceptable biological levels, and are monitored by NOAA Fisheries inseason management to ensure that the catch of all groundfish species does not exceed acceptable levels. A detailed analysis of the groundfish fisheries as currently managed was conducted in the Groundfish PSEIS, and updated in the annual Environmental Assessment on the TAC specifications (NMFS 2004a). These analyses concluded that the groundfish fisheries do not have a significant impact on groundfish stocks.

4.1.7 Impacts on threatened or endangered species

As discussed in Section 3.10, Section 7 consultations have been undertaken for species that are listed under the Endangered Species Act and present in the BSAI management area, with respect to the impact of the Federal groundfish fisheries. In some instances, such as with the western stock of the Steller sea lion, the consultation has resulted in reasonable and prudent alternative recommendations that have been put in place in the groundfish fisheries to mitigate any potential impact of the fisheries on the species. For ESA-listed Pacific salmon, the studies have indicated that very few of these salmon are caught in the BSAI groundfish fisheries. In all cases, the consultations have concluded that the action of the fisheries is unlikely to result in jeopardy or adverse modification of critical habitat for the species.

The Groundfish PSEIS found that the current management regime is effective at providing protection to ESA-listed seabirds and marine mammals, and that current fishing has no adverse impacts on these species. Direct and indirect interactions of marine mammals and seabirds with the primary target fisheries are few, and are not likely to create a population-level impact on these species. Alternative 1 is not considered to have a significant impact on threatened and endangered species.

4.1.8 Impacts on the ecosystem

An evaluation of the effects of the pollock fishery on the ecosystem is undertaken annually in the *Stock Assessment and Fishery Evaluation* report. Ianelli et al. (2004) do not consider the fishery to have an adverse effect on the ecosystem. Three areas are cited as possible concerns. The fishery's concentration is space and time has been distributed to protect Steller sea lions, but this may have resulted in increased impacts to fur seals. The fishery's contribution to discards and offal production is evaluated to be improving, but data is limited. Data is also lacking for understanding fishery effects on age-at-maturity and fecundity.

Based on the analysis in the Groundfish PSEIS (NMFS 2004b) and the annual TAC-setting EA (NMFS 2004a), the ecosystem impacts of Alternative 1 are determined not to be significant.

4.1.9 Socio-economic impacts

A detailed analysis of Alternative 1 is presented in Section 5.6.1, as part of the analysis in the Regulatory Impact Review. The analysis has shown that Alternative 1, the status quo, has resulted in dramatic increases in salmon bycatch in the Bering Sea pollock trawl fishery in recent years. This translates into foregone salmon value, assuming full terminal harvest of salmon bycatch, of nearly $1 million for Chinook and more than $250 thousand for chum in 2003. These values greatly overstate the actual harvest that might have occurred if salmon bycatch had not been taken in the Bering Sea pollock trawl fishery.

Unfortunately, it is not possible to accurately estimate actual harvest value. However, the dramatic increases in salmon bycatch under the status quo likely translate into increases in forgone value and decreased benefits of bycatch reduction. The status quo also bears some risk of future restrictions on the Bering Sea pollock trawl fleet as a result of exceeding the ESA Chinook incidental take permit cap.

Alternative 1 also imposes increased operational costs on the trawl fleet when the salmon savings areas are closed and may adversely affect vessel safety. The closures are also having a detrimental effect on product quality for the CV fleet. The decreased quality appears to have reduced product grade, eliminated fillet production in some cases, and increased shoreside processing facility costs. Alternative 1 also results in some management and enforcement costs to administer the closures and monitor vessel locations.

4.2 Alternative 2

4.2.1 Methodology for data analysis

Analysis of Alternative 2 is largely qualitative given the inability of the analysts to predict how the fleet may operate in the absence of regulatory constraints and the resultant impacts upon salmon stocks, groundfish stocks, threatened and endangered species, ecosystem effects and socio-economic impacts. Discussion is drawn largely from previous amendment analyses for these closures, namely Amendments 21b, 35 and 58 (ADF&G 1995a; ADF&G 1995b; NMFS 1999). However it should be clearly understood that the underlying situation in both salmon population as well as fleet behavior has changed dramatically since the time period of these previous analyses. Notably among these changes is the implementation of the American Fisheries Act as described in Section 3.6.

The reduction of the capacity of the catcher/processor fleet resulting from the AFA reduced the rate at which the catcher/processor sector (allocated 36% of the eastern Bering Sea pollock TAC) caught pollock beginning in 1999, and the fleet as a whole in 2000. Disentangling the specific changes in the temporal and spatial dispersion of the eastern Bering Sea pollock fishery resulting from the sea lion management measures (implemented during that time period) from those resulting from implementation of the AFA is difficult. However the relative timing and behavior of the fishery has changed since the implementation of the management measures for regulatory closures for Chinook and chum bycatch management, and this should be taken into consideration in any discussion the impact of then eliminating these measures.

4.2.2 Impacts on Chinook salmon:

Under Alternative 2 existing regulatory closures for Chinook in the Bering Sea, triggered by bycatch number limits, would be repealed. There would be no cap on the number of Chinook salmon taken as bycatch nor any closures to move the fleet out of areas determined as hot spots for Chinook bycatch. Chinook salmon would remain as a prohibited species and as such would still be discarded at sea or retained for donation to food banks as is currently done in the fishery.

Prior to the establishment of the current Chinook Salmon Savings Area closures under Amendment 21b to the BSAI groundfish FMP (and the revised areas and trigger limits for these closures under Amendment 58), Chinook bycatch in the BSAI domestic trawl fisheries was not managed by either PSC limits or by time and area closures. The analysis for Amendment 21b stated that “in the absence of a Chinook salmon bycatch management program, future annual bycatch amounts are not constrained, and significant increases in bycatch could impact Chinook salmon escapement in Western Alaska River systems, several of which experienced low escapement in the last decade” (ADF&G 1995a).

The pollock fleet as described in section 3.6 has excellent observer coverage and there is no anticipated change to this level of monitoring. Thus, this actual numbers of Chinook salmon taken as bycatch in this fishery will be known with fairly high precision.

Currently the fleet shifts and relocates in an attempt to avoid areas of high Chinook bycatch over the course of the “A” and “B” seasons. It is anticipated that under this alternative CPUE in the pollock fleet would be maximized. The incentive to move away from a high bycatch location would be removed under this alternative as the pollock fleet would have no reason to do other than maximize their CPUE. In this scenario the bycatch numbers for Chinook salmon would be expected to increase under this alternative. The population effects of this bycatch increase as well as the relative magnitude of the increase are unknown.

However, while bycatch numbers are expected to increase under this alternative by removing the incentive to carefully constrain the bycatch of Chinook salmon, shifts in fishing patterns in response to the removal of regulatory closures may ameliorate the potentially increase in bycatch. The discussion of the fishery performance in recent years under section 4.1.2.2 indicated that high bycatch rates for Chinook have been observed in the vicinity of the Pribilofs in recent years. It is presumed that the fleet moves into these areas when they are constrained by regulatory closures in other, potentially more desirable fishing locations closer to port. If fishing patterns changed under this alternative and many vessels opted not to fish in the vicinity of the Pribilofs, it is anticipated that some of the high bycatch areas for Chinook salmon taken in recent years from those areas would decrease. Some areas near the Pribilofs had been included in the original Chinook Salmon Savings Area closures under amendment 21b but revised closures initiated under amendment 58 removed areas in the Pribilof region due to inconsistent bycatch rates during the period utilized in the analysis (NMFS 1999).

As discussed above in section 4.2.1, the implementation of the AFA as well as the Steller Sea Lion management measures have changed the fishing practices in the eastern Bering Sea pollock fleet considerably since the Chinook Salmon Savings Area closures were instituted. It is difficult to evaluate how the fleet would respond under the removal of these regulatory closures under this alternative. It is anticipated that overall numbers of Chinook salmon bycatch would either remain consistent or, if existing measures have effectively controlled some of the overall bycatch, that these numbers would increase under this alternative.

Low numbers of salmon in the observed trawl bycatch are presumed to be originating from western Alaskan stocks of both Chinook and chum, particularly in the case of chum stocks where the majority of bycatch appears to be of Asian origin. Further, there are recent indications (as noted in Chapter 3) of increasing returns to chum and Chinook stocks in western Alaska. Thus the incidental catch of chum and Chinook salmon by the BSAI trawl fisheries is not thought to be extremely detrimental to the health and viability of those stocks. However, given the lack of absolute knowledge on many of the salmon stocks, coupled with the uncertainty regarding the actual impact of trawl caught bycatch on the viability of these stocks it is difficult to ascertain the actual impact on these stocks.

However, as discussed in section 3.7.1, the current ESA Chinook incidental take cap for the BSAI trawl fishery is set at 54,000 Chinook salmon. This cap was exceeded under status quo management in 2004 and has triggered an ESA section seven consultation. Under Alternative 2, there is the risk that, in the absence of any salmon bycatch reduction measures, future bycatch in excess of the ESA cap could result in the imposition of restrictions on the BSAI trawl fleet under the ESA. It is unknown what the result of this consultation would be or how future incidental take caps for this fishery would be redefined following any additional consultations.

4.2.3 Impacts on chum salmon

Under alternative 2 existing Chum Salmon Savings area regulatory closures ("other" salmon) triggered by bycatch number limits would be repealed. There would be no cap on the number of other salmon taken as bycatch nor any closures to move the fleet out of areas determined as hot spots for other salmon bycatch. Salmon would remain as a prohibited species and as such would still be discarded at sea or retained for donation to food banks as is currently done in the fishery.

The pollock fleet as described in 3.6 has excellent observer coverage and there is no anticipated change to this levels of monitoring. Thus, this actual numbers of other salmon taken as bycatch in this fishery will be known with fairly high precision.

Currently the fleet shifts and relocated in an attempt to avoid areas of high salmon bycatch over the course of the "A" and (for other salmon particularly) "B" seasons. The incentive to move away from a high bycatch location would be removed under this alternative as the pollock fleet would have no reason to do other than maximize their CPUE. In this scenario the bycatch numbers for other salmon would be expected to increase under this alternative. The population effects of this bycatch increase as well as the relative magnitude of the increase are unknown.

The Chum Salmon Savings Area was initiated under amendment 35 to the BSAI groundfish FMP (ADF&G 1995) following concerns raised regarding uncontrolled bycatch in the trawl fisheries and the potential relationship between bycatch in trawl fisheries and poor returns to Western Alaska river system for Chum salmon in 1993 (ADF&G 1995). At that time, bycatch of 'other' salmon in the BSAI trawl fisheries had risen dramatically from previous years and in 1993 was approximately 245,000 in the BSAI management area. In this analysis it was stated that "if no regulatory means of controlling excessive future bycatch interceptions is in place, a large number of "other" salmon could, once again, be incidentally caught during the pollock "B" season in future years because of the coincidence of time and area management actions which are currently in place". (ADF&G 1995b). Again as noted in section 4.2.1, since this time the nature of the pollock fishery has changed dramatically with both the implementation of the AFA and the regulations for time and area closures for Steller sea lion management measures.

However as discussed in sections 3.1 and 4.1, 'other' salmon bycatch has risen dramatically in the BSAI trawl fisheries in recent years, with overall bycatch in 2004 over 360,000 salmon (of these nearly all are chum salmon). The current fleet is constrained in movement by the Chum Salmon Savings Area annual and triggered closures, as well as the interaction between Chum and Chinook closures. At times the fleet has moved away from evidence of high Chinook bycatch rates to avoid triggering a closure and into a high Chum bycatch area (John Gruver, personal communication). It is possible that the removal of the savings area closures under this alternative would alleviate some of these concerns and decrease the bycatch from forced fleet movement.

Given that the time and area closures currently in regulations would be entirely removed under this alternative, it is likely that with no incentive for the fleet to move away from high bycatch areas, bycatch of 'other' salmon under this alternative would either remain the same or, as is more likely, increase. Low numbers of salmon in the observed trawl bycatch are presumed to be originating from western Alaskan stocks of both Chinook and chum, particularly in the case of chum stocks where the majority of bycatch appears to be of Asian origin. Further, there are recent indications (as noted in Chapter 3) of increasing returns to chum and Chinook stocks in western Alaska. Thus the incidental catch of chum and Chinook salmon by the BSAI trawl fisheries is not thought to be extremely detrimental to the health and viability of those stocks. However, given the lack of absolute knowledge on many of the salmon stocks, coupled with the uncertainty regarding the actual impact of trawl caught bycatch on the viability of these stocks it is difficult to ascertain the actual impact on these stocks.

Unlike the situation as described in the previous section for Chinook salmon, there are no current ESA listings or recent consultations for species contained in the 'other' salmon category.

4.2.4 Impacts on groundfish stocks

Alternative 2 would repeal the salmon savings areas. CPUE of pollock is likely to increase under this alternative, as the cooperatives are no longer restrained by salmon bycatch caps and can maximize CPUE. Incidental catch rates of other groundfish species may vary under the alternative, as fishing patterns no longer need to respond to savings area closures. Incidental catch rates inside and outside of the savings areas are unknown, however, incidental catch is low in the pollock fishery, as discussed in Section 3.6.

As described under Alternative 1, close monitoring of the pollock fishery, through the fishery observer program and other reporting mechanisms, should allow for accurate accounting of pollock and other groundfish species catch. Harvest of these species will be counted against each species' total allowable catch (TAC). As a result, catch of all groundfish species is not likely to exceed acceptable levels under this alternative. Therefore, the impact on groundfish stocks is determined not to be significant.

4.2.5 Impacts on threatened or endangered species

Under this alternative, savings areas are repealed. The pollock fishery is likely to maximize its CPUE under this alternative, as salmon bycatch limits are no longer constraining to the fishery. As a result, the fishery is likely to reduce interactions with marine mammals and seabirds, as the harvest is achieved more efficiently. It is unknown to what extent the fishery may be able to decrease its fishing effort, however any change is unlikely to create an impact on marine mammals and seabirds that would be discernable at an ecosystem level. As a result, impacts of the alternative on these species are not significant.

Section 3.10.1 cites studies that indicate that there is a low presence of ESA-listed Pacific salmon in the BSAI management area. However, to the extent that salmon bycatch increases under this alternative, it is possible that catch of ESA-listed Pacific salmon would also increase. Because of the low abundance of ESA-listed Pacific salmon caught in the BSAI groundfish fisheries, the effects of Alternative 2 are not likely to jeopardize the sustainability of these species, so the impacts of the alternative are determined not to be significant.

An ESA consultation for Chinook salmon in the BSAI was initiated in 2005 following the 2004 fishery having exceeded the Incidental Take Statement. The consultation upheld the ITS and concluded that the fishery is not likely to further impact ESA-listed salmon at present, however the consultation noted the continued need to monitor Chinook bycatch in the BSAI trawl fisheries as well as actions taken by the Council and industry to minimize this bycatch.

4.2.6 Impacts on the ecosystem

Alternative 2 repeals the savings areas, and may result in an increase in salmon bycatch by the pollock fishery, as catch limits are no longer constraining on the fishery. Although this is likely to impact the commercial salmon fisheries, the groundfish bycatch is taken into account in the State of Alaska's salmon management. The pollock fishery's extensive observer program should allow for accurate accounting of the levels of salmon bycatch. In other respects, the alternative may result in benefits for some ecosystem components, as the fishery is allowed to operate more efficiently and reduce interactions with ecosystem components. Alternative 2 is unlikely to produce population-level impacts for marine species, or changes to community- or ecosystem-level attributes beyond the range of natural variability for the system. As a result, the impacts at an ecosystem level are not considered to be significant.

4.2.7 Socio-economic impacts

A detailed analysis of Alternative 2 is presented in Section 5.6.2, as part of the analysis in the Regulatory Impact Review. Alternative 2 would eliminate the salmon savings closure areas altogether. The result would likely be reduced operational costs, improved vessel safety, improved product quality, and reduced management and enforcement costs. However, in the absence of any bycatch reduction measures this alternative may result in further increase in salmon bycatch in the Bering Sea pollock trawl fishery. Were that to occur, the foregone value of such bycatch would increase and the associate benefits of bycatch reduction would decrease, possibly dramatically. This could also result in the Bering Sea pollock trawl fleet significantly exceeding the ESA Chinook incidental take permit cap.

4.3 Alternative 3

As described in section 2.3, Alterative 3 suspends the existing regulatory salmon savings are closures and allows Pollock cooperatives and CDQ groups to use their voluntary rolling hot spot closure system to avoid salmon bycatch. Under this alternative, the catch limits for Bering Sea subarea trawl Chinook and BSAI trawl chum salmon would be suspended and would not longer trigger savings area closures. The annual closure of the Chum Salmon Savings Area would also be suspended. The suspension would go into effect so long as the Pollock cooperatives and CDQ groups have in place an effective salmon bycatch voluntary rolling “hot spot” (VRHS) closure system to avoid salmon bycatch. The following sections describe this VRHS system and the Inter Cooperative Agreement (ICA) under which it is formed and how the fleet would be organized within this system.

There are two options to alternative three. Under option 1 (as described in section 2.3.1) regulatory salmon savings area closures would be reimposed on an expedited basis if reported non-compliance merits this action. The regulatory constraints and potential impacts of this option on alternative 3 are discussed in section 4.3.9.

Under option 2 (as described in section 2.3.2), the regulatory salmon savings area triggers and closures would be maintained, however participants in a cooperative VRHS system would be exempted from compliance with the savings area closures. This exemption would be subject to Council approval and review of the effectiveness of the VRHS system. Under this option, the Pollock cooperatives and CDQ groups participating in the VRHS system will be exempt from the existing closures (both the annual chum closures and additional chum and Chinook if triggered). Cooperatives and other vessels not participating in a VRHS system will be subject to the annual chum closures and additional savings area closures if triggered. The regulatory constraints and potential impacts of this option on alternative 3 are discussed in section 4.3.10.

A suboption to option 2 (as described in section 2.3.2.1) extends the exemption to the chum salmon savings area closures to vessels in the trawl cod and/or flatfish targets. Vessels in these fleets are not required to participate in a VRHS system in order to obtain the exemption. The potential impacts of this suboption on option 2 under alternative 3 are described in section 4.3.10.

The design and function of the Inter Cooperative Agreement, the VRHS system and the organization of the fleet under is alternative 3 remains the same regardless of whether the savings area closures are suspended (as per alternative 3) or participating vessels are exempt (as per alternative 3, option 2).

Likewise the ability to reimpose closures on an expedited basis due to non-compliance (option 1) as well as an extension of the exemption to the closure to vessels in non-pollock targets do not change the nature of fleet organization within this system.

The following description details the overall Inter Cooperative Agreement and the management of the fleet within this system. Any changes that would be made to the ICA (or changes in managing under the VRHS system) under either of the options or the suboption are discussed only in those sections as detailed above.

4.3.1 Description of Inter Cooperative Agreement

The Inter Cooperative Agreement (ICA) is a salmon bycatch management agreement with all of the AFA pollock cooperatives and the CDQ groups. The agreement is similar to previous inter cooperative bycatch management agreements between the AFA cooperatives (see Section 4.1.4 for further detail) but has been modified to include the CDQ groups as well as other specific modifications pertaining to the necessary changes for management of the ICA under a system where there are no regulatory closures. The ICA is included in full in Appendix 2.

Members of the ICA include the following AFA cooperatives: Pollock Conservation Cooperative (PCC), the High Seas Catchers Cooperative (High Seas), the Mothership Fleet Cooperative (MFC) and the Inshore Coops (Akutan Catcher Vessel Association, Arctic Enterprise Association, Northern Victor Fleet Cooperative, Peter Pan Fleet Cooperative, Unalaska Fleet Cooperative, Unisea fleet cooperative and Westward Fleet Cooperative) and all CDQ groups. Additional members to the Inter Cooperative Agreement are two western Alaskan groups who have an interest in the sustainability of the salmon resource. These groups, the Bering Sea Fishermen's Association (BSFA) and the Yukon River Drainage Association (YRDFA) have participated in meetings for refining the ICA and will have 3rd party status for compliance purposes under the agreement (see Section 4.3.1.4 for more information).

The purpose of the ICA is to use alternative measures to reduce unnecessary incidental catch of chum and Chinook salmon. The agreement is a private, contractual agreement between the interested parties. Parties to the agreement agree to all tenants of the contract and agree to abide by the structure of the ICA. All parties agree to retain Sea State, Inc (Sea State) to provide the data gathering, analysis, fleet monitoring and reporting services necessary to implement the bycatch management program under the agreement.

The ICA is structured based upon a cooperatives' bycatch rate as compared with a pre-determined "Base Rate". Once the Base Rate is determined (see Section 4.3.1.1), all provisions for fleet behavior, closures and enforcement are based upon the proportion of the cooperative's rate to the Base Rate. Tier assignments (Section 4.3.1.2) are calculated from the cooperatives' proportional bycatch rate to the Base Rate with higher tiers corresponding to higher bycatch rates. These tiers then determine how access to specific areas will be determined following designation of "hot spot" closures. These areas are then to be avoided by cooperatives in higher tiers.

4.3.1.1 Base Rate: calculation

The structure of the ICA is based upon cooperatives' bycatch rates in comparison with a calculated Base Rate established prior to the start of the season. The Base Rate is initially calculated based upon the previous seasons' bycatch experience. Under the revised ICA for Chinook, the Base Rate would be initially established as equal to the previous year's overall "A" season Chinook bycatch rate by members of the agreement. The rate is calculated by dividing the members' previous "A" season's total Chinook bycatch by the members' previous "A" season's total pollock harvest.

An acceptable range (lower and higher limits) of 0.04 to 0.06 is established to constrain the variability of the Base Rate. If initial Base Rate calculations are below 0.04, the Base Rate will be established at 0.04. Likewise if the initial calculation yields a Base Rate above 0.06, the Base Rate will be established as 0.06. This range is based upon a combination of previous year's bycatch Base Rate values and negotiations within the IC members. The upper limit is intended as a precautionary measure to ensure that bycatch is constrained while the lower limit is intended to protect against immediate and excessive closures if a normal bycatch year is preceded by an excessively low year. This range is only applicable to the initial starting Base Rate (not the in-season adjustment). For comparison, the Base Rate utilized under the agreement for fishing in 2005 was established at 0.05.

In-season adjustment to the Chinook Base Rate will occur on February 14. This recalculation will be the members' total "A" season salmon bycatch to date divided by the members' total "A" season pollock harvest to date. The recalculated rate will be implemented on the following Thursday's announcement for closures that will be implemented the following Friday. The recalculated Base Rate will be the rate utilized for management for the remainder of the "A" season. This rate is not constrained to any range.

For the "B" season for Chinook, the Base Rate will be set at 0.05 for the 2006 and 2007 seasons based upon Base Rate calculations under the previous ICA for 2004 and 2005. This number is initially established for those years based on previous experience with "B" season bycatch rates and typical closure needs. There is no inseason adjustment for the "B" season Base Rate for Chinook. Beginning in 2008, the Base Rate will be the previous "B" season bycatch rate based on the members' fall Chinook bycatch. The Base Rate calculation is established this way due to the regulatory closures enacted in the previous years which have complicated an average bycatch calculation similar to the "A" season. However, in the absence of the complicating factor from regulatory closures in the "B" season, two years worth of experience (2006 and 2007) should allow for a more applicable calculation in 2008.

For chum salmon, the "B" season initial Base Rate will be established at 0.19. This is based upon a roughly 80% of the 2003 season average and is established such that no unnecessary closures would be enacted in periods of low abundance.

An inseason adjustment will occur on September 1. This adjustment will recalculate the Base Rate according to the average bycatch by members over the previous three week period (August 10-31). It seems likely that the inseason adjustment will raise the Base Rate substantially at this time, given that bycatch rates in recent years have tended to increase during the time period included in the re-adjustment (Figures 4-5, 4-6, 4-7).

4.3.1.2 Tier assignment based upon Base Rate

Once the Base Rate is established, cooperatives are placed into "tiers" based upon their percentage performance with respect to the base rate[4]. Tier status is determined by a coop's "rolling two week" average bycatch rate. Closures are determined by Sea State based upon spatial information on "hot spot" bycatch areas.

Tier Assignment rates

i. Tier 1 – cooperatives with bycatch rates less than 75% of Base Rate.

[4] For Chinook in "A" season and Chum in "B" season only. There are no tier assignments made under this alternative for "B" season Chinook.

ii. Tier 2 – cooperatives with bycatch rates equal to or greater than 75% of the Base Rate and equal to or less than 125% of the Base Rate.

iii. Tier 3 – cooperatives with bycatch rates greater than 125% of the Base Rate.

4.3.1.3 Impacts of assignment to tier

Cooperatives are subject to savings closures based upon their tier assignments. Cooperatives assigned to Tier 1 are not constrained by savings closures. Cooperatives assigned to Tier 2 are subject to savings closures for 4 days; Friday at 6:00 pm to Tuesday at 6:00 pm. Cooperatives assigned to Tier 3 are subject to savings closures for 7 days; Friday at 6:00 pm to the following Friday at 6:00 pm.

Closures are determined by Sea State based upon spatial information on “hot spot” bycatch areas. Closure areas are rolling and are determined by Sea State based upon the bycatch rate within specified areas.

For “A” season Chinook, salmon savings area closures will begin on January 30. This allows for 10 days of bycatch information since the start of the season on January 20. All salmon bycatch by the members from the season opening date through January 29 will count toward the cooperatives’ tier status.

Beginning on January 30, the salmon savings area closures for “A” season Chinook will be implemented under the following criteria:

1. Aside from the January 30 initial Savings Closures, Savings Closures are based on the salmon bycatch and pollock harvest for the four to seven day period, depending on data quality**,** immediately preceding each closure announcement.
2. Chinook bycatch in an area must exceed the Base Rate in order for the area to be eligible for a Savings Closure.
3. Pollock harvest in a potential Savings Closure area must be a minimum of 2% of the total fleet pollock harvest for the same time period in order to be eligible as a Savings Closure.
4. Current Savings Closures are exempt from the 2% minimum harvest rule described in item 3, above, and may continue as a Savings Closure if surrounding bycatch conditions indicate there has likely been no change in bycatch conditions for the area.
5. The Bering Sea is managed as a single region however Savings Closures west of 168° west longitude may not exceed 500 sq. miles in area.
6. Total Savings Closure area (east and west of 168° W. longitude) may be up to, but not exceed, 1000 sq. miles.
7. There may be up to two Savings Closure areas west of 168° W. longitude and two Savings Closure areas east of 168° W. longitude.
8. Closure areas will be described by a series of latitude and longitude coordinates and will be shaped as Sea State deems appropriate.

The 2% minimum harvest rule (described in item 3, above) is enacted in order to balance the need to focus upon concentrated fishing in high bycatch areas with the need to avoid rapidly closing down regions based upon a single bad tow. This also allows for more specified ”surgical” closures in hot spot areas. One to two factory trawlers fishing in a specified location can easily achieve this 2% harvest threshold (John Gruver, pers. communication).

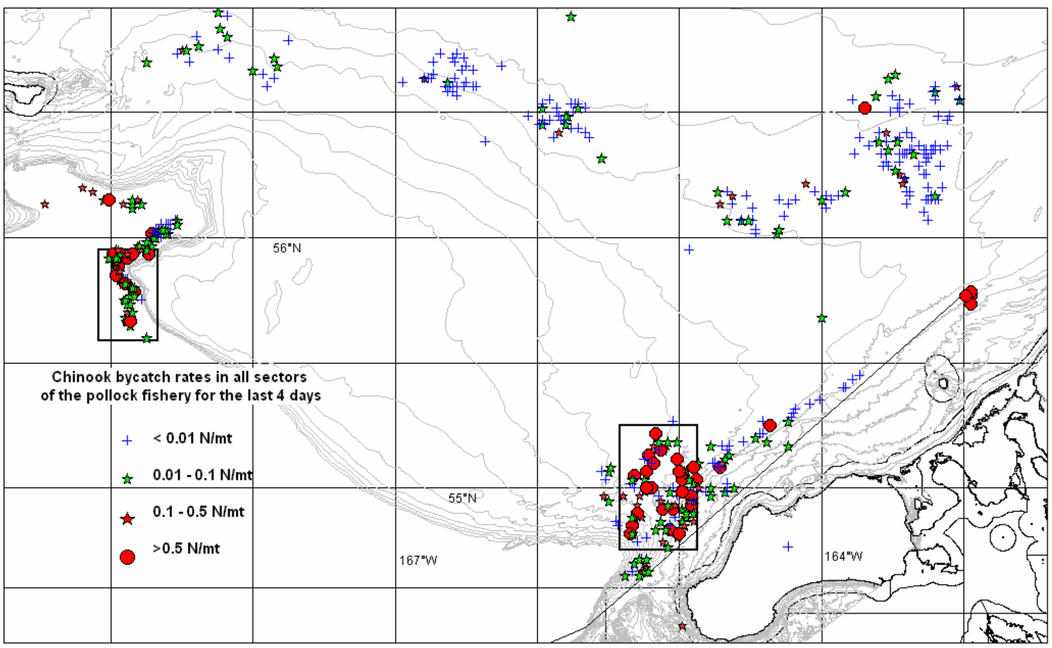
The split in the Bering Sea at 168º W. longitude (Eastern and Western Regions) is done in order to allow for discreet closures in smaller areas (or larger closures in larger areas) while still allowing for fishing opportunities. It is noted that larger closures may be necessary in the eastern region in order to more effectively move the fleet, while smaller, more discreet closures in the western region tend to be more effective while allowing for fishing opportunities.

Closure areas for Chinook may be up to 1000 square miles for Chinook. Bycatch for a specified area must be over the Base Rate for the area to be eligible as a Savings Closure area. Up to two Savings Closures may be established at any one time. Penalties for violating the closures are enacted in the form of liquidated damages which increase with repeat offenses.

An example of how closures are determined and specified on a weekly basis is provided below. As described above, closures may be up to 1000 square miles for Chinook, with up to two closures each to the east and west of 168º W. longitude.

Closure areas need not be large or regularly shaped. The area of the closure is intended to bracket the highest observed bycatch areas while allowing for maximum fishing opportunities. Figure 4-26 illustrates example closures for Chinook.

Figure 4-26 Example Chinook closure from February 2005

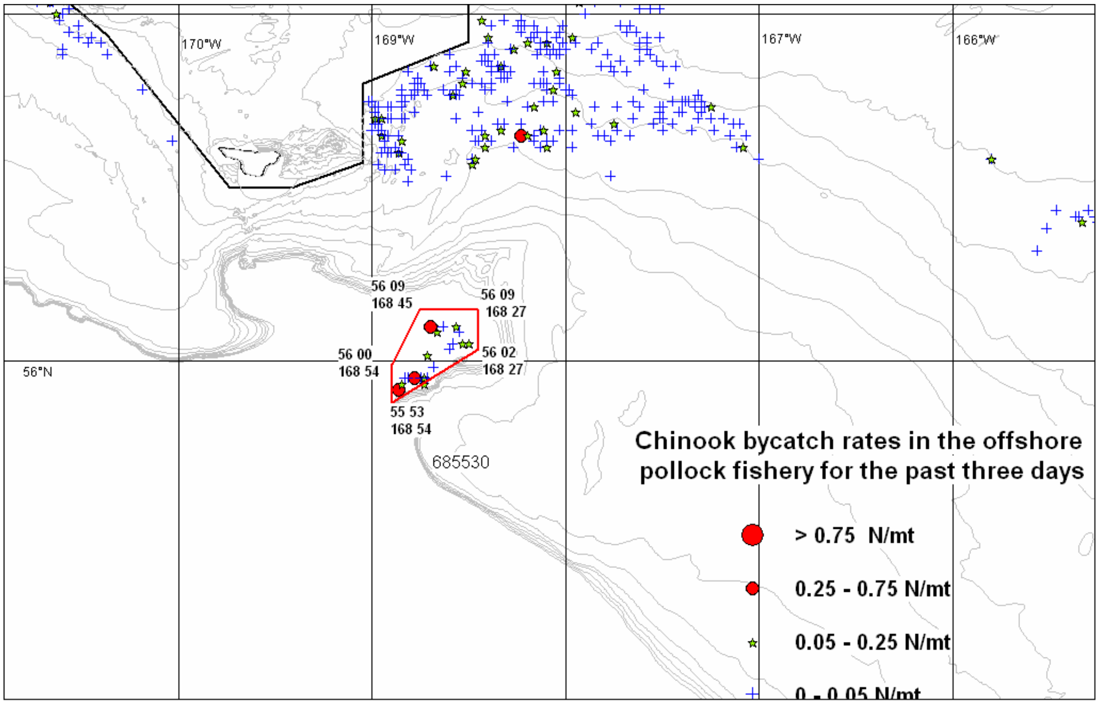


In Figure 4-26, two rectangular areas are closed totaling an area of approximately 900 square miles. The bycatch rates in these areas were approximately 0.150 and 0.143 salmon per mt of groundfish. In this example two cooperatives were restricted from fishing in the closed areas based on their tier assignments.

Figure 4-27 shows an irregularly shaped closure from February of 2004. Here the closure brackets the high bycatch area located near the mushroom area. The closure is an irregularly shaped polygon of approximately 150 square miles. The average calculated bycatch rate in this area was 0.096 salmon per mt of groundfish. In this example all cooperatives were in Tier 1 and thus no cooperatives were closed out of this area. However, while no cooperatives were prohibited from fishing in the area delineated, the fleet often avoids these areas regardless so as not to raise their bycatch rates and cause the cooperative to elevate its tier level in the next round of tier calculation the following week (K. Haflinger, pers. communication).

More information on these closures and the specified example is provided in Appendix 3.

Figure 4-27 Example closure imposed in February 2004 for Chinook



For "B" season, closures are determined according to the following criteria:

1. Savings Closures are based on the salmon bycatch and pollock harvest for the four to seven day period, depending on data quality, immediately preceding each closure announcement.
2. Salmon bycatch in an area must exceed the chinook and/or chum salmon Base Rate in order for the area to be eligible for a Savings Closure.
3. Pollock harvest in a potential Savings Closure area must be a minimum of 2% of the total fleet pollock harvest for the same time period in order to be eligible as a Savings Closure.
4. Current Savings Closures are exempt from the 5% minimum harvest rule described in item 3, above, and may continue as a Savings Closure if surrounding bycatch conditions indicate there has likely been no change in bycatch conditions for the area.
5. The Bering Sea will managed as 2 regions during the "B" season; a region east of 168° W. longitude (the Eastern Region) and a region west of 168° W. longitude (the Western Region).
6. Total Savings Closure area.
    i. Chum salmon
        a. The Eastern Region Savings Closures may cover up to 3000 sq. miles.
        b. The Western Region Savings Closures may cover up to 1000 sq. miles.
    ii. Chinook Salmon
        c. The Eastern region Savings Closure may cover up to 500 sq. miles.
        d. The Western Region Savings Closure may cover up to 500 Sq. miles
7. There may be up to two Savings Closure areas at any one time within each region.

8. Within a single region Savings Closures must be either a chum closure or a chinook closure, but not both. In the event Base Rates for both chum and chinook are exceeded within a region during a week, the Savings Closure within that region shall be a chinook closure. In this case, Sea State will issue a non-binding avoidance recommendation for the area of high chum bycatch.
9. Closure areas will be described by a series of latitude and longitude coordinates and will be shaped as Sea State deems appropriate.

For Chinook salmon during the "B" season there are no tier assignments made based upon the Base Rate. Instead, all closures that are instituted based on weekly rolling hot spots apply to all cooperatives. Thus these closures represent core closures for the entire fleet. The areas will change based upon existing bycatch management (rolling hot spots) but will apply to all vessels and all cooperatives throughout the entire "B" season. Core closures are instituted in the "B" season for Chinook for two reasons: 1) Chinook bycatch tends to increase by week in the "B" season and thus the "backward looking" system of imposing tier assignments and closures based on previous week's bycatch rates is not adequately responsive to changing conditions in the fishery, and 2) the fishery is spread out over a larger area in the "B" season and conditions tend to change more rapidly than in the "A" season. These core closures suggested for the "B" season, are to apply unilaterally to all cooperatives.

For the "B" season, after June 10 bycatch information will be supplied to the fleet as chum and Chinook salmon bycatch begin to show up in the Fishery. Savings Closures will begin once an area with bycatch over the initial Base Rate is identified.

In cases where Chinook and chum rates are both over the Base Rate, the savings closure in that region will be a Chinook closure. This is due to the elevated conservation concerns with respect to western Alaskan Chinook stocks. The assumption is that based on available data, the Chinook species are more likely to be of western Alaskan origin, while it is presumed that a higher proportion of chum salmon are primarily of Asian origin.

4.3.1.4 Monitoring and enforcement considerations

Monitoring and enforcement of the bycatch agreement is done by Sea State using the Base Rate as a trigger for Savings Area closures and determining the Tier Assignment of the vessel.

Sea State will report announcements to the members on Thursdays (weekly announcements) and Mondays (Savings closures updates). Examples of closure announcements are found in Appendix 3. The Thursday announcements are effective at 6:00 pm on Friday and include the following:

1. Season update on pollock harvest and salmon bycatch by sector and in total for each species.
2. Each coop's updated rolling 2-week bycatch rate for chum salmon and the associated tier status, closure start and stop times and dates for each region, and number of closure days in each region.
3. Savings Closures - coordinates and map with species notation.
4. Bycatch rates for each statistical area fished for each species
5. Updated "Dirty Twenty Lists" for each species.

Monday updates are effective at 6:00 pm Tuesday and include the following:

1. Season update on pollock harvest and salmon bycatch by sector and in total for each species.
2. Updated Savings Closures - coordinates and map with species notations
3. Bycatch rates for each stat area fished for each species.

4. Tier status reminder (where applicable).

"Dirty Twenty Lists" refer to lists which are published and made available to all members and include the 20 vessels with the highest Chinook (or chum) bycatch rates (over the Base Rate). Lists are published by highest rate by week, highest rate for the past 2 weeks, and highest rates for the season-to-date (see Appendix 3 for examples of "Dirty Twenty lists"). Only vessels with bycatch rates over the base rate appear on the list. Only vessels with more than 500 mt of groundfish catch are included in the season-to-date list. The season-to-date list is based on appearances on the weekly list. Accumulative points are assigned to vessels as they appear on the weekly list. Vessels in the number 1 slot on the weekly list receive 20 points, those in the number 2 slot receive 19 points and so on. The vessel's points are totaled each week and the vessels with the 20 highest scores appear on the seasonal "Dirty Twenty list". A vessel must have harvested over 500 mt of pollock before being eligible for the seasonal list.

Sea State will also provide additional hot-spot avoidance notices, outside of the savings closures, to the cooperatives as they occur throughout the season.

Many other considerations have been included under the Inter Cooperative Agreement in order to the member cooperative and CDQ groups to function under the AFA. See Appendix 2 for more details on additional provisions under the ICA.

The effectiveness of the bycatch management program under this alternative through the ICA is dependant upon gathering, analyzing and disseminating accurate Chinook and chum bycatch data rapidly. This is accomplished by a requirement under the agreement for all members' vessels to exercise all commercially reasonable efforts to report to Sea State within 24 hours the location of, estimated pollock tonnage of, and estimated number of Chinook and chum salmon in each trawl tow.

PCC may satisfy its obligation under this Section 3.a of the agreement by arranging to have its members' vessels' observer reports concerning Chinook bycatch transmitted to Sea State. MFC and High Seas may satisfy their obligations under this Section by arranging to have the pollock amounts and Chinook salmon counts for their members' vessels reported to Sea State by the observers on the processing vessels to which their members' vessels deliver. The Inshore Cooperatives shall arrange for their vessels to report the crew's best estimate of the amount of pollock and the number of Chinook salmon in the tow when reporting its location. Each Inshore Coop shall develop its own methods and means to accurately calculate (when feasible) or estimate the amount of pollock and the number of salmon contained in each tow by its members' vessels, and to rapidly and accurately report that information to Sea State.

Given that a Vessel Monitoring System (VMS) is the most efficient means for reporting tow-by-tow data to Sea State, the Inshore Cooperatives have agreed to encourage their members to use the VMS system to do so. However, it has been acknowledged by all of the cooperatives that in certain circumstances, it may be difficult to achieve accurate, reliable reporting through the VMS system, and that for vessels with relatively small pollock allocations, the cost of acquiring, installing and operating the VMS data transmission system may be higher than reasonable. Therefore, reporting bycatch information via the VMS system is not required.

Sea State will from time to time announce a Chinook or chum bycatch rate that will trigger an incident reporting requirement. Each cooperative shall require its members' vessels to notify their cooperative manager (if applicable), the intercooperative manager and, if feasible, Sea State as soon as possible of any tow with a Chinook (or chum) salmon bycatch rate that the crew estimates to be equal to or greater than the incident reporting rate threshold.

Enforcement of the agreement is accomplished through legal agreements between all members. There are two tiers of legal agreements. The top tier is an agreement among the 10 Bering Sea pollock cooperatives that sets forth the Voluntary Rolling Hot Spot system terms and conditions (the Inter Cooperative Agreement). The second tier comprises the membership agreements of all 10 cooperatives. The terms and conditions of the Inter Cooperative Agreement are described above (and included in Appendix 2). The terms and conditions of the cooperative membership agreements that are specifically related to enforcement of the VRHS system are as follows:

A. Each member acknowledges that its vessel's operations are governed by the Inter Cooperative Agreement, and agrees to comply with its terms, as they may be amended from time to time.

B. Each member authorizes the Board of Directors of its cooperative to take all actions and execute all documents necessary to give effect to the Inter Cooperative Agreement.

C. Each member authorizes the Board of Directors of its cooperative to enforce the Inter Cooperative Agreement, and if the Board fails to do so within 30 days of receiving notice from Sea State that a cooperative member may have failed to comply with the Agreement, each member authorizes each of the Boards of Directors of each other pollock cooperative, each of the CDQ groups, Bering Sea Fishermen's Association and Yukon River Drainage Fishermen's Association to individually or collectively take legal action to enforce the Inter Cooperative Agreement.

D. Each member releases to Sea State its VMS tacking data, its vessel log books and its plotter data for purposes of determining its compliance with the Inter Cooperative Agreement, and agrees that in the event Sea State concludes that its vessel may have violated a hot spot closure, Sea State may deliver any and all of such data to the Boards of Directors, the CDQ groups, BSFA and YRDFA for purposes of enforcing the Agreement.

E. Each member agrees that the information contained in the records identified in item D, above, shall be presumed accurate absent a clear and compelling demonstration otherwise, and shall be presumed sufficient to determine its compliance with the Inter Cooperative Agreement.

F. Each member agrees that damages for violating the Inter Cooperative Agreement shall apply on a strict liability basis, regardless of a member's lack of knowledge of the violation or intent to violate the agreement.

G. Each member agrees that actual damages for violating the agreement would be difficult to calculate, and therefore agrees to pay an amount per tow made in violation of the Interco-operative Agreement as the Board of Directors establishes from time to time as liquidated damages. Each member agrees to modify its skipper contracts to make its skipper(s) fully responsible for the liquidated damages that are assessed in connection with a breach of the agreement. Further, each member agrees that in the event a skipper fails to assume such assignment of liability, or in the event such assumption is deemed invalid, the member shall be liable for the full amount of such liquidated damages.

H. The current penalties for Savings Closure violations are $10,000 for the first violation in a year, $15,000 for a second violation in the same year as the first, and $20,000 for a third and subsequent violations in a year.

I. Each member agrees that in connection with any action taken to enforce the Inter-coop Agreement, the prevailing party shall be entitled to the costs and fees it incurs in connection with such action, including attorneys' fees.

J. Each member agrees that in addition to legal remedies, the Board of Directors of each cooperative, each of the CDQ groups, BSFA and YRDFA shall be entitled to injunctive relief in connection with the second and subsequent violations of the Inter-coop Agreement.

Penalties for savings closure violations as described in item H above will be designated for a research foundation (actual foundation to be determined). Any penalty money collected under the agreement will be contributed to this research foundation and specified for use in salmon stock identification research.

An important aspect of this agreement is the inclusion of the western Alaskan groups (YRDFA and BSFA) for compliance purposes of this agreement. Under the agreement as listed above, there are three primary means by which these groups are included in the ability to monitor and enforce the agreement. These are listed in items C, D and J, above. They have the legal ability to individually or collectively take legal action to enforce the agreement (item C). These groups also participate in the ability to request and obtain data from Sea State in cases where a violation of the cooperative agreement has occurred (item D). And finally, these groups are included in the ability to seek injunctive relief in the case of a violation of the agreement (item J).

4.3.1.5 Annual Performance Review

In order to respond to the request for an annual performance review by the Council, the inter-cooperative would produce a report to the Council which would contain the following:

1. Number of salmon taken by species and season
2. Estimate number of salmon avoided as demonstrated by the movement of fishing effort away from salmon hot-spots.
3. A compliance/enforcement report which will include the results of an internal compliance audit and an external compliance audit if one has been done.
4. List of each vessels number of appearances on the weekly dirty 20 lists for both salmon species
5. Acknowledgement that the Agreement term has been extended for another year (maintaining the 3 year lifespan) and report any changes to the Agreement that were made at the time of the renewal.

While calculating the number of salmon avoided cannot be done with absolute precision, an estimate will be provided for purposes of comparison with number of salmon caught by the fleet under the new system. This will be accomplished by calculating the number of salmon that the fleet would have caught in each “hot spot” had that area remained open for the time period of the voluntary hot spot closure. This is based upon the bycatch rate just prior to enactment of the closure and multiplied out by the cooperative’s vessels restricted from the area for the time period of the closure according to their individual tier classification.

4.3.2 Methodology for impact analysis

Given that this program is being proposed under this alternative and is not in effect now, methodology by which to evaluate the impacts of the program are qualitative in nature. The basis for comparison by which to evaluate how the fishery may perform under this alternative and the related impacts thereof is by the performance of the fishery under the current inter-cooperative agreement. While substantial changes have been made to the existing agreement in order to operate in the absence of regulatory closures, the basis mechanism by which hot spot management occurs remains similar.

The impact analysis discussion is focused primarily on the relative bycatch of Chinook and chum salmon.

4.3.3 Impacts on Chinook salmon:

Hot spot management has the potential to reduce incidental take of Chinook salmon stocks in the pollock fishery especially when this management is not constrained by the current system of regulatory closures. Examples of the enactment of closures based upon cooperative bycatch rates and their relative tier level (for 2004 and 2005) under the previous Inter Cooperative Agreement were shown in Sections 4.3.1.1 and 4.3.1.2.

The hot spot closure system for salmon under the previous agreement was first utilized in the 2003 "A" season. The closure system for Chinook in the "B" season was not begun until 2004, where core closures were utilized for that season. The agreement has since been modified according to the details as listed for improved bycatch management. It is difficult therefore to use data from the previous years to judge absolutely the efficacy of the system. Not only was it not utilized consistently over both "A" and "B" seasons, but the inclusion in the past of the stand-down period may have complicated the ability of the ICA in the past to effectively reduce Chinook bycatch. Modifications to the agreement were made to specifically address improved bycatch reduction. An additional complication in evaluating the previous bycatch cooperative agreement's performance as a measure of the future performance, is the fact that in the past this has been complicated by the necessity to adhere to the regulatory closures. The necessary movement of the fleet away from regulatory closures has complicated the ability of the ICA to effectively move the fleet to areas of lower bycatch.

An important modification of the revised ICA under alternative three is the removal of the stand-down period for Chinook. In previous years the ICA for the "A" season for Chinook included a stand down provision whereby 40% of the Chinook limit had to be taken prior to the initiation by Sea State of any hot spot closures. This stand-down provision was included regardless of what observed bycatch rates were, nor the tier levels of the cooperatives.

Under the revised agreement for Alternative 3, there is no stand down period. Bycatch accounting by cooperative occurs as soon as the fishery opens for the "A" season, and the first notice of closures (as described in Section 4.3) will transpire on January 30. This will incorporate incidental catch in the fishery from the first day of the opening. This is anticipated to greatly increase the ability of management to move the fleet away from high bycatch areas.

In the past several years it has taken until approximately the second week in February to reach this 40% limit. For example, in 2003, this number was reached at the end of the reporting week of February 15 (15,441) for comparison, the previous week's total was 10,184. In 2004, the 40% was reached during the week ending February 14 (12,150), while in 2005 it was reached at the end of the week of February 12 (11,496).

Core closures in the "B" season are another major modification to the ICA under Alternative 3 than the way the agreement was managed in the past. Under core closures, hot spot closures for Chinook in the "B" season apply to all vessels in all cooperatives regardless of their bycatch rate or the tier structure within which the cooperatives fall. In this way the hot spots are closed to all fishing for pollock. The closures still rotate weekly, but are applicable to everyone. If tiers were utilized, the concern is that given the more dispersed fishery, most if not all boats would be in Tier 1 and thus the closures would not affect the fleet. While areas under core closures are closed to the entire fleet, alternative fishing grounds are available and the fleet still retains sufficient fishing opportunities.

Core closures are not considered at this point in the "A" season due to the high value of the fishery (roe fishery) and the potential that imposing core closures would then cause a disincentive to utilize experimental means of avoiding salmon such as with salmon excluder devices on the trawl nets. Fishing is more spatially and temporally spread out in the “B” season thus core closures can be used without excessive economic impacts on the fleet. However in the “A” season fishing is in smaller spatial regions and of a shorter temporal nature and core closures would cause economic hardship on the fleet and reduce the relative value of the fishery.

Management of the hot spots and fishery behavior under Alternative 3 is tied to the Base Rate calculation. How this rate is calculated is the critical aspect in how the closures are enacted and which cooperatives are impacted. The Base Rate calculation is described in Section 4.3.1.1. The range of acceptable base rates were agreed upon by the members of the ICA and are generally based upon historical bycatch rates. In order to establish the Base Rate according to present conditions, the inseason adjustment was added to the agreement (as different from the agreement in the previous years). Thus if salmon bycatch (and presumably abundance) is high, the Base Rate will be adjusted inseason to accommodate this while if it is low it will also be readjusted to accommodate that fact.

Once concern may be the ability of the fleet to inflate the Base Rate arbitrarily and thus avoid the enactment of closures by staying below an artificially high rate. The ability to inflate the Base Rate deliberately would likely require the cooperation of all of the cooperatives or at the very least a large majority of them. The Base Rate is calculated as an average of the entire fleet’s bycatch, thus all of the incidentally caught salmon divided by all of the pollock caught to date. It is extremely unlikely that a widespread “conspiracy” could be arranged in order to artificially raise the Base Rate such that every cooperative remained in tier 1 all season. If such a conspiracy were organized it is more likely that cooperatives would not comply and in their own self-interest retain clean fishing to ensure that they would remain in tier 1 regardless of the behavior of the other cooperatives.

Under alternative 3, bycatch rates for Chinook salmon are anticipated to decrease with the potential for more flexibile and responsive fleet management by the ICA under this alternative. Hot spot management has show indications that it could represent a more dynamic real-time tool for managing rapidly changing and largely unpredictable situations such as with Chinook salmon bycatch in the BSAI pollock fishery. Therefore it is anticipated that Chinook bycatch will decrease under this alternative. Given the relatively small impact the current overall numbers of incidentally caught Chinook salmon in the BSAI Pollock trawl fishery to the overall population of Chinook salmon returns to rivers in western Alaska and elsewhere, and the possibility that under alternative 3 these will decrease, Alternative 3 is not considered to result in a significant impact to Chinook salmon stocks.

As with the discussion under Alternative 2, under alternative 3 if bycatch is not reduced substantially, there is still the risk that future bycatch in excess of the ESA cap could result in the imposition of restrictions on the BSAI trawl fleet under the ESA. It is unknown what the result of this consultation would be or how future incidental take caps for this fishery may be redefined following the results of the current consultation.

4.3.4 Impacts on chum salmon

Information as listed above for potential impacts on Chinook salmon apply equally for impacts to ‘other’ (chum) salmon. For ‘other’ salmon, hot spot management is applied in the ‘B’ season when bycatch is predictably highest. Hot spot management has the potential to reduce incidental take of chum salmon stocks in the pollock fishery, especially when this management is not constrained by the current system of regulatory closures. Examples of the enactment of closures based upon cooperative bycatch rates and their relative tier level (for 2004 and 2005) under the previous Inter Cooperative Agreement were shown in Sections 4.3.1.1 and 4.3.1.2. The in-season adjustment as described under 4.3.1.1 has the potential to provide additional protection to chum salmon stocks by possibly elevating the Base Rate at that time and forcing the fleet out of additional high bycatch areas.

The prohibited species limit for “other salmon” currently applies to all BSAI groundfish trawl fisheries, not just the pollock fishery. This alternative suspends the trigger limit for “other salmon”, and as a result the non-pollock trawl fisheries will consequently no longer be constrained in their catch of “other salmon”.

Table 4-7 illustrates the bycatch of “other salmon” in the trawl groundfish fisheries. Between 1998 and 2003, the pollock pelagic trawl fishery caught between 91 and 98% of all “other salmon” bycatch. Salmon bycatch by other trawl groundfish target fisheries ranged between 1000 and 4700 fish annually, during the same period. These fisheries are unlikely to have high salmon bycatch as they are bottom-trawl fisheries rather than mid-water fisheries. Bycatch may increase as the “other salmon” constraint is lifted and the fisheries no longer need to avoid salmon bycatch, but any increase is unlikely to represent a significant portion of the overall “other salmon” bycatch.

Table 4-7 “Other salmon” bycatch in the trawl groundfish fisheries, in 1000s of fish

Year	Pollock pelagic	Pollock bottom	Pacific cod	Flatfish targets	Rockfish	Atka mackerel	All longline targets	Total for all BSAI fisheries	Total for all trawl, excluding pollock pelagic
1998	46.6	3.2	.5	.4	.0	.5	.1	51.2	4.7
1999	44.2	.7	.0	1.1	.1	.5	.0	46.6	2.3
2000	56.6	.3	.1	.3	.0	.3	.0	57.6	1.0
2001	52.8	1.0	1.5	1.4	.2	.3	.1	57.4	4.4
2002	78.6	.4	.9	.6	.0	.0	.1	80.8	1.9
2003	190.9	1.8	1.0	.7	.0	.3	.0	194.7	3.8

Source: Hiatt et al. 2000, 2002, 2004; note: figures rounded to 100s.

Under alternative 3, bycatch rates for other salmon are anticipated to decrease with the potential for more flexible and responsive fleet management by the ICA under this alternative. Hot spot management has show indications that it could represent a more dynamic real-time tool for managing rapidly changing and largely unpredictable situations such as with ‘other’ salmon bycatch in the BSAI pollock fishery. Therefore it is anticipated that ‘other’ salmon bycatch will decrease under this alternative. Given the relatively small impact the current overall numbers of incidentally caught chum salmon in the BSAI Pollock trawl fishery to the overall population of chum salmon returns to rivers in western Alaska and elsewhere, and the possibility that bycatch may decrease, Alternative 3 is considered to have limited impact on these stocks although the actual impacts are difficult to determine.

4.3.5 Impacts on groundfish stocks

Alternative 3 would suspend the salmon savings areas, and instead allow the pollock cooperatives and CDQ groups to avoid salmon bycatch using their voluntary rolling hot spot closure system. CPUE of pollock is likely to increase under this alternative, as the cooperatives have increased flexibility to maximize CPUE. Incidental catch rates of other groundfish species may vary under the alternative, as fishing patterns change to respond to hot spot closures. Incidental catch rates inside and outside of the savings areas are unknown, however, incidental catch is low in the pollock fishery, as discussed in Section 3.9.

As described under Alternative 1, close monitoring of the pollock fishery, through the fishery observer program and other reporting mechanisms, should allow for accurate accounting of pollock and other groundfish species catch. Harvest of these species will be counted against each species' total allowable catch (TAC). As a result, catch of all groundfish species is not likely to exceed acceptable levels under this alternative. Therefore, the impact on groundfish stocks is determined not to be significant.

4.3.6 Impacts on threatened or endangered species

Although fishing patterns may change under the alternative, as the pollock fishery is no longer mandatorily forbidden to fish in the established savings areas, the changes due to the alternative are unlikely to result in a significant change in the interaction between the fisheries and threatened or endangered species. To the extent that CPUE for pollock can be diminished under this alternative, by increasing the flexibility of the cooperatives to avoid salmon bycatch, interactions with seabirds and marine mammals should also decrease as the vessels spend less time catching their allocations. As discussed in Section 3.10, studies have indicated that very few ESA-listed Pacific salmon are caught in the BSAI groundfish fisheries. As a result, Alternative 3 is not considered to result in a significant impact to threatened or endangered species.

4.3.7 Impacts on the ecosystem

Alternative 3 is not likely to result in changes to the pollock fishery that are discernable at an ecosystem level. Under this alternative, the savings areas will be suspended, and a more flexible closure system will be put in place to avoid salmon bycatch. This may result in a decrease in salmon bycatch, and possibly a decrease in fishing effort as the cooperatives are able to catch pollock more efficiently. Reduced interactions between the pollock fishery and other components of the ecosystem may provide some benefit to the ecosystem, however the scale of these changes would be small. As a result, the ecosystem impacts of Alternative 3 are determined not to be significant.

4.3.8 Socio-economic impacts

A detailed analysis of Alternative 3 is presented in Section 5.6.3, as part of the analysis in the Regulatory Impact Review. Alternative 3 eliminates the BSAI salmon savings area closures but replaces them with a dynamic system of rolling hot spot closures and creates incentives for individual vessels to reduce salmon bycatch by penalizing the worst offenders. This alternative would likely reduce operational costs, improve vessel safety, and improve product quality. Alternative 3 also have the potential to reduce salmon bycatch more than the status quo management measures. If that potential were realized, Alternative 3 would reduce foregone value of salmon bycatch and increase the overall benefits of bycatch reduction. Alternative 3 also provides some mitigation possibilities for Western Alaska fishing organizations.

Alternative 3 would reduce management and enforcement costs for government agencies by transferring much of that cost to industry. However, the industry has volunteered to bear this cost in hopes of reducing operational costs associated with the status quo while at the same time attempting to reduce salmon bycatch. If bycatch is not reduced under alternative 3 and the Bering Sea pollock trawl fleet continues to exceed the ESA Chinook incidental take permit cap, unknown restrictions on the fleet could result.

4.3.9 Option 1: Re-impose expedited closures

The option, as described in section 2.3.1, would re-impose a closure system of salmon savings areas which would be closed to directed pollock fishing once salmon bycatch limits were triggered. The salmon savings areas would not be the same as those currently in regulation, but instead would be based on the best available science regarding areas and timing of salmon abundance.

Although there are no specific criteria under which the Council would impose the option, it is likely that the Council would re-impose savings areas for one of two reasons. First the option would come into effect if salmon bycatch is not controlled under the Alternative 3 voluntary rolling hot spot closure system, and continues in the pollock fishery at current levels, regardless of the suspension of the savings areas. Secondly, the option might be reimposed if certain vessels are not complying with the ICA, and are not respecting the hotspot closures instituted by Sea State.

4.3.9.1 Regulatory constraints on expedited action

The ability of the Council to impose savings areas on an expedited basis may be constrained by regulatory requirements. Notice and comment rules for any change in regulation must follow the guidelines of the Administrative Procedures Act (APA). General guidance from NOAA Fisheries has indicated that prior notice and comment (i.e., proposed and final rulemaking) for any change in regulations, including a reactivation of the Salmon Savings Areas, would be at best a 5-6 month process *following* the preparation of Council analyses and relevant decision-making (i.e., an EA/RIR/IRFA subject to initial and final review by the Council). Realistically, depending on other priorities of the Council and NOAA Fisheries, this may take considerably longer.

The APA contains provisions for a case-by-case waiver of prior notice and comment, in which case an action would effectively go directly to a final rule. In order for the waiver to be granted, the criteria to be met would be similar to those required for undertaking an emergency rule. This “good cause” exemption requires that it be established that the comment and notice period would be unnecessary, impracticable, or contrary to public interest.

4.3.9.2 Impacts of the option

The conditions that are likely to prompt the Council to implement the option, i.e., increased salmon bycatch either from non-compliant vessels or because the VRHS system is ineffective, are likely to provide the basis for a good cause exemption. These conditions would apply both if the Council adopts the option, but also if the Council decided at any time, as it has the authority to do, to initiate an action to reimpose savings areas on the pollock fishery.

The option does not allow the Council to reinstate the savings areas that are in regulation under Alternative 1, unless they are based on the best available science. Instead, the option would allow the Council at any point to call for the re-imposition of savings areas to be triggered by exceeding salmon bycatch cap. At that time, the Council would initiate an analysis to determine the geographic bounds and appropriate timing of salmon savings areas. This analysis would form the basis of the Council’s decision, and the Council’s action would then go through NOAA Fisheries rulemaking (and perhaps qualify for the good cause exemption) and be implemented. In the interest of expediency, and in anticipation of such a need, the Council has, under Amendment Package B (Section 2.4) initiated just such an analysis of alternative savings areas.

As a result, the option does not afford the Council any additional expediency. The Council may, at any time, decide to initiate an analysis to review the pollock fishery's salmon bycatch, and to impose salmon savings areas to control that bycatch. The conditions likely to cause the Council to impose the option or initiate an analysis of savings areas regardless of the option would both be equally likely to merit the APA's "good cause" exemption.

The sole impact of the option is to serve as a public announcement to the pollock fishery, that should the voluntary rolling hot spot closure system not be effective, the Council may re-impose savings areas. As the location and timing of said savings areas are not specified under the option, they would need to be defined and analyzed at the point that the Council chooses to implement the provisions of the option.

4.3.10 Option 2: Maintain closures but allow exemption for participants in VRHS system

Under option 2 (as described in section 2.3.2), the regulatory salmon savings area triggers and closures would be maintained, however participants in a cooperative VRHS system would be exempted from compliance with the savings area closures. This exemption would be subject to Council approval and review of the effectiveness of the VRHS system. Under this option, the Pollock cooperatives and CDQ groups participating in the VRHS system will be exempt from the existing closures (both the annual chum closures and additional chum and Chinook if triggered). Cooperatives and other vessels not participating in a VRHS system will be subject to the annual chum closures and additional savings area closures if triggered. The regulatory constraints and potential impacts of this option on alternative 3 are discussed in section 4.3.10.

4.3.10.1 Regulatory considerations of exemption

In order to implement the exemption, some form of permit would likely be issued by NMFS to exempt coops who have indicated prior to the season that they will be participating in the VRHS system and as such seek an exemption from the existing closures. There would be no mandate on the minimum number of participants required for the exemption. Cooperatives will report annually to the Council and NMFS the cooperatives which are participating in the exemption and those that choose not to participate. Those non-participating coops will be subject to existing closures if they are triggered. All bycatch regardless of exemption will count toward the trigger limit for the closures.

If a cooperative breaches the ICA and chooses mid-season not to participate after it has been endorsed by NMFS for exemption, that coop will turn in its exemption permit to NMFS and will thereafter be subject to the existing closures if triggered for the remainder of the year. The ICA contract will include a provision requiring that in the case of a decision to breach the agreement, members notify NMFS immediately and will turn their endorsements over to NMFS.

4.3.10.2 Impacts of the option

Impacts of this option for an exemption are anticipated to be similar to all impacts noted under Alternative 3. The exemption represents a different regulatory means to allow for the VRHS system as the primary means to controlling salmon bycatch in the Pollock fishery. For vessels that choose not to participate in the VRHS system, they will be subject to the existing closures if they are triggered. The impacts to the portion of the fleet which chooses not to participate (and are then subject to the regulatory closures) will be similar to those socio-economic impacts as noted under Alternative 1.

4.3.10.3 Sub-option: Extend exemption to chum salmon savings area closure to vessels in the trawl cod and/or flatfish targets

As described in section 2.3.1.2, under this sub-option, vessels in the trawl cod and/or flatfish target fisheries would be exempt from compliance with the chum savings area closure. Vessels in these target fleets are not required to participate in a VRHS system to obtain this exemption.

4.3.10.3.1 Regulatory considerations of the sub-option

In order to extend the exemption to the Pacific cod and flatfish trawl fleets, the existing regulatory Chum Salmon Savings Area would be redefined to apply only to the Pollock trawl fishery. Whether or not their non-Chinook bycatch in the CVOA continued to accrue towards the amount allowed under the trigger would need to be determined.

4.3.10.3.2 Impacts of the sub-option

As described in section 3.1 of this analysis, the bycatch of chum salmon is predominantly from the Pollock fishery (see Table 3-1). Incidental catch of non-chinook salmon does occur in other fisheries, as shown in table Table 3-2, however it is very small in comparison with the Pollock trawl contribution to the total non-chinook incidental catch.

Under current regulations the catch of chum salmon in other groundfish trawl fisheries contributes towards the trigger amount for the Chum Salmon Savings Area. The total incidental catch of non-chinook salmon by target fishery in the BSAI from 1998-2004 is shown below in Table 4-8. In 2004, the Pacific cod fishery had a much higher incidental catch of chum than in previous years. However, totals for all other fisheries are very small in comparison with the pollock trawl contribution to the total chum salmon incidental catch.

Table 4-8 Total incidental catch of non-Chinook salmon by target fishery 1998-2004

Year	Atka mackerel	Pacific cod	Other flatfish	Rockfish	Flathead sole	Rock sole	Arrowtooth flounder	Yellowfin sole	Total
1998	162	669	2	0	93	0	0	239	1,165
1999	505	33	2	0	285	439	0	412	1,676
2000	255	128	1	0	108	0	0	188	680
2001	347	1835	0	171	67	356	46	620	3,442
2002	10	921	15	0	121	31	25	446	1,569
2003	346	988	174	0	0	0	0	520	2,037
2004	142	6,563	45	0	2,369	0	0	233	9,353

As per regulations, only the non-chinook incidental catch within the CVOA contributes towards the cap. Since 2003 the contribution of these fisheries towards the CVOA trigger is shown in Table 4-8. The only contribution (outside of confidential numbers from the Other flatfish and Yellowfin sole target fisheries) were from the Pacific cod fishery. Again, the Pacific cod fishery showed a higher contribution in 2004. This may be due to the flatfish fisheries ending early in 2004 and hence additional effort focussed upon the Pacific cod target in late summer and early fall (than in the previous year).

Table 4-9 Incidental catch of non-Chinook salmon by target fishery within the CVOA 2003-2004

Year	Atka mackerel	Pacific cod	Other flatfish	Rockfish	Flathead sole	Rock sole	Arrowtooth flounder	Yellowfin sole	Total
2003	0	681	0	0	0	0	0	0	681
2004	0	4,666	confid	0	0	0	0	confid	4,666

When the chum salmon savings area is closed, vessels fishing in the non-pollock trawl targets as listed above are also precluded from fishing with the savings area closure. Movement outside of the closure areas for these vessels increases operational costs and may adversely affect vessel safety.

The analysis for amendment 35 which implemented the Chum salmon savings area closure included non-Chinook salmon bycatch by the Pollock and Pacific cod vessels only given that the highest bycatch of chum salmon at that time was in those two targets. Currently bycatch by the Pacific cod and flatfish targets makes up a very small percentage of the total bycatch of non-Chinook species. Total Pacific cod bycatch of non-Chinook salmon within the CVOA in 2004 made up less than 3% of the total amount taken within the CVOA (163,674) and overall Pacific cod non-salmon bycatch for 2004 was less than 1.5 % of the total bycatch in the fishery in 2004.

4.4 Cumulative Impacts

Analysis of the potential cumulative effects of a proposed action and its alternatives is a requirement of NEPA. Cumulative effects are those combined effects on the quality of the human environment that result from the incremental impact of the proposed action when added to other past, present, and reasonably foreseeable future actions, regardless of what Federal or non-Federal agency or person undertakes such other actions (40 CFR 1508.7, 1508.25(a), and 1508.25(c)). Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time. The concept behind cumulative effects analysis is to capture the total effects of many actions over time that would be missed by evaluating each action individually. At the same time, the CEQ guidelines recognize that it is not practical to analyze the cumulative effects of an action on the universe but to focus on those effects that are truly meaningful.

The 2004 Final Alaska Groundfish Fisheries Programmatic Supplemental Environmental Impact Statement (Groundfish PSEIS; NMFS 2004b) assesses the potential direct and indirect effects of groundfish FMP policy alternatives in combination with other factors that affect physical, biological and socioeconomic resource components of the BSAI and GOA environment. To the extent practicable, this analysis incorporates the cumulative effects analysis of the Groundfish PSEIS, including the persistent effects of past actions and the effects of reasonable foreseeable future actions.

Beyond the cumulative impacts analysis documented in the Groundfish PSEIS, no additional past, present, or reasonably foreseeable cumulative negative impacts on the natural and physical environment (including fish stocks, essential fish habitat, ESA-listed species, marine mammals, seabirds, or marine ecosystems) except for Pacific salmon have been identified that would accrue from the proposed action. Cumulatively significant negative impacts on these resources are not anticipated with the proposed action because no negative direct or indirect effects on the resources have been identified.

There may be effects on the Bering Sea pollock fishery participants and on salmon stocks, and thus on the salmon fisheries and fishery-dependent communities, as a result of the proposed action in combination with other actions. These effects are discussed below.

4.4.1 Past and Present Actions

This section describes the effects of the BSAI Groundfish FMP and its amendments and other pertinent external factors that could contribute to potential cumulative impacts on the Bering Sea pollock fishery participants and salmon stocks. Past actions are evaluated to determine whether there are lingering effects that may still result in synergistic or incremental impacts when combined with the proposed action.

Pollock Fishery

The Groundfish PSEIS noted that the availability and consistency of data limits the ability to analyze the effects of past actions on the economic condition of selected sectors of the Alaska groundfish fishery. According to the Groundfish PSEIS, analyses are also limited by the difficulty of delineating the cause-and-effect relationships between multiple factors and the resultant economic effects. Many factors substantially affect the economic status of the Alaska groundfish fishery. Changes in markets, biological conditions and fishery management regulations can result in changes in the revenues and operating costs of firms participating in the fisheries as well as changes in fleet size and composition. Isolating the effects of a single factor is seldom possible. Nonetheless, this analysis has identified a number of actions that have contributed to the current economic status of the Bering Sea pollock fishery participants.

The mid- to late-1980s saw increased restrictions on the domestic groundfish fishery, due primarily to problems with incidental catches of non-target species. In 1983, the BSAI Groundfish FMP established a prohibited species catch policy for domestic fisheries and defined prohibited species to include crab, halibut, herring, crab, and salmon. In 1987, the Council established bycatch limitation zones for prohibited species and established limits on the amounts of PSC that could be taken. The salmon bycatch measures affecting the Bering Sea pollock fishery are discussed in Section 3.2.

A sequence of Steller sea lion protection measures that began in the 1990s limited the pollock harvests of the fleet. The measures closed some of the best fishing grounds for this target species, thereby adversely affecting the sector.

In 1998, Congress passed the American Fisheries Act (AFA), which limited the number of harvesting and processing vessels allowed to participate in the Bering Sea pollock fishery. The AFA also modified specific allocations of the Bering Sea pollock quota as follows: 10 percent to the western Alaska CDQ program, with the remainder allocated 50 percent to the inshore sector, 40 percent to the offshore sector and 10 percent to the mothership sector. Also included in the AFA was the establishment of the authority and mechanisms by which the pollock fleet can form fishing cooperatives. Finally, the AFA raised the standards for catch measurement and monitoring in the Bering Sea pollock fishery.

Disentangling the specific changes in the temporal and spatial dispersion of the eastern Bering Sea pollock fishery resulting from the sea lion management measures from those resulting from implementation of the AFA is difficult. The reduction of the capacity of the catcher/processor fleet resulting from the AFA reduced the rate at which the catcher/processor sector (allocated 36% of the eastern Bering Sea pollock TAC) caught pollock beginning in 1999, and the fleet as a whole in 2000. Because of some of its provisions, the AFA gave the industry the ability to respond efficiently to changes mandated for sea lion conservation that otherwise could have been more disruptive to the industry.

Salmon

The Groundfish PSEIS describes the past and present impacts on salmon stocks. Salmon catch in the groundfish fisheries (where, as a prohibited species, all salmon must be returned to the sea immediately), the commercial salmon fisheries, subsistence and sport fisheries, contributes to salmon mortality.

Additionally, the health of the stocks is affected by competition from salmon mariculture and climatic variability.

The importance of commercial, subsistence, and recreational salmon harvests, both in terms of economic and cultural value, is discussed in Chapter 5.

4.4.2 Reasonably Foreseeable Future Actions

As discussed previously, a cumulative effects assessment should also identify reasonably foreseeable future events that are relevant to the proposed action, and should look at the incremental effect the proposed action might have if those reasonably foreseeable events occur. The focus must be on actions that are likely to occur or probable, rather than those that are merely possible. To identify actions within the purview of NOAA Fisheries and the Council that are sufficiently likely to occur (as opposed to “highly speculative” actions), this analysis examined authorized planning documents recently issued by the Council.

Pollock Fishery

Three reasonably foreseeable management actions relevant to this analysis were identified—the allocation of BSAI Pacific cod, protection of EFH in the Bering Sea, and a recent proposal by the Alaska Board of Fisheries to modify pollock closures for Steller sea lion protection in State waters.

The Groundfish PSEIS describes several factors external to the fishery management regime that have influenced the costs and revenues of harvesting sectors in the Alaska groundfish fishery and may continue to do so. These factors include foreign fishing, product prices, vessel fuel costs and market forces beyond the region that affect the costs of insurance, labor, and so forth. While these external factors could have significant economic impacts on the participants in the Bering Sea pollock fishery in the future, a discussion of what those effects would be speculative.

Bering Sea/Aleutian Islands Pacific Cod Allocations

The Council is considering revising current allocations of BSAI Pacific cod among trawl, jig, and fixed gear that were implemented in 1997 (BSAI Groundfish FMP Amendment 46). The basis for determining sector allocations will be catch history as well as consideration of socio-economic factors. Sectors for which catch history will be calculated are as follows: AFA Trawl CPs; Non-AFA Trawl CPs; AFA Trawl Catcher Vessels; Non-AFA Trawl Catcher Vessels; Longline CPs; Longline Catcher Vessels ≥ 60'; Pot CPs; Pot Catcher Vessels ≥ 60'; Fixed Gear Catcher Vessels <60'; and Jig Catcher Vessels.

In the event that the BSAI Pacific cod ABC/TAC is apportioned between the BS and the AI management areas, the Council is also considering establishing a protocol that would continue to maintain the benefits of sector allocations and minimize competition among gear groups; recognize differences in dependence among gear groups and sectors that fish for Pacific cod in the BS and AI; and ensure that the distribution of harvest remains consistent with biomass distribution and associated harvest strategy.

<u>Anticipated Effects</u>

Allocations adjusted to better reflect historic use by sectors will reduce uncertainty and provide stability for participants in the BSAI Pacific cod fishery who have made significant investments and have a long-term dependence on the resource.

Measures to Minimize Fishing Effects on Bering Sea Essential Fish Habitat

As noted in the discussion of past and present actions, the Council took action in February 2005 to conserve EFH in the AI and GOA from potential adverse effects of fishing. At that time, the Council also took action to initiate an expanded analysis of alternatives to minimize the effects of fishing on EFH in the Bering Sea, and conduct an assessment of gear modification that tiers off of the EFH FEIS. The analysis will include the existing alternative in the EFH FEIS, an alternative to leave the rolling closure area open, and options to the closed areas south of Nunivak Island and north of the Bogoslof Area, as well as other alternatives to be developed.

Anticipated Effects

Measures to minimize the effects of fishing in the Bering Sea could have a negative economic effect on certain harvesting sectors in the Alaska groundfish fishery, including the participants in the Bering Sea pollock fishery, by reducing the harvest of target species and/or increasing operating costs. Because specific measures have not yet been identified and their effects evaluated, the economic impacts are uncertain.

Aleutian Islands Pollock Fishery in State Waters

In November 2002, the Alaska Board of Fisheries adopted the same Steller sea lion protection measures for the State parallel groundfish fisheries in the AI as were established for Federal fisheries. However, in March 2005, the Alaska Board of Fisheries considered a proposal to revise pollock closures for Steller sea lion protection in State waters of the Aleutian Islands from 170º to 180º W. longitude, in State waters of the Western Gulf of Alaska from 157º to 163º W. longitude, and in the Cook Inlet Management Area between 149º and 150º W. longitude to allow harvesting of pollock. The State would not actively manage the harvests in the pollock fisheries in State waters; rather, ADF&G would treat these fisheries similar to other parallel fisheries through the annually issued global emergency order—the Federal government would manage harvests against Federally-established TACs and allocations, open and close seasons, establish gear restrictions, etc.

The Alaska Board of Fisheries has deferred this proposal to the October 2005 work session of the Board for further action. In addition, the Board intends to refer the proposal to the Board/Council joint protocol committee for discussion and coordination with the NPFMC.

Anticipated Effects

An alteration of the pollock closures in State waters to allow harvesting of pollock may trigger the need to conduct a formal re-consultation under section 7 of the Endangered Species Act. The outcome of a consultation is uncertain, but a “jeopardy opinion” could result in additional fishing restrictions on certain harvesting sectors in the Alaska groundfish fishery, including participants in the Bering Sea pollock fishery.

Salmon

The Alaska Board of Fisheries is charged with setting policy and direct for the management of the state’s fishery resources including salmon. The Board of Fisheries’ main role is to conserve and develop the fishery resources of the state. This involves setting seasons, bag limits, methods and means for the state’s subsistence, commercial, sport, guided sport. The board is also charged with making allocative decisions. The Board of Fisheries meets four to six times per year in communities around the state to consider proposed changes to fisheries regulations around the state. The board uses the biological and socioeconomic information provided by the Alaska Department of Fish and Game, public comment received from people inside and outside of the state, and guidance from the Alaska Department of Public Safety and Alaska Department of Law when creating regulations that are sound and enforceable. The board considers changes to regulations on a region-based schedule that occurs every three years. The fisheries include subsistence, sport, guided sport, personal use, and commercial. A call for proposals for the Alaska Peninsula/Aleutian Island areas as well as the Arctic-Yukon-Kuskokwim Areas was in 2003/3004. The next time proposals for these areas may be submitted is 2006/2007.

Currently, there appears to be no impending future regulatory or management action for salmon that would likely impact the proposed action under this amendment.

4.4.3 Summary of Cumulative Effects

The analysis of past actions affecting the Bering Sea pollock fishery participants and salmon stocks show that since the mid-to late-1980s saw increased restrictions, due primarily to problems with incidental catches of non-target species. A sequence of Steller sea lion protection measures limited the pollock harvest by closing some of the more productive fishing grounds, thereby adversely affecting the sector. Congress, in 1998, passed the American Fisheries Act, which restricted access to the Bering Sea pollock fishery and allocated Bering Sea pollock between different components of the pollock fleet and the western Alaska CDQ program. The AFA also authorized the development of fishing cooperatives among the pollock fleet. Finally, the AFA raised the standards for catch measurement and monitoring for the Bering Sea pollock fishery.

In recent years, the Bering Sea pollock fishery participants could incorporate Pacific cod allocations into their cooperatives, but at the same time could face some additional fishing restrictions. The Council is considering revising the current allocations of BSAI Pacific cod among trawl, jig, and fixed gear that were implemented in 1997. These allocations are expected to reduce uncertainty and provide stability for participants in the BSAI Pacific cod fishery, which includes participants from the Bering Sea pollock fishery. In February 2005, the Council took action to conserve EFH in the AI and GOA from potential adverse affects of fishing. These measures could have a negative economic effect on participants in the Bering Sea pollock fishery, by reducing the harvest of target species and/or increasing operating costs. Finally, the Alaska Board of Fisheries in March 2005 are considering a proposal to revise pollock closures for Steller sea lion protection in State waters for the Aleutian Islands, in State waters of the Western Gulf of Alaska, and in the Cook Inlet Management Area to allow harvesting of pollock. This action could trigger the need to conduct a formal re-consultation under section 7 of the Endangered Species Act. The outcome of consultation is uncertain, but a “jeopardy opinion” could result in additional fishing restrictions on the Bering Sea pollock fishery.

With the possible exception of the BSAI Pacific cod allocations, the reasonably foreseeable future actions cited above may have some negative effects (to some degree) on the economic performance of the Bering Sea pollock fishery participants. The cumulative effects of all actions—past, present, and future—are toward an increasingly restrictive regulatory environment resulting in lower harvests and gross revenues and/or higher operating costs.

Chapter 5 Regulatory Impact Review

5.1 Introduction

This Regulatory Impact Review (RIR) examines the costs and benefits of a proposed regulatory amendment to change salmon bycatch reduction measures in the Bering Sea and Aleutian Islands (BSAI) area. The proposed changes include eliminating Chinook and chum salmon savings areas and/or implementing an industry operated and funded "voluntary rolling hot spot" management system in their place.

5.2 What is a Regulatory Impact Review?

The preparation of an RIR is required under Presidential Executive Order (E.O.) 12866 (58 *FR* 51735: October 4, 1993). The requirements for all regulatory actions specified in E.O. 12866 are summarized in the following Statement from the E.O.:

> In deciding whether and how to regulate, agencies should assess all costs and benefits of available regulatory alternatives, including the alternative of not regulating. Costs and Benefits shall be understood to include both quantifiable measures (to the fullest extent that these can be usefully estimated) and qualitative measures of costs and benefits that are difficult to quantify, but nonetheless essential to consider. Further, in choosing among alternative regulatory approaches agencies should select those approaches that maximize net benefits (including potential economic, environmental, public health and safety, and other advantages; distributive impacts; and equity), unless a statute requires another regulatory approach.

E.O. 12866 requires that the Office of Management and Budget (OMB) review proposed regulatory programs that are considered to be "significant." A "significant regulatory action" is one that is likely to:

- Have an annual effect on the economy of $100 million or more or adversely affect in a material way the economy, a sector of the economy, productivity, competition, jobs, local or tribal governments or communities;
- Create a serious inconsistency or otherwise interfere with an action taken or planned by another agency;
- Materially alter the budgetary impact of entitlements, grants, user fees, or loan programs or the rights and obligations of recipients thereof; or
- Raise novel legal or policy issues arising out of legal mandates, the President's priorities, or the principles set forth in this Executive Order.

5.3 Statutory Authority

Under the Magnuson-Stevens Act, the United States has exclusive fishery management authority over all marine fishery resources found within the exclusive economic zone (EEZ). The management of these marine resources is vested in the Secretary of Commerce (Secretary) and in the Regional Fishery Management Councils. The groundfish fisheries in the EEZ off Alaska are managed under the Fishery Management Plan (FMP) for Groundfish of the BSAI.

Statutory authority for measures designed to reduce bycatch is specifically addressed in Sec. 600.350 of the Magnuson-Stevens Act. That section establishes National Standard 9—Bycatch, which directs the Councils to minimize bycatch and to minimize mortality of bycatch when it cannot be avoided. Additional discussion of National Standard 9 and other provisions of the Magnuson-Stevens Act and consistency with applicable law and policy are presented in Chapter 7 of this EA/RIR/IRFA.

5.4 Purpose and Need for Action

To comply with bycatch provisions of the Magnuson-Stevens Act, the Council amended the BSAI Groundfish FMP several times to enact and modify savings area closures (see Section 3.2) based upon the best available information at that time. Recently, Chinook and chum bycatch have been elevated well above the regulatory closure limits and the fleet has been displaced into other regions when the salmon savings areas have closed. Alternative measures are being sought to reduce salmon bycatch at this time.

5.4.1 Market failure rationale

The OMB guidelines for analysis under E.O. 12866 state that

> *in order to establish the need for the proposed action, the analysis should discuss whether the problem constitutes a significant market failure. If the problem does not constitute a market failure, the analysis should provide an alternative demonstration of compelling public need, such as improving governmental processes or addressing distributional concerns. If the proposed action is a result of a statutory or judicial directive, that should be so stated.*[5]

Groundfish that are the target of the BSAI trawl fisheries and the salmon bycatch these fisheries take are both common property resources. However, both are subject to systems of stock and allocation management. These management systems include forms of ownership of access and/or harvest allocation privileges. Trawl vessels operating in the BSAI Groundfish fisheries do not have ownership or access privileges to salmon. Similarly, salmon harvesters operating in the waters of and off Alaska do not have ownership or access privileges to groundfish.

Bycatch of salmon in the BSAI trawl fisheries reduces the common property pool of the salmon resource. Such reductions may reduce the targeted catch, and thereby the revenue, of salmon harvesters who have ownership of salmon access privileges (e.g. Alaska Limited Entry permits). This may, over time, reduce the value of salmon access ownership privileges. The market, however, has no mechanism by which groundfish harvesters compensate salmon harvesters for such losses. Thus bycatch reduction measures are imposed to reduce, to the extent practicable, this market failure. The goal of the action considered in the RIR is to improve salmon bycatch reduction in the BSAI trawl fisheries and thereby to further mitigate the effects of market failure.

[5] Memorandum from Jacob Lew, OMB director, March 22, 2000. "Guidelines to Standardize Measures of Costs and Benefits and the Format of Accounting Statements" Section 1.

5.5 Alternatives Considered

The alternatives under consideration are discussed in detail in Chapter 2 of this EA/RIR/IRFA. That discussion also considers alternatives that have been considered but have been eliminated from the current analysis (Section 2.4).

5.5.1 Alternative 1: No action

Alternative 1 maintains the existing regulatory measures for Chinook and Chum salmon savings area closures as described in section 3.2.

5.5.2 Alternative 2: Eliminate the Regulatory Salmon Savings Area Closures

Under Alternative 2, the catch limits for the Bering Sea subarea trawl Chinook and BSAI trawl chum salmon would be eliminated, and would no longer trigger savings area closures. The annual closure of the Chum Salmon Savings Area would also be eliminated. Salmon would remain a prohibited species under this (and all) alternatives.

5.5.3 Alternative 3: Suspend the Regulatory Salmon Savings Area Closures and Allow Pollock Cooperatives and CDQ groups to Utilize Their Voluntary Rolling Hot Spot Closure System to Avoid Salmon Bycatch.

Under Alternative 3, the catch limits for the Bering Sea subarea trawl Chinook and BSAI trawl chum salmon would be suspended, and would no longer trigger savings area closures. The annual closure of the Chum Salmon Savings Area would also be suspended. The suspension will go into effect so long as the pollock cooperatives and CDQ groups have in place an effective salmon bycatch voluntary rolling “hot spot” (VRHS) closure system to avoid salmon bycatch.

A full discussion of the VRHS closure system, the Inter Cooperative Agreement (ICA), and how the fleet would be organized within this system, is contained in Section 4.3.

5.5.4 Suboption to Alternative 3: Re-impose Regulatory Salmon Savings Area Closures if Reported Non-compliance with Agreement Merits Expedited Action.

Option 1: Reimpose regulatory salmon savings closures if reported non-compliance with agreement merits expedited action

Under this suboption, the Council may recommend re-imposition of the regulatory salmon savings area closures on an expedited basis if the situation merits this recommendation. The Inter Cooperative Agreement (ICA) managers will report to the Council immediately if there is non-participation or non-compliance without effective enforcement action under the VRHS system. In that event, the Council may recommend re-imposition of the regulatory salmon savings area closures on an expedited basis. If the regulatory closure area system is reinstated, it is the Council’s intent that the closure areas be based on the most recent information available and if the analysis of Amendment Package B’s Alternative 1 supports the approach, with regular adjustments.

Option 2: Maintain the regulatory salmon savings area triggers and closures but participants in a cooperative voluntary rolling hotspot (VRHS) system would be exempted from compliance with savings area closures. This exemption is subject to Council approval and review of the effectiveness of a VRHS system.

Under this option, the existing salmon savings area closures would remain in place. Pollock cooperatives and CDQ groups who participate in a voluntary rolling "hot spot" (VRHS) closure system to avoid salmon bycatch will be granted an exemption to the existing closures. Cooperatives or other vessels which are not participating in a VRHS system will be subject to the savings area closures if triggered.

Suboption (applies to option 2): Extend the exemption to the chum salmon savings area closure to vessels in the trawl cod and/or flatfish targets.

Under this suboption, vessels in the trawl cod and/or flatfish target fisheries would be exempt from compliance with the chum savings area closure. Vessels in these target fleets are not required to participate in a VRHS system to obtain the exemption.

5.6 Analysis of the Alternatives

This analysis of Alternatives addresses the potential costs and benefit of the alternatives on the BSAI trawl pollock fishery. Section 3.6 of this EA/RIR/IRFA provides a brief summary of relevant characteristics of the fishery. A detailed description of the fishery can be found in the *Alaska Groundfish Fisheries Final Programmatic Supplemental Environmental Impact Statement* (Groundfish PSEIS; NMFS 2004b) Sections 3.1-3.5 of this EA/RIR/IRFA present the necessary background to this analysis of alternatives and will not be repeated here. . However, a brief overview of potentially affected salmon fisheries is presented here.

Potentially Affected Commercial and Subsistence Salmon Fisheries

Analysis of the stock composition of Chinook salmon incidentally caught in the BSAI trawl fisheries has shown that the stock structure was dominated by western Alaska stocks. Stock composition of chum salmon indicates a small proportion is of Alaska natal origin. This section describes recent trends in the commercial and subsistence salmon fisheries in potentially affected areas. The data cited here is from published Alaska Department of Fish and Game reports. Data tables from these reports are cited directly and appear in Appendix 5.

Yukon River

The Yukon River Salmon Fishery is among the most complex, in terms of management, in Alaka. The fishery is composed of four stocks; Chinook, summer chum, fall chum, and coho. The Alaska Department of Fish and Game manages the overall Yukon salmon fishery for escapement needs and, in portions of the region, jointly manages subsistence harvest with the U.S. Fish and Wildlife Service. In addition, the U.S./Canada panel of the Pacific Salmon Treaty annually negotiates escapement objectives for the Canadian portion of the Yukon River. The fishery supports subsistence, personal use, sport, and commercial harvests of salmon. For a complete treatment of the management of this fishery please refer to 2005 Yukon Area Subsistence, Personal Use, and Commercial Salmon Fisheries Outlook and Management Strategies (Bue & Lingnau, 2005)

The Alaska Board of Fisheries has designated Yukon River Chinook as a stock of yield concern and summer chum as a stock of management concern. As in other areas of the State, subsistence fishing has highest priority over other uses. ADF&G utilizes a subsistence fishery schedule as well as emergency orders to ensure adequate subsistence fishing opportunities are made available. There is also a personal use fishery schedule. Commercial openings are made when available surpluses are determined to be available.

Table 4 of the Yukon River 2004 Summer Information Letter (ADF&G 2004b) provides historic data on Yukon commercial Chinook salmon sales and estimated harvests from 1961-2004. In the lower Yukon River Chinook harvests have trended downwards since the mid 1990s when nearly 120,000 Chinook were harvested. By 2001, there were no commercial Chinook openings in the Yukon River. Since 2001, the Chinook run has improved enough to allow for commercial openings. Commercial Chinook harvest on the lower Yukon have improved considerably, however the 2004 harvest of 52,565 Chinook was still 27% below historic average. The Upper Yukon River, while accounting for a much smaller proportion of the total catch, has had a similar trend in Chinook harvests. The 2005 outlook is for the run to achieve escapements, support normal subsistence harvests, and allow a below average commercial harvest.(Bue & Lignau, 2005)

Table 5 from the Yukon River 2004 Summer Information Letter (ADF&G 2004b) provides historic data on Yukon commercial summer chum salmon sales and estimated harvests from 1967-2004. Lower Yukon summer chum harvests have declined from the period peak of over 1 million fish in 1988 to zero commercial harvests in 2001. The 2004 harvest of 19,775 summer chum was 71.6% below the ten-year historic average.

Table 6 in the Yukon River 2004 Summer Information Letter (ADF&G 2004b) shows how participation of permit holders has changed in the Yukon summer fisheries. Despite dramatic declines in harvest of both Chinook and summer chum, the number of permits fished in Lower Yukon commercial openings has remained high. The 2004 participation by 550 permit holders was about 10% below the ten year historic average. In contrast, the upper Yukon has seen a marked decrease in permits fished as harvest has fallen. Nearly 160 permits were fished in the late 1980s but that number had fallen to 37 in 1999. Participation in 2004 was down to 20 permit holders, or 71.3% below the ten year average.

Table 7 of the Yukon River 2004 Summer Information Letter (ADF&G 2004b) provides historic data on the value of the Yukon summer Chinook and chum fisheries. A review of price data shows that Chinook and chum prices have fluctuated over time but have remained relatively high in recent years. Overall Chinook value has fallen, as harvests have fallen, from a peak value of more than $10 million in 1992 to zero in 2001. The 2004 Chinook value was $3,101,957, which was shared by 570 participants. Summer chum value has fallen from a period high of more than $6 million in 1988 to zero in 2001. In 2004, the summer chum commercial value was $18,529.

Yukon fall chum and coho commercial harvests have occurred in six of the past ten years and have been restricted by buyer interest. Over that time, harvests have been decreasing. In 2004, market conditions and lack of buyer interest restricted fising, despite harvestable surpluses of fall chum and coho, to a single district. This resulted in harvests of 24,342 fish, or about 63% of the 65,500 ten-year average. The combined value is estimated to be $11,120, or 88% below the ten-year average of $92,261 (ADF&G Yukon Fishery Season Summary, 2004).
The Alaska Department of fish and Game estimates Yukon subsistence harvests from analysis of household subsistence surveys. Table 4 from the 2004 Yukon fall Chum and Coho Information Letter (ADF&G 2004a) provides historical estimates of subsistence chum harvests by community and table 5 provides similar for Yukon coho. Unfortunately similar data tables are not readily available for subsistence harvests of summer chum and Chinook. A review of subsistence harvests shows a similar declining trend in fall chum harvests as seen in the commercial fishery but coho harvests have been more

steady. Of course, subsistence harvests were allowed in the years when commercial harvests were not allowed and are given highest priority among users.

Kuskokwim River, Kuskokwim Bay

The Kuskokwim River commercial and subsistence fishery is currently being managed under the Kuskokwim River Salmon Rebuilding Management Plan. These commercial and subsistence fisheries have historically included Chinook, chum, sockeye and coho. A major focus of management under the rebuilding plan is to allow adequate fishing time to meet subsistence needs. There are also subsistence, commercial, and sport fisheries in the Kuskokwim Bay area under a separate management plan. (Ward, et.al. 2003)

Unlike other regions, licenses and permits have not been required for subsistence salmon fishing in the region. Nor have there been annual subsistence harvest limits, however, daily limits and gear restrictions are in place in some areas within the region. Under the rebuilding plan, subsistence fishing with gillnets and fish wheels is restricted during June and July by a fishing schedule of four consecutive days per week; rod and reel subsistence fishing is allowed all week. As a result, subsistence fishers are constrained in the amounts they can harvest each week, which may require more time spent to achieve needed harvests. According to the ADF&G Preliminary 2004 Kuskokwim Area Salmon Fishery Summary, " Subsistence fishers were generally satisfied with subsistence fishing opportunity, however, not all fishery are satisfied with the subsistence fishing schedule.

Under the rebuilding plan the commercial fishery in Kuskokwim River can only be opened in June and July once escapement and subsistence goals have been met. In 2004 this resulted in a Chinook, chum, and sockeye fishery limited to two openings in each of two subdistricts. A 22 opening coho fishery occurred in August and September. Similar schedules are expected for 2005. The results of the 2004 Kuskokwim river fishery are that 390 individual permit holders, 28% below the ten year average of 539, recorded commercial landings. These landings amounted to 2,300 Chinook, 20,429 chum, 9,743 sockeye, and 433,809 coho. While it was a good year for coho, landings of other salmon were below recent 10-year averages. However, Chinook and chum commercial harvests appear to be rebounding from extremely low levels observed in the early part of the decade (see Table 5 From appendix to Ward et.al.).

Kuskokwim Bay Commercial fisheries also rebounded slightly during the 2003 and 2004 seasons. The ADF&G Preliminary 2004 Kuskokwim Area Salmon Fishery Summary indicates that "fishing effort in 2004 was similar to the increased effort seen in 2003, but remained well below the high effort seen from the mid-1980's through the mid-1990's." The report also indicates that "Chinook and coho harvests were above the recent 10-year averages and sockeye and chum were below the 10-year averages. Fishery values remained depressed with $404,986, or 84% of the ten-year average, earned in Kuskokwim bay (District 4). The Goodnews bay (District 5) fishery earned $135,246, or 68% of the 10-year average.

Norton Sound

The Norton Sound 2005 Annual Management Plan indicates that during the late 1990s and early 2000s there has been a decline in the abundance of Chinook, chum, and coho salmon. While the 2004 coho return improved somewhat, the Board of Fisheries maintained chum salmon as a stock of concern in the region in 2004. The 2005 outlook was for a below average Chinook run with only 100-1000 fish harvested commercially and no restrictions on subsistence harvest. Chum harvests were projected to be between 15,000 and 25,000 fish, or on par with historical averages. However, restrictions are being placed on subsistence chum harvests in the Nome subdistrict.

Table 1 in the Norton Sound 2004 Fishing Summary (ADF&G 2004d) provides historic salmon catches by species in the Norton Sound Disctrict from 1961-2004, Commercial Chinook catches have trended down substantially in the late 1990s and early 2000s. As recently at 1997, more than 12,000 Chinook were commercially harvested in the region. In 2000, commercial Chinook harvest had declined to just 752. By 2004, no commercial Chinook harvest was allowed. However, subsistence Chinook fishing has been allowed to continue without restrictions on harvest numbers.

The data also document A longer term decline in commercial harvest of chum salmon. From peak numbers of more than 300,000 in the 1980's, Commercial harvest of chum salmon declined to a period low of just 600 fish in 2002. The 2004 commercial chum harvest was 6,296. Commercial harvest of pink salmon has not occurred in the past several years because of market conditions.

Table 4 in the Norton Sound 2004 Fishing Summary (ADF&G 2004d) provides the total value of Norton Sound commercial salmon harvest from 1961-2004 and also provides the numbers of permit holders active in the commercial salmon fisheries. The decline in catch, combined with declining salmon prices since the early 1980s, has depressed overall fishery value from a peak of over $1 million in 1982 to a period low of just $2,941 in 2002. Participation has fallen from highs in the 1970s to as few as 12 in 2002. Since 2002, some improvement in value has occurred, largely due to strong coho returns.

The Norton Sound subsistence fishery is managed under a permit system with annual harvest limits specific to each body of water in the region. There are also gear restrictions that limit use of gillnets to reduce take of Chinook and coho, which each have a 10 fish per season per household limit. Table 4 in the Norton Sound Salmon Fisheries Summary 2003 (Menard, J., 2003b.) provides historic subsistence harvest in the Norton Sound region from 1963-2003. Subsistence surveys were halted in 2004 due to budget constraints. Overall subsistence salmon harvest in the region peaked in the early 1990s with 134,050 fish caught in 1996. A downward trend in overall harvest occurred in the late 1990s, but the 2002 harvest of 103,489 fish was above historic averages. Within these overall trends, however, are downward trends in Chinook, sockeye, and chum harvests since the early 1990s with replacement by coho and, more recently, pink salmon. The 2002 pink harvest of 64,354, for example, was the majority share of the season total of 103,489 salmon.

Kotzebue

Table 1 from 2005 Kotzebue Salmon Management Plan (ADF&G 2005a) provides historic data on the Kotzebue District chum salmon fishery. The Kotzebue fishery is primarily a chum salmon fishery, with some Chinook, sockeye, and Dolly Varden taken incidentally. This fishery has been constrained in recent years by market conditions. Data on numbers of chum caught commercially show considerable fluctuations over the years. A dramatic decline in harvest from 211,672 in 2001 to only 8,390 in 2002 is likely the result of just three permit holders fishing in 2002, due to lack of buyer interest. This is in sharp contract to the 66 permits fished in 2001. While permits fished have increased in recent years (43 in 2004) harvest has not recovered to near historic levels but is similar to harvest by similar numbers of permit holders fishing in previous years.

Very little published information is available on The Kotzebue subsistence fishery. The 2005 Kotzebue District Salmon Fisheries Management Plan indicates that 18,684 salmon were harvested in the Kobuk River and 2,234 salmon were harvested from the Noatak River with chum salmon making up 90% of the harvest. As in other areas, the subsistence fishery takes precedence over the commercial fishery. There appear to be no indications, in published management reports and summaries, that subsistence harvest opportunities are lacking in the region.

Bristol Bay

The Bristol Bay region supports one of the largest commercial salmon fisheries in the State of Alaska. The fishery, both for commercial and subsistence, is dominated by sockeye salmon. However, both subsistence and commercial harvesters in the region catch all five species of Pacific salmon.

Tables A4 and A5 in the 2004 Bristol Bay Annual Management Report—Westing et.al. 2005) provide historic Chinook and chum commercial catch by district for the Bristol Bay region. Chinook harvests generally trended downwards from the late 1990’s to mid-2000’s, with total harvest well below 20-year and 10-year averages. However, Chinook harvests have improved considerably in recent years. The most pronounced increases have been in the Nushagak region. The 2004 total Chinook harvest was 106,461, which exceeds the 20-year average of 69,481 by nearly 40,000 fish. It is noteworthy that region wide Chinook harvest has maintained a consistent average over the past ten years and the ten years prior to that even though wide fluctuations have occurred in individual districts.

Bristol Bay Chum harvests have shown similar trends. However, the 2004 harvest of 729,629 chum was below the nearly 932,970 chum harvested in 2003 and lower than the 20-year average of nearly 1 million fish. It is important to note here that the past ten year average and the average of the ten years prior to that differ substantially. From 1984 to 1993, the annual average commercial chum harvest in Bristol Bay was 1,268,283. In contrast, the 1994-2003 average of 674,156 was a little more than half the average of the previous ten years. Thus, it appears that Bristol Bay commercial chum harvests are in a downward trend and have not yet begun to recover to the extent that commercial Chinook harvests have recovered to near long-term average levels.

Table A26 in the 2004 Bristol Bay Annual Management Report(Westing et.al. 2005) provides the historic value per pound of Bristol Bay salmon and table A27 provides the historic estimated ex-vessel value of Bristol Bay commercial salmon catch by species. A review of price data revels that prices for all five species have generally trended downward from the late 1980’s/early 1990’s to present. This trend has, of course, coincided with the well-documented expansion of the farmed salmon industry around the world. Chum prices equaled the 20-year low of $.09 per pound in 2004 and Chinook prices were only slightly better at $.39 per pound, or slightly more than half of the 20-year average of $.70 per pound. Overall fishery value has followed the downward trend in prices

Table A29 in the 2004 Bristol Bay Annual Management Report (Westing et.al. 2005) provides historic data on subsistence salmon participation and harvests by species by district, and bay wide. Participation was greatest among residents of the Naknek-Kvichak and Nushagak districts. Total permits issued in 2004 number 1,100, which is quite similar to the 20-year average of 1,108, but lower than the 1993-2003 average of 1,176. Harvest numbers show that sockeye salmon dominates the subsistence catch in all districts, but that subsistence sockeye harvests have been declining in recent years. In contrast, subsistence Chinook harvests hit a 20 year high of 21,231 in 2003 (note error in ADF&G table of repeated 2002 numbers after 2003 line) before falling to 18,012 in 2004. These numbers considerably exceed the 20-year average subsistence Chinook harvest of 14,934 as well as the 1984-1993 average of 13,842 and have pushed the 1993-2003 average to 16,026. While it appears that subsistence Chinook harvests in the Bristol Bay area are improved over historic levels, there were some significant declines in Chinook harvests in districts (e.g. Naknek-Kvichak) within Bristol Bay during the early 2000’s.

The Importance of Subsistence Harvest

Many rural Western Alaska communities have mixed subsistence-market based economies where subsistence harvests are a prominent part of the local economy and the social welfare of the people

(Wolfe and Walker, 1987). The subsistence salmon harvests in the AYK region, for example, have cultural and practical significance to many of the approximately 4,500 households residing in 38 communities in the region, and have been relied upon for food by indigenous peoples since their original immigration into the region (Buklis, 1999). In Western Alaska, entire families migrate seasonally to summer fishcamps. These annual migrations, and fishcamp life itself, are important elements of rural and cultural life. Subsistence studies have estimated that fish make up as much as 85% of pounds of subsistence fish and wildlife harvested in the AYK region, with salmon contributing as much as 53% and as much as 650 pounds per capita. (Buklis, 1999).

It is important to understand that subsistence harvesting activity is not without cost. Subsistence salmon harvesters generally use the same or similar type of set and/or drift gillnets, boats, and other equipment as commercial harvesters. Some subsistence harvesters also participate in commercial salmon fisheries and they depend on income earned in the commercial fisheries to help offset the costs, both of acquiring equipment and of operating it, associated with subsistence salmon fishing. While it appears that sufficient opportunities for subsistence harvests have occurred in recent years, the dependence on commercial catch to offset costs incurred in the subsistence fishery may result in financial difficulties if commercial harvests are depressed.

Another factor is the relative value of Chinook versus chum salmon. A single commercially harvested Chinook salmon weighs, and is worth, considerably more than a chum salmon. It is likely more difficult to offset subsistence costs with chum salmon commercial catch if commercial Chinook harvests are depressed. This problem has been occurring over the past decade as the value of chum salmon has fallen dramatically. Buklis described this with the example that in 1976 the sale of 6 summer chum salmon roughly equaled the value of 1 Chinook salmon. In 1988, the relationship was 14 to 1 and by 1996 it was 65 to 1.(Buklis, 1999).

In some chum fisheries in the region, commercial harvest has not occurred due to a lack of buyer interest. (ADF&G 2004a) Buyer interest has likely been depressed by declining market value for chum salmon, but possibly also due to the uncertainties over harvest volumes that have existed with declines in chum runs. While chum runs appear to be improving, it is unclear whether market conditions will continue to hold prices down and keep buyers away.

In several areas of Alaska, the value of salmon harvested in personal use, sport, and subsistence fisheries has been estimated via the economic travel cost modeling method. Such studies have been carried out on the Copper and Gulkana river dipnet fisheries (Henderson, et. al., 1999; Layman et. al., 1996) Henderson, et. al., found that that rural areas with high unemployment and high percentages of subsistence users had higher visitation rates to the Copper River than more urban areas, although the differences were not statistically significant. They also found that estimated consumer surplus per Copper River trip, in 1996, ranged from $50.93 to $56.88 depending on assumed opportunity cost of time. Another important finding was that these estimates were within the lower bound range of the replacement costs of the catches. However, they are lower than the upper bound estimate of foregone gross ex-vessel (i.e, commercial) average trip revenue of $98.09. This suggests that personal use and subsistence values, while possibly greater than sport value, are potentially less than commercial value of the catch. Henderson et. al. point out that the opportunity cost of personal use and subsistence harvest to commercial fishermen would be the difference between the estimated ex-vessel value and the incremental cost of catching a fish.

Layman et.al. estimated that Gulkana River sport trip consumer surplus ranged from $26.05 to $32.35, using opportunity cost of time of 30% and 60% of wage rate respectively, in 1992. Henderson et.al. updated these numbers for inflation to 1996 values of $28.55 and 35.46 per trip. Thus, sport trips on the Gulkana appear to generate smaller consumer surplus values than do subsistence trips on the Copper river. However, the quantity of fish that may be retained in the Copper River subsistence fishery is much larger than in the Gulkana sport fishery.

Unfortunately, the range of consumer surplus benefits found in the above mentioned studies cannot be directly applied (e.g. via benefits transfer) to subsistence activity in Western Alaska. This is largely because it is difficult to define a similar "trip" in Western Alaska due to differing transport modes (e.g riverboat vs. car) and duration, e.g a week or an opening vs. a day or a weekend. The results of these studies do, however, suggest importance to rural residents is higher than non-rural and that subsistence harvest has value potentially as high as replacement cost.

5.6.1 Alternative 1

Alternative 1 is the no-action alternative (status quo). This alternative is the baseline alternative against which the costs and benefits for action alternatives have been estimated. This alternative would leave the existing Chinook and chum salmon bycatch reduction measures in place in the BSAI trawl fisheries.

Foregone Value of Bycatch

The origin of salmon[6] taken as bycatch in the Bering Sea includes rivers in western Alaska, Southcentral and Southeast Alaska, Asia, British Columbia and Washington (Witherell et al. 2002). Recent genetic stock studies in the Bering Sea have looked at the origin and distribution of chum salmon (Urawa et al. 2004; Moongeun et al. 2004). Results indicated that the estimated stock composition for maturing chum salmon was 70% Japanese, 10% Russian and 20% North American stocks, while immature fish were estimated as 54% Japanese, 33% Russian, and 13% North American (Urawa et al. 2004). Stock composition of North American fish was identified for Northwest Alaska, Yukon, Alaskan Peninsula/Kodiak, Susitna River, Prince William Sound, Southeast Alaska/Northern British Columbia and Southern British Columbia/Washington State. Of these the majority of mature chum salmon for North America stocks came from Southern BC/Washington State and Alaska Peninsula/Kodiak (Urawa et al. 2004). For immature chum salmon, the largest contribution for North American stocks came from Southeast Alaska/Northern BC, followed by Alaska Peninsula/Kodiak and Southern BC/Washington State.

A study completed in 2003 estimated age and stock composition of Chinook salmon in the 1997-1999 BSAI groundfish fishery bycatch samples from the NMFS observer program database (Myers et al. 2004). Results indicated that bycatch samples were dominated by younger (age 1.2) fish in summer and older (age 1.3 and 1.4) fish in winter (Myers et al. 2004). The stock structure was dominated by western Alaskan stocks, with the estimated stock composition of 56% Western Alaska, 31% Central Alaska, 8% Southeast Alaska-British Columbia and 5% Russia. In the winter, age-1.4 western Alaskan Chinook were primarily from the subregions of the Yukon and Kuskokwim. In the fall, results indicated that age-1.2 western Alaskan Chinook were from subregions of the Kuskokwim and Bristol Bay with a large component of Cook Inlet Chinook salmon stocks as well (Myers et al. 2004).

Evaluating the foregone potential commercial and/or subsistence value of salmon bycatch is problematic. Information on the natal origin of salmon bycatch (see above) indicates a wide distribution of natal origin, both within and outside of Alaska. Further, the proportion that would survive to reach their natal streams, were they not captured as bycatch, is not completely known. The proportion of salmon bycatch that might escape to spawning grounds (i.e. not be harvested) is also not known. Given these uncertainties, it is difficult to determine where these salmon might have been caught and how many might have been

[6] Section 3.5 provides much greater detail on salmon stock origin.

caught in commercial or subsistence fisheries. Therefore, it is difficult to determine what price, or subsistence value, they might bring and what market they might enter.

In order to provide some estimate of potentially foregone value, this analysis presents a worst-case scenario of assuming all salmon would reach Alaska natal streams and be harvested. Given the wide distribution of natal streams of origin within Alaska, statewide average weight and statewide average price has been used to estimate foregone value. These estimates are shown in Table 5-1.

Table 5-1 Foregone Value of Salmon Bycatch in BSAI Pollock Trawl Fisheries (1000s).

Year	Chinook Bycatch	Chinook lbs.	Chinook Value	Other Bycatch	Other lbs.	Other Value
1999	10.2	174.2	$340	44.2	396.5	$71
2000	4.1	69.0	$115	56.6	502.6	$136
2001	30.1	522.5	$894	52.8	441.9	$150
2002	34.2	562.9	$760	78.6	676.7	$129
2003	46.3	752.4	$986	190.9	1328.7	$252

Sources: Table 3.1 and price and weight data from http://www.cf.adfg.state.ak.us/geninfo/finfish/salmon/salmhome.php

Table 5-1 shows that the potentially foregone value of salmon bycatch has increased dramatically over the past several years. Chinook value increased from $115 thousand in 2000 to nearly $1 million in 2003. Chum value nearly doubled from $136 thousand to $252 thousand during the same time period. These estimates greatly overstate the actual harvest that might have occurred if salmon bycatch had not been taken in the Bering Sea pollock trawl fishery.

Operational costs

The current geographical boundaries of the BSAI Chinook and chum salmon savings areas are depicted in Figures 3-3 and 3-4 of this EA/RIR/IRFA. A review of the closure areas and distribution of fishing effort shows that they are large areas that lie between the primary port of Dutch Harbor and the fishing grounds utilized by the fleet when these areas are closed. A further consideration is that these areas can be closed simultaneously.

When the savings areas are closed fishing effort is sometimes pushed to the distant (from Dutch Harbor) edges of the closure area. As a result, Catcher Vessels (CVs) and Catcher processors (CPs) must travel a considerably longer distance from port to fish and must avoid the large closure areas. If they are actively fishing at the time of a closure they must relocate outside of the area. This increases their operational costs of fuel consumption, crew accommodation (food etc.) and opportunity costs of time spent in travel mode rather than in fishing mode.

These operational cost increases are likely more severely felt by the CVs as they must return to port to offload their catch to shoreside processors frequently. CPs face similar operational cost increases for relocation of fishing effort. However, they are not required to return to port as frequently as CVs.

Vessel Safety

Although large and highly capable vessels prosecute the BSAI trawl fishery, much of the fishery is conducted during the fall and winter months when the Bering Sea can be extremely rough and the salmon savings areas closures can occur. The closures can force fishing effort to the distant edges of the closure areas, potentially exposing vessels to more difficult conditions and longer run times to seek shelter in port if conditions are extremely bad. Under such conditions, there is heightened potential for crew injury and vessel damage. These impacts would be most likely felt by CVs operating in the Catcher Vessel Operational Area (CVOA).

Quality

Longer run times to port during salmon savings area closures translate into quality reductions for product delivered by CVs to dockside. Groundfish must be processed within a relatively short period of time after harvest. Assuming groundfish catch rates remain similar outside the closure areas as those within the closure areas, the added time from harvest to processing would be the increased running time from the distant edges of the closure areas to port. If, however, groundfish catch rates are lower outside of the closure area, then additional fishing time will be required to fill the hold. The result would be longer times from harvest to processing for the first fish caught on the trip. This impact would be worse in times of bad weather.

Increased time of harvest and running time can lead to reductions in quality. Reduced quality can, in turn, result in reduced ex-vessel price, increased processing costs, reduced yield, elimination of high valued product forms, and reduced final product value. These effects translate into revenue reductions for vessels and processing plants as well as cost increases for processing plants. One processor in the region has reported a dramatic reduction in grade and value of surimi and the inability to process fillets due to low quality during the times when the salmon savings area closures are in effect.[7]

Management and Enforcement Costs

Management and enforcement of the BSAI Chinook and chum salmon savings area closures bears some administrative costs. Such costs include staff time and resources needed to monitor bycatch and issue closure notices as needed. All vessels in the affected fleet are 100% observed and are required to operate Vessel Monitoring Systems (VMS) that automatically detect whether they violate a closure area. Enforcement costs are thus minimized, unless a suspected violation results in investigative costs.

Endangered Species Act, Section 7 Consultation

Under the status quo alternative, the 2004 trawl fishery exceeded the current Endangered Species Act (ESA) incidental take permit cap of 54,000 Chinook salmon This triggered an ESA Section 7 Consultation. There is a risk, under the status quo, that the incidental take permit cap could be exceeded again in 2005 and perhaps in future years. This would result in further ESA Section 7 consultations. Thus, the need to protect ESA listed Columbia/Snake river salmonids may necessitate future restrictions on the BSAI trawl fishery. The type and magnitude of any such restrictions are unknown at this time. Thus, costs associated with such actions cannot be presently defined. However, the risk of such actions warrants consideration here.

Bycatch Reduction Benefits

The BSAI chum and Chinook salmon savings areas were enacted to reduce salmon bycatch in the trawl fisheries. The salmon savings areas were developed to incorporate the areas with the highest salmon bycatch rates observed at the time, and during the times of the year, when salmon were found to be in greatest abundance in the areas. While it is not possible to predict reductions in salmon bycatch brought about by these closures, it is likely that some reduction in bycatch has been realized through these

[7] Dr. Greg Peters, Alyeska Seafoods Corp. via Personal Communication with John Gruver on May 18, 2005.

closures over the past several years. Such reductions in bycatch translate into benefits to commercial, subsistence, and possibly even recreational harvesters in the areas of natal origin of the salmon bycatch. In recent years, however, a dramatic increase in BSAI trawl bycatch of Chinook and chum salmon has occurred. Table 5-1 above documents the foregone value of that bycatch as a “cost” associated with the status quo alternative. There may be several explanations for this dramatic salmon bycatch increase. It is possible that ocean abundance of salmon in the BSAI has increased. However, it is also possible that the boundaries and timing of salmon area closures are no longer as effective as they once may have been. Data on bycatch rates (see section 4.1) show that salmon bycatch rates for the portion of the trawl fleet operating outside the closure areas is sometimes higher than observed for the Community Development Quota (CDQ) trawl fleet operating inside the closure areas. This suggests that the benefits of the existing system of salmon bycatch reduction measures may be in decline and the system may not be working as well as in the past.

5.6.2 Alternative 2

Alternative 2 eliminates the BSAI Chinook and chum salmon savings areas and their associated bycatch reduction measures. However, Alternative 2 does not replace these measures with other salmon bycatch reduction measures in the Bering Sea pollock trawl fishery. The result, assuming the current bycatch reduction measures have been in any way successful, would be higher rates of Chinook and chum salmon bycatch in this fishery. Thus, the benefits associated with bycatch reduction under the status quo (Alternative 1) discussed above may be lost under this alternative.

Many of the costs identified under the status quo alternative would be eliminated under Alternative 2. With elimination of the savings areas, and associated closures, the industry would be able to fish in a much greater area of the Bering Sea and would not bear the costs of avoiding the areas. This would likely result in reduced operational costs for both CPs and CVs, reduced CV trip costs, potentially improved vessel safety, improved quality of CV harvest, associated reductions in shoreside processing costs and improved revenue for CVs and shoreside plants. Management and enforcement costs associated with the closure areas would be eliminated. However, observer coverage would presumably remain the same. These effects are essentially the opposite of what is occurring under the status quo for these cost categories.

Not all costs associated with the status quo would be expected to decrease under alternative 2. The costs associated with foregone salmon harvests in the commercial and subsistence salmon fisheries in and off Alaska would be expected to increase if salmon bycatch increases. It is not possible to predict the magnitude of such increases. Nor is it possible to accurately predict what proportion of salmon bycatch would eventually be caught in commercial and/or subsistence fisheries in and off Alaska were it not captured in the BSAI trawl fisheries. Thus, it is not possible to quantify the potentially foregone commercial and subsistence salmon value associated with increased bycatch under this alternative.

Another “cost” that may be expected to increase under this alternative, as compared to the status quo, is the risk of future restrictions being placed on the BSAI trawl fisheries if Chinook salmon bycatch continues to exceed the Chinook salmon incidental take cap under the Endangered Species Act (ESA). The current ESA Chinook incidental take cap is set at 54,000 Chinook salmon. This cap was exceeded under status quo management in 2004 and has triggered an ESA section seven consultation.

Under Alternative 2, there is the risk that, in the absence of any salmon bycatch reduction measures, future bycatch in excess of the ESA cap could result in the imposition of restrictions on the BSAI trawl fleet under the ESA. The cost to industry of such actions cannot be predicted but there is clearly a risk that such costs could be incurred, should Alternative 2 be adopted, the ESA Chinook cap is exceeded again in the future, and ESA section 7 consultation finds that restrictions are necessary.

5.6.3 Alternative 3

Alternative 3 would eliminate the current suite of salmon bycatch reduction measures in the Bering Sea pollock trawl fishery and replace it with an industry operated "voluntary rolling hot spot"(VRHS) management system. The proposed system is quite complex and is centered on a contractual legal agreement between the members of the American Fisheries Act (AFA) Cooperatives. A full discussion of the VRHS closure system, the Inter Cooperative Agreement that implements it (ICA), and how the fleet would be organized within this system is contained in Section 4.3. Several key elements are important to mention here.

The ICA is structured based upon a coops' bycatch rate as compared with a pre-determined "Base Rate". Once the Base Rate is determined all provisions for fleet behavior, closures and enforcement are based upon the proportion of the coops rate to the Base Rate. Tier assignments are calculated from the coops' proportional bycatch rate to the Base Rate with higher tiers corresponding to higher bycatch rates. These tiers then determine how access to specific areas will be determined following designation of "hot spot" closures. These areas are to be avoided by coops in higher tiers.

Foregone Value of Bycatch

The discussion of foregone value of bycatch presented for the status quo (Alternative 1) provides a worst-case scenario estimate of the foregone value occurring under current salmon bycatch reduction measures. A comparison of this alternative with the status quo would require an estimate of bycatch levels expected to occur under the VRHS system. However, the VRHS system incorporates several variables that are not presently known and/or will change during the fishing year. These include the base rate, tier assignment, as well as the size and location of rolling closure areas. Further, the VRHS does not appear to contain a provision to restrict salmon bycatch to a defined cumulative level via either an intended level (soft cap) or a mandated level (hard cap). Thus, it is not possible to determine whether foregone value of bycatch would be expected to increase, decrease, or stay the same under this alternative as compared to the status quo.

The VRHS system does, however, attempt to more effectively reduce bycatch by restricting vessels that have the greatest bycatch rates while not restricting lower tier vessels to the same extent. This change essentially replaces a strict "command and control" restriction that applies to all vessels regardless of their bycatch rates with a variable system that creates incentives to reduce salmon bycatch. Restrictions are imposed on those vessels that have the highest bycatch rates thereby creating the potential to reduce bycatch more effectively by "penalizing" the worst offenders. The system also has the potential to more effectively reduce bycatch because closures are dynamic and change with observed incidences of high bycatch. This contrasts with the static closures of the status quo that were developed based on historic bycatch rates. These static closures may not currently be as effective at reducing bycatch as dynamic closures

The ICA and VRHS also create the potential for some level of mitigation of foregone commercial and/or subsistence value for Western Alaska communities. The ICA includes the Bering Sea Fishermen's Association and the Yukon River Delta Fishermen's Association as third party participants. These groups are given some ability to enforce the provision of the ICA on its participants via legal action (see section 4.3). As such, the ICA provides some mitigation potential to these groups and thereby to the Western Alaska communities their members reside in.

In theory, this system may be more effective at reducing bycatch than the strict "command and control" system imposed under the status quo. Thus, this system has the potential to be a more effective bycatch reduction tool than the status quo management system, while at the same time likely reducing overall costs to industry. Thus, the value of foregone commercial and/or subsistence harvest of salmon bycatch may decrease under this alternative.

Management and Enforcement Costs

This alternative would transfer all salmon bycatch management and enforcement responsibilities, and associated costs, to the AFA pollock cooperatives and their designated contractor "Sea State." Given the variable and unknown nature of many key parts of the VRHS (base rate, tier assignment, closure size and location) it is not possible to quantify the cost to industry of this system. However, it must be noted that the industry has volunteered to bear this cost in hopes of reducing operational costs associated with the status quo while at the same time attempting to reduce salmon bycatch. It is also important to note that many of the participants in the new VRHS are currently participating in a "hot spot" system and will not likely bear additional expense.

Operational costs

The removal of large salmon savings area closures and their replacement by more discrete VRHS closures is likely to reduce operational costs. The vessels with the highest bycatch rates will be restricted from "hot spots" and these closure areas will be dynamic. The result will be that vessels with low bycatch rates will be allowed access to productive fishing grounds that would likely be closed under the status quo. For this reason, operational costs for such vessels, and the fleet overall, are likely to be reduced under this alternative as compared to the status quo.

Vessel Safety

The removal of large salmon savings area closures and their replacement by more discrete VRHS closures is likely to improve vessel safety by allowing fishing closer to port. Vessel safety is likely to improve under this alternative as compared to the status quo.

Quality

The removal of large salmon savings area closures and their replacement by more discrete VRHS closures is likely to improve product quality for the CV fleet and for shoreside processors. The hot spot closures likely will not apply to all CVs and will allow fishing closer to port. Run times to and from the fishing ground are likely to be reduced. The fleet will also have greater flexibility to locate concentrations of groundfish in areas that are closed under the status quo, thereby reducing time spent fishing. The result of these changes is that the CV fleet will likely be able to deliver fish to shoreside processors more quickly. This, in turn, will likely improve ex-vessel revenue, improve final product quality and associated revenue, and reduce shoreside processing costs.

Endangered Species Act, Section 7 Consultation

A "cost" that may be expected to increase under this alternative, as compared to the status quo, is the risk of future restrictions being placed on the BSAI trawl fisheries if Chinook salmon bycatch continues to exceed the Chinook salmon incidental take cap under the Endangered Species Act (ESA). The current ESA Chinook incidental take cap is set at 54,000 Chinook salmon. This cap was exceeded under status quo management in 2004 and has triggered an ESA section seven consultation.

Under Alternative 3, there is the risk that, future bycatch in excess of the ESA cap could result in the imposition of restrictions on the BSAI trawl fleet under the ESA. The cost to industry of such actions cannot be predicted but there is clearly a risk that such costs could be incurred, should Alternative 3 be adopted, the ESA Chinook cap is exceeded again in the future, and ESA section 7 consultation finds that restrictions are necessary.

Bycatch Reduction Benefits

Data on bycatch rates (see section 4.1) show that salmon bycatch rates for the portion of the trawl fleet operating outside the status quo closure areas is sometimes higher than observed for the Community Development Quota (CDQ) trawl fleet operating inside the status quo closure areas. This suggests that the benefits of the existing system of salmon bycatch reduction measures may be in decline and the system may not be working as well as in the past.

The VRHS system essentially replaces the strict “command and control” restriction of the status quo with a variable system that creates incentives to reduce salmon bycatch. Thus, this alternative has the potential to more effectively reduce salmon bycatch, and associated benefits of such reductions, in the BSAI AFA pollock trawl fishery.

5.6.4 Alternative 3: Option 1:

This sub-option could result in reversion to the present status quo, where attainment of salmon bycatch limits trigger closure of salmon savings areas. However, salmon savings areas would be amended based on new information. As a result, this suboption, may improve bycatch reduction, and associated benefits, versus the status quo. However, the suboption may impose similar operational cost increases and quality reductions on the industry as the status quo closures presently do. Perhaps the greatest benefit of this suboption is that it increases the incentive for industry to reduce salmon bycatch rates under the voluntary rolling hot spot closure system.

5.6.5 Alternative 3: Option 2:

Under option 2 (as described in section 2.3.2), the regulatory salmon savings area triggers and closures would be maintained, however participants in a cooperative VRHS system would be exempted from compliance with the savings area closures. This exemption would be subject to Council approval and review of the effectiveness of the VRHS system. Under this option, the Pollock cooperatives and CDQ groups participating in the VRHS system will be exempt from the existing closures (both the annual chum closures and additional chum and Chinook if triggered). Cooperatives and other vessels not participating in a VRHS system will be subject to the annual chum closures and additional savings area closures if triggered. The regulatory constraints and potential impacts of this option on alternative 3 are discussed in section 4.3.10.

The effects of this option are essentially the same as the effects of alternative 3 for Cooperatives and other vessesl participating in the VRHS, and essentially the same as the status quo for non-participants. As indicated in section 4.3.10.1, some form of regulatory permit may be required and this could increase management costs slightly. It is also possible that non-particpants may receive some added benefit over the status quo if the VRHS participants significantly reduce their bycatch such that triggers are not met.

Suboption to Option 2:

Under this suboption, vessels in the trawl cod and/or flatfish target fisheries would be exempt from compliance with the chum savings area closure and would not be required to participate in the VRHS system. Although the trawl cod and flatfish target fisheries account for a small proportion of chum salmon bycatch (see section 3.1) the effect of this suboption would likely be similar to the effects of alternative 3 for those sectors.

5.7 Summary of Analysis of Alternatives

Alternative 1, the status quo, has resulted in dramatic increases in salmon bycatch in the Bering Sea pollock trawl fishery in recent years. This translates into foregone salmon value, assuming full terminal harvest of salmon bycatch, of nearly $1 million for Chinook and more than $250 thousand for chum in 2003. These values greatly overstate the actual harvest that might have occurred if salmon bycatch had not been taken in the Bering Sea pollock trawl fishery. Unfortunately, it is not possible to accurately estimate actual harvest value. However, the dramatic increases in salmon bycatch under the status quo likely translate into increases in forgone value and decreased benefits of bycatch reduction. The status quo also bears some risk of future restrictions on the Bering Sea pollock trawl fleet as a result of exceeding the ESA Chinook incidental take permit cap.

Alternative 1 also imposes increased operational costs on the trawl fleet when the salmon savings areas are closed and may adversely affect vessel safety. The closures are also having a detrimental effect on product quality for the CV fleet. The decreased quality appears to have reduced product grade, eliminated fillet production in some cases, and increased shoreside processing facility costs. Alternative 1 also results in some management and enforcement costs to administer the closures and monitor vessel locations.

Alternative 2 would eliminate the salmon savings closure areas altogether. The result would likely be reduced operational costs, improved vessel safety, improved product quality, and reduced management and enforcement costs. However, in the absence of any bycatch reduction measures this alternative may result in further increase in salmon bycatch in the Bering Sea pollock trawl fishery. Were that to occur, the foregone value of such bycatch would increase and the associate benefits of bycatch reduction would decrease, possibly dramatically. This could also result in the Bering Sea pollock trawl fleet significantly exceeding the ESA Chinook incidental take permit cap.

Alternative 3 eliminates the BSAI salmon savings area closures but replaces them with a dynamic system of rolling hot spot closures and creates incentives for individual vessels to reduce salmon bycatch by penalizing the worst offenders. This alternative would likely reduce operational costs, improve vessel safety, and improve product quality. Alternative 3 also have the potential to reduce salmon bycatch more than the status quo management measures. If that potential were realized, Alternative 3 would reduce foregone value of salmon bycatch and increase the overall benefits of bycatch reduction. Alternative 3 also provides some mitigation possibilities for Western Alaska fishing organizations.

Alternative 3 would reduce management and enforcement costs for government agencies by transferring much of that cost to industry. However, the industry has volunteered to bear this cost in hopes of reducing operational costs associated with the status quo while at the same time attempting to reduce salmon bycatch. If bycatch is not reduced under alternative 3 and the BSAI pollock trawl fleet continues to exceed the ESA Chinook incidental take permit cap, unknown restrictions on the fleet could result. The suboption to Alternative 3 increases the incentive for industry to realize bycatch reductions under the alternative.

5.8 Summary of the Significance Criteria

A "significant regulatory action" under E.O. 12866 means any action that is likely to result in a rule that will:

- Have an annual effect on the economy of $100 million or more or adversely affect in a material way the economy, a sector of the economy, productivity, competition, jobs, the environment, public health or safety, or State, local, or tribal governments or communities;
- Create a serious inconsistency or otherwise interfere with an action taken or planned by another agency;
- Materially alter the budgetary impact of entitlements, grants, user fees, or loan programs or the rights and obligations of recipients thereof; or
- Raise novel legal or policy issues arising out of legal mandates, the President's priorities, or the principles set forth in the executive order.

Although the available data do not allow a specific calculation of the net effect on operational revenues or costs, the analysis contained in this RIR has demonstrated that the action alternatives affecting the Bering Sea pollock trawl fishery likely reduce operational costs but may impose some management costs on industry. Given that industry has volunteered to undertake the proposed action, it is likely that industry expects that action to result in positive net benefits.

Based upon the best available information, these actions do not appear to have the potential to produce an annual effect on the economy of $100 million or more, or "adversely affect in a material way the economy, a sector of the economy, productivity, competition, jobs, the environment, public health or safety, or State, local, or tribal governments or communities." The action proposed in Alternatives 2 and 3 would not be expected to meet or exceed the threshold for a "significant" action (as that term is defined in E.O. 12866), either individually or when taken together in any combination as Alternative 2.

Chapter 6 Initial Regulatory Flexibility Analysis

6.1 Introduction

This Initial Regulatory Flexibility Analysis (IRFA) evaluates the impacts, on small entities, of Alternatives designed to reduce salmon bycatch in the groundfish trawl fisheries in the Bering Sea and Aleutian Islands off Alaska.

This IRFA addresses the statutory requirements of the Regulatory Flexibility Act (RFA) of 1980, as amended by the Small Business Regulatory Enforcement Fairness Act (SBREFA) of 1996 (5 U.S.C. 601-612).

6.2 The Purpose of an IRFA

The Regulatory Flexibility Act (RFA), first enacted in 1980, was designed to place the burden on the government to review all regulations to ensure that, while accomplishing their intended purposes, they do not unduly inhibit the ability of small entities to compete. The RFA recognizes that the size of a business, unit of government, or nonprofit organization frequently has a bearing on its ability to comply with a Federal regulation. Major goals of the RFA are: (1) to increase agency awareness and understanding of the impact of their regulations on small business, (2) to require that agencies communicate and explain their findings to the public, and (3) to encourage agencies to use flexibility and to provide regulatory relief to small entities. The RFA emphasizes predicting impacts on small entities as a group distinct from other entities and on the consideration of alternatives that may minimize the impacts while still achieving the stated objective of the action.

On March 29, 1996, President Clinton signed the Small Business Regulatory Enforcement Fairness Act. Among other things, the new law amended the RFA to allow judicial review of an agency's compliance with the RFA. The 1996 amendments also updated the requirements for a final regulatory flexibility analysis, including a description of the steps an agency must take to minimize the significant economic impact on small entities. Finally, the 1996 amendments expanded the authority of the Chief Counsel for Advocacy of the Small Business Administration (SBA) to file *amicus* briefs in court proceedings involving an agency's violation of the RFA.

In determining the scope, or 'universe', of the entities to be considered in an IRFA, NMFS generally includes only those entities that can reasonably be expected to be directly regulated by the proposed action. If the effects of the rule fall primarily on a distinct segment, or portion thereof, of the industry (e.g., user group, gear type, geographic area), that segment would be considered the universe for the purpose of this analysis. NMFS interprets the intent of the RFA to address negative economic impacts, not beneficial impacts, and thus such a focus exists in analyses that are designed to address RFA compliance.

Data on cost structure, affiliation, and operational procedures and strategies in the fishing sectors subject to the proposed regulatory action are insufficient, at present, to permit preparation of a "factual basis" upon which to certify that the preferred alternative does not have the potential to result in "significant adverse impacts on a substantial number of small entities" (as those terms are defined under RFA).

Because, based on all available information, it is not possible to 'certify' this outcome, should the proposed action be adopted, a formal IRFA has been prepared and is included in this package for Secretarial review.

6.3 What is required in an IRFA?

Under 5 U.S.C., Section 603(b) of the RFA, each IRFA is required to contain:

- A description of the reasons why action by the agency is being considered;
- A succinct statement of the objectives of, and the legal basis for, the proposed rule;
- A description of and, where feasible, an estimate of the number of small entities to which the proposed rule will apply (including a profile of the industry divided into industry segments, if appropriate);
- A description of the projected reporting, record keeping and other compliance requirements of the proposed rule, including an estimate of the classes of small entities that will be subject to the requirement and the type of professional skills necessary for preparation of the report or record;
- An identification, to the extent practicable, of all relevant Federal rules that may duplicate, overlap or conflict with the proposed rule;
- A description of any significant alternatives to the proposed rule that accomplish the stated objectives of the proposed action, consistent with applicable statutes, and that would minimize any significant economic impact of the proposed rule on small entities. Consistent with the stated objectives of applicable statutes, the analysis shall discuss significant alternatives, such as:
    1. The establishment of differing compliance or reporting requirements or timetables that take into account the resources available to small entities;
    2. The clarification, consolidation, or simplification of compliance and reporting requirements under the rule for such small entities;
    3. The use of performance rather than design standards;
    4. An exemption from coverage of the rule, or any part thereof, for such small entities.

6.4 What is a small entity?

The RFA recognizes and defines three kinds of small entities: (1) small businesses, (2) small non-profit organizations, and (3) small government jurisdictions.

Small business. Section 601(3) of the RFA defines a 'small business' as having the same meaning as 'small business concern', which is defined under Section 3 of the Small Business Act. 'Small business' or 'small business concern' includes any firm that is independently owned and operated and not dominant in its field of operation. The SBA has further defined a "small business concern" as one "organized for profit, with a place of business located in the United States, and which operates primarily within the United States or which makes a significant contribution to the U.S. economy through payment of taxes or use of American products, materials or labor… A small business concern may be in the legal form of an individual proprietorship, partnership, limited liability company, corporation, joint venture, association, trust or cooperative, except that where the firm is a joint venture there can be no more than 49 percent participation by foreign business entities in the joint venture."

The SBA has established size criteria for all major industry sectors in the United States, including fish harvesting and fish processing businesses. A business involved in fish harvesting is a small business if it is independently owned and operated and not dominant in its field of operation (including its affiliates) and if it has combined annual receipts not in excess of $3.5 million for all its affiliated operations worldwide. A seafood processor is a small business if it is independently owned and operated, not dominant in its field of operation, and employs 500 or fewer persons on a full-time, part-time, temporary, or other basis, at all its affiliated operations worldwide. A business involved in both the harvesting and processing of seafood products is a small business if it meets the $3.5 million criterion for fish harvesting operations. Finally, a wholesale business servicing the fishing industry is a small business if it employs 100 or fewer persons on a full-time, part-time, temporary, or other basis, at all its affiliated operations worldwide.

The SBA has established "principles of affiliation" to determine whether a business concern is "independently owned and operated." In general, business concerns are affiliates of each other when one concern controls or has the power to control the other, or a third party controls or has the power to control both. The SBA considers factors such as ownership, management, previous relationships with or ties to another concern, and contractual relationships, in determining whether affiliation exists. Individuals or firms that have identical or substantially identical business or economic interests, such as family members, persons with common investments, or firms that are economically dependent through contractual or other relationships, are treated as one party with such interests aggregated when measuring the size of the concern in question. The SBA counts the receipts or employees of the concern whose size is at issue and those of all its domestic and foreign affiliates, regardless of whether the affiliates are organized for profit, in determining the concern's size. However, business concerns owned and controlled by Indian Tribes, Alaska Regional or Village Corporations organized pursuant to the Alaska Native Claims Settlement Act (43 U.S.C. 1601), Native Hawaiian Organizations, or Community Development Corporations authorized by 42 U.S.C. 9805 are not considered affiliates of such entities, or with other concerns owned by these entities solely because of their common ownership.

Affiliation may be based on stock ownership when, (1) a person is an affiliate of a concern if the person owns or controls, or has the power to control 50 percent or more of its voting stock, or a block of stock which affords control because it is large compared to other outstanding blocks of stock, or (2) if two or more persons each owns, controls or has the power to control less than 50 percent of the voting stock of a concern, with minority holdings that are equal or approximately equal in size, but the aggregate of these minority holdings is large as compared with any other stock holding, each such person is presumed to be an affiliate of the concern.

Affiliation may be based on common management or joint venture arrangements. Affiliation arises where one or more officers, directors, or general partners, controls the board of directors and/or the management of another concern. Parties to a joint venture also may be affiliates. A contractor and subcontractor are treated as joint venturers if the ostensible subcontractor will perform primary and vital requirements of a contract or if the prime contractor is unusually reliant upon the ostensible subcontractor. All requirements of the contract are considered in reviewing such relationship, including contract management, technical responsibilities, and the percentage of subcontracted work.

<u>Small organizations.</u> The RFA defines "small organizations" as any not-for-profit enterprise that is independently owned and operated and is not dominant in its field.

<u>Small governmental jurisdictions.</u> The RFA defines small governmental jurisdictions as governments of cities, counties, towns, townships, villages, school districts, or special districts with populations of fewer than 50,000.

6.5 Reason for considering the action

To comply with bycatch provisions of the Magnuson-Stevens Act, the Council amended the BSAI Groundfish FMP several times to enact and modify savings area closures (see section 3.2) based upon the best available information at that time. Recently, Chinook and chum bycatch have been elevated well above the regulatory closure limits and the fleet has been displaced into other regions when the salmon savings areas have closed. Alternative measures are being sought to reduce salmon bycatch at this time. Detailed descriptions of each alternative analyzed in this EA/RIR/IRFA can be found in Section 2.0.

6.6 Objectives of, and legal basis for, the proposed action.

Under the Magnuson-Stevens Act, the United States has exclusive fishery management authority over all marine fishery resources found within the exclusive economic zone (EEZ). The management of these marine resources is vested in the Secretary of Commerce (Secretary) and in the Regional Fishery Management Councils. The groundfish fisheries in the EEZ off Alaska are managed under the Fishery Management Plan (FMP) for Groundfish of the BSAI.

Statutory authority for measures designed to reduce bycatch is specifically addressed in Sec. 600.350 of the Magnuson-Stevens Act. That section establishes National Standard 9—Bycatch, which directs the Councils to minimize bycatch and to minimize mortality of bycatch when it cannot be avoided. Additional discussion of National Standard 9 of the Magnuson-Stevens Act and other applicable law are presented in Chapter 7.0 of this EA/RIR/IRFA.

The objectives of the proposed action are to reduce salmon bycatch in the Bering Sea pollock trawl fishery and to minimize the cost imposed on industry of management measures designed to reduce salmon bycatch.

6.7 Number and description of small entities regulated by the proposed action

The entities directly regulated by this action are those entities that harvest groundfish in the EEZ of the BSAI using trawl gear. These entities include the groundfish catcher vessels and groundfish catcher/processor vessels active in the area.

Fishing vessels, both catcher vessels (CVs) and catcher/processors (CPs), are small if their total gross receipts, from all their activities combined, are less than \$3.5 million in a year. Table 6-1 provides estimates of the numbers of catcher vessels and catcher/processors with less than \$3.5 million in gross revenues from groundfish fishing in the BSAI. These estimates overstate the numbers of small entities (and conversely, understate the numbers of large entities) for two reasons.

First, these estimates include only groundfish revenues earned from activity in the EEZ off Alaska. Since many of these vessels are also active in non-groundfish fisheries in the EEZ off of Alaska, in fisheries within Alaskan waters, and off the West Coast of the U.S., the reported groundfish revenues understate the total gross receipts for many of the vessels.

Second, as described in Section 6.4, the RFA requires a consideration of affiliations between entities for the purpose of assessing if an entity is small. The estimates in Table 6-1 and Table 6-2 do not take account of affiliations between entities. There is not a strict one-to-one correspondence between vessels and entities; many persons and firms are known to have ownership interests in more than one vessel, and many of these vessels with different ownership, are otherwise affiliated with each other. The AFA pollock cooperatives in the BSAI are an important type of affiliation. One hundred and twelve of the BSAI CVs, and 21 CPs, were members of AFA coops in 2004, and therefore, "affiliated" for RFA purposes with the other operations in their respective co-op fleets (lists of American Fisheries Act CV and CP permits in 2004, accessed at http://www.fakr.noaa.gov/ram/afa.htm on November 5, 2004). indicates that, in 2003, there were perhaps as many as 116 small trawl CVs in the BSAI and 3 small trawl CPs. NMFS AKR records, cited above, indicate that 112 BSAI CVs were members of AFA cooperatives; all of these are large entities. Thus, four of the BSAI small trawl vessels appear to qualify as "small entities" once AFA affiliation is taken into consideration.

Table 6-2 indicates that, in 2003, there were perhaps as many as 6 large trawl CVs in the BSAI. These vessels belonged to the seven inshore cooperatives, in 2004 (AKR website cited above). Thus, for the purposes of the RFA, there were seven large CV entities, controlling 112 vessels. Table 6.2 shows that 37 large trawl CPs operated in the BSAI in 2004. Twenty-one CPs were issued AFA permits in 2004 (NMFS AKR website cited above). All of these are considered to be large entities for an RFA analysis.

Table 6-3 and Table 6-4 provide estimates of average gross revenues from groundfish production in the BSAI for small and for large CVs and CPs. Small CV trawlers in the BSAI had average revenue of $1.19 million in 2004. Large CV trawlers in the BSAI had average revenue of $4.43 million in 2004. Catcher/processors carry the equipment and personnel they need to process the fish that they themselves catch. In some cases CPs will also process fish harvested for them by CVs and transferred to them at sea. Small BSAI trawl CPs grossed revenue data is restricted due to confidentiality. Large BSAI trawl CPs had average gross revenue of $17 million in 2004.

Table 6-1 Number of vessels that caught or caught and processed less than $3.5 million ex-vessel value or product value of groundfish by area, vessel type and gear, 1998-2003.

	Gulf of Alaska			Bering Sea and Aleutian			All Alaska		
	Catcher Vessels	Catcher process	Total	Catcher Vessels	Catcher process	Total	Catcher Vessels	Catcher process	Total
1998									
All gear	973	21	994	243	41	284	1,052	41	1,093
Hook and line	708	15	723	75	29	104	726	29	755
Pot	188	1	189	70	7	77	231	7	238
Trawl	170	5	175	115	7	122	207	7	214
1999									
All gear	980	29	1,009	271	31	302	1,087	34	1,121
Hook and line	699	17	716	67	19	86	720	22	742
Pot	231	10	241	88	11	99	281	11	292
Trawl	159	3	162	123	4	127	203	4	207
2000									
All gear	987	16	1,003	269	30	299	1,134	32	1,166
Hook and line	716	8	724	79	17	96	746	18	764
Pot	252	5	257	88	10	98	302	11	313
Trawl	125	3	128	108	5	113	199	6	205
2001									
All gear	852	21	873	279	43	322	1,012	44	1,056
Hook and line	650	15	665	92	31	123	681	31	712
Pot	154	4	158	74	7	81	212	9	221
Trawl	119	4	123	117	6	123	195	7	202
2002									
All gear	781	20	801	247	32	279	909	33	942
Hook and line	619	13	632	78	24	102	633	24	657
Pot	127	4	131	59	5	64	169	6	175
Trawl	107	3	110	114	3	117	182	3	185
2003									
All gear	803	13	816	262	18	280	945	21	966
Hook and line	655	9	664	73	12	85	678	14	692
Pot	137	1	138	83	3	86	197	3	200
Trawl	93	3	96	116	3	119	163	4	167

Note: Includes only vessels that fished part of federal TACs.
Source: CFEC fish tickets, weekly processor reports, NMFS permits, Commercial Operators Annual Report (COAR), ADFG intent-to-operate listings. National Marine Fisheries Service, P.O. Box 15700, Seattle, WA 98115-0070.

Table 6-2 Number of vessels that caught or caught and processed more than $3.5 million ex-vessel value or product value of groundfish by area, vessel type and gear, 1998-2003.

	Gulf of Alaska		Bering Sea and Aleutian			All Alaska		
	Catcher process	Total	Catcher Vessels	Catcher process	Total	Catcher Vessels	Catcher process	Total
1998								
All gear	26	26	0	58	58	0	58	58
Hook and line	7	7	0	14	14	0	14	14
Pot	0	0	0	1	1	0	1	1
Trawl	19	19	0	44	44	0	44	44
1999								
All gear	29	29	1	57	58	1	57	58
Hook and line	13	13	0	22	22	0	22	22
Pot	1	1	0	3	3	0	3	3
Trawl	15	15	1	36	37	1	36	37
2000								
All gear	28	28	4	58	62	4	58	62
Hook and line	13	13	0	26	26	0	26	26
Pot	0	0	0	2	2	0	2	2
Trawl	15	15	4	34	38	4	34	38
2001								
All gear	19	19	6	47	53	6	47	53
Hook and line	5	5	0	14	14	0	14	14
Trawl	14	14	6	33	39	6	33	39
2002								
All gear	23	23	10	54	64	10	54	64
Hook and line	10	10	0	18	18	0	18	18
Trawl	13	13	10	36	46	10	36	46
2003								
All gear	34	34	6	65	71	6	65	71
Hook and line	16	16	0	28	28	0	28	28
Pot	0	0	5	0	5	5	0	5
Trawl	18	18	6	37	43	6	37	43

Note: Includes only vessels that fished part of federal TACs.
Source: CFEC fish tickets, weekly processor reports, NMFS permits, Commercial Operators Annual Report (COAR), ADFG intent-to-operate listings. National Marine Fisheries Service, P.O. Box 15700, Seattle, WA 98115-0070.

Table 6-3 Average revenue of vessels that caught or caught and processed less than $3.5 million ex-vessel value or product value of groundfish by area, vessel type and gear, 1998-2003. ($ millions)

	Gulf of Alaska			Bering Sea & Aleutians			All Alaska		
	Catcher Vessels	Catcher process	Total	Catcher Vessels	Catcher process	Total	Catcher Vessels	Catcher process	Total
1998									
All gear	.15	1.77	.18	.44	1.63	.61	.16	1.63	.22
Hook and line	.08	1.59	.11	.18	1.57	.57	.08	1.57	.13
Pot	.11	-	.12	.24	.84	.29	.15	.84	.17
Trawl	.52	2.40	.57	.77	2.58	.88	.54	2.58	.61
1999									
All gear	.20	1.44	.23	.58	1.51	.68	.21	1.38	.25
Hook and line	.09	1.48	.12	.18	1.79	.53	.09	1.55	.13
Pot	.17	1.23	.21	.16	1.16	.27	.16	1.16	.20
Trawl	.77	-	.79	1.10	1.59	1.12	.79	1.59	.80
2000									
All gear	.16	1.33	.18	.67	1.34	.74	.24	1.34	.27
Hook and line	.11	1.24	.12	.23	1.60	.47	.10	1.53	.14
Pot	.16	1.03	.18	.16	.48	.19	.17	.62	.18
Trawl	.57	-	.61	1.40	1.72	1.41	.92	1.83	.95
2001									
All gear	.14	1.76	.18	.58	1.76	.74	.23	1.77	.30
Hook and line	.10	1.82	.14	.17	1.91	.61	.09	1.91	.17
Pot	.12	1.73	.16	.13	.86	.19	.12	1.17	.16
Trawl	.48	1.80	.52	1.18	1.93	1.22	.83	1.95	.87
2002									
All gear	.15	1.70	.18	.65	1.81	.78	.24	1.76	.30
Hook and line	.10	1.89	.14	.19	1.96	.61	.10	1.96	.17
Pot	.15	.38	.16	.18	.62	.22	.14	.52	.15
Trawl	.45	-	.51	1.18	-	1.22	.83	-	.86
2003									
All gear	.17	1.53	.19	.65	1.74	.72	.26	1.65	.29
Hook and line	.12	1.55	.14	.23	2.17	.50	.12	1.91	.15
Pot	.16	-	.16	.28	-	.30	.19	-	.20
Trawl	.57	-	.61	1.19	-	1.19	.93	1.45	.95

Notes: Includes only vessels that fished part of federal TACs. Categories with fewer than four vessels are not reported. Averages are obtained by adding the total revenues, across all areas and gear types, of all the vessels in the category, and dividing that sum by the number of vessels in the category.

Source: CFEC fish tickets, weekly processor reports, NMFS permits, commercial operators annual report (COAR), ADFG intent-to-operate listings. National Marine Fisheries Service, P.O. Box 15700, Seattle, WA 98115-0070.

Table 6-4 Average revenue of vessels that caught or caught and processed more than $3.5 million ex-vessel value or product value of groundfish by area, vessel type and gear, 1998-2003. ($ millions)

	Gulf of Alaska		Bering Sea & Aleutians			All Alaska		
	Catcher process	Total	Catcher Vessels	Catcher process	Total	Catcher Vessels	Catcher process	Total
1998								
All gear	6.41	6.41	-	8.64	8.64	-	8.64	8.64
Hook and line	4.46	4.46	-	4.51	4.51	-	4.51	4.51
Trawl	7.12	7.12	-	9.95	9.95	-	9.95	9.95
1999								
All gear	5.53	5.53	-	10.09	10.00	-	10.09	10.00
Hook and line	4.69	4.69	-	4.70	4.70	-	4.70	4.70
Trawl	6.36	6.36	-	13.23	13.00	-	13.23	13.00
2000								
All gear	6.57	6.57	4.66	10.72	10.33	4.66	10.72	10.33
Hook and line	4.82	4.82	-	5.09	5.09	-	5.09	5.09
Trawl	8.09	8.09	4.66	14.87	13.80	4.66	14.87	13.80
2001								
All gear	7.54	7.54	4.99	13.02	12.11	4.99	13.02	12.11
Hook and line	4.97	4.97	-	4.66	4.66	-	4.66	4.66
Trawl	8.45	8.45	4.99	16.57	14.78	4.99	16.57	14.78
2002								
All gear	6.96	6.96	4.91	12.76	11.54	4.91	12.76	11.54
Hook and line	4.28	4.28	-	4.25	4.25	-	4.25	4.25
Trawl	9.03	9.03	4.91	17.02	14.39	4.91	17.02	14.39
2003								
All gear	6.47	6.47	4.43	11.62	11.01	4.43	11.62	11.01
Hook and line	4.50	4.50	-	4.54	4.54	-	4.54	4.54
Pot	-	-	4.62	-	4.62	4.62	-	4.62
Trawl	8.21	8.21	4.43	16.98	15.23	4.43	16.98	15.23

Notes: Includes only vessels that fished part of federal TACs. Categories with fewer than four vessels are not reported. Averages are obtained by adding the total revenues, across all areas and gear types, of all the vessels in the category, and dividing that sum by the number of vessels in the category.
Source: CFEC fish tickets, weekly processor reports, NMFS permits, commercial operators annual report (COAR), ADFG intent-to-operate listings. National Marine Fisheries Service, P.O. Box 15700, Seattle, WA 98115-0070.

6.8 Impacts on Regulated Small Entities

Though there are very few small entities affected by this action, the impact on regulated small entities of both action alternatives are generally positive. The analysis of alternatives is presented in the RIR and the summary of effects is re-presented here. These effects will apply to all entities, large and small, operating in the Bering Sea pollock trawl fishery.

Alternative 1, the status quo, has resulted in dramatic increases in salmon bycatch in the Bering Sea pollock trawl fishery in recent years. This translates into foregone salmon value, assuming full terminal harvest of salmon bycatch, of nearly $1 million for Chinook and more than $250 thousand for chum in 2003. These values greatly overstate the actual harvest that might have occurred if salmon bycatch had not been taken in the Bering Sea pollock trawl fishery. Unfortunately, it is not possible to accurately estimate actual harvest value. However, the dramatic increases in salmon bycatch under the status quo likely translate into increases in forgone value and decreased benefits of bycatch reduction. The status quo also bears some risk of future restrictions on the Bering Sea pollock trawl fleet as a result of exceeding the ESA Chinook incidental take permit cap.

Alternative 1 also imposes increased operational costs on the trawl fleet when the salmon savings areas are closed and may adversely affect vessel safety. The closures are also having a detrimental effect on product quality for the CV fleet. The decreased quality appears to have reduced product grade, eliminated fillet production in some cases, and increased shoreside processing facility costs. Alternative 1 also results in some management and enforcement costs to administer the closures and monitor vessel locations.

Alternative 2 would eliminate the salmon savings closure areas altogether. The result would likely be reduced operational costs, improved vessel safety, improved product quality, and reduced management and enforcement costs. However, in the absence of any bycatch reduction measures this alternative may result in further increase in salmon bycatch in the Bering Sea pollock trawl fishery. Were that to occur, the foregone value of such bycatch would increase and the associate benefits of bycatch reduction would decrease, possibly dramatically. This could also result in the Bering Sea pollock trawl fleet significantly exceeding the ESA Chinook incidental take permit cap.

Alternative 3 eliminates the BSAI salmon savings area closures but replaces them with a dynamic system of rolling hot spot closures and creates incentives for individual vessels to reduce salmon bycatch by penalizing the worst offenders. This alternative would likely reduce operational costs, improve vessel safety, and improve product quality. Alternative 3 also have the potential to reduce salmon bycatch more than the status quo management measures. If that potential were realized, Alternative 3 would reduce foregone value of salmon bycatch and increase the overall benefits of bycatch reduction. Alternative 3 also provides some mitigation possibilities for Western Alaska fishing organizations.

Alternative 3 would reduce management and enforcement costs for government agencies by transferring much of that cost to industry. However, the industry has volunteered to bear this cost in hopes of reducing operational costs associated with the status quo while at the same time attempting to reduce salmon bycatch. If bycatch is not reduced under alternative 3 and the BSAI pollock trawl fleet continues to exceed the ESA Chinook incidental take permit cap, unknown restrictions on the fleet could result. The suboption to Alternative 3 increases the incentive for industry to realize bycatch reductions under the alternative.

6.9 Recordkeeping and reporting requirements

Depending on the Alternative chosen, the subsequent proposed regulation may impose new recordkeeping or reporting requirements on the regulated small entities. This would be true for Alternative 3, which eliminates existing salmon bycatch prevention measures and replaces them with an industry funded and operated Voluntary Rolling Hot Spot (VRHS) closure system. Under the VRHS, vessels will be required to report bycatch and position data to an industry hired contractor. These activities could conceivably increase recordkeeping and reporting requirements for regulated small entities. However, the industry has volunteered to develop and participate in this system.

6.10 Federal rules that may duplicate, overlap, or conflict with proposed action

This analysis did identify Section 7 consultation under the Endangered Species act as a potential risk of future restrictions on the Bering Sea pollock trawl fishery. A consultation is ongoing at this time and the potential for future consultations has been considered in the analysis presented in the RIR.

6.11 Description of significant alternatives

Alternatives which have been considered by the Council for salmon bycatch management measures include new regulatory salmon savings area closures based upon updated information, and vessel bycatch accountability programs. In February 2005, the Council moved to bifurcate the analytical package which contained these alternatives such that the amendment package considered in this analysis might move forward on a faster track given the time lag in analyzing new closures and developing a vessel bycatch accountability program. In April 2005, the Council further moved that analysis of the two amendment packages, proposed Amendment 84 (this analysis) and Amendment Package B (described in section 2.4 of the EA) be initiated simultaneously, understanding that the analysis of Amendment Package B would take into 2006 before it was available for review by the Council.

Chapter 7 Consistency with Applicable Law and Policy

7.1 Magnuson-Stevens Act

7.1.1 National Standards

The Council's overarching mandate to guide it in managing bycatch is National Standard 9 which states:

> *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*

This amendment package is being considered to relieve the pollock pelagic trawl fishery of the requirement to fish outside of salmon savings areas as specified in regulations, when in fact fishing outside those areas may result in higher salmon bycatch. As a result, the proposed action is in accordance with the Council's mandate under National Standard 9.

7.1.2 Section 303(a)(9) – Fisheries Impact Statement

Section 303(a)(9) of the Magnuson-Stevens Act requires that any plan or amendment include a fishery impact statement which shall assess and describe the likely effects, if any, of the conservation and management measures on a) participants in the fisheries and fishing communities affected by the plan or amendment; and b) participants in the fisheries conducted in adjacent areas under the authority of another Council, after consultation with such Council and representatives of those participants taking into account potential impacts on the participants in the fisheries, as well as participants in adjacent fisheries.

The alternative actions considered in this analysis are described in Chapter 2 of this document. The impacts of these actions on participants in the fisheries and fishing communities are evaluated in the Regulatory Impact Review, Chapter 5.

7.2 Marine Mammal Protection Act

The alternatives analyzed in this action are not likely to result in any significant impacts to marine mammals.

7.3 Coastal Zone Management Act

This action is consistent with the Coastal Zone Management Act.

7.4 BSAI Groundfish FMP management policy

The Council proactively revised their BSAI Groundfish FMP (following action on the Groundfish PSEIS in 2004) and selected several policy-level objectives which reflect the Council's direction in the management of bycatch. These objectives are the following (from the BSAI Groundfish FMP):

Manage Incidental Catch and Reduce Bycatch and Waste:

14. Continue and improve current incidental catch and bycatch management program.
15. Develop incentive programs for bycatch reduction including the development of mechanisms to facilitate the formation of bycatch pools, vessel bycatch allowances, or other bycatch incentive systems.
16. Encourage research programs to evaluate current population estimates for non-target species with a view to setting appropriate bycatch limits, as information becomes available.
17. Continue program to reduce discards by developing management measures that encourage the use of gear and fishing techniques that reduce bycatch which includes economic discards.
18. Continue to manage incidental catch and bycatch through seasonal distribution of total allowable catch and geographical gear restrictions.
19. Continue to account for bycatch mortality in total allowable catch accounting and improve the accuracy of mortality assessments for target, prohibited species catch, and non-commercial species.
20. Control the bycatch of prohibited species through prohibited species catch limits or other appropriate measures.
21. Reduce waste to biologically and socially acceptable levels.

Further direction is provided by the Council’s groundfish policy workplan under the general priority of “Bycatch Reduction” where item “c” states: “explore incentive-based bycatch reduction programs”.

Suspending or eliminating the closure and relying upon the industry’s incentive-based bycatch reduction program certainly fits under both the Council’s approved policy workplan as well as several of the Council’s objectives for managing incidental catch and reducing bycatch and waste.

Chapter 8 Consultation and Preparers

8.1 List of Persons and Agencies Consulted

NPFMC:	David Witherell
NOAA Fisheries:	David Ackley Mary Furuness Sue Salveson
NOAA GC:	Jon Pollard
United Catcher Boats:	Brent Paine, John Gruver
Sea State:	Karl Haflinger
Mundt & McGregor:	Joe Sullivan

8.2 List of Preparers

NPFMC:	Diana Stram, project lead Cathy Coon Diana Evans Jon McCracken Maria Shawback
NOAA Fisheries:	Scott Miller

Chapter 9 References

[ADF&G] Alaska Department of Fish and Game. 1995a. Environmental Assessment/Regulatory Impact Review/Initial Regulatory Flexibility Assessment for Proposed Alternatives to Limit Chinook Salmon Bycatch in the Bering Sea Trawl Fisheries: Amendment 21b. Prepared by staffs of the Alaska Department of Fish and Game and the Alaska Commercial Fisheries Entry Commission. Juneau, AK.

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Appendix 1: NOAA Fisheries Regulatory Closures

INFORMATION BULLETIN 04-74 **September 2, 2004**
Sustainable Fisheries Division 9:30 a.m.
907-586-7228

NMFS PROHIBITS DIRECTED FISHING FOR NON-CDQ POLLOCK WITH TRAWL GEAR IN THE CHINOOK SALMON SAVINGS AREAS OF THE BERING SEA AND ALEUTIAN ISLANDS MANAGEMENT AREA

The National Marine Fisheries Service (NMFS) is prohibiting directed fishing for non- Community Development Quota (CDQ) pollock with trawl gear in the Chinook Salmon Savings Areas of the Bering Sea and Aleutian Islands management area (BSAI) effective 12 noon, Alaska local time (Alt.), September 5, 2004, through 12 midnight, A.l.t., December 31, 2004, according to James W. Balsiger, Administrator, Alaska Region, NMFS.

This action is necessary because the 2004 non-CDQ limit of chinook salmon caught by vessels using trawl gear while directed fishing for pollock in the BSAI has been reached and is issued pursuant to 50 CFR 679.21(e)(7)(viii).

The Chinook Salmon Savings Areas are areas defined as the following portions of the BSAI:

(1) The area defined by straight lines connecting the following coordinates in the order listed:

54 degrees 00' N. lat., 171 degrees 00' W. long.
54 degrees 00' N. lat., 170 degrees 00' W. long.
53 degrees 00' N. lat., 170 degrees 00' W. long.
53 degrees 00' N. lat., 171 degrees 00' W. long.
54 degrees 00' N. lat., 171 degrees 00' W. long.

(2) The area defined by straight lines connecting the following coordinates in the order listed:

56 degrees 00' N. lat., 165 degrees 00' W. long.
56 degrees 00' N. lat., 164 degrees 00' W. long.
55 degrees 00' N. lat., 164 degrees 00' W. long.
55 degrees 00' N. lat., 165 degrees 00' W. long.
54 degrees 30' N. lat., 165 degrees 00' W. long.
54 degrees 30' N. lat., 167 degrees 00' W. long.
55 degrees 30' N. lat., 167 degrees 00' W. long.
55 degrees 30' N. lat., 165 degrees 00' W. long.
56 degrees 00' N. lat., 165 degrees 00' W. long.

This information bulletin only provides notice of a regulatory change. For the purposes of complying with the regulatory change, you are advised to see the actual text in the Code of Federal Regulations.

INFORMATION BULLETIN 04-82 **September 13, 2004**
Sustainable Fisheries Division 10:00 a.m.
907-586-7228

NMFS PROHIBITS FISHING WITH NON-CDQ TRAWL GEAR IN THE CHUM SALMON SAVINGS AREA OF THE BERING SEA AND ALEUTIAN ISLANDS MANAGEMENT AREA

The National Marine Fisheries Service (NMFS) is prohibiting fishing with non-Community Development Quota (CDQ) trawl gear in the Chum Salmon Savings Area (CSSA) of the Bering Sea and Aleutian Islands management area effective 12 noon, Alaska local time (Alt.), September 14, 2004, through 12 noon, A.l.t., October 14, 2004, according to James W. Balsiger, Administrator, Alaska Region, NMFS.

This action is necessary because the 2004 non-CDQ limit of non-chinook salmon for vessels using trawl gear in the Catcher Vessel Operation Area has been reached and is issued pursuant to 50 CFR 679.21(e)(7)(vii).

The CSSA is an area defined as that portion of the Bering Sea Subarea described by straight lines connecting the following coordinates in the order listed:

56 degrees 00' N. lat. 167 degrees 00' W. long.
56 degrees 00' N. lat. 165 degrees 00' W. long.
55 degrees 30' N. lat. 165 degrees 00' W. long.
55 degrees 30' N. lat. 164 degrees 00' W. long.
55 degrees 00' N. lat. 164 degrees 00' W. long.
55 degrees 00' N. lat. 167 degrees 00' W. long.
56 degrees 00' N. lat. 167 degrees 00' W. long.

This information bulletin only provides notice of a regulatory change. For the purposes of complying with the regulatory change, you are advised to see the actual text in the Code of Federal Regulations.

INFORMATION BULLETIN 03-64 **August 1, 2003**
Sustainable Fisheries Division 11:30 a.m.
907-586-7228

NMFS PROHIBITS DIRECTED FISHING FOR NON-CDQ POLLOCK WITH TRAWL GEAR IN THE CHINOOK SALMON SAVINGS AREAS OF THE BERING SEA AND ALEUTIAN ISLANDS MANAGEMENT AREA

The National Marine Fisheries Service (NMFS) is prohibiting directed fishing for non-Community Development Quota (CDQ) pollock with trawl gear in the Chinook Salmon Savings Areas of the Bering Sea and Aleutian Islands management area (BSAI) effective 12 noon, Alaska local time (A.l.t.), September 1, 2003, through 12 midnight, A.l.t., December 31, 2003, according to James W. Balsiger, Administrator, Alaska Region, NMFS.

This action is necessary to prevent exceeding the 2003 non-CDQ limit of chinook salmon caught by vessels using trawl gear while directed fishing for pollock in the BSAI, and is issued pursuant to 50 CFR 679.21(e)(7)(viii).

The Chinook Salmon Savings Areas are areas defined as the following portions of the BSAI:

(1) The area defined by straight lines connecting the following coordinates in the order listed:

54 degrees 00' N. lat., 171 degrees 00' W. long.
54 degrees 00' N. lat., 170 degrees 00' W. long.
53 degrees 00' N. lat., 170 degrees 00' W. long.
53 degrees 00' N. lat., 171 degrees 00' W. long.
54 degrees 00' N. lat., 171 degrees 00' W. long.

(2) The area defined by straight lines connecting the following coordinates in the order listed:

56 degrees 00' N. lat., 165 degrees 00' W. long.
56 degrees 00' N. lat., 164 degrees 00' W. long.
55 degrees 00' N. lat., 164 degrees 00' W. long.
55 degrees 00' N. lat., 165 degrees 00' W. long.
54 degrees 30' N. lat., 165 degrees 00' W. long.
54 degrees 30' N. lat., 167 degrees 00' W. long.
55 degrees 30' N. lat., 167 degrees 00' W. long.
55 degrees 30' N. lat., 165 degrees 00' W. long.
56 degrees 00' N. lat., 165 degrees 00' W. long.

This information bulletin only provides notice of a regulatory change. For the purposes of complying with the regulatory change, you are advised to see the actual text in the Code of Federal Regulations.

INFORMATION BULLETIN 03-79 **September 23, 2003**
Sustainable Fisheries Division 9:30 a.m.
907-586-7228

NMFS PROHIBITS FISHING WITH TRAWL GEAR IN THE CHUM SALMON SAVINGS AREA OF THE BERING SEA AND ALEUTIAN ISLANDS MANAGEMENT AREA

The National Marine Fisheries Service (NMFS) is prohibiting fishing with trawl gear in the Chum Salmon Savings Area (CSSA) of the Bering Sea and Aleutian Islands management area effective 12 noon, Alaska local time (Alt.), September 24, 2003, through 12 noon, A.l.t., October 14, 2003, according to James W. Balsiger, Administrator, Alaska Region, NMFS.

This action is necessary to prevent exceeding the 2003 limit of non-chinook salmon caught by vessels using trawl gear in the Catcher Vessel Operation Area and is issued pursuant to 50 CFR 679.21(e)(7)(vii).

The CSSA is an area defined as that portion of the Bering Sea Subarea described by straight lines connecting the following coordinates in the order listed:

56 degrees 00' N. lat. 167 degrees 00' W. long.
56 degrees 00' N. lat. 165 degrees 00' W. long.
55 degrees 30' N. lat. 165 degrees 00' W. long.
55 degrees 30' N. lat. 164 degrees 00' W. long.
55 degrees 00' N. lat. 164 degrees 00' W. long.
55 degrees 00' N. lat. 167 degrees 00' W. long.
56 degrees 00' N. lat. 167 degrees 00' W. long.
This does not apply to vessels fishing for Community Development Quota.

This information bulletin only provides notice of a regulatory change. For the purposes of complying with the regulatory change, you are advised to see the actual text in the Code of Federal Regulations.

INFORMATION BULLETIN 02-78 **September 19, 2002**
Sustainable Fisheries Division 9:45 A.M.
907-586-7228

NMFS PROHIBITS FISHING WITH TRAWL GEAR IN THE CHUM SALMON SAVINGS AREA OF THE BERING SEA AND ALEUTIAN ISLANDS MANAGEMENT AREA

The National Marine Fisheries Service (NMFS) is prohibiting fishing with trawl gear in the Chum Salmon Savings Area (CSSA) of the Bering Sea and Aleutian Islands management area (BSAI) effective 12 noon, Alaska local time (Alt.), September 21, 2002, through 12 noon, Alt., October 14, 2002, according to James W. Balsiger, Administrator, Alaska Region, NMFS.

This action is prevent exceeding the 2002 limit of non-chinook salmon caught by vessels using trawl gear in the CVOA and is issued pursuant to 50 CFR 679.21(e)(7)(vii).

The CSSA is an area defined as that portion of the Bering Sea Subarea described by straight lines connecting the following coordinates in the order listed:

56 degrees 00' N. lat. 167 degrees 00' W. long.
56 degrees 00' N. lat. 165 degrees 00' W. long.
55 degrees 30' N. lat. 165 degrees 00' W. long.
55 degrees 30' N. lat. 164 degrees 00' W. long.
55 degrees 00' N. lat. 164 degrees 00' W. long.
55 degrees 00' N. lat. 167 degrees 00' W. long.
56 degrees 00' N. lat. 167 degrees 00' W. long.

This information bulletin only provides notice of a regulatory change. For the purposes of complying with the regulatory change, you are advised to see the actual text in the Code of Federal Regulations.

Appendix 2: Inter Cooperative Agreement Preferred Alternative

Preferred Alternative as Developed by the AFA Pollock Cooperatives

May 5, 2005

I. Members to the Agreement (the "Members").

- High Seas Catchers Cooperative
- Inshore Catcher Vessel Cooperatives
  - Akutan Catcher Vessel Association
  - Arctic Enterprise Association
  - Northern Victor Fleet Cooperative
  - Peter Pan Fleet Cooperative
  - Unalaska Fleet Cooperative
  - UniSea Fleet Cooperative
  - Westward Fleet Cooperative
- Mothership Fleet Cooperative
- Pollock Conservation Cooperative
- Community Development Quota Groups

II. Purpose of Agreement - The purpose of this Agreement is to implement a private, contractual inter-cooperative program to reduce salmon bycatch in the 2006, 2007, and 2008 Bering Sea pollock AFA and CDQ fisheries (the "Fishery"). Each party to this Agreement agrees to exercise all commercially reasonable efforts to achieve that purpose.

III. Data Monitoring and Agreement Management – The Members will retain Sea State to provide data gathering, analysis, fleet monitoring, and reporting services necessary to implement the bycatch management program contemplated under this agreement. Management of the Agreement will be the responsibility of United Catcher Boats Association via their Intercooperative Manager. (Individual cooperativeagreement addendums will be drafted to protect Sea State and UCB from legal action).

IV. "A" Season Management – The Members agree during the 2006, 2007, and 2008 "A" Seasons chinook salmon bycatch in the Fishery shall be managed on an inter-cooperative basis as follows.

B. Chinook Base Rate – Each "A" season's initial Base Rate will be equal to the previous year's overall "A" season chinook bycatch rate by the Members to this Agreement. The rate is calculated by dividing the Members' previous "A" season's total chinook bycatch by the Members' previous "A" season's total pollock harvest. Initial Base Rate calculations below .04 will set the starting Base Rate at .04 and initial Base Rate calculations above .06 will set the starting Base Rate at .06.

C. In-Season Base Rate adjustment – On February 14 a Base Rate recalculation will be made. The recalculation will be the Members' total "A" season salmon bycatch to date divided by the Members' total "A" season pollock harvest to date. The recalculated rate will be implemented on the following Thursday's announcement for closures occurring on the following Friday and thereafter for the remainder of the "A" season.

****A lower limit (floor) may be applied to the in-season recalculation pending an analysis by Sea State. The intention is to limit setting the in-season adjustment to impracticable levels in low salmon abundance years. At some point bycatch incidents no longer identify "hotspots". ****

D. "A" Season Savings Closures will begin on January 30, allowing 10 days of bycatch information from the start of the season. All salmon bycatch by the Members from the season opening date forward through Jan. 29 will be account towards each coop's tier status.

E. Savings Closures – Beginning Jan. 30 salmon Savings Closures will be implemented under the following criteria.
    1. Aside from the Jan.30 initial Savings Closures as described in IV. C. above, Savings Closures are based on the salmon bycatch and pollock harvest for the four to seven day period, depending on data quality, immediately preceding each closure announcement.
    2. Chinook bycatch in an area must exceed the Base Rate in order for the area to be eligible for a Savings Closure.
    3. Pollock harvest in a potential Savings Closure area must, during the data gathering period described in section IV.D.1., above, be a minimum of 2% of the total fleet pollock harvest for the same time period in order to be eligible as a Savings Closure.
    4. Current Savings Closures are exempt from the 2% minimum harvest rule described in item 3, above, and may continue as a Savings Closure if surrounding bycatch conditions indicate there has likely been no change in bycatch conditions for the area.
    5. The Bering Sea is managed as a single region however Savings Closures west of 168° west longitude may not exceed 500 sq. miles in area.
    6. Total Savings Closure area (east and west of 168° west longitude) may be up to, but not exceed, 1000 sq. miles.
    7. There may be up to two Savings Closure areas west of 168° and two Savings Closure areas east of 168°.
    8. Closure areas will be described by a series of latitude and longitude coordinates and will be shaped as Sea State deems appropriate.

F. Tier Structure
    1. Tier status is determined by a coop's "rolling two week" bycatch rate.
    2. Tier Assignments
        i. Tier 1 – coops with bycatch rates less than 75% of Base Rate.
        ii. Tier 2 – coops with bycatch rates equal to or greater than 75% of the Base Rate and equal to or less than 125% of the Base Rate.
        iii. Tier 3 – coops with bycatch rates greater than 125% of the Base Rate.
    3. Coops assigned to Tier 1 are not constrained by Savings Closures
    4. Coops assigned to Tier 2 are subject to Savings Closures for 4 Days; Friday at 6:00 pm to Tuesday at 6:00 pm.
    5. Coops assigned to Tier 3 are subject to Savings Closures for 7 days, Friday at 6:00 pm to the following Friday at 6:00 pm

G. Sources for Salmon bycatch information will be the NMFS Observer and E-Log data bases.

H. Sea State Reports

1. Announcements will be distributed to the Members on Thursdays (Weekly announcement) and Mondays (Savings Closure update)
2. Thursday announcements are effective at 6:00 pm on Friday and Monday updates effective at 6:00 pm Tuesday.
    - i. Thursday announcements include:
        - a. Season update on pollock harvest and salmon bycatch by sector and in total.
        - b. Each coop's updated rolling 2 week bycatch rate, associated tier status, closure start and stop times and dates, and number of closure days.
        - c. Savings Closures - coordinates and map.
        - d. Bycatch rates for each stat area fished.
        - e. Updated Dirty Twenty Lists.
    - ii. Monday announcements include:
        - a. Season update on pollock harvest and salmon bycatch by sector and in total.
        - b. Updated Savings Closures - coordinates and map
        - c. Bycatch rates for each stat area fished.
        - d. Tier status reminder.

I. Dirty Twenty Lists

1. Weekly list – 20 vessels with the highest chinook salmon bycatch rates for the previous week. Only vessels with bycatch rates over the base rate appear on the list.
2. Two week list – 20 vessels with the highest chinook salmon bycatch rates for the previous 2 weeks. Only vessels with bycatch rates over the base rate appear on the list.
3. Season list – 20 vessels with the highest season-to-date bycatch performance; the list is based on appearances on the weekly list. Accumulative points are assigned to vessels as they appear on the weekly list. Vessels in the number 1 slot on the weekly list receives 20 points, number 2 slot gets 19 points and so on. Each vessel's points are totaled weekly and the vessels with the 20 highest scores appear on the seasonal Dirty 20 list. A vessel must have harvested over 500 mt of pollock before being eligible for the seasonal list.

J. Sea State will provide additional hot-spot advisory notices, outside of the Savings Closures, to the coops as they occur throughout the season.

V. "B" Season Management - the parties agree during the 2006, 2007, and 2008 "B" seasons chinook and chum salmon bycatch in the Fishery shall be managed on an inter-cooperative basis as follows.

B. Base Rates

1. Chum Salmon – The "B" season initial Base Rate will be .19 with an in-season adjustment on Sept. 1 to the Members' fleet bycatch rate of the previous 3 weeks. (August 10th – 31).

2. Chinook Salmon – The “B” season Base Rate will be .05 for the 2006 and 2007 “B” seasons. Beginning in 2008 the Base Rate will be the previous “B” season bycatch rate based on the Members’ fall chinook bycatch.

****Sea State will use data from the 2006 and 2007 Fisheries to determine the best range of dates for defining the “fall chinook bycatch” Base Rate calculation time frame.****

C. Season Start-up – After June 10 bycatch information will be supplied to the fleet as chum and chinook salmon bycatch begin to show up in the Fishery. Savings Closures will begin once an area with bycatch over the initial Base Rate is identified.

D. Savings Closures

1. Savings Closures are based on the salmon bycatch and pollock harvest for the four to seven day period, depending on data quality, immediately preceding each closure announcement.
2. Salmon bycatch in an area must exceed the chinook and/or chum salmon Base Rate in order for the area to be eligible for a Savings Closure.
3. Pollock harvest in a potential Savings Closure area must, during the data gathering period described in section V.C.1., above, be a minimum of 2% of the total fleet pollock harvest for the same time period in order to be eligible as a Savings Closure.
4. Current Savings Closures are exempt from the 5% minimum harvest rule described in item 3, above, and may continue as a Savings Closure if surrounding bycatch conditions indicate there has likely been no change in bycatch conditions for the area.
5. The Bering Sea will managed as 2 regions during the “B” season; a region east of 168° West longitude (the Eastern Region) and a region west of 168° West longitude (the Western Region).
6. Total Savings Closure area.
    i. Chum salmon
        a. The Eastern Region Savings Closures may cover up to 3000 sq. miles.
        b. The Western Region Savings Closures may cover up to 1000 sq. miles.
    ii. Chinook Salmon
        a. The Eastern region Savings Closure may cover up to 500 sq. miles.
        b. The Western Region Savings Closure may cover up to 500 Sq. miles
7. There may be up to two Savings Closure areas at any one time within each region.
8. Within a single region Savings Closures must be either a chum closure or a chinook closure, but not both. In the event Base Rates for both chum and chinook are exceeded within a region during a week, the Savings Closure within that region shall be a chinook closure. In this case, Sea State will issue a non-binding avoidance recommendation for the area of high chum bycatch.
9. Closure areas will be described by a series of latitude and longitude coordinates and will be shaped as Sea State deems appropriate.

E. Chum salmon Savings Closure Area Access – Tier System

1. Tier status is determined by a coop’s “rolling two week” bycatch rate.
2. Tier Assignments
    i. Tier 1 – coops with bycatch rates less than 75% of Base Rate.

ii. Tier 2 – coops with bycatch rates equal to or greater than 75% of the Base Rate and equal to or less than 125% of the Base Rate.
iii. Tier 3 – coops with bycatch rates greater than 125% of the Base Rate.

3. Coops assigned to Tier 1 are not constrained by Savings Closures
4. Coops assigned to Tier 2 are subject to Savings Closures for 4 Days; Friday at 6:00 pm to Tuesday at 6:00 pm.
5. Coops assigned to Tier 3 are subject to Savings Closures for 7 days, Friday at 6:00 pm to the following Friday at 6:00 pm

F. Chinook salmon Savings Closure Access – During “B" season chinook Savings Closures are closed to fishing by all cooperatives (a.k.a. “Core Closures”).

G. Sources for Salmon bycatch information will be the NMFS Observer and E-Log data bases.

H. Sea State Reports

1. Announcements will be distributed to the Members on Thursdays (Weekly announcement) and Mondays (Savings Closure update).
2. Thursday announcements are effective at 6:00 pm on Friday and Monday updates effective at 6:00 pm Tuesday.

i. Thursday announcements include:

a. Season update on pollock harvest and salmon bycatch by sector and in total for each species.
b. Each coop’s updated rolling 2 week bycatch rate for chum salmon and the associated tier status, closure start and stop times and dates for each region, and number of closure days in each region.
c. Savings Closures - coordinates and map with species notation.
d. Bycatch rates for each stat area fished for each species
e. Updated Dirty Twenty Lists for each species.

ii. Monday announcements include:

a. Season update on pollock harvest and salmon bycatch by sector and in total for each species.
b. Updated Savings Closures - coordinates and map with species notations
c. Bycatch rates for each stat area fished for each species.
d. Chum salmon tier status reminder.

I. Dirty Twenty Lists – one set for each species.

1. Weekly list – 20 vessels with the highest chinook salmon bycatch rates for the previous week. Only vessels with bycatch rates over the base rate appear on the list.
2. Two week list – 20 vessels with the highest chinook salmon bycatch rates for the previous 2 weeks. Only vessels with bycatch rates over the base rate appear on the list.
3. Season list – 20 vessels with the highest season-to-date bycatch performance based on appearances on the weekly list. Accumulative points are assigned to vessels as they appear on the weekly list. Vessels in the number 1 slot on the weekly list receives 20 points, number 2 slot gets 19 points and so on. The vessel’s points are totaled each week and the vessels with the 20 highest scores appear on the seasonal

Dirty 20 list. A vessel must have harvested over 500 mt of pollock before being eligible for the seasonal list.

K. Sea State will provide additional hot-spot advisory notices, outside of the Savings Closures, to the coops as they occur throughout the season.

VI. Inshore Vessels Landing to a Non-Associated Processor. (Same as written in the 2005 Agreement.)

A. If a member's vessel will be delivering to a Non- affiliated Processor under an Amendment 69 charter arrangement, prior to commencing the first fishing trip under such arrangement, the member shall execute and deliver to the Authorized Representative of the Coop into which it is being chartered (the "Charter Coop") and to the intercoop manager an adherence agreement under which such member agrees to comply with all of the applicable terms and conditions of the Charter Coop's Membership Agreement, and grants such Charter Coop authority to impose penalties as appropriate for any failure to comply with such terms and conditions. The member shall notify the intercoop manager of each delivery made in whole or in part under an Amendment 69 charter within two (2) days of making such delivery. All salmon taken as bycatch under an Amendment 69 charter shall be counted as Charter Coop bycatch, and the vessel shall be subject to the salmon Savings Area closures applicable to the Charter Coop in connection with each fishing trip made under an Amendment 69 charter.

B. If a member's vessel delivers to a Non-affiliated Processor from the member's Coop's ten percent (10%) "free market" allocation, such deliveries shall be subject to all of the terms and conditions of the member's Coop's Membership Agreement. All salmon taken as bycatch in connection with such deliveries shall be counted as the member's Coop's bycatch, and the vessel shall be subject to the salmon Savings Area closures applicable to the member’s Coop in connection with all such deliveries.

C. If a member's vessel delivers to a Non-Affiliated processor fish harvested both under an Amendment 69 charter and from the member's Coop's free market allocation during a single fishing trip (such trip being a “Split Trip”), the member shall comply with the terms and conditions of the Membership Agreements of both the member's Coop and the Charter Coop, and, without limitation, shall comply with the more restrictive of the Savings Area closures applicable to each of such Coops. All salmon bycatch taken during a Split Trip shall be allocated between the member's Coop and the Charter Coop in proportion to the amount of pollock taken under each such Coop's allocation during each such trip."

VII. Data Gathering and Reporting - The Coops acknowledge that the effectiveness of the bycatch management program set forth in Sections III, IV, and V, above, depends on gathering, analyzing and disseminating accurate chinook salmon bycatch data rapidly. The Coops therefore agree as follows.

A. Each Coop shall require its members’ vessels to exercise all commercially reasonable efforts to report to Sea State within 24 hours the location of, estimated pollock tonnage of and estimated number of chinook salmon in each trawl tow. PCC may satisfy its obligation under this section 3.a by arranging to have its members’ vessels’ observer reports concerning chinook bycatch transmitted to Sea State. MFC and High Seas may satisfy their obligations under this Section by arranging to have the pollock amounts and chinook salmon counts for their members' vessels reported to Sea State by the observers on the processing vessels to which their members' vessels deliver. The Inshore Coops shall arrange for their vessels to report the crew's best estimate of the amount of pollock and the number of chinook salmon in the tow when reporting its location. Each Inshore Coop shall develop its own methods and means to accurately calculate (when feasible) or estimate the amount of pollock and the number of salmon contained in each tow by its members' vessels, and to rapidly and accurately report that information to Sea State.

B. The Inshore Coops acknowledge that the Vessel Monitoring System ("VMS") is the most efficient means for reporting tow-by-tow data to Sea State, and the Inshore Coops therefore agree to encourage their members to use the VMS system to do so. However, the Coops all acknowledge that in certain circumstances, it may be difficult to achieve accurate, reliable reporting through the VMS system, and that for vessels with relatively small pollock allocations, the cost of acquiring, installing and operating the VMS data transmission system may be higher than reasonable. Therefore, reporting bycatch information via the VMS system is not required.

C. Sea State will from time to time announce a chinook or chum bycatch rate that will trigger an incident reporting requirement. Each Coop shall require its members' vessels to notify their coop manager (if applicable), the intercooperative manager and, if feasible, Sea State as soon as possible of any tow with a chinook salmon bycatch rate that the crew estimates to be equal to or greater than the incident reporting rate threshold.

VIII. Savings Area Closure Enforcement – This portion of the Agreement is implemented through two tiers of legal agreements. The top tier is an agreement among the 10 BS/AI pollock cooperatives that sets forth the Voluntary Rolling Hot Spot (VRHS) system terms and conditions (the "Inter-coop Agreement"). The second tier comprises the membership agreements of all 10 cooperatives. The terms and conditions of the Inter-coop Agreement are described in Section I through VII. above. The terms and conditions of the cooperative membership agreements that are specifically related to enforcement of the VRHS system are as follows:

A. Each member acknowledges that its vessel's operations are governed by the Inter-coop Agreement, and agrees to comply with its terms, as they may be amended from time to time.

B. Each member authorizes the Board of Directors of its cooperative to take all actions and execute all documents necessary to give effect to the Inter-coop Agreement.

C. Each member authorizes the Board of Directors of its cooperative to enforce the Inter-coop Agreement, and if the Board fails to do so within 30 days of receiving notice from Sea State that a cooperative member may have failed to comply with the Agreement, each member authorizes each of the Boards of Directors of each other pollock cooperative, each of the CDQ groups, Bering Sea Fishermen's Association ("BSFA") and Yukon River Drainage Fishermen's Association ("YRDFA") to individually or collectively take legal action to enforce the Inter-coop Agreement.

D. Each member releases to Sea State its VMS tacking data, its vessel log books and its plotter data for purposes of determining its compliance with the Interco-op Agreement, and agrees that in the event Sea State concludes that its vessel may have violated a hot spot closure, Sea State may deliver any and all of such data to the Boards of Directors, the CDQ groups, BSFA and YRDFA for purposes of enforcing the Agreement.

E. Each member agrees that the information contained in the records identified in D., above, shall be presumed accurate absent a clear and compelling demonstration otherwise, and shall be presumed sufficient to determine its compliance with the Interco-op Agreement.

F. Each member agrees that damages for violating the Interco-op Agreement shall apply on a strict liability basis, regardless of a member's lack of knowledge of the violation or intent to violate the agreement.

G. Each member agrees that actual damages for violating the agreement would be difficult to calculate, and therefore agrees to pay an amount per tow made in violation of the Inter-coop Agreement as the Board of Directors establishes from time to time as liquidated damages. Each member agrees to modify its skipper contracts to make its skipper(s) fully responsible for the liquidated damages that are assessed in connection with a breach of the agreement. Further, each member agrees that in the event a skipper fails to assume such assignment of liability, or in the event such assumption is deemed invalid, the member shall be liable for the full amount of such liquidated damages.

H. The current penalties for Savings Closure violations are $10,000.00 for the first violation in a year, $15,000.00 for a second violation in the same year as the first, and $20,000.00 for a third and subsequent violations in a year.

I. Each member agrees that in connection with any action taken to enforce the Inter-coop Agreement, the prevailing party shall be entitled to the costs and fees it incurs in connection with such action, including attorneys' fees.

J. Each member agrees that in addition to legal remedies, the Board of Directors of each cooperative, each of the CDQ groups, BSFA and YRDFA shall be entitled to injunctive relief in connection with the second and subsequent violations of the Inter-coop Agreement.

IX. **Annual Report to the NPFMC.** At the end of each year a report will be made to the North Pacific Fisheries Management Council by the members of the Inter-cooperative Salmon Management Agreement which will address the following:

1. Number of salmon taken in the year by species
2. Estimate number of salmon bycatch avoided as demonstrated by the movement of fishing effort away from salmon hot-spots.
3. A compliance / enforcement report which will include the results of an internal compliance audit and an external compliance audit if one has been done.
4. List of each AFA vessels' number of appearances on the weekly dirty 20 list for both salmon species.
5. Acknowledge that the Agreement term has been extended for another year (maintaining the 3 year lifespan) and report any changes to the Agreement that were made at the time of the renewal.

X. **Term -** Three year agreement (2006 – 2008). The 3 year span of the Agreement will be maintained by an annual renewal. The annual renewal will allow "fine-tuning" of the Agreement.

XI. Miscellaneous. (This section will be consistent with previous Agreements.)

Entered into as of the date first set forth above.

MOTHERSHIP FLEET COOPERATIVE

By ______________________________
Its ___________________________

AKUTAN CATCHER VESSEL ASSOCIATION

By ______________________________
Its ___________________________

ARCTIC ENTERPRISE ASSOCIATION

By ______________________________
Its ___________________________

NORTHERN VICTOR FLEET COOPERATIVE

By ______________________________
Its ___________________________

PETER PAN FLEET COOPERATIVE

By ______________________________
Its ___________________________

UNALASKA FLEET COOPERATIVE

By ______________________________
Its ___________________________

HIGH SEAS CATCHERS COOPERATIVE

By ______________________________

POLLOCK CONSERVATION COOPERATIVE

By ______________________________
Its ___________________________

Its ____________________________

ALEUTIAN PRIBILOF ISLAND COMMUNITY DEVELOPMENT ASSOCIATION

By _______________________________
Its ____________________________

BRISTOL BAY ECONOMIC DEVELOPMENT CORPORATION

By _______________________________
Its ____________________________

CENTRAL BERING SEA FISHERMAN'S ASSOCIATION

By _______________________________
Its ____________________________

COASTAL VILLAGES REGION FUND

By _______________________________
Its ____________________________

NORTON SOUND ECONOMIC DEVELOPMENT CORPORATION

By _______________________________
Its ____________________________

YUKON DELTA FISHERIES DEVELOPMENT ASSOCIATION

By _______________________________
Its ____________________________

Appendix 3: Sea State Closures and Example Weekly Announcement Reports

Chinook Examples

SEA STATE
P.O. Box 74, Vashon, WA 98070

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August 19, 2005

Re: IC Salmon closure

Overall catch and bycatch by sector (no cdq)

Sector	Pollock (mt)	Chinook (N)	Chinook rate (N/mt)
Shoreside	120,400	7,274	0.060
C/P	109,861	6,348	0.057
Motherships	30,210	1,302	0.042
Total	260,471	14,924	0.057

The chinook numbers keep climbing. Hopefully these closures (yes, there are some this time, and yes some coops are definitely in Tiers 2 and 3) will throttle it back some. We have split the closures between the two areas with the highest rates (685530 and 655430) because there is certainly no statistically significant difference between their rates (.150 and .143 respectively). The total closure area amounts to a bit over 900 sq nm, and while we have kept them rectangular, they aren't perfect subsets of stat areas. The closure down near the horseshoe in particular straddles four ADFG stat areas.

Closure boundaries:

Area1: 54 45N to 55 15N
164 52W to 165 25W

Area2: 55 35N to 55 57N
168 40W to 169 05W

WEEKLY SALMON BYCATCH UPDATE - For Week Ending 2/17/05					
Coop	Bycatch Rate	Coop Tier Status	Savings Closure Start Date (1800 Hrs.)	Savings Closure End Date (1800 Hrs.)	Number of Closure Days
Akutan Coop	0.089	3	2/18/2005	2/25/2005	7
Arctic Coop	0.043	1	NA	NA	0
Mothership Coop	0.049	1	NA	NA	0
North Victor Coop	0.082	2	2/18/2005	2/22/2005	4
Peter Pan Coop	0.059	2	2/18/2005	2/22/2005	4
Plck Cons. Coop	0.073	2	2/18/2005	2/22/2005	4
Unalaska Coop	0.091	3	2/18/2005	2/25/2005	7
UniSea Coop	0.045	1	NA	NA	0
Westward Coop	0.089	3	2/18/2005	2/25/2005	7

Tier 1: Less that .050 salmon per mt. Not affected by closures
Tier 2: Greater than .050 but less than .084 salmon per mt. Subject to 4-day closure
Tier 3: Greater than .084 salmon per mt. Subject to 7-day closure

Bycatch rates by area for week ending 2/17/05			
Stat Area	Rate	Stat Area	Rate
685530	0.150	635530	0.030
655430	0.143	645600	0.029
695600	0.140	685600	0.024
655530	0.140	645530	0.020
655501	0.140	635630	0.020
645434	0.079	635600	0.013
645501	0.076	675630	0.010
695530	0.040	655630	0.010
685630	0.040	665630	0.000
665600	0.037	635504	0.000
655600	0.030		

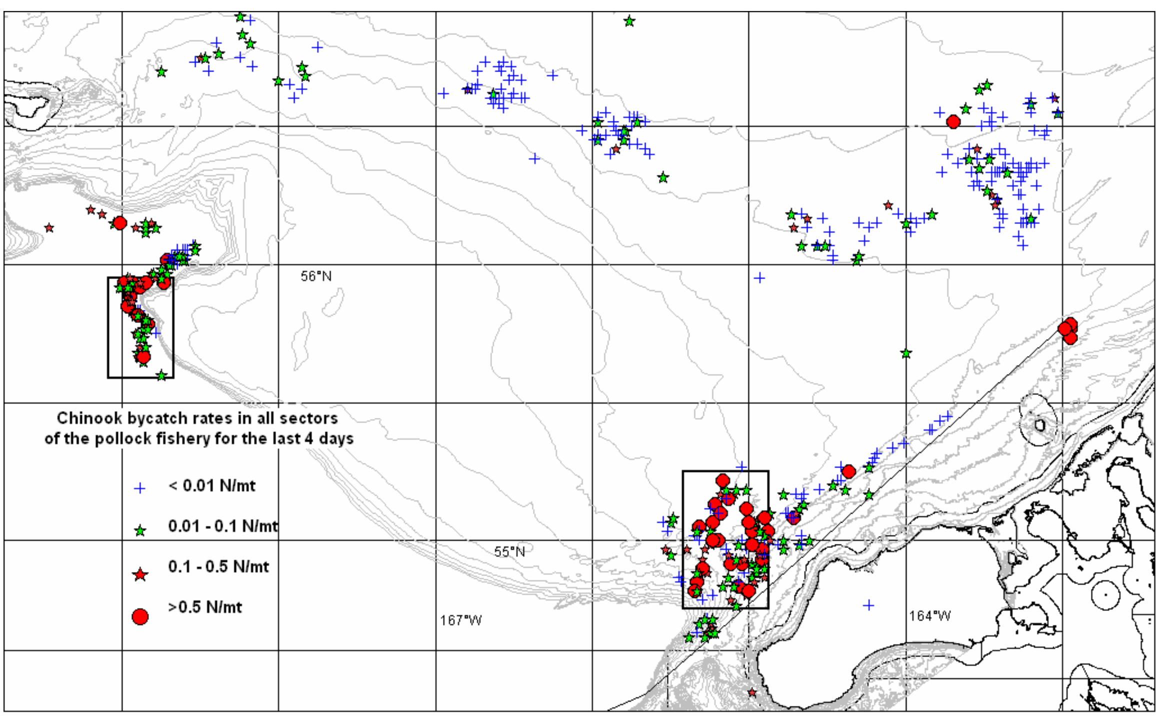
Dirty 20 Lists:

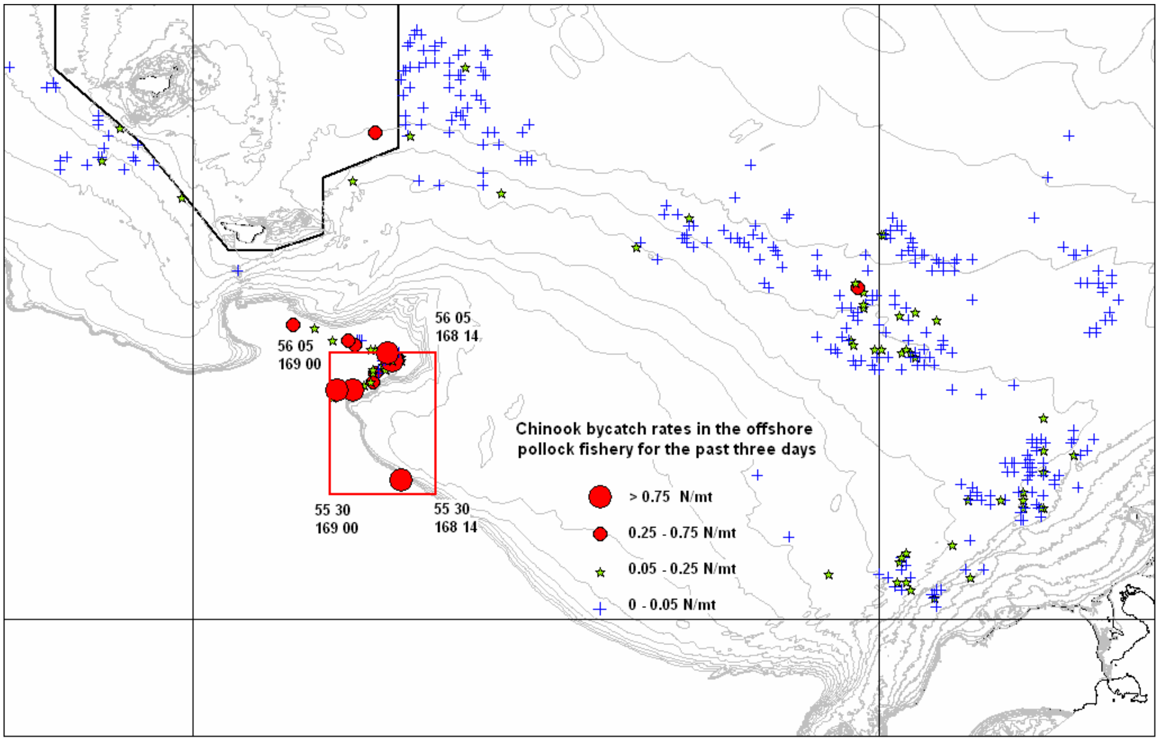
Past two weeks

Vessel	Chinook Rate N/mt
1	0.235
2	0.145
3	0.141
4	0.138
5	0.138
6	0.136
7	0.134
8	0.131
9	0.118
10	0.116
11	0.113
12	0.112
13	0.106
14	0.105
15	0.101
16	0.101
17	0.101
18	0.100
19	0.099
20	0.099

Weekly

Vessel	Chinook Rate N/mt
1	0.359
2	0.184
3	0.160
4	0.155
5	0.153
6	0.151
7	0.150
8	0.146
9	0.145
10	0.143
11	0.138
12	0.136
13	0.136
14	0.135
15	0.126
16	0.125
17	0.118
18	0.117
19	0.115
20	0.114




56 05
168 14
56 05
169 00
55 30
169 00
55 30
168 14
Chinook bycatch rates in the offshore pollock fishery for the past three days
> 0.75 N/mt
0.25 - 0.75 N/mt
0.05 - 0.25 N/mt
0 - 0.05 N/mt

SEA STATE
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August 19, 2005

Re: IC Salmon mid-week update

There has been a significant movement of salmon onto the shelf in the last few days. It shows in the catcher-processor and mothership data, but I don't think we have received much shoreside information yet that indicates the increased rates. I expect that to change by Thursday, which is the next time we announce new closures. I wouldn't be surprised to find that we have cooperatives out of Tier 1 by then, which would mean that we would have coops affected by closures announced Thursday.

These Tuesday announcements can be confusing. On Thursday we evaluate tier levels and list the start and end dates for which closures are in effect for the various coops. We also describe the initial closure areas on Thursday. On Tuesday we can change those areas, but the closure dates remain the same.

Right now it looks as though the mushroom and another area along the shelf edge just west of the mushroom would close. I don't think anyone is left fishing those areas, so the closure would be made mainly to prevent anyone moving back in. I have looked at other areas of the map and see surprisingly high, and relatively uniform rates in three different areas where boats have been fishing up on the shelf. Right now I don't think I could decide between them if I were trying to figure out which area to close, although the central circle with a rate of .038 obviously doesn't make much sense to close. It may be that by Thursday the situation will change and some area of the shelf will look like it should be closed. (So stay tuned).

Regards,

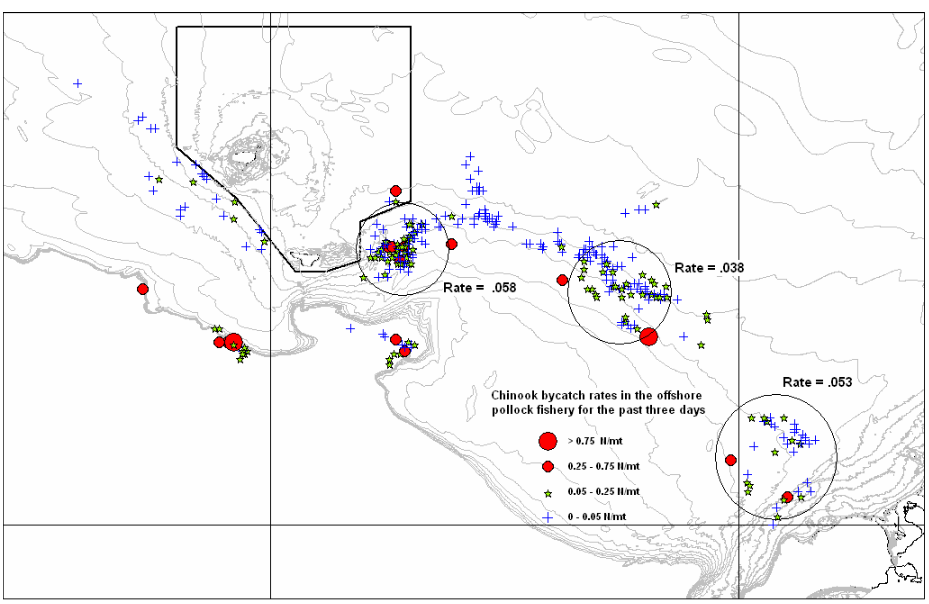
Karl

Sector	Pollock (mt)	Chinook (N)	Chinook rate (N/mt)
Shoreside	199,519	7,431	0.037
C/P	158,217	5,967	0.037
Motherships	47,277	1,447	0.030
Total	405,013	14,845	0.037

WEEKLY SALMON BYCATCH UPDATE - For 3/9/04					
Coop	Bycatch Rate	Coop Tier Status	Savings Closure Start Date (1800 Hrs.)	Savings Closure End Date (1800 Hrs.)	Number of Closure Days
Akutan Coop	0.032	1	NA	NA	0
Arctic Coop	0.016	1	NA	NA	0
Mothership Coop	0.040	1	NA	NA	0
North Victor Coop	0.027	1	NA	NA	0
Peter Pan Coop	0.024	1	NA	NA	0
Plck Cons. Coop	0.051	2	NA	NA	0
Unalaska Coop	0.023	1	NA	NA	0
UniSea Coop	0.028	1	NA	NA	0
Westward Coop	0.031	1	NA	NA	0

Tier 1: Less that .050 salmon per mt. Not affected by closures
Tier 2: Greater than .050 but less than .084 salmon per mt. Subject to 4-day closure
Tier 3: Greater than .084 salmon per mt. Subject to 7-day closure

Bycatch rates by area for 3/9/04			
Stat Area	Rate	Stat Area	Rate
705600	0.160	655600	0.030
685600	0.110	645434	0.030
685630	0.064	705701	0.010
645500	0.060	665630	0.010
665600	0.052	715700	0.000
645530	0.044	675700	0.000
645501	0.040	675630	0.000
705630	0.035		



Chum Examples

SEA STATE P.O. Box 74, Vashon, WA 98070

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Email: karl@seastateinc.com

August 19, 2005

Re: IC Salmon closure

Although chinook bycatch continues to dribble in, there are no areas that are over the threshold necessary to trigger a chinook closure. There appear to be high numbers of chums in a relatively small part of the western area, so for this week we are closing parts of 2 stat areas, but an overall area that is less than a single stat area. The bycatch rate on chums in the box that we are closing is about .32 salmon per mt. At this point only the motherships are in Tier 3. Peter Pan and PCC are in Tier 2 and must observe 4 day closures.

Regards,

Karl

Overall catch and bycatch by sector (no cdq)

Sector	Pollock (mt)	Chinook (N)	Chinook rate (N/mt)	other salmon (N)	other salmon rate (N/mt)
Shoreside	76,362	158	0.002	3,074	0.040
C/P	112,254	665	0.006	24,864	0.221
Motherships	13,482	56	0.004	1,699	0.126
Total	202,097	879	0.004	29,638	0.147

WEEKLY SALMON BYCATCH UPDATE - For Week Ending 7/15/04					
Coop	Bycatch Rate	Coop Tier Status	Savings Closure Start Date (1800 Hrs.)	Savings Closure End Date (1800 Hrs.)	Number of Closure Days
Akutan Coop	0.017	1	N/A	N/A	0
Arctic Coop	0.023	1	N/A	N/A	0
Mothership Coop	0.138	3	7/16/2004	7/23/2004	7
North. Victor Coop	0.033	1	N/A	N/A	0
Peter Pan Coop	0.056	2	7/16/2004	7/20/2004	4
Plck Cons. Coop	0.085	2	7/16/2004	7/20/2004	4
Unalaska Coop	N/A	1	N/A	N/A	0
UniSea Coop	0.037	1	N/A	N/A	0
Westward Coop	0.041	1	N/A	N/A	0

Tier 1: Less than .054 salmon per mt
Tier 2: Greater than .054 but less that .090 salmon per mt
Tier 3: Greater than .090 salmon per mt

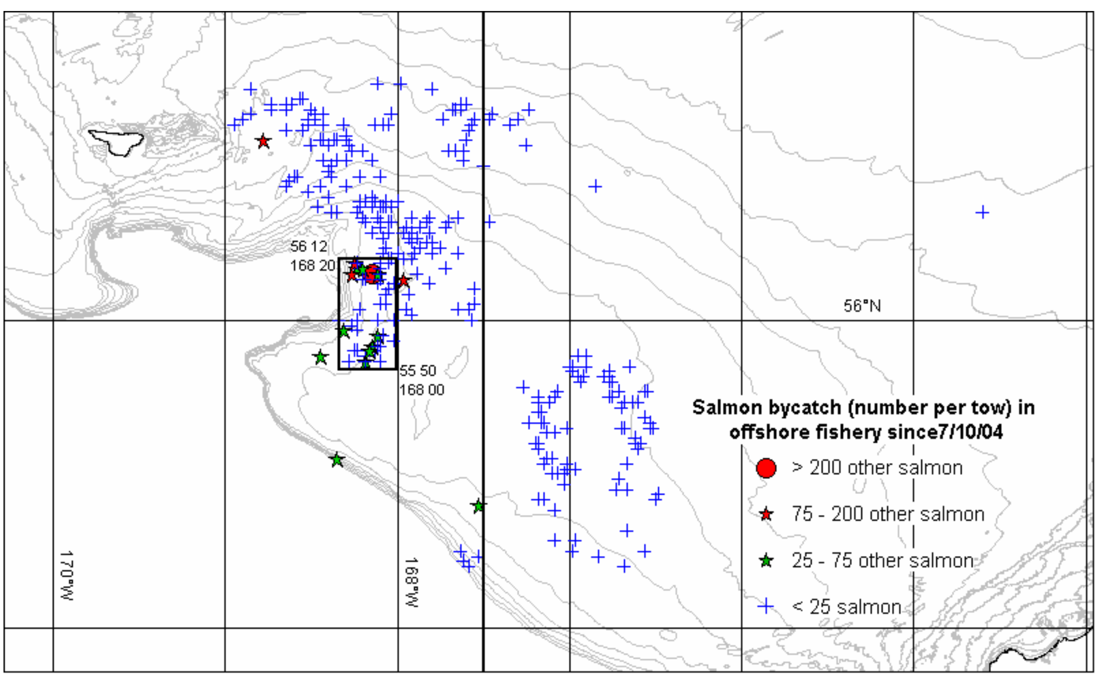
Western Region Closure Area

55 50N to 56 12N
168 00W to 168 20W

Bycatch rates by area through 7/15/04			
Stat Area	Rate	Stat Area	Rate
685530	0.291	675630	0.028
685600	0.136	675530	0.024
635600	0.112	665500	0.022
685630	0.105	655409	0.018
675600	0.073	655430	0.006
675500	0.039	665430	0.004
665530	0.031	685500	0.000

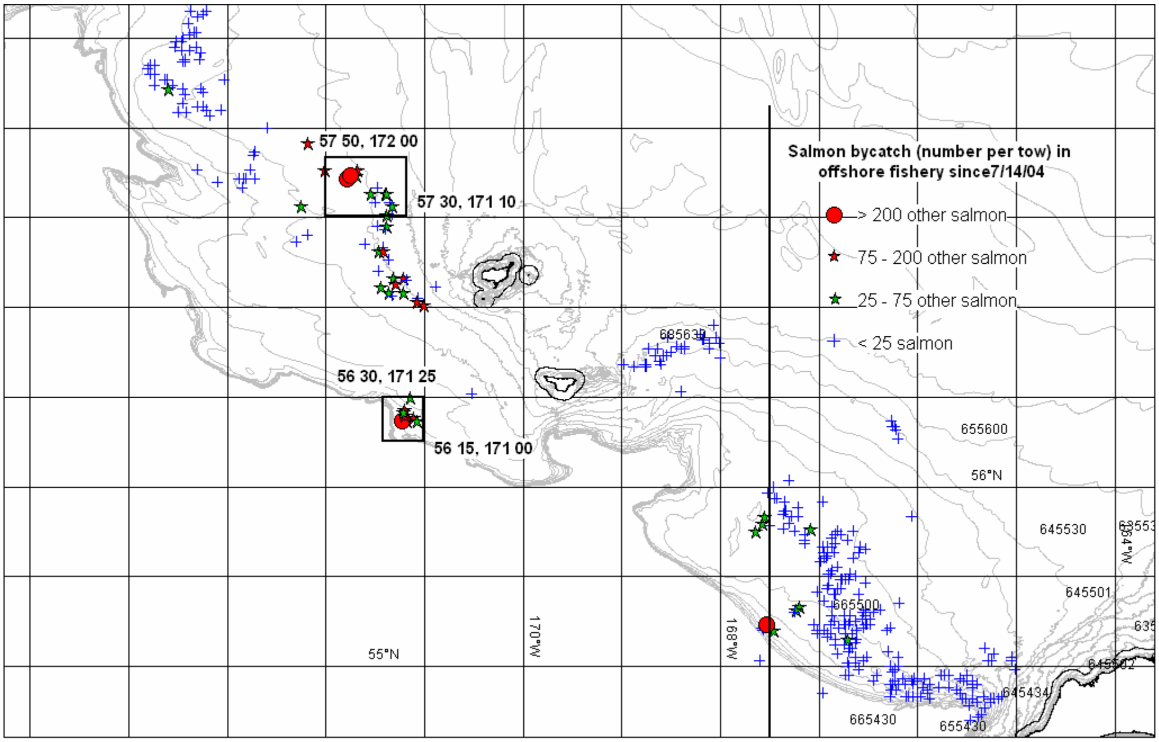
Dirty 20 Lists

All Season Vessel	Other Salmon Rate	Past two weeks Vessel	Other Salmon Rate	Weekly Vessel	Other Salmon Rate
1	0.460	1	0.313	1	0.518
2	0.392	2	0.194	2	0.290
3	0.372	3	0.175	3	0.261
4	0.270	4	0.171	4	0.233
5	0.265	5	0.131	5	0.175
6	0.240	6	0.121	6	0.153
7	0.220	7	0.109	7	0.120
8	0.217	8	0.108	8	0.115
9	0.200	9	0.107	9	0.113
10	0.175	10	0.103	10	0.104
11	0.153	11	0.097	11	0.096
12	0.145	12	0.081	12	0.080
13	0.131	13	0.080	13	0.073
14	0.126	14	0.073	14	0.071
15	0.121	15	0.072	15	0.064
16	0.107	16	0.071	16	0.062
17	0.103	17	0.070	17	0.054
18	0.097	18	0.063	18	
19	0.093	19	0.058	19	
20	0.080	20	0.056	20	



Western Region Closure Areas:

Area 1:	56 15N to 56 30N 171 00W to 171 25W
Area 2:	57 30N to 57 50N 171 10W to 172 00W



Bycatch rates by area through 7/22/04			
Stat Area	Rate	Stat Area	Rate
715600	0.869	665500	0.051
715730	0.639	745830	0.042
715700	0.512	735830	0.042
675500	0.441	735800	0.036
715630	0.382	685630	0.024
725730	0.298	655409	0.019
675530	0.183	655430	0.013
655500	0.085	635600	0.006
665530	0.058		
665430	0.058		

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August 19, 2005

Re: IC Salmon closure

Overall catch and bycatch by sector (no cdq)

Sector	Pollock (mt)	Chinook (N)	Chinook rate (N/mt)	Other Salmon (N)	Other salmon rate (N/mt)
Shoreside	128,488	235	0.002	5,281	0.041
C/P	162,632	751	0.005	33,263	0.204
Motherships	22,999	90	0.004	2,476	0.107
Total	314,120	1,077	0.003	41,020	0.131

Bycatch continues to be high out west of the Pribilofs. We are closing the entire stat area 725630 as it clearly had the worst hauls in the last 7 days (even the last 2 days). In the eastern bycatch management region we have had a couple of deliveries from west of 166 that result in parts of 665430 and 665500 being closed. The south part of 665500 will also close for a month on August 1 as it is part of the chum savings area, but 665430 is outside the chum savings area and will be fair game for Tier 2 coops after 1800 hrs on August 3rd. Of course, it will not close at all to Tier 1 coops.

It looks like we again have very clean fishing up in the chum savings area, and certainly some very dirty fishing outside the savings area. I have my fingers crossed that the areas south of the 55 line stay relatively chum-free for awhile. It may be that the large numbers of chums up by the Pribilofs indicate a shift in their main area of abundance, at least for this year. That would be good news for the shoreside fleet, although small consolation to the factory trawlers.

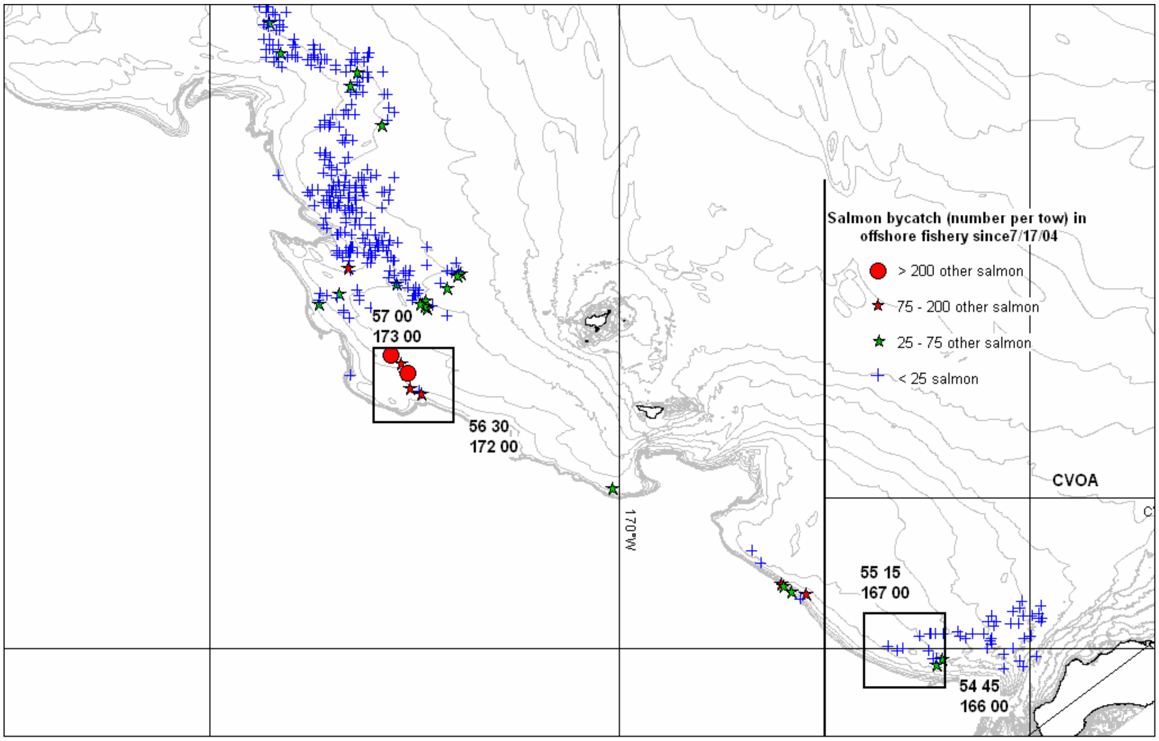
-Karl

WEEKLY SALMON BYCATCH UPDATE - For Week Ending 7/29/04					
Coop	Bycatch Rate	Coop Tier Status	Savings Closure Start Date (1800 Hrs.)	Savings Closure End Date (1800 Hrs.)	Number of Closure Days
Akutan Coop	0.029	1	N/A	N/A	0
Arctic Coop	0.037	1	N/A	N/A	0
Mothership Coop	0.084	2	7/30/2004	8/3/2004	4
North. Victor Coop	0.035	1	N/A	N/A	0
Peter Pan Coop	0.018	1	N/A	N/A	0
Plck Cons. Coop	0.167	3	7/30/2004	8/6/2004	7
Unalaska Coop	0.037	1	N/A	N/A	0
UniSea Coop	0.086	2	7/30/2004	8/3/2004	4
Westward Coop	0.030	1	N/A	N/A	0

Tier 1: Less than .054 salmon per mt
Tier 2: Greater than .054 but less that .090 salmon per mt
Tier 3: Greater than .090 salmon per mt

Western Region Closure Areas – 725630:
Coordinates: 56 30N – 57 00N
172 00W – 173 00W

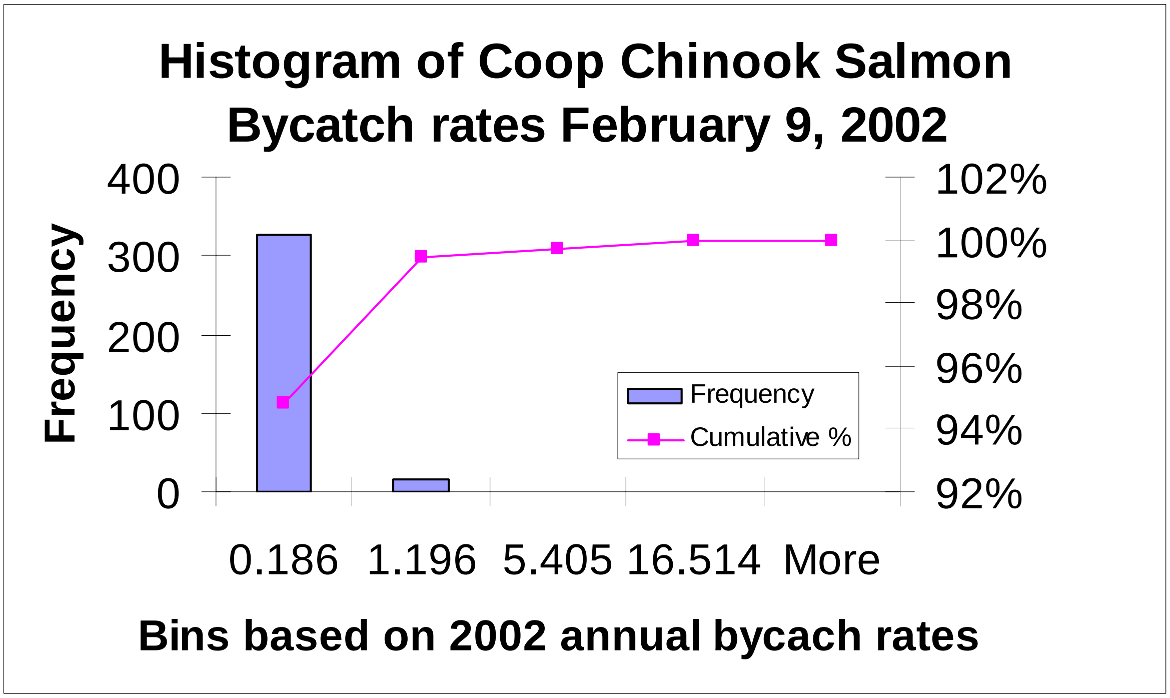
Eastern Region Closure – north half of 665530and south half of 665500:
Coordinates: 54 45 – 55 15
166 00W – 167 00W

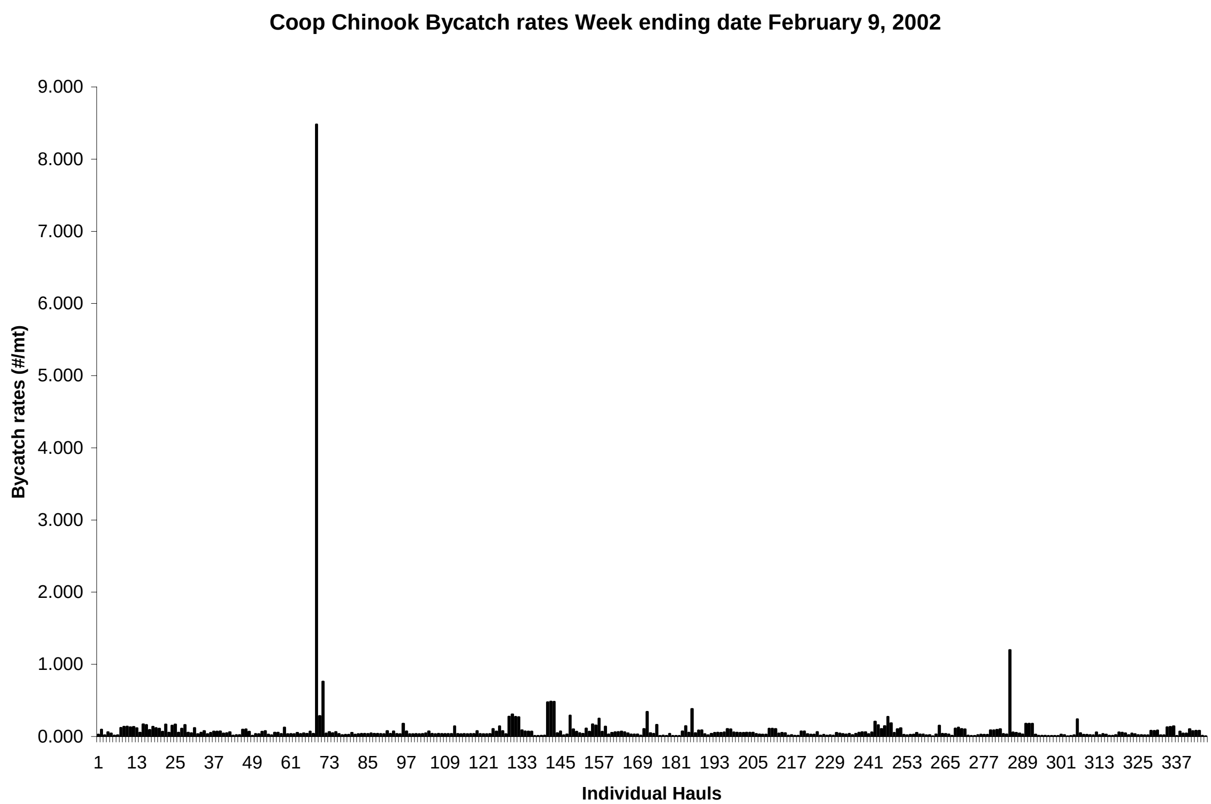


Bycatch rates by area through 7/29/04			
Stat Area	Rate	Stat Area	Rate
725630	1.476	725730	0.058
685500	0.515	735800	0.047
675500	0.475	745830	0.043
715700	0.425	655500	0.042
715730	0.290	735730	0.038
665500	0.268	735830	0.037
665430	0.164	645501	0.035
735700	0.135	725830	0.035
725700	0.116	655430	0.030
725800	0.108	645434	0.020
735900	0.082	655530	0.018
685530	0.081	655409	0.003
745900	0.079	745800	0.000
645500	0.064		

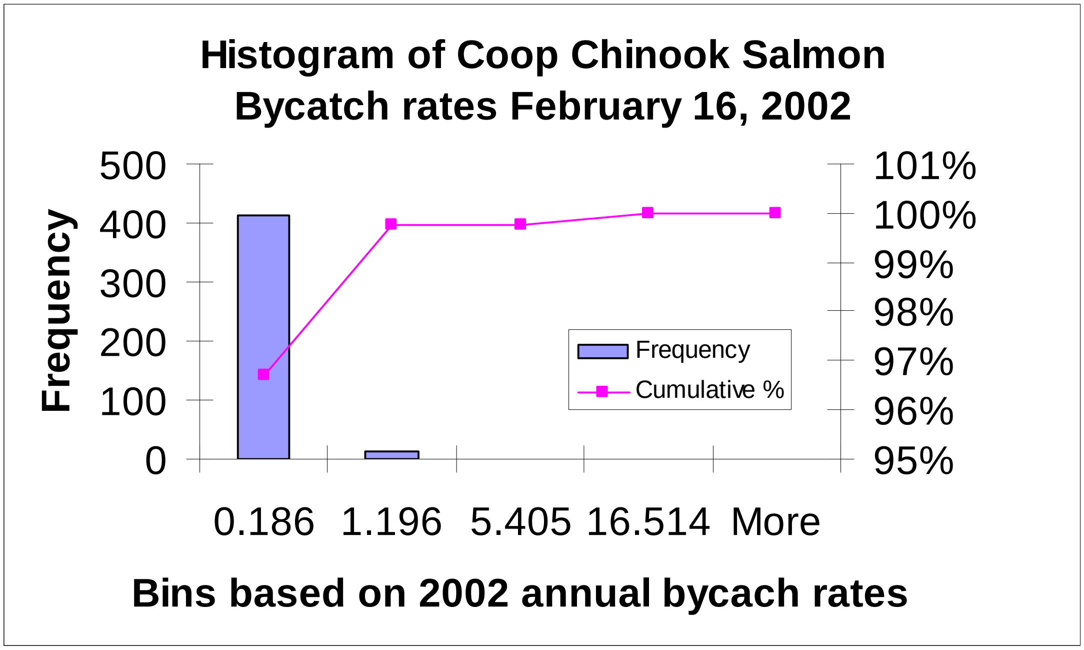
Appendix 4 HISTOGRAMS AND FREQUENCY DIAGRAMS BYCATCH BY WEEK.

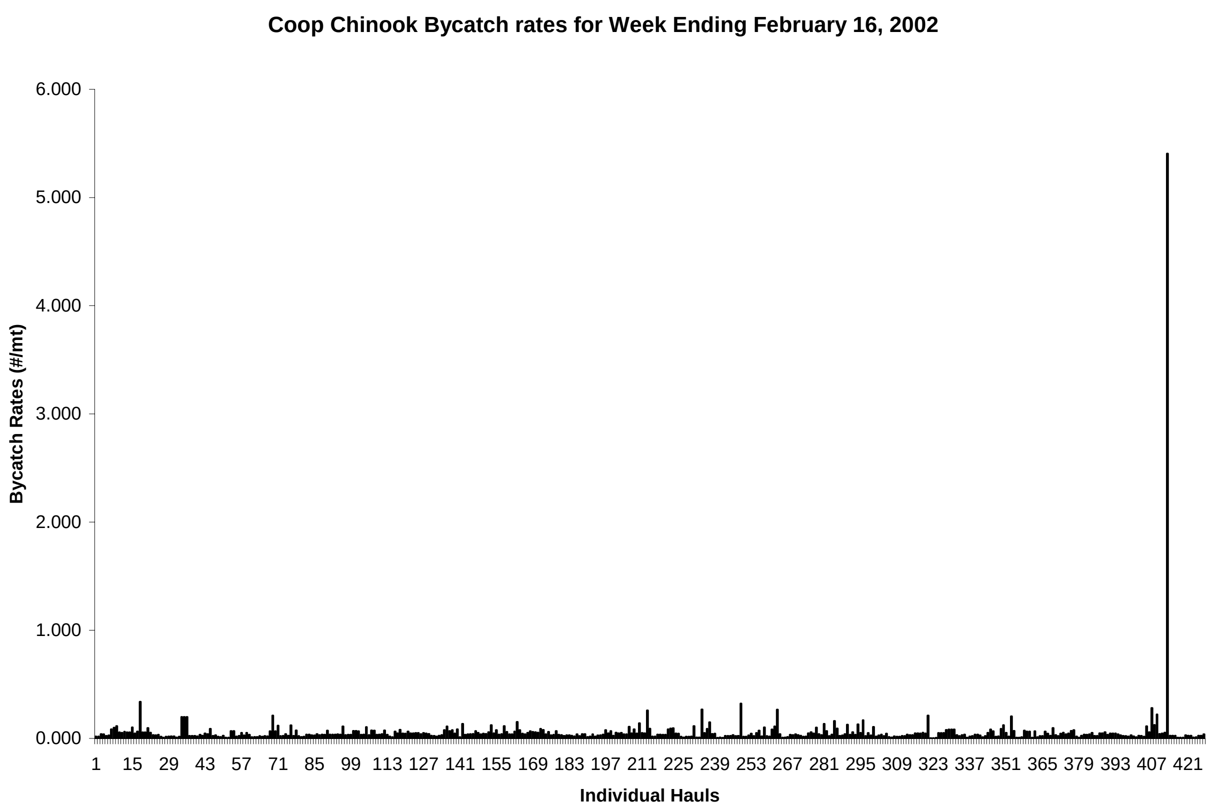
Appendix 4 - 1 Chinook Salmon Bycatch rates in the non-CDQ Pollock Fishery "A" Season week ending February 9, 2002. a) Histogram representing the frequency of weekly hauls in each bin allocated to the annual bycatch rate, and b) frequency distribution of number of hauls by bycatch rate.



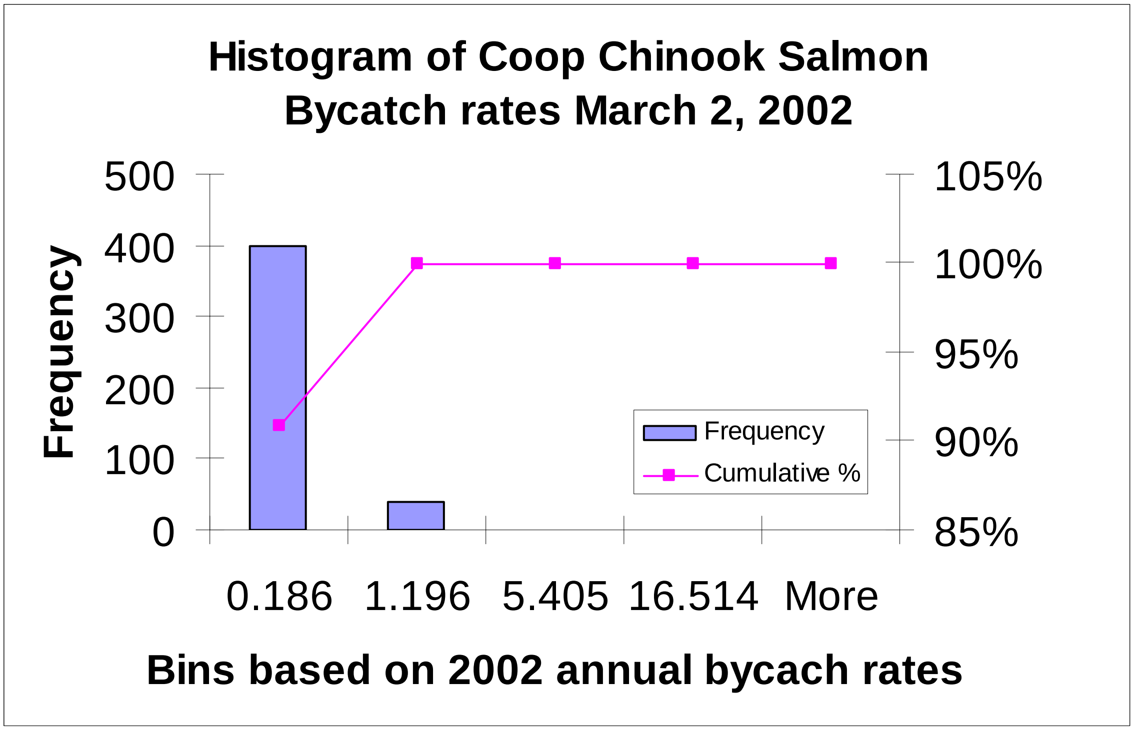


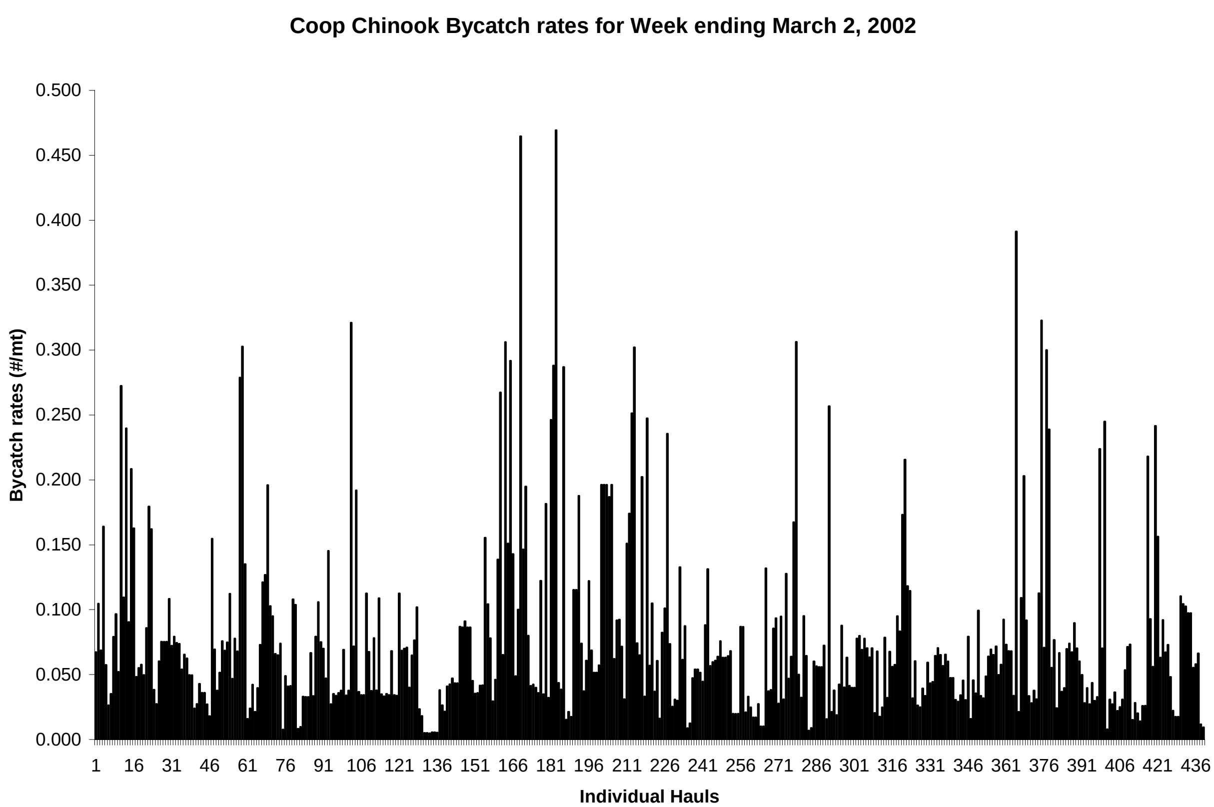
Appendix 4 - 2 Chinook Salmon Bycatch rates in the non-CDQ Pollock Fishery "A" Season week ending February 16, 2002. a) Histogram representing the frequency of weekly hauls in each bin allocated to the annual bycatch rate, and b) frequency distribution of number of haul by bycatch rate.



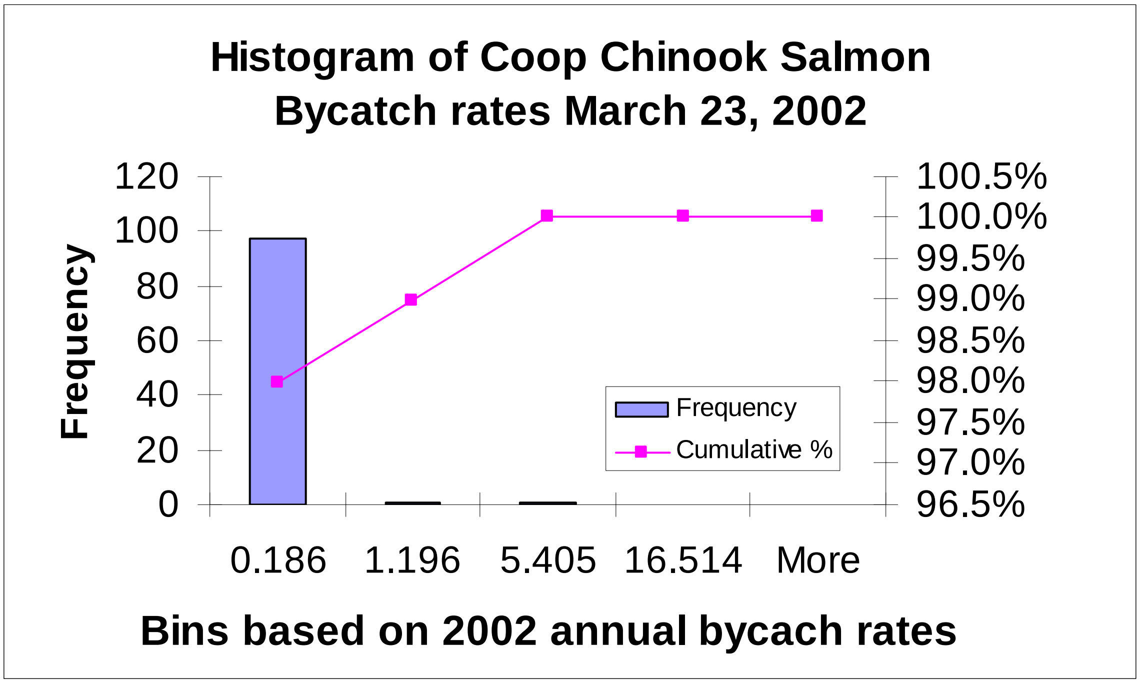


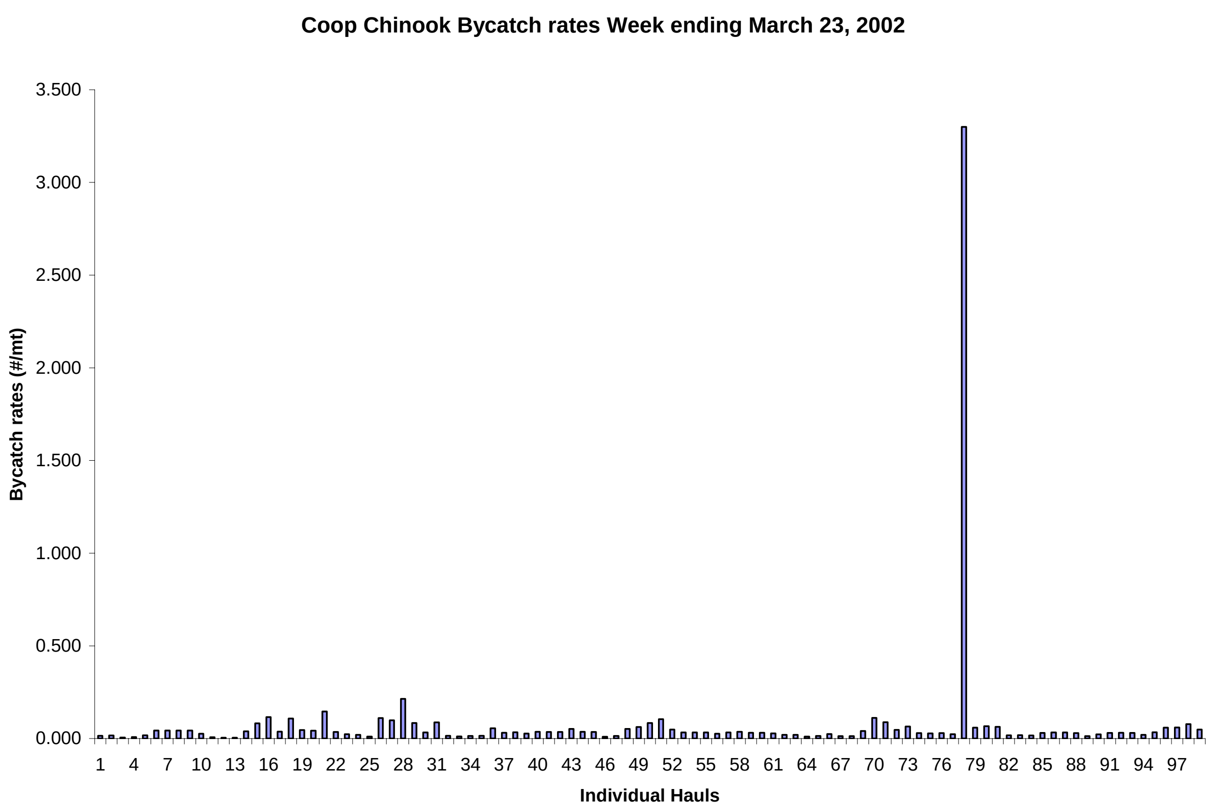
Appendix 4 - 3 Chinook Salmon Bycatch rates in the non-CDQ Pollock Fishery "A" Season week ending March 2, 2002. a) Histogram representing the frequency of weekly hauls in each bin allocated to the annual bycatch rate, and b) frequency distribution of number of hauls by bycatch rate.



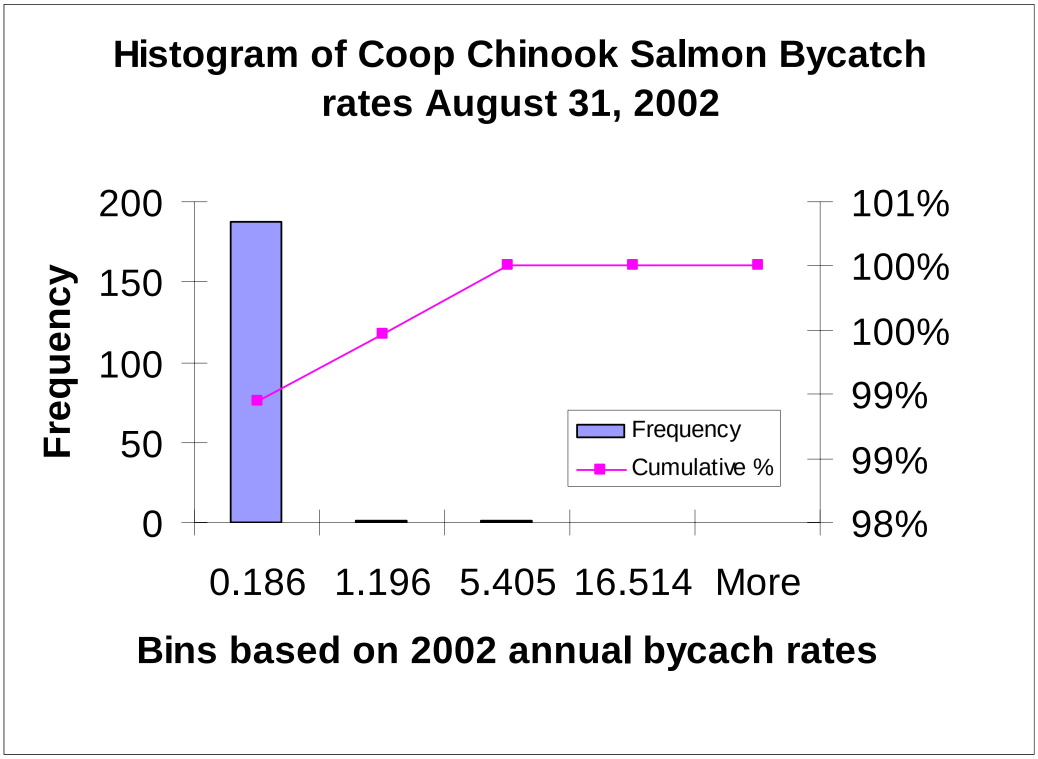


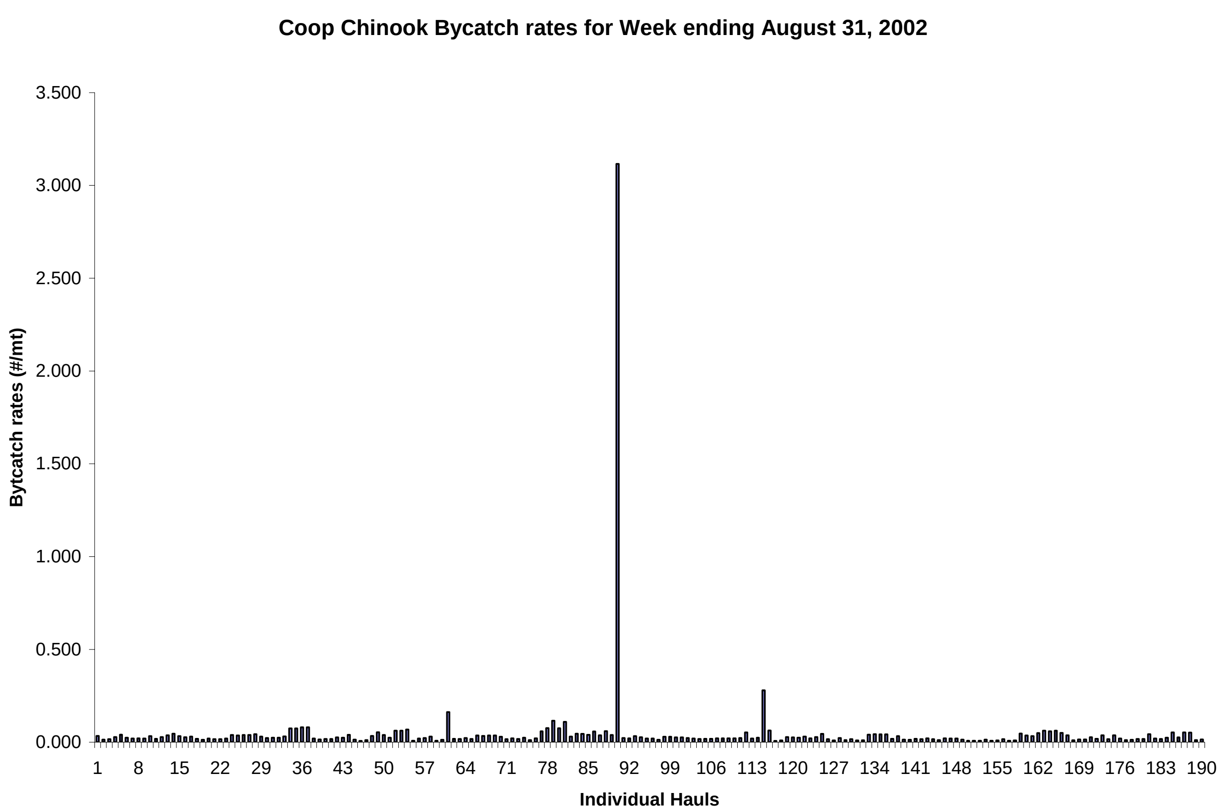
Appendix 4 - 4 Chinook Salmon Bycatch rates in the non-CDQ Pollock Fishery “A” Season week ending March 23, 2002. a) Histogram representing the frequency of weekly hauls in each bin allocated to the annual bycatch rate, and b) frequency distribution of number of hauls by bycatch rate.



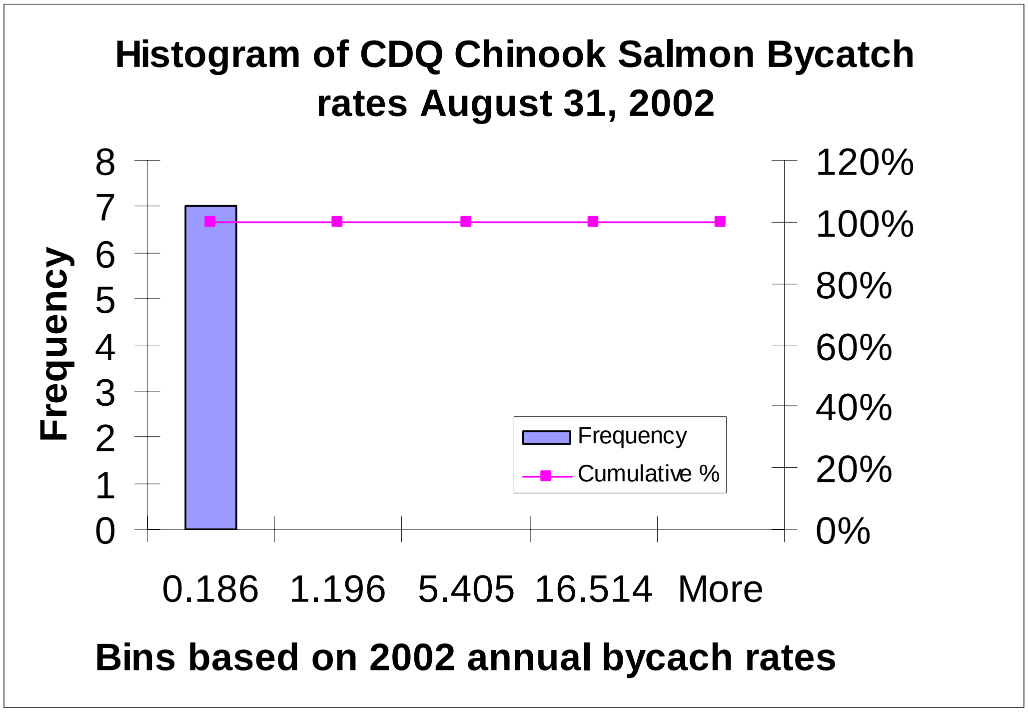


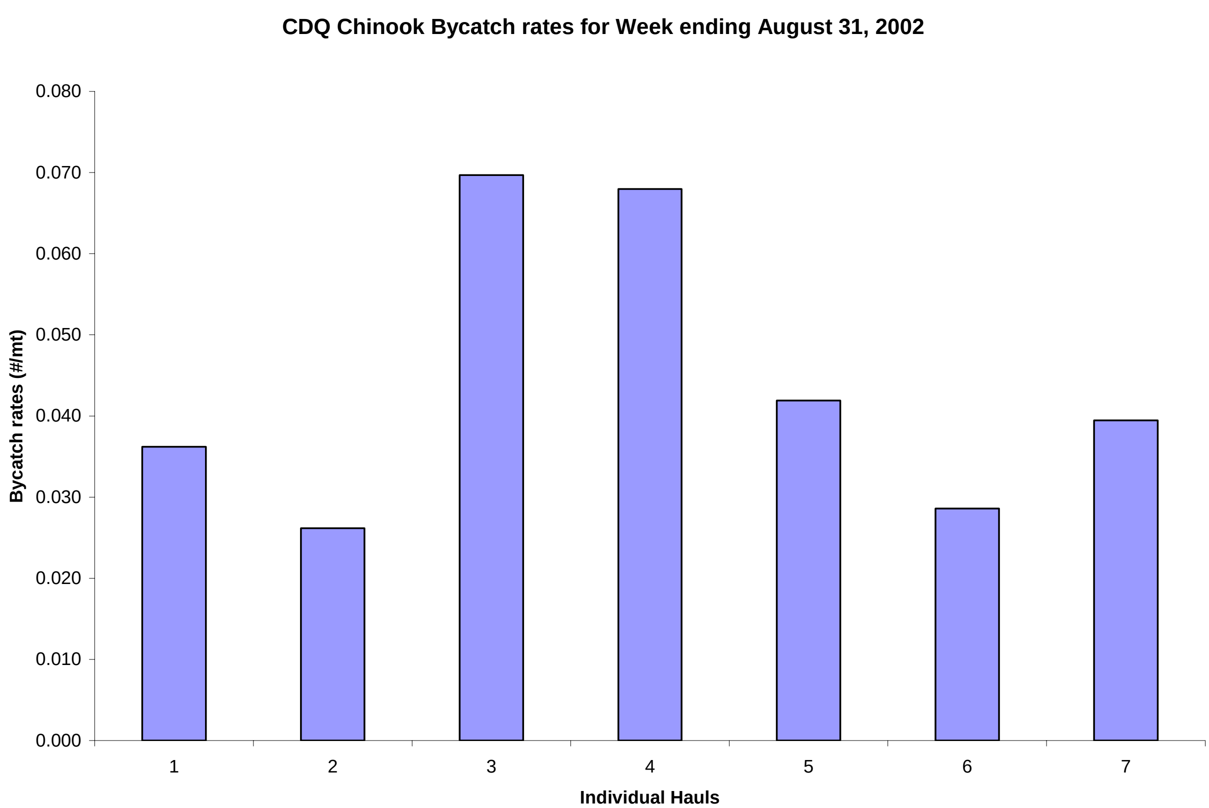
Appendix 4 - 5 Chinook Salmon Bycatch rates in the non-CDQ Pollock Fishery "B" Season week ending August 31, 2002. a) Histogram representing the frequency of weekly hauls in each bin allocated to the annual bycatch rate, and b) frequency distribution of number of hauls by bycatch rate.



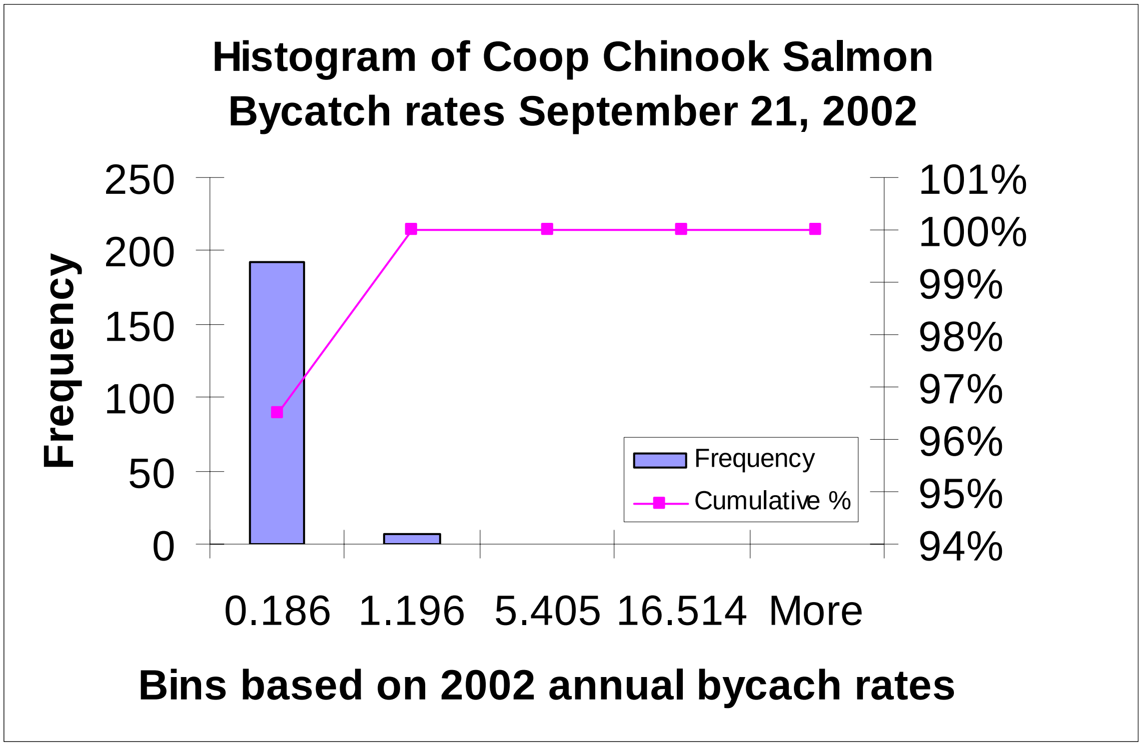


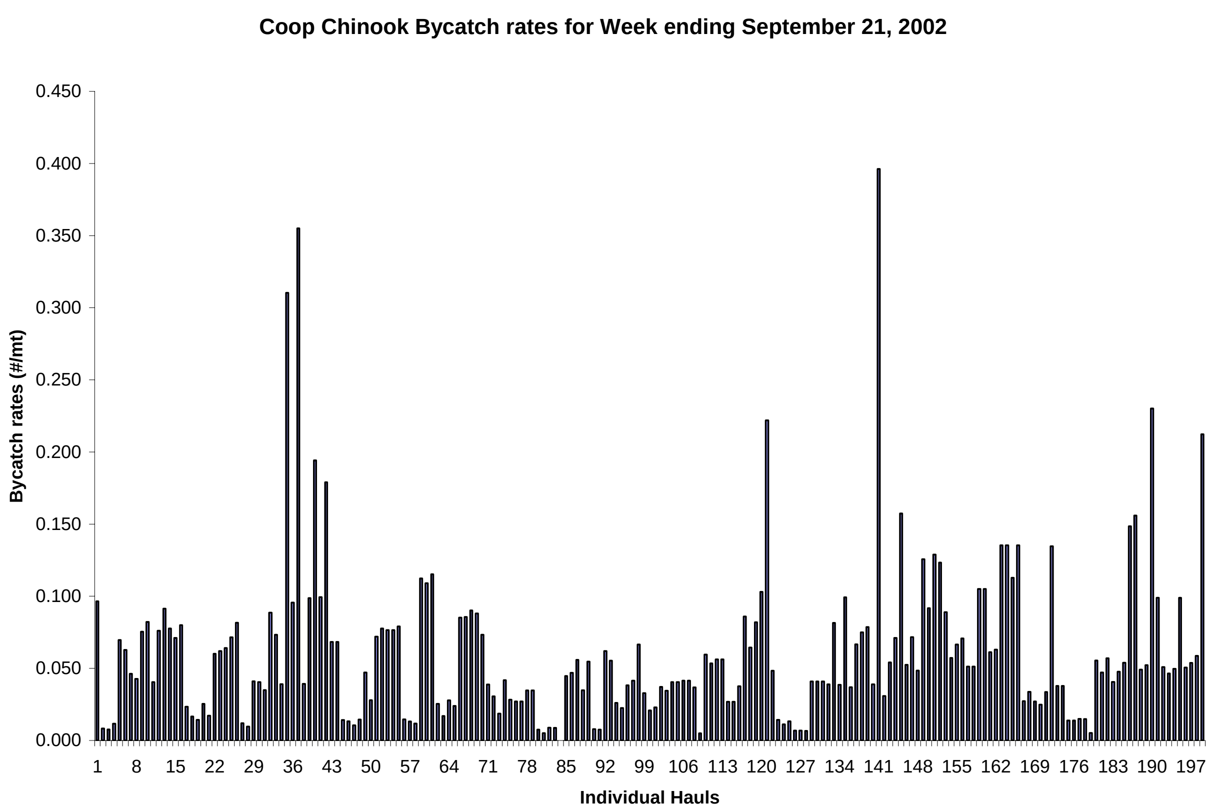
Appendix 4 - 6 Chinook Salmon Bycatch rates in the CDQ Pollock Fishery "B" Season week ending August 31, 2002. a) Histogram representing the frequency of weekly hauls in each bin allocated to the annual bycatch rate, and b) frequency distribution of number of hauls by bycatch rate.



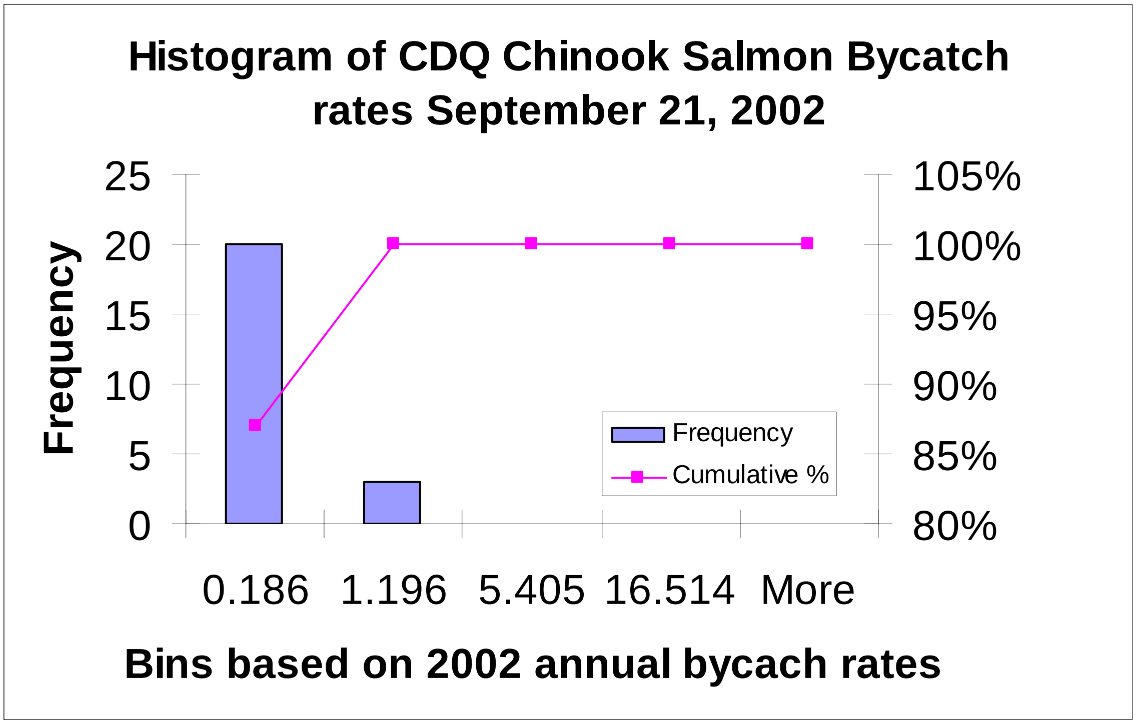


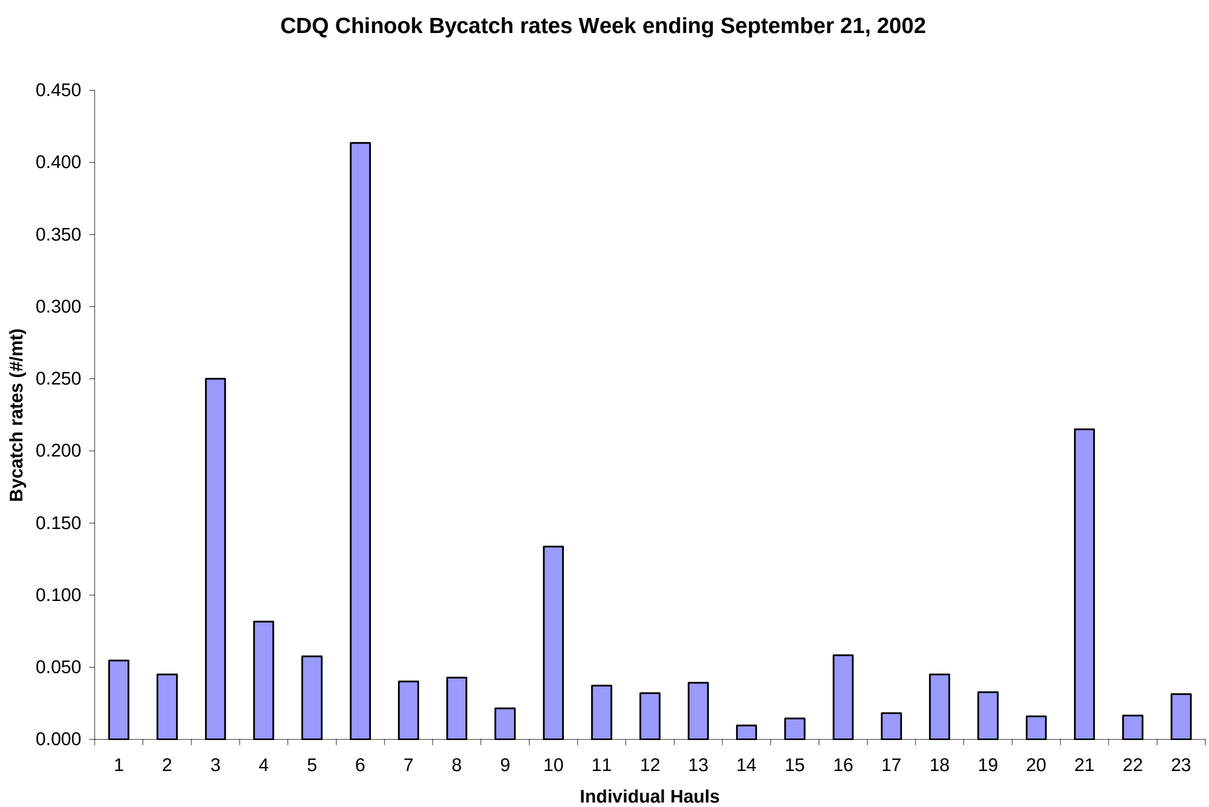
Appendix 4 - 7 Chinook Salmon Bycatch rates in the non-CDQ Pollock Fishery "B" Season week ending September 21, 2002. a) Histogram representing the frequency of weekly hauls in each bin allocated to the annual bycatch rate, and b) frequency distribution of number of hauls by bycatch rate.



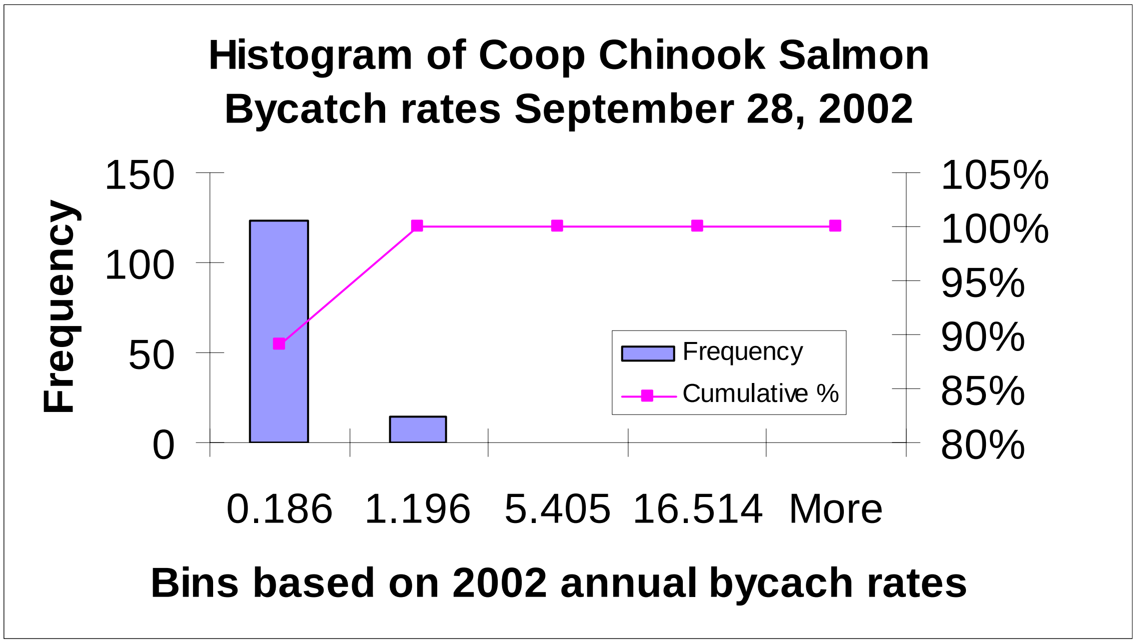


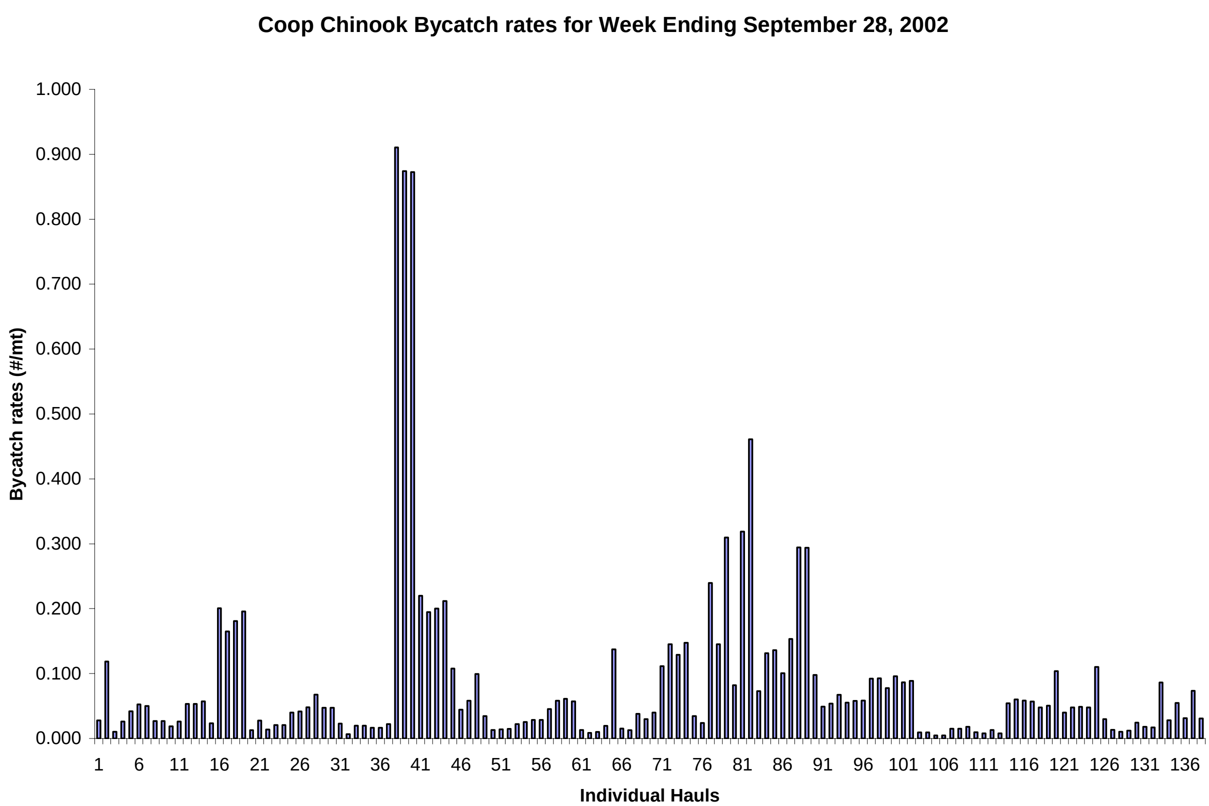
Appendix 4 - 8 Chinook Salmon Bycatch rates in the CDQ Pollock Fishery "B" Season week ending September 21, 2002. a) Histogram representing the frequency of weekly hauls in each bin allocated to the annual bycatch rate, and b) frequency distribution of number of hauls by bycatch rate.



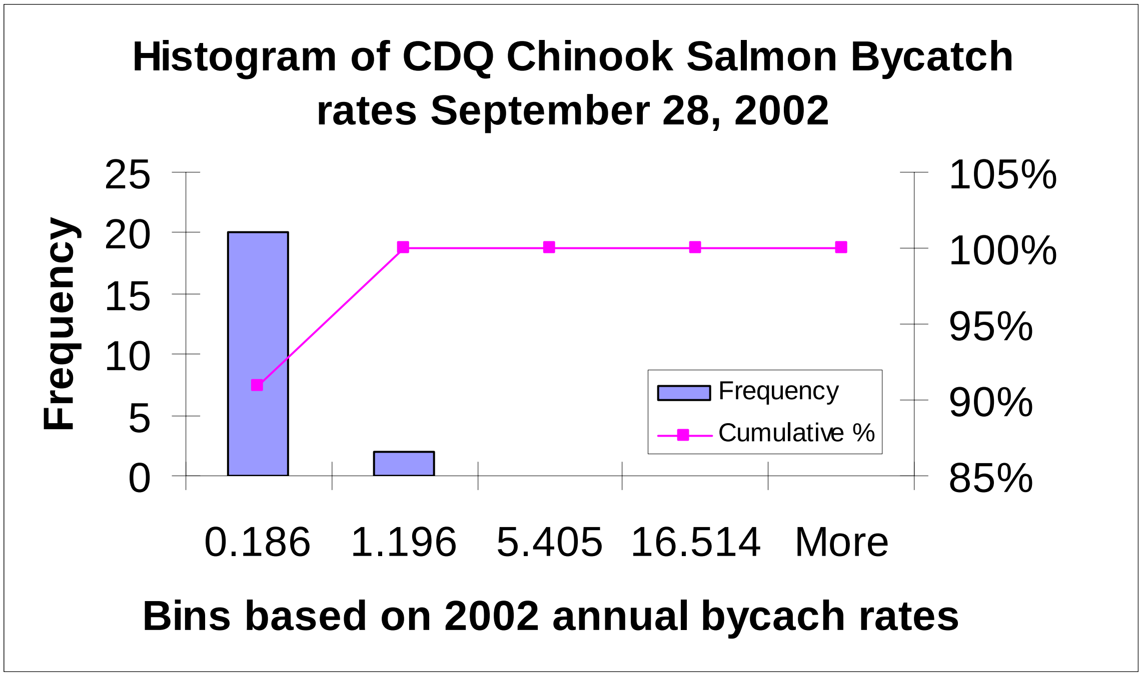


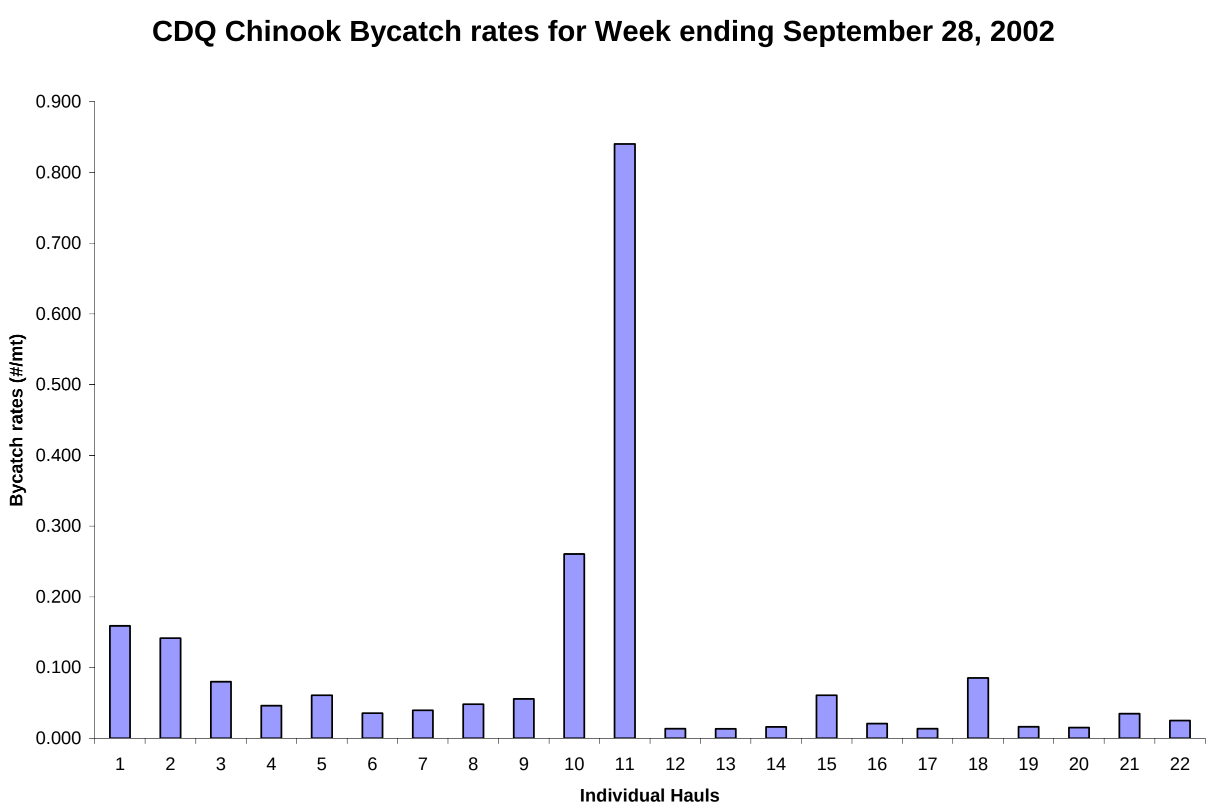
Appendix 4 - 9 Chinook Salmon Bycatch rates in the non-CDQ Pollock Fishery "B" Season week ending September 28, 2002. a) Histogram representing the frequency of weekly hauls in each bin allocated to the annual bycatch rate, and b) frequency distribution of number of hauls by bycatch rate.



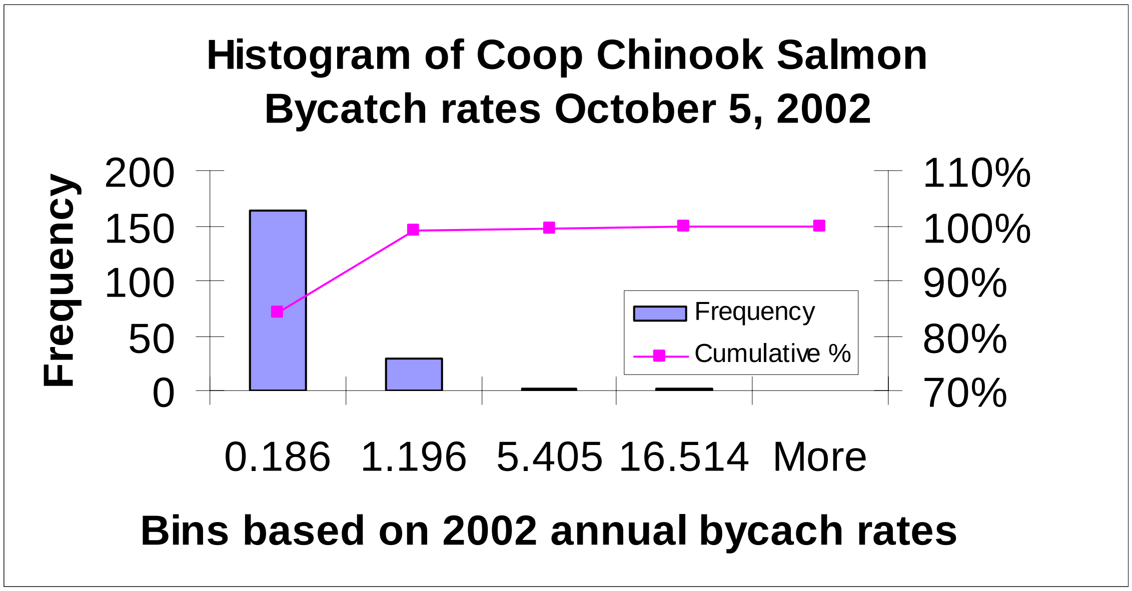


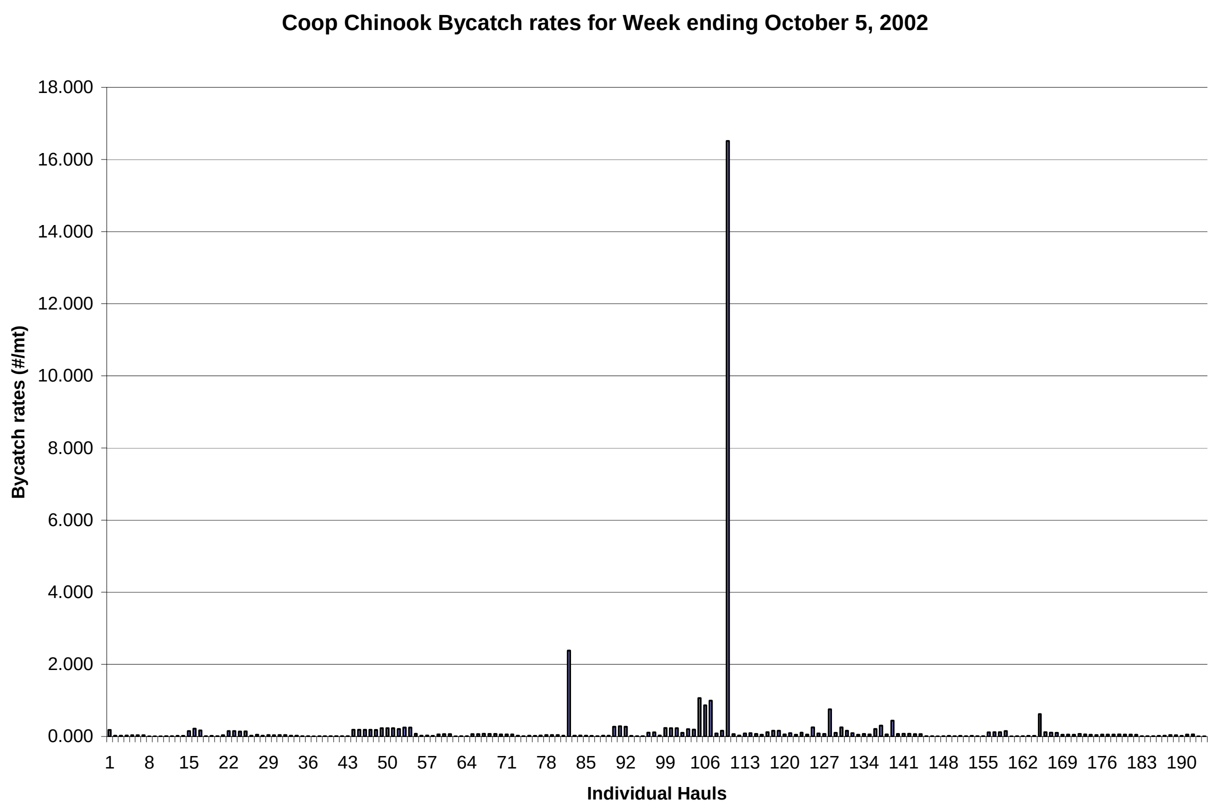
Appendix 4 - 10 Chinook Salmon Bycatch rates in the CDQ Pollock Fishery "B" Season week ending September 28, 2002. a) Histogram representing the frequency of weekly hauls in each bin allocated to the annual bycatch rate, and b) frequency distribution of number of hauls by bycatch rate.



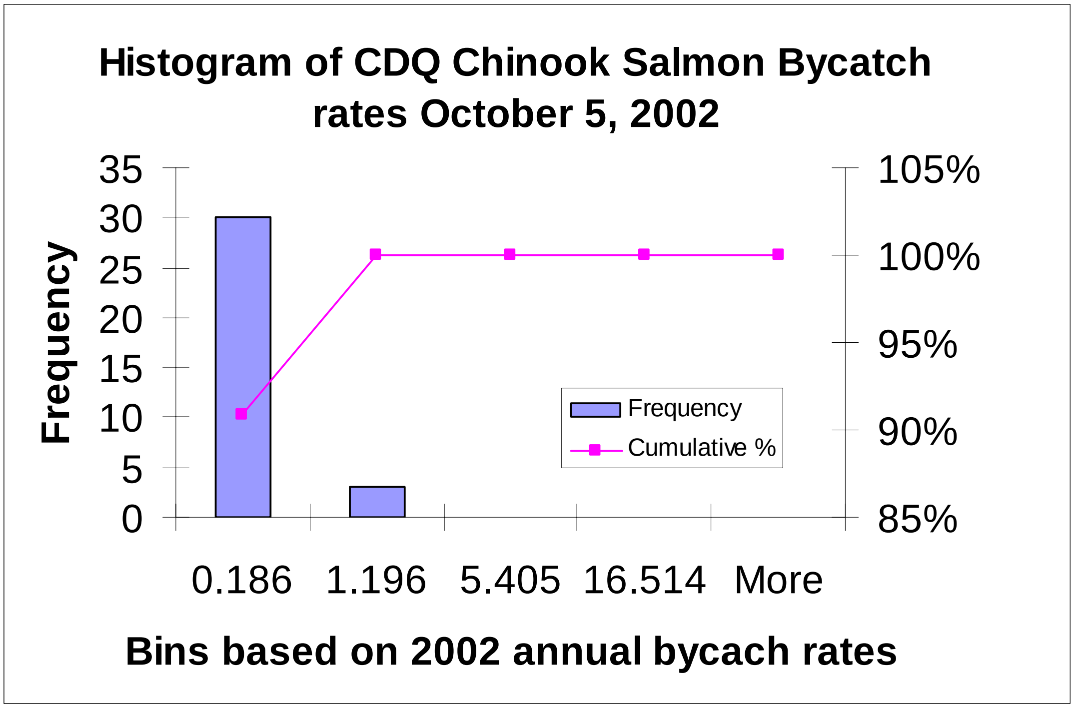


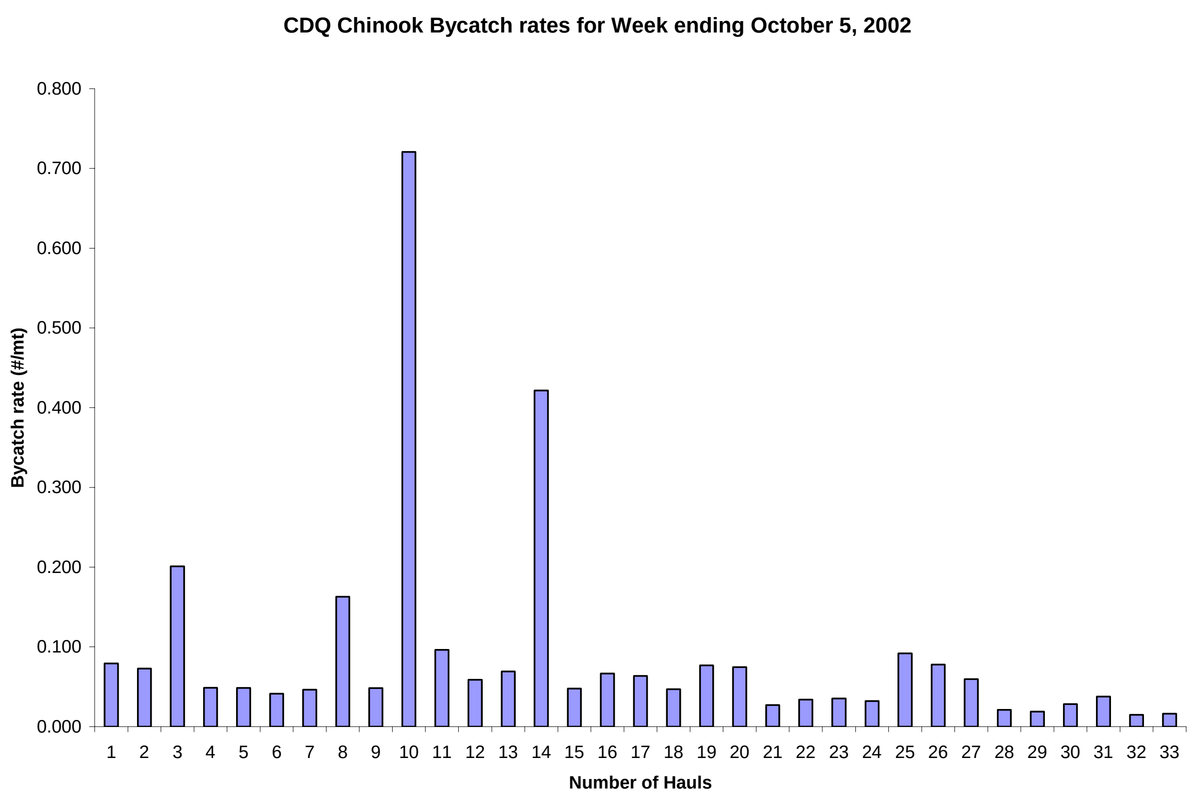
Appendix 4 - 11 Chinook Salmon Bycatch rates in the non-CDQ Pollock Fishery "B" Season week ending October 5, 2002. a) Histogram representing the frequency of weekly hauls in each bin allocated to the annual bycatch rate, and b) frequency distribution of number of hauls by bycatch rate.



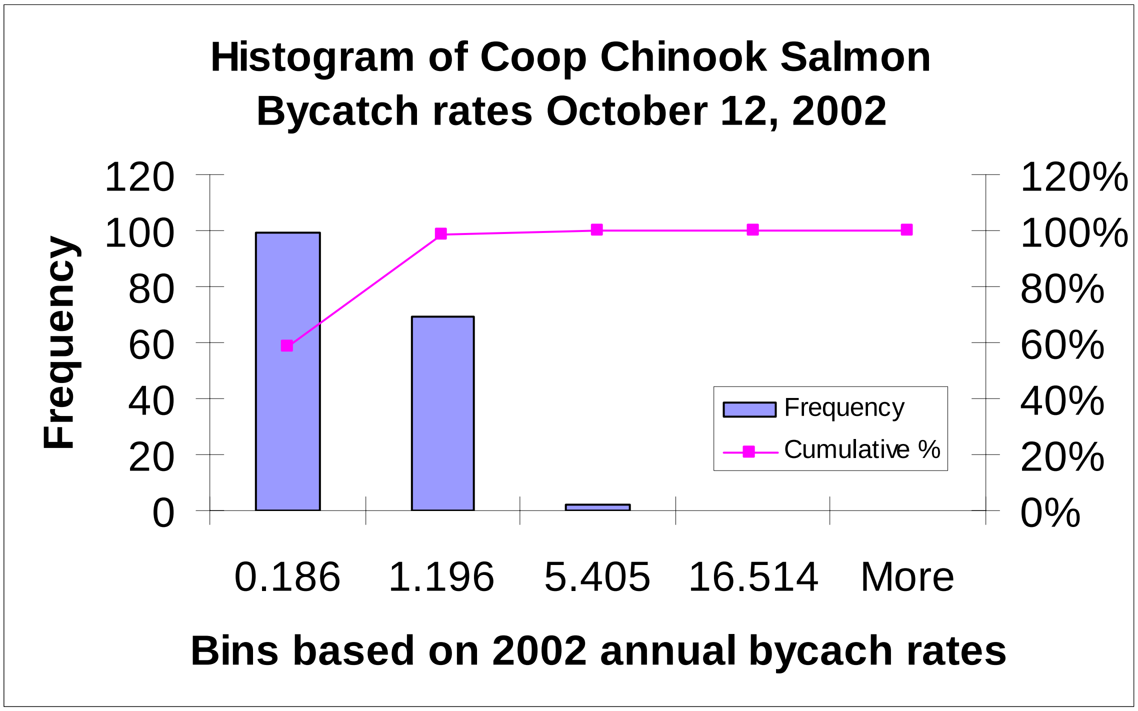


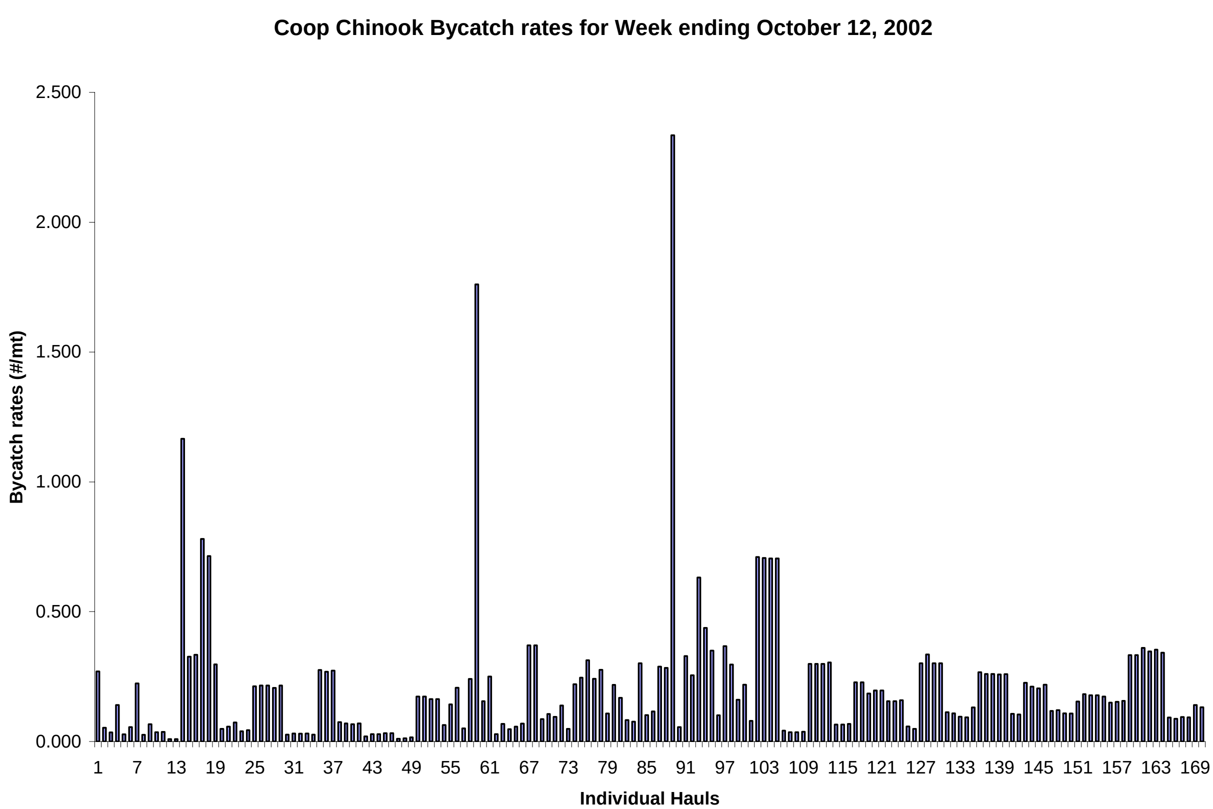
Appendix 4 - 12 Chinook Salmon Bycatch rates in the CDQ Pollock Fishery "B" Season week ending October 5, 2002. a) Histogram representing the frequency of weekly hauls in each bin allocated to the annual bycatch rate, and b) frequency distribution of number of hauls by bycatch rate



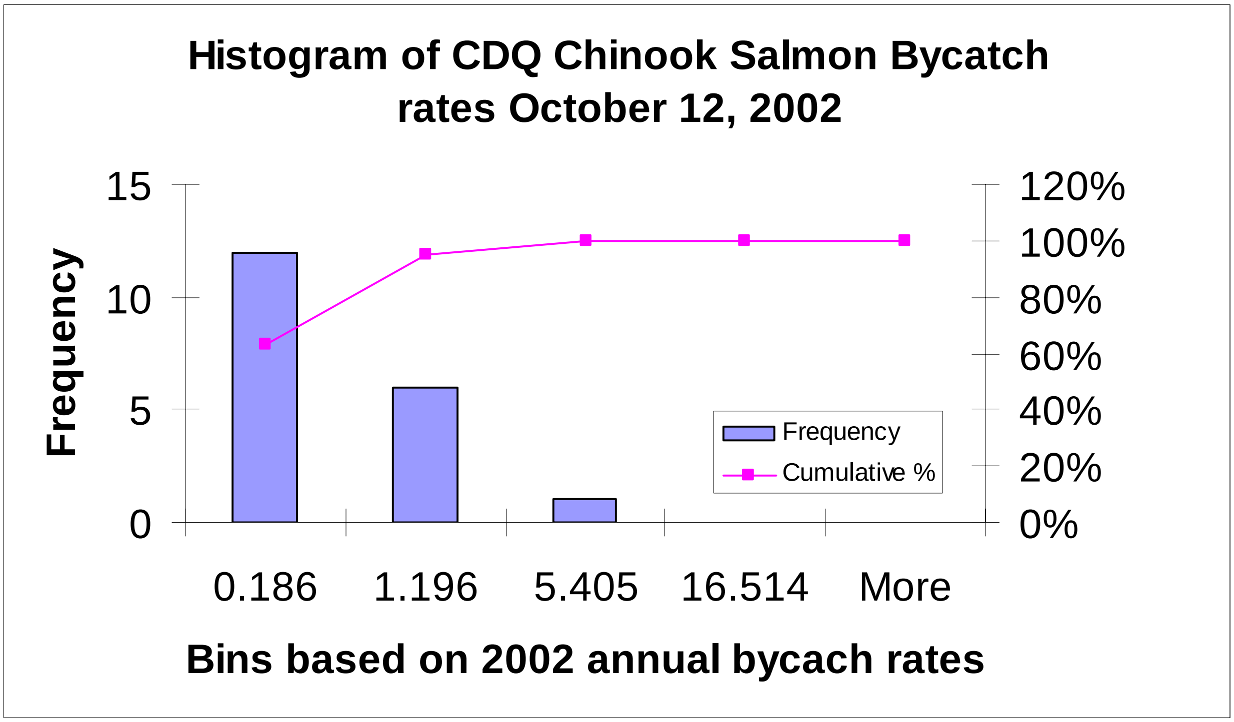


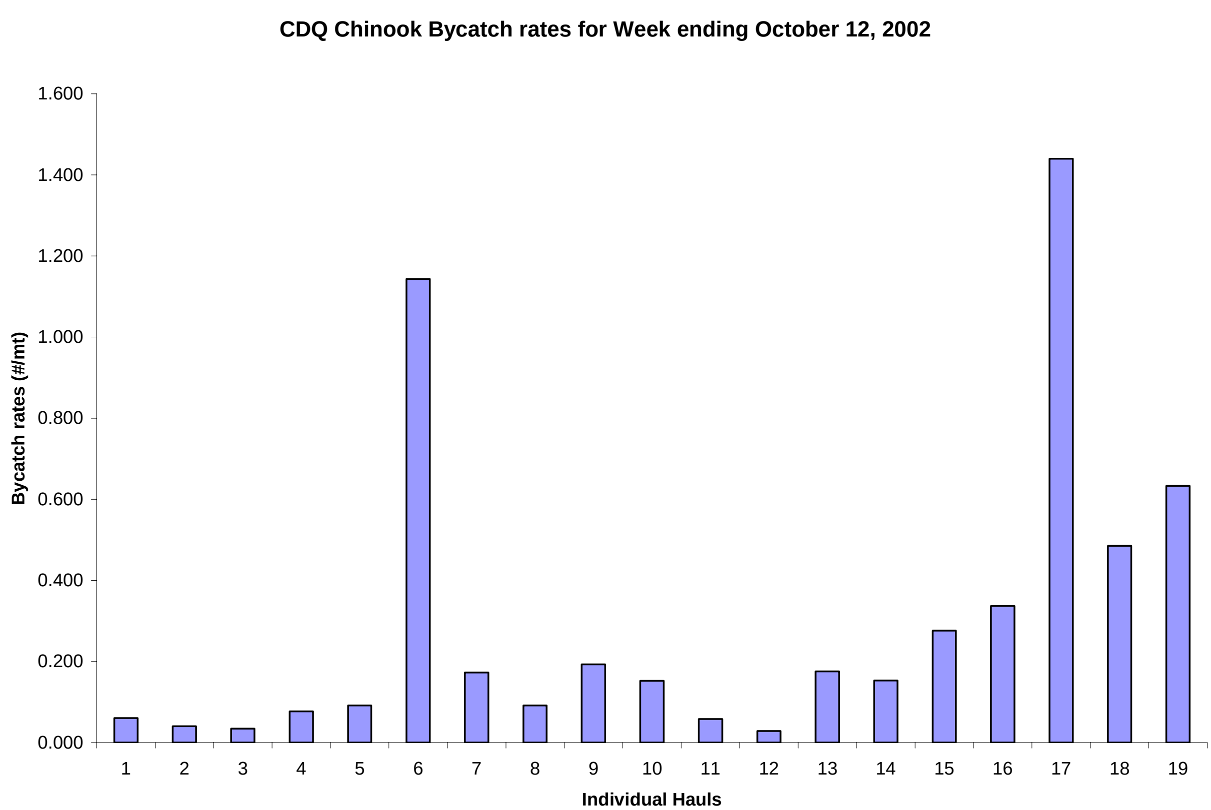
Appendix 4 - 13 Chinook Salmon Bycatch rates in the non-CDQ Pollock Fishery "B" Season week ending October 12, 2002. a) Histogram representing the frequency of weekly hauls in each bin allocated to the annual bycatch rate, and b) frequency distribution of number of hauls by bycatch rate.



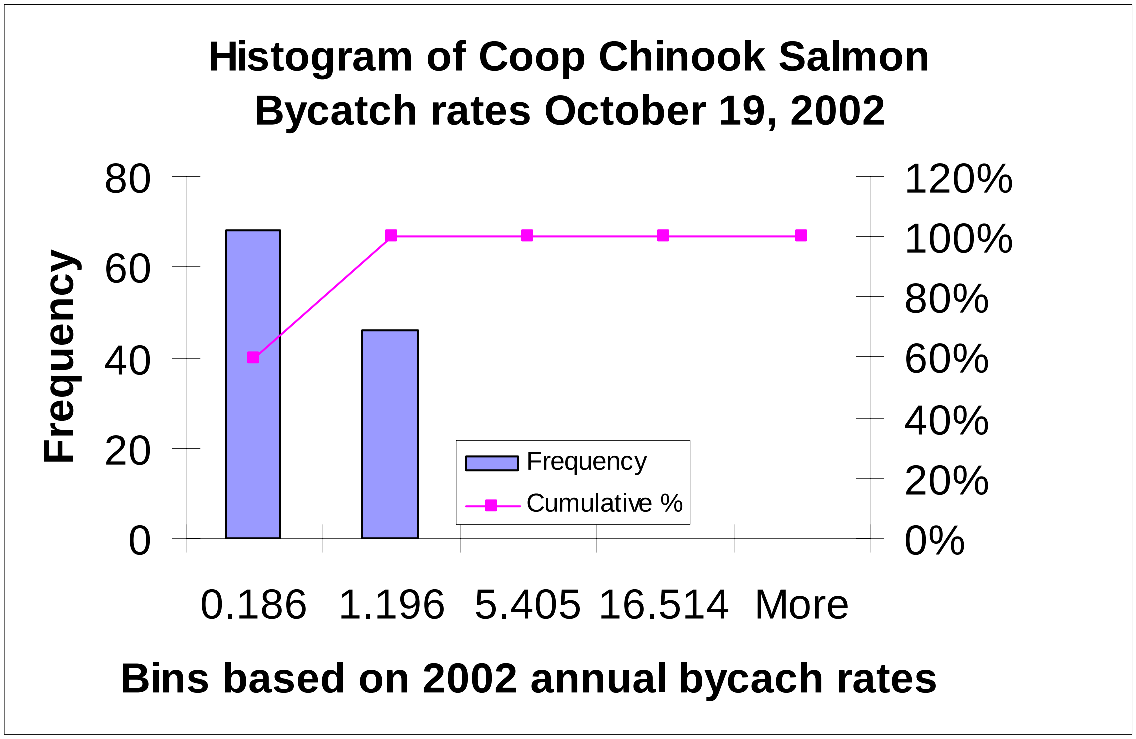


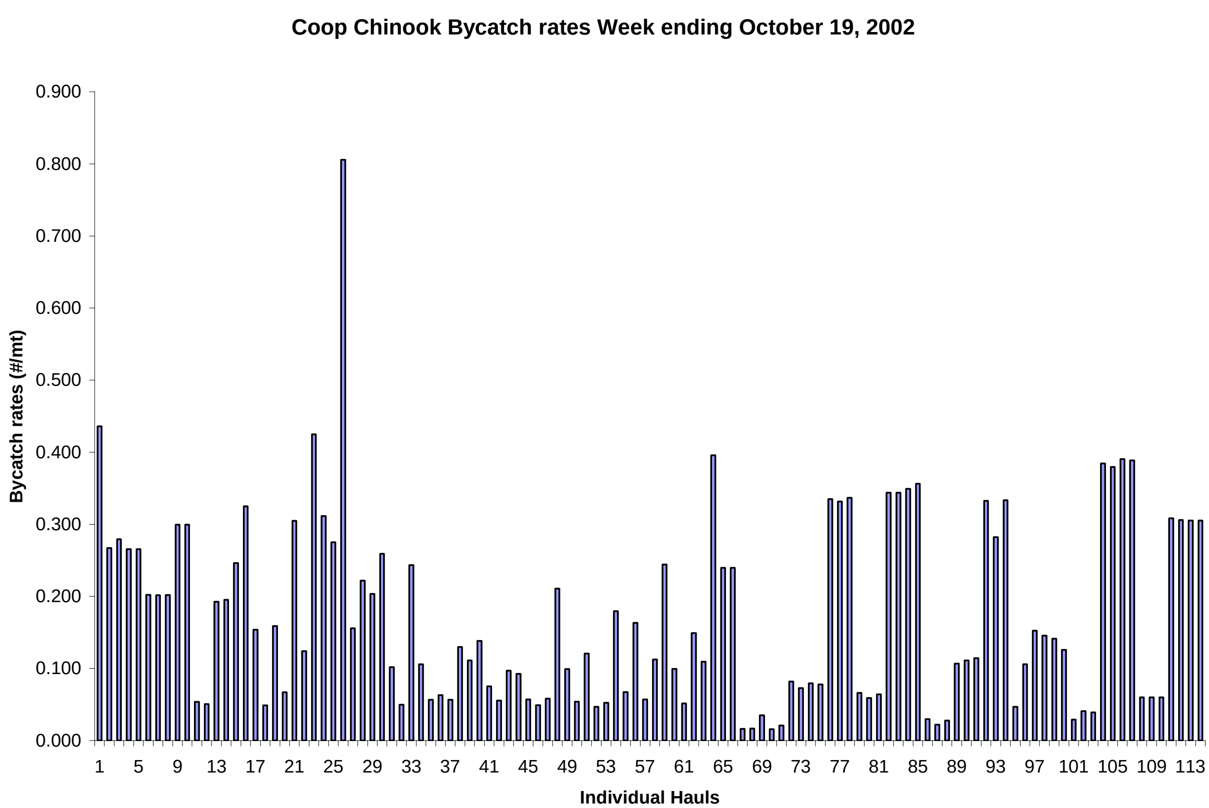
Appendix 4 - 14 Chinook Salmon Bycatch rates in the CDQ Pollock Fishery "B" Season week ending October 12, 2002. a) Histogram representing the frequency of weekly hauls in each bin allocated to the annual bycatch rate, and b) frequency distribution of number of hauls by bycatch rate.



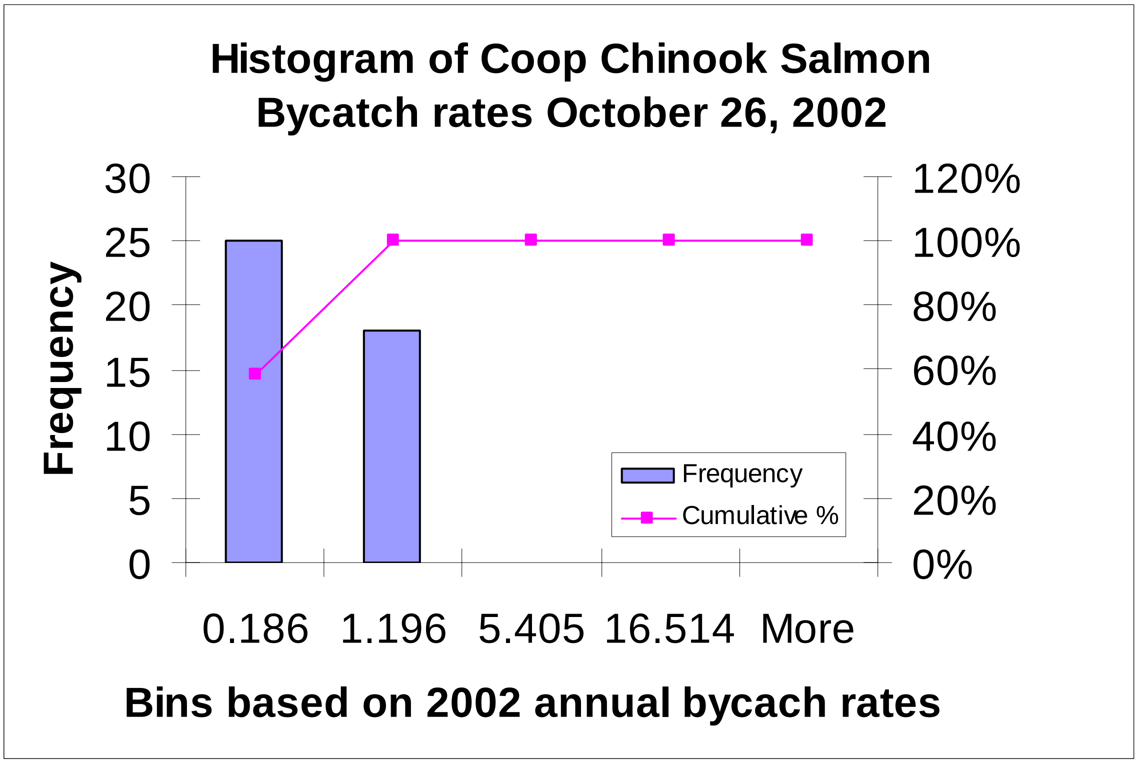


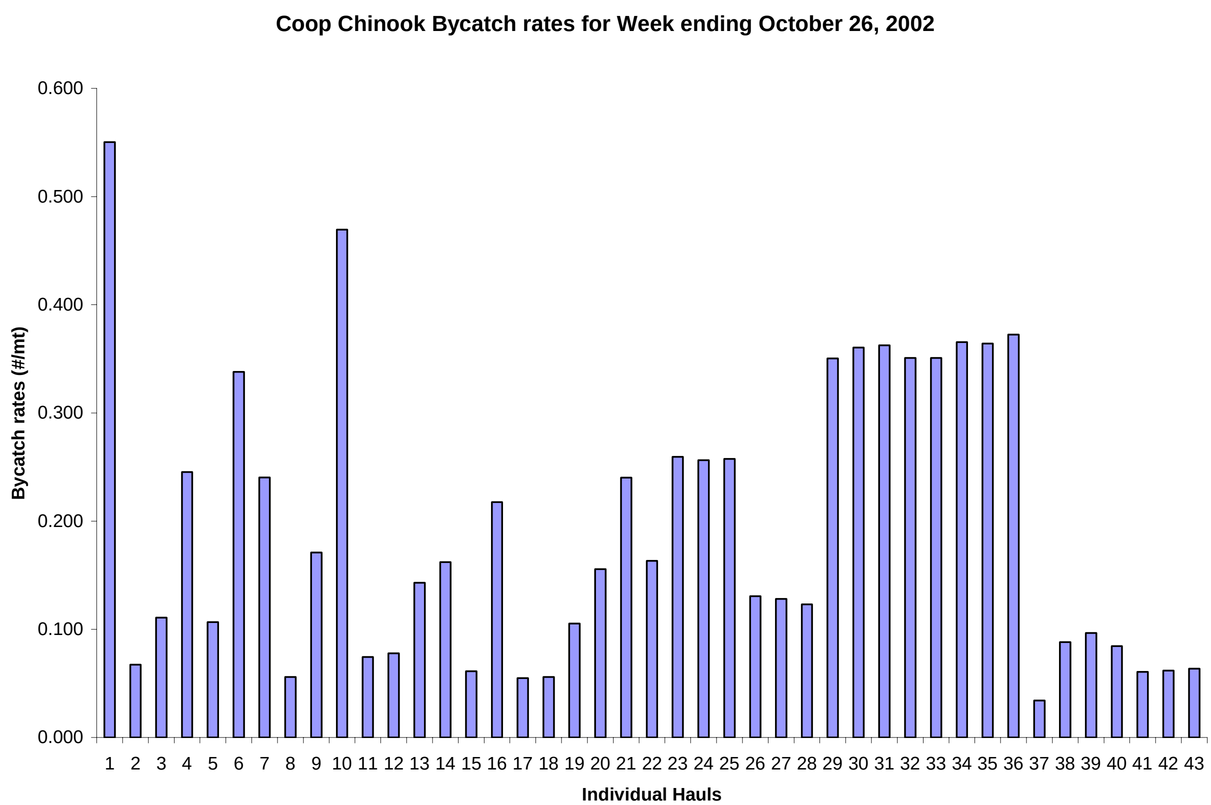
Appendix 4 - 15 Chinook Salmon Bycatch rates in the non-CDQ Pollock Fishery "B" Season week ending October 19, 2002. a) Histogram representing the frequency of weekly hauls in each bin allocated to the annual bycatch rate, and b) frequency distribution of number of hauls by bycatch rate.



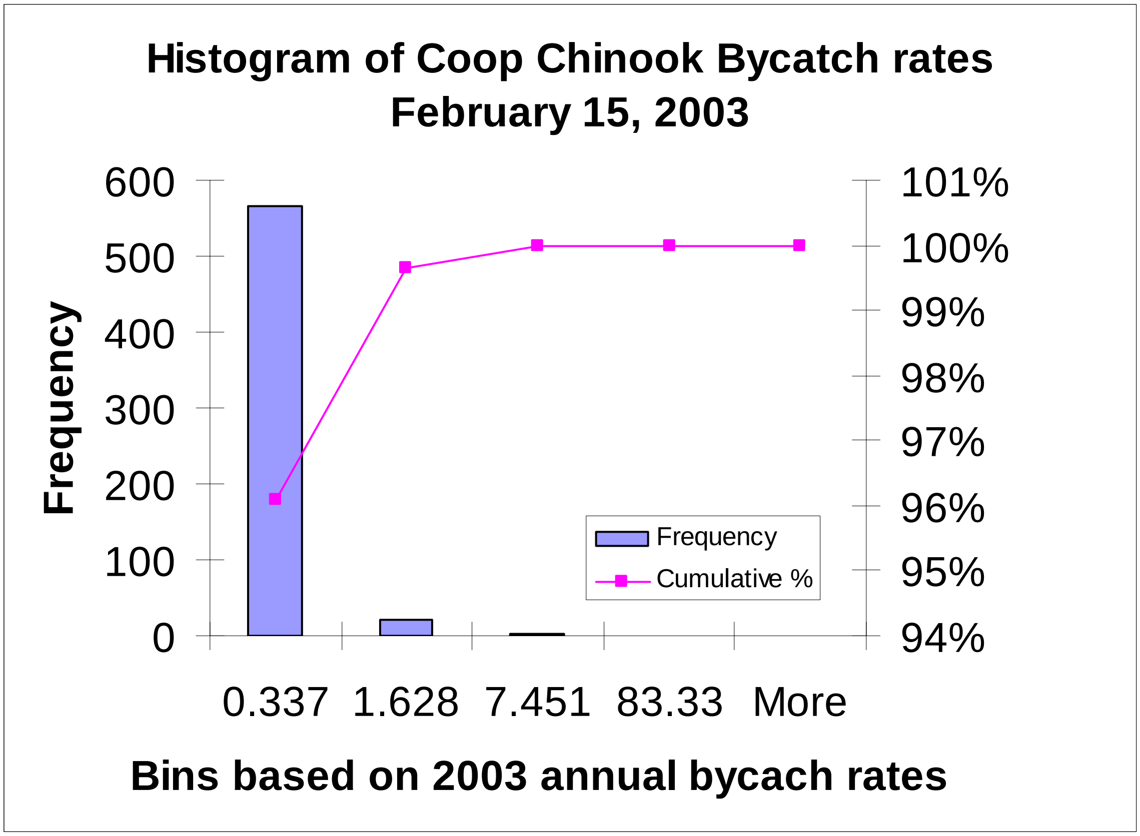


Appendix 4 - 16 Chinook Salmon Bycatch rates in the non-CDQ Pollock Fishery "B" Season week ending October 26, 2002. a) Histogram representing the frequency of weekly hauls in each bin allocated to the annual bycatch rate, and b) frequency distribution of number of hauls by bycatch rate.

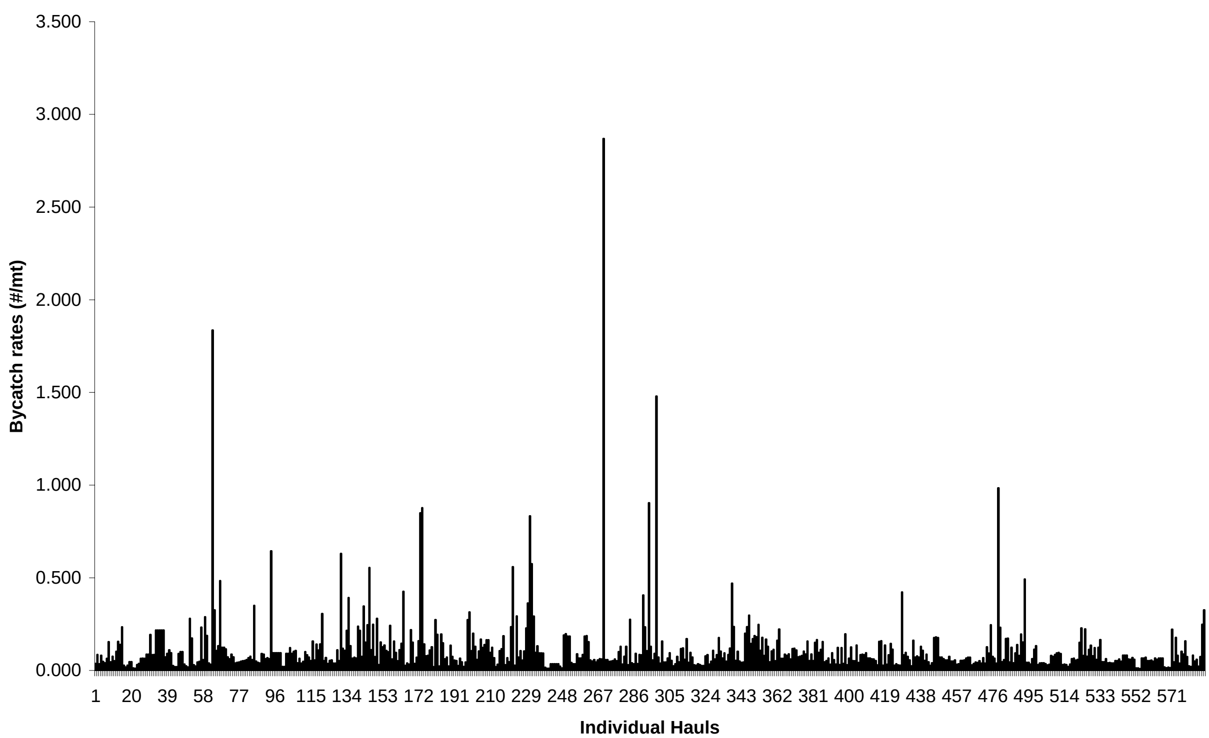




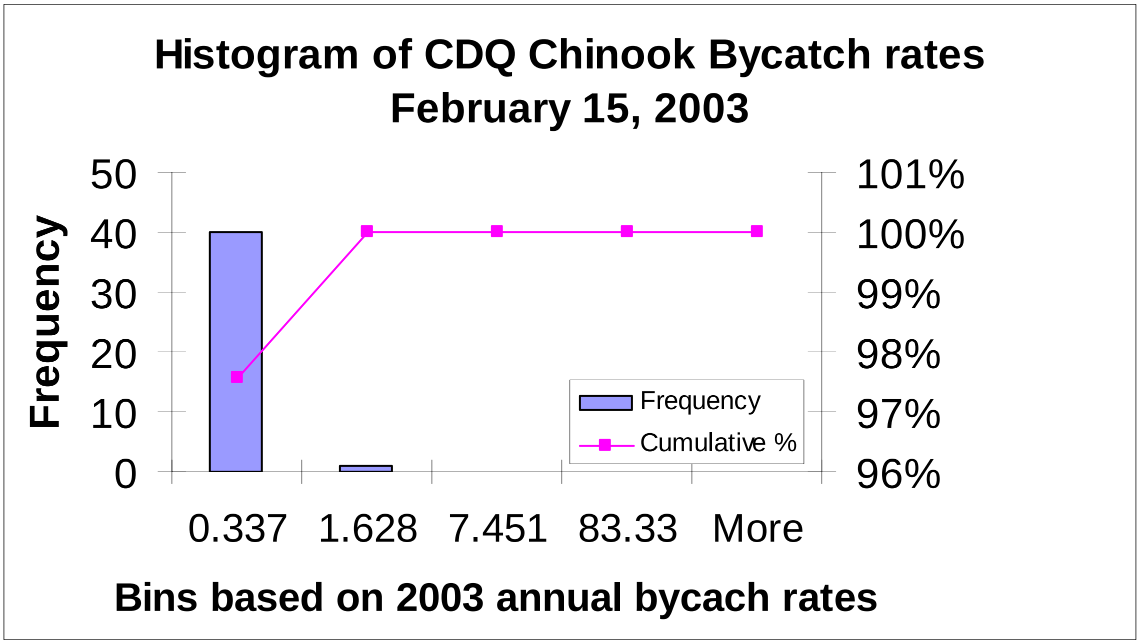
Appendix 4 - 17 Chinook Salmon Bycatch rates in the non-CDQ Pollock Fishery "A" Season week ending February 15, 2003. a) Histogram representing the frequency of weekly hauls in each bin allocated to the annual bycatch rate, and b) frequency distribution of number of hauls by bycatch rate.

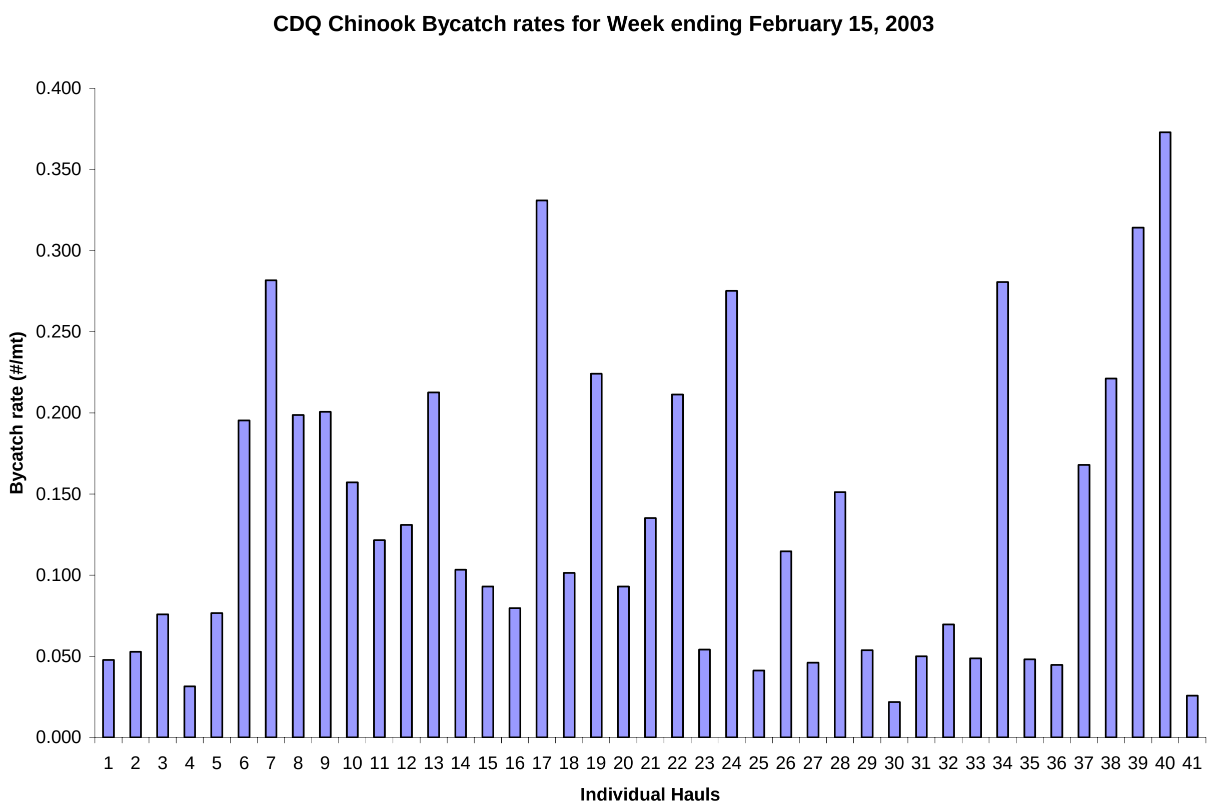


Coop Chinook Bycatch rates for Week ending February 15, 2003

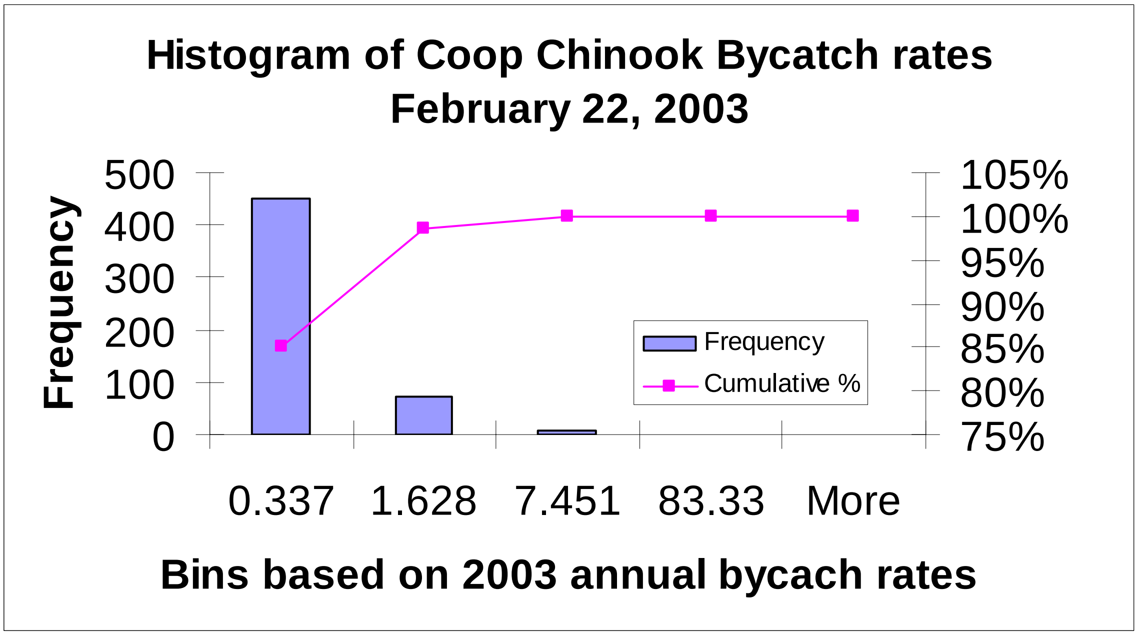


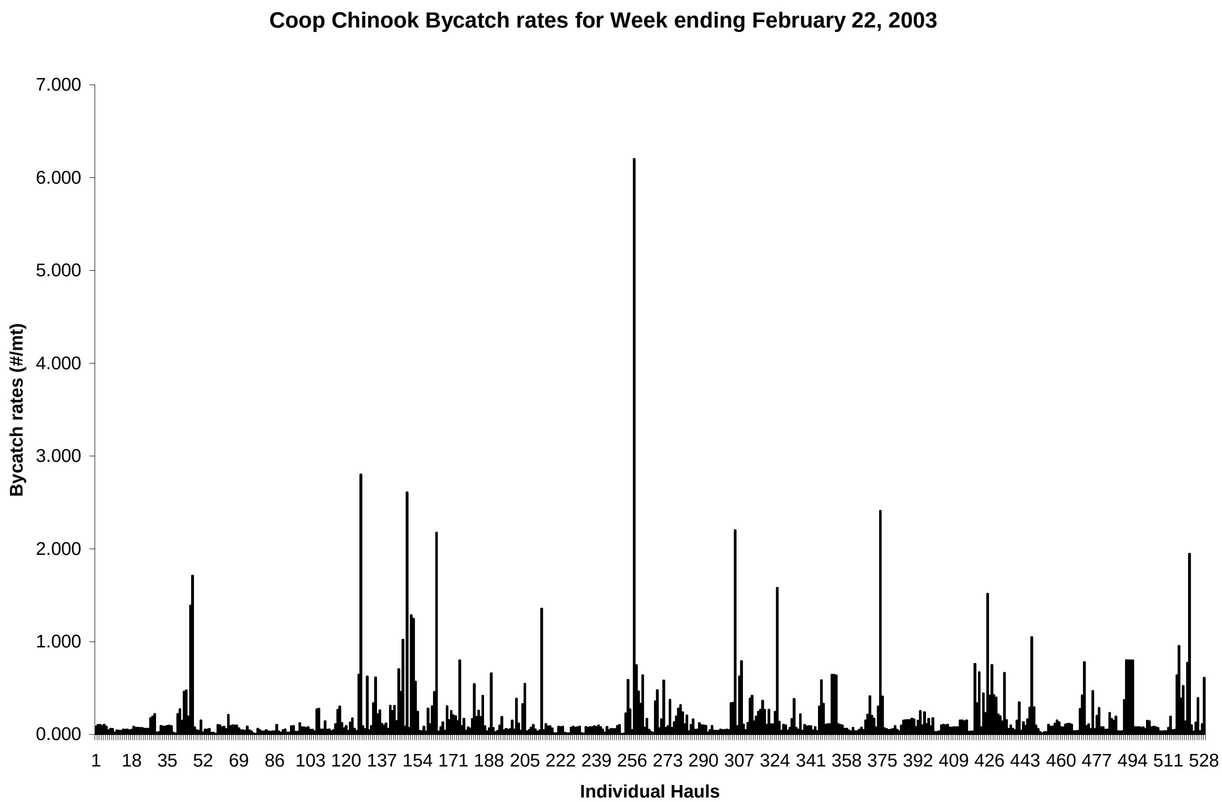
Appendix 4 - 18 Chinook Salmon Bycatch rates in the CDQ Pollock Fishery "A" Season week ending February 15, 2003. a) Histogram representing the frequency of weekly hauls in each bin allocated to the annual bycatch rate, and b) frequency distribution of number of hauls by bycatch rate.



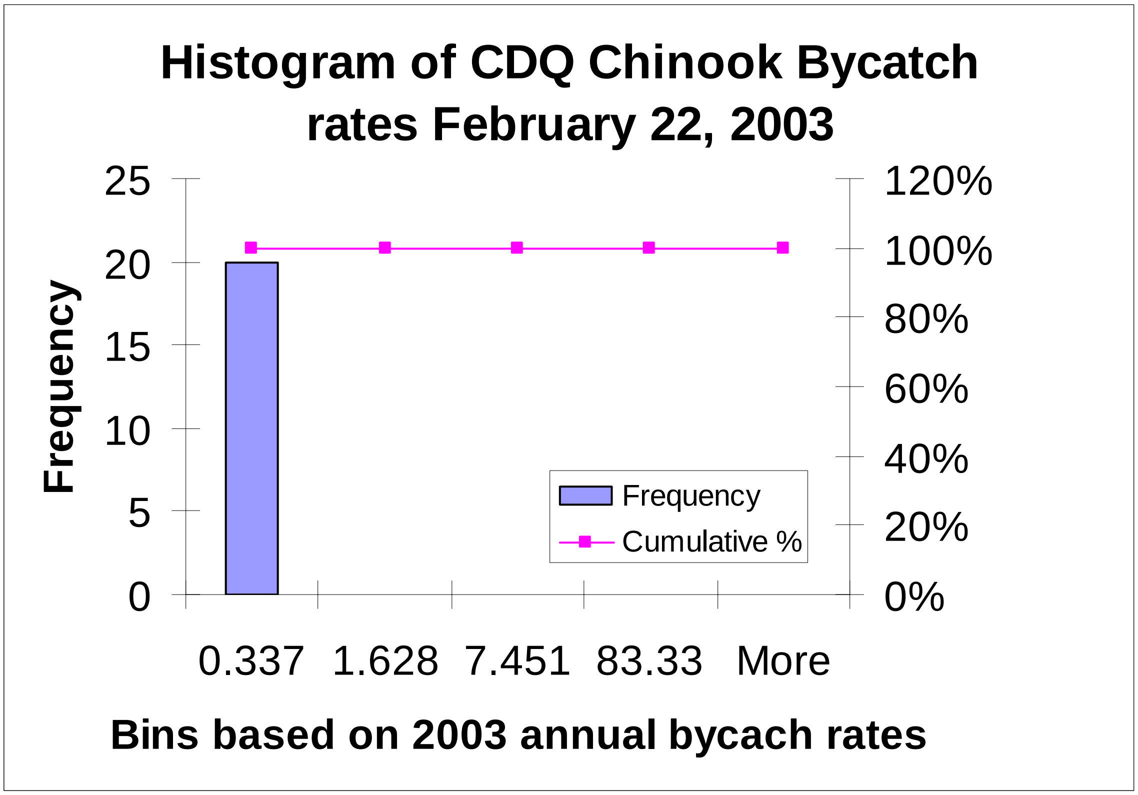


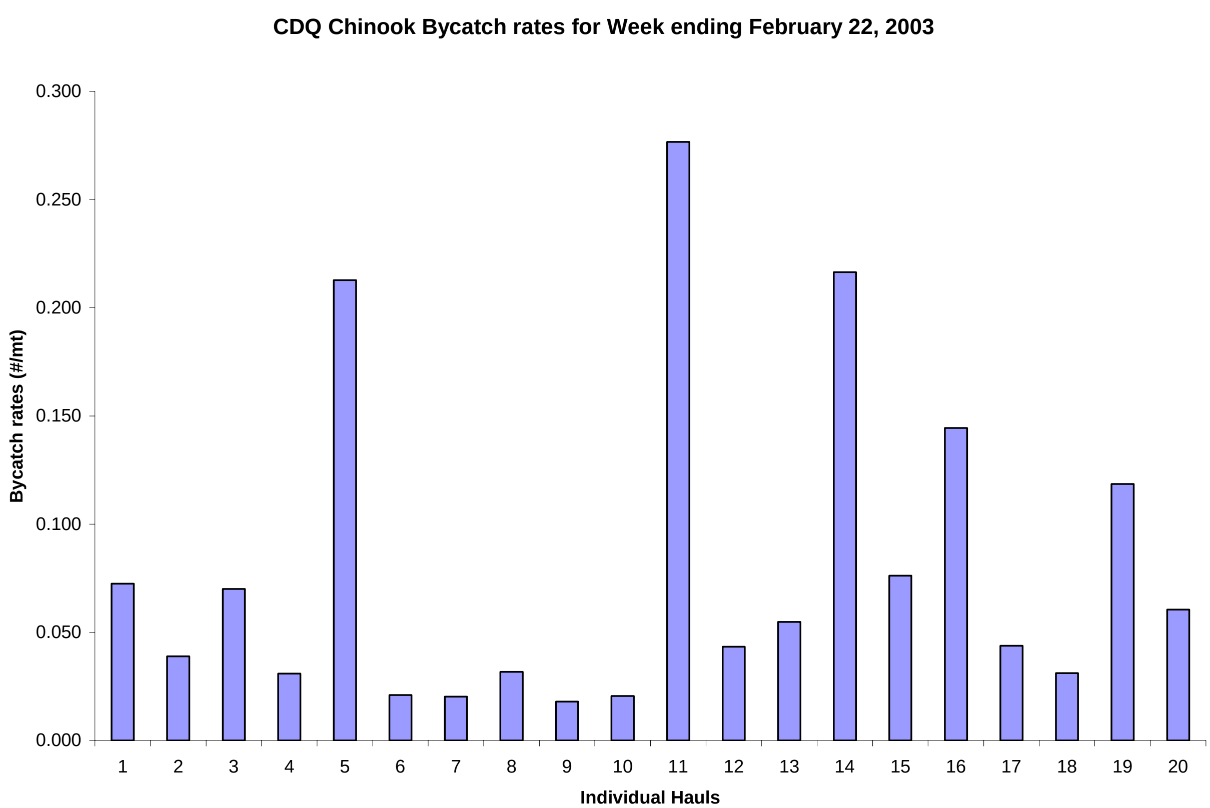
Appendix 4 - 19 Chinook Salmon Bycatch rates in the non-CDQ Pollock Fishery "A" Season week ending February 22, 2003. a) Histogram representing the frequency of weekly hauls in each bin allocated to the annual bycatch rate, and b) frequency distribution of number of hauls by bycatch rate.



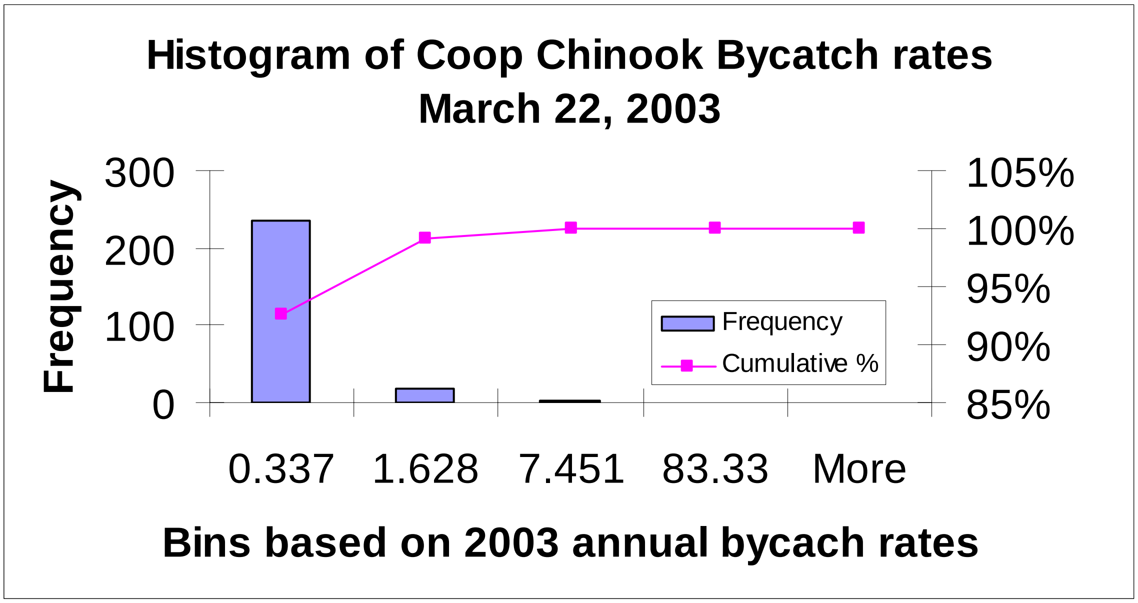


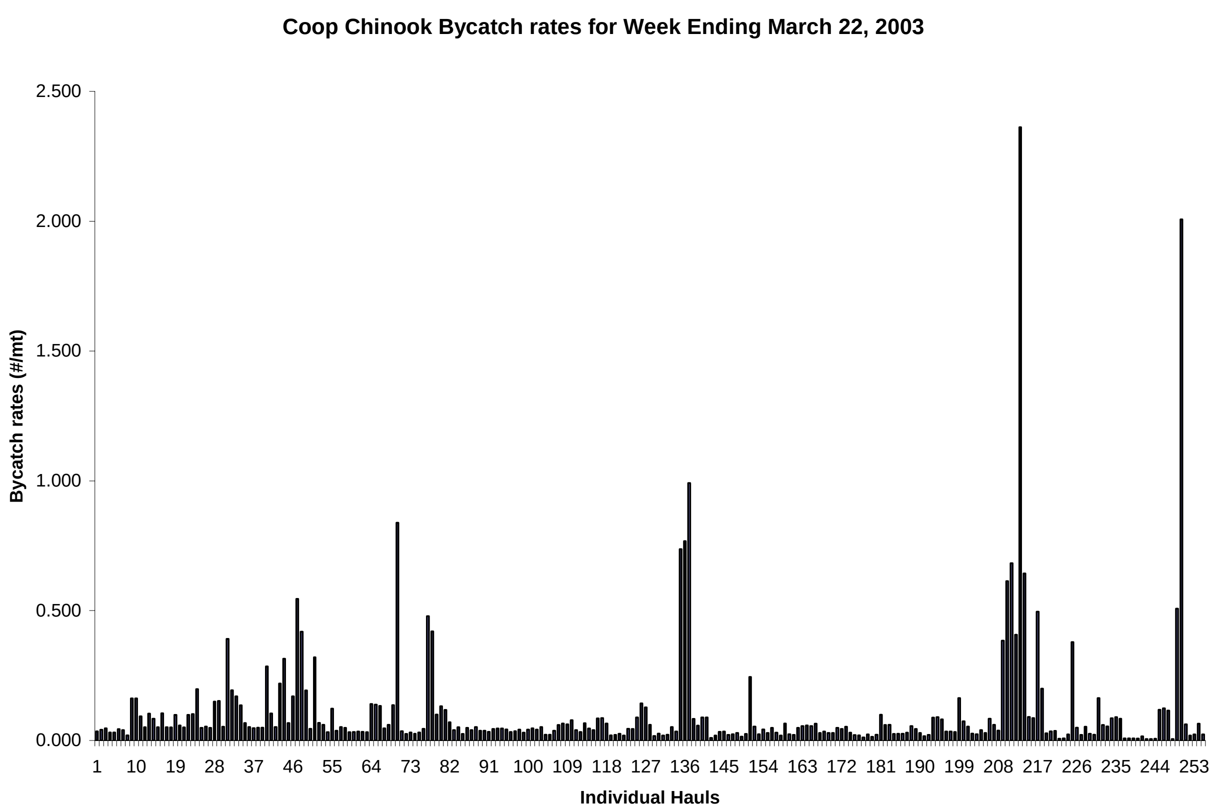
Appendix 4 - 20 Chinook Salmon Bycatch rates in the CDQ Pollock Fishery "A" Season week ending February 22, 2003. a) Histogram representing the frequency of weekly hauls in each bin allocated to the annual bycatch rate, and b) frequency distribution of number of hauls by bycatch rate



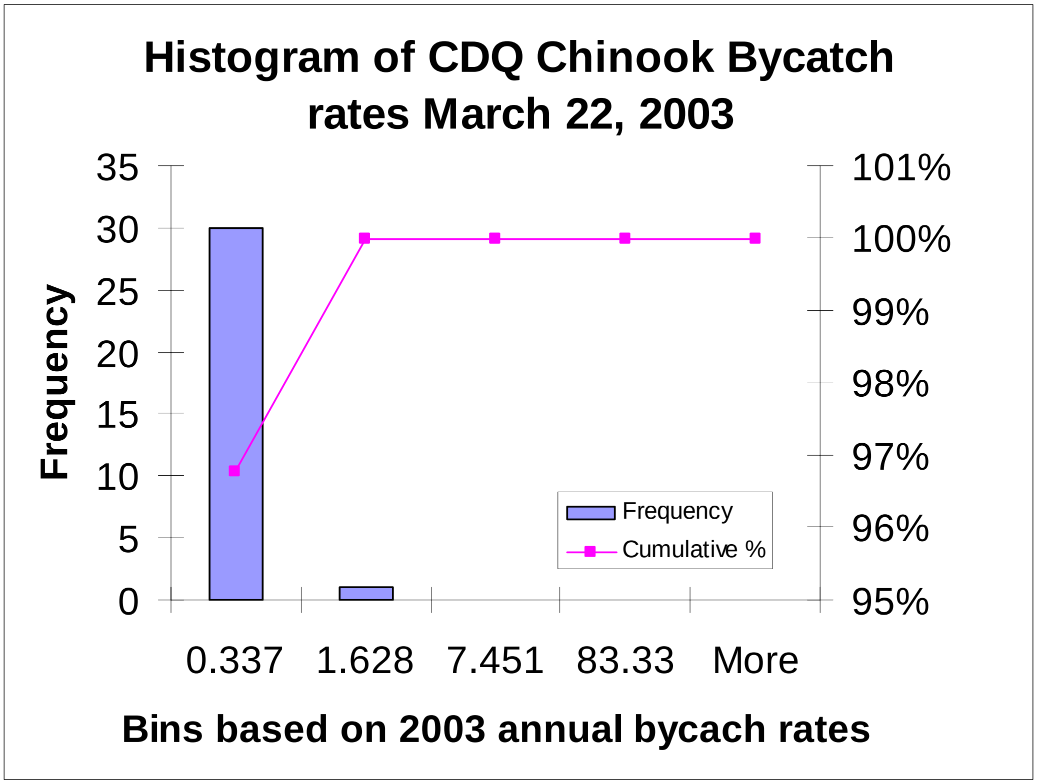


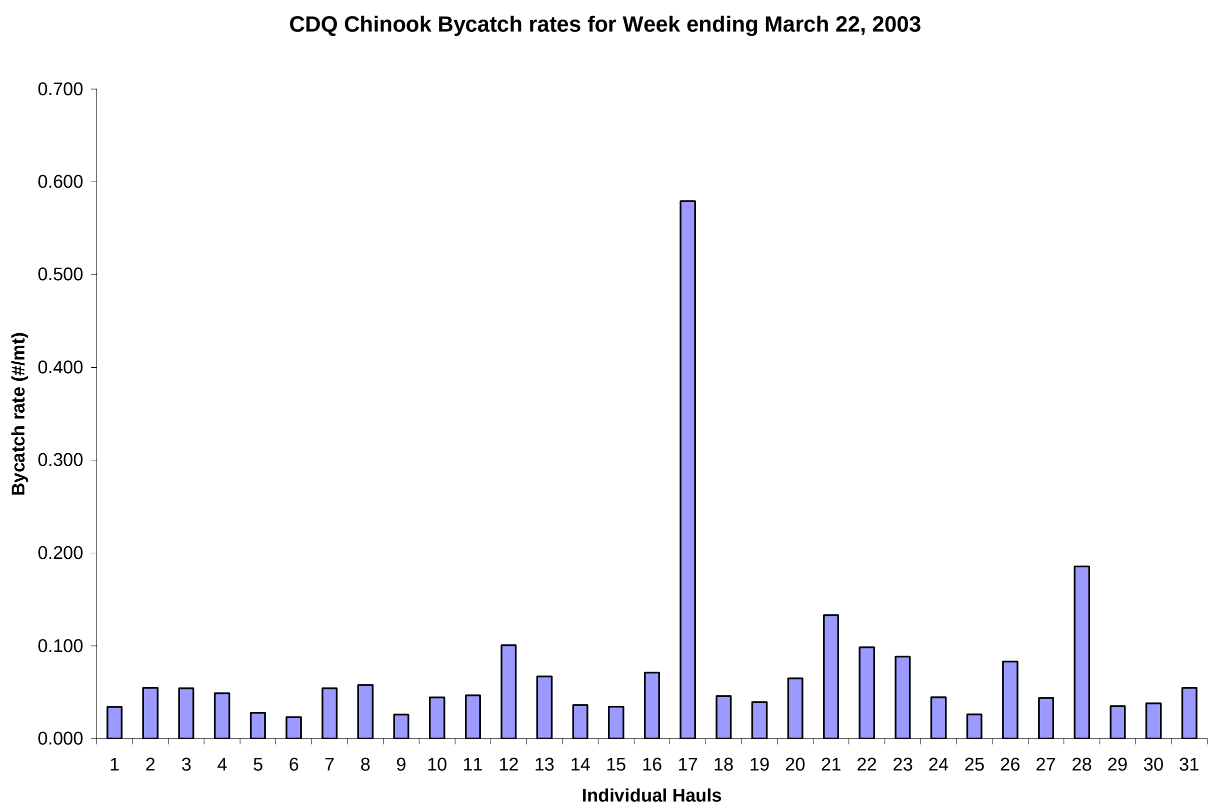
Appendix 4 - 21 Chinook Salmon Bycatch rates in the non-CDQ Pollock Fishery "A" Season week ending March 22, 2003. a) Histogram representing the frequency of weekly hauls in each bin allocated to the annual bycatch rate, and b) frequency distribution of number of hauls by bycatch rate



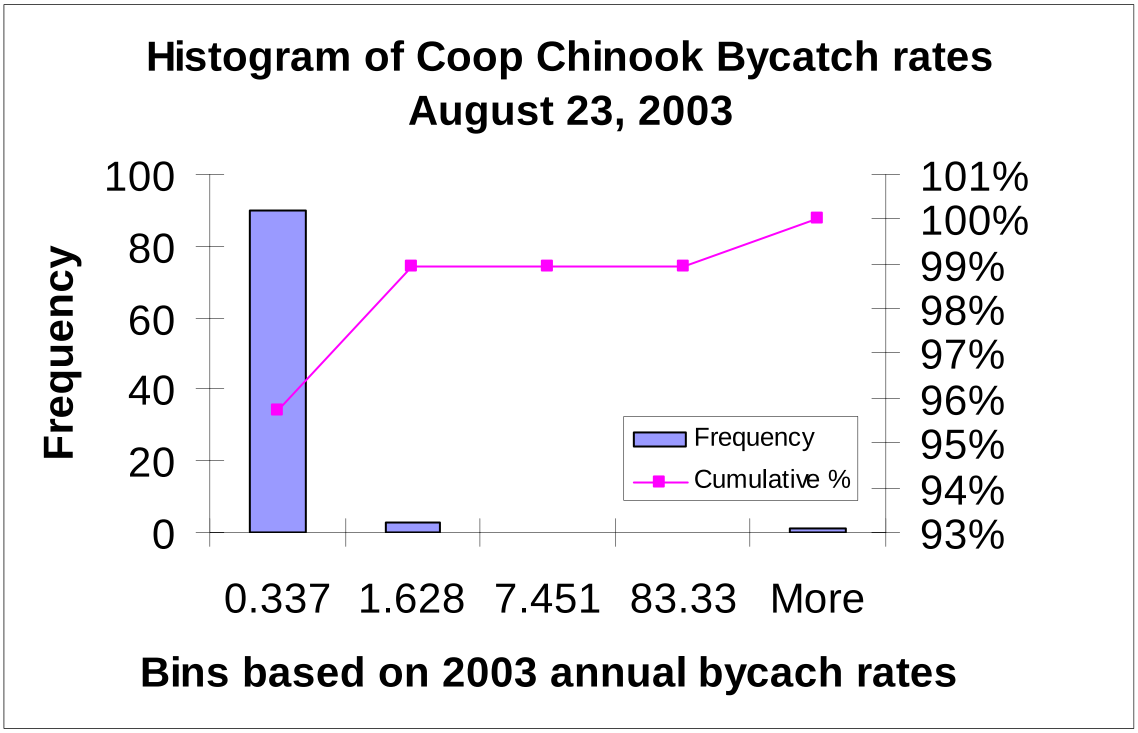


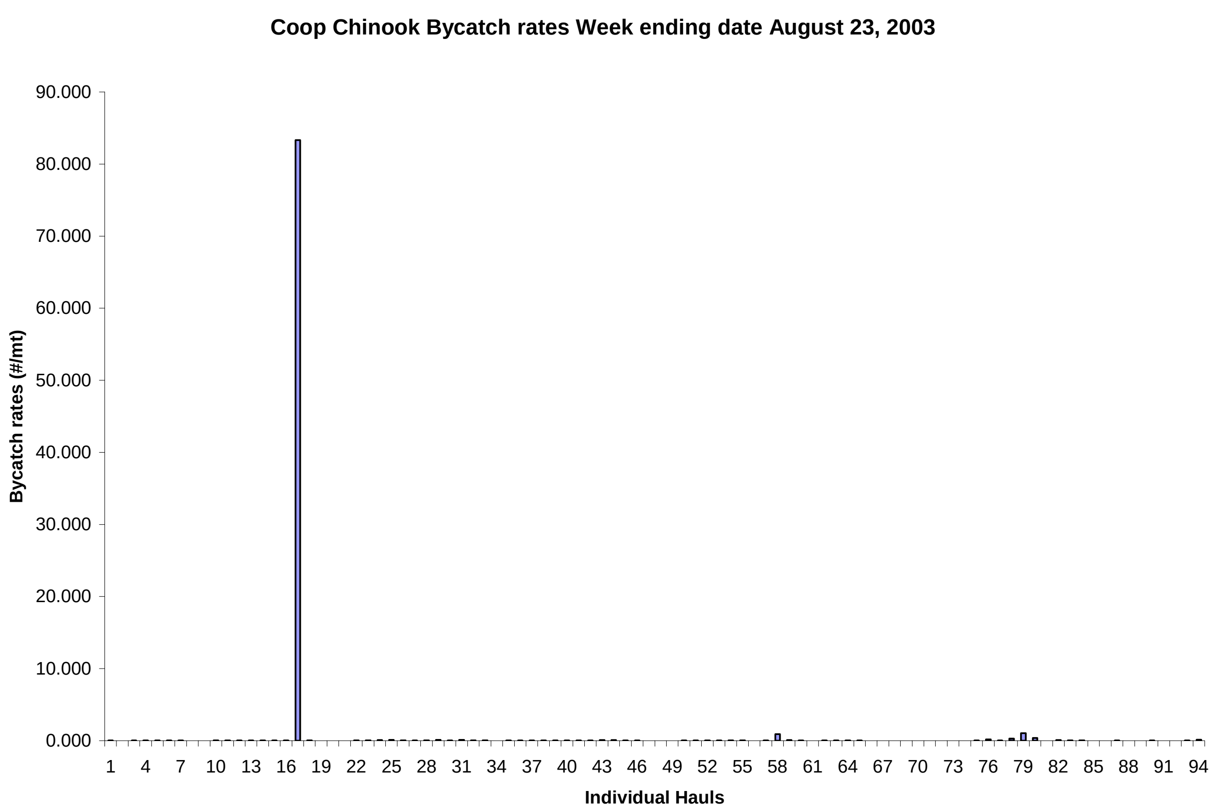
Appendix 4 - 22 Chinook Salmon Bycatch rates in the CDQ Pollock Fishery "A" Season week ending March 22, 2003. a) Histogram representing the frequency of weekly hauls in each bin allocated to the annual bycatch rate, and b) frequency distribution of number of hauls by bycatch rate



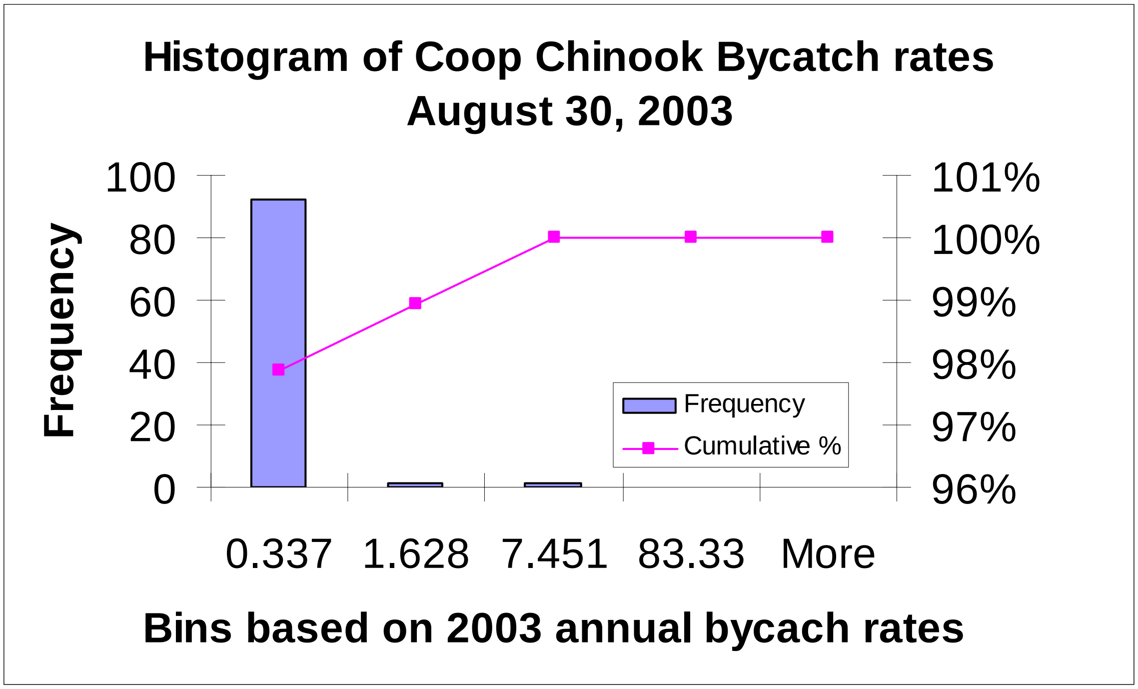


Appendix 4 - 23 Chinook Salmon Bycatch rates in the non CDQ Pollock Fishery “B” Season week ending August 23, 2003. a) Histogram representing the frequency of weekly hauls in each bin allocated to the annual bycatch rate, and b) frequency distribution of number of hauls by bycatch rate

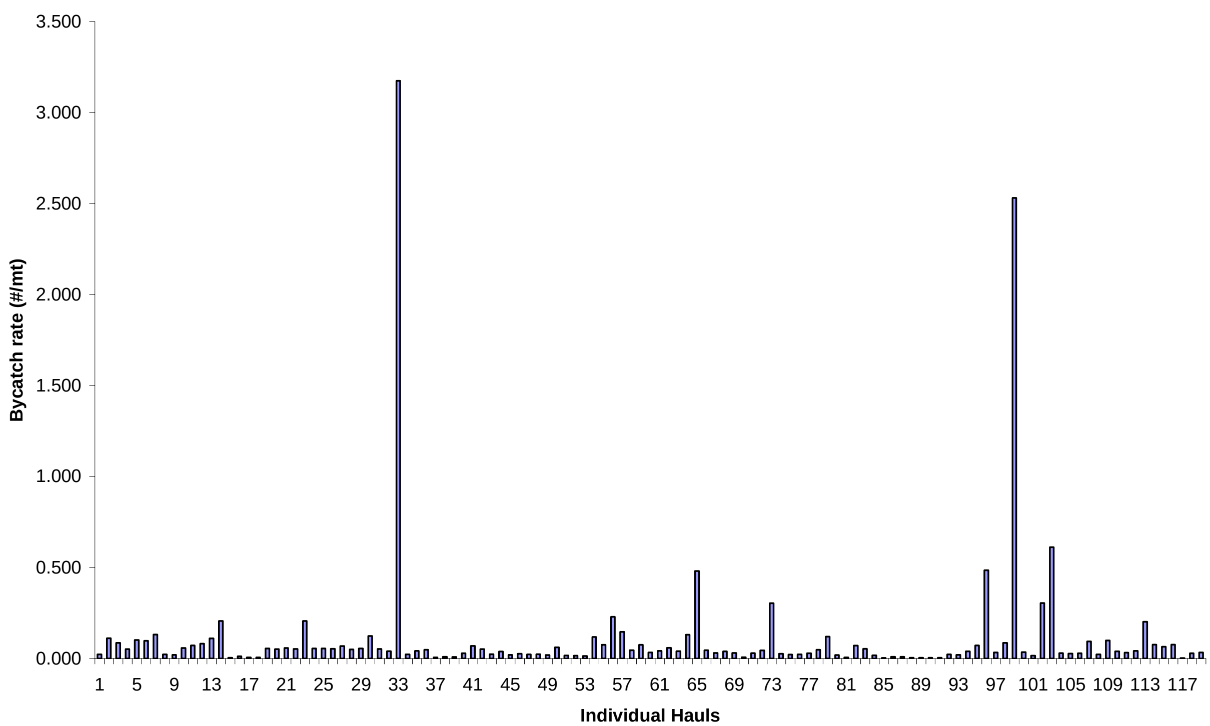




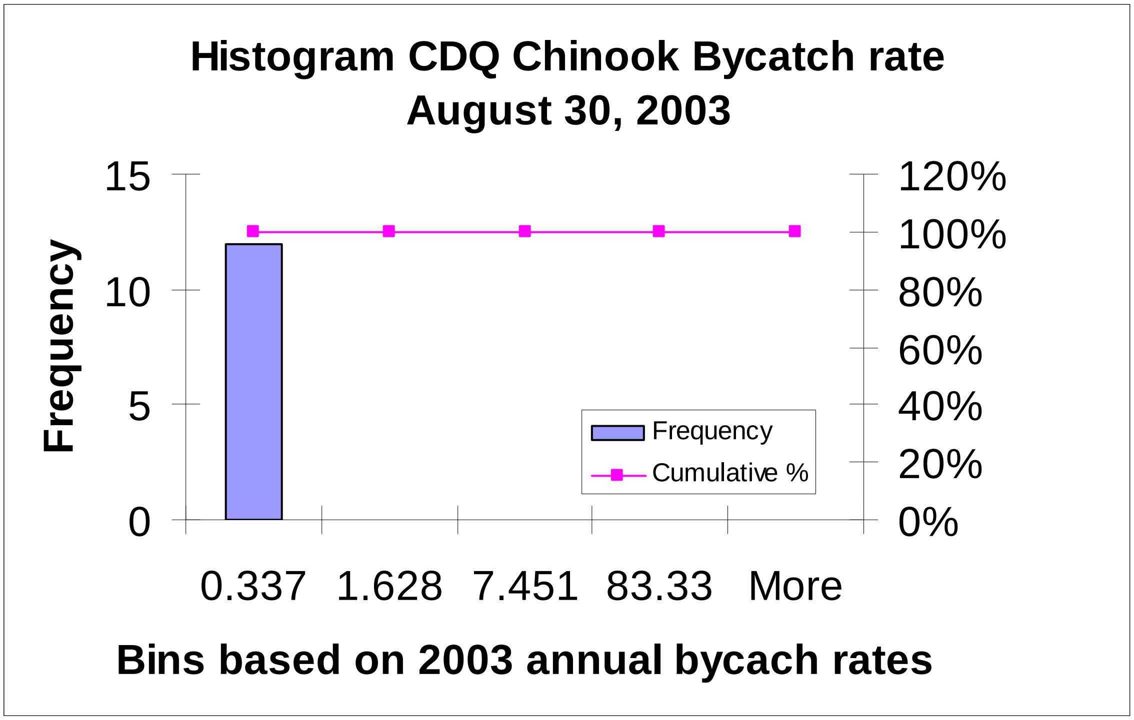
Appendix 4 - 24 Chinook Salmon Bycatch rates in the non CDQ Pollock Fishery "B" Season week ending August 30, 2003. a) Histogram representing the frequency of weekly hauls in each bin allocated to the annual bycatch rate, and b) frequency distribution of number of hauls by bycatch rate

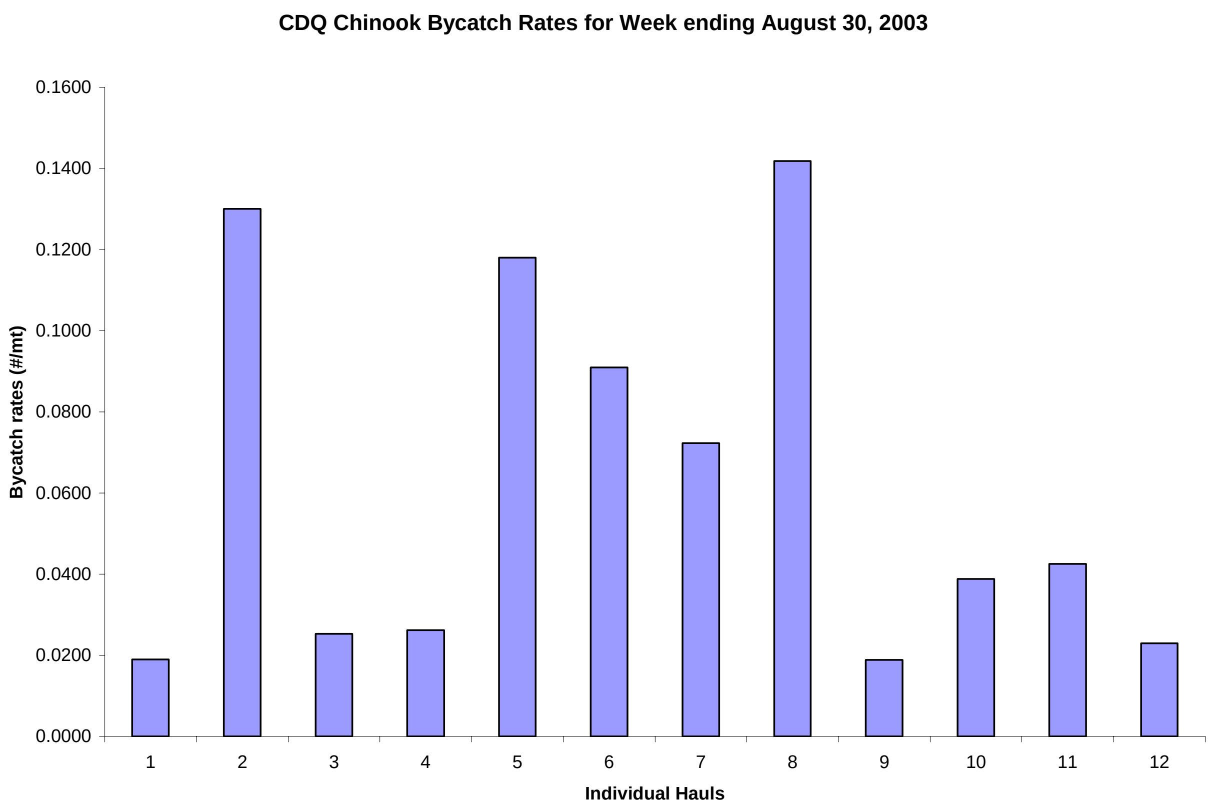


Coop Chinook Bycatch rates Week ending August 30, 2003

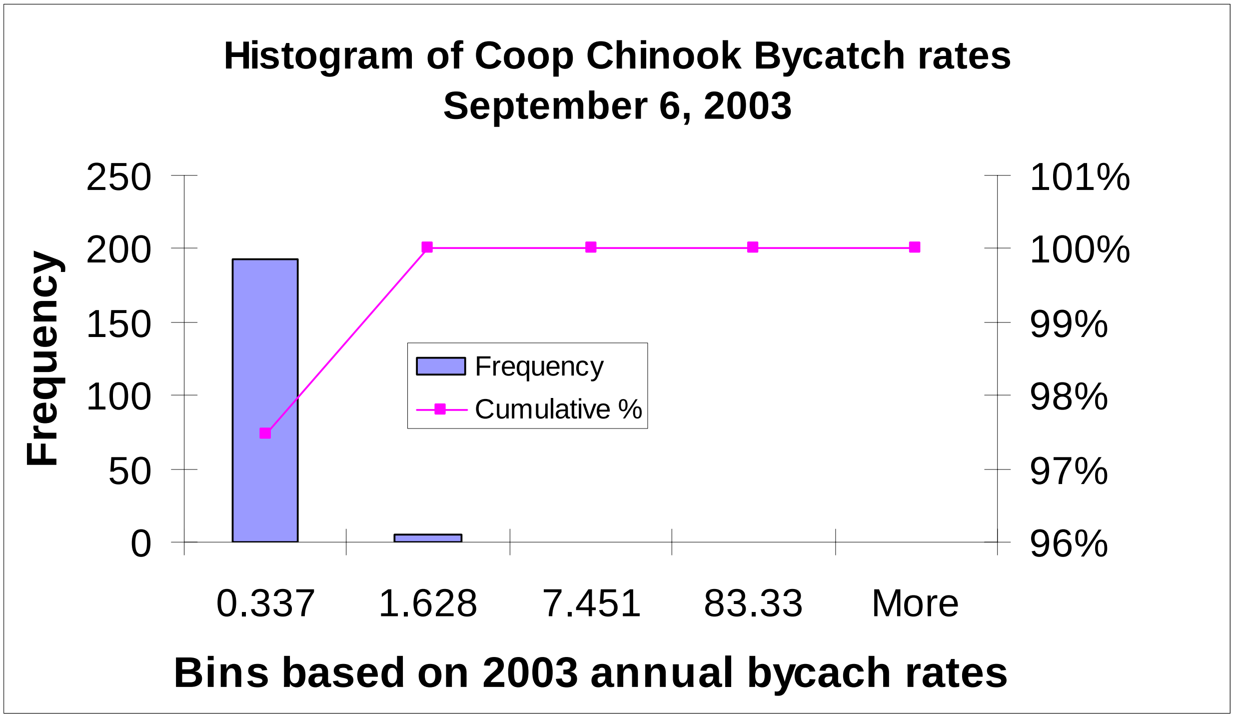


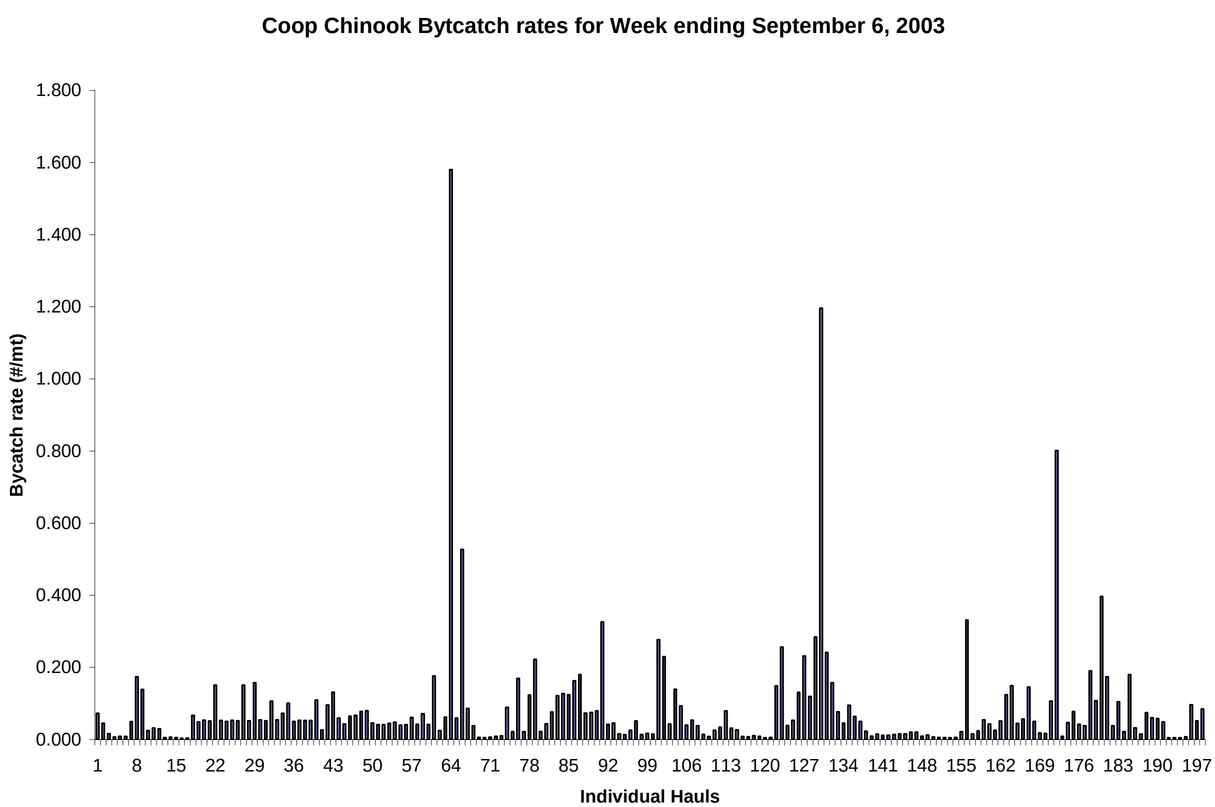
Appendix 4 - 25 Chinook Salmon Bycatch rates in the CDQ Pollock Fishery "B" Season week ending August 23, 2003. a) Histogram representing the frequency of weekly hauls in each bin allocated to the annual bycatch rate, and b) frequency distribution of number of hauls by bycatch rate



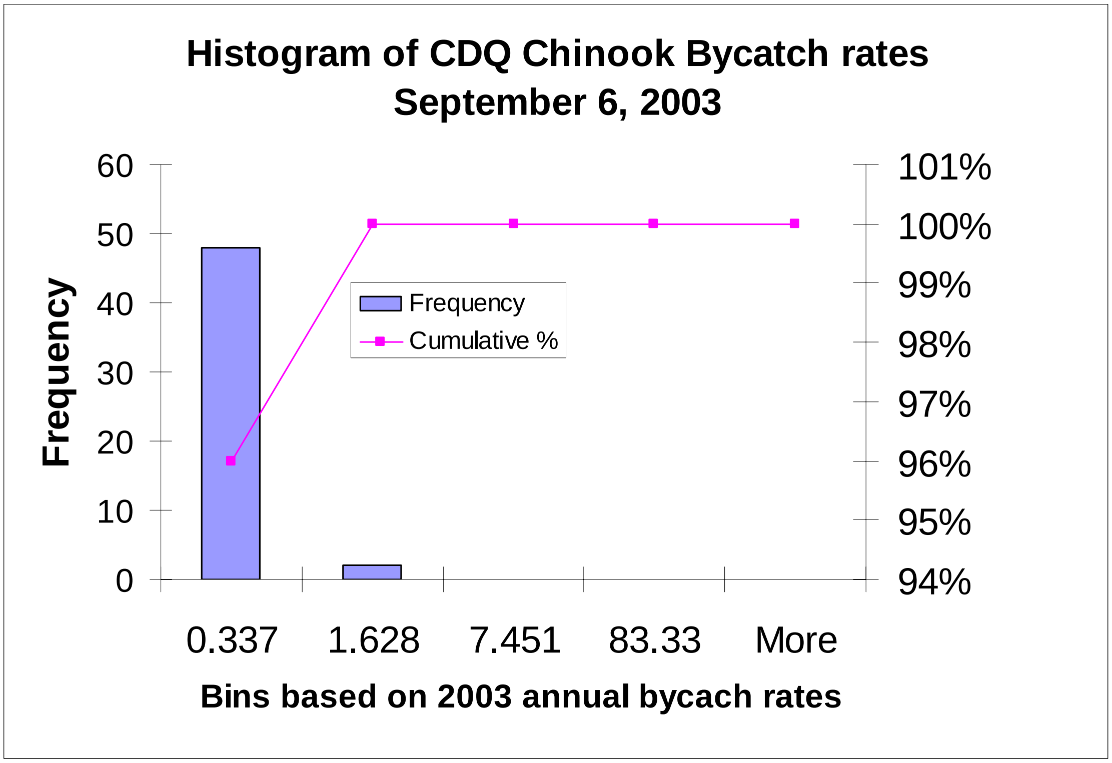


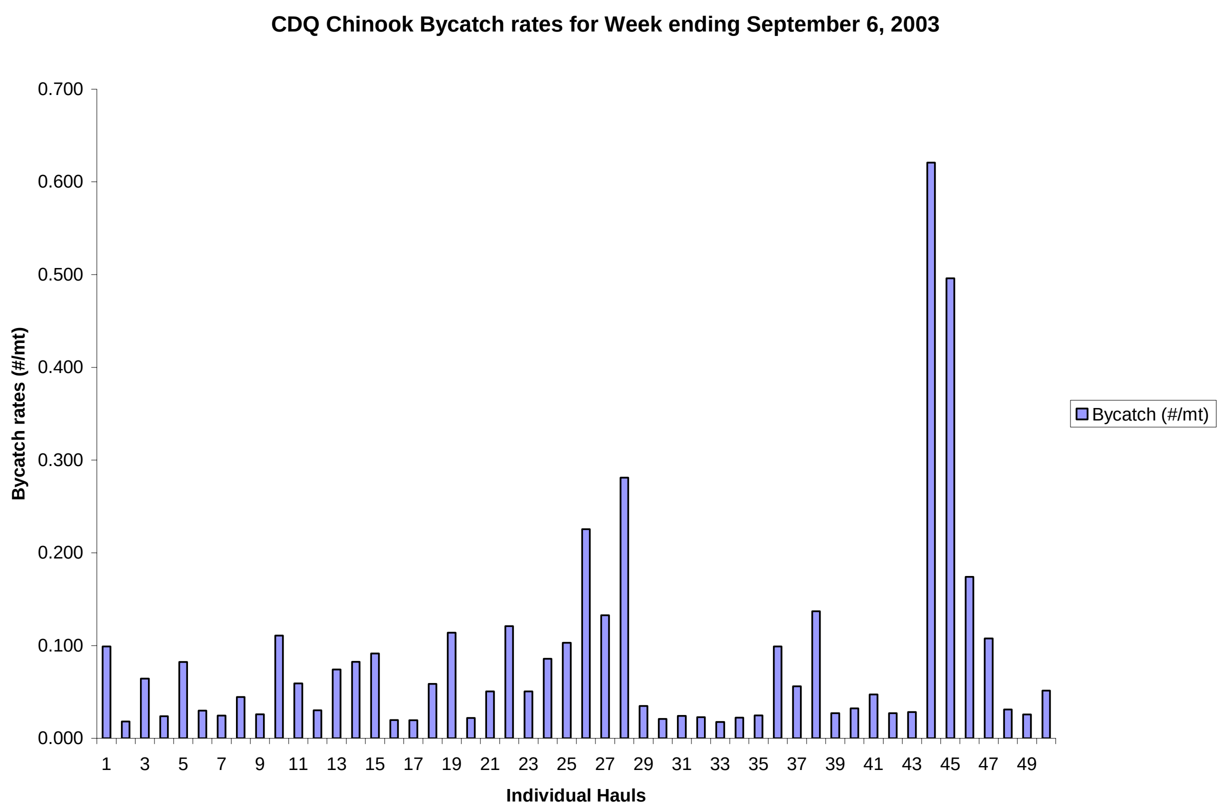
Appendix 4 - 26 Chinook Salmon Bycatch rates in the non CDQ Pollock Fishery "B" Season week ending August 23, 2003. a) Histogram representing the frequency of weekly hauls in each bin allocated to the annual bycatch rate, and b) frequency distribution of number of hauls by bycatch rate



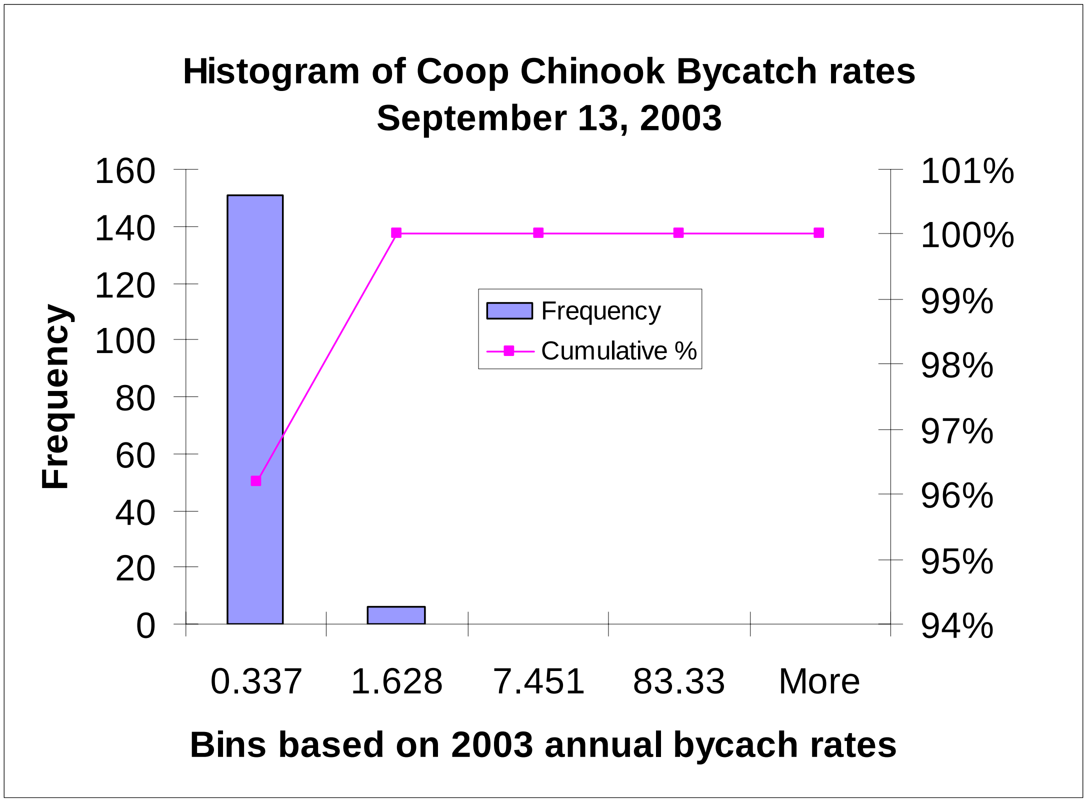


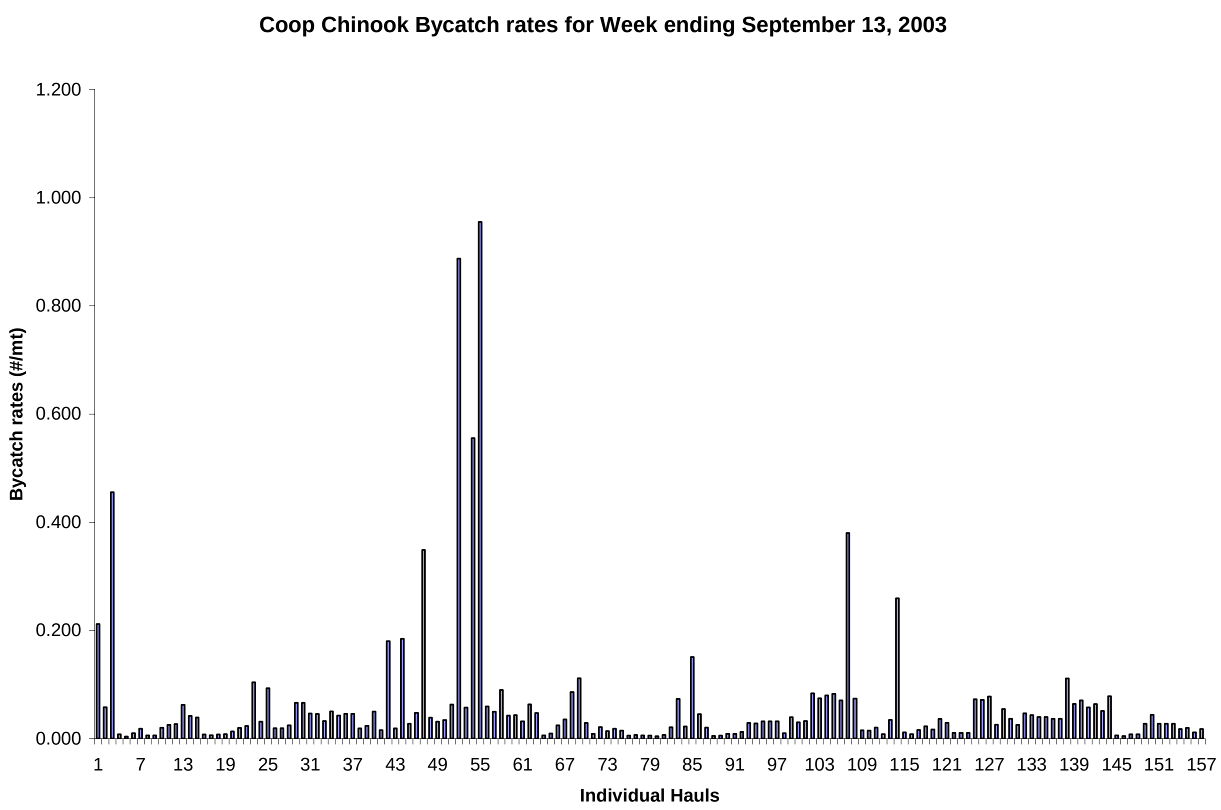
Appendix 4 - 27 Chinook Salmon Bycatch rates in the non CDQ Pollock Fishery "B" Season week ending September 6, 2003. a) Histogram representing the frequency of weekly hauls in each bin allocated to the annual bycatch rate, and b) frequency distribution of number of hauls by bycatch rate





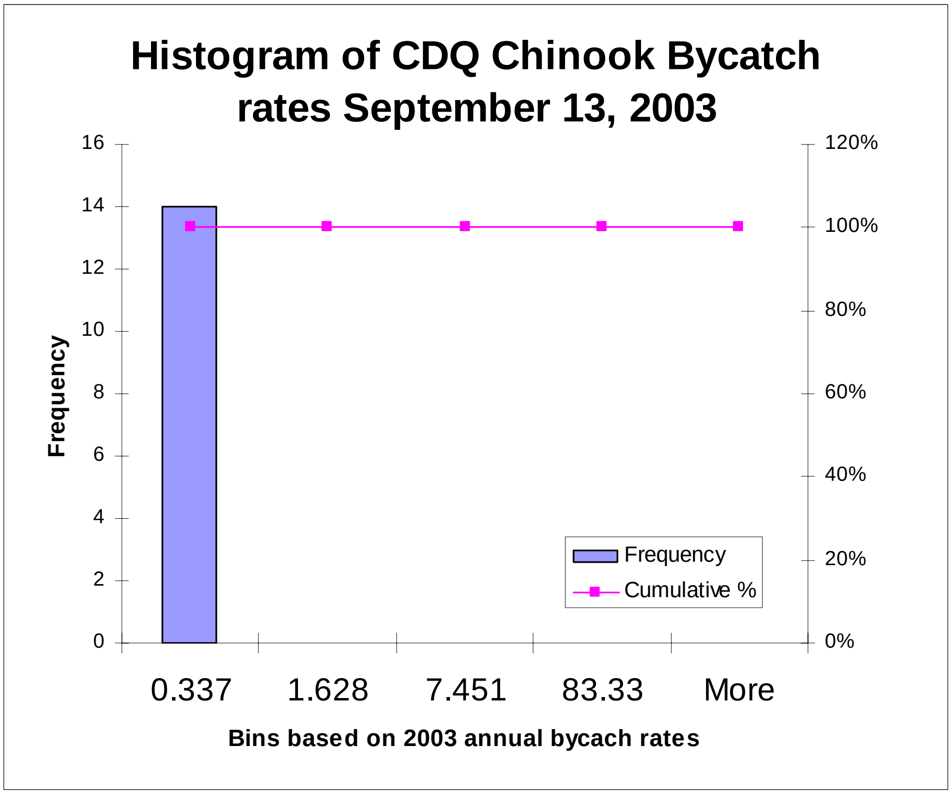
Appendix 4 - 28 Chinook Salmon Bycatch rates in the non CDQ Pollock Fishery "B" Season week ending September 13, 2003. a) Histogram representing the frequency of weekly hauls in each bin allocated to the annual bycatch rate, and b) frequency distribution of number of hauls by bycatch rate

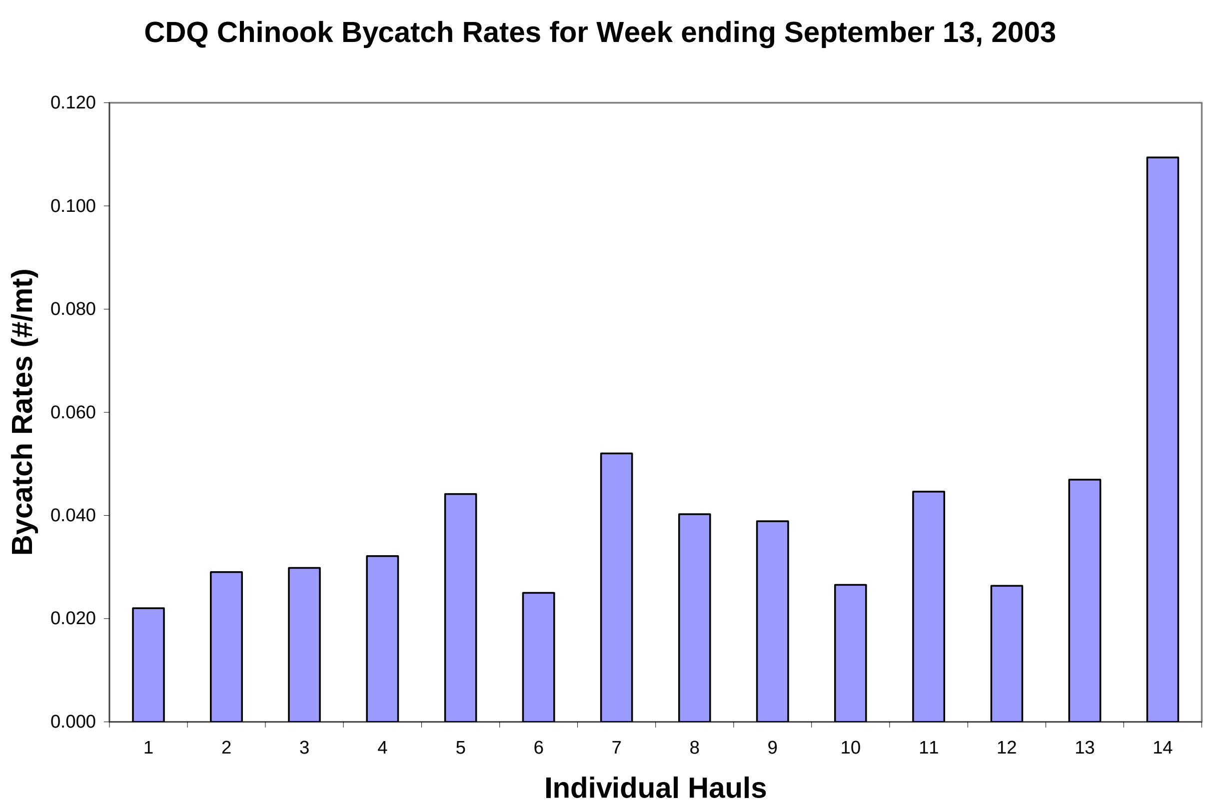




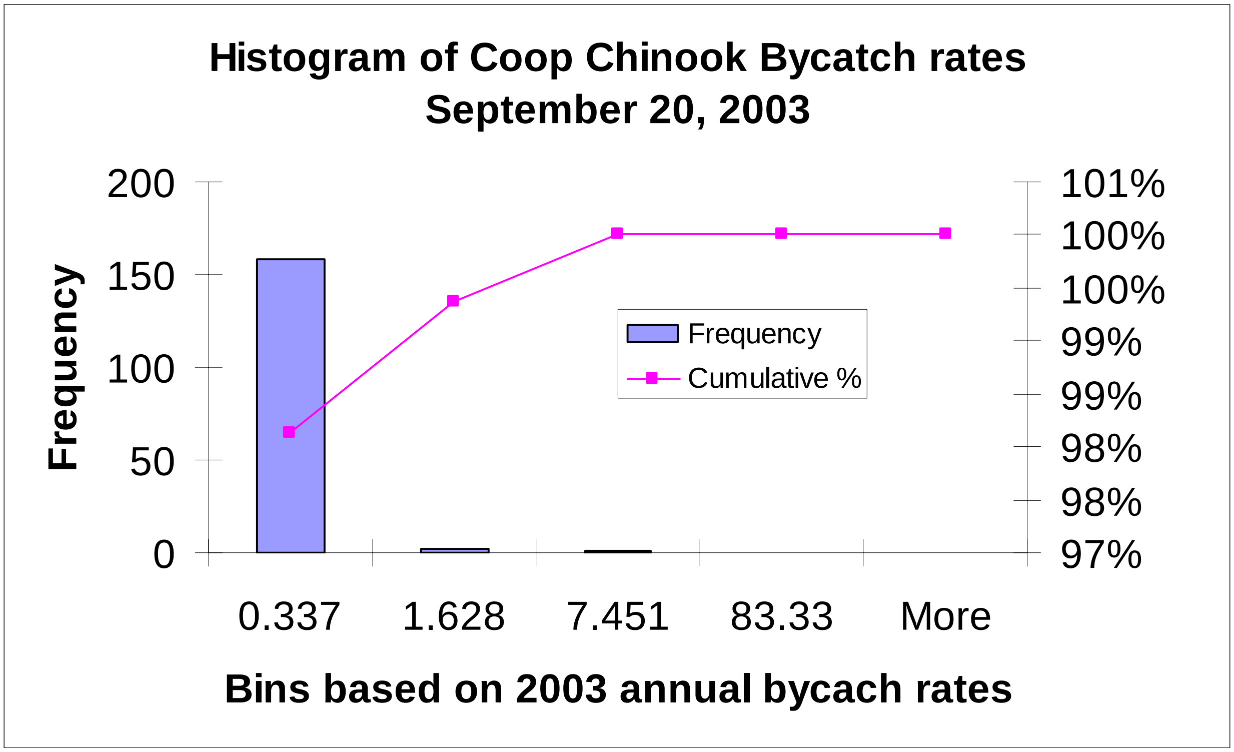
Appendix 4 - 29 Chinook Salmon Bycatch rates in the CDQ Pollock Fishery "B" Season week ending September 13, 2003. a) Histogram representing the frequency of weekly hauls in each bin allocated to the

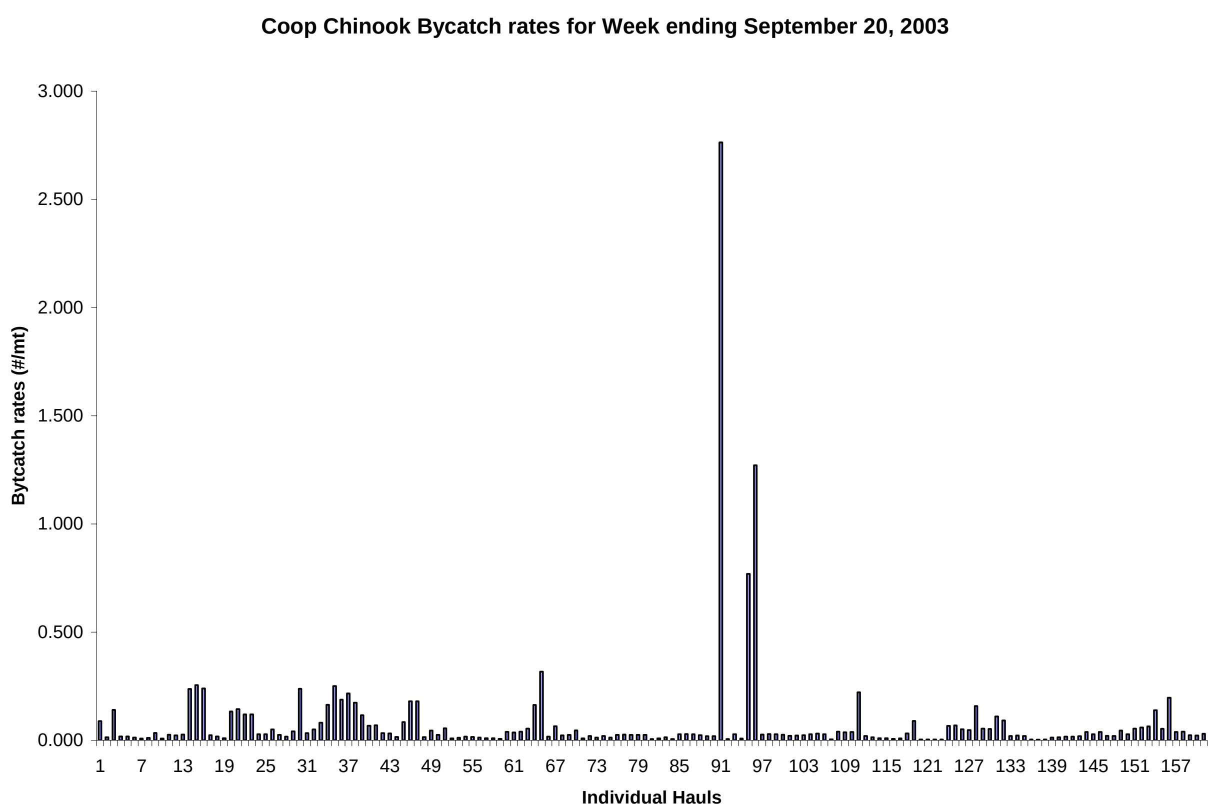
annual bycatch rate, and b) frequency distribution of number of hauls by bycatch rate



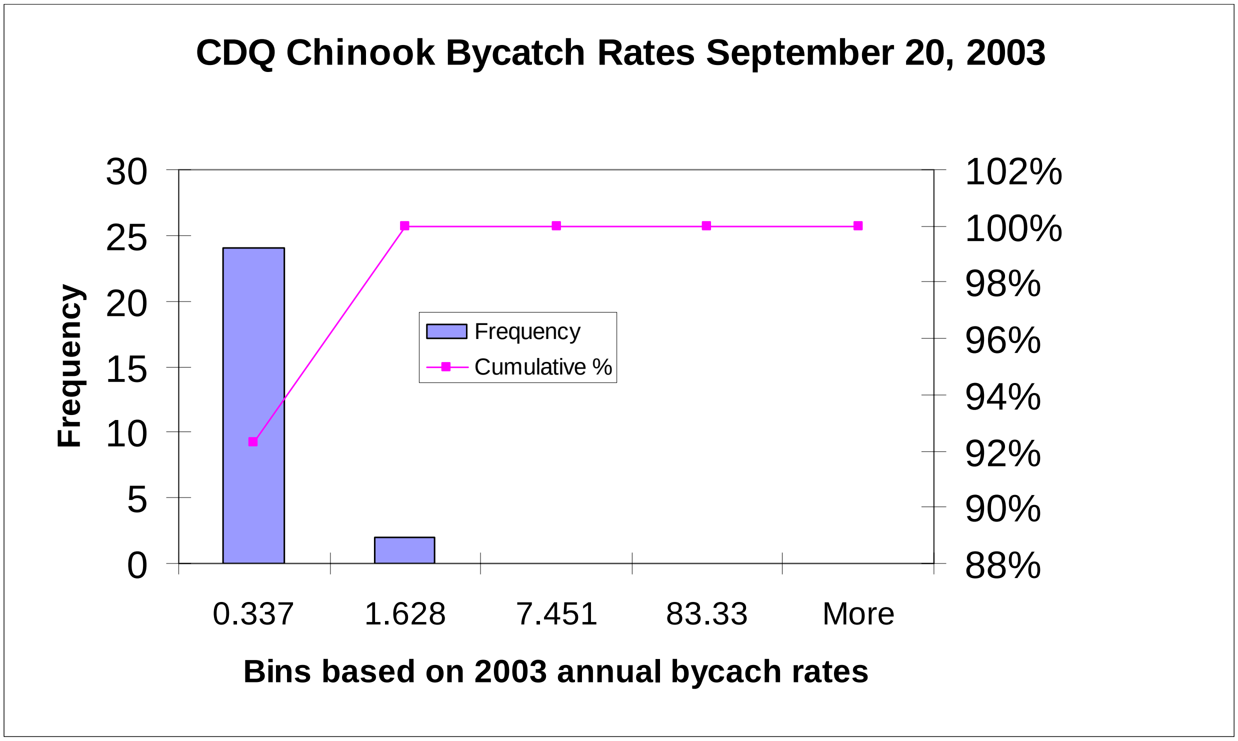


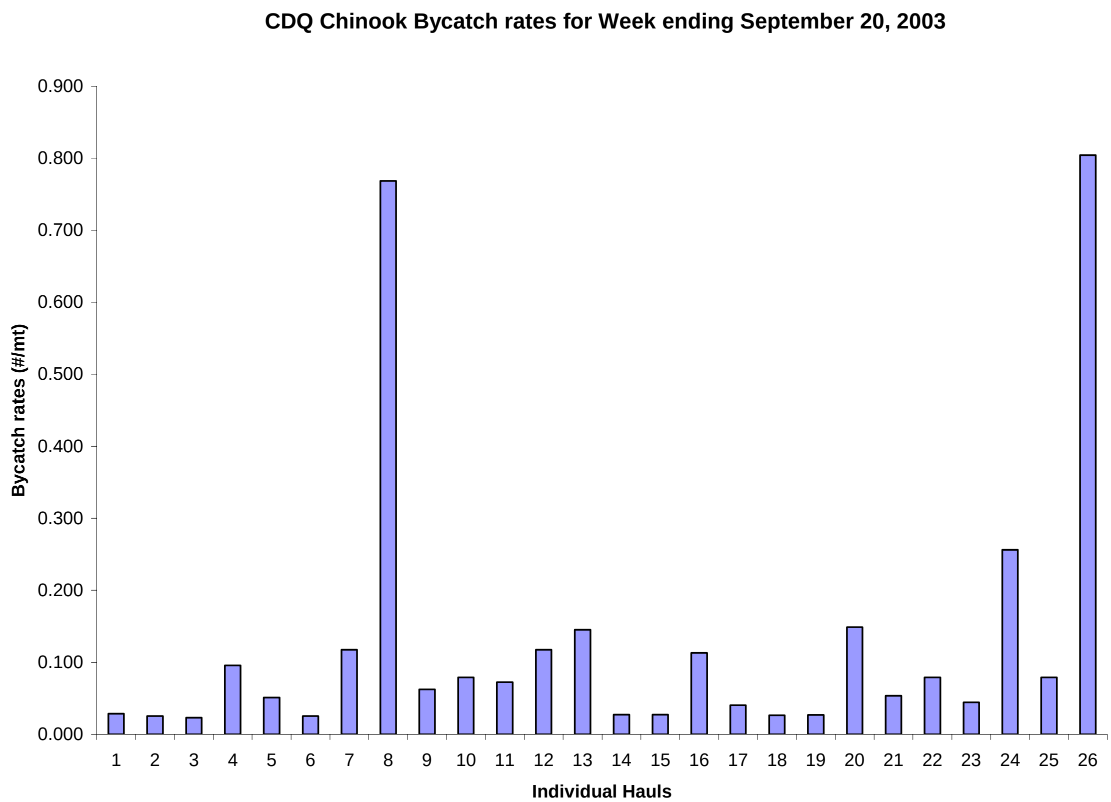
Appendix 4 - 30 Chinook Salmon Bycatch rates in the non CDQ Pollock Fishery "B" Season week ending September 20, 2003. a) Histogram representing the frequency of weekly hauls in each bin allocated to the annual bycatch rate, and b) frequency distribution of number of hauls by bycatch rate



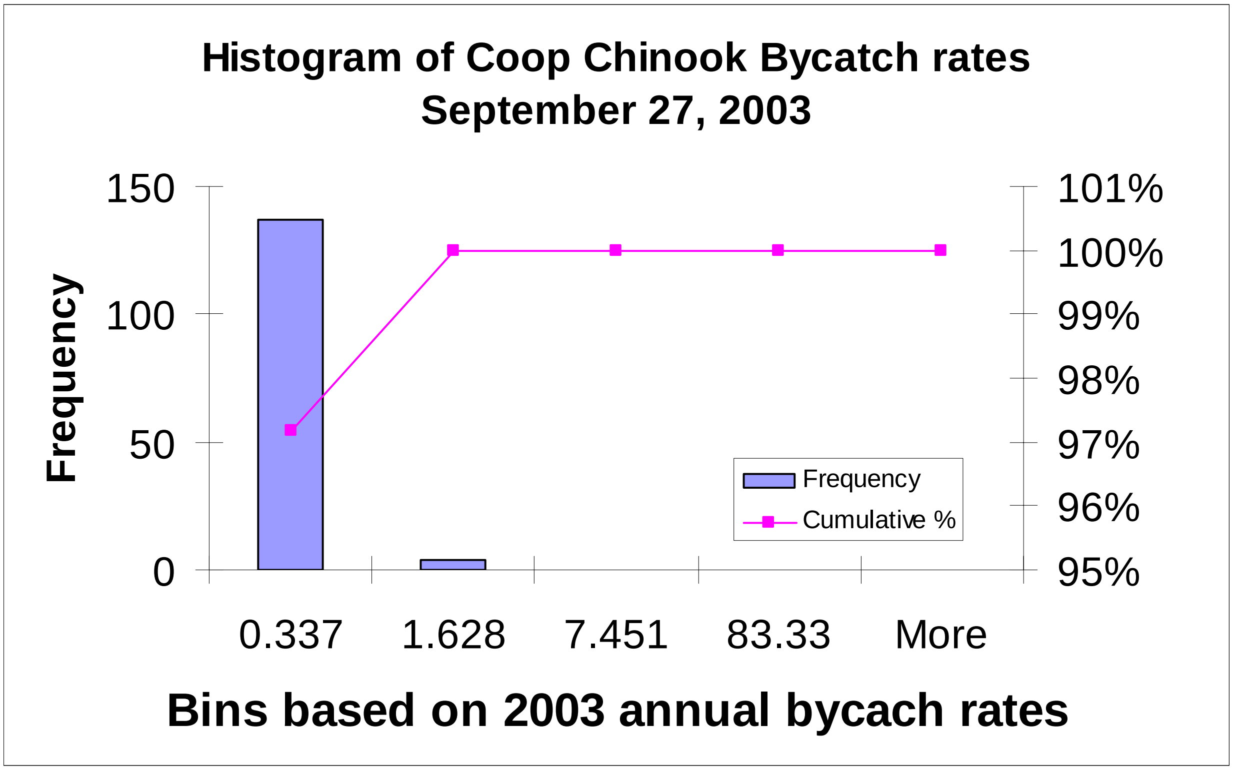


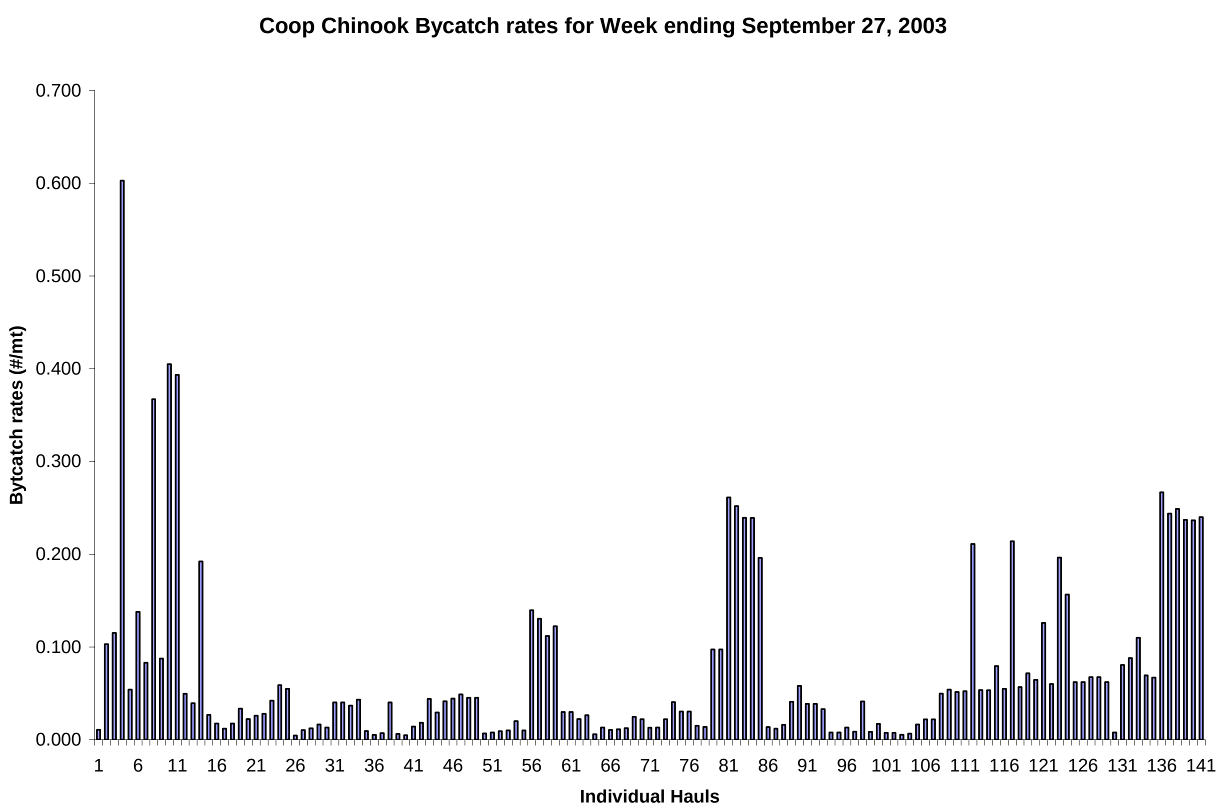
Appendix 4 - 31 Chinook Salmon Bycatch rates in the CDQ Pollock Fishery "B" Season week ending September 20, 2003. a) Histogram representing the frequency of weekly hauls in each bin allocated to the annual bycatch rate, and b) frequency distribution of number of hauls by bycatch rate



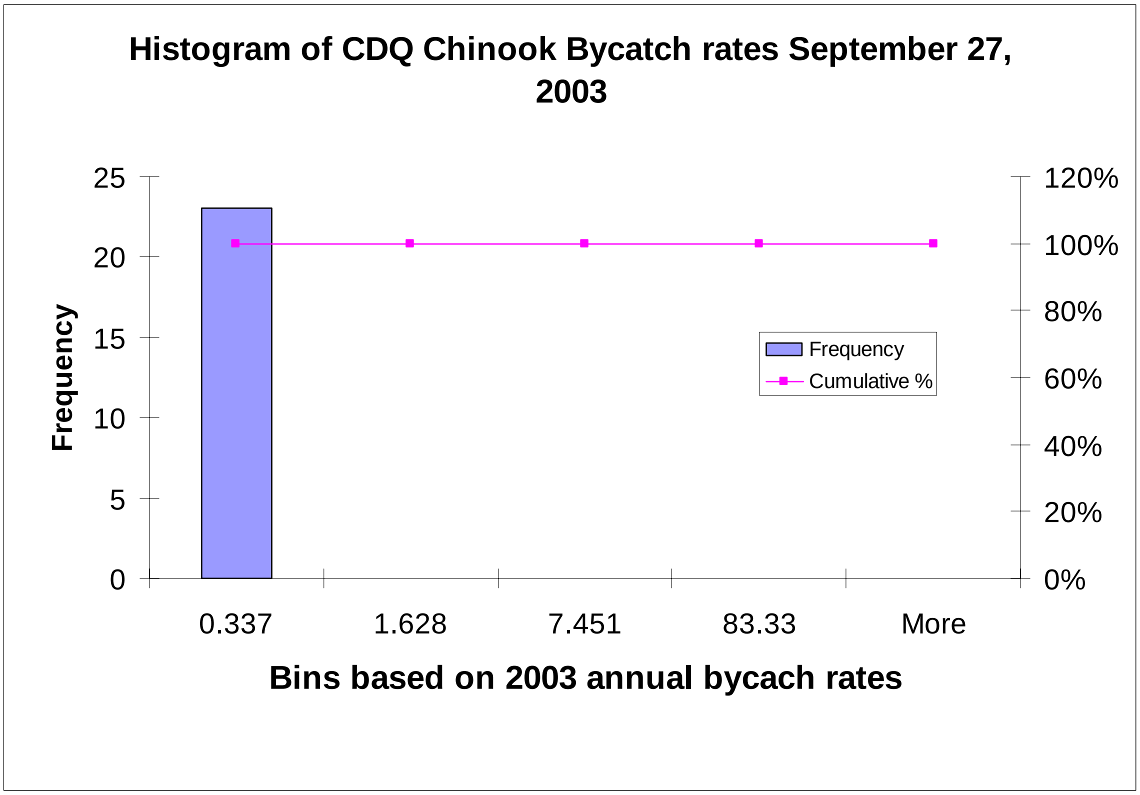


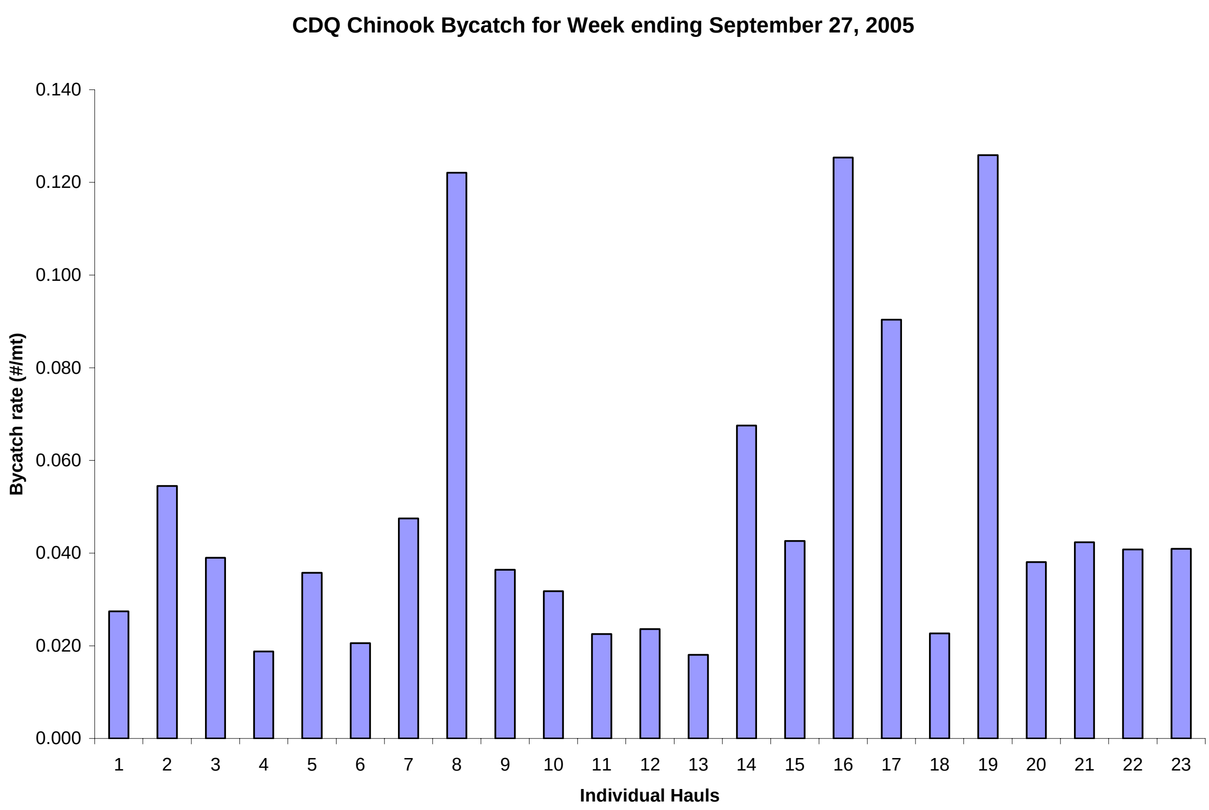
Appendix 4 - 32 Chinook Salmon Bycatch rates in the non CDQ Pollock Fishery "B" Season week ending September 27, 2003. a) Histogram representing the frequency of weekly hauls in each bin allocated to the annual bycatch rate, and b) frequency distribution of number of hauls by bycatch rate



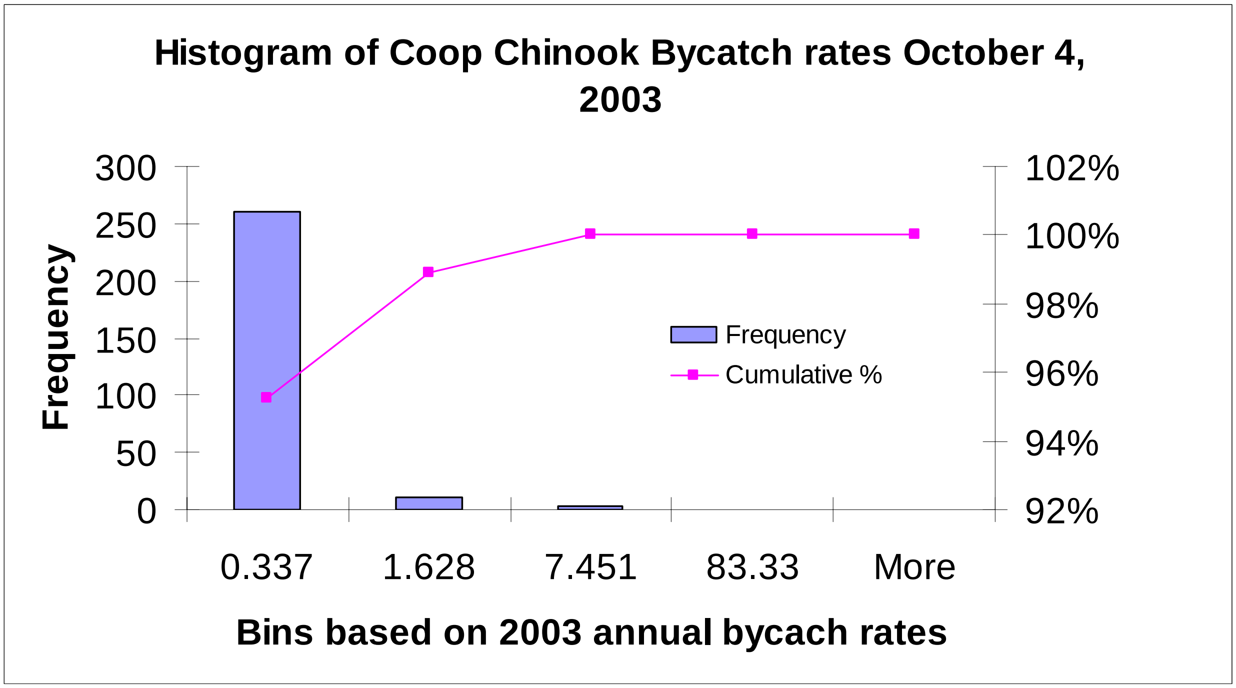


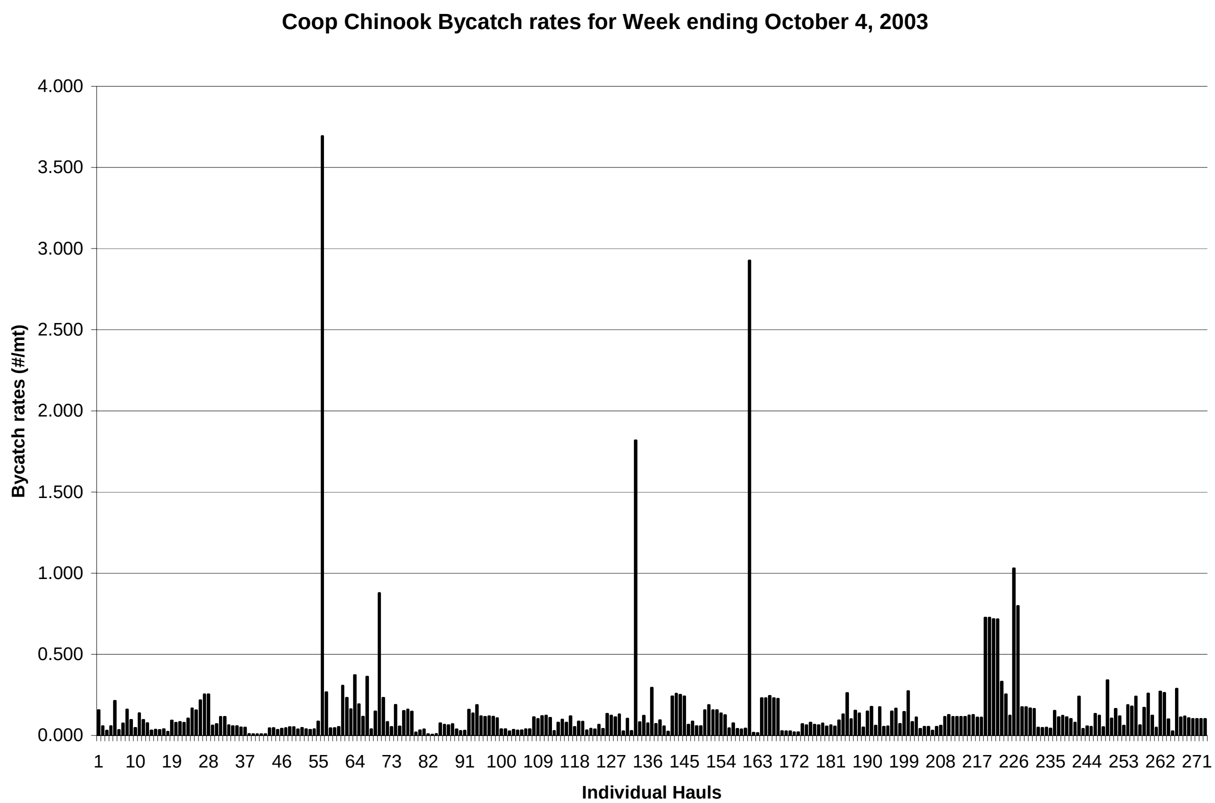
Appendix 4 - 33 Chinook Salmon Bycatch rates in the CDQ Pollock Fishery "B" Season week ending September 27, 2003. a) Histogram representing the frequency of weekly hauls in each bin allocated to the annual bycatch rate, and b) frequency distribution of number of hauls by bycatch rate



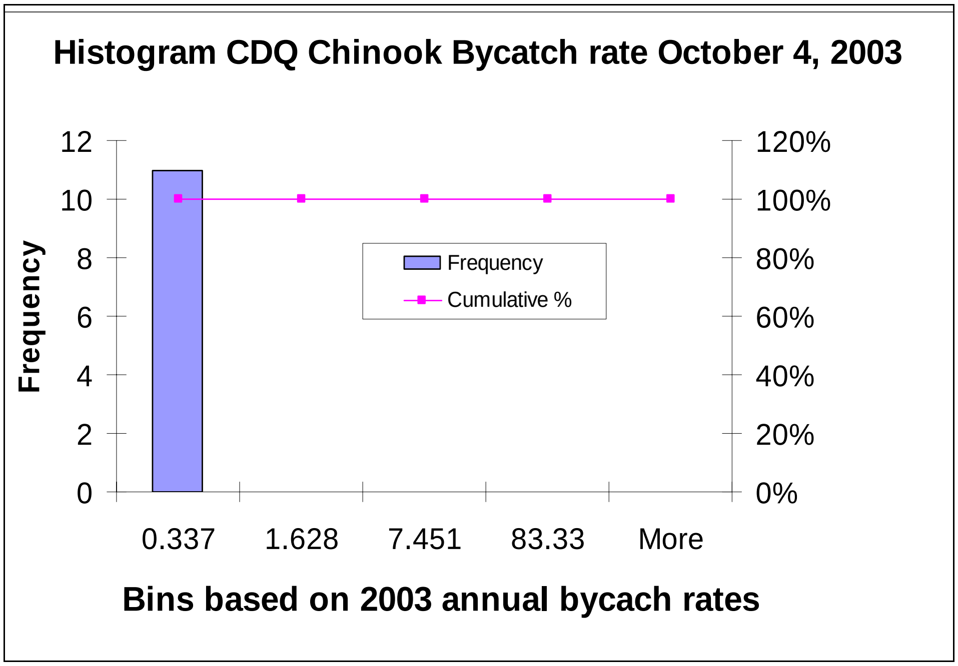


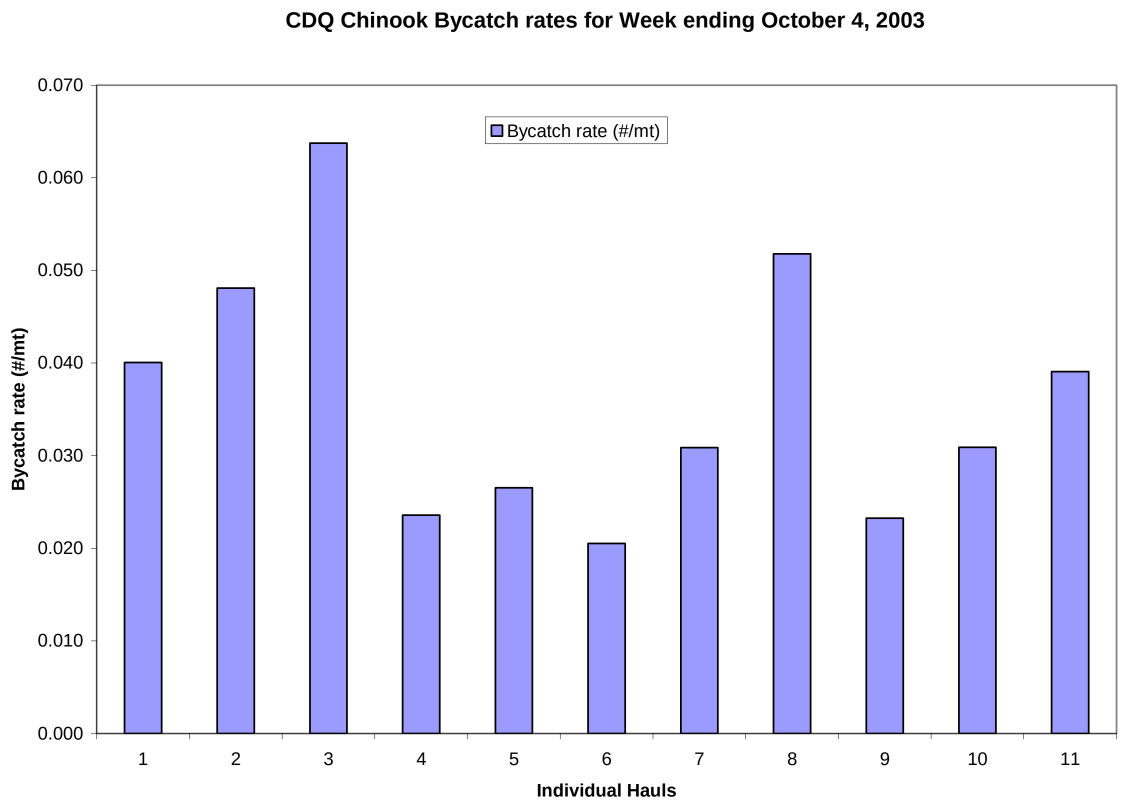
Appendix 4 - 34 Chinook Salmon Bycatch rates in the non CDQ Pollock Fishery "B" Season week ending October 4, 2003. a) Histogram representing the frequency of weekly hauls in each bin allocated to the annual bycatch rate, and b) frequency distribution of number of hauls by bycatch rate



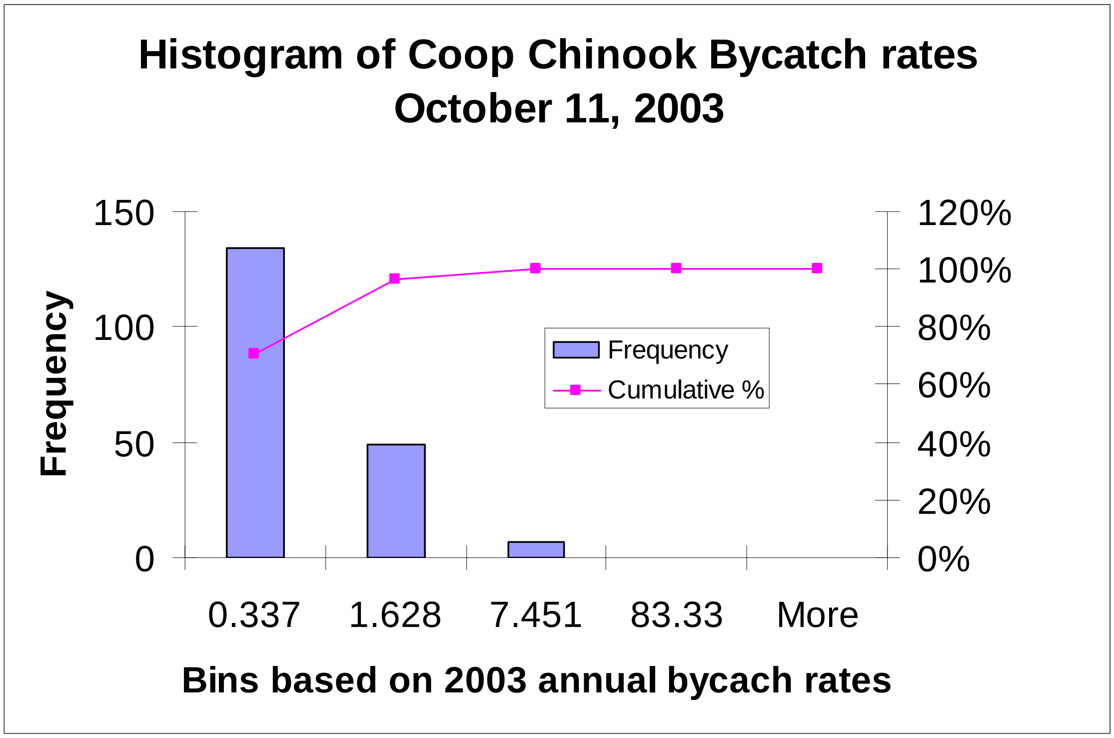


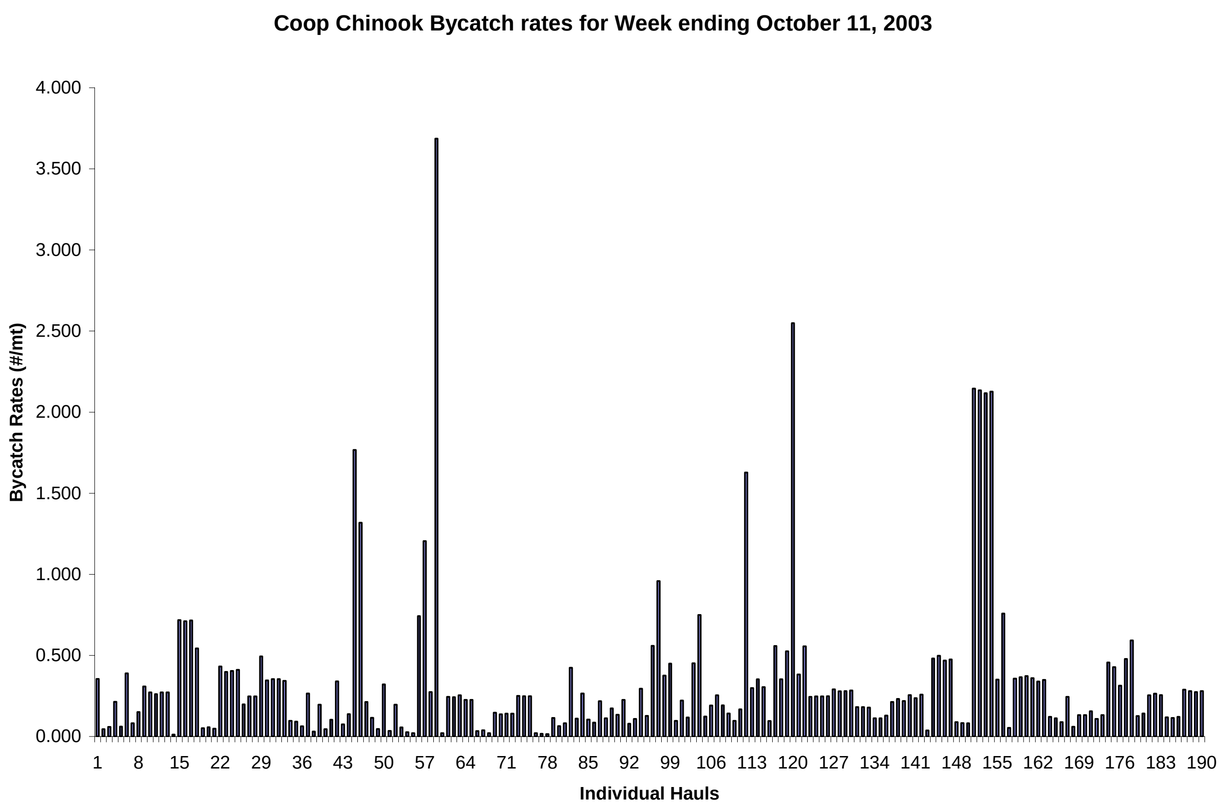
Appendix 4 - 35 Chinook Salmon Bycatch rates in the CDQ Pollock Fishery "B" Season week ending October 4, 2003. a) Histogram representing the frequency of weekly hauls in each bin allocated to the annual bycatch rate, and b) frequency distribution of number of hauls by bycatch rate



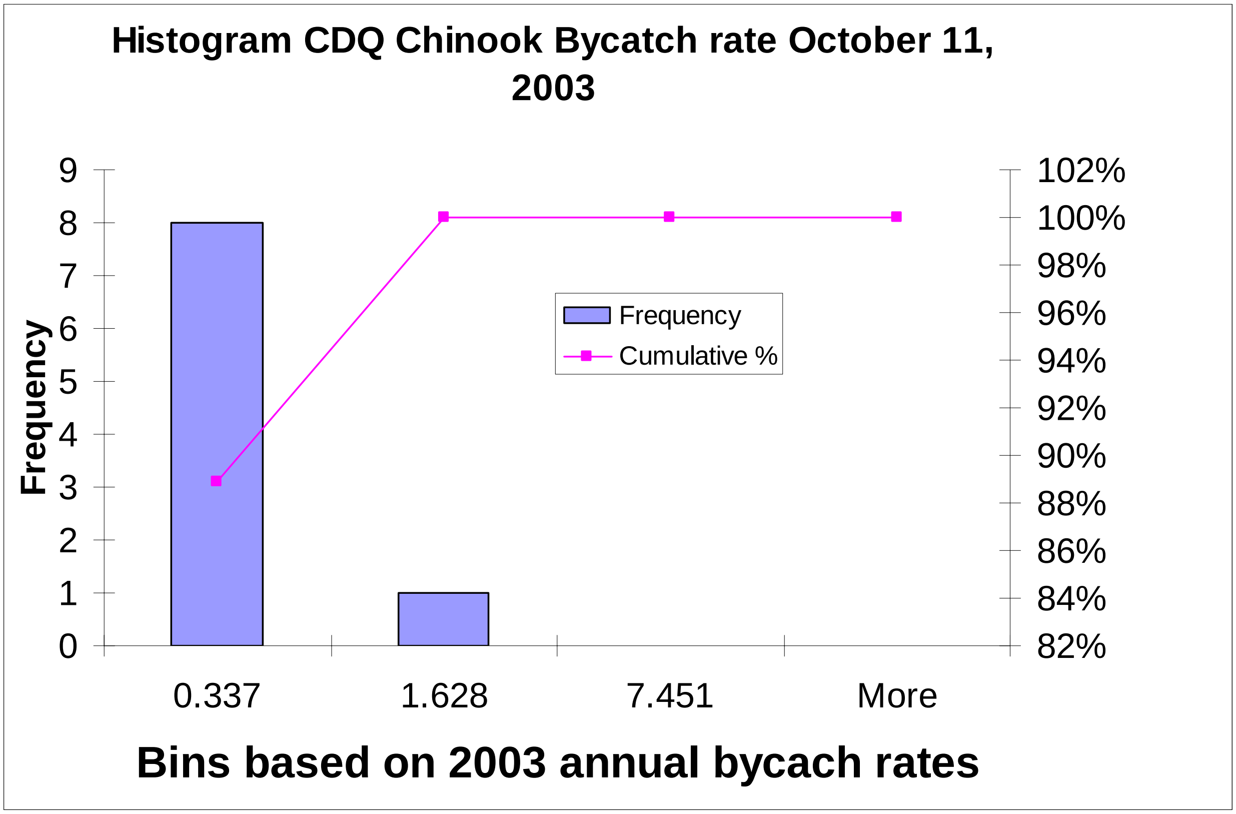


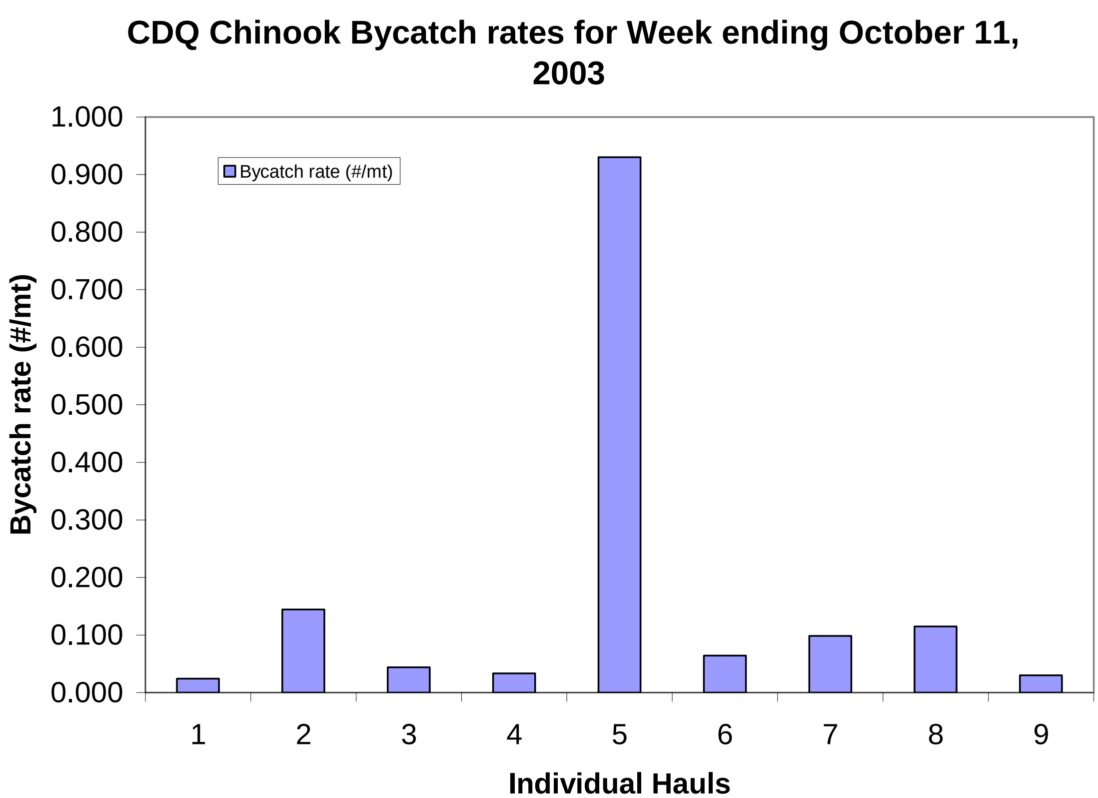
Appendix 4 - 36 Chinook Salmon Bycatch rates in the non CDQ Pollock Fishery "B" Season week ending October 11, 2003. a) Histogram representing the frequency of weekly hauls in each bin allocated to the annual bycatch rate, and b) frequency distribution of number of hauls by bycatch rate



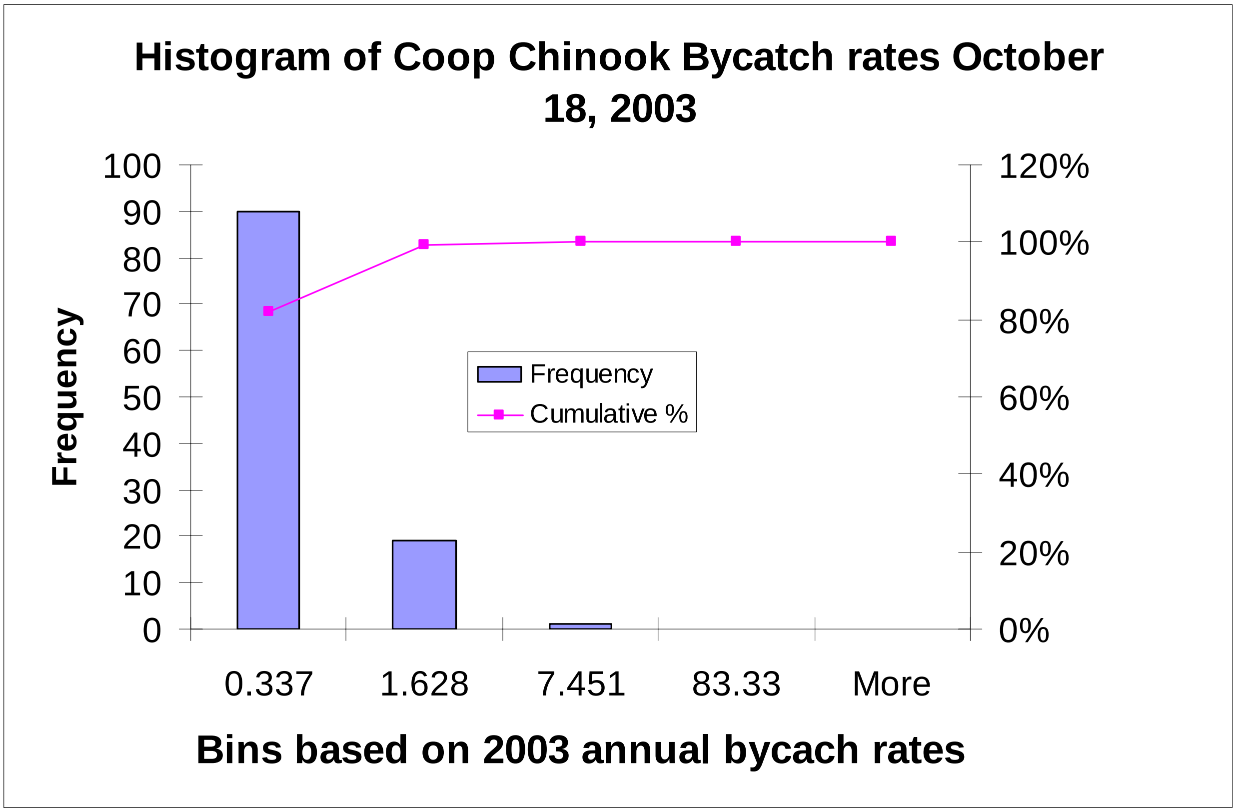


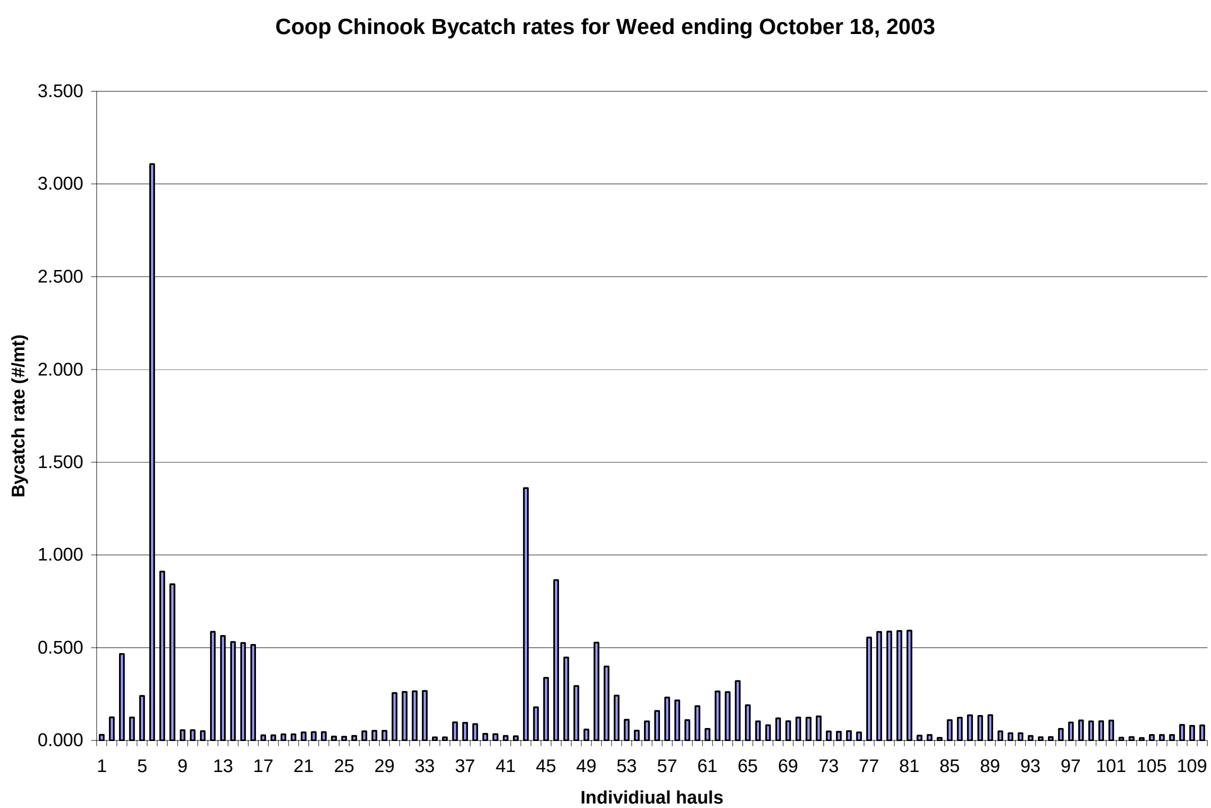
Appendix 4 - 37 Chinook Salmon Bycatch rates in the CDQ Pollock Fishery "B" Season week ending October 11, 2003. a) Histogram representing the frequency of weekly hauls in each bin allocated to the annual bycatch rate, and b) frequency distribution of number of hauls by bycatch rate



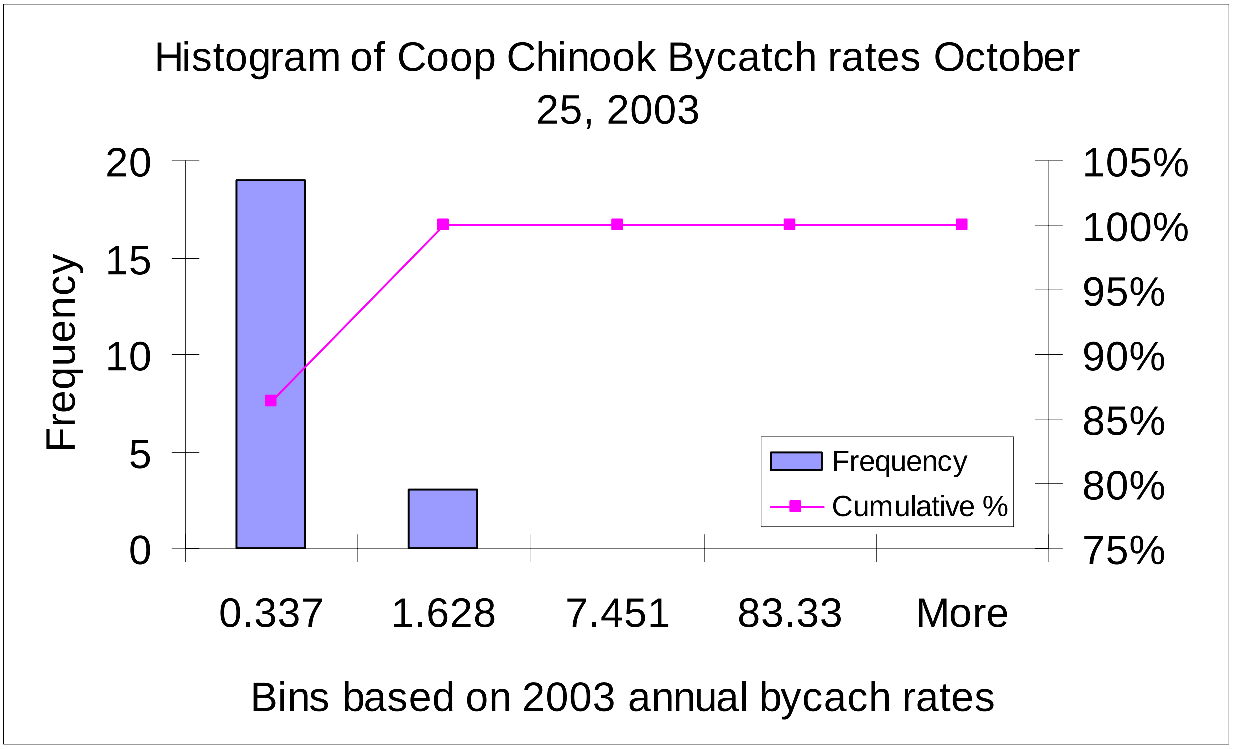


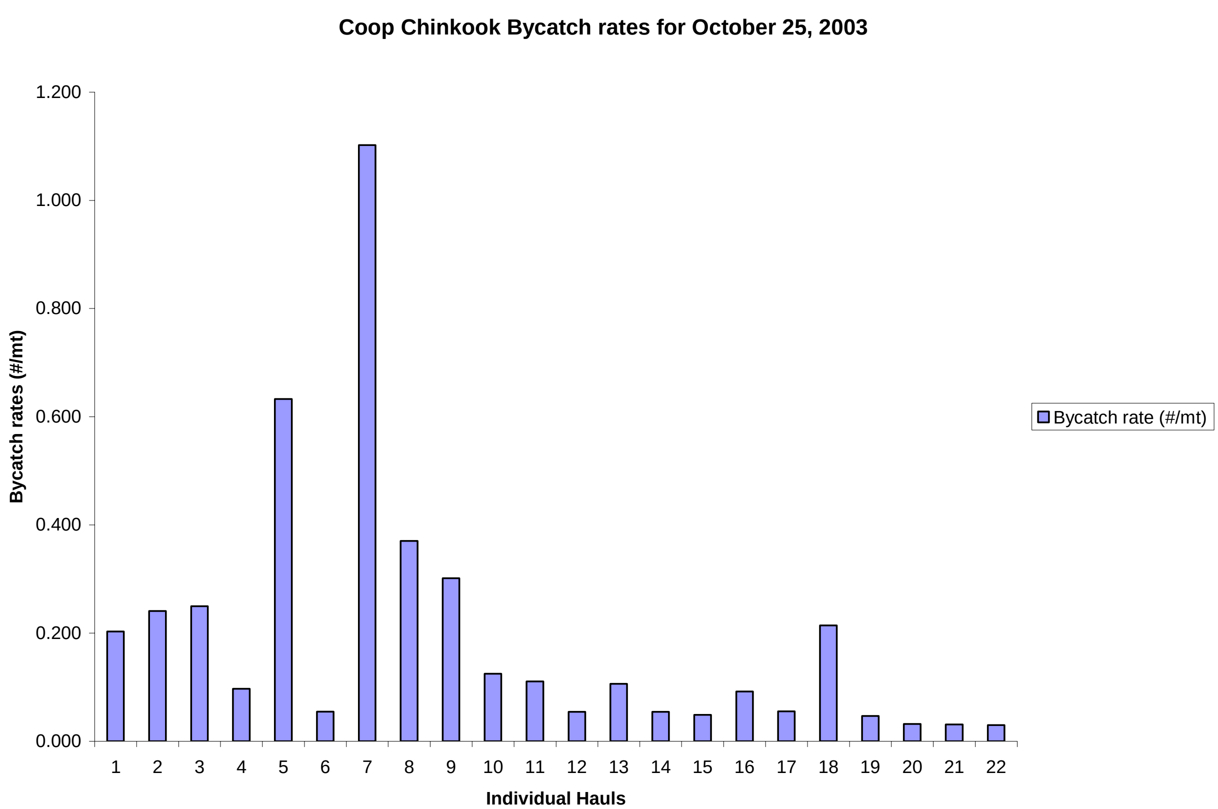
Appendix 4 - 38 Chinook Salmon Bycatch rates in the nonCDQ Pollock Fishery "B" Season week ending October 18, 2003. a) Histogram representing the frequency of weekly hauls in each bin allocated to the annual bycatch rate, and b) frequency distribution of number of hauls by bycatch rate



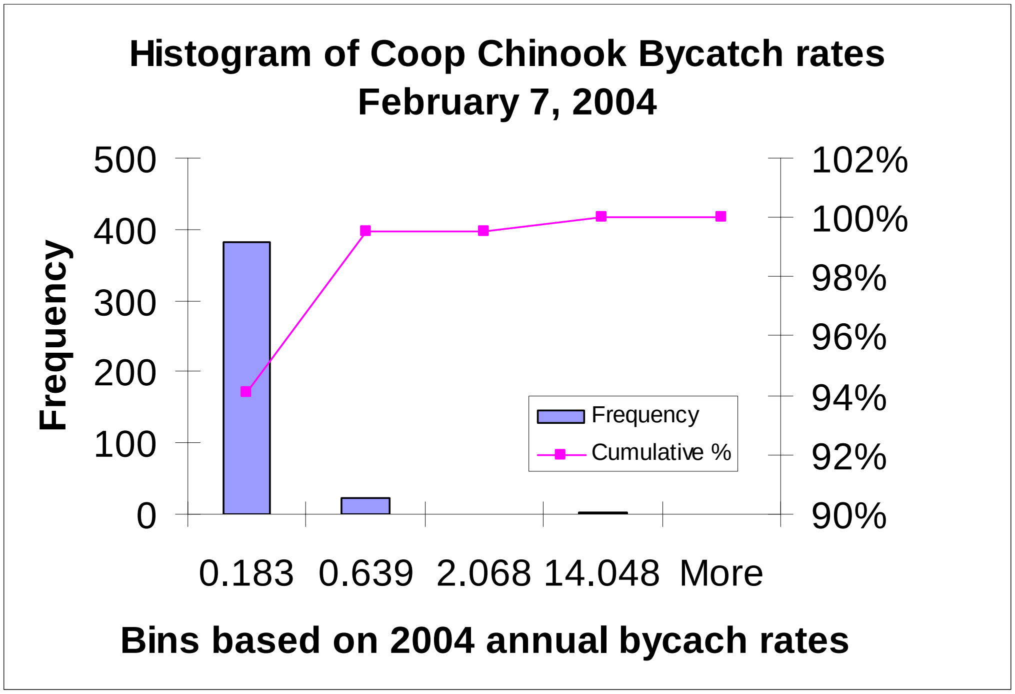


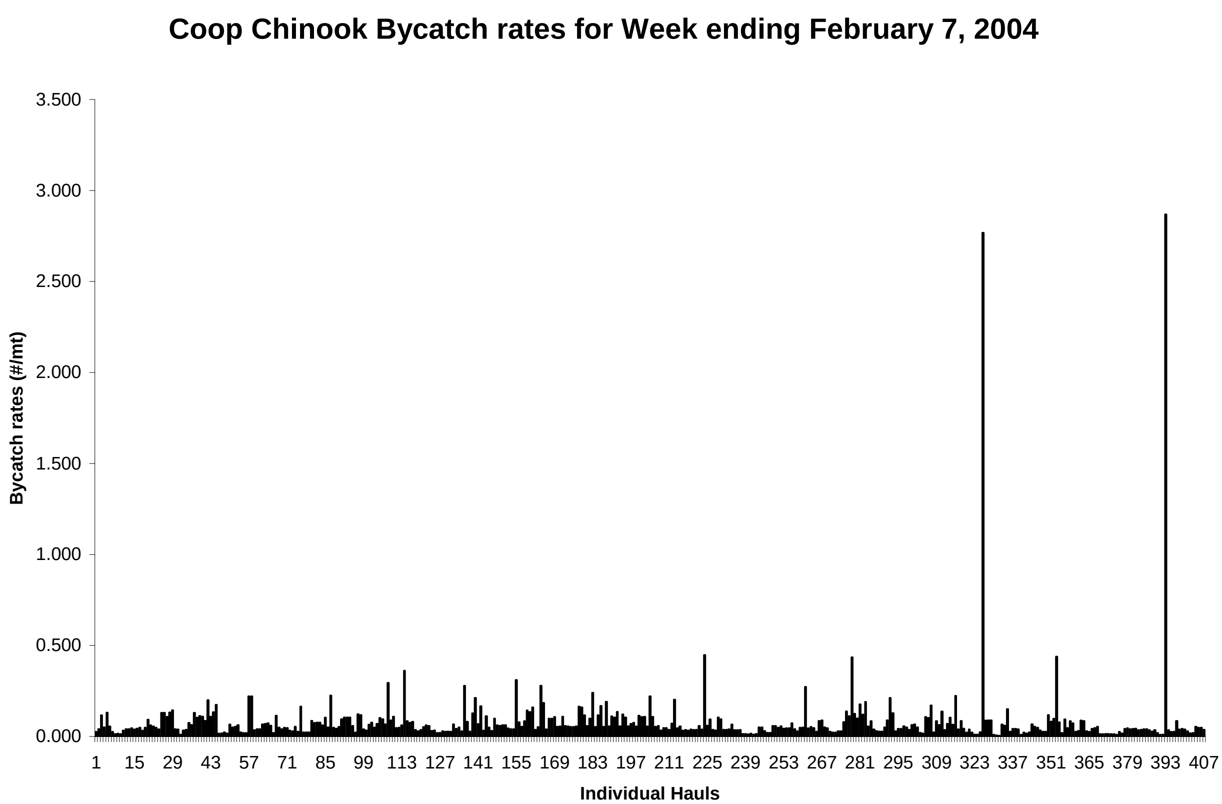
Appendix 4 - 39 Chinook Salmon Bycatch rates in the non CDQ Pollock Fishery "B" Season week ending October 25, 2003. a) Histogram representing the frequency of weekly hauls in each bin allocated to the annual bycatch rate, and b) frequency distribution of number of hauls by bycatch rate



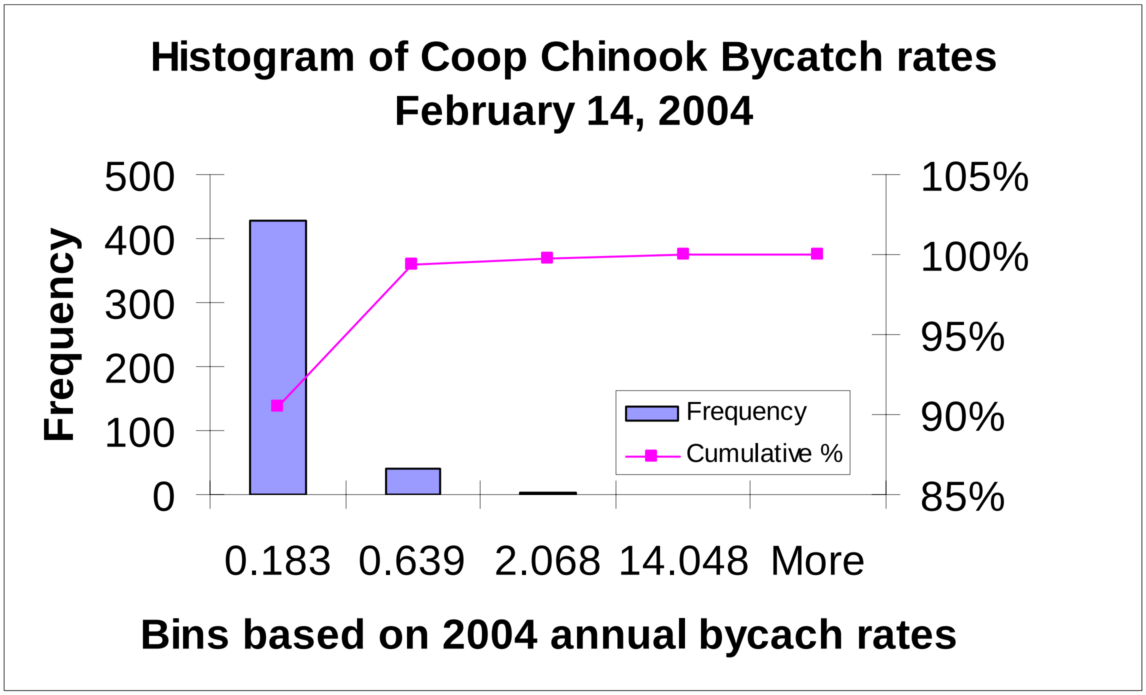


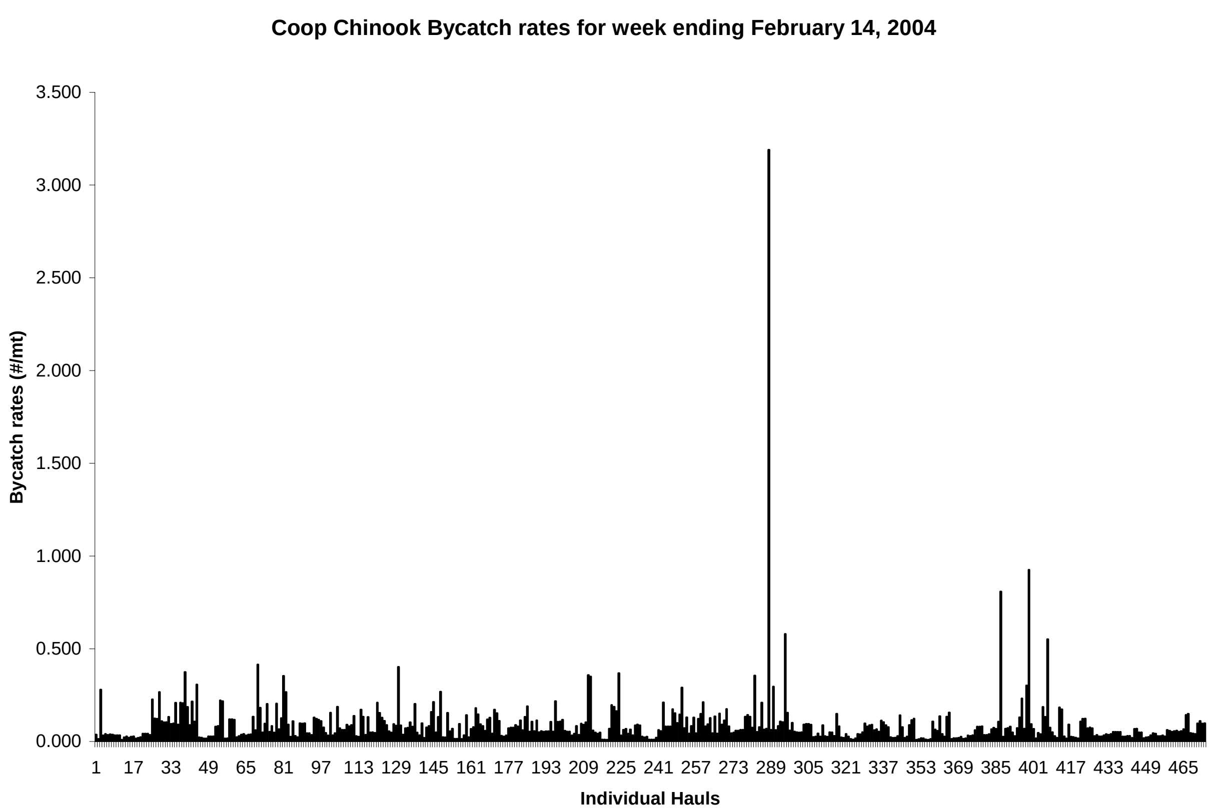
Appendix 4 - 40 Chinook Salmon Bycatch rates in the non CDQ Pollock Fishery "A" Season week ending February 7, 2004. a) Histogram representing the frequency of weekly hauls in each bin allocated to the annual bycatch rate, and b) frequency distribution of number of hauls by bycatch rate



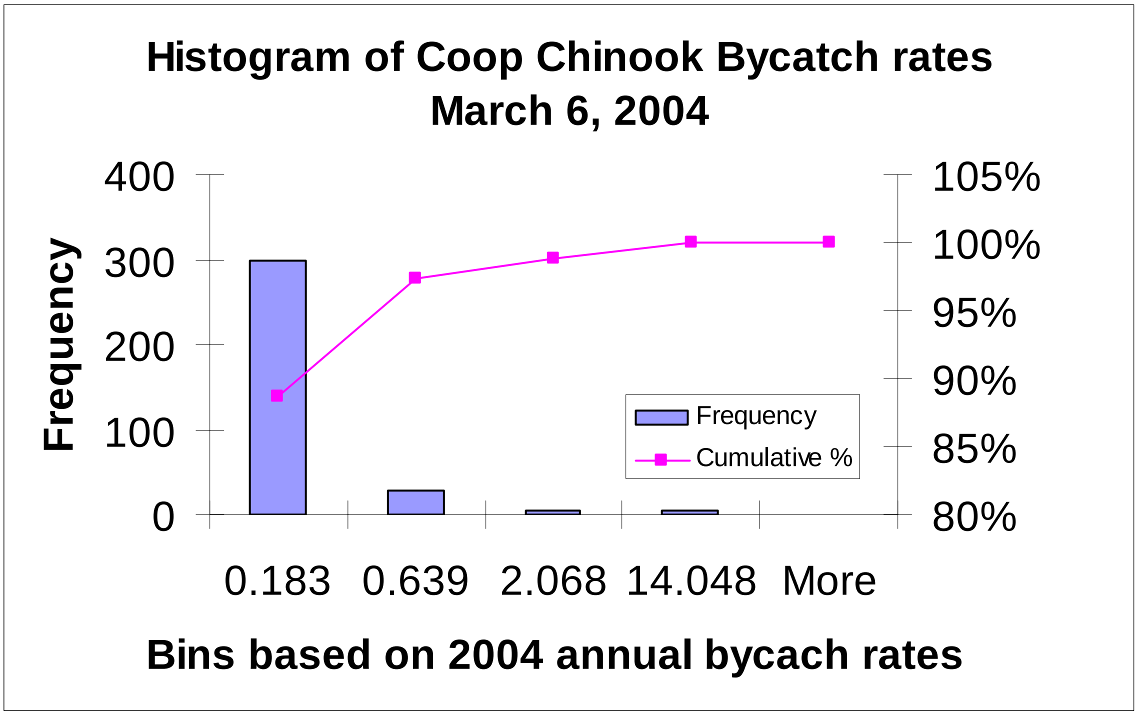


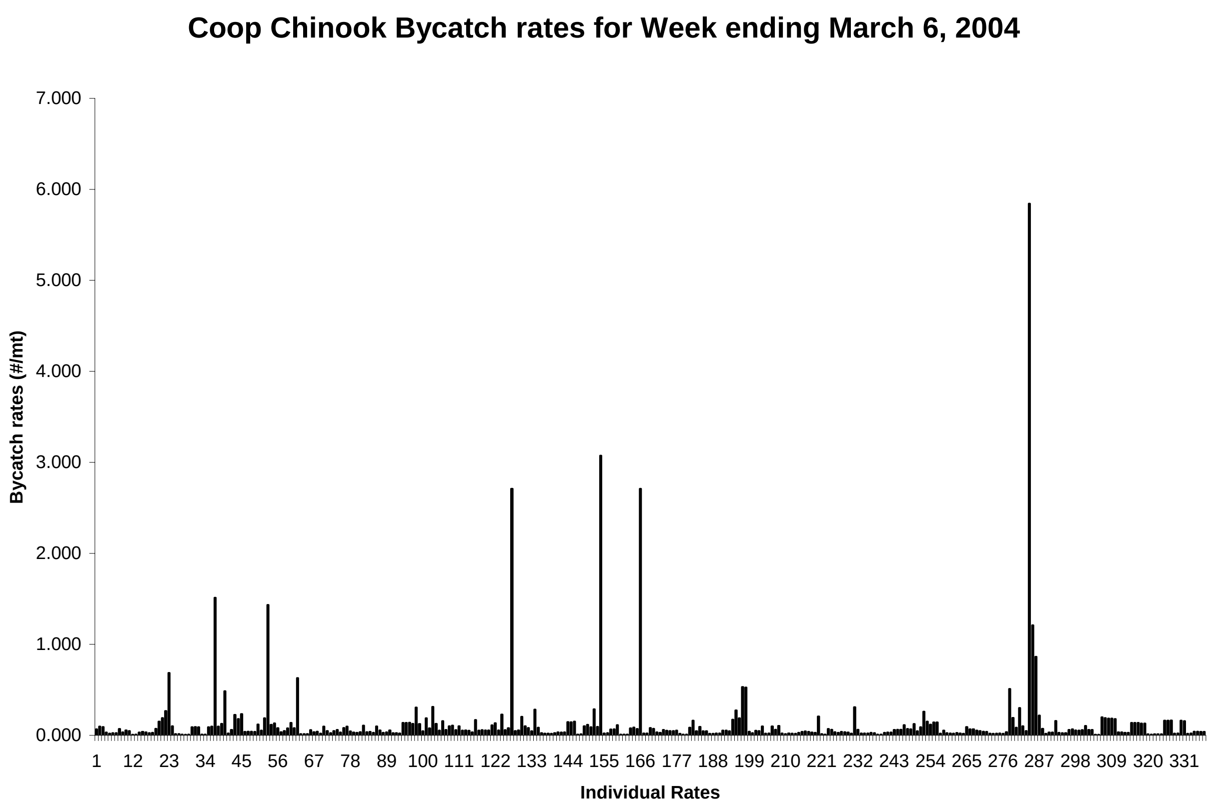
Appendix 4 - 41 Chinook Salmon Bycatch rates in the non CDQ Pollock Fishery "A" Season week ending February 14, 2004. a) Histogram representing the frequency of weekly hauls in each bin allocated to the annual bycatch rate, and b) frequency distribution of number of hauls by bycatch rate



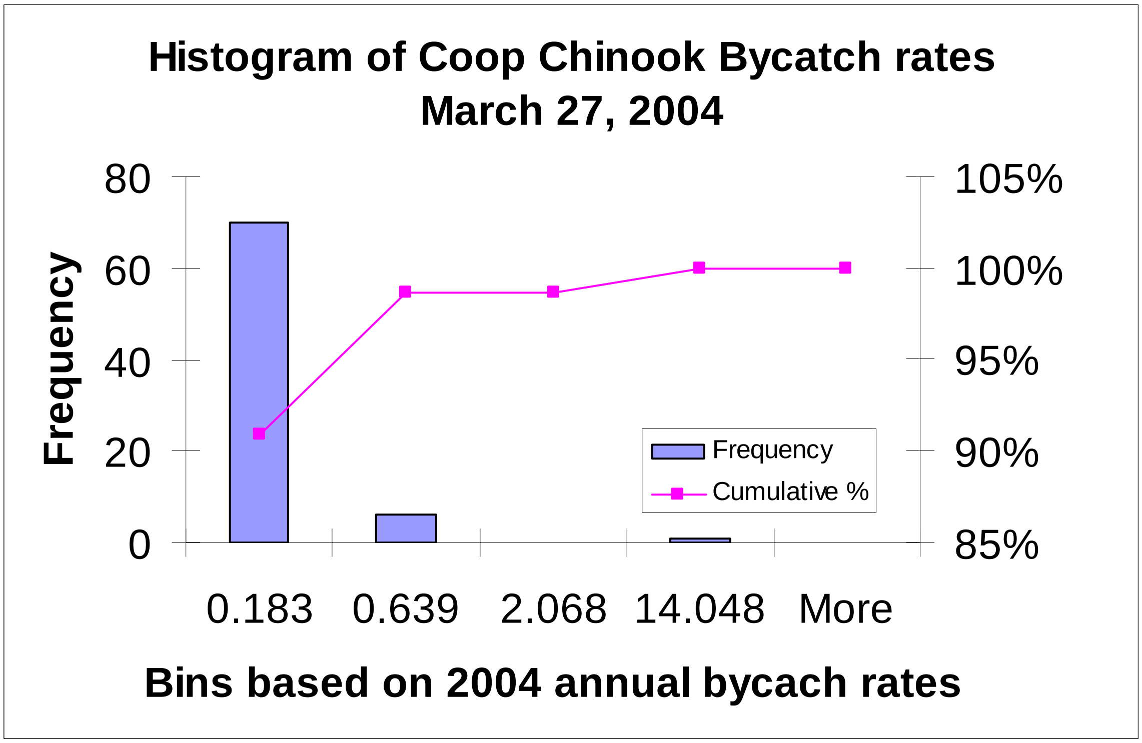


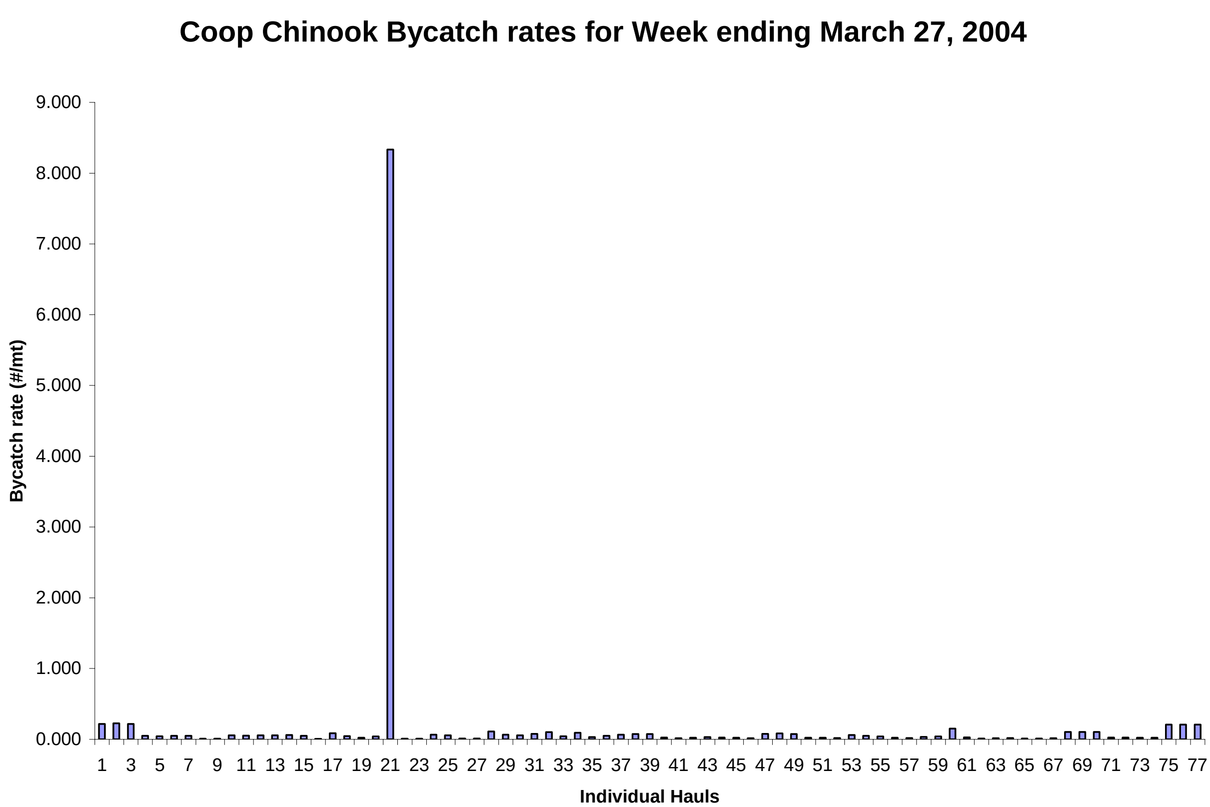
Appendix 4 - 42 Chinook Salmon Bycatch rates in the non CDQ Pollock Fishery "A" Season week ending March 6, 2004. a) Histogram representing the frequency of weekly hauls in each bin allocated to the annual bycatch rate, and b) frequency distribution of number of hauls by bycatch rate



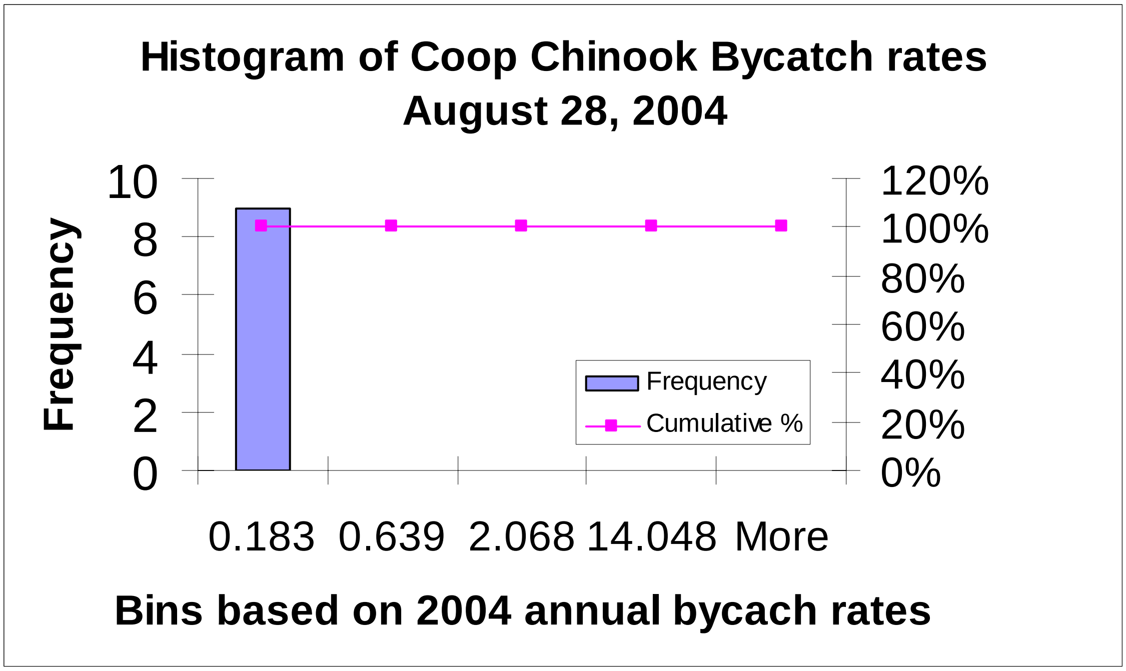


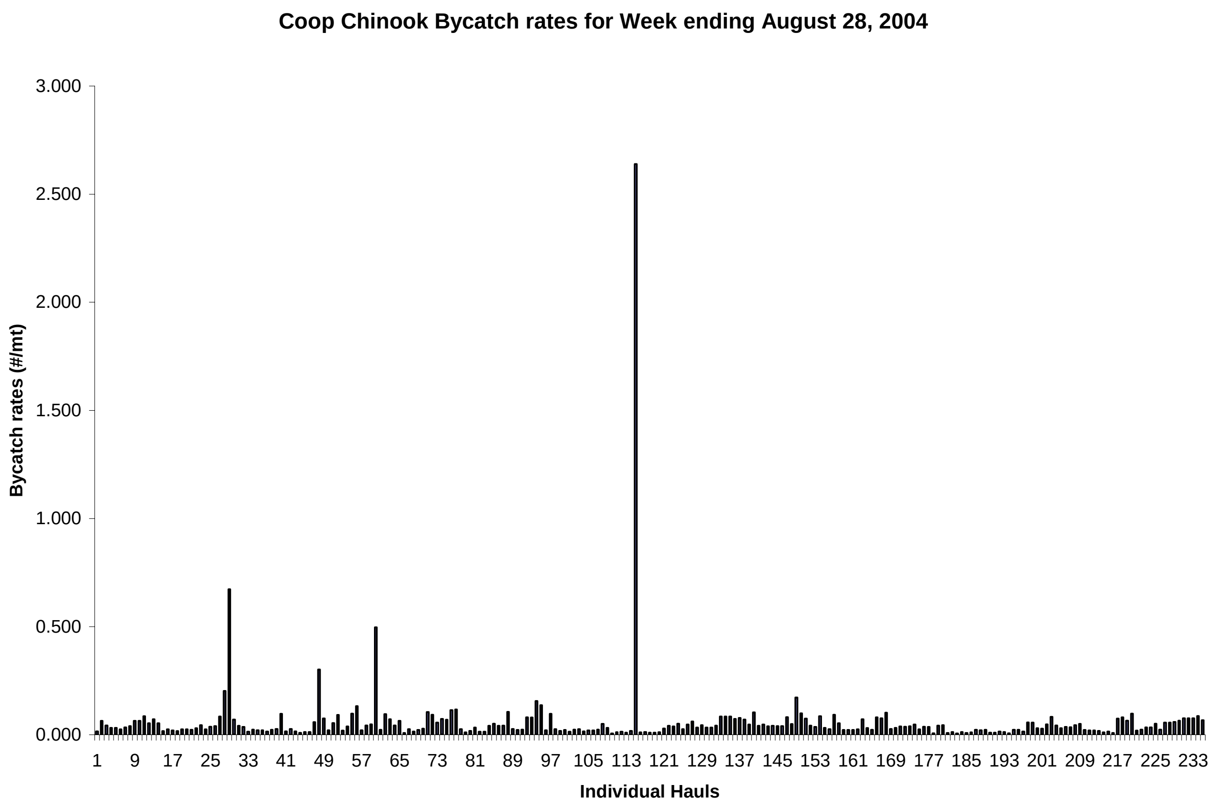
Appendix 4 - 43 Chinook Salmon Bycatch rates in the non CDQ Pollock Fishery "A" Season week ending March 27, 2004. a) Histogram representing the frequency of weekly hauls in each bin allocated to the annual bycatch rate, and b) frequency distribution of number of hauls by bycatch rate



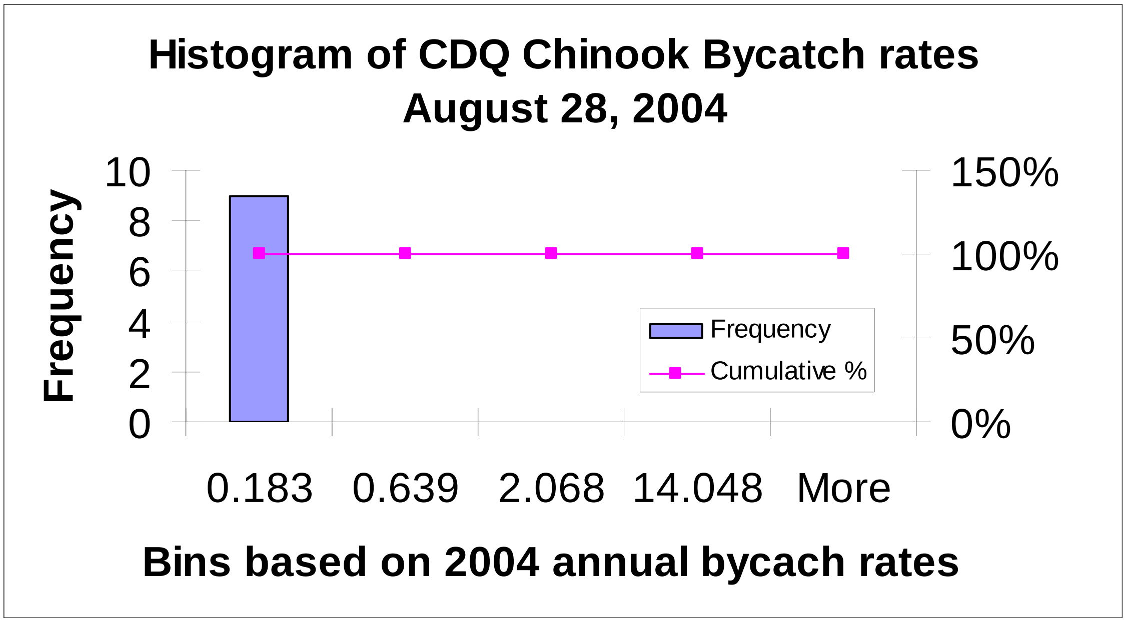


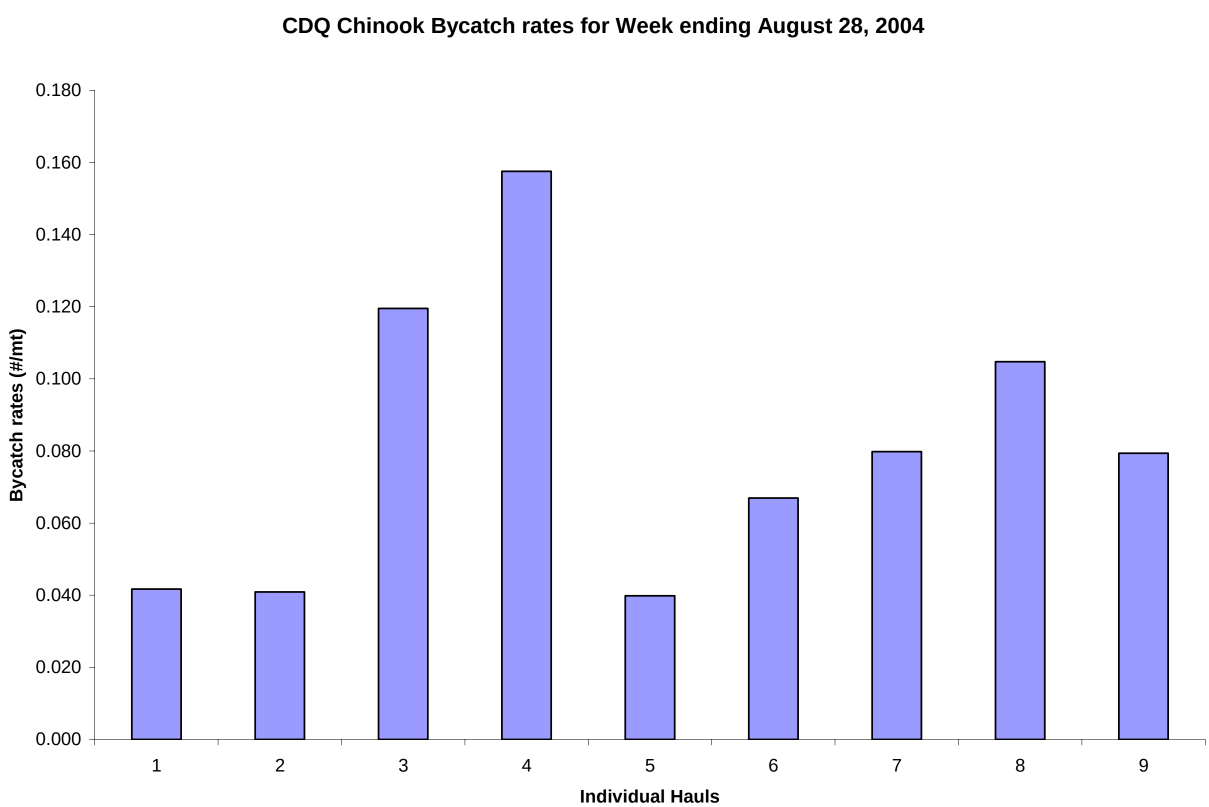
Appendix 4 - 44 Chinook salmon Bycatch rates in the non CDQ Pollock Fishery "B" Season week ending August 28, 2004. a) Histogram representing the frequency of weekly hauls in each bin allocated to the annual bycatch rate and b) frequency distribution of number of hauls by bycatch rate



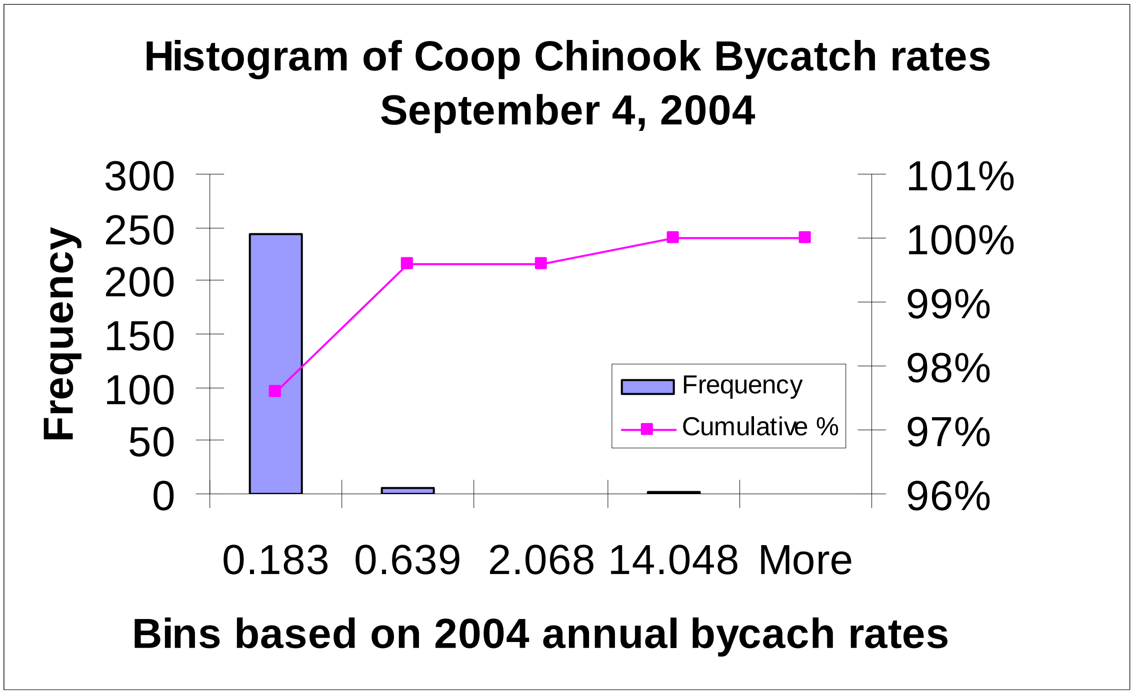


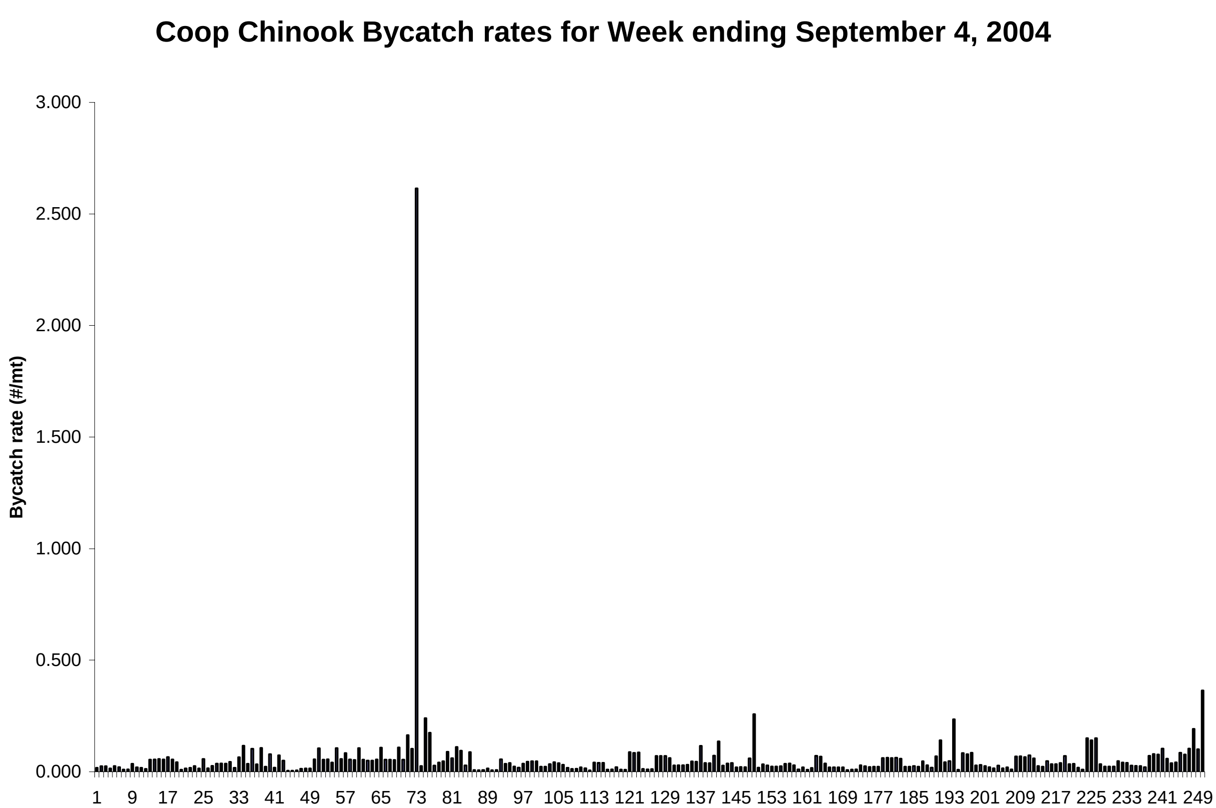
Appendix 4 - 45 Chinook salmon Bycatch rates in the CDQ Pollock Fishery "B" Season week ending August 28, 2004. a) Histogram representing the frequency of weekly hauls in each bin allocated to the annual bycatch rate and b) frequency distribution of number of hauls by bycatch rate



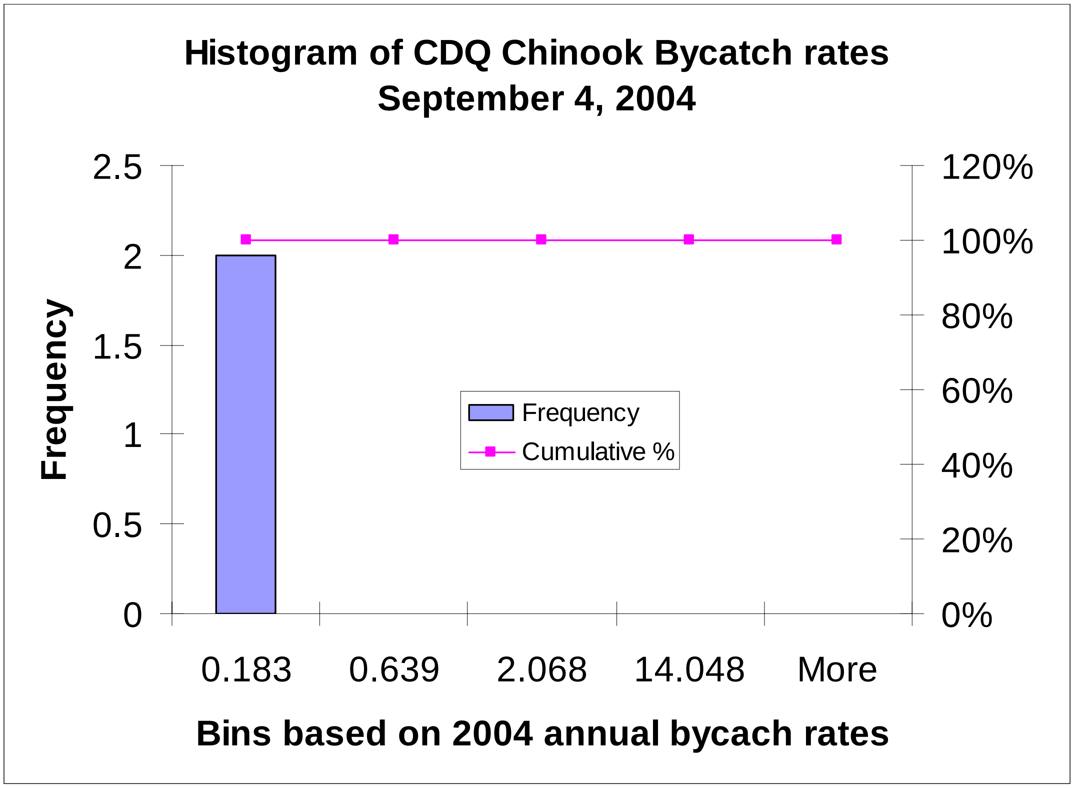


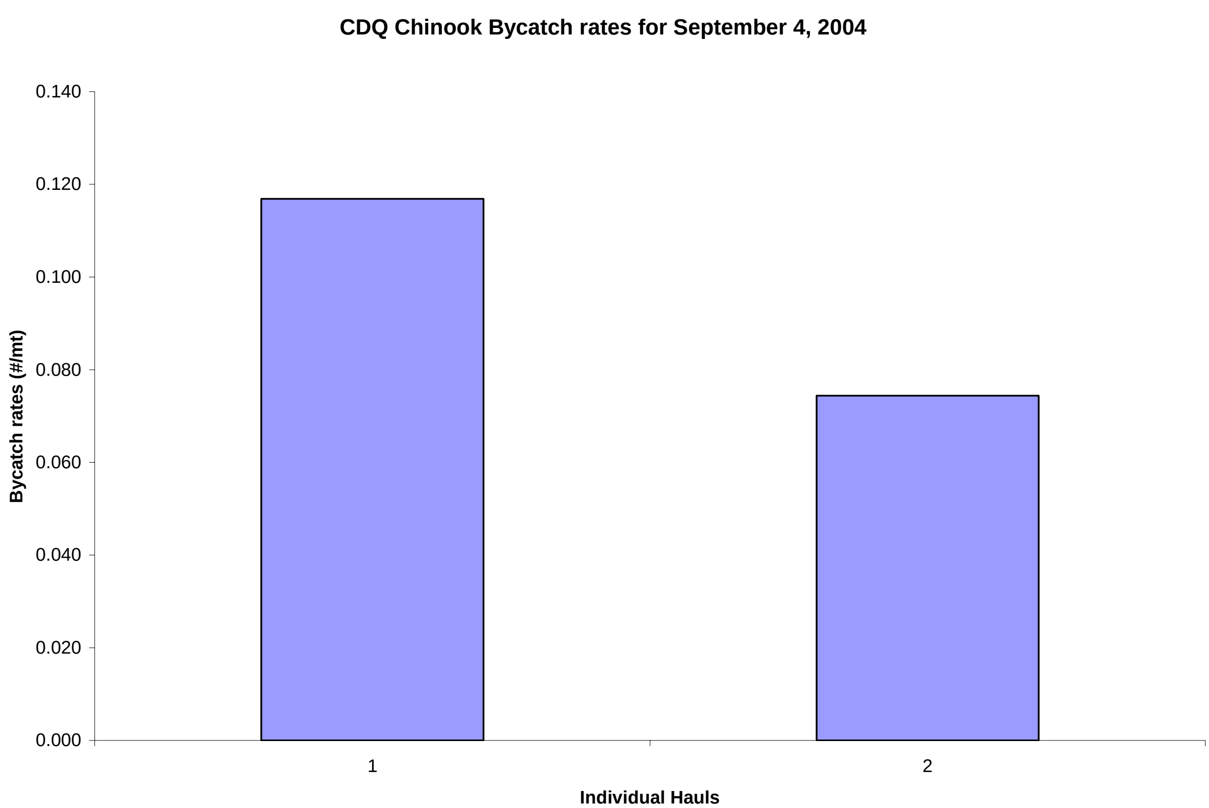
Appendix 4 - 46 Chinook salmon Bycatch rates in the non CDQ Pollock Fishery "B" Season week ending September 4, 2004. a) Histogram representing the frequency of weekly hauls in each bin allocated to the annual bycatch rate and b) frequency distribution of number of hauls by bycatch rate



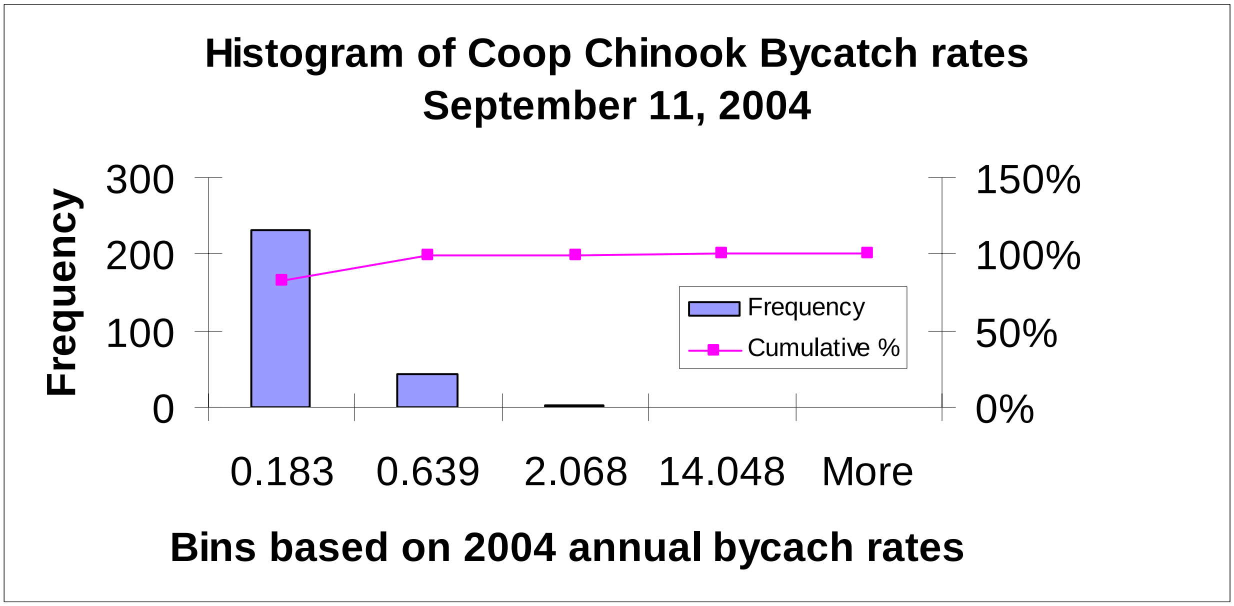


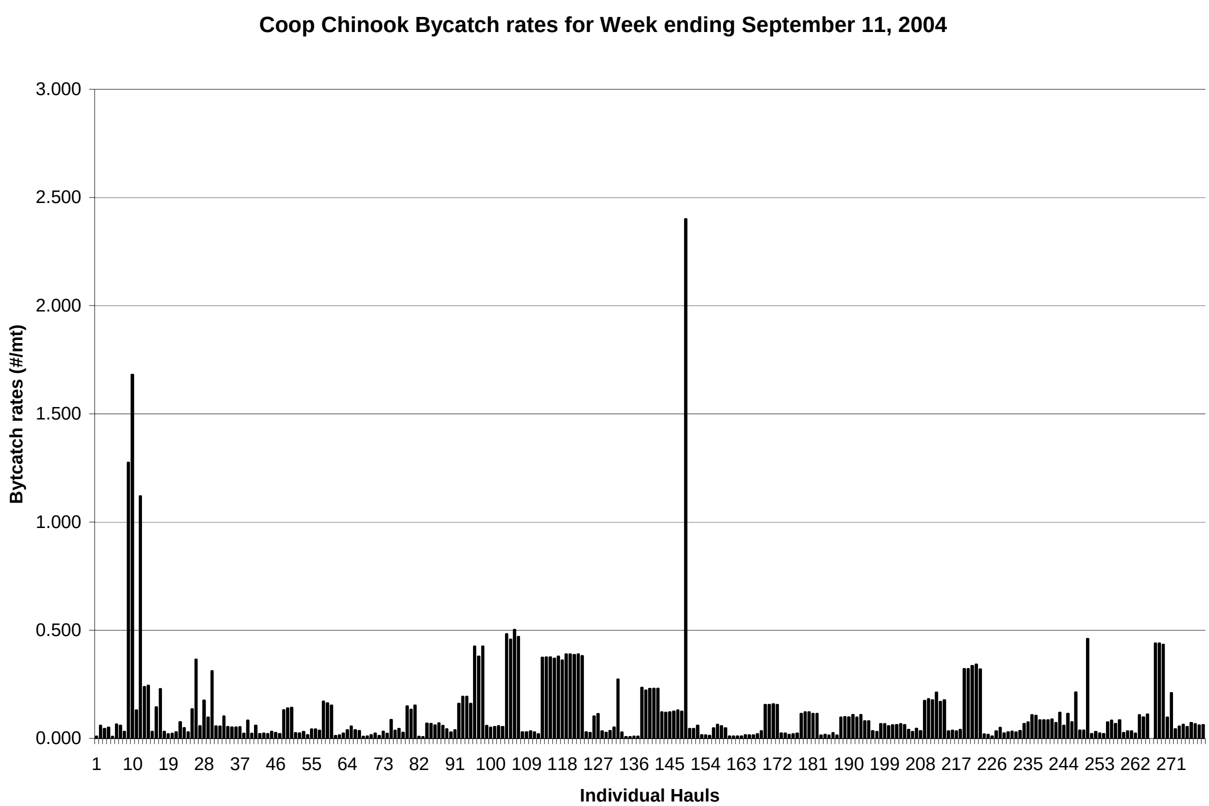
Appendix 4 - 47 Chinook salmon Bycatch rates in the CDQ Pollock Fishery "B" Season week ending September 4, 2004. a) Histogram representing the frequency of weekly hauls in each bin allocated to the annual bycatch rate and b) frequency distribution of number of hauls by bycatch rate



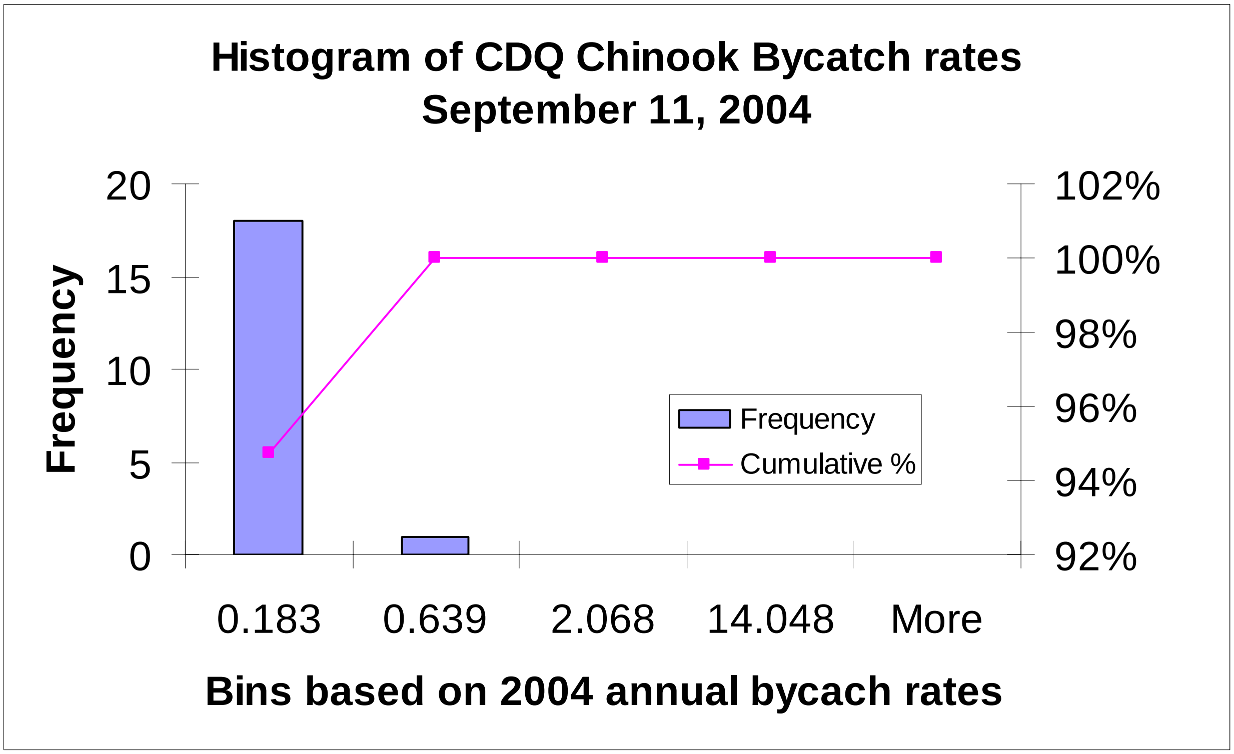


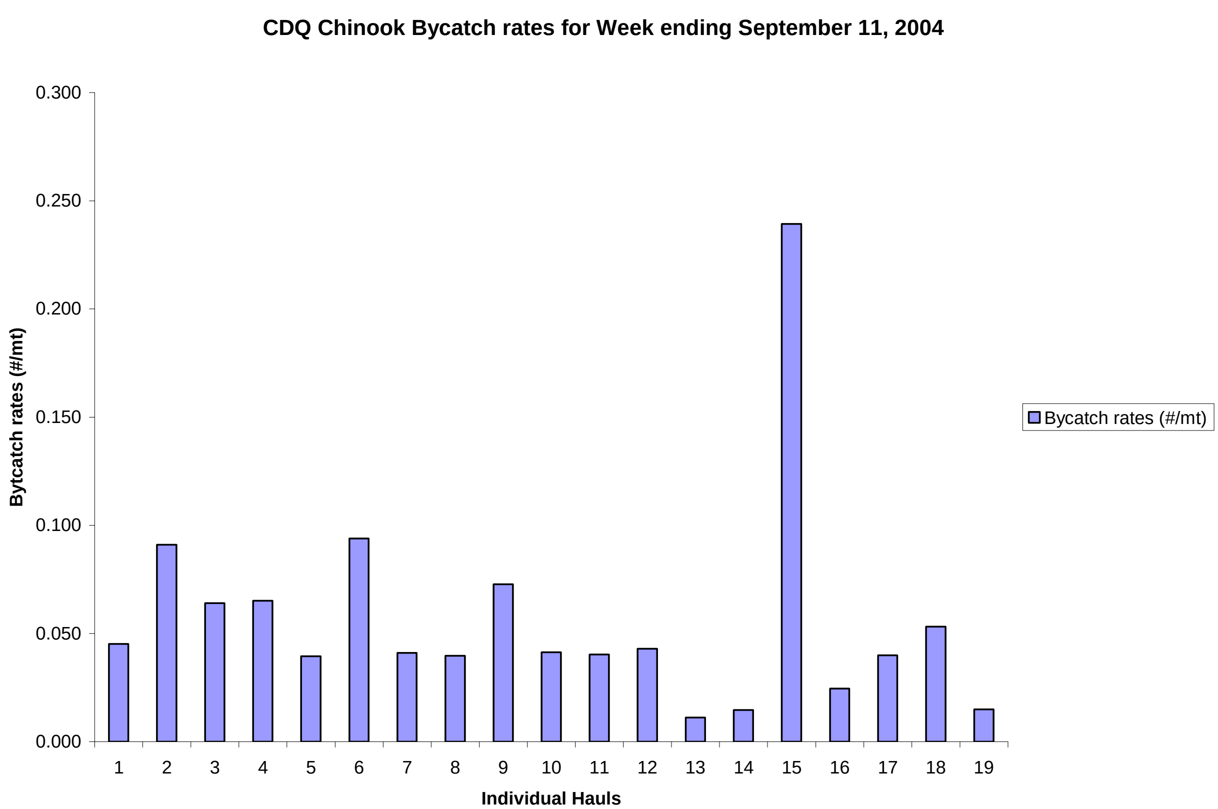
Appendix 4 - 48 Chinook salmon Bycatch rates in the non-CDQ Pollock Fishery “B” Season week ending September11, 2004. a) Histogram representing the frequency of weekly hauls in each bin allocated to the annual bycatch rate and b) frequency distribution of number of hauls by bycatch rate



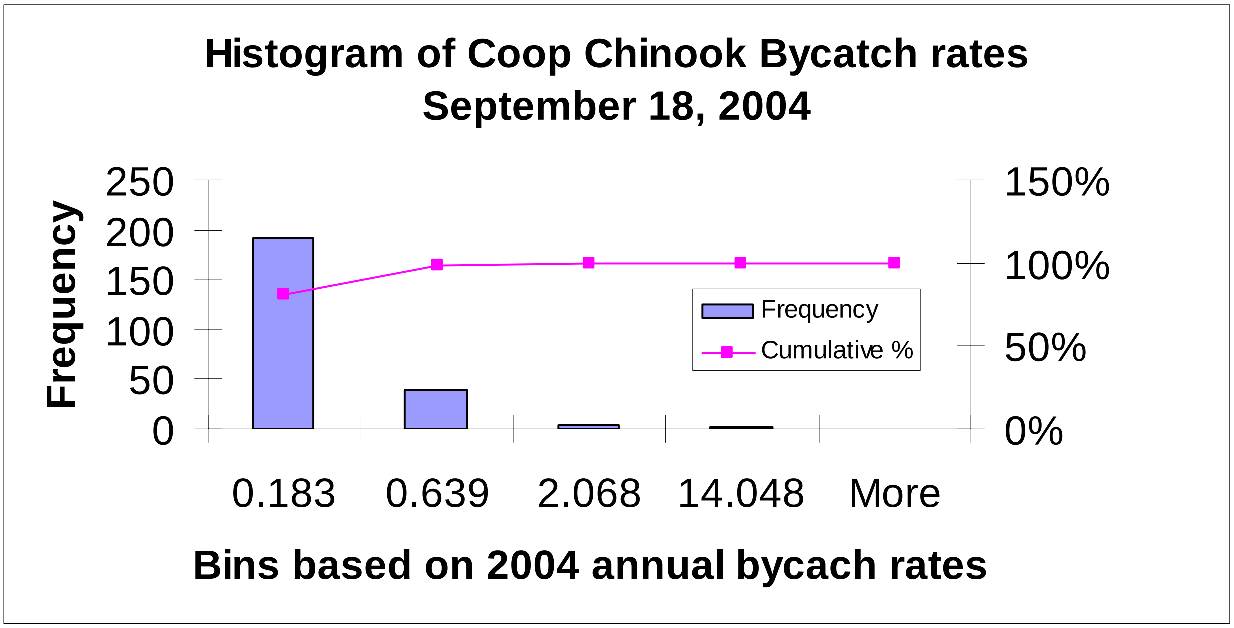


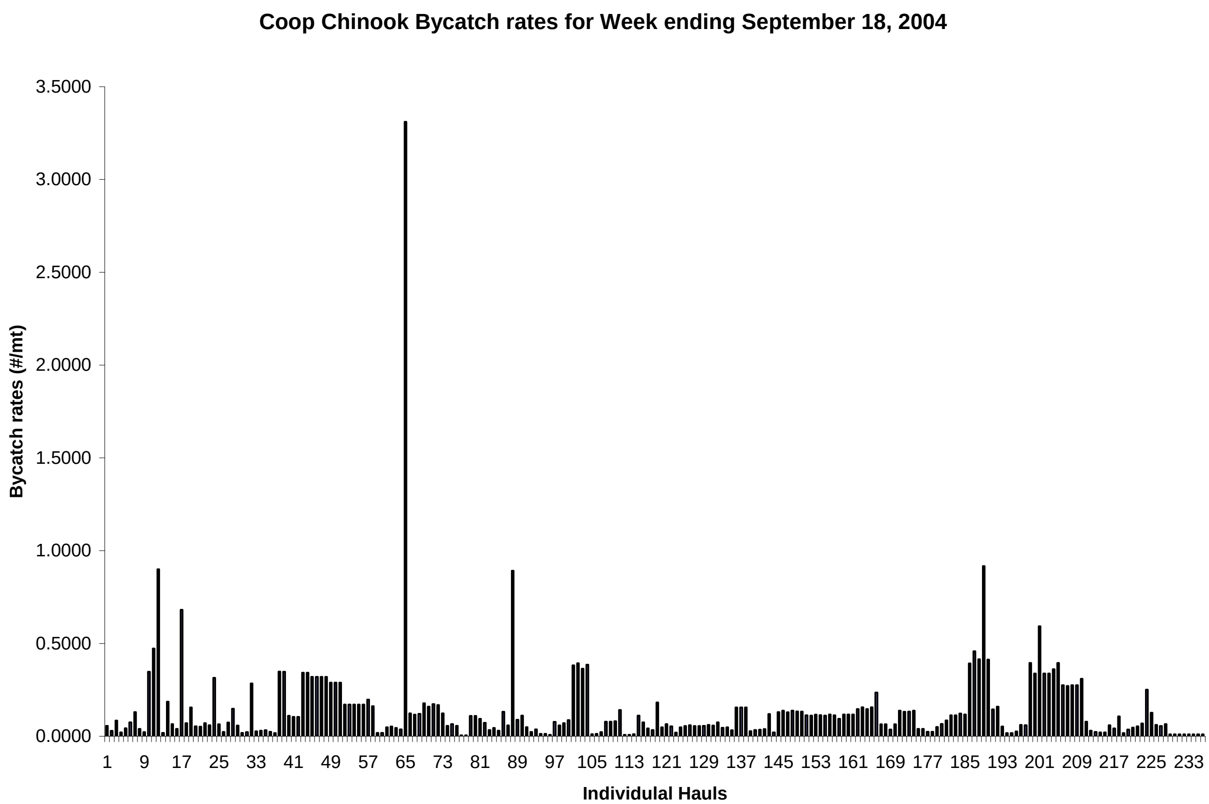
Appendix 4 - 49 Chinook salmon Bycatch rates in the CDQ Pollock Fishery "B" Season week ending September 11, 2004. a) Histogram representing the frequency of weekly hauls in each bin allocated to the annual bycatch rate and b) frequency distribution of number of hauls by bycatch rate



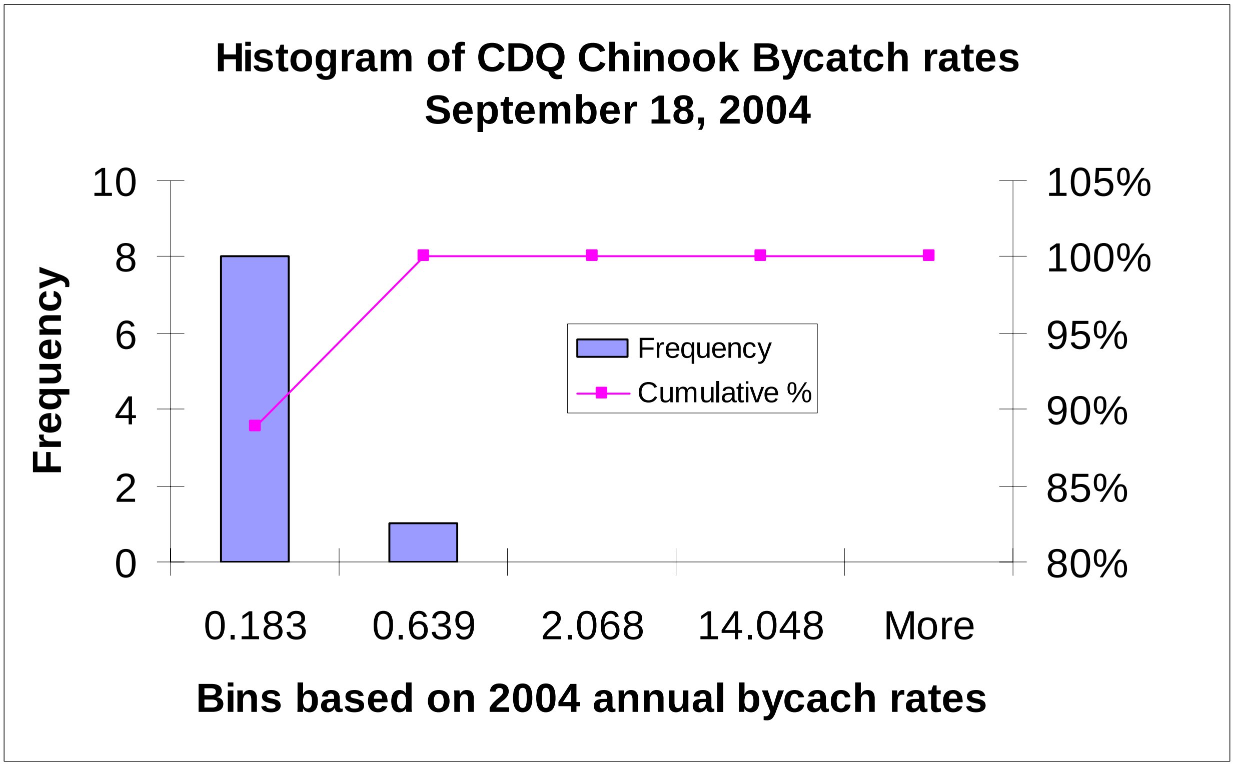


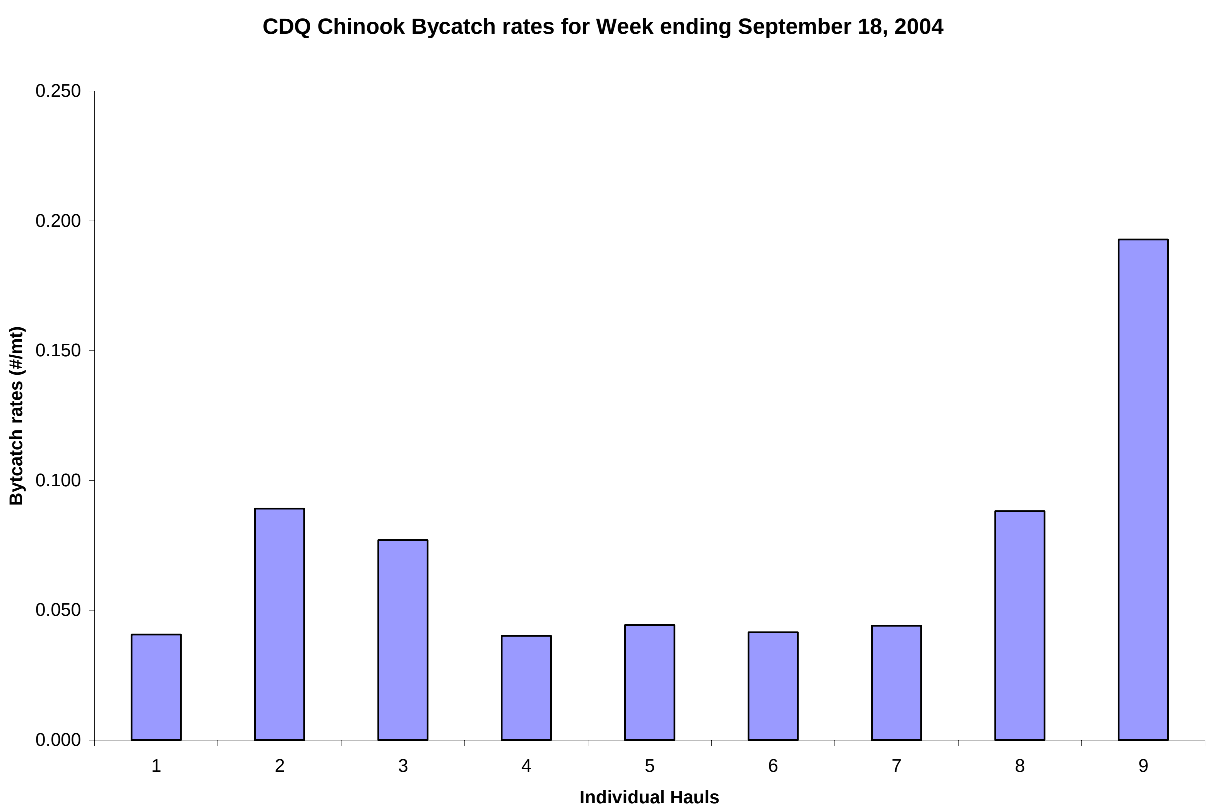
Appendix 4 - 50 Chinook salmon Bycatch rates in the CDQ Pollock Fishery "B" Season week ending September 18, 2004. a) Histogram representing the frequency of weekly hauls in each bin allocated to the annual bycatch rate and b) frequency distribution of number of hauls by bycatch rate



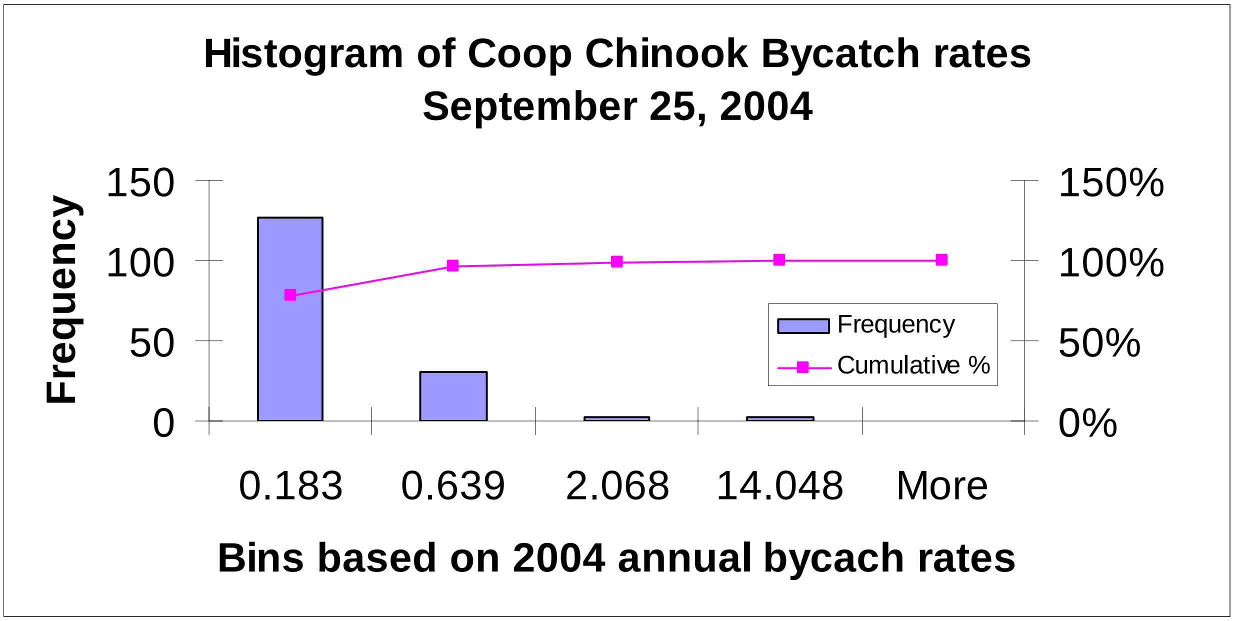


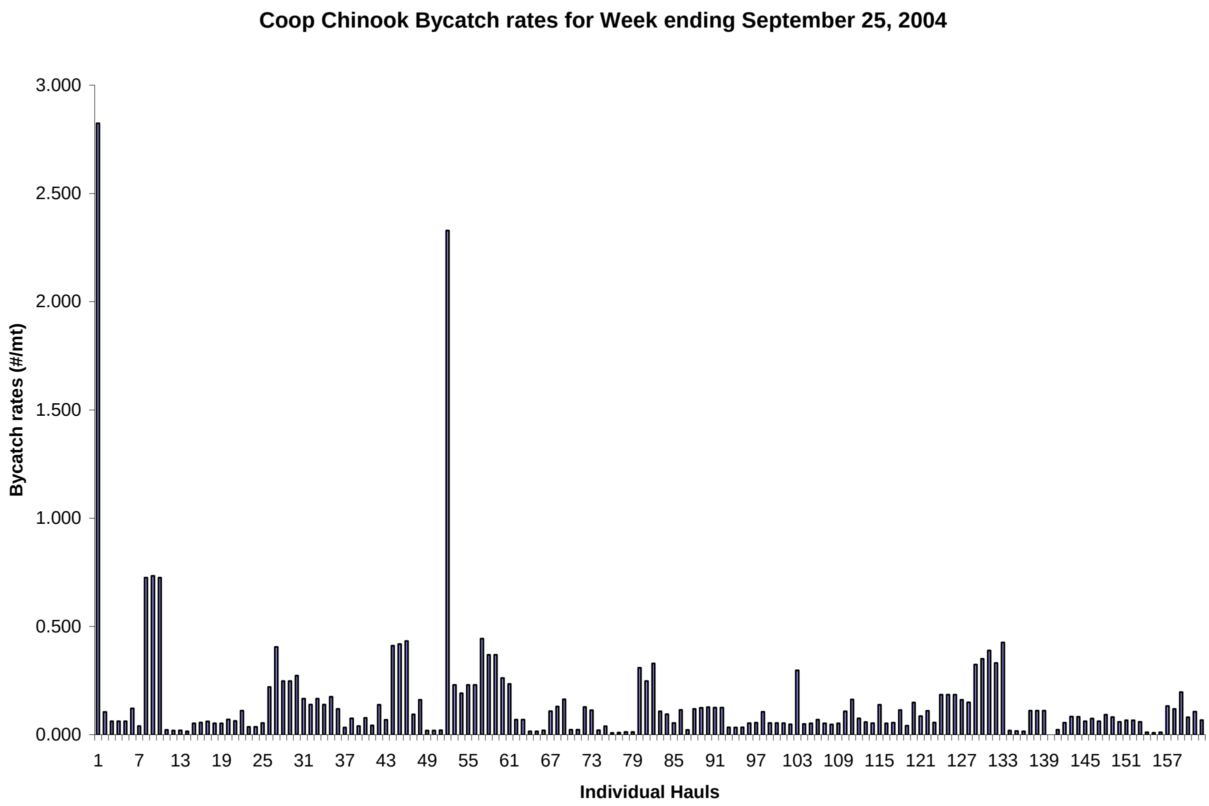
Appendix 4 - 51 Chinook salmon Bycatch rates in the CDQ Pollock Fishery "B" Season week ending September 18, 2004. a) Histogram representing the frequency of weekly hauls in each bin allocated to the annual bycatch rate and b) frequency distribution of number of hauls by bycatch rate



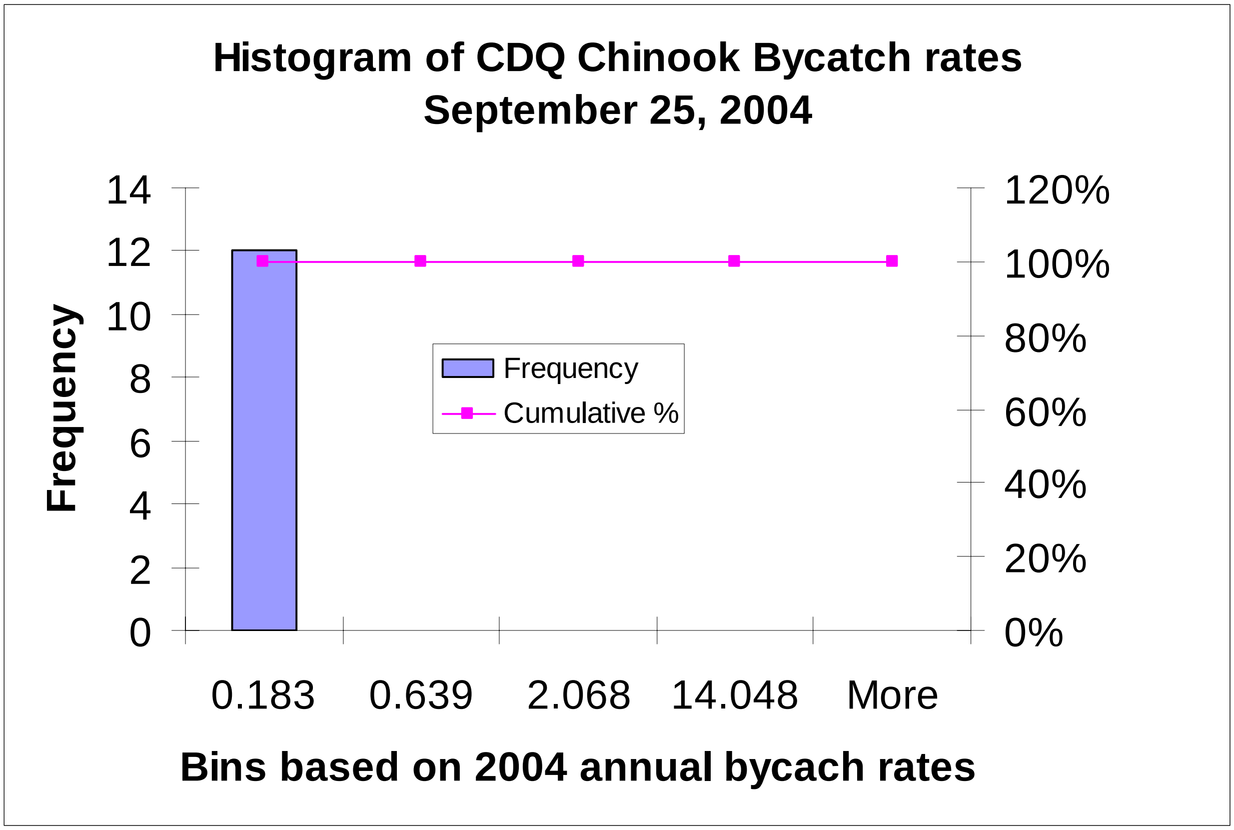


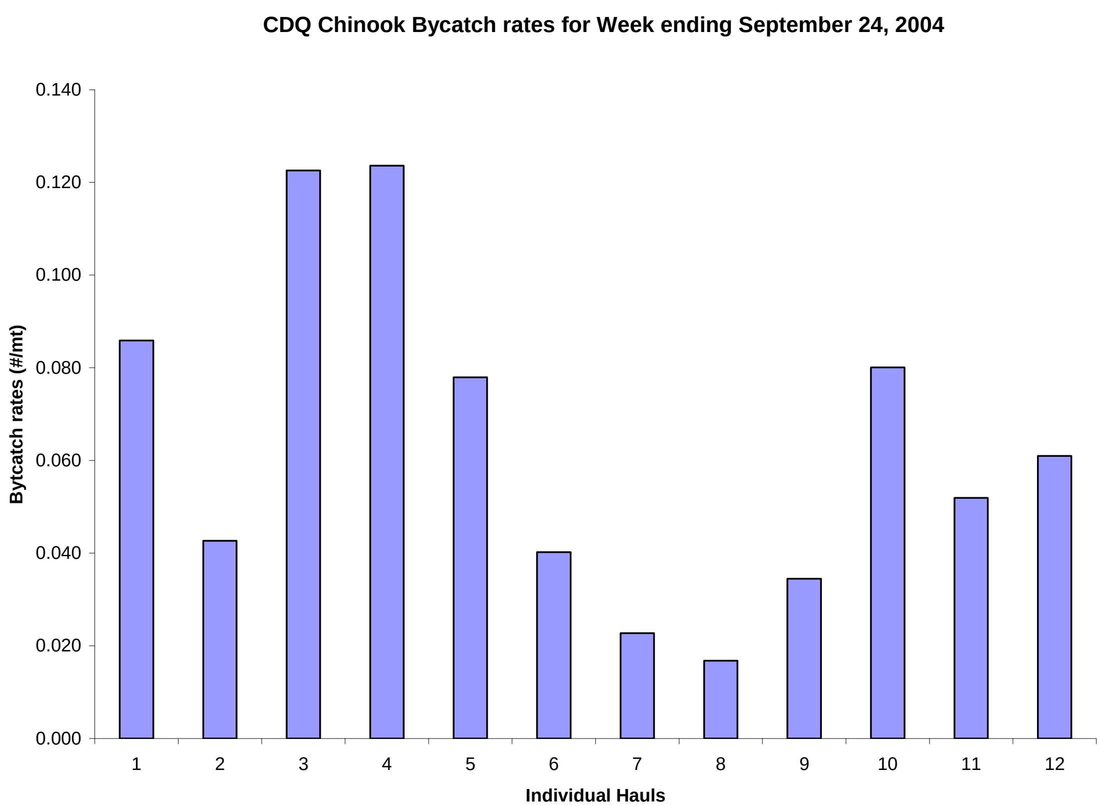
Appendix 4 - 52 Chinook salmon Bycatch rates in the non-CDQ Pollock Fishery "B" Season week ending September 25, 2004. a) Histogram representing the frequency of weekly hauls in each bin allocated to the annual bycatch rate and b) frequency distribution of number of hauls by bycatch rate





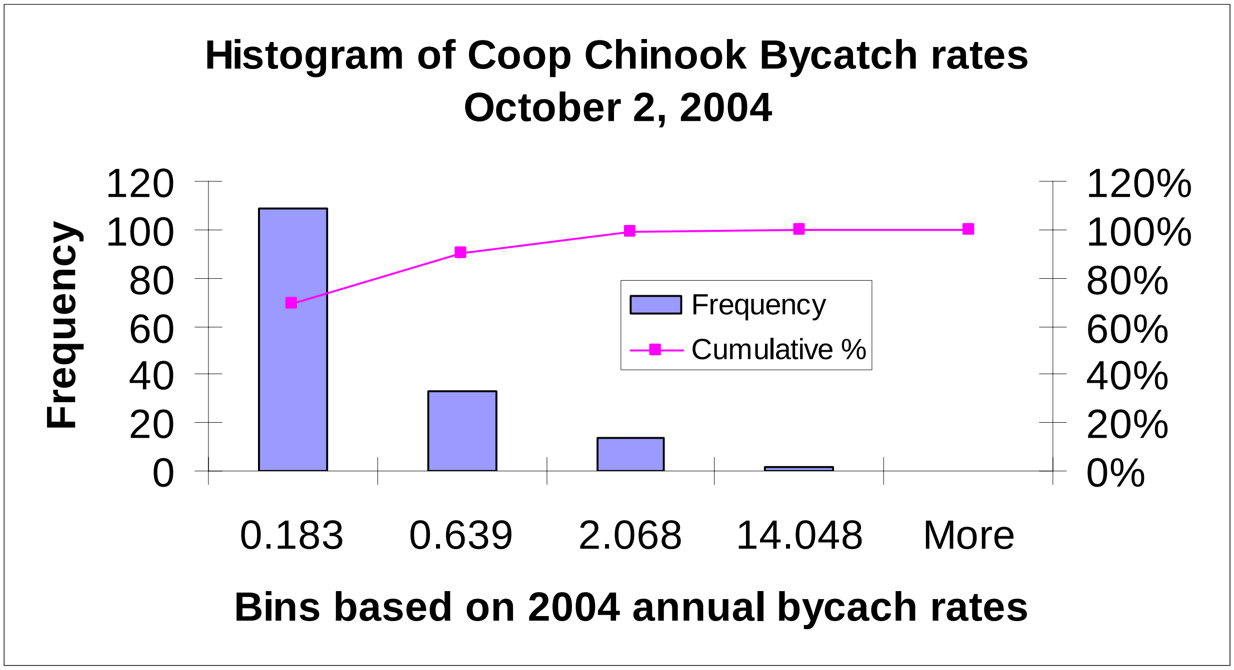
Appendix 4 - 53 Chinook salmon Bycatch rates in the CDQ Pollock Fishery "B" Season week ending September 25, 2004. a) Histogram representing the frequency of weekly hauls in each bin allocated to the annual bycatch rate and b) frequency distribution of number of hauls by bycatch rate

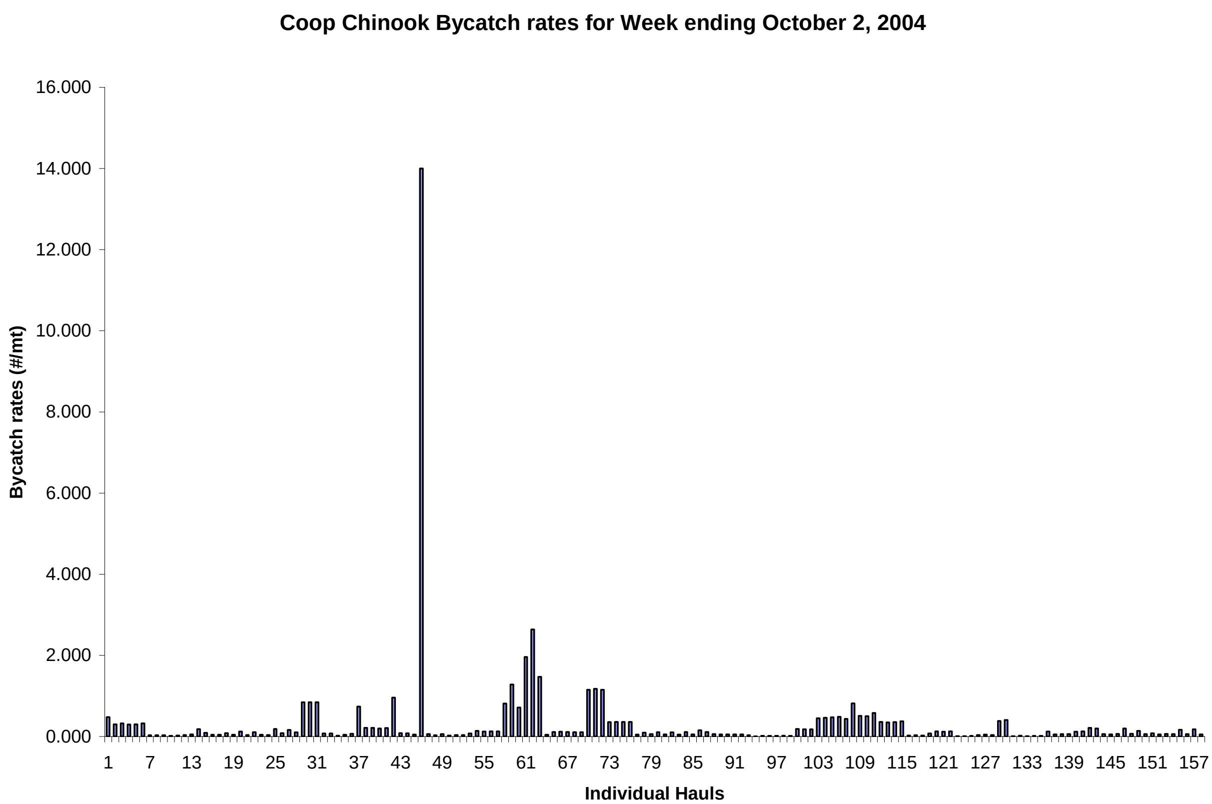




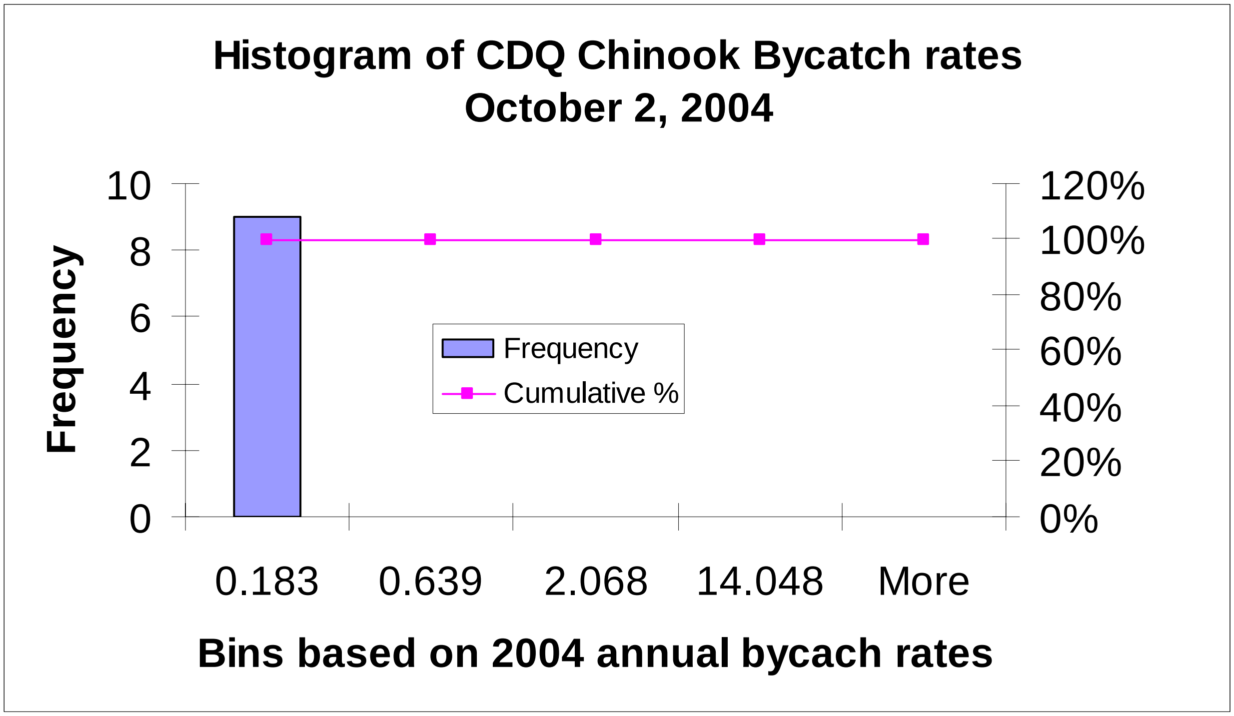
Appendix 4 - 54 Chinook salmon Bycatch rates in the non-CDQ Pollock Fishery "B" Season week ending

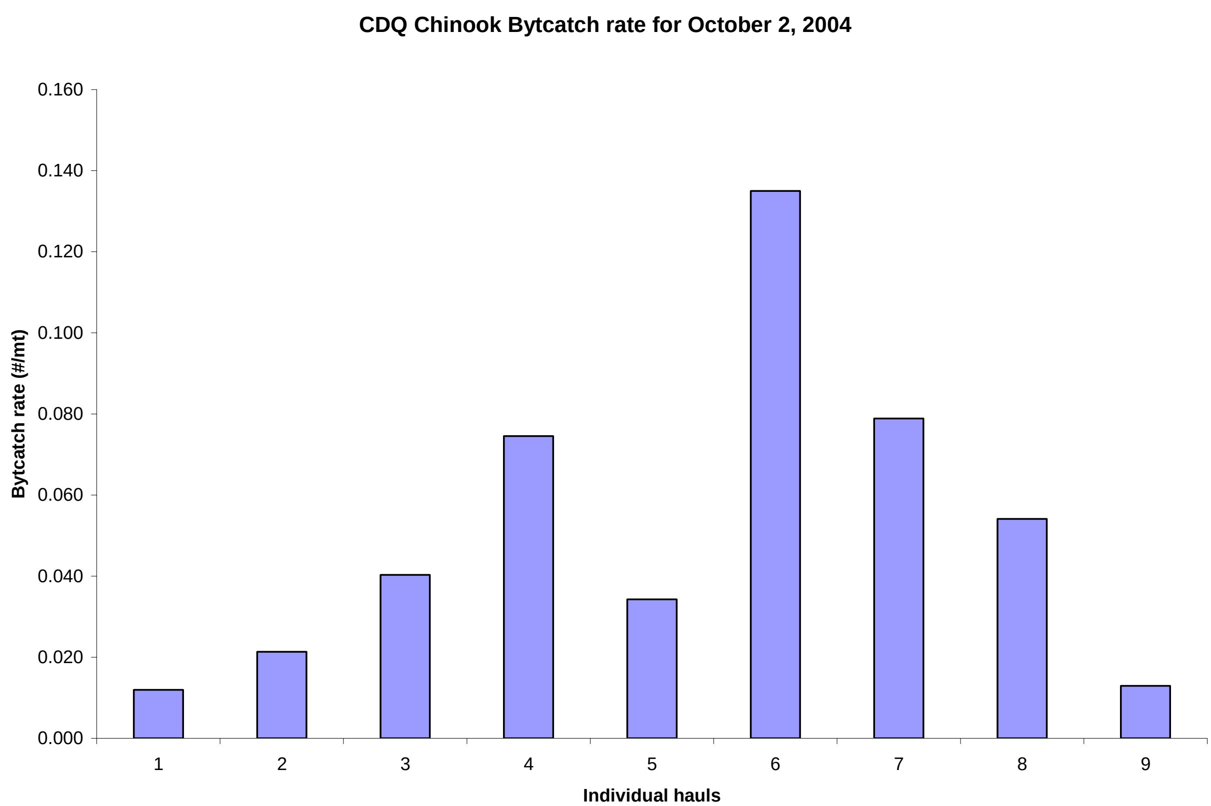
October 2, 2004. a) Histogram representing the frequency of weekly hauls in each bin allocated to the annual bycatch rate and b) frequency distribution of number of hauls by bycatch rate



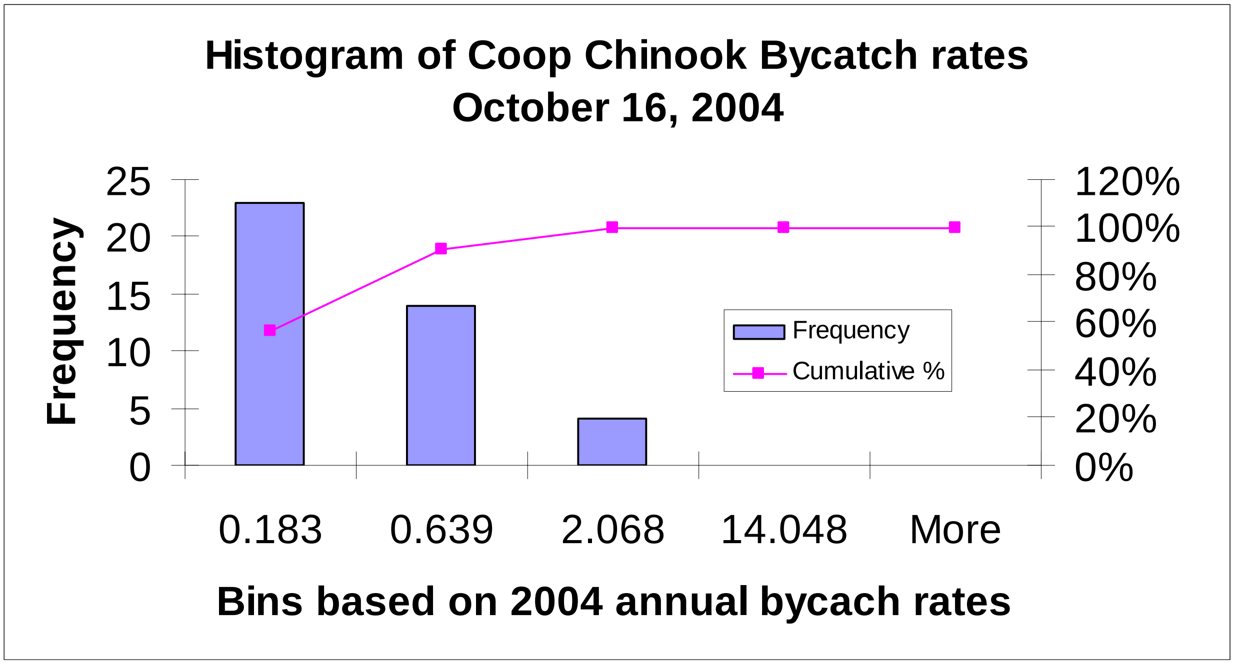


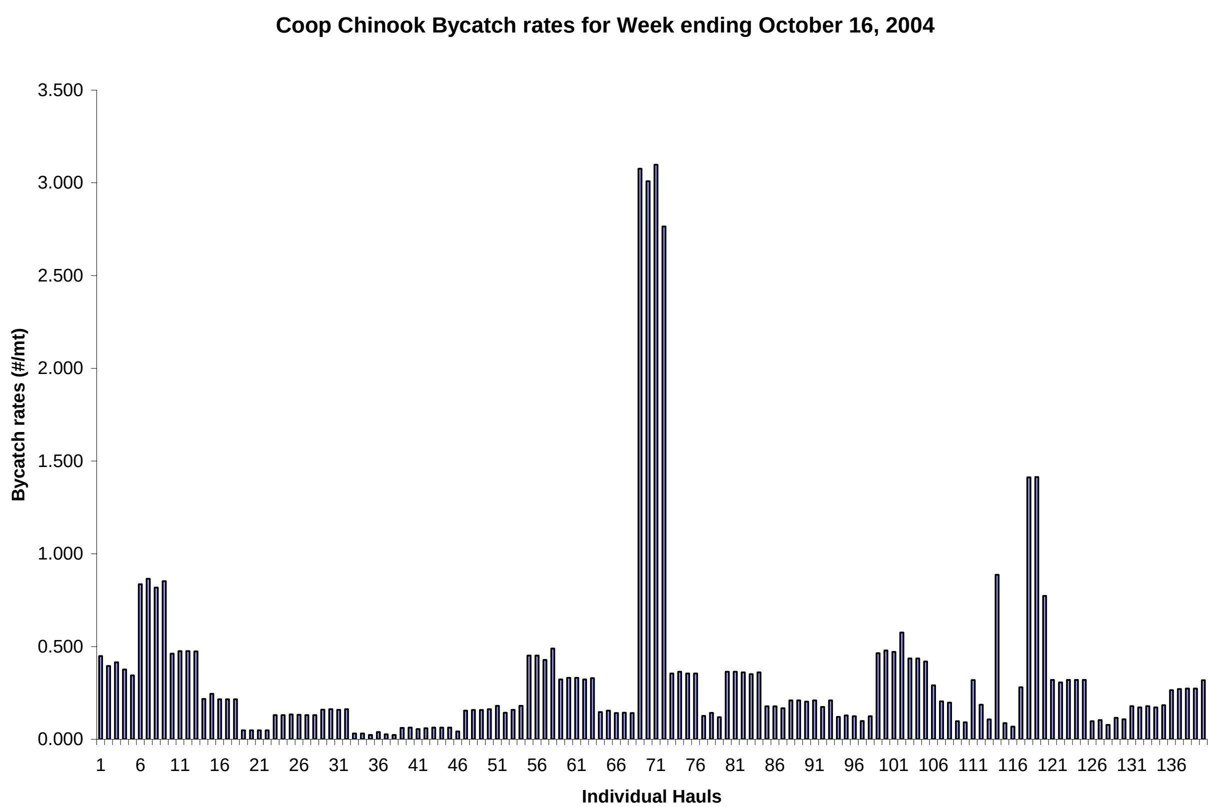
Appendix 4 - 55 Chinook salmon Bycatch rates in the CDQ Pollock Fishery "B" Season week ending October 2, 2004. a) Histogram representing the frequency of weekly hauls in each bin allocated to the annual bycatch rate and b) frequency distribution of number of hauls by bycatch rate



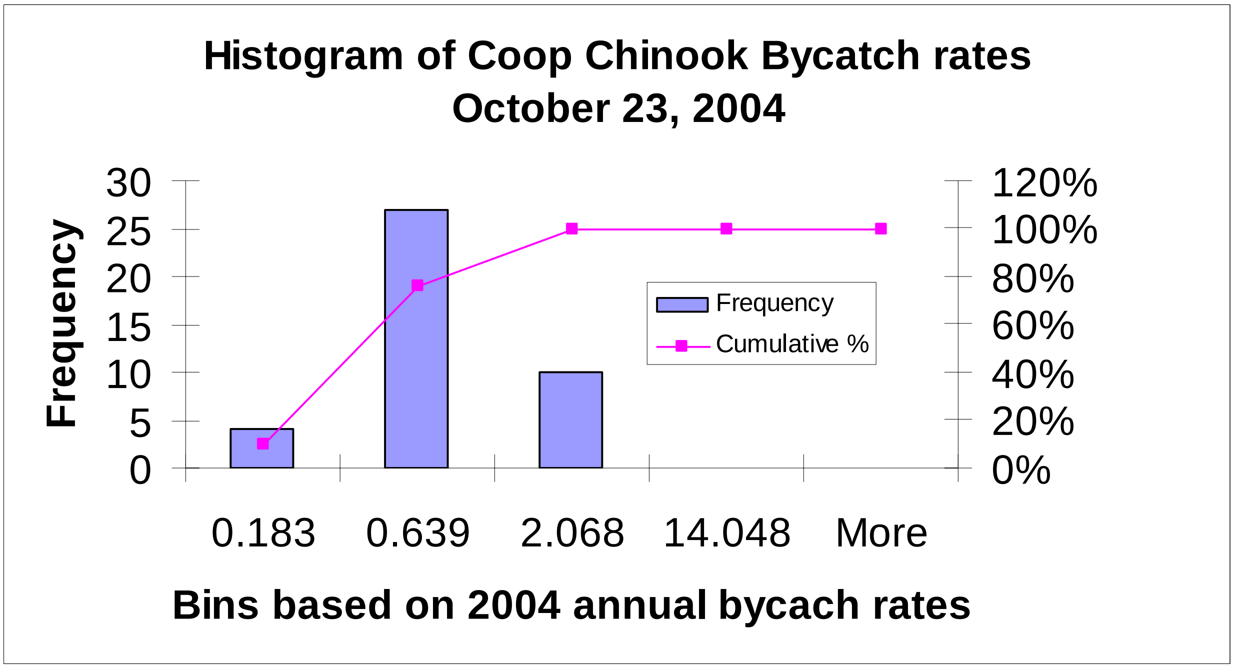


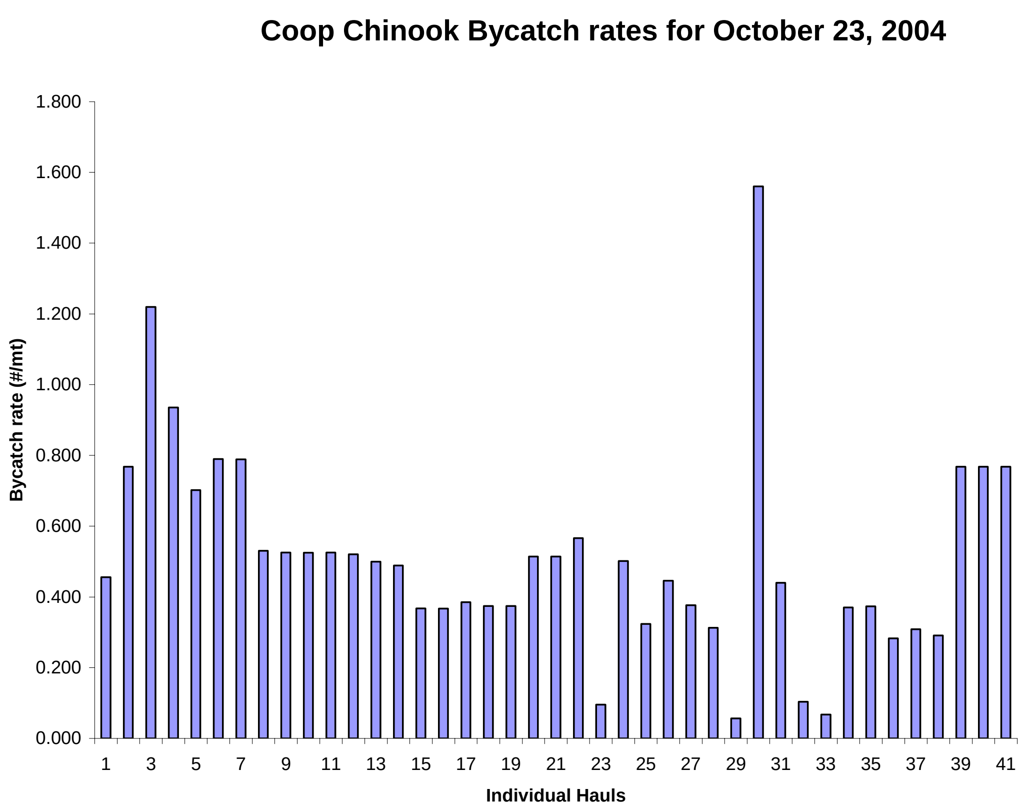
Appendix 4 - 56 Chinook salmon Bycatch rates in the non-CDQ Pollock Fishery "B" Season week ending October 16, 2004. a) Histogram representing the frequency of weekly hauls in each bin allocated to the annual bycatch rate and b) frequency distribution of number of hauls by bycatch rate



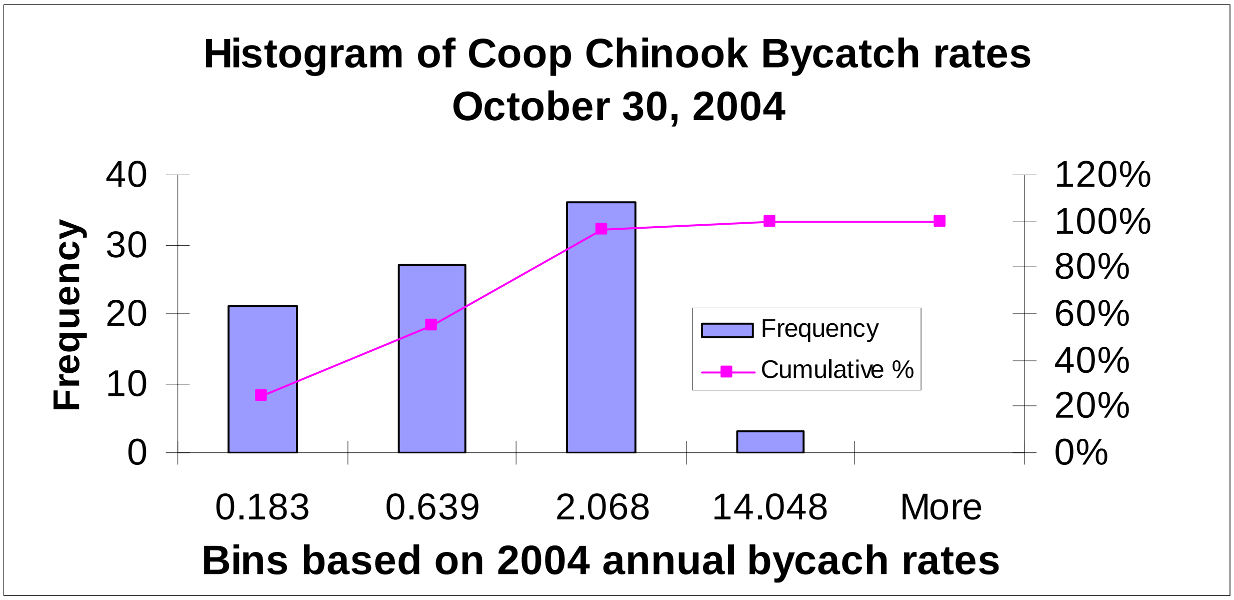


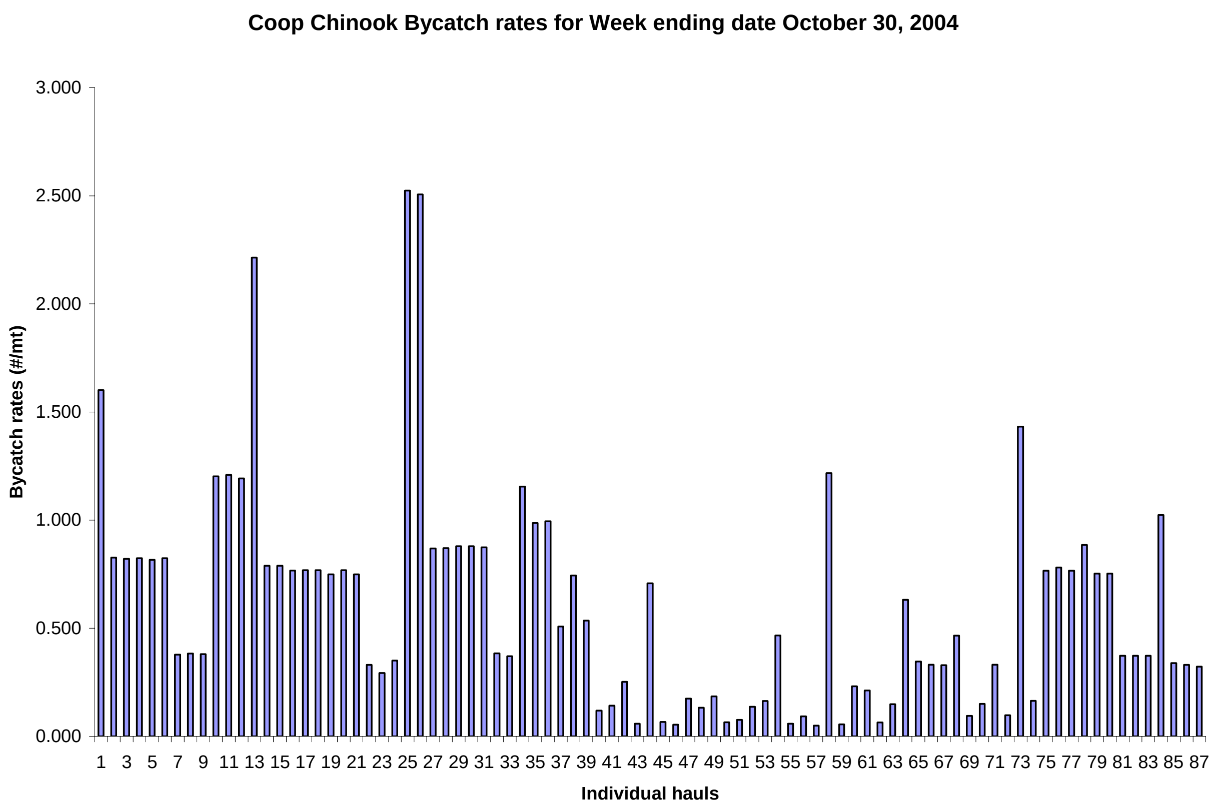
Appendix 4 - 57 Chinook salmon Bycatch rates in the non-CDQ Pollock Fishery "B" Season week ending October 23, 2004. a) Histogram representing the frequency of weekly hauls in each bin allocated to the annual bycatch rate and b) frequency distribution of number of hauls by bycatch rate



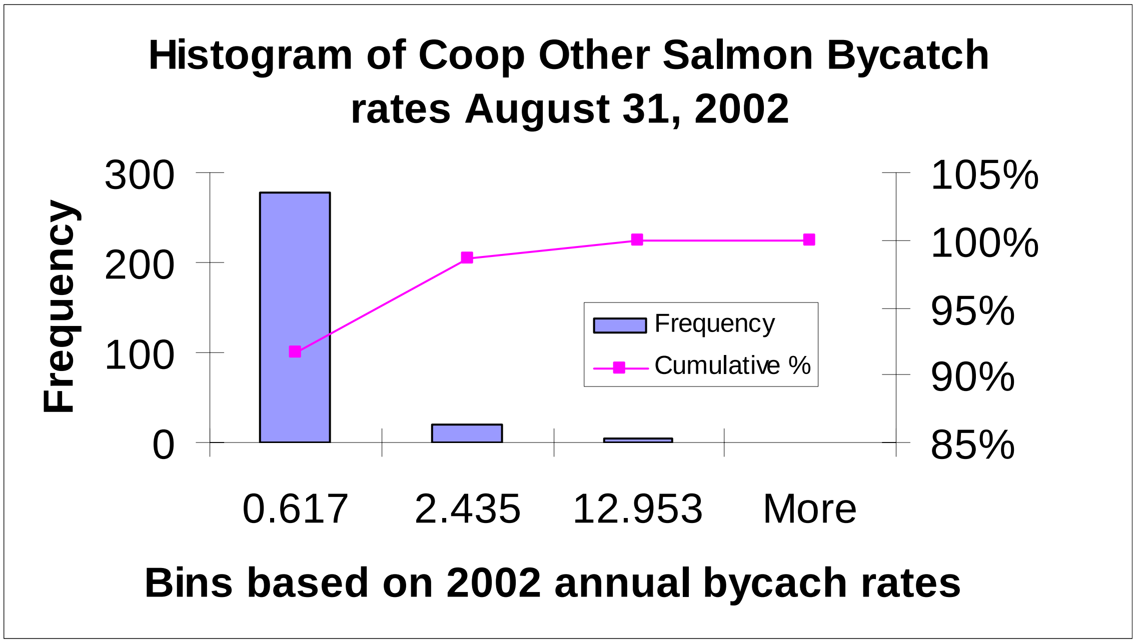


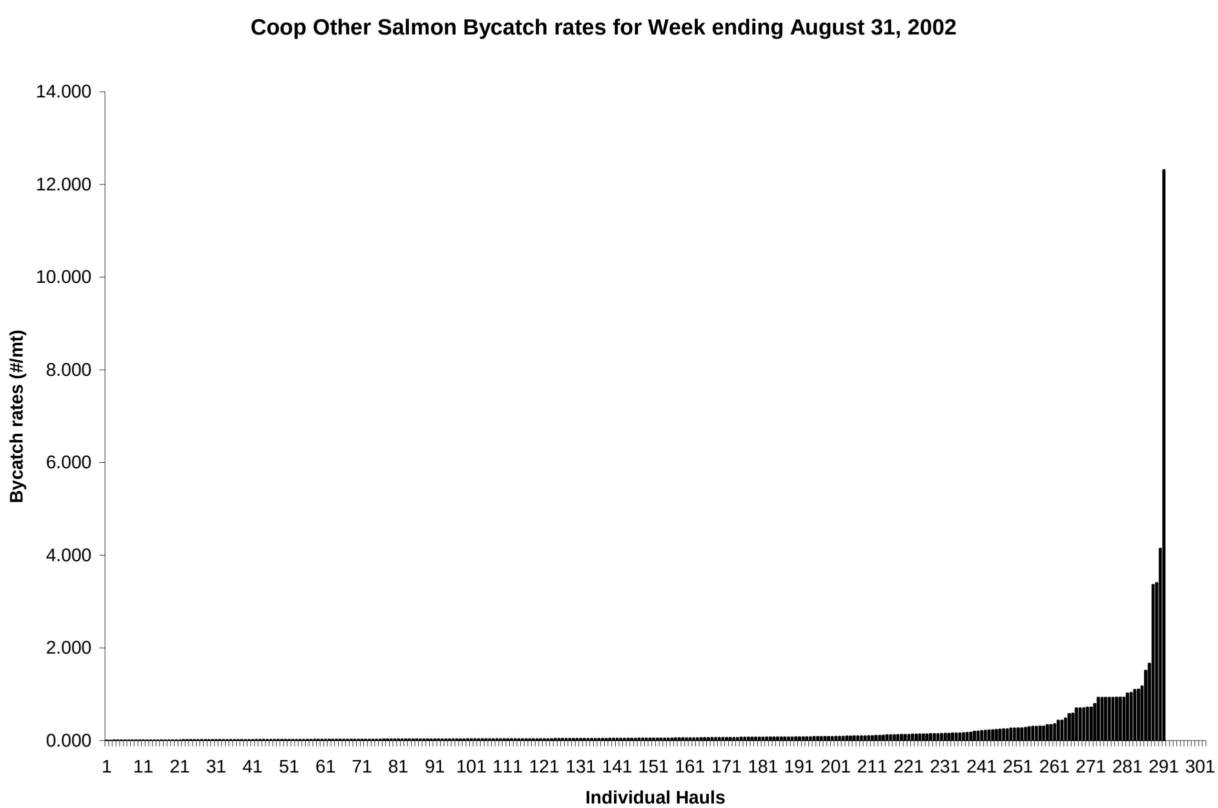
Appendix 4 - 58 Chinook salmon Bycatch rates in the non-CDQ Pollock Fishery "B" Season week ending October 30, 2004. a) Histogram representing the frequency of weekly hauls in each bin allocated to the annual bycatch rate and b) frequency distribution of number of hauls by bycatch rate



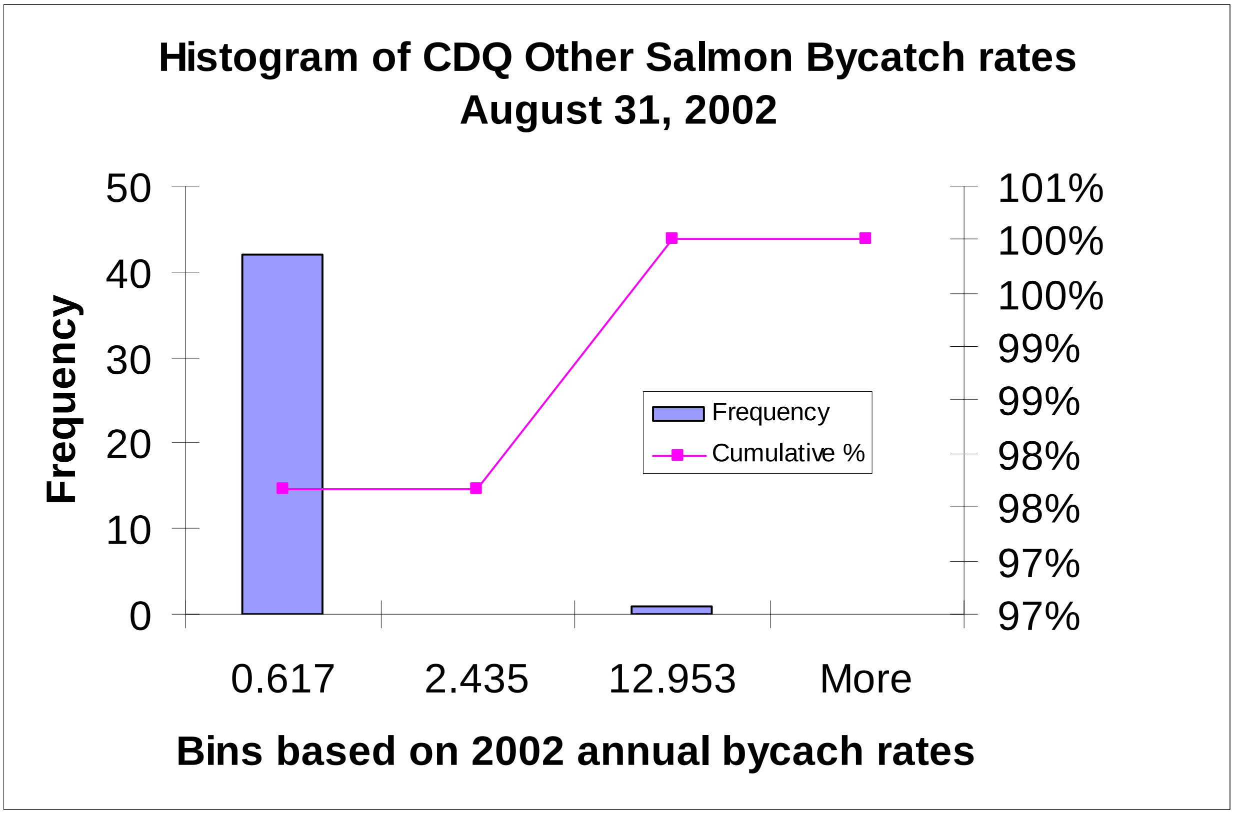


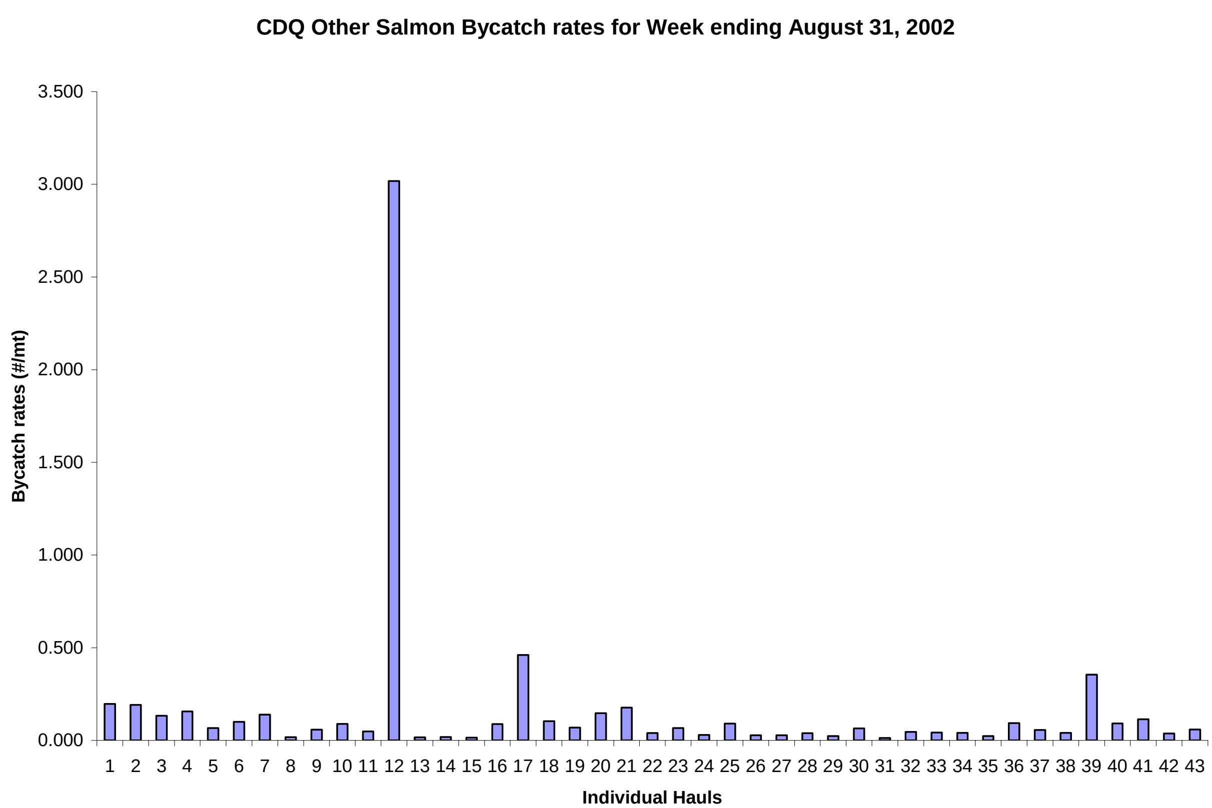
Appendix 4 - 59 Other salmon Bycatch rates in the non-CDQ Pollock Fishery "B" Season week ending August 31, 2002. a) Histogram representing the frequency of weekly hauls in each bin allocated to the annual bycatch rate and b) frequency distribution of number of hauls by bycatch rate



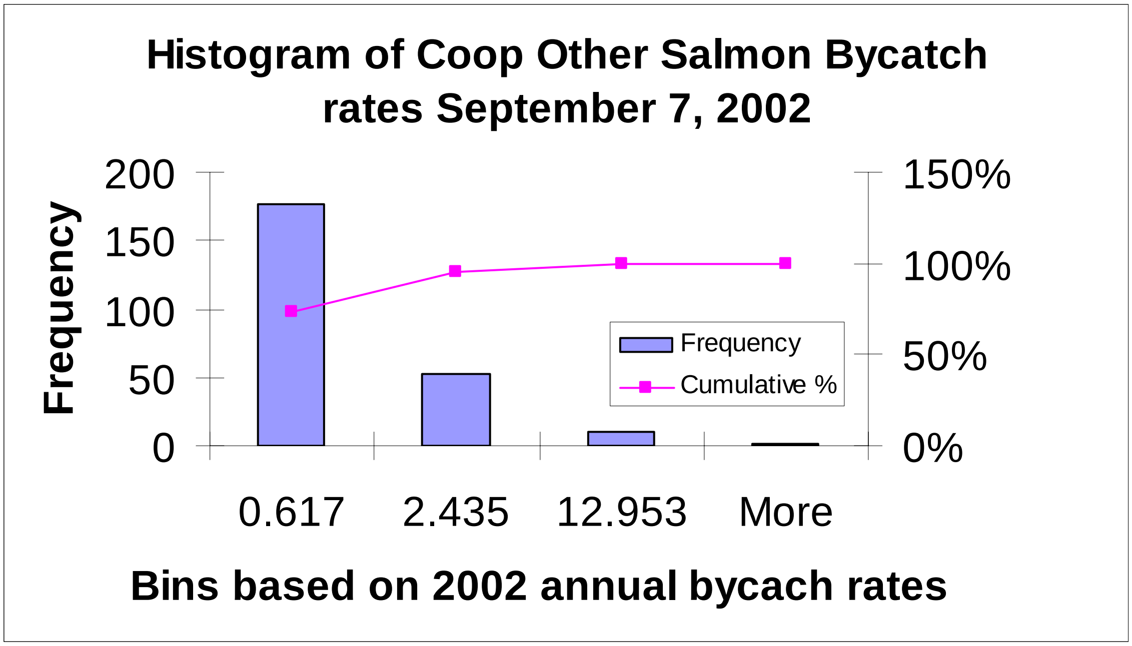


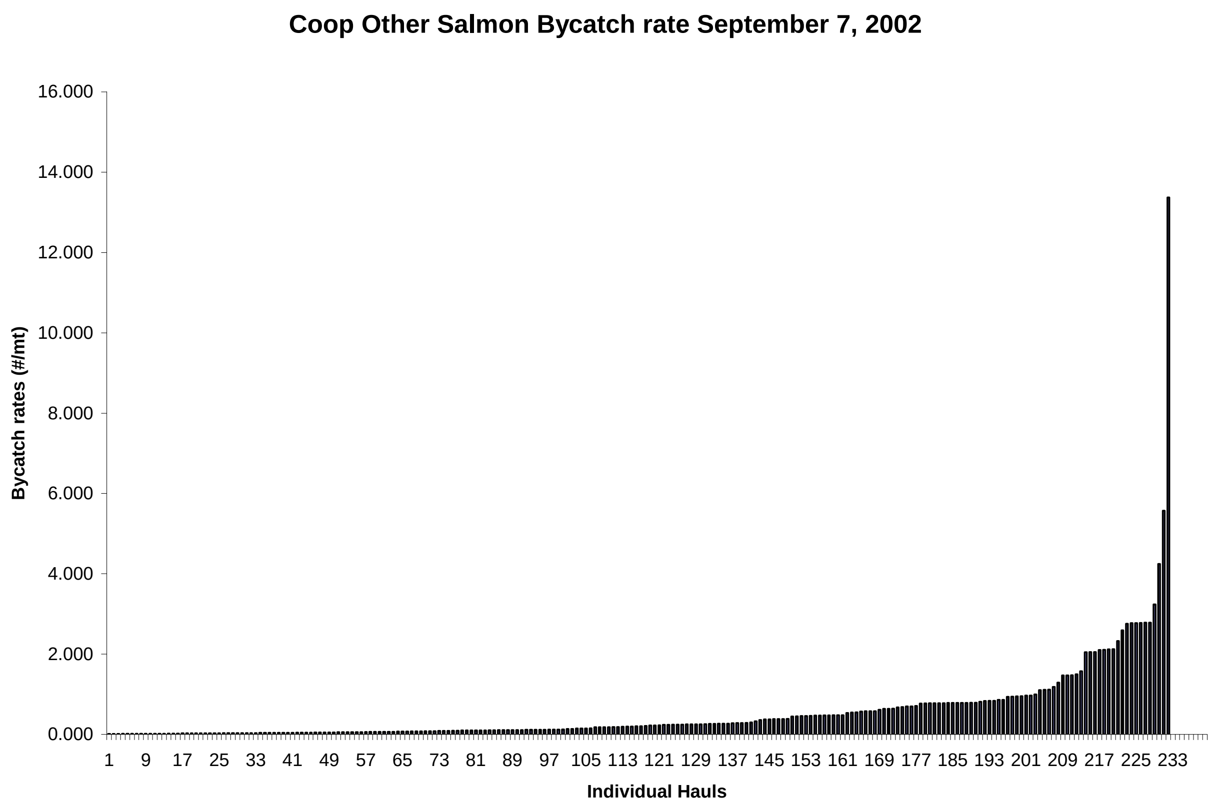
Appendix 4 - 60 Other salmon Bycatch rates in the CDQ Pollock Fishery "B" Season week ending August 31, 2002. a) Histogram representing the frequency of weekly hauls in each bin allocated to the annual bycatch rate and b) frequency distribution of number of hauls by bycatch rate



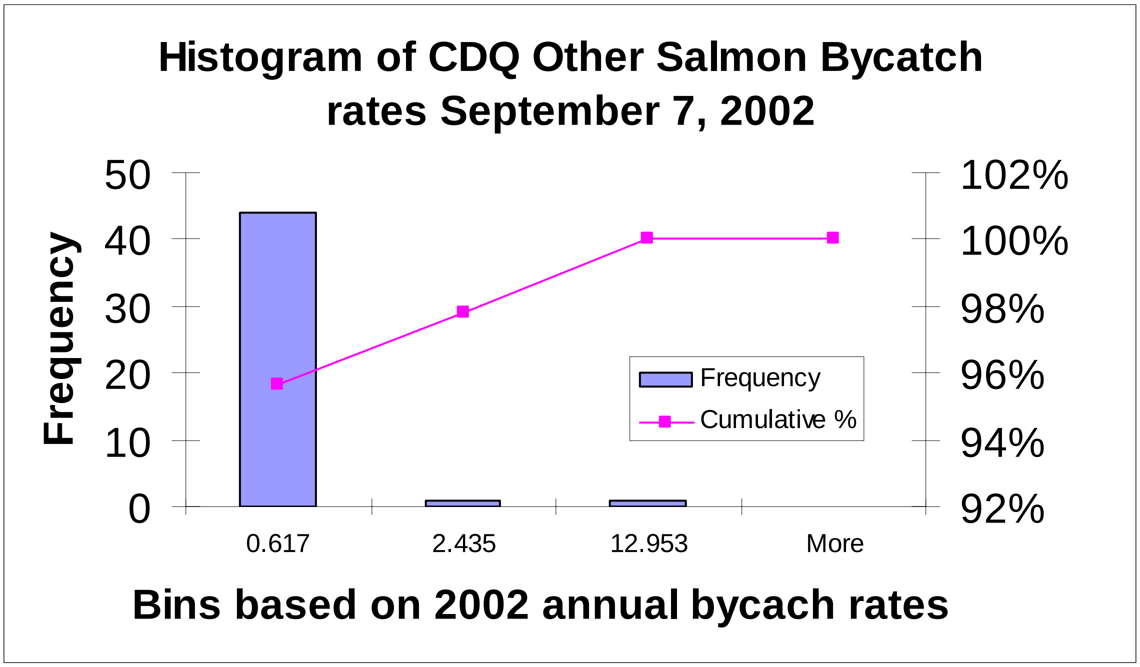


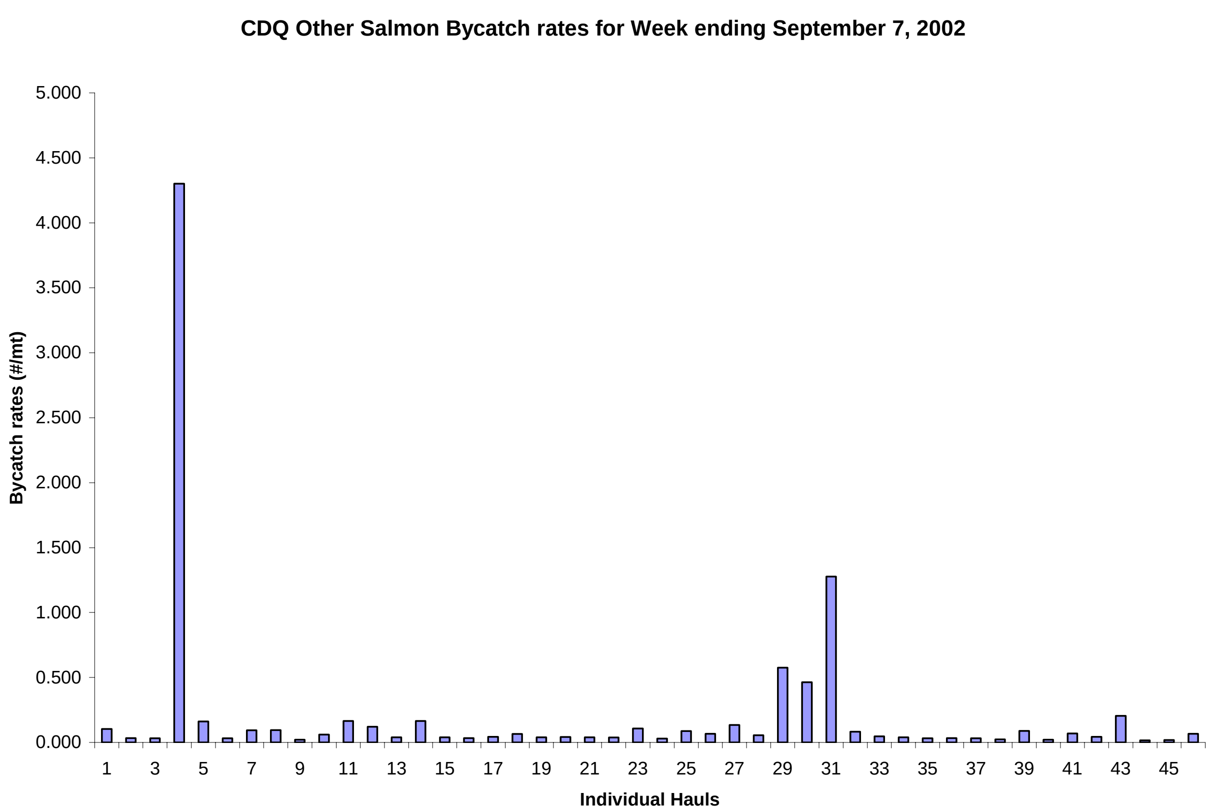
Appendix 4 - 61 Other salmon Bycatch rates in the non-CDQ Pollock Fishery "B" Season week ending September 7, 2002. a) Histogram representing the frequency of weekly hauls in each bin allocated to the annual bycatch rate and b) frequency distribution of number of hauls by bycatch rate



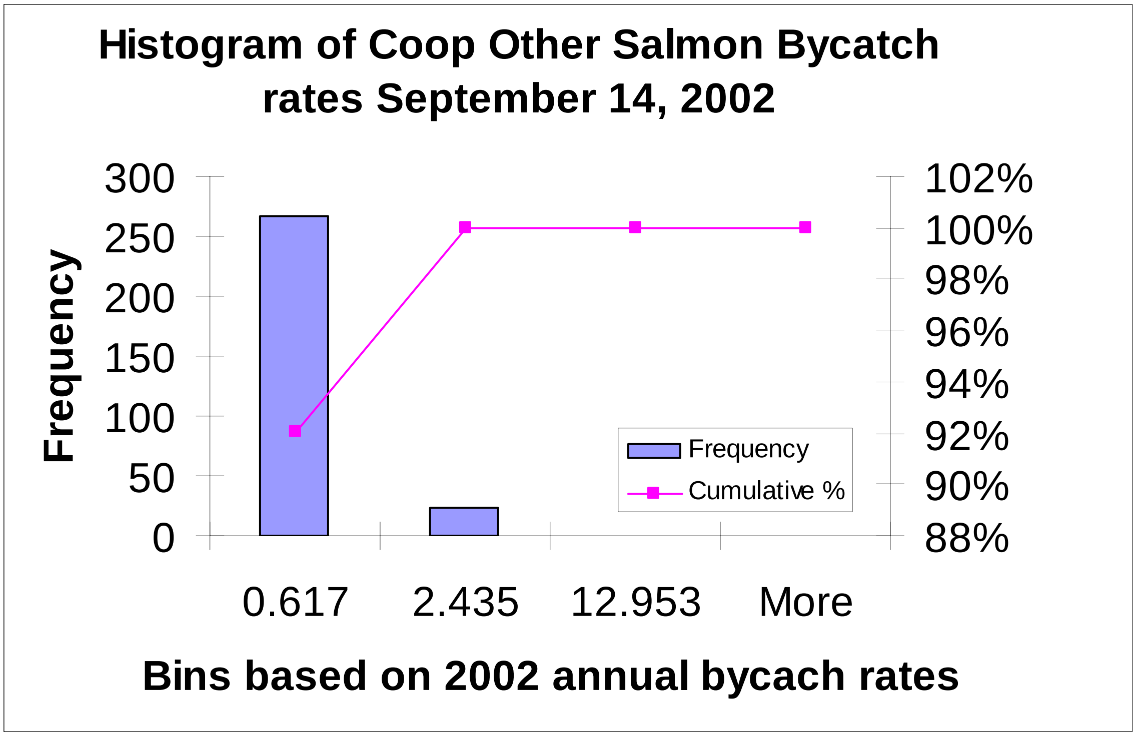


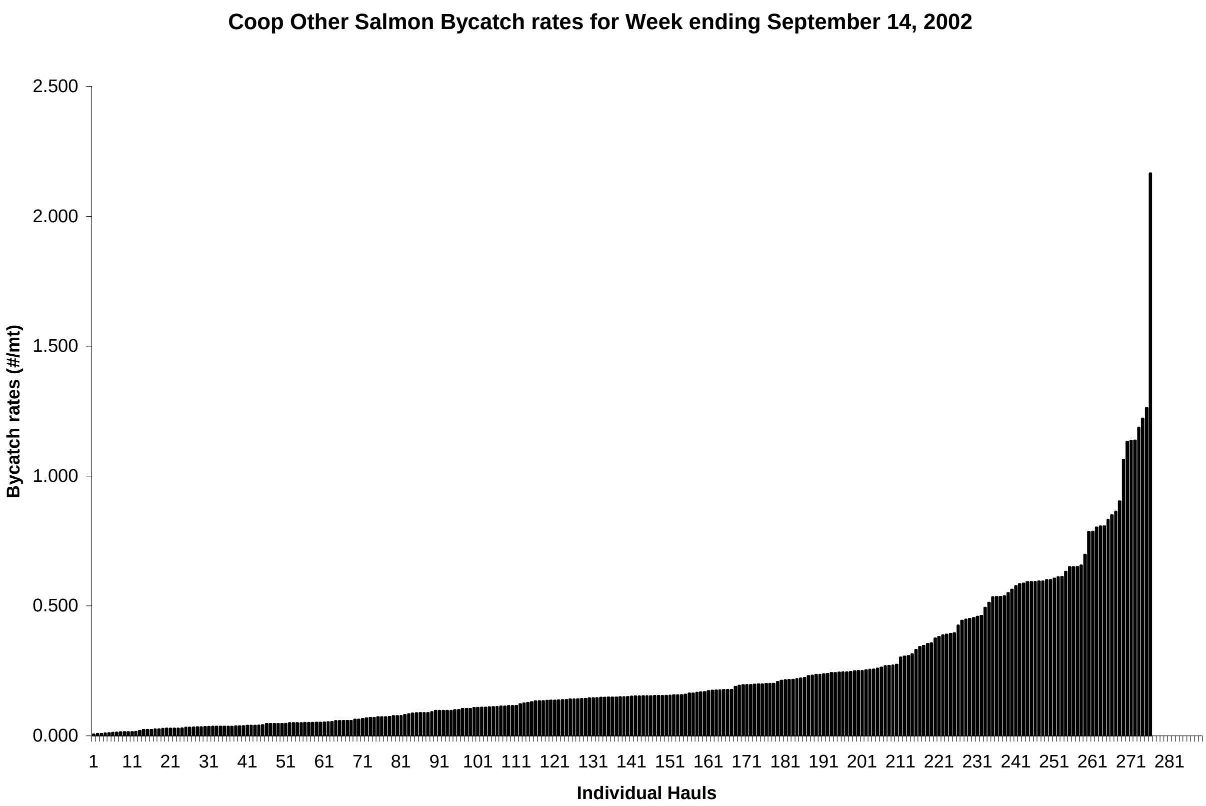
Appendix 4 - 62 Other salmon Bycatch rates in the CDQ Pollock Fishery "B" Season week ending September 7, 2002. a) Histogram representing the frequency of weekly hauls in each bin allocated to the annual bycatch rate and b) frequency distribution of number of hauls by bycatch rate



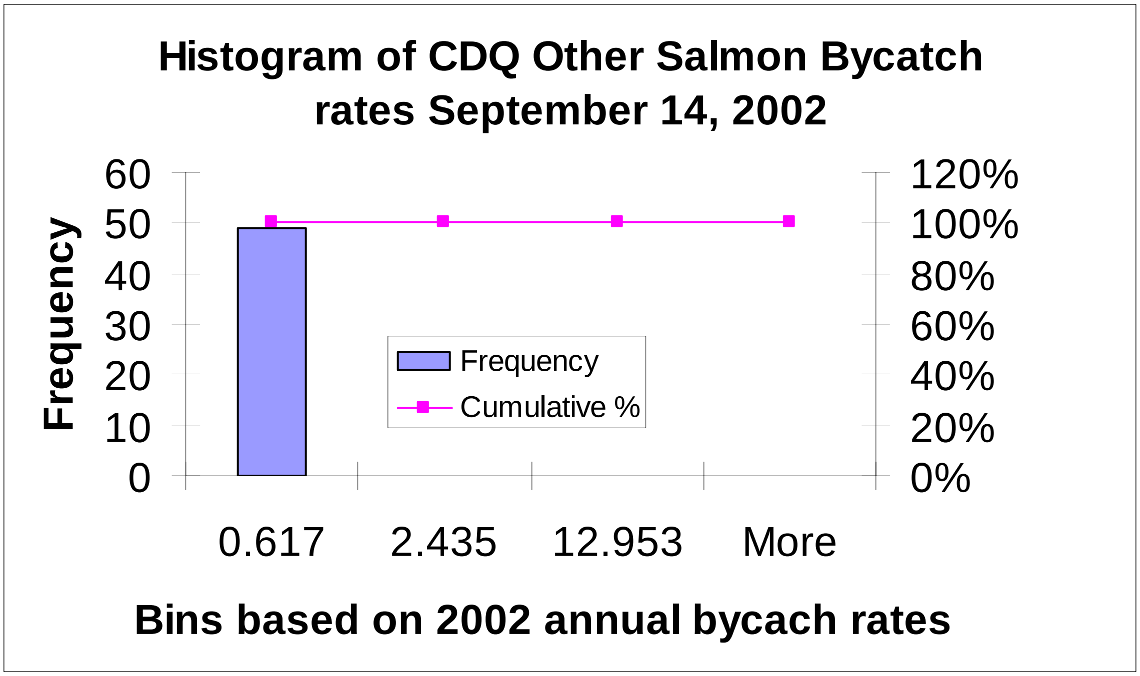


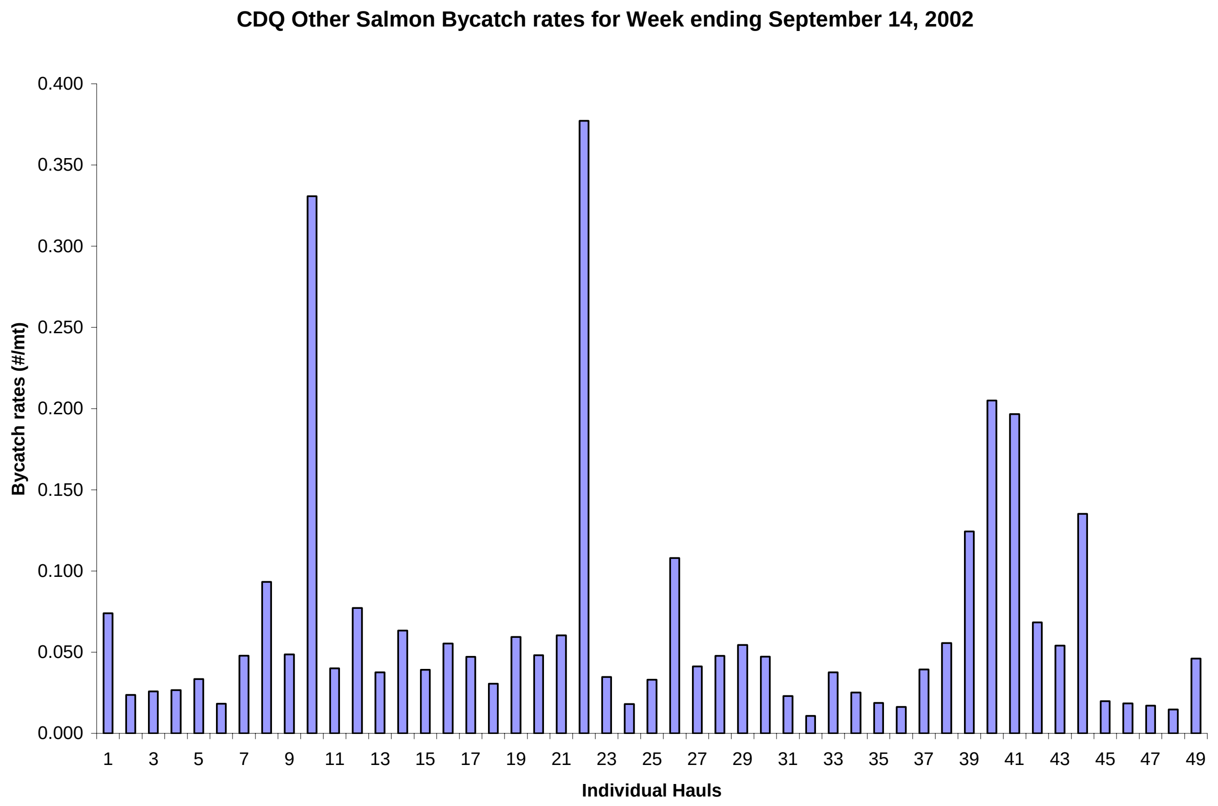
Appendix 4 - 63 Other salmon Bycatch rates in the non-CDQ Pollock Fishery "B" Season week ending September 14, 2002. a) Histogram representing the frequency of weekly hauls in each bin allocated to the annual bycatch rate and b) frequency distribution of number of hauls by bycatch rate



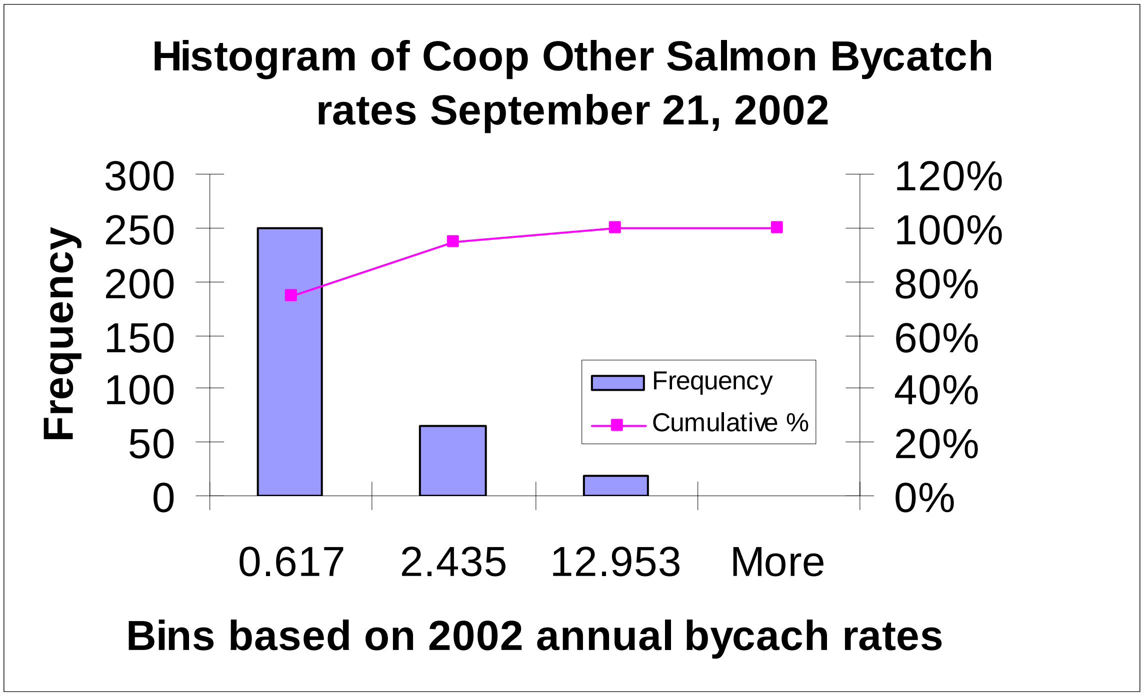


Appendix 4 - 64 Other salmon Bycatch rates in the CDQ Pollock Fishery "B" Season week ending September 14, 2002. a) Histogram representing the frequency of weekly hauls in each bin allocated to the annual bycatch rate and b) frequency distribution of number of hauls by bycatch rate

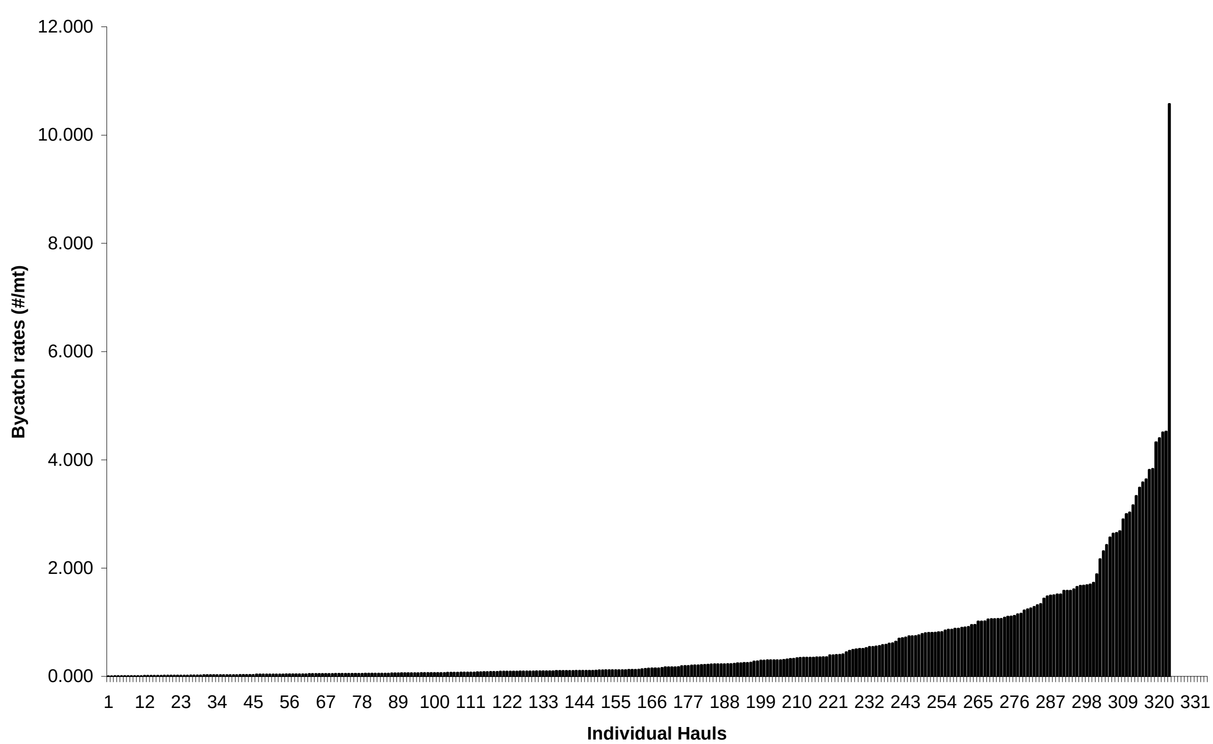




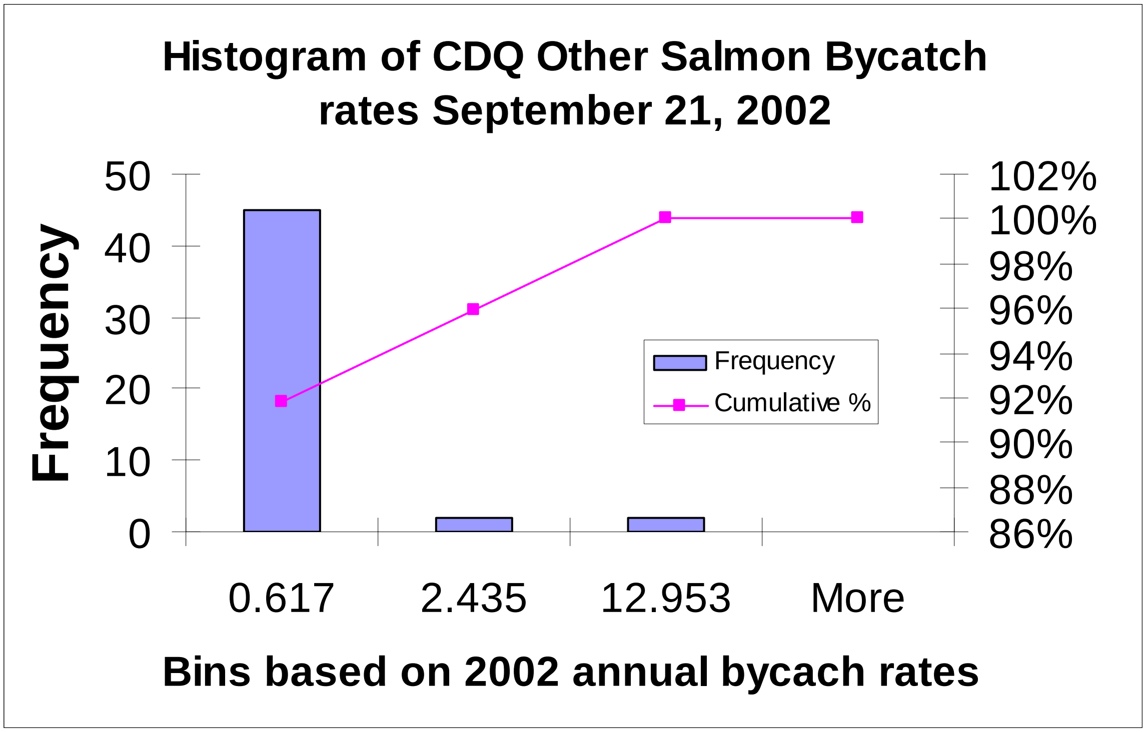
Appendix 4 - 65 Other salmon Bycatch rates in the non-CDQ Pollock Fishery "B" Season week ending September 21, 2002. a) Histogram representing the frequency of weekly hauls in each bin allocated to the annual bycatch rate and b) frequency distribution of number of hauls by bycatch rate

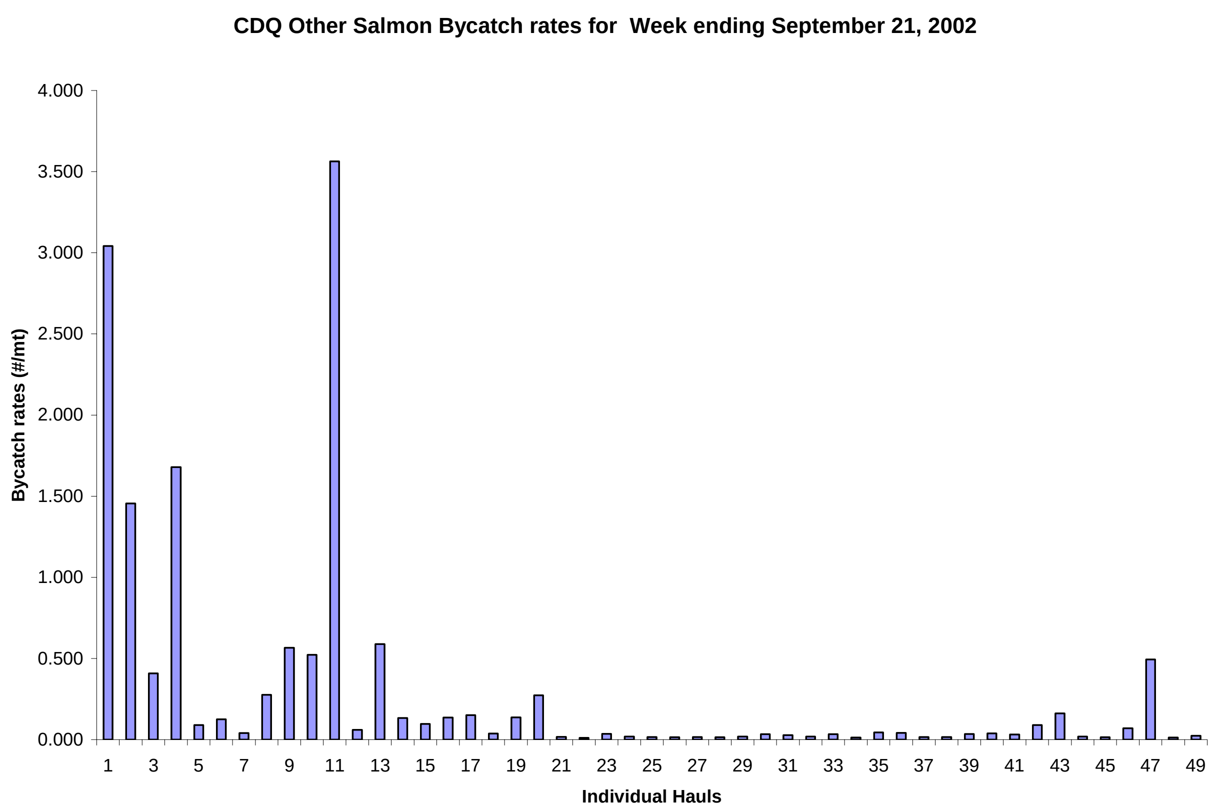


Other Salmon Bycatch rates for Week ending September 21, 2002

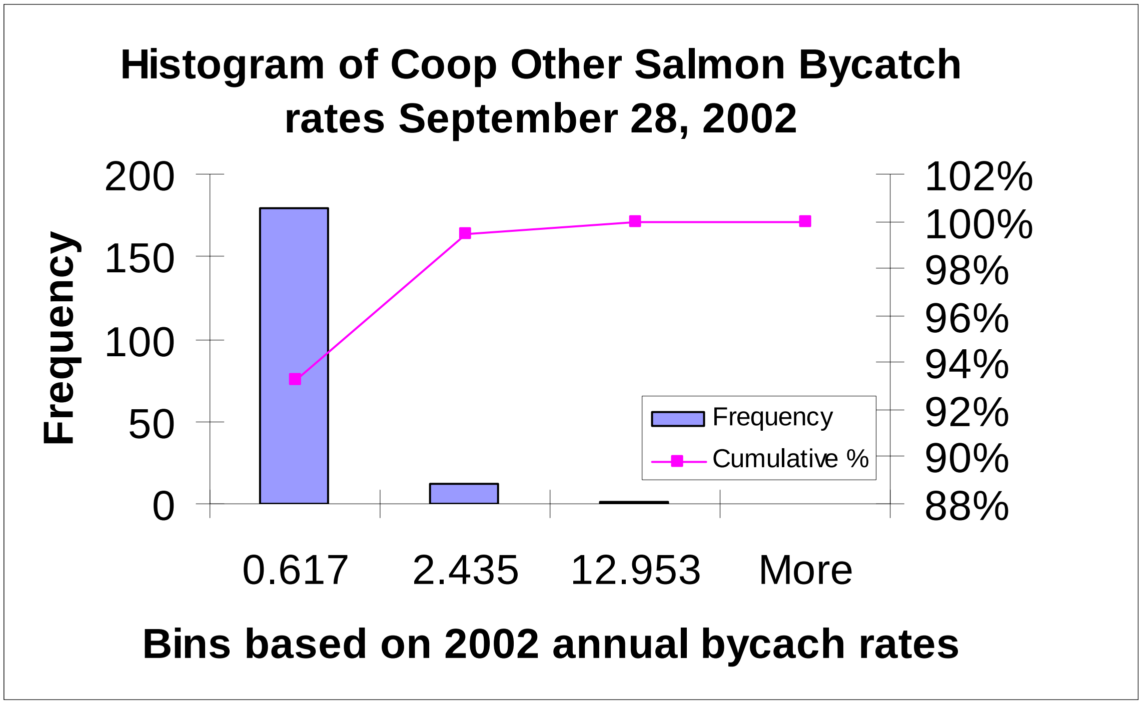


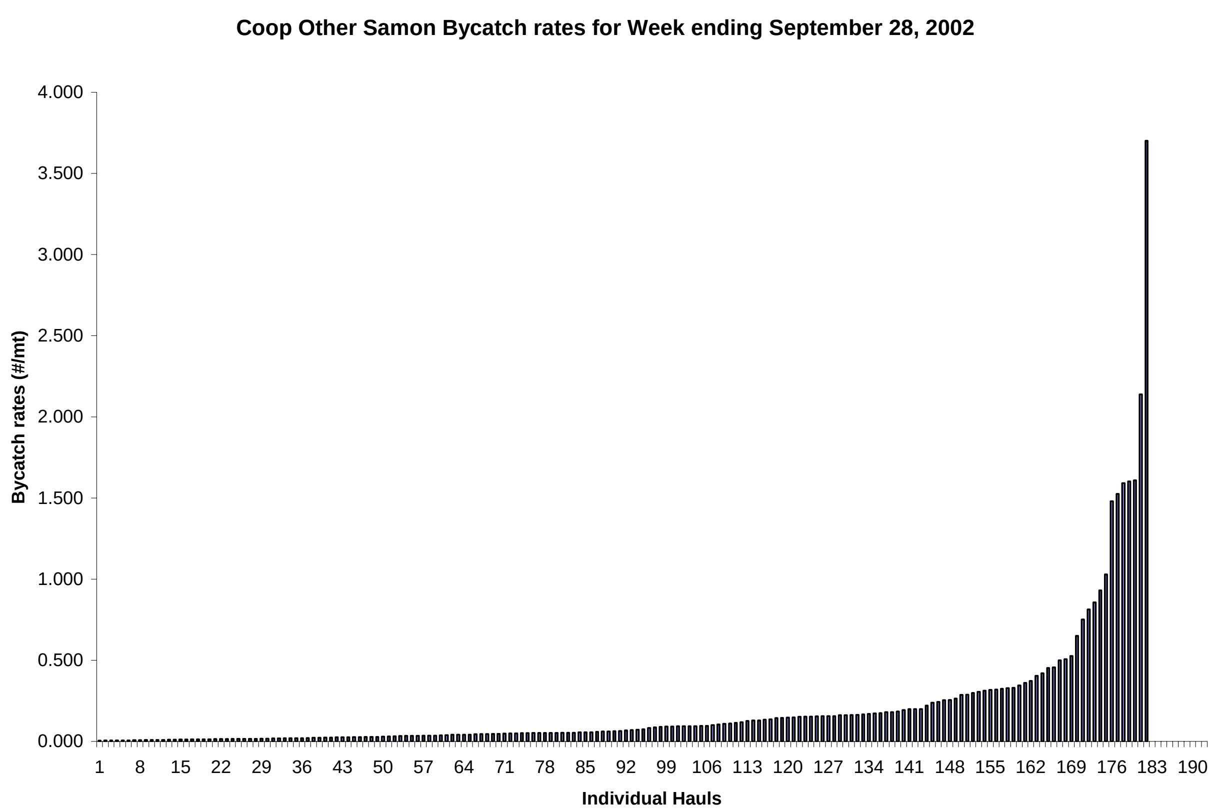
Appendix 4 - 66 Other salmon Bycatch rates in the CDQ Pollock Fishery "B" Season week ending September 21, 2002. a) Histogram representing the frequency of weekly hauls in each bin allocated to the annual bycatch rate and b) frequency distribution of number of hauls by bycatch rate



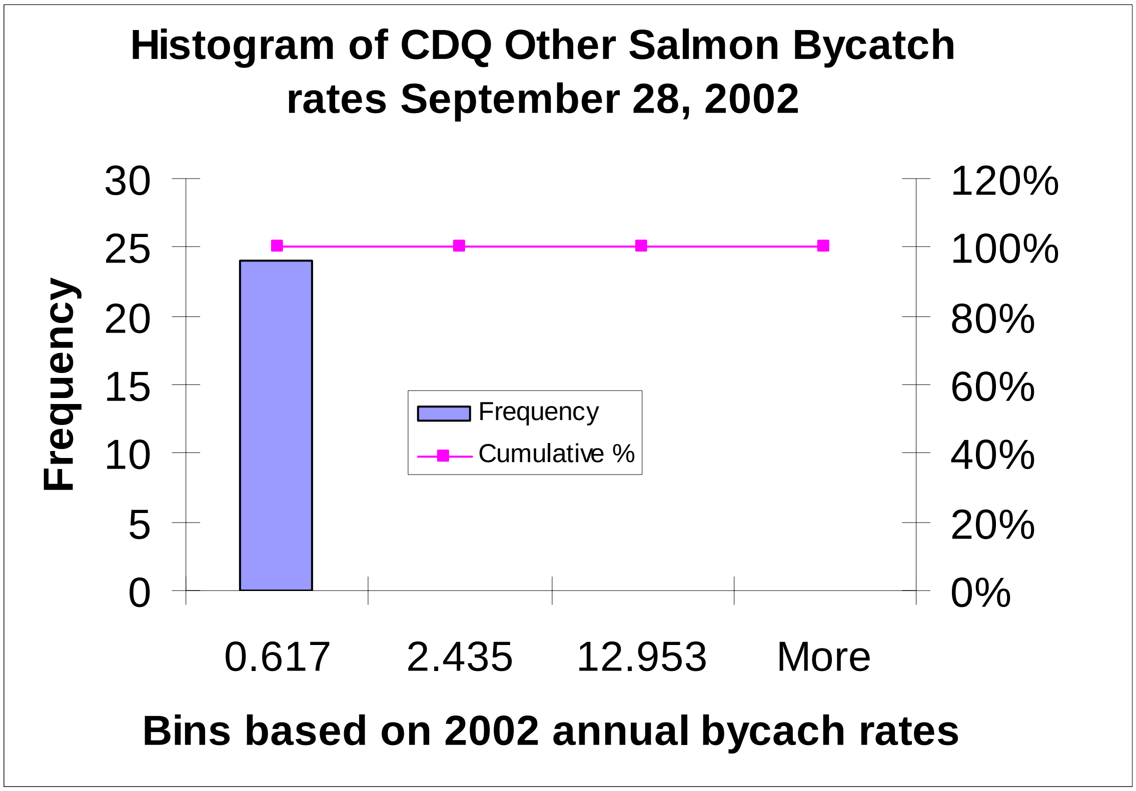


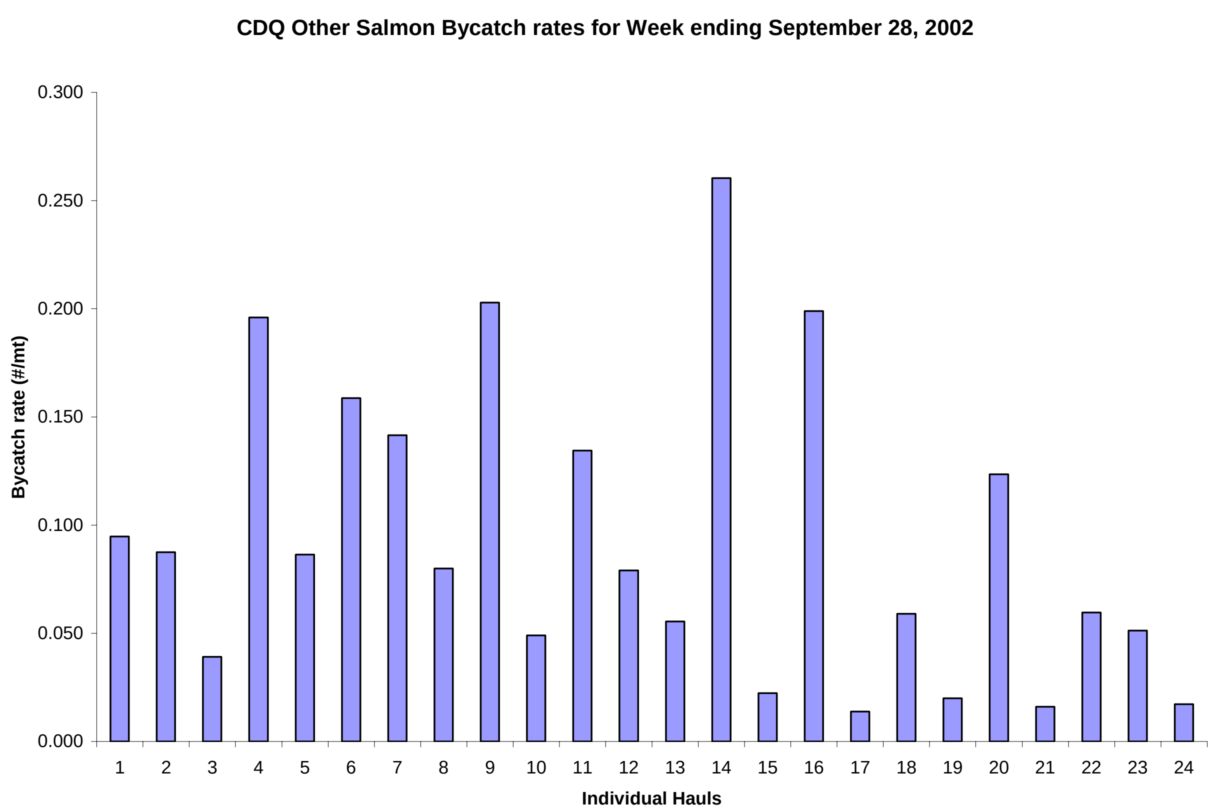
Appendix 4 - 67 Other salmon Bycatch rates in the non-CDQ Pollock Fishery "B" Season week ending September 28, 2002. a) Histogram representing the frequency of weekly hauls in each bin allocated to the annual bycatch rate and b) frequency distribution of number of hauls by bycatch rate



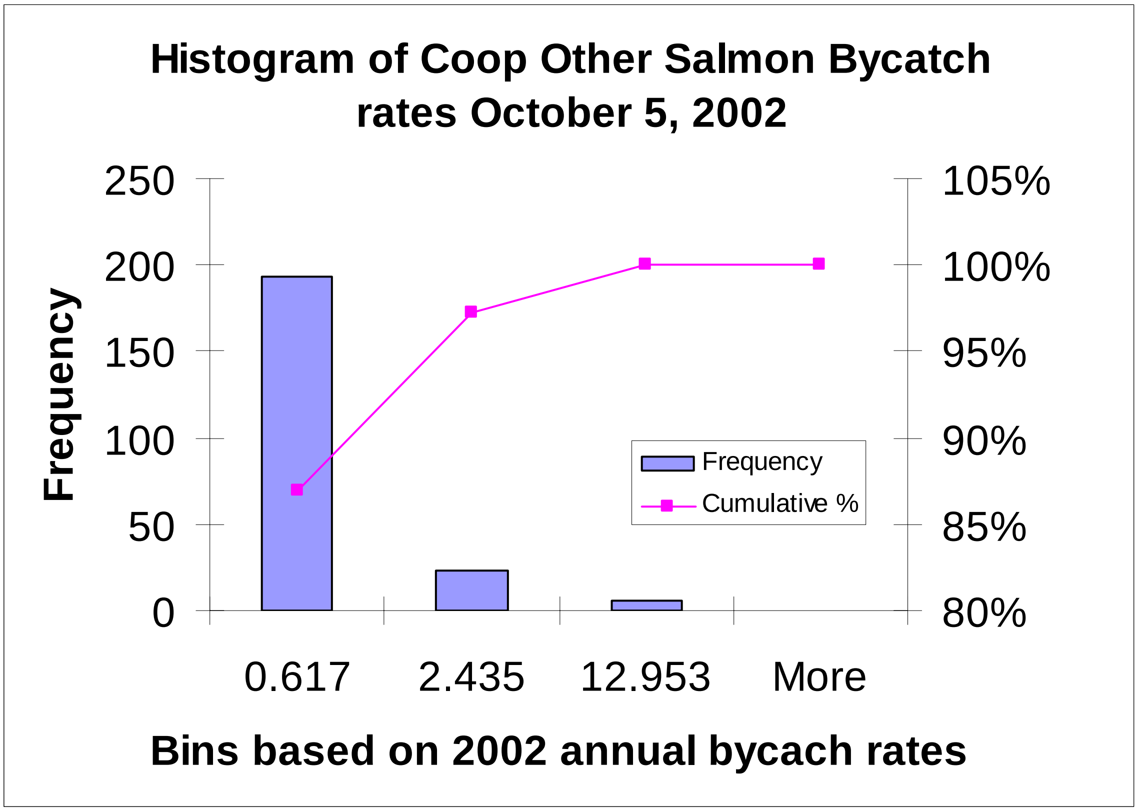


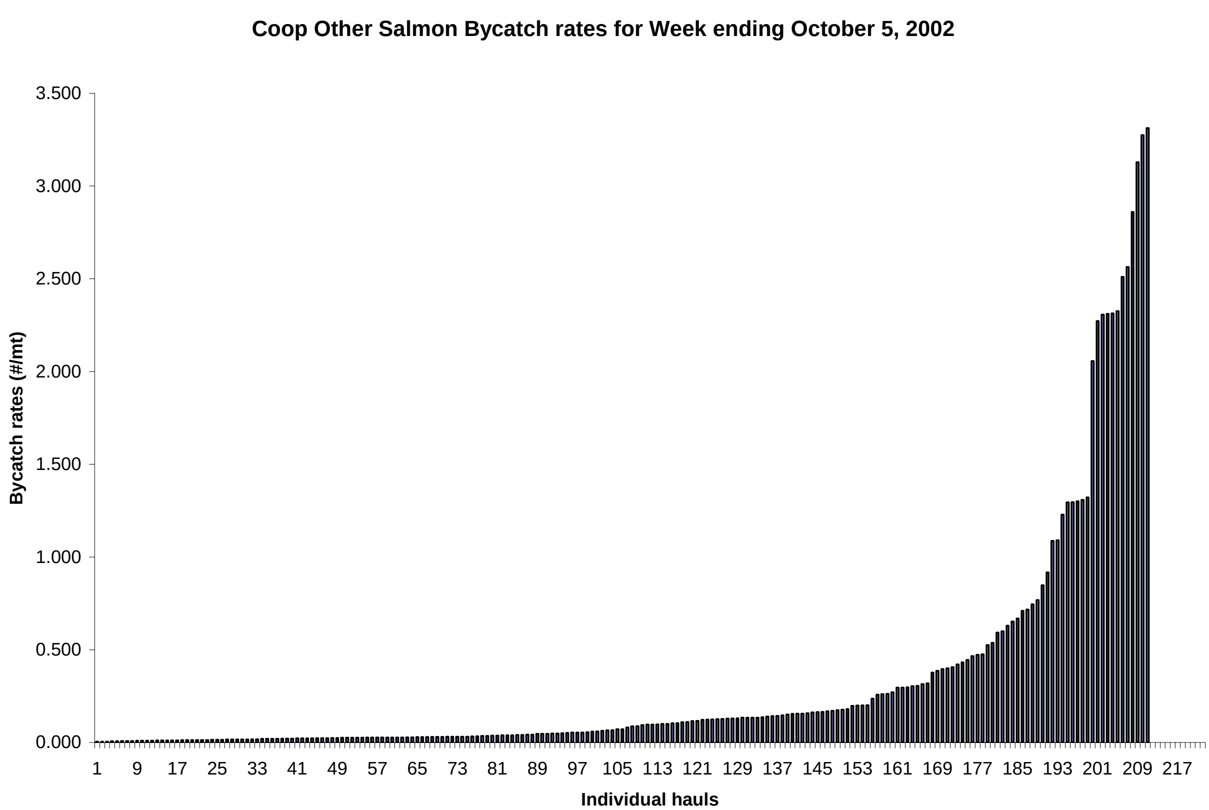
Appendix 4 - 68 Other salmon Bycatch rates in the CDQ Pollock Fishery "B" Season week ending September 28, 2002. a) Histogram representing the frequency of weekly hauls in each bin allocated to the annual bycatch rate and b) frequency distribution of number of hauls by bycatch rate





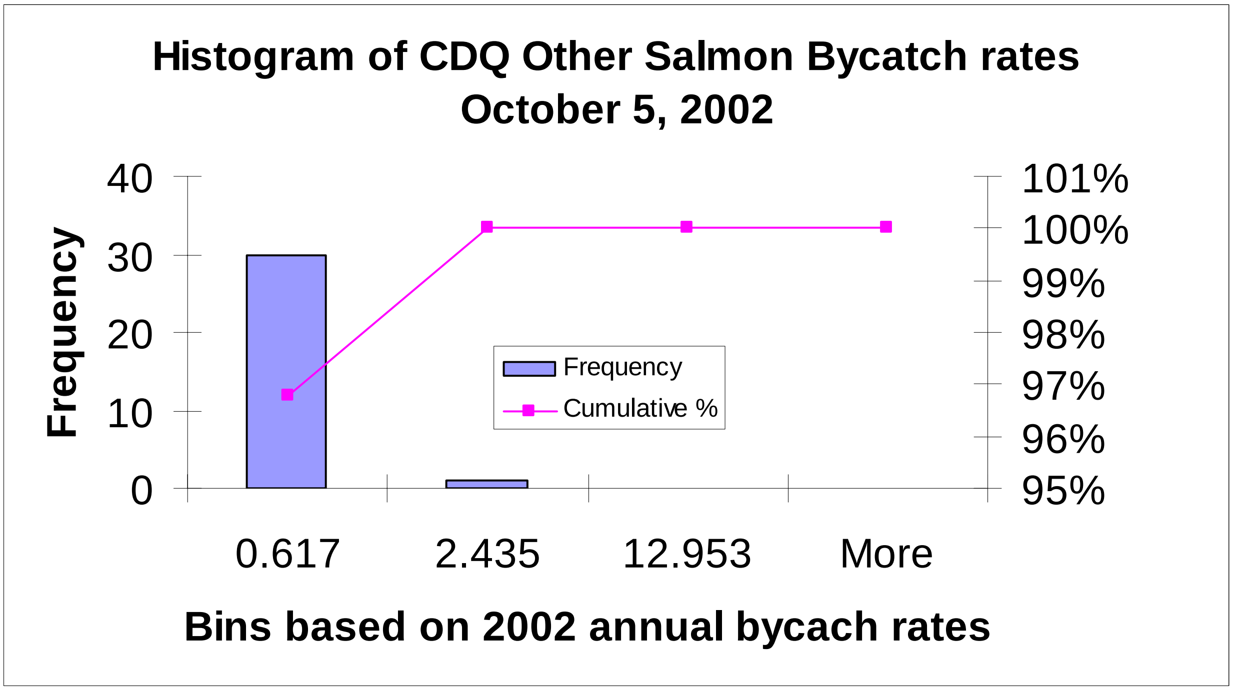
Appendix 4 - 69 Other salmon Bycatch rates in the non-CDQ Pollock Fishery "B" Season week ending October 5, 2002. a) Histogram representing the frequency of weekly hauls in each bin allocated to the annual bycatch rate and b) frequency distribution of number of hauls by bycatch rate

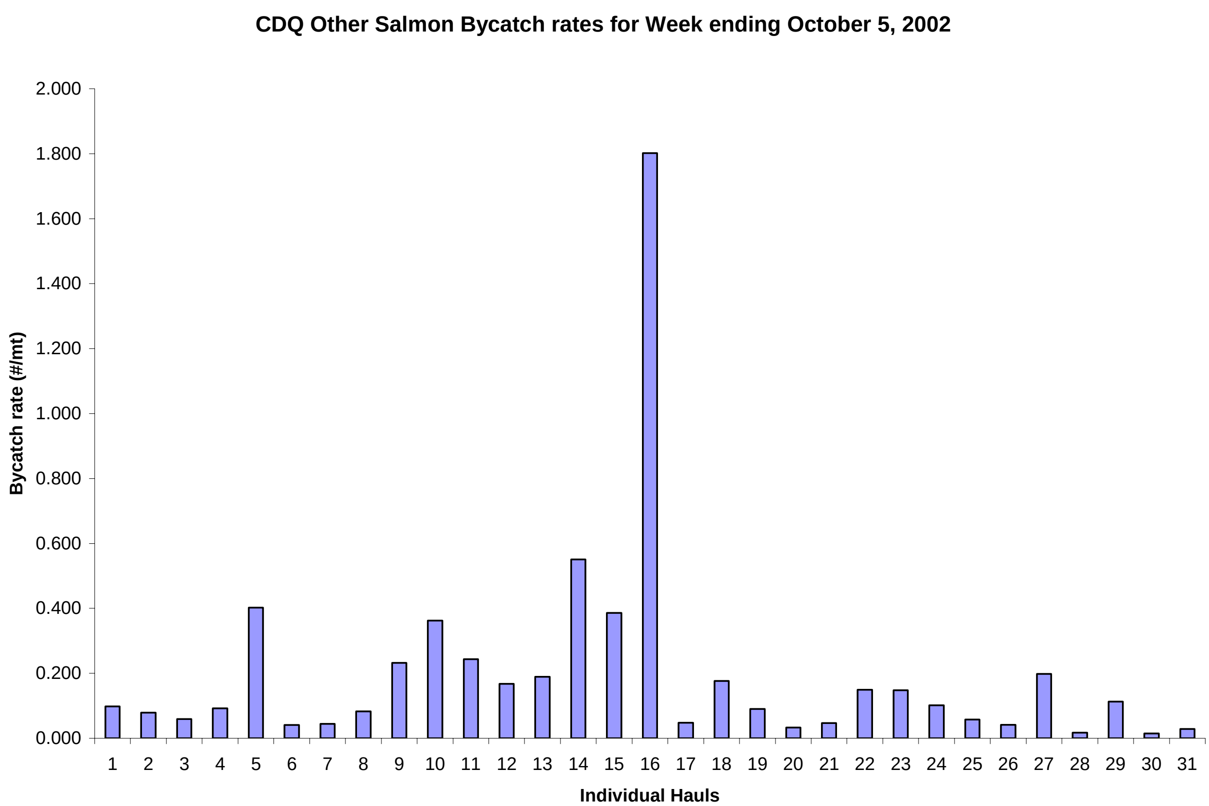




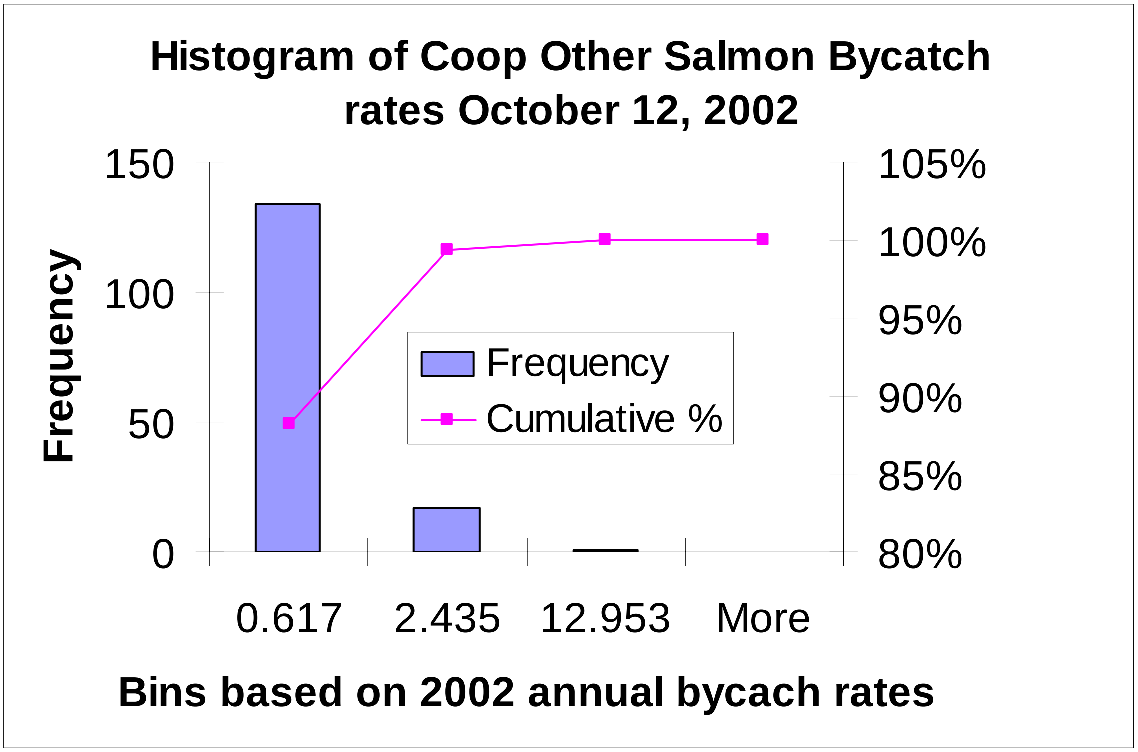
Appendix 4 - 70 Other salmon Bycatch rates in the CDQ Pollock Fishery "B" Season week ending October 5,

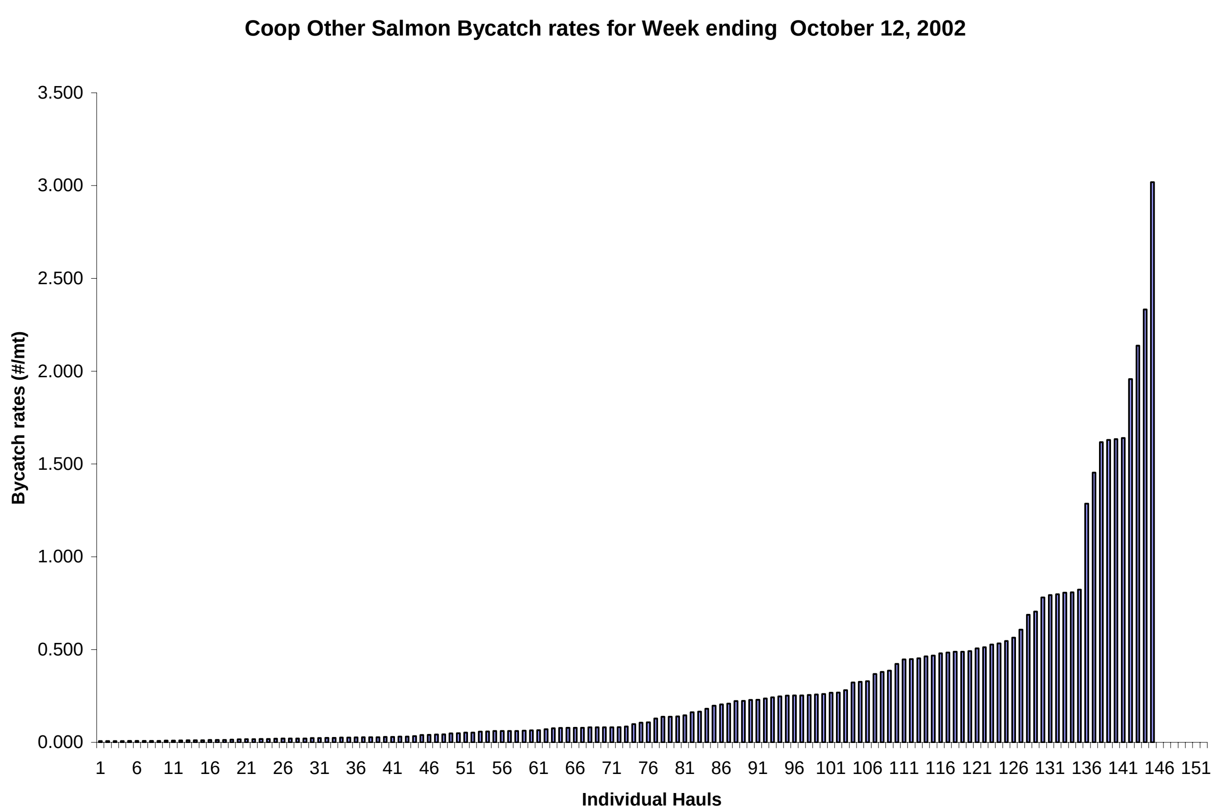
2002. a) Histogram representing the frequency of weekly hauls in each bin allocated to the annual bycatch rate and b) frequency distribution of number of hauls by bycatch rate



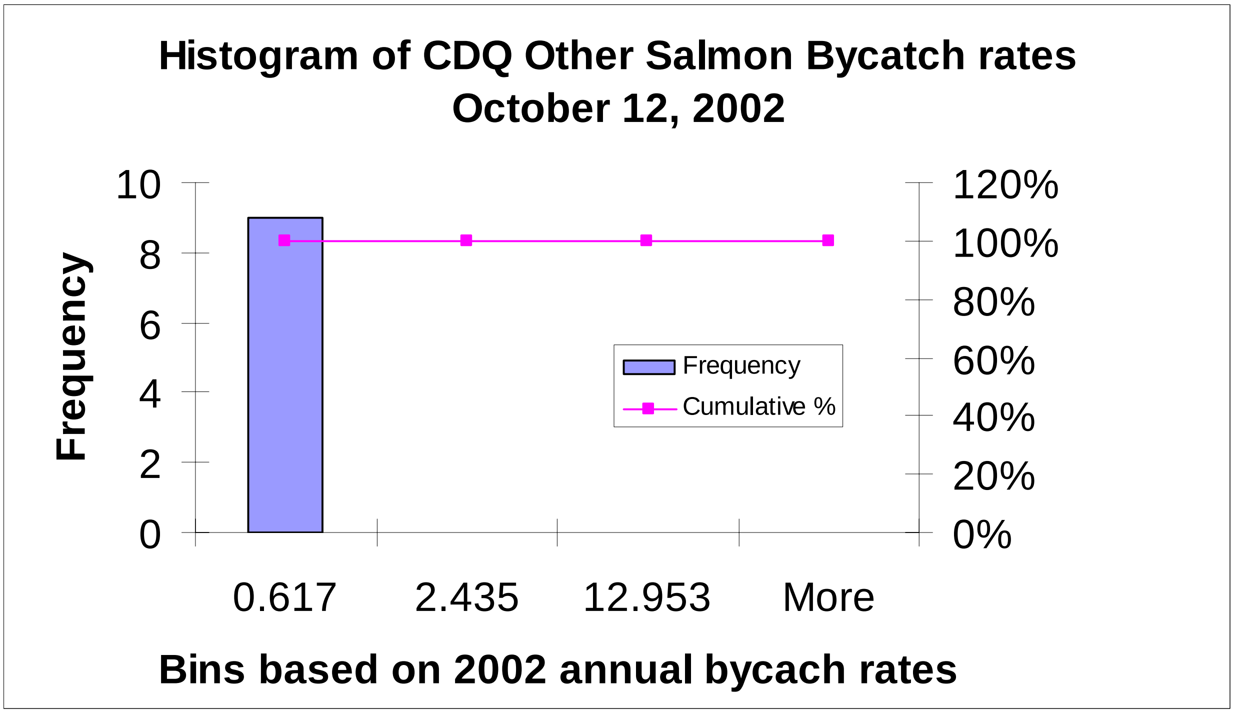


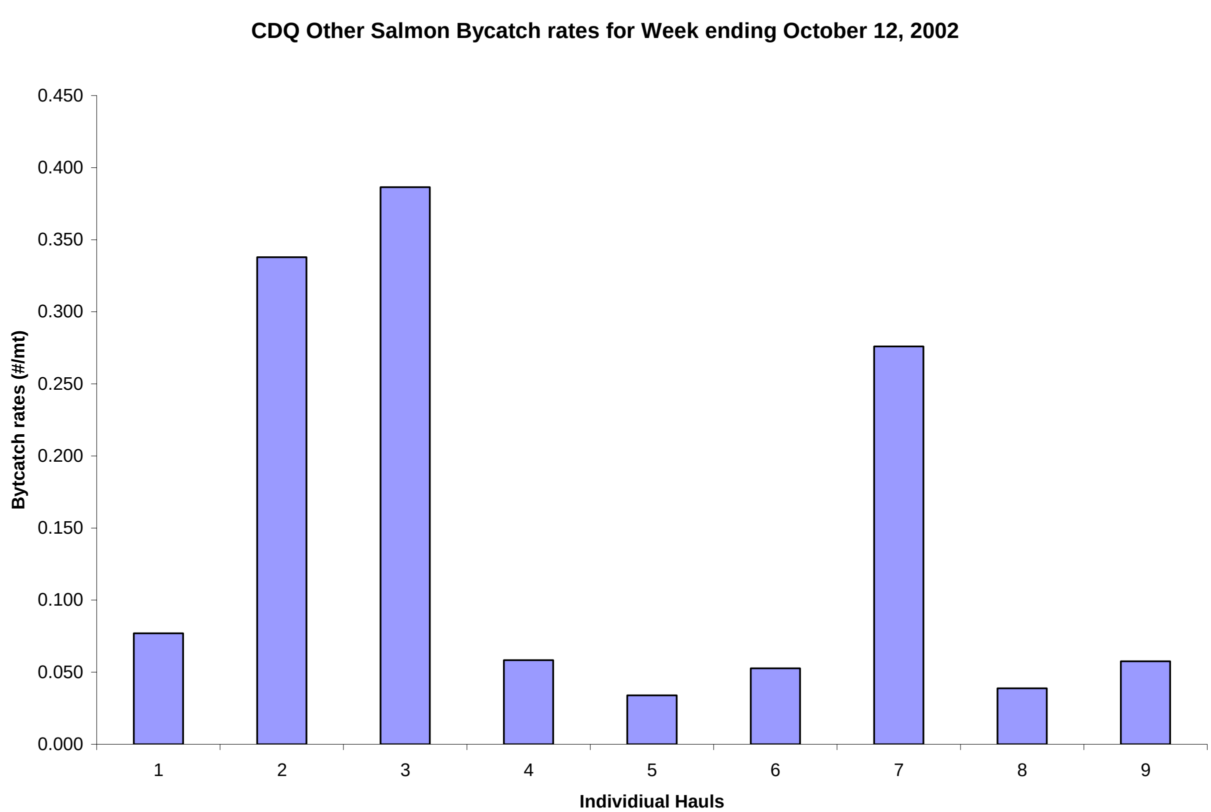
Appendix 4 - 71Other salmon Bycatch rates in the non-CDQ Pollock Fishery "B" Season week ending October 12, 2002. a) Histogram representing the frequency of weekly hauls in each bin allocated to the annual bycatch rate and b) frequency distribution of number of hauls by bycatch rate



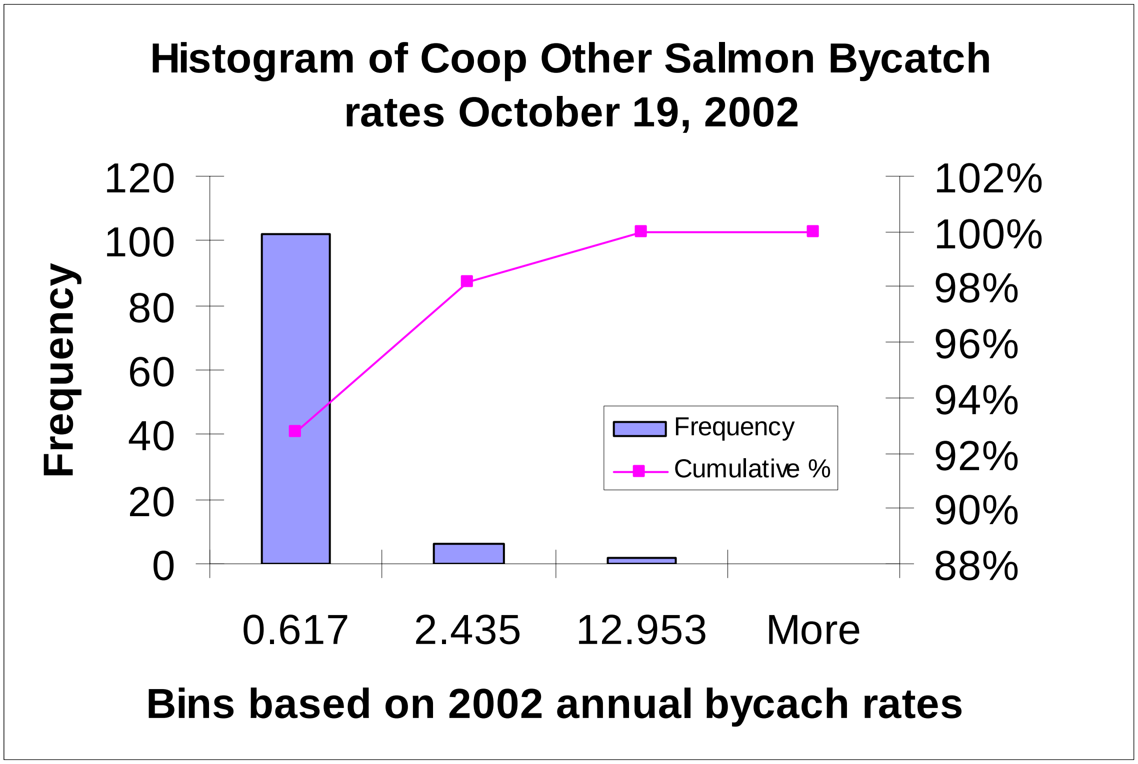


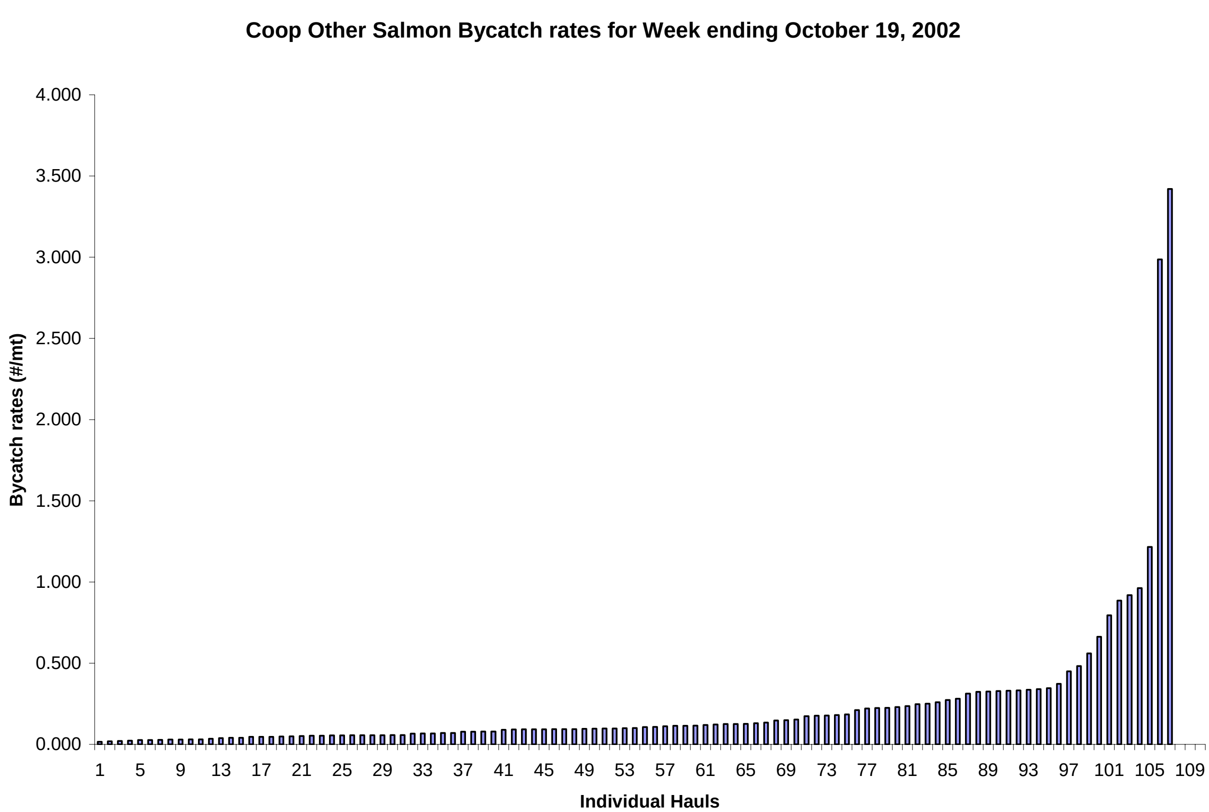
Appendix 4 - 72 Other salmon Bycatch rates in the CDQ Pollock Fishery "B" Season week ending October 12, 2002. a) Histogram representing the frequency of weekly hauls in each bin allocated to the annual bycatch rate and b) frequency distribution of number of hauls by bycatch rate



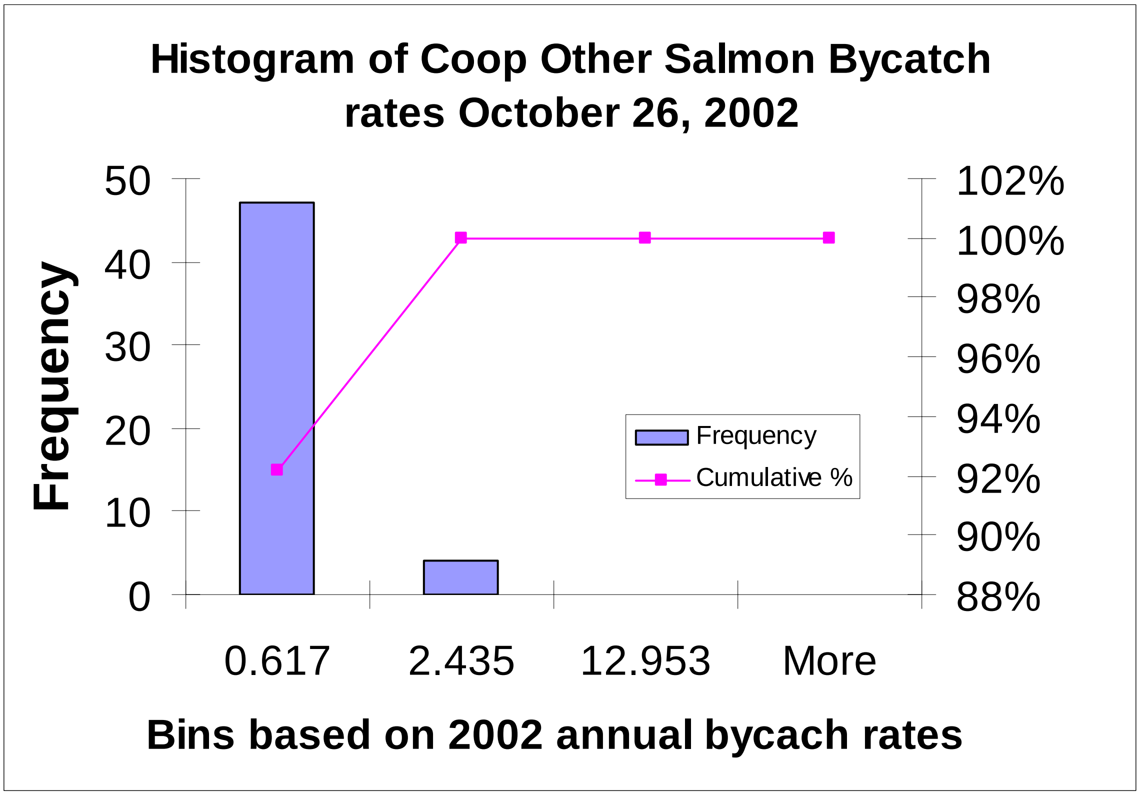


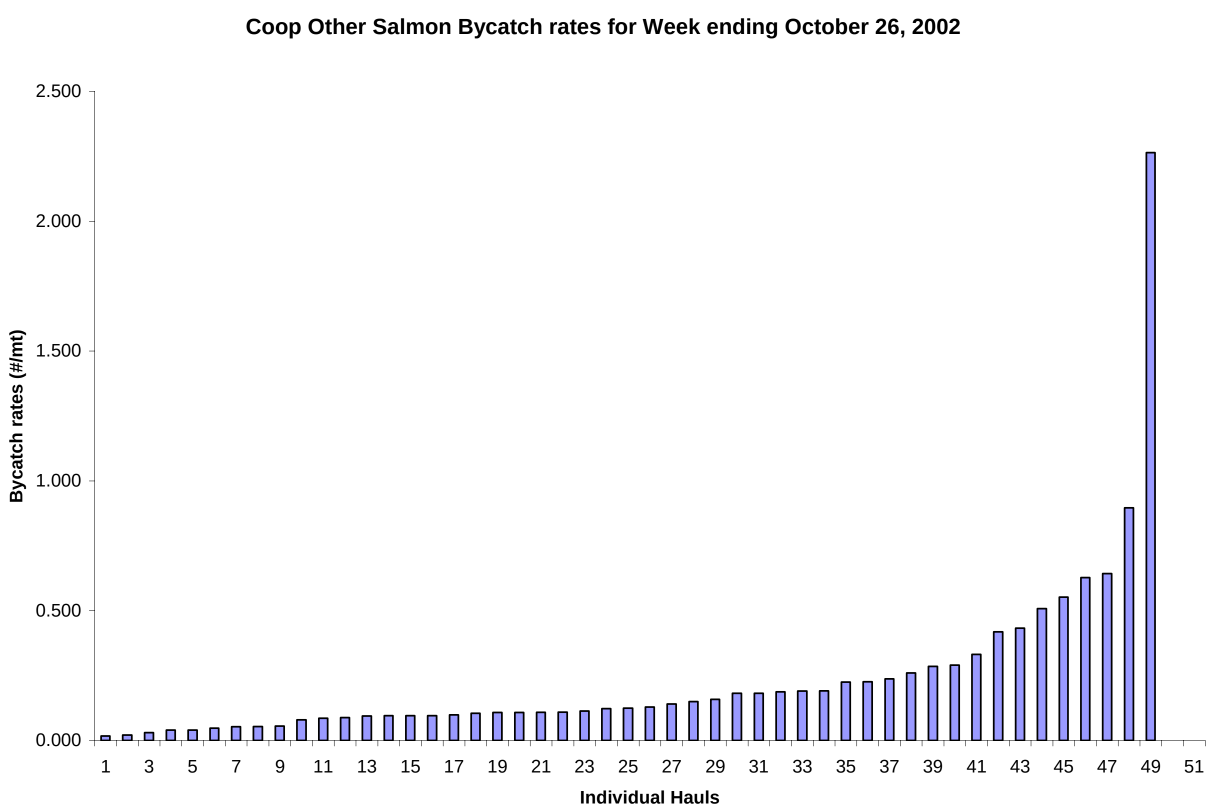
Appendix 4 - 73 Other salmon Bycatch rates in the non-CDQ Pollock Fishery "B" Season week ending October 19, 2002. a) Histogram representing the frequency of weekly hauls in each bin allocated to the annual bycatch rate and b) frequency distribution of number of hauls by bycatch rate



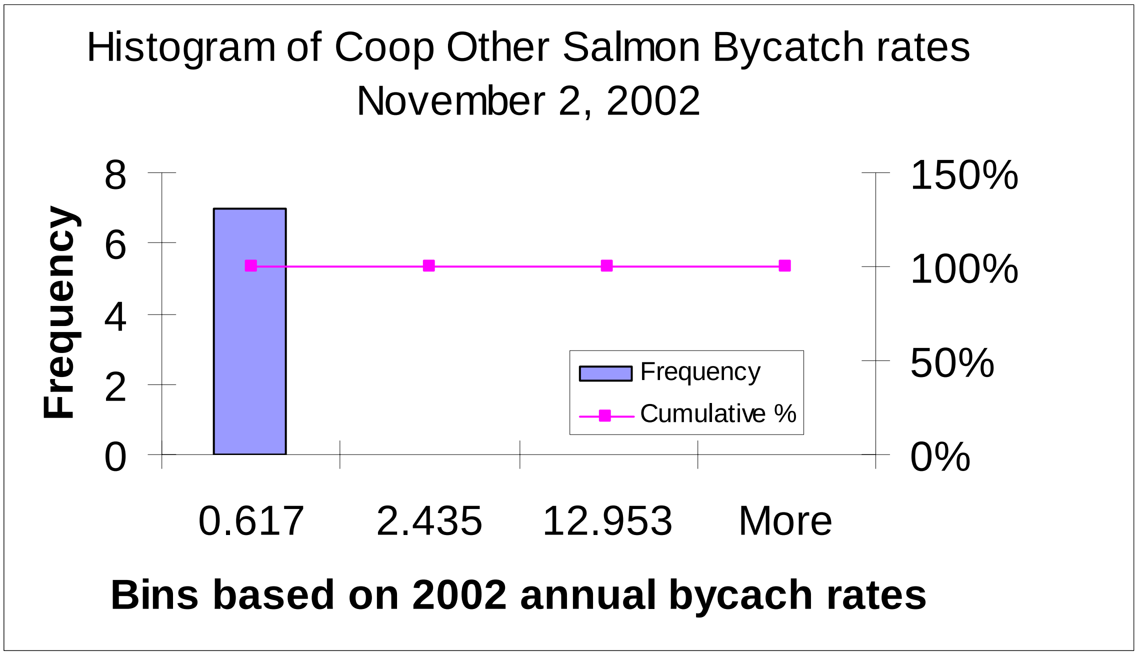


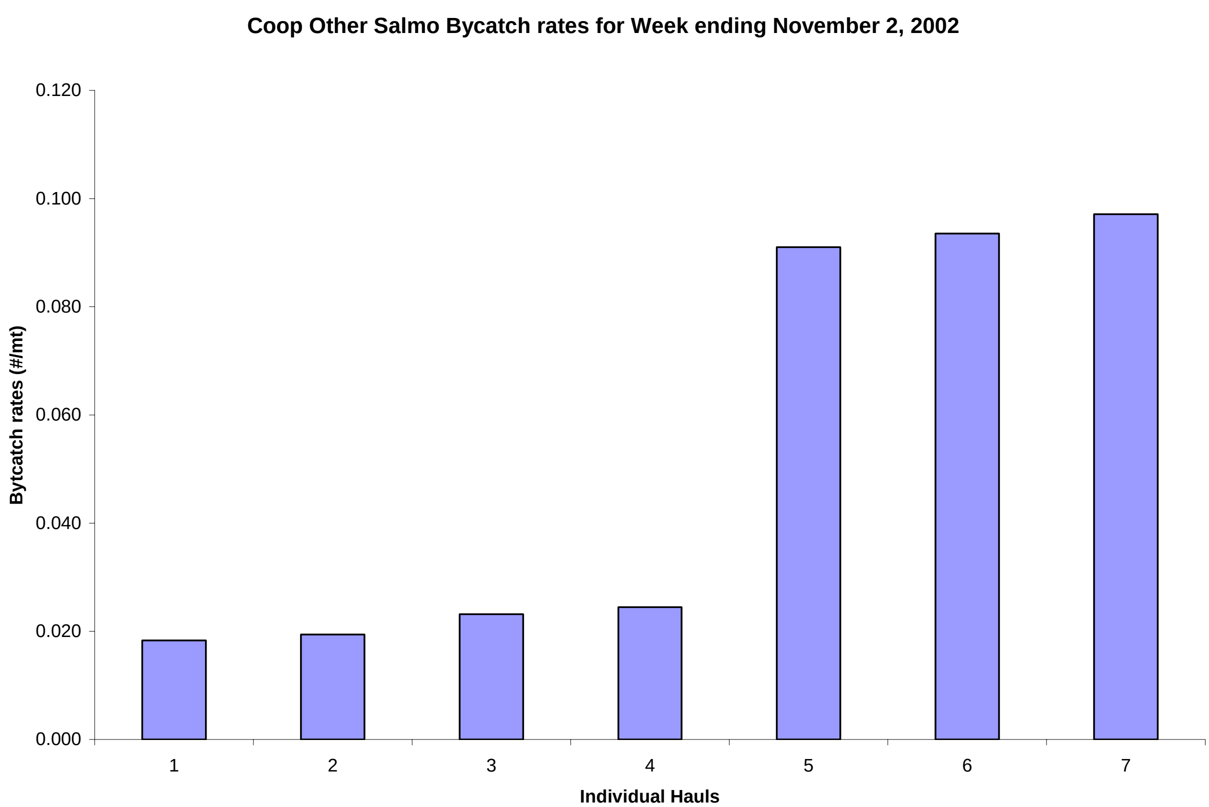
Appendix 4 - 74 Other salmon Bycatch rates in the non-CDQ Pollock Fishery "B" Season week ending October 26, 2002. a) Histogram representing the frequency of weekly hauls in each bin allocated to the annual bycatch rate and b) frequency distribution of number of hauls by bycatch rate



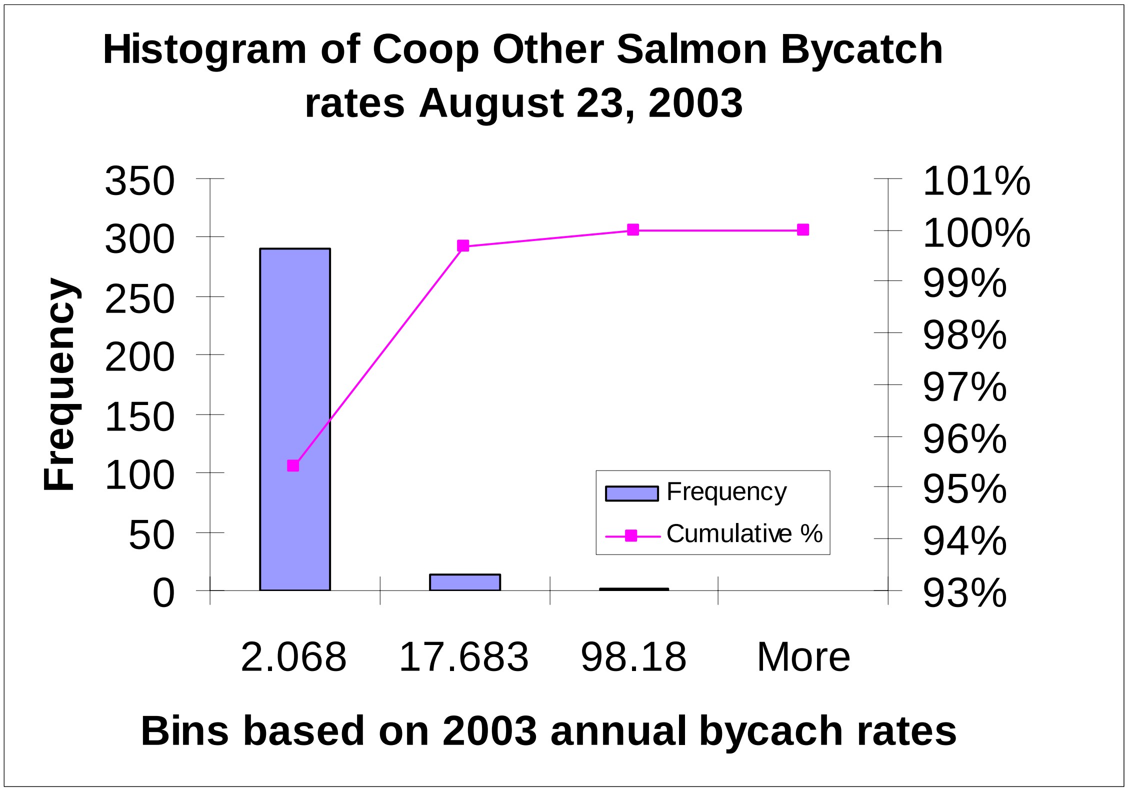


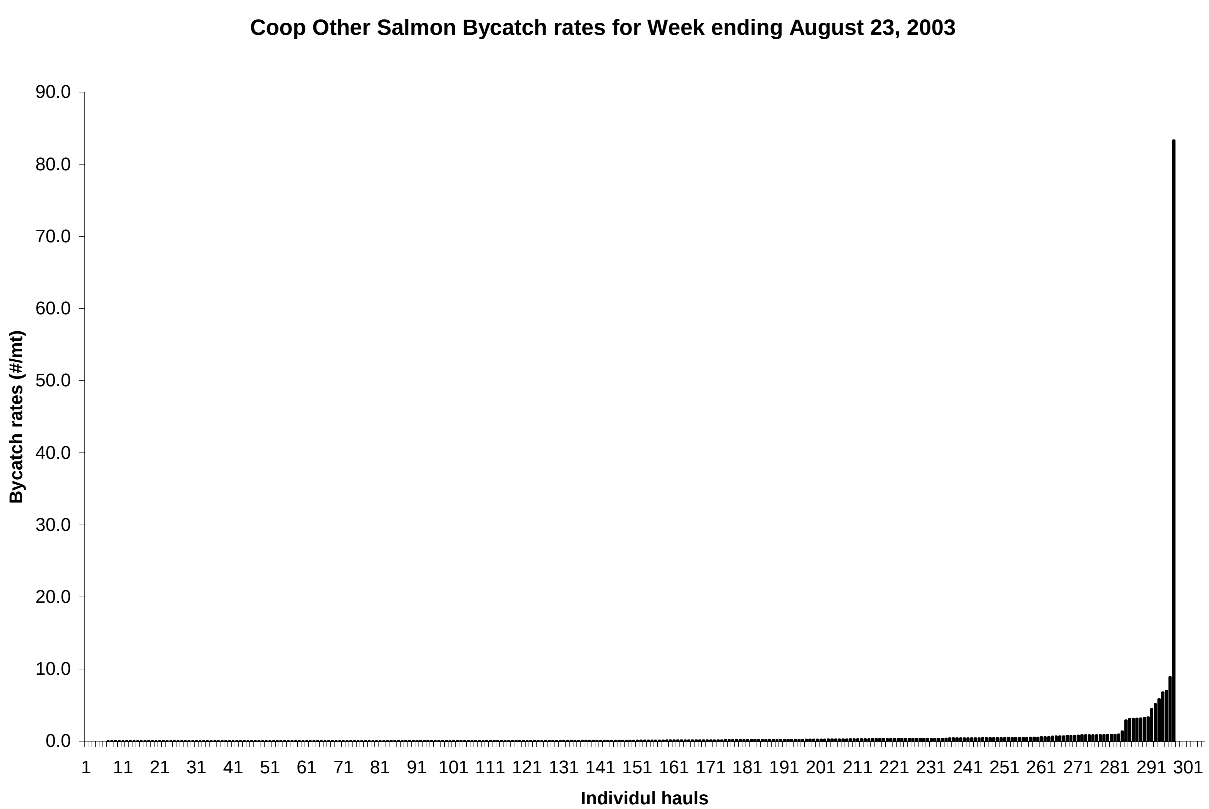
Appendix 4 - 75 Other salmon Bycatch rates in the non-CDQ Pollock Fishery "B" Season week ending November 2, 2002. a) Histogram representing the frequency of weekly hauls in each bin allocated to the annual bycatch rate and b) frequency distribution of number of hauls by bycatch rate



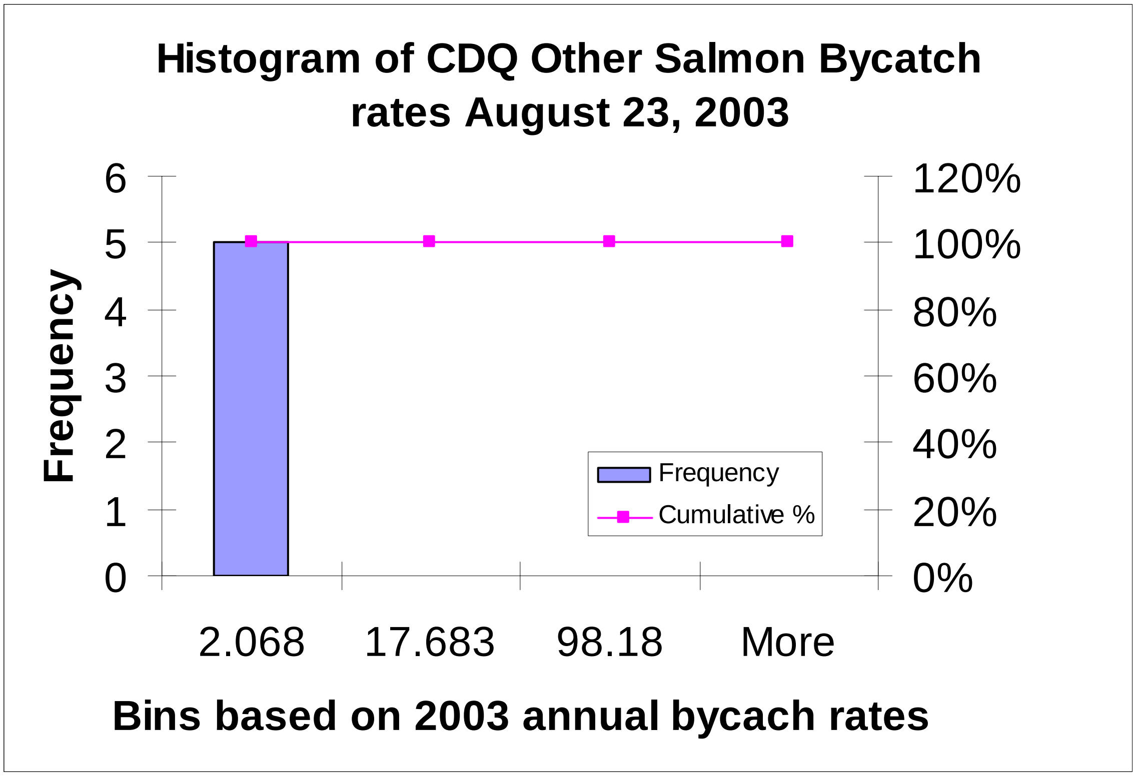


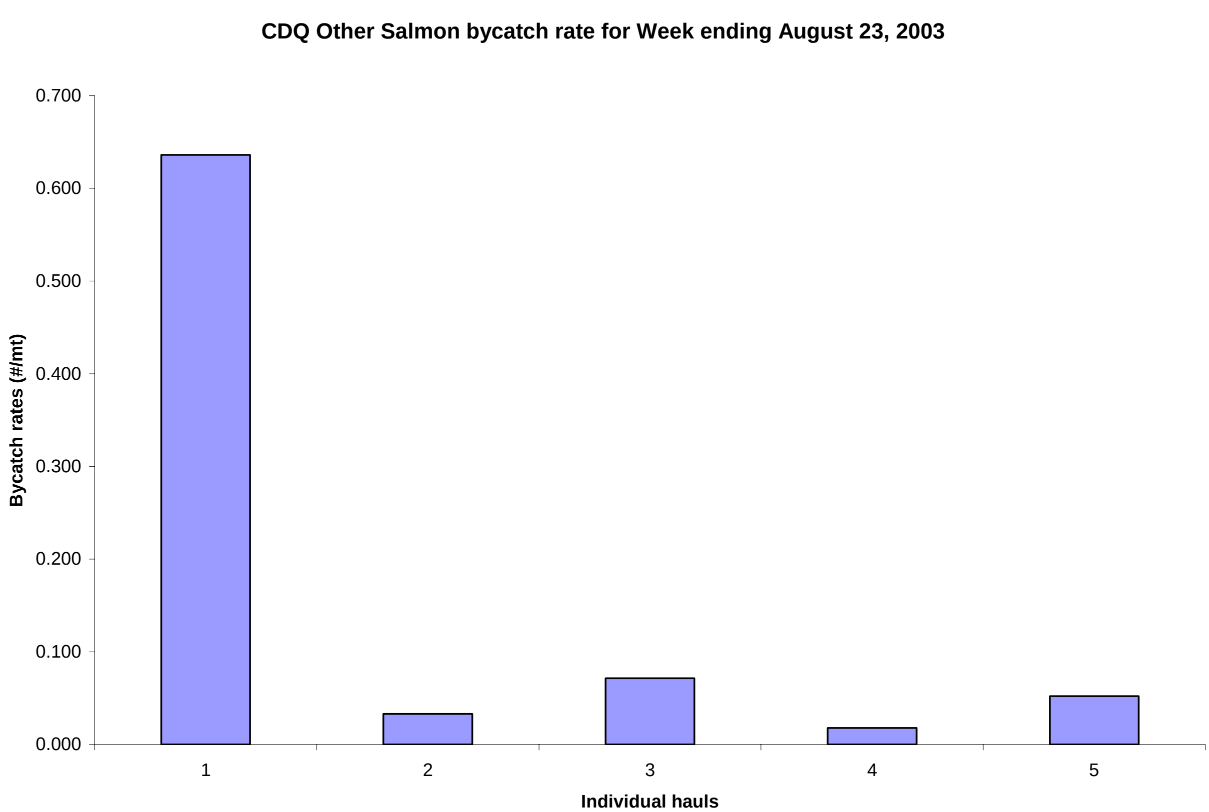
Appendix 4 - 76 Other salmon Bycatch rates in the non-CDQ Pollock Fishery "B" Season week ending September 23, 2003. a) Histogram representing the frequency of weekly hauls in each bin allocated to the annual bycatch rate and b) frequency distribution of number of hauls by bycatch rate



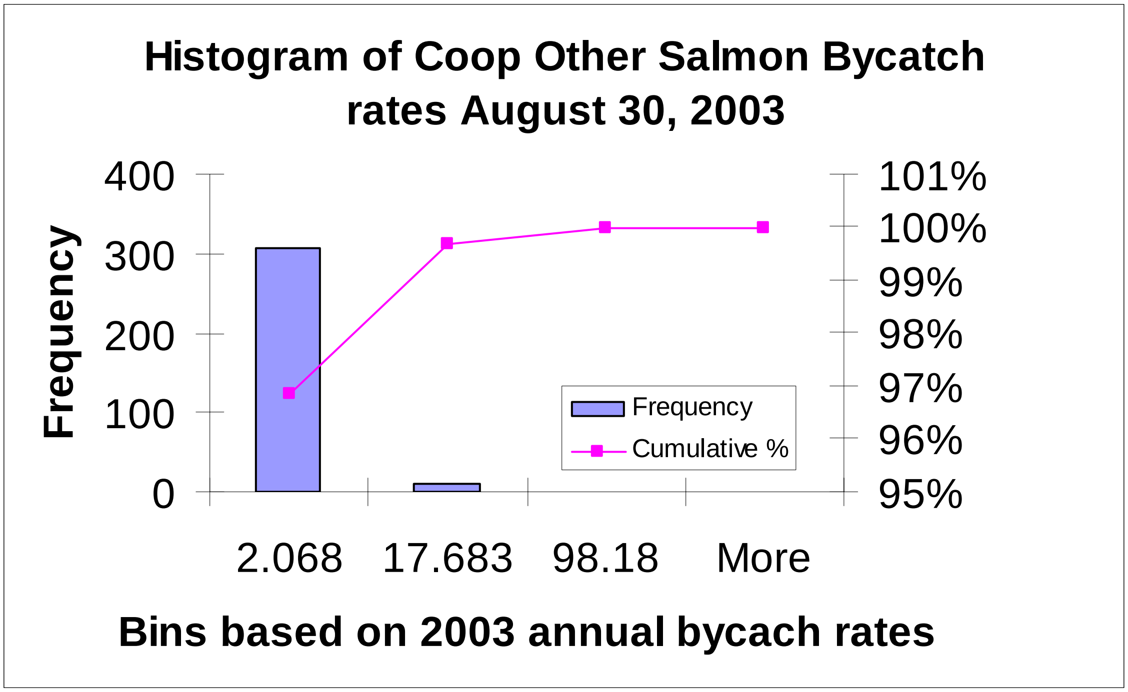


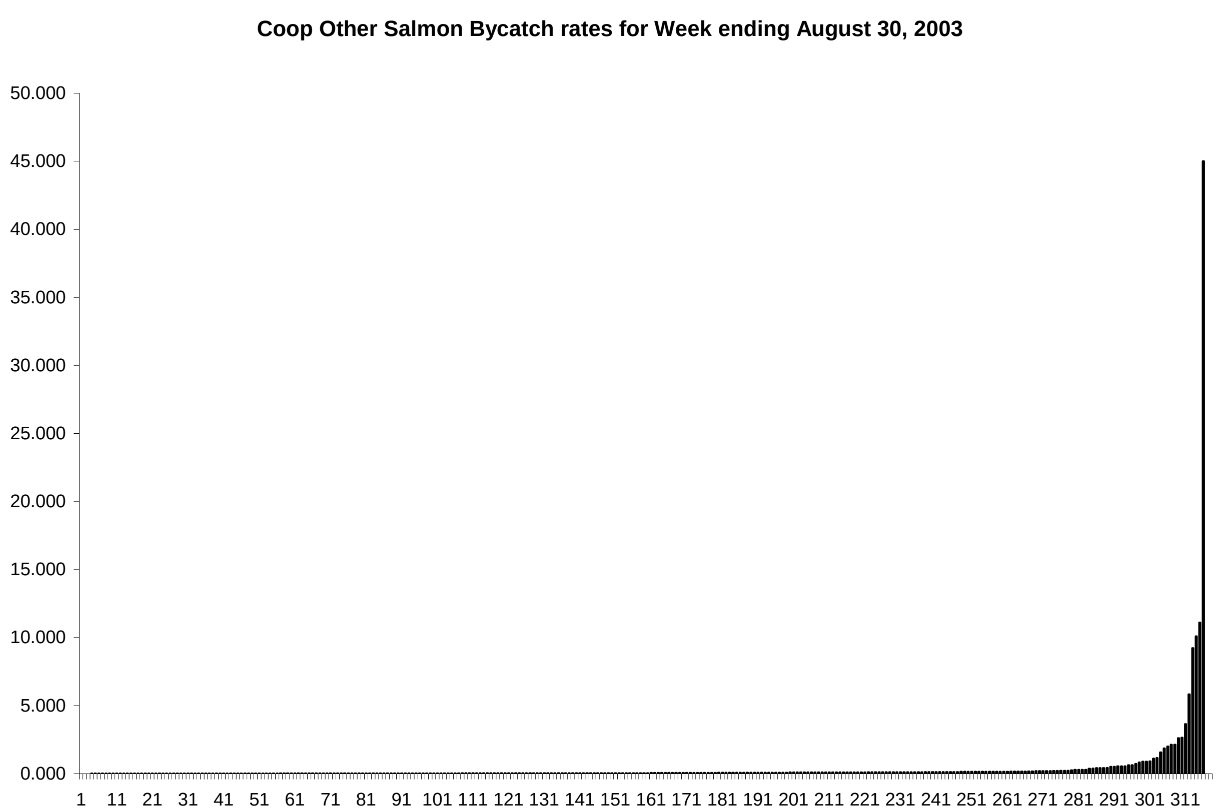
Appendix 4 - 77 Other salmon Bycatch rates in the CDQ Pollock Fishery "B" Season week ending August 23, 2003. a) Histogram representing the frequency of weekly hauls in each bin allocated to the annual bycatch rate and b) frequency distribution of number of hauls by bycatch rate



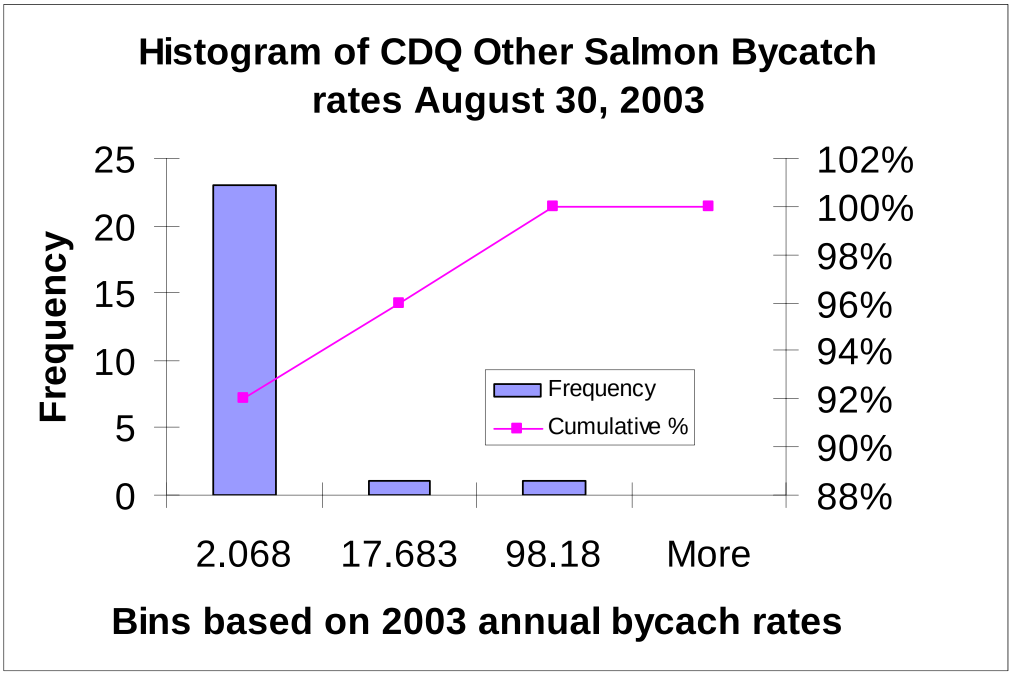


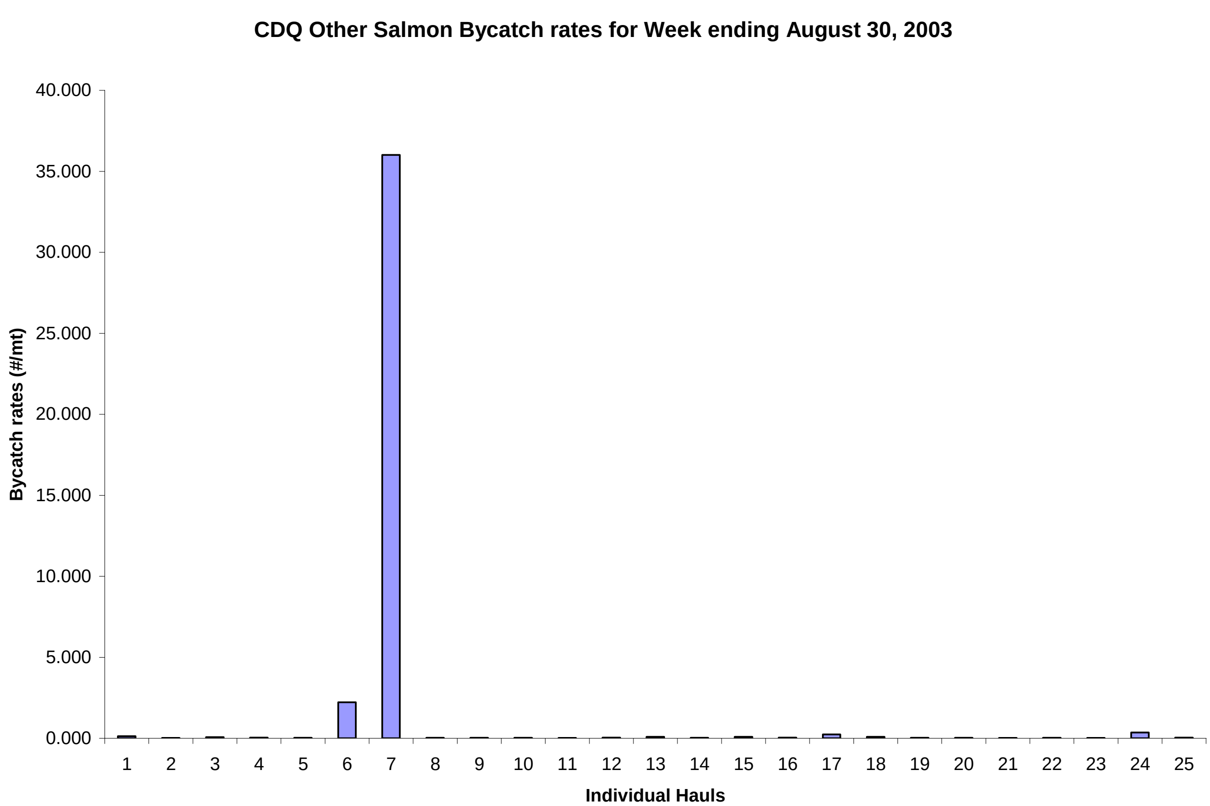
Appendix 4 - 78 Other salmon Bycatch rates in the non-CDQ Pollock Fishery "B" Season week ending August 30, 2003. a) Histogram representing the frequency of weekly hauls in each bin allocated to the annual bycatch rate and b) frequency distribution of number of hauls by bycatch rate



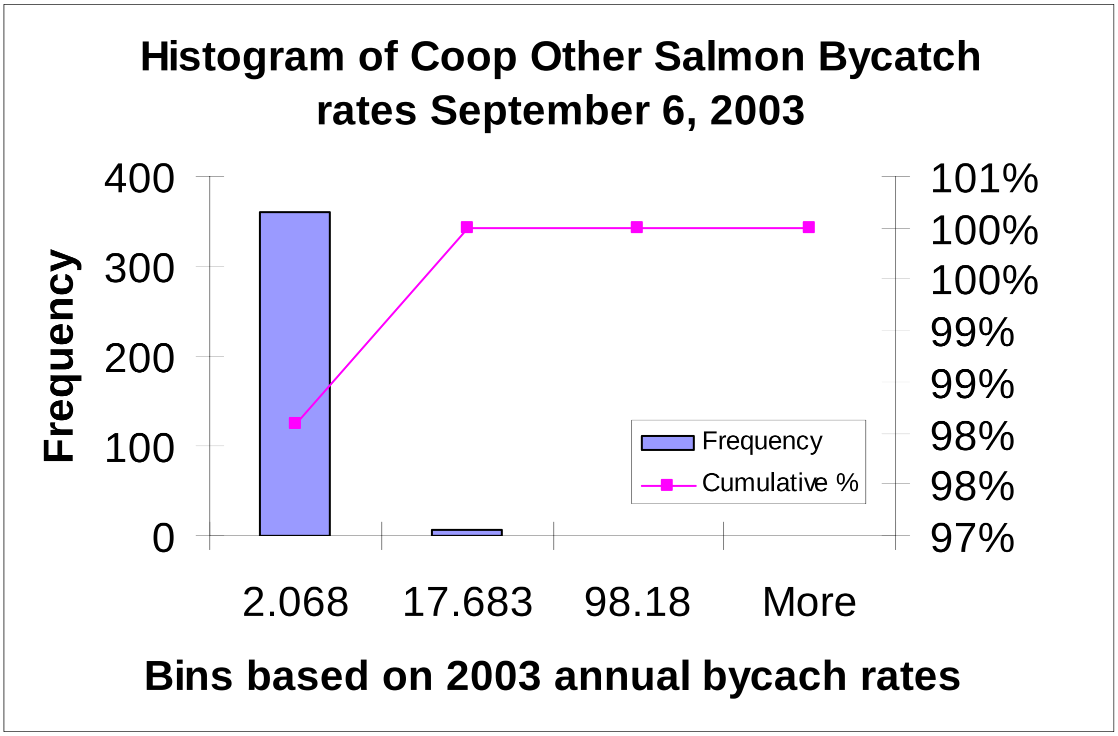


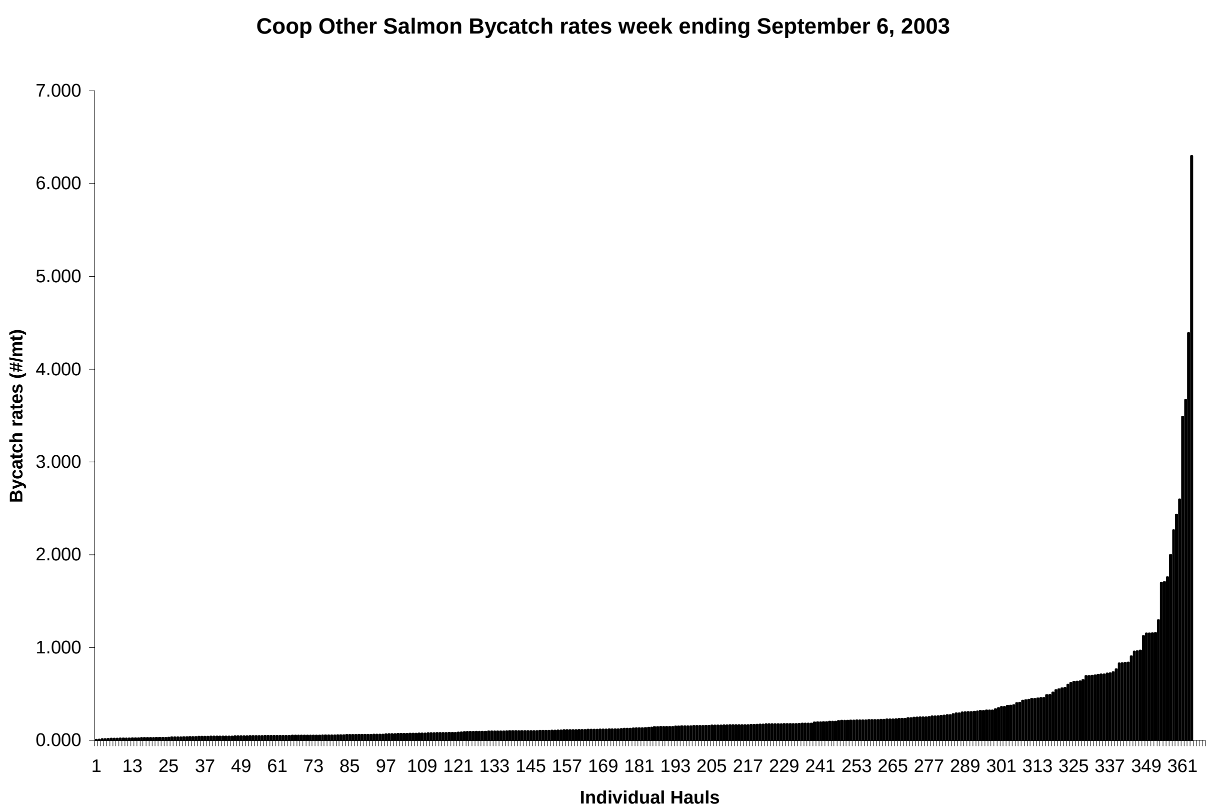
Appendix 4 - 79 Other salmon Bycatch rates in the CDQ Pollock Fishery "B" Season week ending August 30, 2003. a) Histogram representing the frequency of weekly hauls in each bin allocated to the annual bycatch rate and b) frequency distribution of number of hauls by bycatch rate



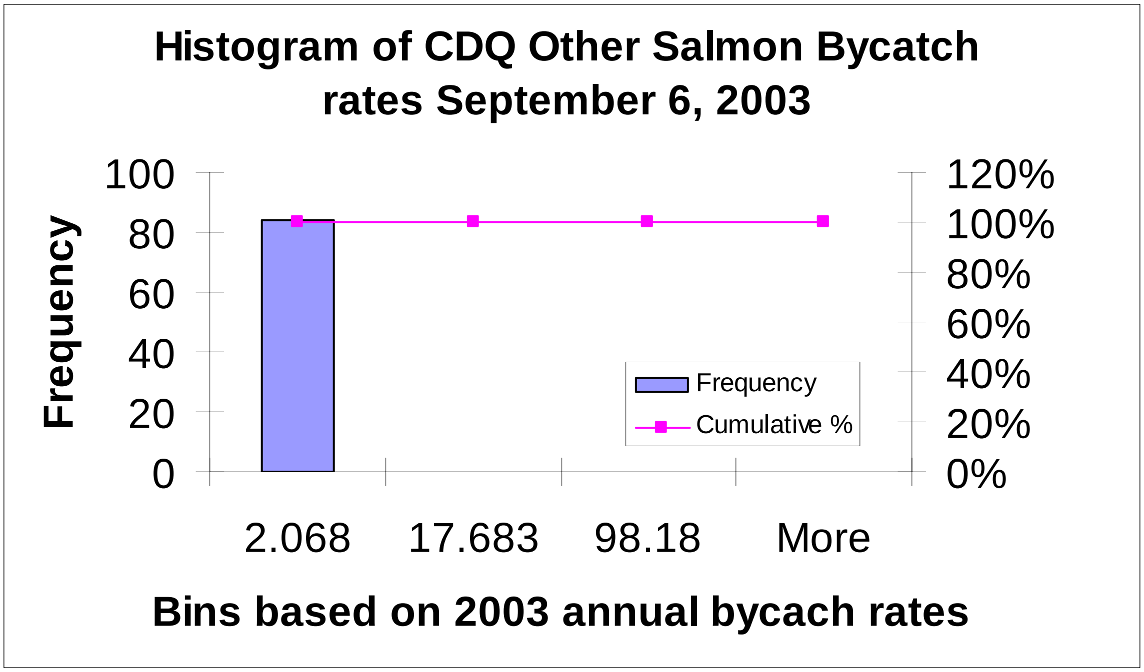


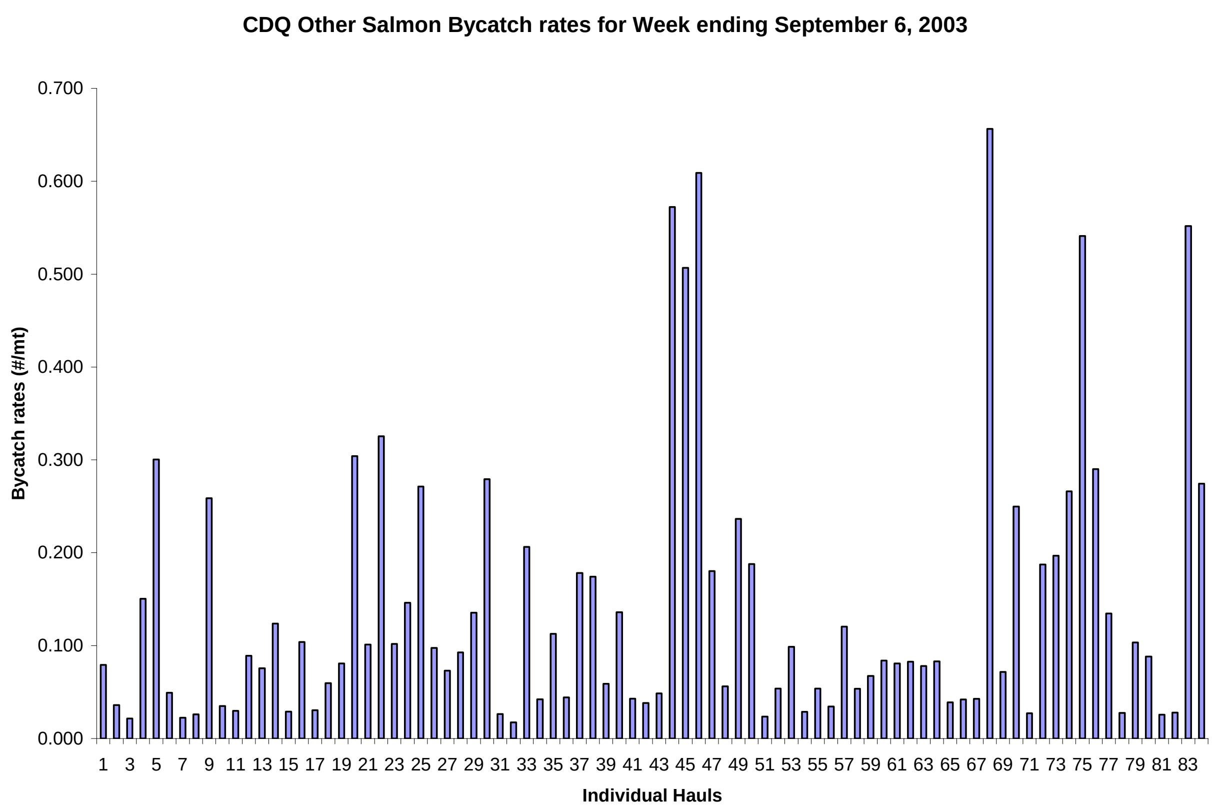
Appendix 4 - 80 Other salmon Bycatch rates in the non-CDQ Pollock Fishery "B" Season week ending September 6, 2003. a) Histogram representing the frequency of weekly hauls in each bin allocated to the annual bycatch rate and b) frequency distribution of number of hauls by bycatch rate



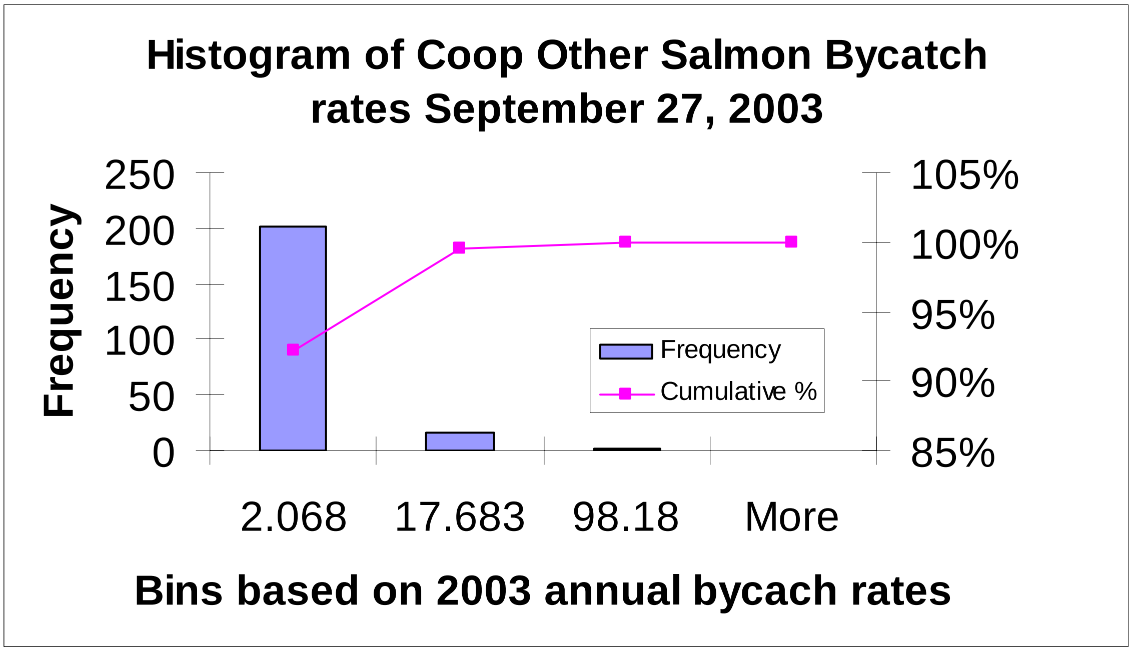


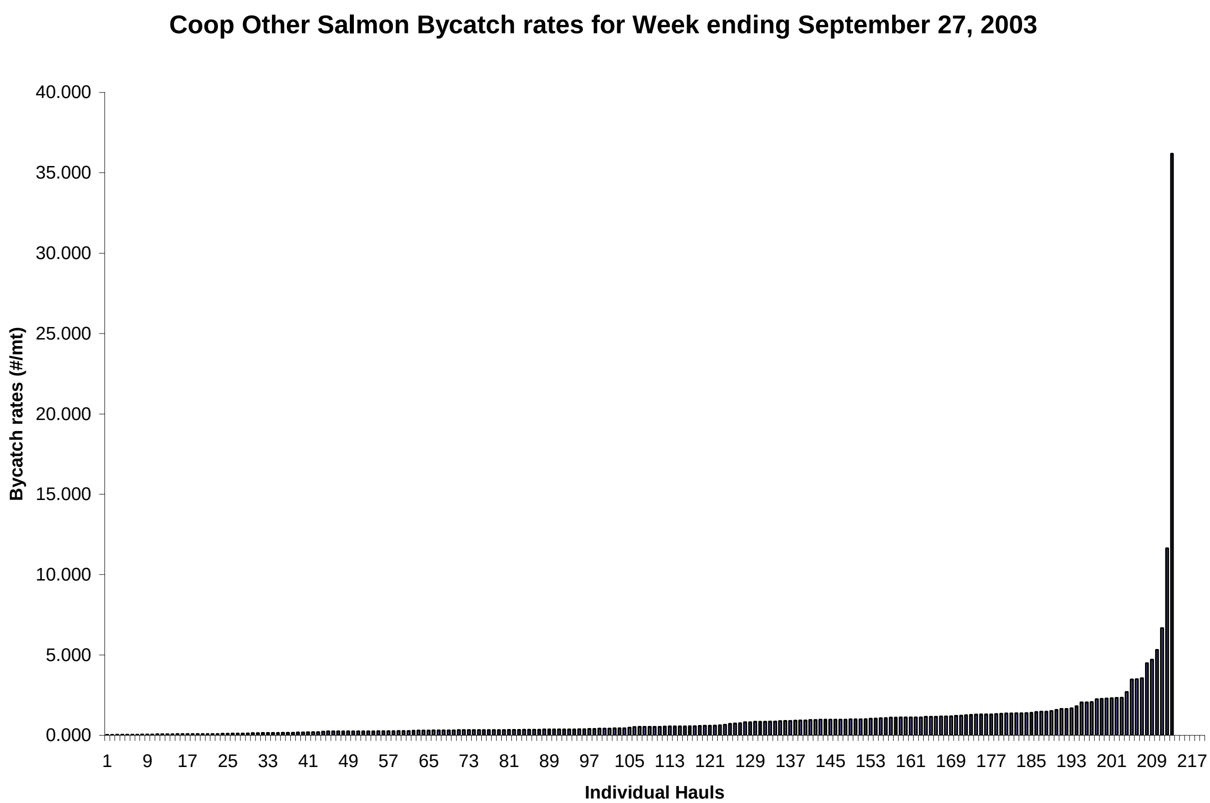
Appendix 4 - 81 Other salmon Bycatch rates in the CDQ Pollock Fishery "B" Season week ending September 6, 2003. a) Histogram representing the frequency of weekly hauls in each bin allocated to the annual bycatch rate and b) frequency distribution of number of hauls by bycatch rate



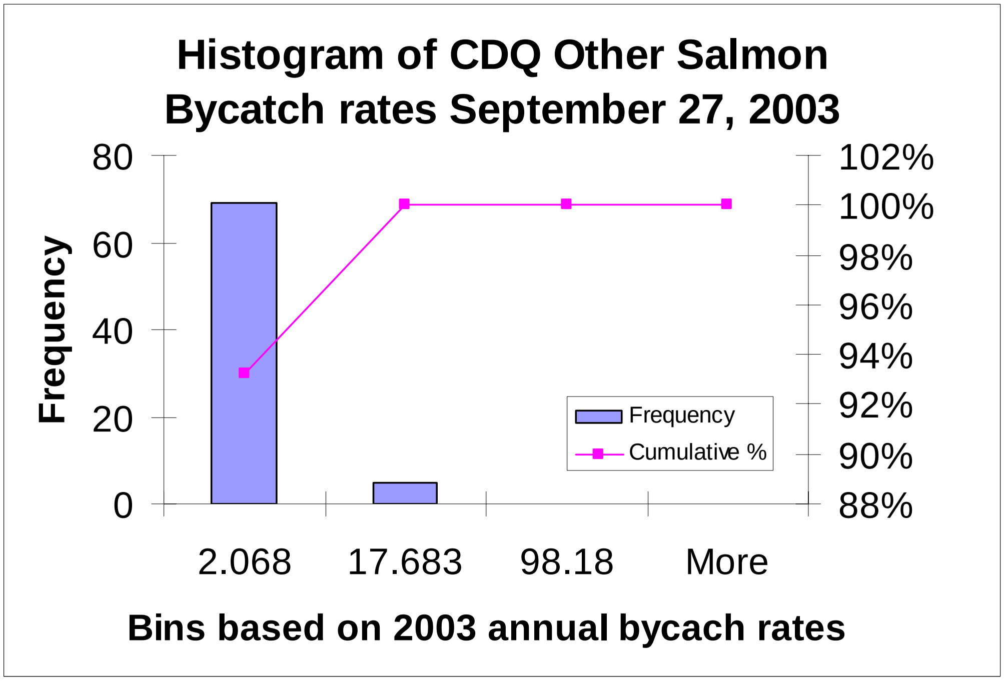


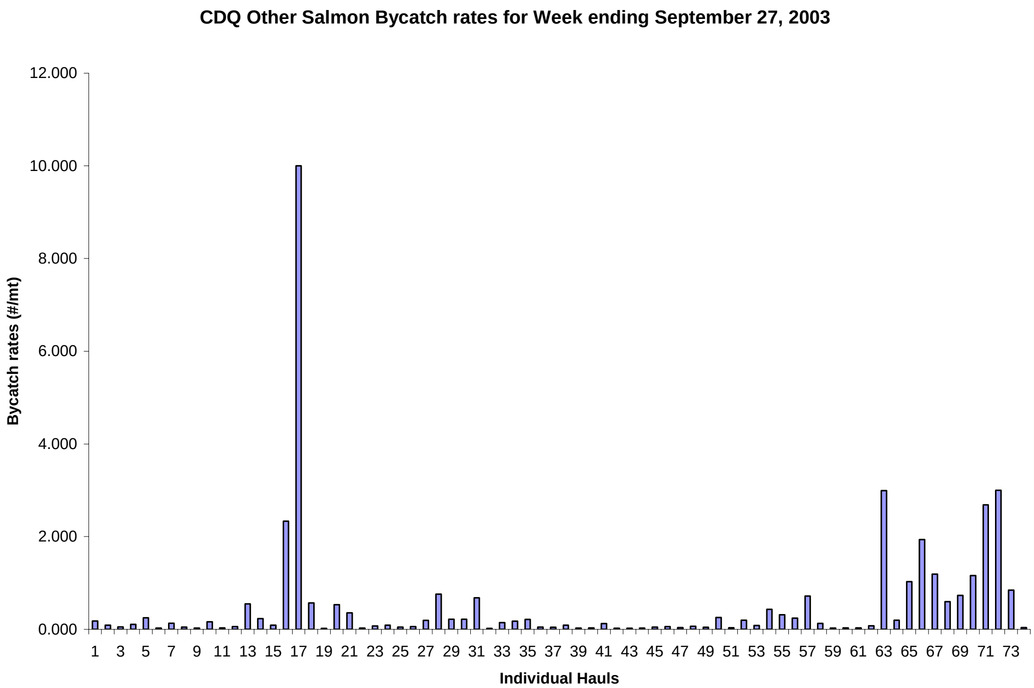
Appendix 4 - 82 Other salmon Bycatch rates in the non-CDQ Pollock Fishery "B" Season week ending September 27, 2003. a) Histogram representing the frequency of weekly hauls in each bin allocated to the annual bycatch rate and b) frequency distribution of number of hauls by bycatch rate



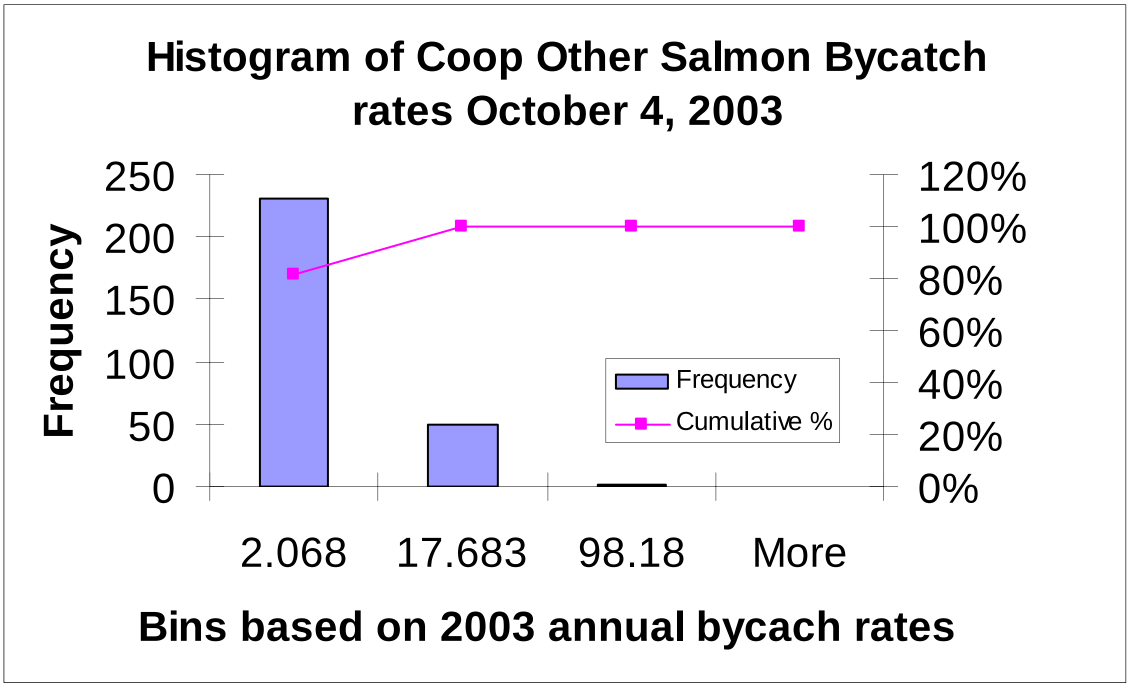


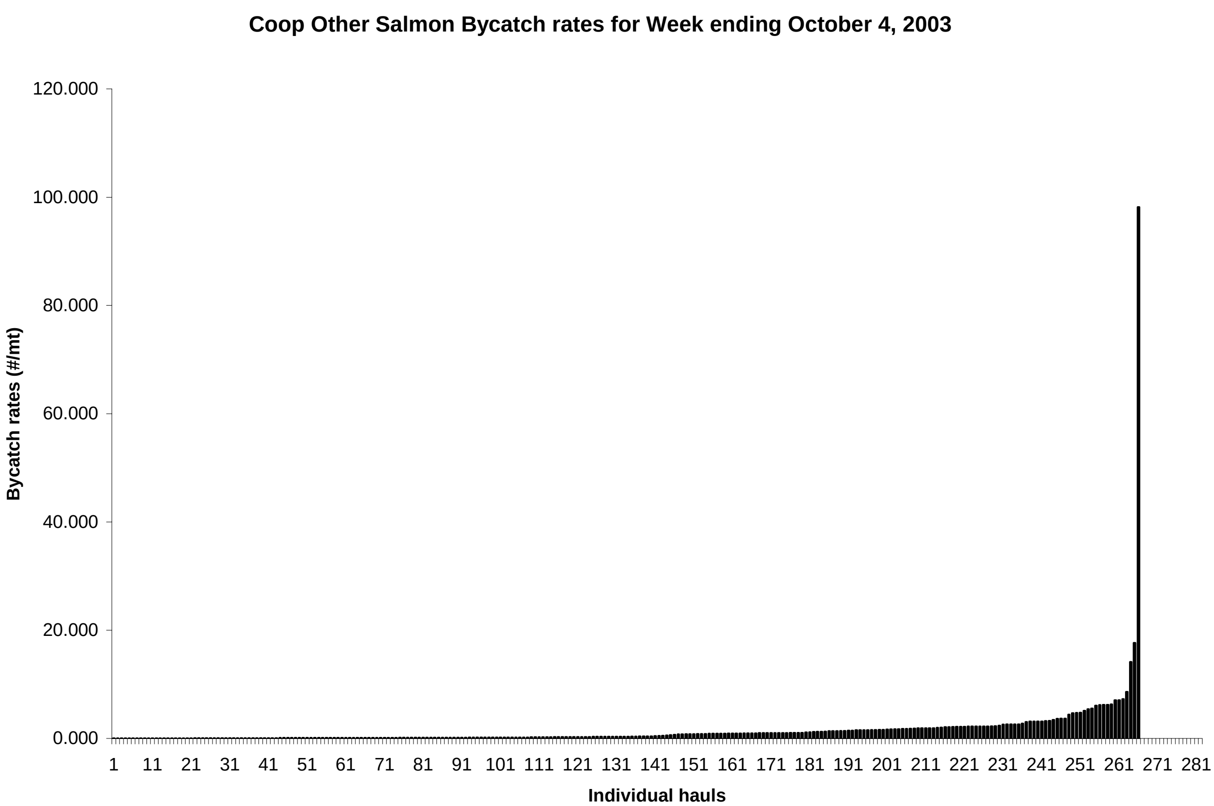
Appendix 4 - 83 Other salmon Bycatch rates in the CDQ Pollock Fishery "B" Season week ending September 27, 2003. a) Histogram representing the frequency of weekly hauls in each bin allocated to the annual bycatch rate and b) frequency distribution of number of hauls by bycatch rate



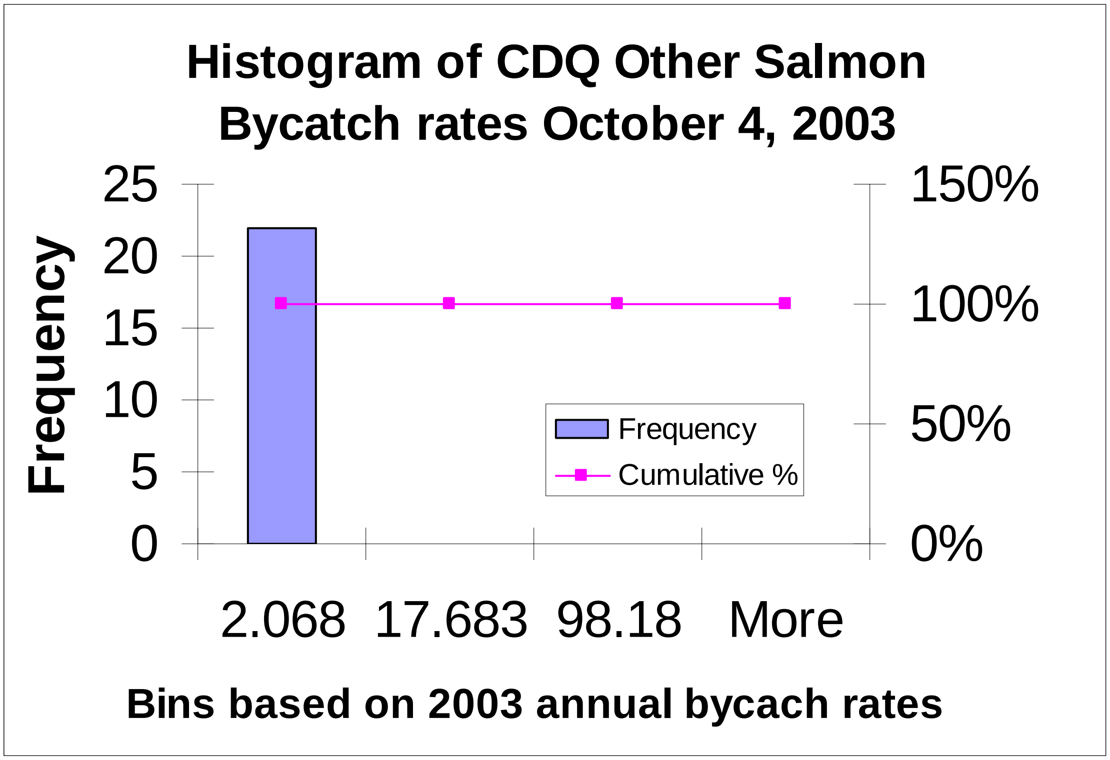


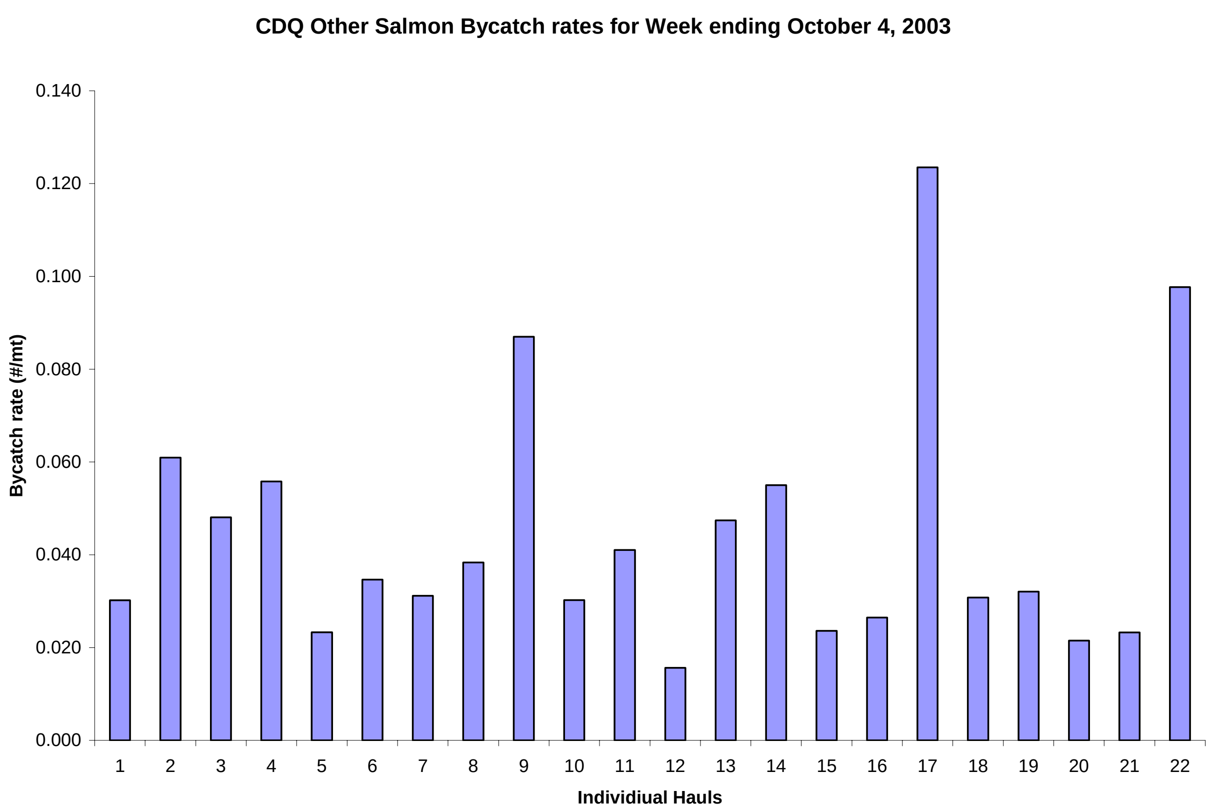
Appendix 4 - 84 Other salmon Bycatch rates in the non-CDQ Pollock Fishery "B" Season week ending October 4, 2003. a) Histogram representing the frequency of weekly hauls in each bin allocated to the annual bycatch rate and b) frequency distribution of number of hauls by bycatch rate



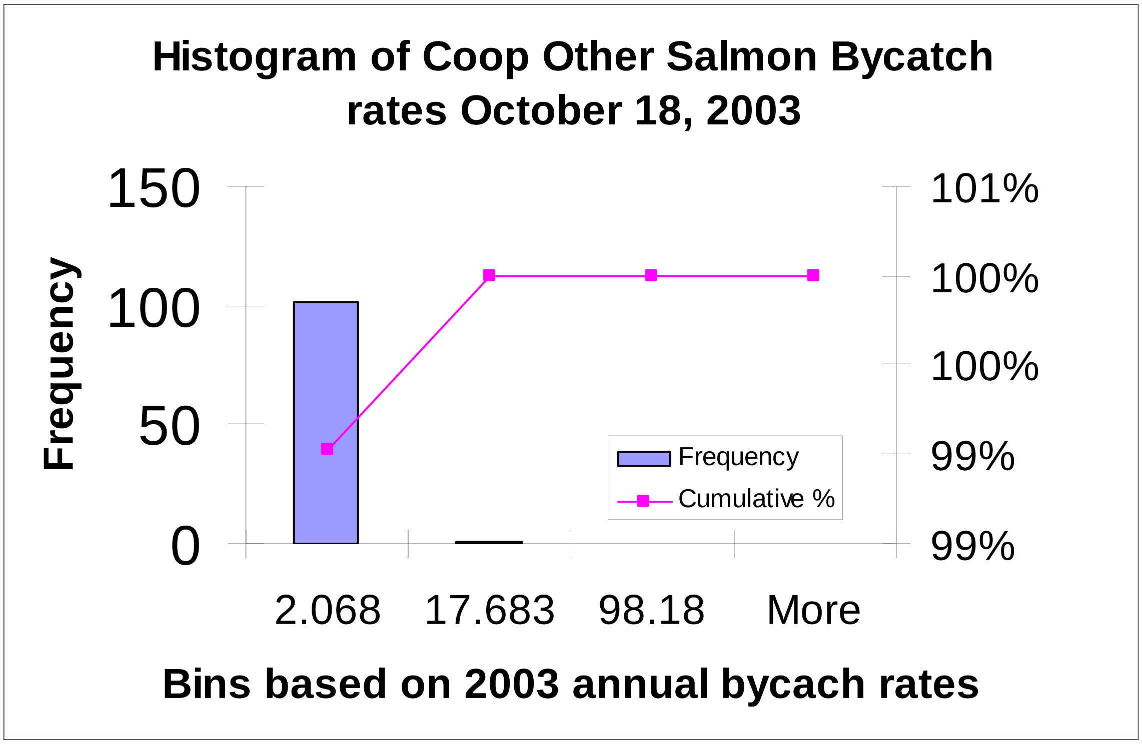


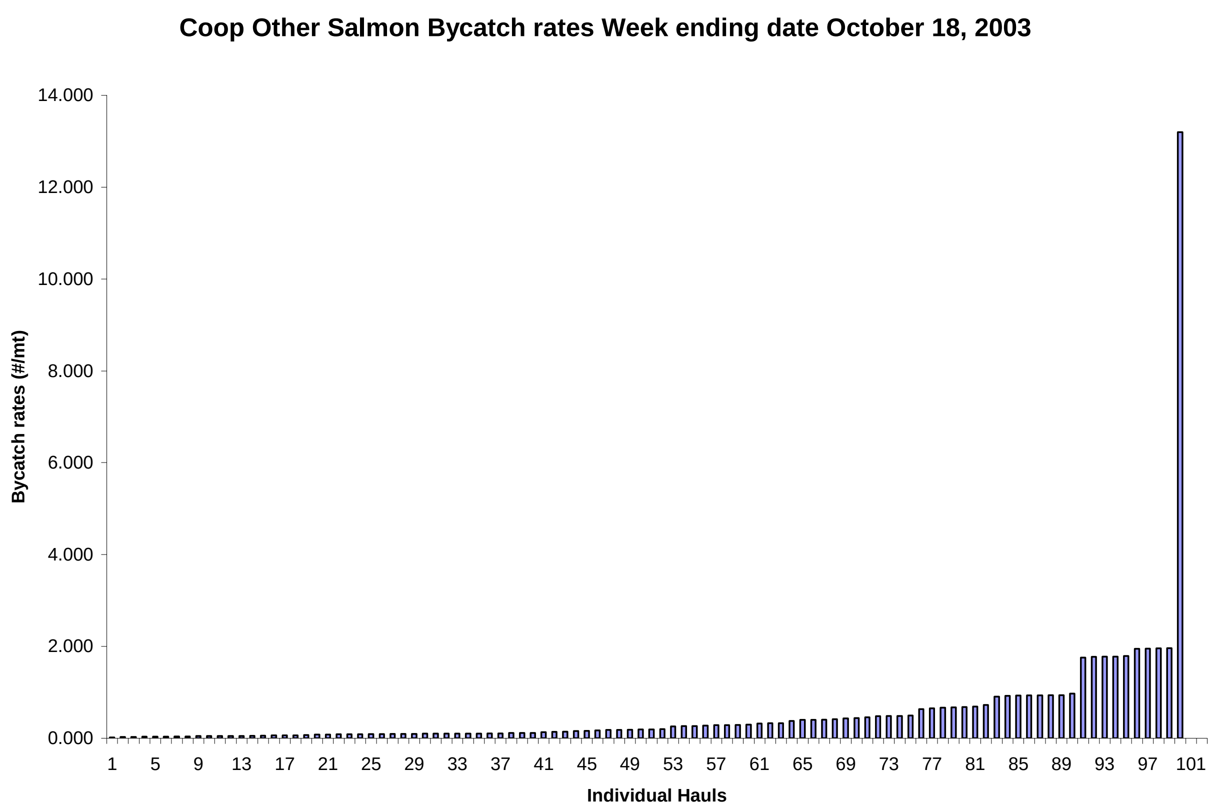
Appendix 4 - 85 Other salmon Bycatch rates in the CDQ Pollock Fishery "B" Season week ending October 4, 2003. a) Histogram representing the frequency of weekly hauls in each bin allocated to the annual bycatch rate and b) frequency distribution of number of hauls by bycatch rate



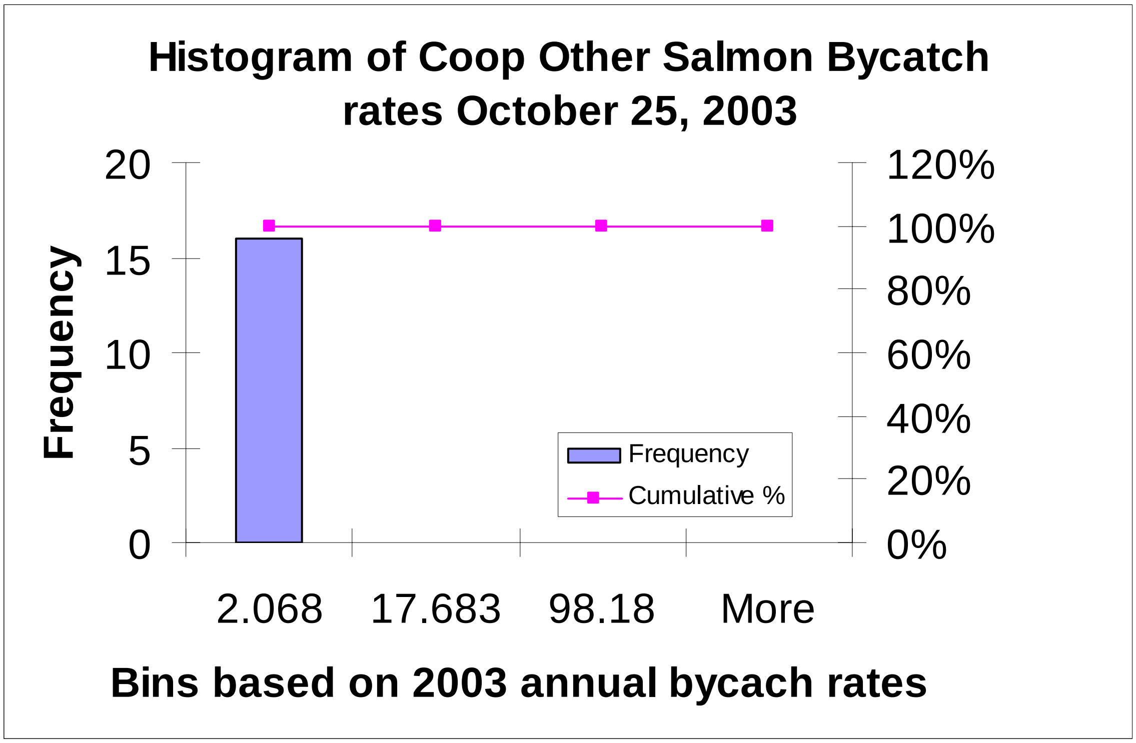


Appendix 4 - 86 Other salmon Bycatch rates in the non-CDQ Pollock Fishery "B" Season week ending October 18, 2003. a) Histogram representing the frequency of weekly hauls in each bin allocated to the annual bycatch rate and b) frequency distribution of number of hauls by bycatch rate





Appendix 4 - 87 Other salmon Bycatch rates in the non-CDQ Pollock Fishery "B" Season week ending October 25, 2003. a) Histogram representing the frequency of weekly hauls in each bin allocated to the annual bycatch rate and b) frequency distribution of number of hauls by bycatch rate



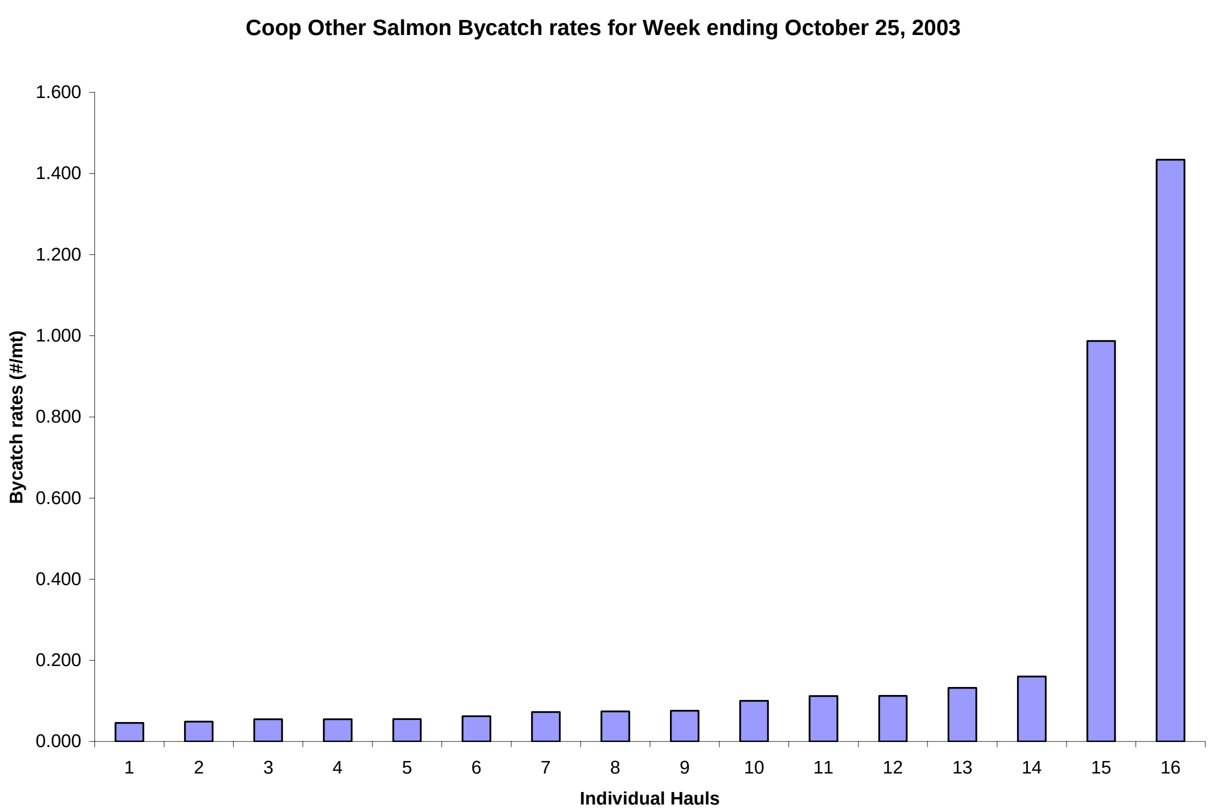


Table 4: Yukon River 2004 Summer Information Letter (ADF&G 2004b)

Table 4. Commercial chinook salmon sales and estimated harvest by area, district, and country, Yukon River drainage, 1961-2003.

	Lower Yukon Area [b]				Upper Yukon Area [a]													Estimated	Canada	
					District 4			District 5			District 6			Subtotal			Alaska Total		
Year	District 1	District 2	District 3	Subtotal	Number	Roe	Est. Harvest [c]	Number	Roe	Est. Harvest [c]	Number	Roe	Est. Harvest [c]	Number	Roe	Est. Harvest [c]	Harvest [c]	Total	Total
1961	84,466	29,026	4,368	117,860										1,804		1,804	119,664	3,446	123,110
1962	67,099	22,224	4,687	94,010										724		724	94,734	4,037	98,771
1963	85,004	24,221	7,020	116,245										803		803	117,048	2,283	119,331
1964	67,555	20,246	4,705	92,506										1,081		1,081	93,587	3,208	96,795
1965	89,268	23,763	3,204	116,235										1,863		1,863	118,098	2,265	120,363
1966	70,788	16,927	3,612	91,327										1,988		1,988	93,315	1,942	95,257
1967	104,350	20,239	3,618	128,207										1,449		1,449	129,656	2,187	131,843
1968	79,465	21,392	4,543	105,400										1,126		1,126	106,526	2,212	108,738
1969	71,688	14,756	3,595	90,039										988		988	91,027	1,640	92,667
1970	56,648	17,141	3,705	77,494										1,651		1,651	79,145	2,611	81,756
1971	86,042	19,226	3,490	108,758										1,749		1,749	110,507	3,178	113,685
1972	70,052	17,855	3,841	91,748										1,092		1,092	92,840	1,769	94,609
1973	56,981	13,859	3,204	74,044										1,309		1,309	75,353	2,199	77,552
1974 [d]	71,840	17,948	3,480	93,268	685		685	2,663		2,663	1,473		1,473	4,821		4,821	98,089	1,808	99,897
1975	44,585	11,315	4,177	60,077	389		389	2,872		2,872	500		500	3,761		3,761	63,838	3,000	66,838
1976	62,410	16,556	4,148	83,114	409		409	3,151		3,151	1,102		1,102	4,662		4,662	87,776	3,500	91,276
1977	69,915	16,722	3,965	90,602	985		985	4,162		4,162	1,008		1,008	6,155		6,155	96,757	4,720	101,477
1978	59,006	32,924	2,916	94,846	608		608	3,079		3,079	635		635	4,322		4,322	99,168	2,975	102,143
1979	75,007	41,498	5,018	121,523	1,989		1,989	3,389		3,389	772		772	6,150		6,150	127,673	6,175	133,848
1980	90,382	50,004	5,240	145,626	1,521		1,521	4,891		4,891	1,947		1,947	8,359		8,359	153,985	9,500	163,485
1981	99,506	45,781	4,023	149,310	1,347		1,347	6,374		6,374	987		987	8,708		8,708	158,018	8,593	166,611
1982	74,450	39,132	2,609	116,191	1,087		1,087	5,385		5,385	981		981	7,453		7,453	123,644	8,640	132,284
1983	95,457	43,229	4,106	142,792	601		601	3,606		3,606	911		911	5,118		5,118	147,910	13,027	160,937
1984	74,671	36,697	3,039	114,407	961		961	3,669		3,669	867		867	5,497		5,497	119,904	9,885	129,789
1985	90,011	48,365	2,588	140,964	664		664	3,418		3,418	1,142		1,142	5,224		5,224	146,188	12,573	158,761
1986	53,035	41,849	901	95,785	502		502	2,733		2,733	950		950	4,185		4,185	99,970	10,797	110,767
1987	76,643	47,458	2,039	126,140	1,524		1,524	3,758		3,758	3,338		3,338	8,620		8,620	134,760	10,864	145,624
1988 [f]	56,120	35,120	1,767	93,007	3,159		3,159	3,436		3,436	762		762	7,357		7,357	100,364	13,217	113,581
1989	61,570 [g]	33,166	1,645	96,381	2,790		2,790	3,286		3,286	1,741		1,741	7,817		7,817	104,198	9,789	113,987
1990	51,199 [h]	33,061	2,341	86,601	3,536	8	3,538	3,353	47	3,365	1,757	1,676	2,156	8,646	1,731	9,059	95,660	11,324	106,984
1991 [j]	56,332	39,260	2,344	97,936	2,446	2,222	3,582	3,810	62	3,826	686	1,545	1,072	6,942	3,829	8,480	106,416	10,906	117,322
1992 [k]	74,212	38,139	1,819	114,170	1,651	2,273	2,394	3,852	7	3,855	572	884	753	6,075	3,164	7,002	121,172	10,877	132,049
1993	49,286	37,293	1,501	88,080	1,349	701	1,577	3,008		3,008	1,113	1,313	1,445	5,470	2,014	6,030	94,110	10,350	104,460
1994	62,241	41,692	1,114	105,047	2,216	564	2,443	3,739	10	3,744	2,135	1,820	2,606	8,090	2,394	8,793	113,840	12,028	125,868
1995	76,106	41,458		117,564	262	626	499	3,242		3,242	1,660	4,731	2,747	5,164	5,357	6,488	124,052	11,146	135,198
1996	56,642	30,209		86,851	45	202	137	2,497	518	2,757	278	750	447	2,820	1,470	3,341	90,192	10,164	100,356
1997	66,384	39,363		105,747	1,450	14	1,457	3,678		3,678	1,966	3,211	2,728	7,094	3,225	7,863	113,610	5,311	118,921
1998	25,413	16,806		42,219				517		517	882	260	963	1,399	260	1,480	43,699	390	44,089
1999	37,161	27,133	538	64,832	1,437		1,437	2,604		2,604	402	1,096	689	4,443 0	1,096	4,730	69,562	3,160	72,722
2000 [m]	4,735	3,783		8,518													8,518	0	8,518
2001 [n]																		1,351	1,351
2002	11,159	11,434		22,593				771		771	836	896	1,066	1,607 0	896	1,837	24,430	708	25,138
2003 [p]	22,750	14,178		36,928	562		562	1,134		1,134	1,813		1,813	3,509		3,509	40,437	2,672	43,109
2004	28,401	24,164		52,565				1,546		1,546	2,057		2,057	3,603		3,603	56,168	3,521	59,689
1994-2003 Avg. [r]	40,288	27,784	826	72,723	995	352	1,089	2,273	264	2,306	1,247	1,823	1,632	4,266	2,100	4,755	77,478	5,697	83,175
2004 vs. Avg.	-29.5%	-13.0%	-100.0%	-27.7%			-100.0%			-33.0%			26.0%	-15.5%	-100.0%	-24.2%	-27.5%	-38.2%	-28.2%

[a] Harvest reported in numbers of fish sold in the round and pounds of roe sold. Since 1990, efforts were made to separate chinook roe from summer chum roe. Does not include department test fish sales.

[b] All fish sold in the round. Includes department test fish sales prior to 1988.

[c] The estimated harvest is the fish sold in the round plus the estimated number of females to produce the roe sold.

[d] In 1974, District 4 was subdivided to include Districts 5 and 6.

[f] Includes the illegal sales of 653 chinook salmon in District 5, and 2,136 chinook salmon in District 6.

[g] Includes the illegal sales of 3,211 chinook salmon.

[h] Includes the illegal sales of 1,101 chinook salmon.

[j] Includes the illegal sales of 2,711 chinook salmon in District 1, and 284 chinook salmon in District 2.

[k] Includes the illegal sales of 1,218 chinook salmon in District 1, and 207 chinook salmon in District 2.

[m] No commercial fishing periods in Districts 3,4, 5 and 6.

[n] No commercial fishing periods in Districts 1 through 6.

[p] Data are preliminary.

Table 5: Yukon River 2004 Summer Information Letter (ADF&G 2004b)

Table 5. Commercial summer chum salmon sales and estimated harvest by area and district, Yukon River drainage in Alaska, 1967-2003.

	Lower Yukon Area							
	District 1 [b]	District 2 [b]	District 3 [a]			Subtotal Lower Yukon Area		
Year	Number	Number	Number	Roe	Estimated Harvest [c]	Number	Roe	Estimated Harvest [c]
1967	9,453	1,425	57			10,935	-	10,935
1968	12,995	1,407	68			14,470	-	14,470
1969	56,886	5,080	-			61,966	-	61,966
1970	117,357	19,649	-			137,006	-	137,006
1971	93,928	6,112	50			100,090	-	100,090
1972	114,234	20,907	527			135,668	-	135,668
1973	221,644	63,402	463			285,509	-	285,509
1974 [d]	466,004	74,152	1,721			541,877	-	541,877
1975	418,323	99,139	-			517,462	-	517,462
1976	273,204	99,190	9,802			382,196	-	382,196
1977	250,652	105,679	3,412			359,743	-	359,743
1978	393,785	227,548	27,003			648,336	-	648,336
1979	369,934	172,838	40,015			582,787	-	582,787
1980	391,252	308,704	44,782			744,738	-	744,738
1981	507,158	351,878	54,471			913,507	-	913,507
1982	249,516	182,344	4,086			435,946	-	435,946
1983	451,164	248,092	14,600			713,856	-	713,856
1984	292,676	236,931	1,087			530,694	-	530,694
1985	247,486	188,099	1,792			437,377	-	437,377
1986	381,127	288,427	442			669,996	-	669,996
1987	222,898	174,876	3,501			401,275	-	401,275
1988	645,322	424,461	13,965			1,083,748	-	1,083,748
1989	544,373 [f]	343,032	7,578			894,983	-	894,983
1990	146,725	131,755	643			279,123	-	279,123
1991	140,470 [h]	175,149	8,912			324,531	-	324,531
1992 [I]	177,329	147,129	65			324,523	-	324,523
1993	73,659	19,332	463			93,454	-	93,454
1994	42,332	12,869	35			55,236	-	55,236
1995	142,266	83,817	0			226,083	-	226,083
1996	92,506	30,727	0	935	1,534	123,233	935	124,767
1997	59,915	18,242				78,157	0	78,157
1998	21,270	6,848				28,118	0	28,118
1999	16,181	11,702	0	0	0	27,883	0	27,883
2000 [k]	3,315	3,309		-	-	6,624	0	6,624
2001 [m]	-	-		-	-	-	-	-
2002	6,333	4,011		-	-	10,344		10,344
2003 [p]	3,579	2,583		-	-	6,162		6,162
2004 [p]	13,993	5,782				19,775		19,775
1994-2003 Avg.	48,048	21,350			767			69,594
2004 vs. Avg.	-70.9%	-72.9%			-100.0%			-71.6%

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Table 5: Yukon River 2004 Summer Information Letter (ADF&G 2004b)

Table 5. (page 2 of 3)

	Upper Yukon Area [a]								
	District 4			District 5			District 6		
Year	Number	Roe	Estimated Harvest [c]	Number	Roe	Estimated Harvest [c]	Number	Roe	Estimated Harvest [c]
1967	-	-	-	-	-	-	-	-	-
1968	-	-	-	-	-	-	-	-	-
1969	-	-	-	-	-	-	-	-	-
1970	-	-	-	-	-	-	-	-	-
1971	-	-	-	-	-	-	-	-	-
1972	-	-	-	-	-	-	-	-	-
1973	-	-	-	-	-	-	-	-	-
1974 [d]	27,866	-	27,866	6,831	-	6,831	13,318	-	13,318
1975	165,054	-	165,054	12,997	-	12,997	14,782	-	14,782
1976	211,307	-	211,307	774	-	774	6,617	-	6,617
1977	169,541	-	169,541	1,274	-	1,274	4,317	-	4,317
1978	364,184	16,920	381,104	4,892	605	5,497	34,814	8,236	43,050
1979	169,430	35,317	204,747	8,608	1,009	9,617	18,491	3,891	22,382
1980	147,560	135,824	283,384	456	-	456	35,855	3,282	39,137
1981	59,718	187,032	330,445	1,236	49	1,285	32,477	1,987	34,464
1982	3,647	151,281	257,719	213	21	234	21,597	1,517	23,114
1983	6,672	148,125	255,388	42	1,856	1,898	24,309	18	24,327
1984	1,009	166,842	278,070	645	47	692	56,249	335	56,584
1985	12,007	247,085	427,483	700	-	700	66,913	1,540	68,453
1986	300	269,545	465,535	690	-	690	50,483	2,146	52,629
1987	29,991	121,474	209,800	362	44	406	10,610	450	11,060
1988	24,051	254,526	490,074	722	363	1,085	40,129	1,646	41,775
1989	18,554	283,305	510,244	154	373	527	42,115	4,871	46,986
1990	12,364	105,723	222,550	11	594	671	11,127 [g]	3,059	14,833
1991	6,381	137,232	309,644	4	28	35	18,197	4,716	23,892
1992 [f]	2,659	110,809	211,396	102	295	430	5,029	1,892	7,228
1993	27	22,447	42,957	0	0	0	3,041	515	3,705
1994	3,611	89,717	171,607	229	212	464	21,208	7,828	31,434
1995	8,873	281,074	554,587	107	188	316	24,711	9,475	37,428
1996	0	295,190	510,240	0	302	336	22,360	18,332	46,890
1997	2,062	74,231	124,671	137	0	137	14,886	9,036	25,287
1998	0	0	0	96	13	110	397	140	570
1999	1,267	0	1,267	115	0	115	124	24	147
2000 [k]	-	-	-	-	-	-	-	-	-
2001 [m]	-	-	-	-	-	-	-	-	-
2002	0	0	0	6	-	6	3,198	16	3,218
2003 [p]	62	0	62	-	-	-	4,461	-	4,461
2004 [p]	-	-	-	25	-	25	6,610	-	6,610
1994-2003 Avg. [r]			170,304			212			18,679
2004 vs. Avg.			-100.0%			-88.2%			-64.6%

-Continued-

Table 5: Yukon River 2004 Summer Information Letter (ADF&G 2004b)

Table 5. (page 3 of 3)

	Subtotal Upper Yukon Area			Total Yukon River		
Year	Number	Roe	Estimated Harvest [c]	Number	Roe	Estimated Harvest [c]
1967	0	0	0	10,935	0	10,935
1968	0	0	0	14,470	0	14,470
1969	0	0	0	61,966	0	61,966
1970	0	0	0	137,006	0	137,006
1971	0	0	0	100,090	0	100,090
1972	0	0	0	135,668	0	135,668
1973	0	0	0	285,509	0	285,509
1974 [d]	48,015	0	48,015	589,892	0	589,892
1975	192,833	0	192,833	710,295	0	710,295
1976	218,698	0	218,698	600,894	0	600,894
1977	175,132	0	175,132	534,875	0	534,875
1978	403,890	25,761	429,651	1,052,226	25,761	1,077,987
1979	196,529	40,217	236,746	779,316	40,217	819,533
1980	183,871	139,106	322,977	928,609	139,106	1,067,715
1981	93,431	189,068	366,194	1,006,938	189,068	1,279,701
1982	25,457	152,819	281,067	461,403	152,819	717,013
1983	31,023	149,999	281,613	744,879	149,999	995,469
1984	57,903	167,224	335,346	588,597	167,224	866,040
1985	79,620	248,625	496,636	516,997	248,625	934,013
1986	51,473	271,691	518,854	721,469	271,691	1,188,850
1987	40,963	121,968	221,266	442,238	121,968	622,541
1988	64,902	256,535	532,934	1,148,650	256,535	1,616,682
1989	60,823	288,549	557,757	955,806	288,549	1,452,740
1990	23,502	109,376	238,054	302,625	109,376	517,177
1991	24,582	141,976	333,571	349,113	141,976	658,102
1992 [i]	7,790	112,996	219,054	332,313	112,996	543,577
1993	3,068	22,962	46,662	96,522	22,962	140,116
1994	25,048	97,757	203,505	80,284	97,757	258,741
1995	33,691	290,737	592,331	259,774	290,737	818,414
1996	22,360	313,824	557,466	145,593	314,759	682,233
1997	17,085	83,267	150,095	95,242	83,267	228,252
1998	493	153	680	28,611	153	28,798
1999	1,506	24	1,529	29,389	24	29,412
2000 [k]	-	-	-	6,624	-	6,624
2001 [m]	-	-	-	-	-	-
2002	3,204	16	3,224	13,548	16	13,568
2003	4,523	-	4,523	10,685	-	10,685
2004 [p]	6,635	-	6,635	26,410	-	26,410
1994-2003 Avg. [r]	13,489	112,254	189,169	74,417	112,388	258,763
2004 vs. Avg.	-50.8%	-100.0%	-96.5%	-64.5%	-100.0%	-89.8%

[a] Harvest reported in numbers of fish sold in the round and pounds of roe. Roe sales may include some pink and chinook salmon roe. Does not include department test fish sales.

[b] All sales are fish in the round in District 1 and 2. Includes department test fish sales prior to 1988.

[c] The estimated harvest is the fish sold in the round plus the estimated number of females caught to produce the roe sold. In addition, the estimated harvest for Districts 3 and 4 includes the estimated number of unsold males harvested.

[d] In 1974, District 4 was subdivided to include Districts 5 and 6.

[f] Includes the illegal sales of 150 summer chum salmon in District 1.

[g] Does not include 1,233 female summer chum salmon sold in Subdistrict 6-C with roe extracted and roe sold separately These fish are included in estimated harvest to produce roe sold.

[h] Includes the illegal sales of 1,023 summer chum salmon.

[i] Includes the illegal sales of 31 summer chum salmon in District 1, and 91 summer chum salmon in District 2.

[k] No commercial fishing periods in Districts 3, 4, 5 and 6.

[m] No commercial fishing periods in Districts 1 through 6.

[p] Data are preliminary.

r Does not include 2000 or 2001 .

Table 6: Yukon River 2004 Summer Information Letter (ADF&G 2004b)

Table 6. Number of commercial salmon fishing gear permit holders who delivered fish, listed by district and season, Yukon Area, 1971-2004.

	Chinook and Summer Chum Salmon Season								
	Lower Yukon Area				Upper Yukon Area				
Year	District 1	District 2	District 3	Subtotal [a]	District 4	District 5	District 6	Subtotal	Total
1971	405	154	33	592	-	-	-	-	592
1972	426	153	35	614	-	-	-	-	614
1973	438	167	38	643	-	-	-	-	643
1974	396	154	42	592	27	31	20	78	670
1975	441	149	37	627	93	52	36	181	808
1976	453	189	42	684	80	46	29	155	839
1977	392	188	46	626	87	41	18	146	772
1978	429	204	22	655	80	45	35	160	815
1979	425	210	22	657	87	34	30	151	808
1980	407	229	21	657	79	35	33	147	804
1981	448	225	23	696	80	43	26	149	845
1982	450	225	21	696	74	44	20	138	834
1983	455	225	20	700	77	34	25	136	836
1984	444	217	20	613	54	31	27	112	725
1985	425	223	18	666	74	32	27	133	799
1986	441	239	7	672	75	21	27	123	795
1987	440	239	13	659	87	30	24	141	800
1988	456	250	22	678	95	28	33	156	834
1989	445	243	16	687	98	32	29	159	846
1990	453	242	15	679	92	27	23	142	821
1991	489	253	27	678	85	32	22	139	817
1992	438	263	19	679	90	28	19	137	816
1993	448	238	6	682	75	30	18	123	805
1994	414	250	7	659	55	28	20	103	762
1995	439	233	0	661	87	28	21	136	797
1996	448	189	9	627	87	23	15	125	752
1997	457	188	0	639	39	29	15	83	722
1998	434	231	0	643	0	18	10	28	671
1999	412	217	5	631	5	26	6	37	668
2000	350	214	-	562	-	-	-	-	562
2001 [b]	-	-	-	-	-	-	-	-	-
2002	323	223	[c]	540	[c]	14	6	20	560
2003	352	217	[c]	556	3	16	7	26	582
2004	396	213	[c]	550	[c]	14	6	20	570
1994-2003 Avg.	403	218	4	613	39	23	13	70	675
2004 vs. Avg.	-1.8%	-2.3%	-100.0%	-10.3%	-100.0%	-38.5%	-52.0%	-71.3%	-15.6%

[a] Since 1984 the subtotal for the Lower Yukon Area was the unique number of permits fished. Prior to 1984, the subtotals are additive for District 1, 2, and 3. Some individual fishermen in the Lower Yukon Area may have operated in more than one district during the year.

[b] No commercial fishing occurred in 2001.

[c] No commercial fishing periods in portions or all of Districts 3 and 4.

Table 7: Yukon River 2004 Summer Information Letter (ADF&G 2004b)

Table 7. Value of commercial salmon fishery to Yukon Area fishermen, 1977-2003.

	Chinook					Summer Chum						Value by Species		Value by Area		
	Lower Yukon		Upper Yukon			Lower Yukon			Upper Yukon							
Year	$/lb	Value	$/lb	$/Roe	Value	$/lb	$/Roe	Value	$/lb	$/Roe	Value	Chinook	Summer Chum	Lower	Upper	Total
1977	0.85	1,841,033	1.37		148,766	0.40		1,007,280	0.27	2.66	306,481	1,989,799	1,313,761	2,848,313	455,247	3,303,560
1978	0.90	2,048,674	0.87		66,472	0.45		2,071,434	0.24	N/A	655,738	2,115,146	2,727,172	4,120,108	722,210	4,842,318
1979	1.09	2,763,433	1.00		124,230	0.52		2,242,564	0.25	3.00	444,924	2,887,663	2,687,488	5,005,997	569,154	5,575,151
1980	1.04	3,409,105	0.85		113,662	0.20		1,027,738	0.23	2.50	627,249	3,522,767	1,654,987	4,436,843	740,911	5,177,754
1981	1.20	4,420,669	1.00		206,380	0.40		2,741,178	0.20	3.00	699,876	4,627,049	3,441,054	7,161,847	906,256	8,068,103
1982	1.41	3,768,107	1.02		162,699	0.40		1,237,735	0.18	2.75	452,837	3,930,806	1,690,572	5,005,842	615,536	5,621,378
1983	1.40	4,093,562	1.08		105,584	0.34		1,734,270	0.16	1.66	281,883	4,199,146	2,016,153	5,827,832	387,467	6,215,299
1984	1.50	3,510,923	0.95		102,354	0.26		926,922	0.23	1.78	382,776	3,613,277	1,309,698	4,437,845	485,130	4,922,975
1985	1.50	4,294,432	0.86		82,644	0.35		1,032,700	0.23	1.94	593,801	4,377,076	1,626,501	5,327,132	676,445	6,003,577
1986	1.63	3,165,078	0.89		73,363	0.38		1,746,455	0.22	2.08	634,091	3,238,441	2,380,546	4,911,533	707,454	5,618,987
1987	1.98	5,428,933	0.79		136,196	0.48		1,313,618	0.19	2.22	323,611	5,565,129	1,637,229	6,742,551	459,807	7,202,358
1988	2.97	5,463,800	1.04		142,284	0.66		5,001,100	0.23	4.33	1,213,991	5,606,084	6,215,091	10,464,900	1,356,275	11,821,175
1989	2.77	5,181,700	0.84		108,178	0.34		2,217,700	0.24	4.41	1,377,117	5,289,878	3,594,817	7,399,400	1,485,295	8,884,695
1990	2.84	4,820,859	0.72		105,295	0.24		497,571	0.11	4.41	506,611	4,926,154	1,004,182	5,318,430	611,906	5,930,336
1991	3.70	7,128,300	0.70	2.92	97,140	0.36		782,300	0.18	4.21	627,177	7,225,440	1,409,477	7,910,600	724,317	8,634,917
1992	4.12	9,957,002	0.91	2.82	168,999	0.27		606,976	0.30	4.53	525,204	10,126,001	1,132,180	10,563,978	694,203	11,258,181
1993	2.70	4,884,044	1.06	5.52	113,217	0.37		226,772	0.35	8.53	203,762	4,997,261	430,534	5,110,815	316,979	5,427,794
1994	2.07	4,169,270	0.92	3.11	124,270	0.21		79,206	0.20	3.77	396,685	4,293,540	475,891	4,248,476	520,955	4,769,431
1995	2.09	5,317,508	0.77	2.64	87,059	0.16		241,598	0.13	3.57	1,060,322	5,404,567	1,301,920	5,559,106	1,147,381	6,706,487
1996	1.95	3,491,582	0.95	2.57	47,282	0.09	2.96	89,020	0.07	3.05	966,277	3,538,864	1,055,297	3,580,602	1,013,559	4,594,161
1997	2.46	5,450,433	0.97	1.62	110,713	0.10		56,535	0.07	1.08	96,806	5,561,146	153,341	5,506,968	207,519	5,714,487
1998	2.51	1,911,370	0.91	2.00	17,285	0.14		26,415	0.18	1.90	821	1,928,655	27,236	1,937,785	18,106	1,955,891
1999	3.80	4,950,522	1.10	2.11	74,475	0.10		19,687	0.18	2.25	1,719	5,024,997	21,406	4,970,209	76,194	5,046,403
2000	4.57	725,606				0.17		8,633				725,606	8,633	734,239		734,239
2001																
2002	3.77	1,691,105	0.75	1.75	20,744	0.06		4,342	0.32	2.25	6,176	1,711,849	10,518	1,695,447	26,920	1,722,367
2003	2.37	1,871,202	0.80		40,957	0.05		1,585	0.27		6,879	1,912,159	8,464	1,872,787	47,836	1,920,623
2004	2.80	3,063,667	0.77		38,290	0.05		8,884	0.27		9,645	3,101,957	18,529	3,072,551	47,935	3,120,486
1994-2003 Avg.	2.63	3,606,624	0.90	2.26	65,348	0.11	2.96	64,799	0.18	2.55	316,961	3,671,972	381,759	3,671,423	382,309	4,053,731
2004 vs. Avg.	6.6%	-15.1%	-14.0%		-41.4%	-56.0%		-86.3%	49.9%		-97.0%	-15.5%	-95.1%	-16.3%	-87.5%	-23.0%

[a] Does not include 2000 or 2001.

Table 4: Yukon River 2004 Fall Information Letter (ADF&G 2004a)

Table 4. Fall chum salmon subsistence harvest totals by fishing district and community of residence, Yukon Area, 1991-2003. Harvests are estimated from post season survey, returned permits and test fish projects.

Community	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	1993-1997 Average	1998-2002 Average
Hooper Bay	127	113	284	207	392	0	0	0	78	364	44	40	199	97
Scammon Bay	79	7	63	147	0	0	34	204	11	195	240	106	43	137
Coastal District Subtotal	***206***	***120***	***347***	***354***	***392***	***0***	***34***	***204***	***89***	***559***	***284***	***146***	***243***	***234***
Nunam Iqua	490	158	25	256	21	337	266	115	105	176	284	127	159	189
Alakanuk	401	182	73	631	100	900	665	558	505	1,032	222	348	377	596
Emmonak	1,628	1,507	3,441	1,614	1,501	1,039	867	1,849	1,165	1,272	1,261	1,257	1,820	1,283
Kotlik	2,697	5,923	1,348	2,197	2,525	856	1,365	3,980	3,519	957	114	407	2,570	1,987
District 1 Subtotal	***5,216***	***7,770***	***4,887***	***4,698***	***4,147***	***3,132***	***3,163***	***6,502***	***5,294***	***3,437***	***1,881***	***2,139***	***4,927***	***4,055***
Mountain Village	1,052	1,113	797	1,347	1,366	2,698	2,031	1,968	313	470	478	873	1,464	1,052
Pitkas Point	77	268	294	99	603	178	233	53	5	34	16	49	288	68
St. Marys	2,356	440	1,062	542	658	310	416	722	255	227	103	762	602	345
Pilot Station	1,170	1,017	1,527	575	448	1,106	1,162	1,155	852	1,522	680	823	935	1,074
Marshall	2,727	256	471	754	2,212	388	640	696	0	1,003	341	394	816	536
District 2 Subtotal	***7,382***	***3,094***	***4,151***	***3,317***	***5,287***	***4,680***	***4,482***	***4,594***	***1,425***	***3,256***	***1,618***	***2,901***	***4,106***	***3,075***
Russian Mission	648	172	11	865	587	0	137	100	37	76	164	615	327	103
Holy Cross	845	1,066	665	681	1,814	420	1,095	239	523	624	0	9	929	496
Shageluk	865	211	186	126	305	367	329	76	38	0	0	114	239	89
District 3 Subtotal	***2,358***	***1,449***	***862***	***1,672***	***2,706***	***787***	***1,561***	***415***	***598***	***700***	***164***	***738***	***1,495***	***688***
Lower Yukon River Total	**14,956**	**12,313**	**9,900**	**9,687**	**12,140**	**8,599**	**9,206**	**11,511**	**7,317**	**7,393**	**3,663**	**5,778**	**10,528**	**7,818**
Anvik	894	420	155	269	457	514	388	126	175	29	401	179	363	224
Grayling	2,993	2,083	811	1,155	1,759	1,531	648	1,370	284	314	52	441	1,468	534
Kaltag	2,522	704	630	644	1,049	1,142	499	764	190	607	314	725	834	475
Nulato	1,910	571	1,109	1,137	2,299	697	367	2,338	0	151	0	1,341	1,163	571
Koyukuk	2,817	2,052	1,049	814	2,458	1,954	1,583	1,544	239	517	255	835	1,665	828
Galena	2,393	3,255	3,963	3,202	6,620	3,370	1,915	1,932	564	420	349	1,510	4,082	1,036
Ruby/Kokrines	4,499	1,085	5,553	4,695	561	2,195	2,427	907	64	581	78	2,331	2,818	811
District 4 Yukon River Subtotal (Excluding the Koyukuk River)	***18,028***	***10,170***	***13,270***	***11,916***	***15,203***	***11,403***	***7,827***	***8,981***	***1,516***	***2,619***	***1,449***	***7,362***	***12,392***	***4,478***
Huslia	1,286	258	55	1,035	298	10	0	89	35	683	0	1,786	331	161
Hughes	325	169	0 d	263	274	51	60	84	157	0	0	497	151	60
Allakaket	1,452	233	0 d	260	961	270	11	20	36	50	100	105	345	43
Alatna	127	2	0 d	0	0	0	0	0	15	0	0	0	0	3
Bettles	14	0	0	583	50	0	0	0	0	0	0	0	127	0
Koyukuk River Subtotal	***3,204***	***662***	***55***	***2,141***	***1,583***	***331***	***71***	***193***	***243***	***733***	***100***	***2,388***	***954***	***268***
District 4 Subtotal	***21,232***	***10,832***	***13,325***	***14,057***	***16,786***	***11,734***	***7,898***	***9,174***	***1,759***	***3,352***	***1,549***	***9,750***	***13,347***	***4,746***

-Continued-

Table 4: Yukon River 2004 Fall Information Letter (ADF&G 2004a)

Table 4. (page 2 of 2)

Community	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	1993-1997 Average	1998-2002 Average
Tanana	19,365	23,103	34,681	14,409	21,420	25,058	24,956	22,305	9,384	9,779	6,255	14,308	23,734	14,536
Rampart	5,701	3,272	1,007	1,403	896	646	100	4,324	0	183	0	365	1,445	921
Fairbanks g	2,491	930	2,870	2,184	2,727	491	96	681	8	0	0	105	1,840	157
Stevens Village	150	862	45	3,194	991	1,585	1,076	20	10	20	0	857	1,335	225
Beaver	361	692	2,069	1,231	9	243	409	16	0	21	1	192	849	89
Ft. Yukon j	2,284	2,380	6,827	9,196	8,144	6,119	3,035	9,702	355	2,209	3,523	7,963	6,533	3,765
Circle	6,279	349	4,581	5,102	5,308	3,707	37	2,722	0	2,588	74	499	3,809	1,084
Central	100	0	0	0	132	0	0	0	0	0	0	0	26	0
Eagle	5,630	2,070	8,263	13,115	14,916	14,488	543	11,292	32	2,714	339	2,871	10,570	2,984
Other m	0	1,750	0	830	505	421	50	65	1	0	100	0	701	43
District 5 Yukon River Subtotal (Excluding Chandalar/Black Rivers)	***42,361***	***35,408***	***60,343***	***50,664***	***55,048***	***52,758***	***30,302***	***51,127***	***9,790***	***17,514***	***10,292***	***27,160***	***50,844***	***23,805***
Venetie	3,066	7,881	4,302	6,085	7,195	1,564	658	2,011	130	3,286	680	770	5,405	1,353
Chalkyitsik	274	475	1,751	845	1,230	936	433	442	0	73	4	340	1,047	190
Chandalar/Black Rivers Subtotal	***3,340***	***8,356***	***6,053***	***6,930***	***8,425***	***2,500***	***1,091***	***2,453***	***130***	***3,359***	***684***	***1,110***	***6,453***	***1,543***
District 5 Subtotal	***45,701***	***43,764***	***66,396***	***57,594***	***63,473***	***55,258***	***31,393***	***53,580***	***9,920***	***20,873***	***10,976***	***28,270***	***57,297***	***25,348***
Manley	7,010	3,215	13,722	20,272	10,662	5,887	4,411	5,172	0	1,230	947	1,303	10,752	2,352
Minto	3,017	301	1,419	4,782	4,381	2,361	505	781	2	251	100	675	2,649	328
Nenana	13,253	5,929	11,201	15,500	14,207	3,799	6,781	5,619	8	999	1,070	7,802	10,127	2,895
Fairbanks n	1,394	56	5,006	6,384	5,736	4,031	960	1,630	0	201	229	1,949	4,243	604
Other p	1,039	352	2,249	2,230	1,481	3,472	1,713	2,269	300	855	856	1,257	1,957	1,199
District 6 Tanana River Subtotal	***25,713***	***9,853***	***33,597***	***49,168***	***36,467***	***19,550***	***14,370***	***15,471***	***310***	***3,536***	***3,202***	***12,986***	***29,727***	***7,378***
Upper Yukon River Total	**92,646**	**64,449**	**113,318**	**120,819**	**116,726**	**86,542**	**53,661**	**78,225**	**11,989**	**27,761**	**15,727**	**51,006**	**100,371**	**37,473**
Alaska, Yukon River Total q	**107,602**	**76,762**	**123,218**	**130,506**	**128,866**	**95,141**	**62,867**	**89,736**	**19,306**	**35,154**	**19,390**	**56,784**	**110,899**	**45,291**
Alaska, Yukon Area Total	**107,808**	**76,882**	**123,565**	**130,860**	**129,258**	**95,141**	**62,901**	**89,940**	**19,395**	**35,713**	**19,674**	**56,930**	**111,141**	**45,525**

a Blanks indicate harvest information was not collected.
d Due to floods in 1994, Hughes, Allakaket, and Alatna were not surveyed and the estimated harvest of fall chum salmon was zero.
g Harvests by Fairbanks subsistence permit holders who fished in District 5 near the Yukon River bridge crossing.
j Includes Birch Creek except in 1990 and 1991. A harvest of zero fall chum salmon has been estimated in all years surveyed.
m Other permit holders who fished in District 5 but did not reside in the communities listed.
n Harvests by Fairbanks subsistence permit holders who fished in the Tanana River.
p Other permits holders who fished in District 6 but did not reside in the communites listed.
q Does not include the Coastal District.

Table 5: Yukon River 2004 Fall Information Letter (ADF&G 2004a)

Table 5. Coho salmon subsistence harvest totals by fishing district and community of residence, Yukon Area, 1991-2003. Harvests are estimated from post season survey, returned permits and test fish projects.

Community	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	1993-1997 Average	1998-2002 Average
Hooper Bay	28	0	1	48	92	0	145	68	218	439	125	244	28	199
Scammon Bay	31	40	80	104	0	0	204	0	4	63	123	48	45	79
Coastal District Subtotal	***59***	***40***	***81***	***152***	***92***	***0***	***349***	***68***	***222***	***502***	***248***	***292***	***73***	***278***
Nunam Iqua	441	78	52	419	138	51	229	51	5	32	56	117	148	75
Alakanuk	966	138	94	658	103	882	292	108	84	414	183	193	375	216
Emmonak	666	196	959	485	594	356	696	525	191	342	514	547	518	454
Kotlik	3,353	1,931	2,167	689	1,610	534	954	1,046	787	486	542	403	1,386	763
District 1 Subtotal	***5,426***	***2,343***	***3,272***	***2,251***	***2,445***	***1,823***	***2,171***	***1,730***	***1,067***	***1,274***	***1,295***	***1,260***	***2,427***	***1,507***
Mountain Village	1,971	447	968	921	276	1,089	954	665	376	423	361	745	740	556
Pitkas Point	641	349	364	554	691	427	305	302	139	112	47	130	477	181
St. Marys	2,130	102	614	154	292	329	290	536	117	610	209	276	298	352
Pilot Station	300	477	811	241	1,258	323	413	249	1,708	222	230	371	622	564
Marshall	1,545	320	1,124	272	958	256	335	1,041	11	73	386	64	586	369
District 2 Subtotal	**6,587**	**1,695**	**3,881**	**2,142**	**3,475**	**2,424**	**2,297**	**2,793**	**2,351**	**1,440**	**1,233**	**1,586**	**2,723**	**2,023**
Russian Mission	1,148	152	55	891	255	10	233	542	24	0	115	178	273	183
Holy Cross	105	88	171	0	0	20	100	62	70	0	0	498	56	46
Shageluk	296	39	137	0	189	736	67	6	0	0	0	35	220	15
District 3 Subtotal	***1,549***	***279***	***363***	***891***	***444***	***766***	***400***	***610***	***94***	***0***	***115***	***711***	***549***	***244***
Lower Yukon River Total	**13,562**	**4,317**	**7,516**	**5,284**	**6,364**	**5,013**	**4,868**	**5,133**	**3,512**	**2,714**	**2,643**	**3,557**	**5,699**	**3,774**
Anvik	202	115	95	10	44	24	20	282	0	13	0	12	58	63
Grayling	859	164	36	97	236	1,055	133	201	372	144	30	559	318	176
Kaltag	2,105	334	245	426	298	60	71	333	110	533	212	463	273	252
Nulato	435	37	27	25	149	444	34	170	60	258	78	928	136	120
Koyukuk	1,877	70	305	33	476	345	421	295	138	80	249	1,155	246	237
Galena	1,398	124	803	275	780	1,002	322	123	71	142	169	1,507	597	165
Ruby/Kokrines	1,299	308	1,957	607	376	474	1,459	620	173	871	69	648	744	638
District 4 Yukon River Subtotal (Excluding the Koyukuk River)	***8,175***	***1,152***	***3,468***	***1,473***	***2,359***	***3,404***	***2,460***	***2,024***	***924***	***2,041***	***807***	***5,272***	***2,371***	***1,651***
Huslia	233	9	47	307	18	50	128	15	132	83	60	375	86	84
Hughes	21	3	0 d	153	51	250	5	10	12	117	100	20	91	49
Allakaket	0	3	0 d	0	39	50	0	0	0	25	56	99	18	16
Alatna	0	0	0 d	0	0	0	0	0	0	0	0	7	0	0
Bettles	0	0	0	1	0	0	0	0	0	0	0	0	0	0
Koyukuk River Subtotal	***254***	***15***	***47***	***461***	***108***	***350***	***133***	***25***	***144***	***225***	***216***	***501***	***196***	***149***
District 4 Subtotal	***8,429***	***1,167***	***3,515***	***1,934***	***2,467***	***3,754***	***2,593***	***2,049***	***1,068***	***2,266***	***1,023***	***5,773***	***2,567***	***1,800***

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Table 5: Yukon River 2004 Fall Information Letter (ADF&G 2004a)

Table 5. (page 2 of 2)

Community	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	1993-1997 Average	1998-2002 Average
Tanana	11,406	5,576	2,587	2,154	6,110	3,045	2,572	3,989	4,826	6,675	2,032	3,480	3,894	4,019
Rampart	75	38	99	0	5	34	20	126	0	0	0	0	35	29
Fairbanks f	34	0	25	18	42	26	11	0	2	11	0	120	22	5
Stevens Village	20	0	0	1	2	1	63	0	0	2	0	0	1	13
Beaver	398	135	10	20	7	0	0	0	0	0	17	0	34	3
Fort Yukon h	341	5	963	4	157	251 j	39	124	129	972	14	0	276	256
Circle	54	10	30	0	0	210	0	0	0	0	0	244	50	0
Central	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Eagle	3	85	0	1	1	2	132	0	0	0	1	0	18	27
Other j	0	0	0	7	0	0	2	2	30	0	0	25	1	7
District 5 Yukon River Subtotal (Excluding Chandalar/Black Rivers	***12,331***	***5,849***	***3,714***	***2,205***	***6,324***	***3,569***	***2,839***	***4,241***	***4,987***	***7,660***	***2,064***	***3,869***	***4,332***	***4,358***
Venetie	45	135	4	0	264	7	0	0	0	10	12	11	82	4
Chalkyitsik	0	0	456	0	0	7	0	0	0	4	0	7	93	1
Chandalar/Black River Subtotal	***45***	***135***	***460***	***0***	***264***	***14***	***0***	***0***	***0***	***14***	***12***	***18***	***175***	***5***
District 5 Subtotal	***12,376***	***5,984***	***4,174***	***2,205***	***6,588***	***3,583***	***2,839***	***4,241***	***4,987***	***7,674***	***2,076***	***3,887***	***4,507***	***4,363***
Manley	4,725	1,535	10,410	7,395	2,462	3,236	2,362	3,244	2,180	2,637	1,617	886	5,008	2,408
Minto	614	300	2,616	338	1,223	364	31	0	3	0	250	423	968	57
Nenana	8,895	1,314	9,387	7,142	7,883	5,147	3,519	4,023	1,767	4,443	3,574	5,431	6,175	3,465
Fairbanks k	2,281	0	2,103	3,076	2,314	1,230	786	868	0	102	1,024	1,049	1,745	556
Other m	1,039	1,155	1,973	851	1,011	1,618	774	1,259	1,200	1,818	3,034	2,574	1,322	1,617
District 6 Tanana River Subtotal	***17,554***	***4,304***	***26,489***	***18,802***	***14,893***	***11,595***	***7,472***	***9,394***	***5,150***	***9,000***	***9,499***	***10,363***	***15,217***	***8,103***
Upper Yukon Area Total	**38,359**	**11,455**	**34,178**	**22,941**	**23,948**	**18,932**	**12,904**	**15,684**	**11,205**	**18,940**	**12,598**	**20,023**	**22,291**	**14,266**
Alaska, Yukon River Total n	**51,921**	**15,772**	**41,694**	**28,225**	**30,312**	**23,945**	**17,772**	**20,817**	**14,717**	**21,654**	**15,241**	**23,580**	**27,990**	***18,040***
Alaska, Yukon Area Total	**51,980**	**15,812**	**41,775**	**28,377**	**30,404**	**23,945**	**18,121**	**20,885**	**14,939**	**22,156**	**15,489**	**23,872**	**28,063**	***18,318***

a Blanks indicate harvest information was not collected.
d Due to floods in 1994, Hughes, Allakaket, and Alatna were not surveyed and the estimated harvest of coho salmon was zero.
f Harvests by Fairbanks subsistence permit holders who fished in District 5 near the Yukon River bridge crossing.
h Includes Birch Creek except in 1990 and 1991. A harvest of three coho salmon was estimated in 1997.
j Other permit holders who fished in District 5 but did not reside in the communities listed.
k Harvests by Fairbanks subsistence permit holders who fished in the Tanana River.
m Other permits holders who fished in District 6 but did not reside in the communities listed.
n Does not include the Coastal District.

Table 5: Kuskokwim 2003 Annual Management Report (Ward et.al.)

Table 5. Histroical utilization of chinook salmon in the Kuskokwim River.

Year	Commercial Harvest[a] Annual	Commercial Harvest[a] 10-yr Ave	Subsistence Harvest[b] Annual	Subsistence Harvest[b] 10-yr Ave	Test-Fish Harvest	Total Utilization	10-Year Average
1960	5,969		18,887			24,856	
1961	18,918		28,934			47,852	
1962	15,341		13,582			28,923	
1963	12,016		34,482			46,498	
1964	17,149		29,017			46,166	
1965	21,989		24,697			46,686	
1966	25,545		49,325		285	75,155	
1967	29,986		59,913		766	90,665	
1968	34,278		32,942		608	67,828	
1969	43,997	22,519	40,617	33,240	833	85,447	56,008
1970	39,290	25,851	69,612	38,312	857	109,759	64,498
1971	40,274	27,987	43,242	39,743	756	84,272	68,140
1972	39,454	30,398	40,396	42,424	756	80,606	73,308
1973	32,838	32,480	39,093	42,885	577	72,508	75,909
1974	18,664	32,632	27,139	42,698	1,236	47,039	75,997
1975	22,135	32,646	48,448	45,073	704	71,287	78,457
1976	30,735	33,165	58,606	46,001	1,206	90,547	79,996
1977	35,830	33,750	56,580	45,668	1,264	93,674	80,297
1978	45,641	34,886	36,270	46,000	1,445	83,356	81,850
1979	38,966	34,383	56,283	47,567	979	96,228	82,928
1980	35,881	34,042	59,892	46,595	1,033	96,806	81,632
1981	47,663	34,781	61,329	48,404	1,218	110,210	84,226
1982	48,234	35,659	58,018	50,166	542	106,794	86,845
1983	33,174	35,692	47,412	50,998	1,139	81,725	87,767
1984	31,742	37,000	56,930	53,977	231	88,903	91,953
1985	37,889	38,576	43,874	53,519	79	81,842	93,009
1986	19,414	37,443	51,019	52,761	130	70,563	91,010
1987	36,179	37,478	67,325	53,835	384	103,888	92,032
1988	55,716	38,486	70,943 [c]	57,303	576	127,235	96,419
1989	43,217	38,911	81,176	59,792	543	124,936	99,290
1990	53,504	40,673	85,979	62,401	512	139,995	103,609
1991	37,778	39,685	85,554	64,823	117	123,449	104,933
1992	46,872	39,549	64,795	65,501	1,380	113,047	105,558
1993	8,735	37,105	87,512	69,511	2,483	98,730	107,259
1994	16,211	35,552	93,242	73,142	1,937	111,390	109,508
1995	30,846	34,847	96,436	78,398	1,421	128,703	114,194
1996	7,419	33,648	78,063	81,103	247	85,729	115,710
1997	10,441	31,074	81,577	82,528	332	92,350	114,556
1998	17,359	27,238	81,265	83,560	210	98,834	111,716
1999	4,705	23,387	73,194	82,762	98	77,997	107,022
2000	444	18,081	64,893	80,653	64	65,401	99,563
2001	90	14,312	73,610	79,459	86	73,786	94,597
2002	72	9,632	74,778	80,457	288	75,138	90,806
10-Yr. Ave. (1992-2001)	14,312		79,459		826	94,597	

[a] Districts 1 and 2; also includes harvests in District 3 from 1960 to 1965.

[b] Estimated subsistence harvest expanded from villages surveyed.

[c] Beginning in 1988, estimates are based on a new formula so data since 1988 is not comparable with previous years.

Table 1: Norton Sound 2004 Fishing Summary (ADF&G 2004d)

Table 1. Commercial salmon catches by species, Norton Sound District, 1961-2004.

Year	Chinook	Sockeye	Coho	Pink	Chum	Total
1961	5,300	35	13,807	34,327	48,332	101,801
1962	7,286	18	9,156	33,187	182,784	232,431
1963	6,613	71	16,765	55,625	154,789	233,863
1964	2,018	126	98	13,567	148,862	164,671
1965	1,449	30	2,030	220	36,795	40,524
1966	1,553	14	5,755	12,778	80,245	100,345
1967	1,804	-	2,379	28,879	41,756	74,818
1968	1,045	-	6,885	71,179	45,300	124,409
1969	2,392	-	6,836	86,949	82,795	178,972
1970	1,853	-	4,423	64,908	107,034	178,218
1971	2,593	-	3,127	4,895	131,362	141,977
1972	2,938	-	454	45,182	100,920	149,494
1973	1,918	-	9,282	46,499	119,098	176,797
1974	2,951	-	2,092	148,519	162,267	315,829
1975	2,393	2	4,593	32,388	212,485	251,861
1976	2,243	11	6,934	87,916	95,956	193,060
1977	4,500	5	3,690	48,675	200,455	257,325
1978	9,819	12	7,335	325,503	189,279	531,948
1979	10,706	57	31,438	167,411	140,789	350,401
1980	6,311	40	29,842	227,352	180,792	444,337
1981	7,929	56	31,562	232,479	169,708	441,734
1982	5,892	10	91,690	230,281	183,335	511,208
1983	10,308	27	49,735	76,913	319,437	456,420
1984	8,455	6	67,875	119,381	146,442	342,159
1985	19,491	166	21,968	3,647	134,928	180,200
1986	6,395	233	35,600	41,260	146,912	230,400
1987	7,080	207	24,279	2,260	102,457	136,283
1988	4,096	1,252	37,214	74,604	107,966	225,132
1989	5,707	265	44,091	123	42,625	92,811
1990	8,895	434	56,712	501	65,123	131,665
1991	6,068	203	63,647	0	86,871	156,789
1992	4,541	296	105,418	6,284	83,394	199,933
1993	8,972	279	43,283	157,574	53,562	263,670
1994	5,285	80	102,140	982,389	18,290	1,108,184
1995	8,860	128	47,862	81,644	42,898	181,392
1996	4,984	1	68,206	487,441	10,609	571,241
1997	12,573	161	32,284	20	34,103	79,141
1998	7,429	7	29,623	588,013	16,324	641,396
1999	2,508	0	12,662	0	7,881	23,051
2000	752	14	44,409	166,548	6,150	217,873
2001	213	44	19,492	0	11,100	30,849
2002	5	1	1,759	0	600	2,365
2003	12	16	17,058	0	3,560	20,646
2004	0	40	42,016	0	6,296	48,352
Previous 5-Yr Avg [a]	698	15	19,076		5,858	58,957
Previous 10-Yr Avg [b]	4,262	45	37,550	444,878	15,152	287,614

[a] 1999-2003

[b] 1994-2003; even years only for pink salmon

Table 4: Norton Sound 2004 Fishing Summary (ADF&G, 2004d)

Table 4. Dollar estimates of Norton Sound District commercial salmon fishery, 1961 - 2004.

Year	Number of Permit Holders	Gross Value of Catch to Permit Holders	Average Value of Catch to Permit Holder
1961	[a]	[a]	[a]
1962	[a]	$105,800.00	[a]
1963	[a]	$104,000.00	[a]
1964	[a]	$51,000.00	[a]
1965	[a]	$21,483.00	[a]
1966	[a]	$68,000.00	[a]
1967	[a]	$44,038.00	[a]
1968	[a]	$63,700.00	[a]
1969	[a]	$95,297.00	[a]
1970	[a]	$99,019.00	[a]
1971	[a]	$101,000.00	[a]
1972	[a]	$102,225.00	[a]
1973	[a]	$308,740.00	[a]
1974	[a]	$437,127.00	[a]
1975	[a]	$413,255.00	[a]
1976	[a]	$285,283.00	[a]
1977	164	$546,010.00	$3,329.33
1978	176	$907,330.00	$5,155.28
1979	175	$878,792.00	$5,021.67
1980	159	$572,125.00	$3,598.27
1981	167	$761,658.00	$4,560.83
1982	164	$1,069,723.00	$6,522.70
1983	170	$946,232.00	$5,566.07
1984	141	$738,064.00	$5,234.50
1985	155	$818,477.00	$5,280.50
1986	163	$546,452.00	$3,352.47
1987	164	$517,894.00	$3,157.89
1988	152	$760,641.00	$5,004.22
1989	110	$319,489.00	$2,904.45
1990	128	$474,064.00	$3,703.63
1991	126	$413,479.00	$3,281.58
1992	110	$463,616.00	$4,214.69
1993	153	$368,723.00	$2,409.95
1994	119	$863,060.00	$7,252.61
1995	105	$356,164.00	$3,392.04
1996	86	$292,264.00	$3,398.42
1997	102	$326,618.00	$3,202.14
1998	82	$351,410.00	$4,285.49
1999	60	$82,638.00	$1,377.30
2000	79	$143,621.00	$1,817.99
2001	51	$56,921.00	$1,116.10
2002	12	$2,941.00	$245.08
2003	30	$64,473.00	$2,149.10
2004	36	$122,706.00	$3,408.50
Previous 5-Yr Avg [b]	46	$70,118.80	$1,341.11
Previous 10-Yr Avg [c]	73	$254,011.00	$2,823.63

[a] Information not available.

[b] 1999-2003

[c] 1994-2003

Table 4: Norton Sound Salmon Fisheries Summary 2003 (Menard, 2003b)

Table 4. Subsistence salmon catches by species, Norton Sound District, 1963-2003.

Year	Chinook	Sockeye	Coho	Pink	Chum	Total
1963	5	-	118	16,607	17,635	34,365
1964	565	-	2,567	9,225	12,486	24,843
1965	574	-	4,812	19,131	30,772	55,289
1966	269	-	2,210	14,335	21,873	38,687
1967	817	-	1,222	17,516	22,724	42,279
1968	237	-	2,391	36,912	11,661	51,201
1969	436	-	2,191	18,562	15,615	36,804
1970	561	-	4,675	26,127	22,763	54,126
1971	1,026	197	4,097	10,863	21,618	37,801
1972	804	93	2,319	14,158	13,873	31,247
1973	392	-	520	14,770	7,185	22,867
1974	420	-	1,064	16,426	3,958	21,868
1975	186	11	192	15,803	8,113	24,305
1976	203	-	1,004	18,048	7,718	26,973
1977	846	-	2,530	14,296	26,607	44,279
1978	1,211	-	2,981	35,281	12,257	51,730
1979	747	-	8,487	25,247	11,975	46,456
1980	1,397	-	8,625	63,778	19,622	93,422
1981	2,021	38	13,416	28,741	32,866	77,082
1982	1,011	8	14,612	54,249	18,580	88,460
1983						
1984						
1985	Subsistence surveys were not conducted from 1983 through 1993. Surveys conducted					
1986	beginning in 1994 used several diifferent methods and data is not comparable with					
1987	surveys conducted previously.					
1988						
1989						
	Stebbins and St Michaels were included in subsistence surveys beginning in 1994.					
1990	Catch calendars were sent to subsistence fishers to better track the susbsistence catches					
1991	and help the department better estimate the catch of each salmon species.					
1992						
1993						
1994	7,374	1,161	22,124	71,066	25,020	126,745
1995	7,766	1,222	23,015	38,594	43,014	113,611
1996	7,255	1,182	26,304	64,724	34,585	134,050
1997	8,998	1,892	16,476	27,200	26,803	81,369
1998	8,295	1,214	19,007	51,933	20,032	100,481
1999	6,144	1,177	14,342	20,017	19,398	61,078
2000	4,149	682	17,062	38,308	17,283	77,484
2001	5,576	767	14,543	30,253	20,210	71,349
2002	5,469	763	15,086	64,354	17,817	103,489
2003			Data not yet available.			
Previous 5-Yr Avg [a]	5,927	921	16,008		18,948	82,776
Previous 9-Yr Avg [b]	6,781	1,118	18,662	29,016	24,907	96,628

[a] 1998-2002

[b] 1994-2002; odd years only for pink salmon

Table 1: 2005 Kotzebue Salmon Management Plan (ADF&G 2005a)

Table 1. Kotzebue District chum salmon fishery historical information, 1962-2004.

	Commercial Catch					**Escapement (goals)**				
Year	Number Caught	Number Permits	Average Catch per Permit	Total Value [a]	Value per Fisher	Squirrel R. (11,500)	Salmon R. (7,000)	Tutuksuk R. (2,000)	Upper Kobuk R. (10,000)	Noatak R. (85,000)
1962	129,948	84	1,547	$4,500	$54	5,384	12,936	10,841	9,224	177,080
1963	54,445	61	893	$9,140	$150	2,200	1,535	670	4,535	2,005 [b]
1964	76,449	52	1,470	$34,660	$667	8,009	9,353	2,685	7,985	89,798
1965	40,025	45	889	$18,000	$400	7,230	1,500 [b]		2,750	6,152
1966	30,764	44	699	$25,000	$568	1,350	3,957	1,383	1,474	101,760
1967	29,400	30	980	$28,700	$957	3,332	2,116	169	2,495	29,120 [b]
1968	30,212	59	512	$46,000	$780	6,746	3,367	823	2,370	44,896
1969	59,335	52	1,141	$71,000	$1,365	6,714	2,561	159	7,500 [b]	34,013
1970	159,664	82	1,947	$186,000	$2,268	4,418	3,000 [b]	2,000 [b]	13,908	138,145
1971	154,956	91	1,703	$200,000	$2,198	6,628	5,453	1,384	17,202	41,056
1972	169,664	104	1,631	$260,000	$2,500	32,126	2,073 [b]		18,155	67,601 [b]
1973	375,432	148	2,537	$925,000	$6,250	12,345	6,891		2,470 [b]	32,144
1974	627,912	185	3,394	$1,822,784	$9,853	32,523	29,190	8,312	28,120	151,889
1975	563,345	267	2,110	$1,365,648	$5,115	32,256	9,721	1,344 [b]	10,702	97,811
1976	159,796	220	726	$580,375	$2,638	7,229	1,161	758	2,522 [b]	45,779
1977	195,895	224	875	$1,033,950	$4,616	1,964 [b]				11,963 [b]
1978	111,494	208	536	$575,260	$2,766	1,863	814 [b]	368 [b]	1,981 [b]	43,342
1979	141,623	181	782	$990,263	$5,471	1,500 [b]	674 [b]	382 [b]	2,008	17,515 [b]
1980	367,284	176	2,087	$1,446,633	$8,220	13,563	8,456	1,165	11,472	174,751
1981	677,239	187	3,622	$3,246,793	$17,363	9,854	4,709	1,114	8,648	116,352
1982	417,790	199	2,099	$1,961,518	$9,857	7,690	1,821 [b]	1,322	14,674	20,871 [b]
1983	175,762	189	930	$420,736	$2,226	5,115	1,677	2,637	33,746	82,817
1984	320,206	181	1,769	$1,148,884	$6,347	5,473	1,471	1,132	10,621	72,900
1985	521,406	189	2,759	$2,137,368	$11,309	6,160	2,884	5,089	6,278	46,380 [b]
1986	261,436	187	1,398	$931,241	$4,980	4,982	1,971	4,257	6,015	41,535 [b]
1987	109,467	160	684	$515,000	$3,219	2,708 [c]	3,333	206	8,210	8,295 [b]
1988	352,915	193	1,829	$2,581,333	$13,375	4,848 [b]	6,208	3,122	11,895 [b]	54,569 [b]
1989	254,617	165	1,543	$613,823	$3,720					[c]
1990	163,263	153	1,067	$438,044	$2,863	5,500	6,335	2,275	15,355	26,345
1991	239,923	142	1,690	$437,948	$3,084	4,606	5,845	744	24,525	85,690
1992	289,184	149	1,941	$533,731	$3,582	2,765	1,345	1,162	11,803	35,036 [b]
1993	73,071	114	641	$235,061	$2,062	4,463	13,880	1,196	12,158	30,210 [b]
1994	153,452	109	1,408	$233,512	$2,142					[c]
1995	290,730	92	3,160	$316,031	$3,435	10,605	13,988	3,901	35,725	167,120
1996	82,110	55	1,493	$56,310	$1,024	21,795	21,740	8,200	74,770	336,940
1997	142,720	68	2,099	$187,978	$2,764	4,779 [b]	1,181 [b]	164 [b]	8,513 [b]	[c]
1998	55,907	45	1,242	$70,578	$1,568	[c]	[c]	[c]	600 [b]	[c]
1999	138,605	60	2,310	$179,781	$2,996	13,513	4,989	2,906	27,340	59,225 [b]
2000	159,802	64	2,497	$246,715	$3,855					[c]
2001	211,672	66	3,207	$314,100	$4,759				11,640	
2002	8,390	3	2,797		[d]				3,447 [b]	700 [b]
2003	25,423	4	6,355	$26,377	$6,594				11,175	34,575
2004	51,077	43	1,188	$64,420	$1,498 [e]				26,018	50,141

[a] Some estimates between 1962 and 1981 include only chum value which in figures represent represent over 99% of the total value. Figures after 1981 represent the chum value as well as incidental species such as char, whitefish and other salmon.

[b] Poor survey conditions or incomplete, early or late survey.

[c] Due to unsatisfactory conditions, no aerial surveys were flown.

[d] Value of fishery is confidential when less than 4 permit holders participate in a fishery.

[e] Value of fishery includes $63,225 for chum salmon and $1,195 for other species sold.

Table A4: 2004 Bristol Bay Annual Management Report (Westing et.al.)

Appendix A4.–Chinook salmon commercial catch by district, in numbers of fish, Bristol Bay, 1984–2004.

Year	Naknek-Kvichak	Egegik	Ugashik	Nushagak	Togiak	Total
1984	8,972	4,680	4,767	61,378	22,179	101,976
1985	5,697	4,015	5,840	67,783	37,106	120,441
1986	3,188	1,883	2,982	65,783	19,880	93,716
1987	5,175	2,959	4,065	45,983	17,217	75,399
1988	6,538	3,103	3,444	16,648	15,606	45,339
1989	6,611	2,034	2,112	17,637	11,366	39,760
1990	5,068	1,146	1,840	14,812	11,130	33,996
1991	3,584	510	589	19,718	6,039	30,440
1992	5,724	694	2,146	47,563	12,640	68,767
1993	7,477	1,478	3,075	62,976	10,851	85,857
1994	6,016	1,243	3,685	119,480	10,486	140,910
1995	5,084	760	1,551	79,942	11,981	99,318
1996	4,195	980	588	72,011	8,602	86,376
1997	2,839	2,047	1,084	64,294	6,114	76,378
1998	2,444	760	346	108,486	14,131	126,167
1999	1,295	712	1,638	10,893	11,919	26,457
2000	1,027	1,061	893	12,055	7,858	22,894
2001	904	950	989	11,568	9,937	24,348
2002	969	268	612	39,473	2,801	44,123
2003	567	131	409	42,615	3,231	46,953
20-Year Average	4,169	1,571	2,133	49,055	12,554	69,481
1984–1993 Average	5,803	2,250	3,086	42,028	16,401	69,569
1994–2003 Average	2,534	891	1,180	56,082	8,706	69,392
2004	1,274	1,556	868	93,414	9,349	106,461

Table A7: 2004 Bristol Bay Annual Management Report (Westing et.al.)

Appendix A5.–Chum salmon commercial catch by district, in numbers of fish, Bristol Bay, 1984–2004.

Year	Naknek-Kvichak	Egegik	Ugashik	Nushagak	Togiak	Total
1984	447,259	178,096	210,611	850,114	336,660	2,022,740
1985	210,107	126,736	131,576	396,740	203,302	1,068,461
1986	262,925	94,666	111,112	488,375	270,057	1,227,135
1987	446,908	145,259	101,074	416,476	419,425	1,529,142
1988	295,571	237,888	94,545	371,196	470,132	1,469,332
1989	310,869	136,185	84,673	523,903	203,178	1,258,808
1990	422,276	123,087	32,013	378,223	102,861	1,058,460
1991	443,189	75,892	60,299	463,780	246,589	1,289,749
1992	167,168	121,472	57,170	398,691	176,123	920,624
1993	43,684	70,628	73,402	505,799	144,869	838,382
1994	219,118	62,961	52,127	328,267	232,559	895,032
1995	236,472	68,325	62,801	390,158	221,126	978,882
1996	124,137	85,151	103,392	324,261	207,094	844,035
1997	8,719	53,139	16,379	185,620	47,459	311,316
1998	82,281	29,405	8,088	208,551	67,595	395,920
1999	259,922	74,890	68,004	170,795	111,677	685,288
2000	68,218	38,857	36,349	114,454	140,175	398,053
2001	16,472	33,579	43,394	526,602	211,701	831,748
2002	19,180	23,516	35,792	276,845	112,987	468,320
2003	34,481	37,116	52,908	740,311	68,154	932,970
20-Year Average	205,948	90,842	71,785	402,958	199,686	971,220
1984–1993 Average	304,996	130,991	95,648	479,330	257,320	1,268,283
1994–2003 Average	106,900	50,694	47,923	326,586	142,053	674,156
2004	28,895	72,437	64,019	470,248	94,030	729,629

Table A26: 2004 Bristol Bay Annual Management Report (Westing et.al.)

Appendix A26.–Average price paid in dollars per pound for salmon, by species, Bristol Bay, 1984–2004.

Year	Sockeye [a]	Chinook [a]	Chum [a]	Pink [a]	Coho [a]
1984	0.69	1.03	0.30	0.22	0.71
1985	0.85	1.02	0.31	0.20	0.71
1986	1.42	1.03	0.31	0.15	0.68
1987	1.35	1.24	0.26		0.69
1988	1.93	1.05	0.43	0.34	1.14
1989	1.07	0.80	0.26	0.17	0.67
1990 [b]	1.04	0.91	0.26	0.27	0.74
1991	0.70	0.68	0.22	0.11	0.58
1992	1.04	0.89	0.24	0.12	0.58
1993	0.62	0.76	0.21	0.11	0.52
1994	0.70	0.47	0.22	0.04	0.45
1995	0.75	0.65	0.20	0.11	0.43
1996	0.75	0.50	0.10	0.05	0.30
1997	0.85	0.55	0.10	0.05	0.46
1998	1.10	0.50	0.10	0.10	0.50
1999	0.80	0.50	0.10	0.05	0.30
2000	0.64	0.48	0.09	0.08	0.38
2001	0.40	0.30	0.11	0.07	0.39
2002	0.45	0.30	0.10	0.05	0.30
2003	0.50	0.30	0.09	0.03	0.30
20-Year Average	0.88	0.70	0.20	0.12	0.54
1984–1993Average	1.07	0.94	0.28	0.19	0.70
1994–2003 Average	0.69	0.46	0.12	0.06	0.38
2004	0.46	0.38	0.09	0.05	0.34

[b] Price paid in Nushagak District. Bristol Bay average unavailable.
[a] Price does not include all post-season adjustments.

Table A27: 2004 Bristol Bay Annual Management Report (Westing et. al.)

Appendix A27.–Estimated exvessel value of the commercial salmon catch by species paid to fishermen, in thousands of dollars, Bristol Bay, 1984–2004. Derived from price per pound times commercial catch.

Year	Sockeye	Chinook	Chum	Pink	Coho	Total
1984	94,681	2,158	4,040	2,414	3,072	106,365
1985	115,402	2,188	2,218		923	120,731
1986	135,689	1,819	2,522	207	826	141,063
1987	130,847	1,912	2,594		314	135,667
1988	168,586	891	4,418	1,171	1,792	176,858
1989	173,963	609	2,029		1,186	177,787
1990	198,897	520	1,752	508	582	202,259
1991	103,750	328	1,807		499	106,384
1992	190,368	1,029	1,359	222	767	193,745
1993	152,034	1,131	989		257	154,411
1994	138,007	1,190	1,043	15	650	140,905
1995	183,262	1,272	1,240		129	185,903
1996	139,208	788	615	7	254	140,872
1997	61,728	689	200		150	62,767
1998	62,948	1,116	294	8	521	64,887
1999	109,495	186	438		38	110,157
2000	80,331	172	236	17	363	81,119
2001	38,250	127	656		48	39,081
2002	29,164	240	330	0	18	29,752
2003	46,917	213	473		89	47,692
20 Year Average	117,676	929	1,463	415 [a]	624	120,920
1984–1993Average	146,422	1,259	2,373	754 [a]	1,022	151,527
1994–2003 Average	88,931	599	553	9 [a]	226	90,314
2004	68,968	645	425	10	162	70,210

[a] Includes even-years only.

Table A27: 2004 Bristol Bay Annual Management Report (Westing et. al.)

Appendix A29.–Subsistence salmon harvest, by district and species, Bristol Bay, 1984–2004.

Year[ab]	Permits Issued	Sockeye	Chinook	Chum	Pink	Coho	Total
Naknek-Kvichak District							
1984	382	115,200	900	600	1,300	600	118,600
1985	544	107,543	1,179	540	27	1,103	110,392
1986	412	77,283	1,295	695	2,007	650	81,930
1987	407	86,706	1,289	756	490	1,106	90,347
1988	391	88,145	1,057	588	917	813	91,520
1989	411	87,103	970	693	277	1,927	90,970
1990	466	92,326	985	861	1,032	726	95,930
1991	518	97,101	1,152	1,105	191	1,056	100,605
1992	571	94,304	1,444	2,721	1,601	1,152	101,222
1993	560	101,555	2,080	2,476	762	2,025	108,898
1994	555	87,662	1,843	503	460	1,807	92,275
1995	533	75,644	1,431	1,159	383	1,791	80,407
1996	540	81,305	1,574	816	794	1,482	85,971
1997	533	85,248	2,764	478	422	1,457	90,368
1998	567	83,095	2,433	784	1,063	1,592	88,967
1999	528	85,315	1,567	725	210	856	88,674
2000	562	61,817	894	560	845	937	65,053
2001	506	57,250	869	667	383	740	59,909
2002	471	52,805	837	909	1,137	943	56,632
2003	489	61,443	1,221	259	198	812	63,934
20 Year Average	497	83,943	1,389	895	725 [c]	1,179	88,130
1984–1993 Average	466	94,727	1,235	1,104	860 [c]	1,116	99,041
1994–2003 Average	528	73,158	1,543	686	589 [c]	1,242	77,219
2004	481	71,110	1,075	469	1,080	566	74,300
Egegik District							
1984	24	500		100		300	900
1985	23	582	14	21	1	203	821
1986	41	1,052	69	58	21	319	1,519
1987	49	3,350	87	139	2	284	3,862
1988	52	1,405	97	87	54	333	1,976
1989	50	1,636	50	33	1	414	2,134
1990	61	1,105	53	85	39	331	1,613
1991	70	4,549	82	141	32	430	5,234
1992	80	3,322	124	270	51	729	4,496
1993	69	3,633	128	148	15	905	4,829
1994	59	3,208	166	84	153	857	4,468
1995	60	2,818	86	192	100	690	3,886
1996	44	2,321	99	89	85	579	3,173
1997	34	2,438	101	21	5	740	3,304
1998	36	1,795	44	33	52	389	2,314
1999	42	2,434	106	35	2	806	3,384
2000	31	842	16	11	0	262	1,131
2001	57	2,493	111	105	16	928	3,653
2002	53	1,892	65	34	12	356	2,359
2003	62	3,240	84	32	10	297	3,663
20 Year Average	50	2,231	83	86	34 [c]	508	2,936
1984–1993 Average	52	2,113	78	108	24 [c]	425	2,738
1994–2003 Average	48	2,348	88	64	44 [c]	590	3,133
2004	46	2,618	169	410	91	1,423	4,711

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Table A27: 2004 Bristol Bay Annual Management Report (Westing et. al.)

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Year	Permits Issued	Sockeye	Chinook	Chum	Pink	Coho	Total
Ugashik District							
1984	8	500				200	700
1985	9	233	17	7		143	400
1986	27	1,080	83	48	21	335	1,567
1987	22	892	104	51	29	272	1,348
1988	23	1,400	84	55	35	330	1,904
1989	22	1,309	32	35	2	214	1,592
1990	37	1,578	51	143	120	280	2,172
1991	38	1,403	121	168	42	614	2,348
1992	37	2,348	106	79	8	397	2,938
1993	39	1,766	86	107	24	495	2,478
1994	31	1,587	126	42	38	579	2,372
1995	20	1,513	56	18	6	290	1,883
1996	26	1,247	50	21	7	298	1,623
1997	28	2,785	169	39	23	311	3,327
1998	27	1,241	59	75	82	485	1,942
1999	25	1,365	35	5	0	271	1,675
2000	31	1,927	51	34	1	467	2,481
2001	24	1,197	61	8	2	357	1,624
2002	23	1,294	51	14	2	460	1,821
2003	23	1,113	31	30	0	392	1,567
20 Year Average	26	1,389	72	52	25 [c]	359	1,888
1984–1993 Average	26	1,251	76	77	35 [c]	328	1,745
1994–2003 Average	26	1,527	69	29	16 [c]	391	2,032
2004	21	804	64	9	4	234	1,116
Nushagak District							
1984	438	43,200	9,800	10,300	6,600	8,100	78,000
1985	406	38,000	7,900	4,000	600	6,100	56,600
1986	424	49,000	12,600	10,000	5,400	9,400	86,400
1987	474	40,900	12,200	6,000	200	6,200	65,500
1988	441	31,086	10,079	8,234	6,316	5,223	60,938
1989	432	34,535	8,122	5,704	407	8,679	57,447
1990	441	33,003	12,407	7,808	3,183	5,919	62,320
1991	528	33,161	13,627	4,688	292	10,784	62,552
1992	476	30,640	13,588	7,076	3,519	7,103	61,926
1993	500	27,114	17,709	3,257	240	5,038	53,358
1994	523	26,501	15,490	5,055	2,042	5,338	54,426
1995	484	22,793	13,701	2,786	188	3,905	43,373
1996	481	22,935	15,941	4,704	1,573	5,217	50,370
1997	538	25,080	15,318	2,056	218	3,433	46,106
1998	562	25,217	12,258	2,487	1,076	5,316	46,355
1999	548	29,387	10,057	2,409	124	3,993	45,969
2000	541	24,451	9,470	3,463	1,662	5,983	45,029
2001	554	26,939	11,760	3,011	378	5,993	48,080
2002	520	22,777	11,281	5,096	1,179	4,565	44,897
2003	527	25,491	18,686	5,064	403	5,432	55,076
20 Year Average	490	30,880	12,279	5,165	1,852 [c]	6,120	56,297
1984–1993 Average	456	36,064	11,803	6,707	2,676 [c]	7,255	64,504
1994–2003 Average	528	25,157	13,396	3,613	884 [c]	4,917	47,968
2004	511	17,491	15,610	3,869	1,944	4,240	43,154

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Table A27: 2004 Bristol Bay Annual Management Report (Westing et. al.)

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Year	Permits Issued	Sockeye	Chinook	Chum	Pink	Coho	Total
Togiak District							
1984	41	3,600	600	1,700	500	3,800	10,200
1985	51	3,400	600	1,000	100	1,500	6,600
1986	29	2,400	700	800	100	500	4,500
1987	46	3,600	700	1,000		1,600	6,900
1988	29	2,413	429	716	45	792	4,395
1989	40	2,825	551	891	112	976	5,355
1990	37	3,689	480	786	60	1,111	6,126
1991	43	3,517	470	553	27	1,238	5,805
1992	40	3,716	1,361	626	135	1,231	7,069
1993	38	2,139	784	571	8	743	4,245
1994	25	1,777	904	398	77	910	4,066
1995	22	1,318	448	425	0	703	2,894
1996	19	662	471	285	59	199	1,676
1997	31	1,440	667	380	0	260	2,747
1998	42	2,211	782	412	76	310	3,791
1999	76	3,780	1,244	479	84	217	5,804
2000	54	3,013	1,116	569	90	342	5,130
2001	92	4,162	1,612	367	61	388	6,590
2002	36	2,319	703	605	10	241	3,878
2003	92	4,403	1,208	483	451	883	7,428
20 Year Average	44	2,819	791	652	105 [c]	897	5,260
1984–1993 Average	39	3,130	668	864	121 [c]	1,349	6,120
1994–2003 Average	49	2,509	915	440	91 [c]	445	4,400
2004	46	1,795	1,094	383	108	204	3,584
Total Bristol Bay Area							
1984	893	163,000	11,300	12,700	8,400	13,000	208,400
1985	1,033	149,758	9,710	5,568	728	9,049	174,813
1986	933	130,815	14,747	11,601	7,549	11,204	175,916
1987	998	135,493	14,356	7,895	689	9,453	167,886
1988	936	124,449	11,746	9,680	7,367	7,491	160,733
1989	955	127,408	9,725	7,356	799	12,210	157,498
1990	1,042	131,701	13,976	9,683	4,434	8,367	168,161
1991	1,197	139,731	15,452	6,655	584	14,122	176,544
1992	1,204	134,330	16,623	10,772	5,314	10,612	177,651
1993	1,206	136,207	20,787	6,559	1,049	9,206	173,808
1994	1,193	120,735	18,529	6,082	2,770	9,491	157,607
1995	1,119	104,086	15,722	4,580	677	7,378	132,443
1996	1,110	108,470	18,136	5,915	2,518	7,775	142,813
1997	1,166	116,991	19,159	2,974	668	6,201	145,992
1998	1,234	113,560	15,576	3,792	2,349	8,093	143,368
1999	1,219	122,281	13,009	3,653	420	6,143	145,506
2000	1,219	92,050	11,547	4,637	2,599	7,991	118,824
2001	1,226	92,041	14,412	4,158	839	8,406	119,856
2002	1,093	81,088	12,936	6,658	2,341	6,565	109,587
2003	1,182	95,690	21,231	5,868	1,062	7,816	131,667
2002	1,093	81,088	12,936	6,658	2,341	6,565	109,587
20 Year Average	1,108	120,994	14,934	6,839	2,658 [c]	9,029	154,454
1984–1993 Average	1,040	137,289	13,842	8,847	3,691 [c]	10,471	174,141
1994–2003 Average	1,176	104,699	16,026	4,832	1,624 [c]	7,586	134,766
2004	1,100	93,819	18,012	5,141	3,225	6,667	126,865

[a] Harvests are extrapolated for all permits issued, based on those returned. Harvests prior to 1985 are rounded to the nearest hundred fish.
[b] Permit and harvest estimates prior to 1989 are based on the community where the permit was issued; estimates from 1989 to the present are based on the area fished, as first recorded on the permit.
[c] Includes even years only.