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Norton Sound Subdistrict 2 (Golovin) and Subdistrict 3 (Moses Point) Chum Salmon Stock Status and Action Plan, 2010; AReport to the Alaska Board of Fisheries

by

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and

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December 2009

Alaska Department of Fish and Game **Divisions of Sport Fish and Commercial Fisheries**

Symbols and Abbreviations

The following symbols and abbreviations, and others approved for the Système International d'Unités (SI), are used without definition in the following reports by the Divisions of Sport Fish and of Commercial Fisheries: Fishery Manuscripts, Fishery Data Series Reports, Fishery Management Reports, and Special Publications. All others, including deviations from definitions listed below, are noted in the text at first mention, as well as in the titles or footnotes of tables, and in figure or figure captions.

Weights and measures (metric)

centimeter	cm
deciliter	dL
gram	g
hectare	ha
kilogram	kg
kilometer	km
liter	L
meter	m
milliliter	mL
millimeter	mm

Weights and measures (English)

cubic feet per second	ft^3/s
foot	ft
gallon	gal
inch	in
mile	mi
nautical mile	nmi
ounce	oz
pound	lb
quart	qt
yard	yd

Time and temperature

day	d
degrees Celsius	°C
degrees Fahrenheit	°F
degrees kelvin	K
hour	h
minute	min
second	s

Physics and chemistry

all atomic symbols	
alternating current	AC
ampere	A
calorie	cal
direct current	DC
hertz	Hz
horsepower	hp
hydrogen ion activity (negative log of)	pH
parts per million	ppm
parts per thousand	ppt, ‰
volts	V
watts	W

General

Alaska Administrative Code	AAC
all commonly accepted abbreviations	e.g., Mr., Mrs., AM, PM, etc.
all commonly accepted professional titles	e.g., Dr., Ph.D., R.N., etc.
at	@
compass directions:	
east	E
north	N
south	S
west	W
copyright	©
corporate suffixes:	
Company	Co.
Corporation	Corp.
Incorporated	Inc.
Limited	Ltd.
District of Columbia	D.C.
et alii (and others)	et al.
et cetera (and so forth)	etc.
exempli gratia (for example)	e.g.
Federal Information Code	FIC
id est (that is)	i.e.
latitude or longitude	lat. or long.
monetary symbols (U.S.)	$, ¢
months (tables and figures): first three letters	Jan,...,Dec
registered trademark	®
trademark	™
United States (adjective)	U.S.
United States of America (noun)	USA
U.S.C.	United States Code
U.S. state	use two-letter abbreviations (e.g., AK, WA)

Measures (fisheries)

fork length	FL
mideye to fork	MEF
mideye to tail fork	METF
standard length	SL
total length	TL

Mathematics, statistics

all standard mathematical signs, symbols and abbreviations	
alternate hypothesis	H_A
base of natural logarithm	*e*
catch per unit effort	CPUE
coefficient of variation	CV
common test statistics	(F, t, χ^2, etc.)
confidence interval	CI
correlation coefficient (multiple)	R
correlation coefficient (simple)	r
covariance	cov
degree (angular)	°
degrees of freedom	df
expected value	*E*
greater than	>
greater than or equal to	≥
harvest per unit effort	HPUE
less than	<
less than or equal to	≤
logarithm (natural)	ln
logarithm (base 10)	log
logarithm (specify base)	$\log_2$, etc.
minute (angular)	'
not significant	NS
null hypothesis	H_O
percent	%
probability	P
probability of a type I error (rejection of the null hypothesis when true)	α
probability of a type II error (acceptance of the null hypothesis when false)	β
second (angular)	"
standard deviation	SD
standard error	SE
variance	
population	Var
sample	var

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ABSTRACT

In response to the guidelines established in *Policy for the Management of Sustainable Salmon Fisheries* (SSFP; ADF&G 2000), the Alaska Board of Fisheries (BOF) classified Norton Sound Subdistricts 2 and 3 (Golovin and Moses Point subdistricts, respectively) chum salmon *Oncorhynchus keta,* as a stock of concern, specifically a yield concern, at its September 2000 work session. A "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; a yield concern is less severe than a management concern". An action plan was developed by the Alaska Department of Fish and Game (ADF&G) and acted upon by the BOF in January 2001. The SSFP directs ADF&G to assess salmon stocks in areas addressed during the BOF regulatory cycle to identify stocks of concern and in the case of Norton Sound Subdistricts 2 and 3 chum salmon, to reassess the stock of concern status. In 2003, ADF&G recommended continuation of this classification as a stock of yield concern, which was supported by the BOF at its January 2004 meeting. Likewise in 2006, ADF&G recommended continuation of this classification as a stock of yield concern, which was supported by the BOF at its January 2007 meeting. Since that time, chum salmon yield in Subdistricts 2 and 3 has shown little improvement. The Subdistricts 2 and 3 chum salmon stock continue to meet the definition for a yield concern as defined in SSFP and ADF&G recommends continuing the stock of concern classification.

Key words: Norton Sound, chum salmon, *Oncorhynchus keta,* stock of concern, commercial, fishing, ADF&G, sustainable salmon fisheries policy, Alaska Board of Fisheries, Alaska

INTRODUCTION

The *Policy for the Management of Sustainable Salmon Fisheries* (SSFP; 5 AAC 39.222, ADF&G 2000) directs the Alaska Department of Fish and Game (ADF&G) to provide the Alaska Board of Fisheries (BOF) with reports on the status of salmon stocks and identify any stocks that present a concern related to yield, management, or conservation during regular BOF meetings. This report provides a reassessment by ADF&G of Norton Sound Subdistricts 2 and 3 (Golovin and Moses Point) chum salmon, which has been classified as a yield concern.

In response to the guidelines established in the SSFP (5 AAC 39.222(f)(42)), the BOF classified Norton Sound Subdistricts 2 and 3 chum salmon *Oncorhynchus keta*, as a stock of yield concern at its September 2000 work session. A stock of 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; a yield concern is less severe than a management concern" (5 AAC 39.222(f)(42)). This determination as a yield concern was based on low harvest levels for the previous 5-year period (1995–1999). An action plan was subsequently developed by ADF&G (Bue 2000) and acted upon by the BOF in January 2001. The classification as a yield concern was continued at the January 2004 BOF meeting (Menard and Bergstrom 2003) and at the January 2007 BOF meeting (Menard and Bergstrom 2006).

Based on definitions provided in SSFP (5 AAC 39.222(f)(42)), ADF&G recommended continuation of the Norton Sound Subdistrict 2 and Subdistrict 3 chum salmon as a stock of yield concern at the October 2009 BOF work session. From 2005 to 2009, low yields of chum salmon have continued in Norton Sound Subdistrict 2 and in Subdistrict 3; yields have been inconsistent, but often low.

STOCK ASSESSMENT BACKGROUND

Norton Sound District is composed of 6 commercial fishing subdistricts (Figure 1). Most subdistricts have several rivers where subsistence fishing occurs and, except for Subdistrict 1, there are few restrictions (Soong et al. 2008). In Subdistrict 2, most freshwater subsistence fishing occurs in Niukluk and Fish rivers, and in Subdistrict 3, in Kwiniuk and Tubutulik rivers

(Figure 2). Therefore, the Niukluk, Fish, Kwiniuk, and Tubutulik rivers are index rivers to determine salmon run strength for those 2 subdistricts.

ESCAPEMENT

In Subdistrict 2, ADF&G established a threshold sustainable escapement goal (SEG) of 30,000 chum salmon for Niukluk River tower in 2004. From 2004 though 2009, this SEG was achieved only in 2007, but was within 801 fish of the goal in 2006 (Table 1 and Figure 3). There has been a decreasing trend in escapement since the project was established in 1995.

In 2001, ADF&G recommended, and later established, chum salmon biological escapement goals (BEG) for Kwiniuk River of 10,000 to 20,000 and 8,000 to 16,000 chum salmon for Tubutulik River in Subdistrict 3 (Clark 2001). In January 2001, the BOF established optimal escapement goal (OEG) ranges for chum salmon in Kwiniuk River and Tubutulik River by adding an additional 15% to the BEG range to account for subsistence harvests that may occur above the tower site. Based on escapement counts from Kwiniuk River counting tower project, the OEG of 11,500 to 23,000 chum salmon has been achieved or exceeded in 3 of the 5 recent years (Table 2 and Figure 5). The OEG for the Tubutulik chum salmon stock is 9,200 to 18,400 chum salmon as assessed via aerial survey. It is difficult to determine if the OEG was achieved in most years because aerial surveys were often incomplete due to poor weather conditions or lack of aircraft. Another difficulty in surveying Tubutulik River beginning in 2004 was the huge numbers of pink salmon *O. gorbuscha*, that have been arriving at the same time as chum salmon. Pink salmon prevented adequate surveys of chum salmon in 2004–2006 and in 2008. An aerial survey in 2009 counted 3,161 chum salmon on Tubutulik River. Overall, chum salmon runs in Subdistrict 3 have been lower in the 1990s and 2000s than in the 1980s based on Kwiniuk River escapements and reported harvests (Figure 6).

YIELD

In Subdistricts 2 and 3, chum salmon harvests in the 2000s have been very minimal. Subsistence chum salmon harvests averaged 1,767 and 1,216 fish in Subdistricts 2 and 3, respectively, from 2005 through 2009. The total subsistence salmon harvest has usually been double in even-numbered years compared to odd-numbered years as fishermen take advantage of the greater runs of pink salmon in even-numbered years (Tables 3 and 4). In most years since 2003, chum salmon runs have been insufficient to allow for a commercial harvest in Subdistricts 2 and 3. However, in 2007 there was a large surplus of chum salmon, but the buyer was only able to purchase fish in Subdistrict 3. In 2008 and 2009 there was not a surplus of chum salmon in either subdistrict. During the last 5 years (2005–2009), with the exception of 2007, available yield has been much less than historical yield in the 1980s (Tables 3 and 4; Figures 4 and 6).

STOCK OF CONCERN RECOMMENDATION

Given the continued low yield of chum salmon despite use of specific management measures, the Norton Sound Subdistricts 2 and 3 chum salmon stock continues to meet the criteria for a stock of yield concern. Therefore, based on the definitions provided in the *Policy for the Management of Sustainable Salmon Fisheries* of 5 AAC 39.222(f)(42), ADF&G recommends continuation of the yield concern classification for the Norton Sound Subdistricts 2 and 3 chum salmon stock.

OUTLOOK

The 2010 chum salmon run in Norton Sound Subdistricts 2 and 3 is expected to be average to above average based on parent year escapements and the record number of age-0.2 chum salmon samples from the escapement projects in 2009. Age-0.2 chum salmon are from brood year 2006 and indicate good survival. In most years age-0.3 chum salmon make up the majority of the run to Subdistricts 2 and 3, and the good survival rate from brood year 2006 bodes well for next year's run.

ALASKA BOARD OF FISHERIES ACTION

In response to guidelines established in the SSFP, the BOF is anticipated to continue classification of the Norton Sound Subdistricts 2 and 3 chum salmon as a stock of yield concern during its January, 2010 regulatory meeting.

ESCAPEMENT GOAL EVALUATION

ADF&G has undertaken a review of escapement goals for several Norton Sound salmon stocks where sufficient long-term escapement, catch, and age composition data exist that enable the development of biological escapement goals (BEG) or sustainable escapement goals (SEG) based on analysis of production consistent with the escapement goal policy.

In Subdistrict 2, ADF&G established an escapement goal threshold of 30,000 chum salmon for Niukluk River tower in 2004 (ADF&G 2004). In Subdistrict 3, BEGs were established for the Tubutulik and Kwiniuk rivers in 2001 (Clark 2001). Aerial surveys are used to determine if the Tubutulik River goal is reached. A counting tower project is used to estimate chum salmon escapement in Kwiniuk River. In January 2001, the BOF established OEG ranges for Tubutulik and Kwiniuk rivers by increasing ADF&G recommended BEGs by 15%. Escapement goals were reviewed in the 2007 BOF cycle utilizing additional data since the escapement goals were established. This evaluation resulted in no recommended changes (Brannian et al. 2006). Escapement goals were examined for the 2010 BOF cycle and the review team recommended changing the Niukluk River chum salmon goal to an SEG threshold of >23,000 (Volk et al. *In prep*) based on a risk analysis (Bernard et al. 2009) which indicated escapements exceeding this threshold would result in only a 6.6% estimated risk of a management concern (4 consecutive years of escapements below the threshold), and only a 6.4% estimated risk of experiencing a 75% drop in mean escapement.

Current and proposed goals for Golovin and Moses Point chum salmon stocks are as follows:

Stream	Current Goal		Proposed Goal
Niukluk River Counting Tower	>30,000	SEG	>23,000
Kwiniuk River Counting Tower	10,000–20,000	BEG	No Change
Kwiniuk River Counting Tower	11,500–23,000	OEG	No Change
Tubutulik River Aerial Survey	8,000–16,000	BEG	No Change
Tubutulik River Aerial Survey	9,200–18,400	OEG	No Change

MANAGEMENT ACTION PLAN OPTIONS FOR ADDRESSING STOCKS OF CONCERN AS OUTLINED IN THE SUSTAINABLE FISHERIES POLICY

NORTON SOUND SUBDISTRICTS 2 AND 3 CHUM SALMON MANAGEMENT PLAN REVIEW/DEVELOPMENT

Current Stock Status

In response to guidelines established in the SSFP (5 AAC 39.222), ADF&G recommended continuation of Norton Sound Subdistricts 2 and 3 chum salmon as a stock of yield concern at the October 2009 BOF work session. The BOF, after reviewing stock status information and public input during its January, 2010 regulatory meeting, is anticipated to continue the classification of Subdistricts 2 and 3 chum salmon as a stock of yield concern. This determination is anticipated to be based on the inability, despite the use of specific management measures, to maintain expected yields or harvestable surpluses above a stock's escapement needs during the last 5 years (2005–2009).

Customary and Traditional Use Finding and the Amount Necessary

The BOF has made a positive finding for Customary and Traditional Use (C&T) for salmon in the Norton Sound-Port Clarence Area. Amounts reasonably necessary for subsistence (ANS) uses have been determined to be 96,000–160,000 salmon for the Norton Sound-Port Clarence Area.

HABITAT FACTORS ADVERSELY AFFECTING CHUM SALMON STOCKS

Subdistrict 2

The Norton Sound/Bering Strait Regional Comprehensive Salmon Plan 1996–2010 briefly mentions that the population of Council, on Niukluk River, was 10,000 people during the Gold Rush. Damage to fish habitat would have occurred 50 to 100 years ago and is not thought by area staff to be the limiting factor now in chum salmon production. Available spawning habitat appears to be more than adequate for the numbers of fish returning. The extent to which mining reduced the available spawning and rearing habitat is not known. There is occasional small-scale mining activity on Ophir Creek, which is not currently known for chum salmon production. Oral history indicated Ophir Creek used to be predominately a chum salmon producer. Historically, dredging left numerous dredge ponds. Beaver activity has intensified morphological changes in the creek. The system now primarily produces coho salmon *O. kisutch*. The increasing presence of beavers appears to be a common agent of habitat change. There are likely others with very small impacts that could add up or indicate a trend in changing environment. Casadepaga River has both small-scale mining and significant chum salmon production.

Subdistrict 3

In the late 1990s, there was a perched culvert on Iron Creek on the Moses Point to Elim Road that was a barrier to fish passage (pink, chum, and coho salmon) at all but high tidal stages. Local residents manually transported spawning stocks around the culvert in some years. The culvert was initially installed by the Bureau of Indian Affairs (BIA) and a retrofit has now provided easier fish passage. Beaver dams are becoming more prevalent on Iron Creek and this

stream has been transformed from a chum salmon producer to a coho salmon producer. Many hook and line subsistence fishermen report harvesting coho salmon from Iron Creek. Kroeker (2006) reported the effect of beaver activity on Kwiniuk River and Iron Creek.

Projects Needed

A survey of the loss of chum salmon spawning and rearing habitat due to mining in the Niukluk River drainage and an assessment of the feasibility and cost of restoration is recommended.

Do New Or Expanding Fisheries On This Stock Exist?

There are no new or expanding fisheries on this stock. However, Norton Sound-bound chum salmon are likely taken as bycatch in the Bering Sea groundfish fishery (Wilmot et al. 1998). Chum salmon bycatch greatly increased from 2003 through 2007, but has substantially decreased the last 2 years.

EXISTING MANAGEMENT PLAN

5 AAC 04.390. Subdistricts 2 and 3 of the Norton Sound District Salmon Management Plan.

ACTION PLAN DEVELOPMENT

NORTON SOUND SUBDISTRICTS 2 AND 3 CHUM SALMON ACTION PLAN GOAL

Reduce fishing mortality in order to meet spawning escapement goals, to provide for subsistence levels within the ANS range, and to reestablish historical range of harvest levels by other users.

REVIEW OF MANAGEMENT ACTION PLAN

Regulation Changes Adopted in January 2001

In January 2001, after review of the management action plan options addressing this stock of concern, BOF adopted the following plan:

5 AAC 04.390. Subdistricts 2 and 3 of the Norton Sound District Salmon Management Plan.

(a) The purpose of this management plan is to provide the department with management guidelines for sustained yield of salmon stocks in Subdistricts 2 and 3 in the Norton Sound District. The department shall manage, to the extent practicable, the commercial, sport, subsistence, and personal use fisheries in Subdistricts 2 and 3 to achieve escapement goals.

(b) The department shall manage salmon fisheries in the Subdistricts 2 and 3 as follows:

(1) in the commercial chum salmon fishery,

(A) the department shall manage the fisheries to achieve the following optimal escapement goals ranges:

i. Kwiniuk River: 11,500–23,000 chum salmon; and

ii. Tubutulik River: 9,200–18,400 chum salmon;

(B) the chum salmon harvest may not exceed 15,000 fish before the departments mid July run assessment in Subdistrict 2;

(C) the fishery may occur only if the department projects that chum salmon escapement goals will be achieved and the harvestable surplus will more than meet subsistence needs;

(2) in the commercial pink salmon fishery, the fishery may occur only if subsistence needs are expected to be met and chum salmon escapement goals achieved;

(3) in the commercial coho salmon fishery, the fishery may occur only when the chum salmon escapement goals for the Norton Sound District index rivers specified in 5 AAC 04.358 are achieved or when the department determines that further restrictions would have no impact on achieving chum salmon escapement goals;

(4) the commissioner may not place restrictions on subsistence fishing for chum salmon by emergency order, unless all directed chum salmon commercial fishing has been closed and sport fishing has been appropriately restricted in the subdistrict as provided in 5 AAC 01.180–5 AAC 01.184. (Eff. 6/17/2001, Register 158).

ADF&G was provided the authority to establish subsistence gillnet mesh size restriction of 4.5 inch or less by emergency order when necessary to conserve chum salmon in Subdistricts 1, 2, and 3.

The BOF adopted subsistence hook and line attached to a rod or pole as a lawful gear for all species in northern Norton Sound and southern Kotzebue Sound. Sport fishing bag limits and methods and means restrictions were adopted, except when a subsistence fishing permit is required; then, the catch limits specified in the subsistence fishing permit will apply, except when fishing through the ice.

Regulation Changes Adopted in January 2004

In January 2004, after review of the management action plan options addressing this stock of concern (Menard and Bergstrom 2003), the BOF adopted a regulation requiring subsistence salmon permits in all waters of Subdistricts 2 and 3. No harvest limits were established for Subdistricts 2 and 3.

Regulation Changes Adopted in January 2007

In January 2007, after review of the management action plan options addressing this stock of concern (Menard and Bergstrom 2006), the BOF (1) eliminated the commercial fishing period schedule of two 48-hour fishing periods per week in Subdistrict 2 and allowed ADF&G to set periods by emergency order, and (2) eliminated the commercial fishing period schedule in Subdistrict 3 of two 24-hour fishing periods per week and allowed ADF&G to set periods by emergency order.

Management Review

Historical management actions in Subdistricts 2 and 3 are listed in Table 5. Management strategies employed allowed for commercial chum salmon fishing in 2001. The lower escapement goal range for Kwiniuk River allowed ADF&G to determine earlier in the season that the goal would be reached, and therefore, allow commercial chum salmon fishing. There was limited fishing effort in both Subdistricts 2 and 3. In 2002, the sole buyer was unable to purchase fish because of mechanical problems with tenders. In Subdistrict 2, the 2002 chum salmon run was poor compared to the runs in 1980s and 1990s. However, in Subdistrict 3, the

2002 chum salmon run was the third best since the 1980s. From 2002 through 2006 there was no commercial fishing in either subdistrict, mainly because of no market interest, but in the case of chum salmon, there were some years of poor runs.

In 2003, the chum salmon run was poor in both subdistricts and no commercial fishing was allowed. Furthermore, ADF&G closed subsistence fishing for chum salmon for 2 weeks in Subdistrict 2. Telemetry studies on the Fish River drainage from 2002–2004 estimated that approximately one-third of the chum salmon went up Niukluk River (Todd 2004; Todd et al. 2005). In 2004 and 2005, the chum salmon run was again poor to both subdistricts, but pink salmon runs in both years were near record to record-setting in relation to odd-numbered year and even-numbered year historical runs. In 2006, the chum salmon run to Subdistrict 3 rebounded and the escapement was in the top 10 historically, but in Subdistrict 2, the chum salmon run continued to be poor.

Beginning in 2007, one buyer was interested in purchasing salmon from Subdistrict 3 and expanded to Subdistrict 2 to buy salmon in 2008. Commercial fishing was allowed in 2007 for chum salmon in Subdistrict 3. In 2008 and 2009, the chum salmon runs were too weak to allow for commercial fishing in both subdistricts, but fishing for pink salmon was allowed in 2008, and fishing for coho salmon was allowed in 2008 and 2009.

Subsistence salmon harvests in the 2000s, in Subdistrict 2, have usually been double in even-numbered years compared to odd-numbered years as fishermen take advantage of the greater runs of pink salmon in the even-numbered years. There has been little interest by buyers in purchasing pink salmon. In 2005, there was a much higher odd-numbered year pink salmon run than in previous odd-numbered years since the tower was established, and the pink salmon subsistence harvest was much greater (Table 3). Likewise, in Subdistrict 3, the subsistence salmon harvests have usually been double in even-numbered years (Table 4) because of the greater abundance of pink salmon. In 2007 and 2009, the pink salmon runs decreased to more normal numbers that had been observed in other odd-numbered years since the mid 1980s, while the even-numbered year pink salmon runs continue to be near record breaking.

ACTION PLAN ALTERNATIVE

Action 1

Specify a date in Subdistricts 2 and 3 of the *Norton Sound Salmon Management Plan* after which a pink salmon commercial fishery may be allowed.

Objective

The purpose of this action is to open a commercial pink salmon fishery near the peak of the run when chum salmon abundance is poor, if it is determined there is a large harvestable surplus of pink salmon and that a directed pink salmon commercial fishery will not have a significant impact on escapement or subsistence use of chum salmon.

Specific Action Recommended to Implement the Objective

Allow a directed commercial pink salmon fishery to be opened after July 6 in Subdistrict 3 and after July 14 in Subdistrict 2.

5 AAC 04.390. Subdistricts 2 and 3 of the Norton Sound District Salmon Management Plan (b)

(2) in the commercial pink salmon fishery, the fishery may occur only if subsistence needs are expected to be met and chum salmon escapement goals achieved; **or after July 6 in Subdistrict 3 and after July 14 in Subdistrict 2, if it is determined there is a harvestable surplus of pink salmon and that a directed pink salmon commercial fishery will not have a significant impact on escapement or subsistence use of chum salmon;**

Cost/Benefit Analysis

After reviewing the Subdistricts 2 and 3 salmon management plan, ADF&G believes the provision addressing a pink salmon fishery may be too conservative and is proposing a change to allow pink salmon commercial fishing when chum salmon abundance is low. Niukluk and Kwiniuk rivers have had a large surplus of pink salmon in recent even-numbered years (Tables 1 and 2) and market conditions appear to be improving.

Proposed dates after which a commercial pink salmon fishery may be opened are based upon chum salmon run timing at escapements projects on Kwiniuk and Niukluk rivers. The average midpoint of the chum salmon run at Kwiniuk River counting tower is July 6, and in only 3 of the last 30 years was the midpoint of the chum salmon run not reached by July 11 (Figure 7). At Niukluk River counting tower, the average midpoint for chum salmon is July 14 and in only 5 of the last 15 years has the midpoint not been reached by that date (Figure 8).

Norton Sound has had record pink salmon runs in recent even-numbered years (Figures 9 and 10). Run timing of pink salmon overlaps with chum salmon, less so at Kwiniuk River than at Niukluk River. The average midpoint at the Kwiniuk River counting tower during an even-numbered year is July 11 for pink salmon and 10 days later during an odd-numbered year (Figure 7). At Niukluk River counting tower, the average midpoint for pink salmon during an even-numbered year is July 14, the same as chum salmon, and 10 days later during an odd-numbered year (Figure 8). Emergency order authority would be utilized to open a directed pink salmon fishery if it is determined there is a harvestable surplus of pink salmon and that a commercial fishery will not have a significant impact on escapement or subsistence use of chum salmon. For a pink salmon commercial gillnet fishery, a restriction of 4.5 inch or less mesh size would be specified. Allowing the potential opening of a pink salmon commercial fishery earlier in the run will provide financial benefits to an economically depressed area if commercial markets are available. Adoption of this action plan alternative is not expected to result in additional direct costs for private individuals to participate in this fishery.

Subsistence Issues/Consideration

The chum salmon subsistence harvest in Subdistricts 2 and 3 has had a low estimated exploitation rate (Figures 11 and 12). Since this stock was identified as a yield concern in 2000, ADF&G has restricted chum salmon subsistence fishing opportunities in Subdistricts 2 and 3 only once, in 2003. ADF&G does not anticipate future restrictions to subsistence opportunity for chum salmon in Subdistricts 2 and 3 because of the low exploitation rate and the harvest has a minor effect on escapement. Figure 11 assumes that all chum salmon caught in Subdistrict 2 were bound for the Fish River drainage, the largest river system in the subdistrict, and in years of no commercial fishing, the exploitation is less than 5%. Figure 12 assumes that all chum salmon caught in Subdistrict 3 were bound for Kwiniuk River, 1 of 2 major rivers, in the subdistrict. More subsistence fishermen fish closer to Kwiniuk River and even if all chum salmon catches

are assigned to that drainage, the exploitation rate is often below 10%. The proposed management strategy is not expected to change the current subsistence harvest patterns, or be an additional expense for subsistence fishermen. Typically, half of the chum salmon runs in Subdistricts 2 and 3 would be available for subsistence harvest prior to allowing a commercial pink salmon fishery.

Performance Measures

An important measure of performance would be evaluating incidental chum salmon harvest in relation to meeting established escapement goals and to the level of pink salmon surplus harvested by the commercial fishery. Harvest levels would be determined through inseason verbal catch reports from buyers and fish tickets. Spawning escapement will be monitored through existing weir projects and aerial surveys.

2010 ALASKA BOARD OF FISHERIES REGULATORY PROPOSALS AFFECTING NORTON SOUND SUBDISTRICTS 2 AND 3 CHUM SALMON

Norton Sound - Commercial

74 – Expand commercial fishing boundaries in Subdistrict 3.

76 – Allow purse seines to harvest pink salmon in Norton Sound District.

77 – Allow purse and beach seines to harvest salmon in Norton Sound-Port Clarence Area.

Proposals before the BOF affecting Subdistricts 2 and 3 chum salmon relate to expanding Subdistrict 3 eastern boundary to the boundary for Subdistrict 4, and expanding Subdistrict 3 western boundary to Carson Creek near the boundary for Subdistrict 2, and allowing purse seine and/or beach seine as a commercial gear type. The seine proposals would be a method for targeting pink salmon runs, but some chum salmon will likely be caught in a seine fishery.

RESEARCH PLAN

NORTON SOUND INITIATIVE AND AYK SUSTAINABLE SALMON INITIATIVE

A Norton Sound Initiative (NSI), funded by the Norton Sound Salmon Research and Restoration fund, (NSSR&R) formed a Steering Committee that identified and prioritizing research needs in response to the low chum salmon run in 1999. Through this initiative, native organizations, private industry, non-profit organizations, state, and federal agencies joined together to form an innovative partnership to cooperatively address salmon research and restoration needs. NSI projects were operational from 2001 to 2006 and a final report is scheduled to be issued in 2010. Norton Sound Economic Development Corporation (NSEDC), the community development quota (CDQ) group for Norton Sound, has continued the support of salmon projects since the NSSR&R funding ended. The Arctic-Yukon-Kuskokwim Sustainable Salmon Initiative (AYK SSI) was formed after the NSI and is similar in organization, but encompasses the Yukon and Kuskokwim areas in addition to Norton Sound. The AYK SSI has funded several salmon radiotelemetry and salmon smolt projects in the Norton Sound area.

There were 2 projects in Subdistricts 2 and 3 that received funding from the NSSR&R fund throughout the funding period. The escapement projects on Niukluk and Kwiniuk Rivers received funding to sample chum salmon for age, sex, and length (ASL) data. These data help managers determine age class return strength, which can improve run projections. Another NSSR&R-funded project in Subdistrict 2 used radiotelemetry to track chum salmon tagged in the Fish River several miles downstream of the confluence with Niukluk River. The telemetry project determined the percentage of chum salmon that spawn in the Niukluk River drainage versus the Fish River drainage (Todd 2004; Todd et al. 2005). Some research projects, although outside of Subdistricts 2 and 3, have provided data that can be useful throughout Norton Sound. One project has shown the outmigration timing of juvenile salmon in Subdistrict 1 was in late July (Nemeth et al. 2003) as opposed to a belief that outmigration occurred mainly in late June.

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TABLES AND FIGURES

Table 1.–Historical salmon escapements at Niukluk River counting tower, 1995–2009.

Year	Operating period	Chum	Pink	Chinook [a]	Coho
1995	June 29–Sept 12	86,332	17,088	123	4,713
1996	June 23–Sept 12	80,178	1,154,922	243	12,781
1997	June 28–Sept 09	57,305	10,468	259	3,994
1998	July 04–Aug 09	45,588	1,624,438	260	840
1999	June 04–Sept 04	35,239	20,351	40	4,260
2000	July 04–Aug 27	29,573	961,603	48	11,382
2001	July 10–Sept 08	30,662	41,625	30	3,468
2002	June 25–Sept 10	35,307	645,141	621	7,391
2003	June 25–Sept 10	20,018	75,855	179	1,282
2004	June 25–Sept 08	10,770	975,895	141	2,064
2005	June 28–Sept 09	25,598	270,424	41	2,727
2006	June 26–Sept 08	29,199	1,371,919	39	11,169
2007	July 01–Sept 04	50,994	43,617	30	3,498
2008	July 01–Sept 06	12,078	669,234	33	13,779
2009	July 03–Sept 02	15,879	24,204	204	6,861
5-year avg. [b]		26,750	475,880	69	7,607

[a] Chinook salmon counts from 1965–1984 were not expanded. Counts in 1985 and after were expanded.

[b] 5-year average from 2005–2009.

Table 2.–Historical salmon escapements at Kwiniuk River counting tower, 1965–2009.

Year	Operating period	Chum	Pink	Chinook	Coho
1965	June 18–Jul 19	32,861	8,668	19	
1966	June 19–Jul 28	32,786	10,629	7	
1967	June 18–Jul 28	26,661	3,587	13	
1968	June 18–Jul 24	19,976	129,052	27	
1969	June 26–Jul 26	19,687	56,683	12	
1970	June 25–Jul 29	66,604	226,831		
1971	June 29–Jul 29	38,679	16,634		
1972	June 28–Jul 27	30,686	62,461	65	
1973	June 25–Jul 25	28,029	37,070	57	
1974	June 20–Jul 26	35,161	39,375	62	
1975	July 04–Jul 26	14,049	55,293	44	
1976	July 04–Jul 25	8,508	35,226	12	
1977	June 26–Jul 25	21,798	47,934		
1978	July 04–Jul 22	11,049	70,148		
1979	June 28–Jul 25	12,355	167,492	107	
1980	June 22–Jul 28	19,374	319,363	177	
1981	June 19–Aug 02	34,565	566,534	136	
1982	June 21–Jul 26	44,099	469,674	138	
1983	June 19–Jul 27	56,907	251,965	267	
1984	June 19–Jul 25	54,043	736,544	736 [a]	
1985	June 26–Jul 28	9,013	18,237	955	
1986	June 19–Jul 26	24,700	241,446	654	
1987	June 25–Jul 23	16,133	5,566	317	
1988	June18–Jul 26	13,303	187,907	321	
1989	June 27–Jul 27	14,529	27,488	248	
1990	June 21–Jul 25	13,957	416,512	900	
1991	June 18–Jul 27	19,801	53,499	708	
1992	June 27–Jul 28	12,077	1,464,716	479	
1993	June 27–Jul 27	15,824	43,063	600	
1994	June 23–Aug 09	33,012	2,303,114	625	2,547
1995	June 21–Jul 26	42,500	17,511	498	114
1996	June 20–Jul 25	28,493	907,893	577	461
1997	June 18–Jul 27	20,119	9,535	974	
1998	June 18–Jul 27	24,247	655,934	303	
1999	June 25–Jul 28	8,763	607	116	
2000	June 22–Jul 27	12,879	750,173	144	41
2001	June 27–Sept 15	16,598	8,423	261	9,532
2002	June 17–Sept 11	37,995	1,114,410	778	6,459
2003	June 15–Sept 15	12,123	22,329	744	5,490
2004	June 16–Sept 14	10,362	3,054,684	663	11,240
2005	June 17–Sept 13	12,083	341,048	342	12,950
2006	June 22–Sept 12	39,519	1,347,090	195	22,341
2007	June 21–Sept 10	27,756	54,255	258	9,429
2008	June 23–Sept 07	9,462	1,442,246	237	10,461
2009	June 24–Sept 13	8,733	42,957	444	8,563
5-year avg. [b]		19,511	645,519	295	12,749

[a] Chinook salmon counts from 1965-1984 were not expanded. Counts in 1985 and after were expanded.

[b] 5-year average from 2005–2009.

Table 3.–Commercial and subsistence salmon catch by species by year in Subdistrict 2 (Golovin), Norton Sound District, 1962–2009.

	SUBDISTRICT 2 (GOLOVIN)																	
	Commercial						Subsistence						Combined					
Year	Chinook	Sockeye	Coho	Pink	Chum	Total	Chinook	Sockeye	Coho	Pink	Chum	Total	Chinook	Sockeye	Coho	Pink	Chum	Total
1962	45	11	264	10,276	68,720	79,316	-	-	-	-	-	-	45	11	264	10,276	68,720	79,316
1963	40	40	-	19,677	49,850	69,607	-	-	118	5,702	9,319	15,139	40	40	118	25,379	59,169	84,746
1964	27	40	3	7,236	58,301	65,607	-	-	-	-	-	-	27	40	3	7,236	58,301	65,607
1965	-	-	-	-	-	-	2	-	49	1,523	3,847	5,421	2	-	49	1,523	3,847	5,421
1966	17	14	584	4,665	29,791	35,071	4	-	176	1,573	3,520	5,273	21	14	760	6,238	33,311	40,344
1967	10	-	747	5,790	31,193	37,740	3	-	185	2,774	4,803	7,765	13	-	932	8,564	35,996	45,505
1968	12	-	205	18,428	10,011	28,656	4	-	181	4,955	1,744	6,884	16	-	386	23,383	11,755	35,540
1969	28	-	1,224	23,208	20,949	45,409	2	-	190	2,760	2,514	5,466	30	-	1,414	25,968	23,463	50,875
1970	13	-	3	18,721	20,566	39,303	4	-	353	2,046	2,614	5,017	17	-	356	20,767	23,180	44,320
1971	37	-	197	2,735	33,824	36,793	7	-	191	1,544	1,936	3,678	44	-	388	4,279	35,760	40,471
1972	36	-	20	6,562	27,097	33,715	4	-	62	1,735	2,028	3,829	40	-	82	8,297	29,125	37,544
1973	70	-	183	14,145	41,689	56,087	1	-	48	9	74	132	71	-	231	14,154	41,763	56,219
1974	30	-	3	28,340	30,173	58,546	3	-	-	967	205	1,175	33	-	3	29,307	30,378	59,721
1975	17	-	206	10,770	41,761	52,754	-	-	1	2,011	2,025	4,037	17	-	207	12,781	43,786	56,791
1976	12	-	1,311	24,051	30,219	55,593	-	-	-	1,995	1,128	3,123	12	-	1,311	26,046	31,347	58,716
1977	26	-	426	7,928	53,912	62,292	3	-	80	703	2,915	3,701	29	-	506	8,631	56,827	65,993
1978	22	-	94	72,033	41,462	113,611	1	-	-	2,470	1,061	3,532	23	-	94	74,503	42,523	117,143
1979	75	49	1,606	45,948	30,201	77,879	-	-	845	2,546	2,840	6,231	75	49	2,451	48,494	33,041	84,110
1980	36	36	328	10,774	52,609	63,783	12	-	692	10,727	4,057	15,488	48	36	1,020	21,501	56,666	79,271
1981	23	5	13	49,755	58,323	108,119	8	-	1,520	5,158	5,543	12,229	31	5	1,533	54,913	63,866	120,348
1982	78	5	4,281	39,510	51,970	95,844	7	-	1,289	4,752	1,868	7,916	85	5	5,570	44,262	53,838	103,760
1983	52	10	295	17,414	48,283	66,054	[a]	[a]	[a]	[a]	[a]	[a]	[a]	[a]	[a]	[a]	[a]	[a]
1984	31	-	2,462	88,588	54,153	145,234	[a]	[a]	[a]	[a]	[a]	[a]	[a]	[a]	[a]	[a]	[a]	[a]
1985	193	113	1,196	3,019	55,781	60,302	12	2	430	1,904	9,577	11,925	205	115	1,626	4,923	65,358	72,227
1986	81	8	958	25,425	69,725	96,197	[a]	[a]	[a]	[a]	[a]	[a]	[a]	[a]	[a]	[a]	[a]	[a]
1987	166	51	2,203	1,579	44,334	48,333	[a]	[a]	[a]	[a]	[a]	[a]	[a]	[a]	[a]	[a]	[a]	[a]
1988	108	921	2,149	31,559	33,348	68,085	[a]	[a]	[a]	[a]	[a]	[a]	[a]	[a]	[a]	[a]	[a]	[a]
1989	0	0	0	0	0	0	[a]	[a]	[a]	[a]	[a]	[a]	[a]	[a]	[a]	[a]	[a]	[a]
1990	52	21	0	0	15,993	16,066	[a]	[a]	[a]	[a]	[a]	[a]	[a]	[a]	[a]	[a]	[a]	[a]
1991	49	1	0	0	14,839	14,889	[a]	[a]	[a]	[a]	[a]	[a]	[a]	[a]	[a]	[a]	[a]	[a]
1992	6	9	2,085	0	1,002	3,102	[a]	[a]	[a]	[a]	[a]	[a]	[a]	[a]	[a]	[a]	[a]	[a]
1993	1	4	2	8,480	2,803	11,290	[a]	[a]	[a]	[a]	[a]	[a]	[a]	[a]	[a]	[a]	[a]	[a]
1994 [b]	0	0	3,424	0	111	3,535	253	168	733	8,410	1,337	10,901	253	168	4,157	8,410	1,448	14,436
1995 [b]	0	0	1,616	4,296	1,987	7,899	165	34	1,649	7,818	10,373	20,039	165	34	3,265	12,114	12,360	27,938
1996 [b]	0	0	638	0	0	638	86	134	3,014	17,399	2,867	23,500	86	134	3,652	17,399	2,867	24,138
1997 [b]	19	2	102	20	8,003	8,146	138	427	555	4,570	4,891	10,581	157	429	657	4,590	12,894	18,727

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Table 3.–Page 2 of 2.

	SUBDISTRICT 2 (GOLOVIN)																	
	Commercial						Subsistence						Combined					
Year	Chinook	Sockeye	Coho	Pink	Chum	Total	Chinook	Sockeye	Coho	Pink	Chum	Total	Chinook	Sockeye	Coho	Pink	Chum	Total
1998 [b]	1	0	3	106,761	723	107,488	184	37	1,292	13,340	1,893	16,746	185	37	1,295	120,101	2,616	124,234
1999 [b]	0	0	0	0	0	0	60	48	1,234	469	3,656	5,467	60	48	1,234	469	3,656	5,467
2000 [b]	0	0	1,645	17,408	164	19,217	169	18	2,335	10,906	1,155	14,583	169	18	3,980	28,314	1,319	33,800
2001 [b]	0	43	30	0	7,094	7,167	89	72	880	1,665	3,291	5,997	89	115	910	1,665	10,385	13,164
2002 [b]	0	0	0	0	0	0	69	66	1,640	14,430	1,882	18,087	69	66	1,640	14,430	1,882	18,087
2003 [b]	0	0	0	0	0	0	166	28	309	5,012	1,477	6,992	166	28	309	5,012	1,477	6,992
2004 [c]	0	0	0	0	0	0	164	6	654	19,936	880	21,640	164	6	654	19,936	880	21,640
2005 [c]	0	0	0	0	0	0	96	15	686	11,467	1,852	14,116	96	15	686	11,467	1,852	14,116
2006 [c]	0	0	0	0	0	0	136	38	1,760	14,670	722	17,326	136	38	1,760	14,670	722	17,326
2007 [c]	0	0	0	0	0	0	188	321	1,179	3,980	4,217	9,885	188	321	1,179	3,980	4,217	9,885
2008 [c]	0	0	256	2,699	623	3,578	146	95	2,337	10,155	350	13,083	146	95	2,593	12,854	973	16,661
2009	0	0	2,452	0	87	2,539	237	33	1,377	3,787	1,694	7,128	237	33	3,829	3,787	1,781	9,667
5-year avg. [d]	0	0	542	540	142	1,223	161	100	1,468	8,812	1,767	12,308	161	100	2,009	9,352	1,909	13,531

[a] Subsistence harvests are based on household surveys. The number of households surveyed is unknown and varies annually. Actual harvests are greater.

[b] Subsistence harvests are based on expanded household survey estimates for Golovin and White Mountain. Harvest numbers do not include other residents outside of subdistrict that fished.

[c] Beginning in 2004, a permit was required for Golovin Subdistrict that replaced household surveys and includes residents outside of subdistrict that fished.

[d] 5-year average from 2005–2009.

Table 4.–Commercial and subsistence salmon catch by species, by year in Subdistrict 3 (Moses Point), Norton Sound District, 1962–2009.

	SUBDISTRICT 3 (MOSES POINT)																	
	Commercial						Subsistence						Combined					
Year	Chinook	Sockeye	Coho	Pink	Chum	Total	Chinook	Sockeye	Coho	Pink	Chum	Total	Chinook	Sockeye	Coho	Pink	Chum	Total
1962	27	-	-	11,100	50,683	61,810	-	-	-	-	-	-	-	-	-	-	-	-
1963	15	-	-	2,549	46,274	48,838	5	-	-	5,808	8,316	14,129	20	-	-	8,357	54,590	62,967
1964	32	3	-	3,372	28,568	31,975	-	-	-	63	348	411	-	-	-	3,435	28,916	32,386
1965	-	-	-	-	-	-	16	-	72	1,325	9,857	11,270	-	-	-	-	-	-
1966	17	-	-	2,745	24,741	27,503	14	-	250	2,511	5,409	8,184	31	-	-	5,256	30,150	35,687
1967	-	-	-	-	-	-	39	-	116	1,322	9,913	11,390	-	-	-	-	-	-
1968	12	-	1	9,012	17,908	26,933	2	-	80	6,135	2,527	8,744	14	-	81	15,147	20,435	35,677
1969	29	-	-	11,807	26,594	38,430	9	-	109	1,790	1,303	3,211	38	-	-	13,597	27,897	41,641
1970	39	-	-	13,052	29,726	42,817	16	-	160	4,661	6,960	11,797	55	-	-	17,713	36,686	54,614
1971	95	-	4	922	43,831	44,852	16	-	271	1,046	2,227	3,560	111	-	275	1,968	46,058	48,412
1972	190	-	11	5,866	30,919	36,986	44	-	108	1,579	2,070	3,801	234	-	119	7,445	32,989	40,787
1973	134	-	-	10,603	31,389	42,126	2	-	-		298	300	136	-	-	10,603	31,687	42,426
1974	198	-	9	12,821	55,276	68,304	3	-	-	2,382	1,723	4,108	201	-	-	15,203	56,999	72,412
1975	16	-	-	4,407	46,699	51,122	2	-	6	1,280	508	1,796	18	-	-	5,687	47,207	52,918
1976	24	-	232	5,072	10,890	16,218	22	-	-	5,016	1,548	6,586	46	-	-	10,088	12,438	22,804
1977	96	-	6	9,443	47,455	57,000	22	-	225	1,145	1,170	2,562	118	-	231	10,588	48,625	59,562
1978	444	-	244	39,694	44,595	84,977	38	-	407	1,995	1,229	3,669	482	-	651	41,689	45,824	88,646
1979	1,035	-	177	40,811	37,123	79,146	16	-	890	6,078	1,195	8,179	1,051	-	1,067	46,889	38,318	87,325
1980	502	-	-	1,435	14,755	16,692	131	-	229	4,232	1,393	5,985	633	-	-	5,667	16,148	22,677
1981	198	-	5	26,417	29,325	55,945	32	-	2,345	6,530	2,819	11,726	230	-	2,350	32,947	32,144	67,671
1982	253	-	318	9,849	40,030	50,450	1	-	1,835	3,785	3,537	9,158	254	-	2,153	13,634	43,567	59,608
1983	254	-	-	17,027	65,776	83,057	[a]	[a]	[a]	[a]	[a]	[a]	[a]	[a]	[a]	[a]	[a]	[a]
1984	-	-	5,959	28,035	9,477	43,471	[a]	[a]	[a]	[a]	[a]	[a]	[a]	[a]	[a]	[a]	[a]	[a]
1985	816	32	1,803	559	24,466	27,676	67	-	1,389	1,212	947	3,615	883	-	3,192	1,771	25,413	31,291
1986	600	41	5,874	15,795	20,668	42,978	[a]	[a]	[a]	[a]	[a]	[a]	[a]	[a]	[a]	[a]	[a]	[a]
1987	907	15	64	568	17,278	18,832	[a]	[a]	[a]	[a]	[a]	[a]	[a]	[a]	[a]	[a]	[a]	[a]
1988	663	93	3,974	13,703	18,585	37,018	[a]	[a]	[a]	[a]	[a]	[a]	[a]	[a]	[a]	[a]	[a]	[a]
1989	62	0	0	0	167	229	[a]	[a]	[a]	[a]	[a]	[a]	[a]	[a]	[a]	[a]	[a]	[a]
1990	202	0	0	501	3,723	4,426	[a]	[a]	[a]	[a]	[a]	[a]	[a]	[a]	[a]	[a]	[a]	[a]
1991 [b]	161	0	0	0	804	965	312	-	2,153	3,555	2,660	8,680	473	-	2,153	3,555	3,464	9,645
1992 [b]	0	0	3,531	0	6	3,537	100	-	1,281	6,152	1,260	8,793	100	-	4,812	6,152	1,266	12,330
1993 [b]	3	0	4,065	0	167	4,235	368	-	1,217	1,726	1,635	4,946	371	-	5,282	1,726	1,802	9,181
1994 [b]	0	0	5,345	0	414	5,759	322	104	1,180	9,345	3,476	14,427	322	104	6,525	9,345	3,890	20,186
1995 [b]	4	44	3,742	2,962	1,171	7,923	284	17	1,353	2,046	3,774	7,474	288	61	5,095	5,008	4,945	15,397
1996 [b]	0	0	1,915	68,609	0	70,524	417	52	1,720	9,442	2,319	13,950	417	52	3,635	78,051	2,319	84,474
1997 [b]	844	0	1,409	0	2,683	4,936	619	50	1,213	1,314	2,064	5,260	1,463	50	2,622	1,314	4,747	10,196

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Table 4.–Page 2 of 2.

	SUBDISTRICT 3 (MOSES POINT)																	
	Commercial						Subsistence						Combined					
Year	Chinook	Sockeye	Coho	Pink	Chum	Total	Chinook	Sockeye	Coho	Pink	Chum	Total	Chinook	Sockeye	Coho	Pink	Chum	Total
1990	202	0	0	501	3,723	4,426	-	-	-	-	-	-	-	-	-	-	-	-
1991	161	0	0	0	804	965	312	-	2,153	3,555	2,660	8,680	473	-	2,153	3,555	3,464	9,645
1992	0	0	3,531	0	6	3,537	100	-	1,281	6,152	1,260	8,793	100	-	4,812	6,152	1,266	12,330
1993	3	0	4,065	0	167	4,235	368	-	1,217	1,726	1,635	4,946	371	-	5,282	1,726	1,802	9,181
1994 [b]	0	0	5,345	0	414	5,759	322	104	1,180	9,345	3,476	14,427	322	104	6,525	9,345	3,890	20,186
1995 [b]	4	44	3,742	2,962	1,171	7,923	284	17	1,353	2,046	3,774	7,474	288	61	5,095	5,008	4,945	15,397
1996 [b]	0	0	1,915	68,609	0	70,524	417	52	1,720	9,442	2,319	13,951	417	52	3,635	78,051	2,319	84,475
1997 [b]	844	0	1,409	0	2,683	4,936	619	50	1,213	1,314	2,064	5,261	1,463	50	2,622	1,314	4,747	10,197
1998 [b]	105	0	1,462	145,669	2,311	149,547	414	49	1,831	6,891	1,376	10,561	519	49	3,293	152,560	3,687	160,108
1999 [b]	0	0	0	0	0	0	424	13	975	1,564	744	3,720	424	13	975	1,564	744	3,720
2000 [b]	10	0	5,182	46,369	535	52,096	248	46	1,429	5,983	1,173	8,879	258	46	6,611	52,352	1,708	60,975
2001 [b]	7	0	1,696	0	681	2,384	427	70	1,352	1,390	898	4,137	434	70	3,048	1,390	1,579	6,521
2002 [b]	0	0	0	0	0	0	565	14	1,801	8,345	1,451	12,176	565	14	1,801	8,345	1,451	12,176
2003 [b]	0	0	0	0	0	0	660	39	1,143	2,524	1,687	6,053	660	39	1,143	2,524	1,687	6,053
2004 [c]	0	0	0	0	0	0	412	0	704	7,858	683	9,657	412	0	704	7,858	683	9,657
2005 [c]	0	0	0	0	0	0	225	9	1,011	3,721	598	5,564	225	9	1,011	3,721	598	5,564
2006 [c]	0	0	0	0	0	0	179	13	1,769	5,216	1,267	8,444	179	0	1,769	5,216	1,267	8,444
2007 [c]	1	0	5,908	1,648	4,567	12,124	260	0	2,295	1,742	2,334	6,631	261	0	8,203	3,390	6,901	18,755
2008 [c]	5	0	4,586	14,536	304	19,431	269	0	1,804	7,655	1,284	11,012	274	0	6,390	22,191	1,588	30,443
2009 [c]	0	0	9,582	35	597	10,214	532	13	2,417	1,505	595	5,062	532	13	11,999	1,540	1,192	15,276
5-year avg.[d]	1	0	4,015	3,244	1,094	8,354	293	7	1,859	3,968	1,216	7,343	294	7	5,874	7,212	2,309	15,696

[a] Subsistence harvests are based on household surveys. The number of households surveyed is unknown and varies annually. Actual harvests are greater.

[b] Subsistence harvests are based on expanded household survey estimates for Elim. Harvest numbers do not include residents outside of Elim that fished in the subdistrict.

[c] Beginning in 2004, a permit was required for Moses Point Subdistrict that replaced household surveys and includes residents outside of subdistrict that fished.

[d] 5-year average from 2005–2009.

Table 5.–Subdistrict 2 and 3 (Golovin and Moses Point) historical management actions.

1961	-Districtwide fishing schedule standard two 48-hour periods per week. -Commercial fishing allowed in marine waters only. -100 fathoms maximum length allowable gear.
1962	Formation of 6 Management Subdistricts (SD).
1969	Beach seines allowed in Golovin SD as commercial gear for pink salmon by emergency order.
1977	Kwiniuk River escapement goal of 20,000 chum salmon established due to low returns in 1975 and 1976.
1979	Kwiniuk River escapement goal of 25,000 chum salmon established due to low returns in 1975 and 1976 and rebuild the stock.
1980	-Management authority to restrict gillnet mesh size to 4.5 inch maximum allowed the ability to open pink salmon directed fishing periods. -Moses Point SD periods length reduced to half the standard length.
1985	-Commercial seasons to be opened by emergency order between June 8 and June 20 and close by regulation on August 31. -Moses Point SD returned to the standard two 48 hour fishing periods per week schedule. -Management closed half of Moses Point SD due to low chum salmon returns.
1986	Management closed 4 periods in Moses Point SD due to low chum salmon returns.
1987	Management closed 5 periods in Moses Point SD due to low chum salmon returns.
1988	-Management authority to restrict gillnet mesh size to 6 inch maximum allowed the ability to direct the fishery toward a target species. -Management restricted the Moses Point SD to pink salmon gear only and closed fishing periods to protect the weak chum salmon return.
1989	Management reduced period length in the Golovin SD and closed the Moses Point SD during most of the chum salmon run to protect the weak return.
1990	Moses Point SD restricted half the season to pink salmon gear during weak chum salmon run.
1991	Moses Point SD open only one period during weak chum salmon run.

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1992	-Management Plan for the Golovin SD established a maximum harvest level of 10,000 chum salmon to preserve the stock and allowed directed fisheries on other species only if survey data indicated adequate chum salmon escapements would likely be achieved. -The Kwiniuk River escapement goal was reduced to 19,500 chum salmon past the counting tower. -The *Moses Point Management Plan* allowed only one directed chum salmon commercial period during the anticipated weak chum salmon run.
1993	-Management restricted the Golovin SD to special pink salmon periods with limited gear and harvest areas to avoid high incidental catches of chum salmon which could have terminated the pink salmon fishery since the 10,000 chum salmon cap was in effect again. -The Moses Point SD did not open for Chinook salmon or pink salmon due to the chance of potentially harvesting a portion of the depressed chum salmon stocks. -Subsistence fishing restrictions were imposed that protected chum salmon on the spawning grounds.
1994	-Golovin SD continued 10,000 fish chum salmon cap management plan, but no harvest due to no market. -Moses Point management plan for no directed commercial chum fishery and only allow a pink salmon fishery if adequate chum salmon were available; however, no market interest.
1995	No change in management plans in either subdistrict with some chum salmon caught during directed pink salmon and coho salmon fisheries.
1996	No change in management plans in either subdistrict with some chum salmon caught during directed pink salmon and coho salmon fisheries.
1997	No change in management plans in either subdistrict with some chum salmon caught during directed Chinook salmon periods, except for the Golovin SD chum salmon capacity was liberalized to 15,000 fish prior to July 15.
1998	-One commercial Chinook salmon period allowed to offset incidental catches when chum salmon periods were common. -Pink salmon-directed period opened continuously with the buyer scheduling fishing to maximize transport and production. Good coho salmon run attracted limited market.
1999	-No commercial periods for any salmon species due to poor returns. -Sport and subsistence coho salmon closures in Golovin Subdistrict.
2000	-Directed pink salmon and coho salmon fisheries land small numbers of chum salmon through use of gear and time restrictions.

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Table 5.–Page 3 of 3.

2001	-New chum salmon escapement goals established for Kwiniuk River (11,500–23,000) and Tubutulik River (9,200–18,400).
2002	-Lack of buyer results in no commercial fishing. Sport and subsistence restrictions for coho salmon in Golovin Subdistrict. Run determined to be very late and escapement was good.
2003	-No commercial fishing in either Subdistrict because of poor runs. Sport and subsistence restrictions for chum salmon and coho salmon in Golovin Subdistrict.
2004	-Subsistence and sport restrictions on coho salmon. New goal for chum salmon established for Niukluk River tower (SEG 30,000 chums).
2005	-Sport restrictions for coho salmon in Golovin Subdistrict.
2006	-No restrictions.
2007	-For the first time in 6 years, a buyer returns to Moses Point Subdistrict and commercial chum salmon and coho salmon fishing periods occur.
2008	-For the first time in 8 years, a buyer returns to Golovin Subdistrict and commercial coho salmon fishing periods occur. -After one commercial chum salmon period, the Moses Point Subdistrict is closed because inseason projection indicates the chum salmon escapement goal will not be met. -Pink salmon and coho salmon commercial periods occur in Moses Point Subdistrict.
2009	-Both Golovin and Moses Point Subdistricts remain closed to commercial chum salmon fishing because projections show chum salmon escapement goals will not be reached. -Kwiniuk River counting tower records one of the worst chum salmon escapements on record. -Commercial coho salmon catches in Moses Point Subdistrict smash records, surpassing the previous record by over 50%. -Commercial coho salmon catches are the fourth best on record in the Golovin Subdistrict.

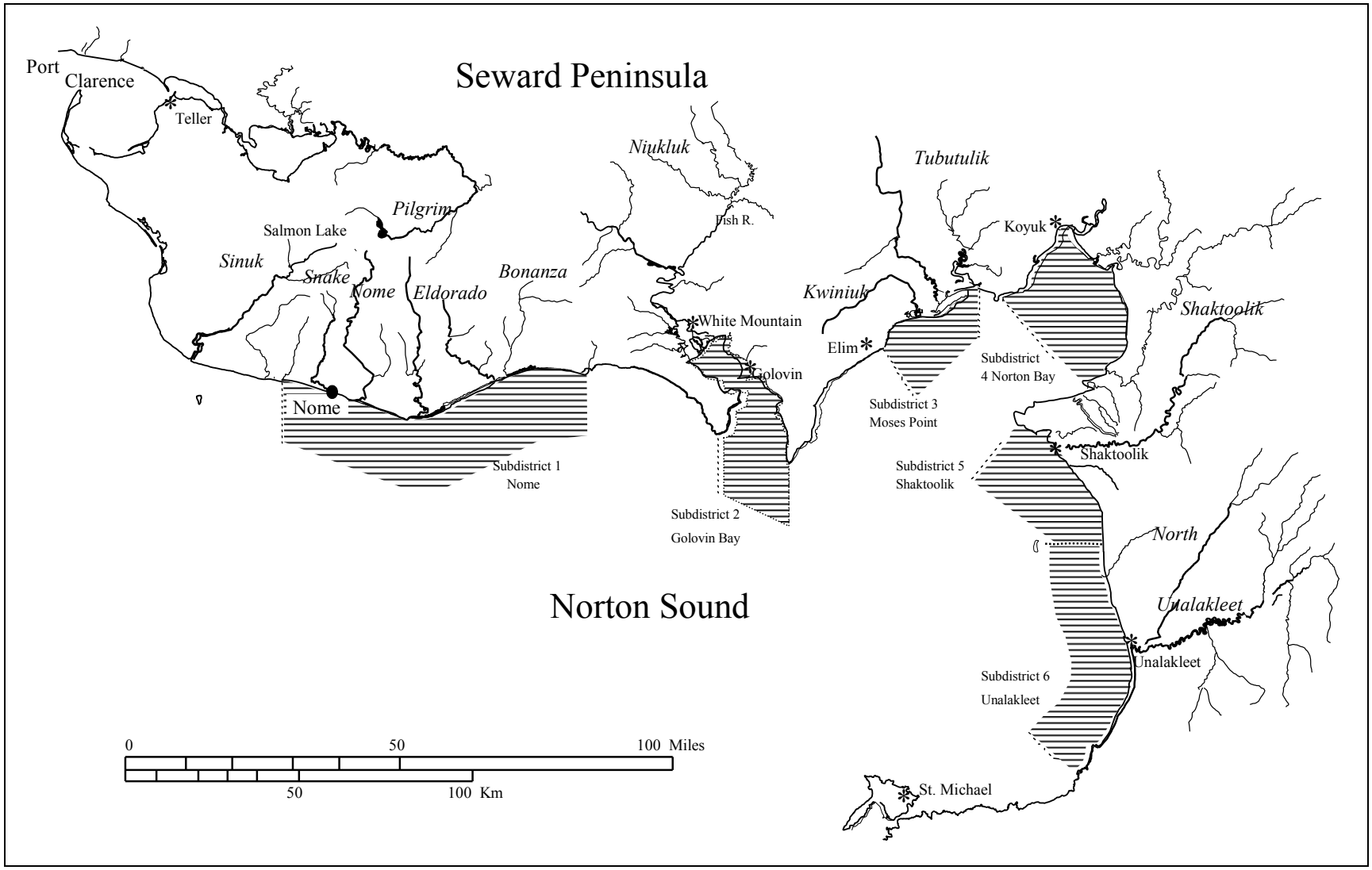


Figure 1.–Norton Sound commercial salmon fishing districts and subdistricts.

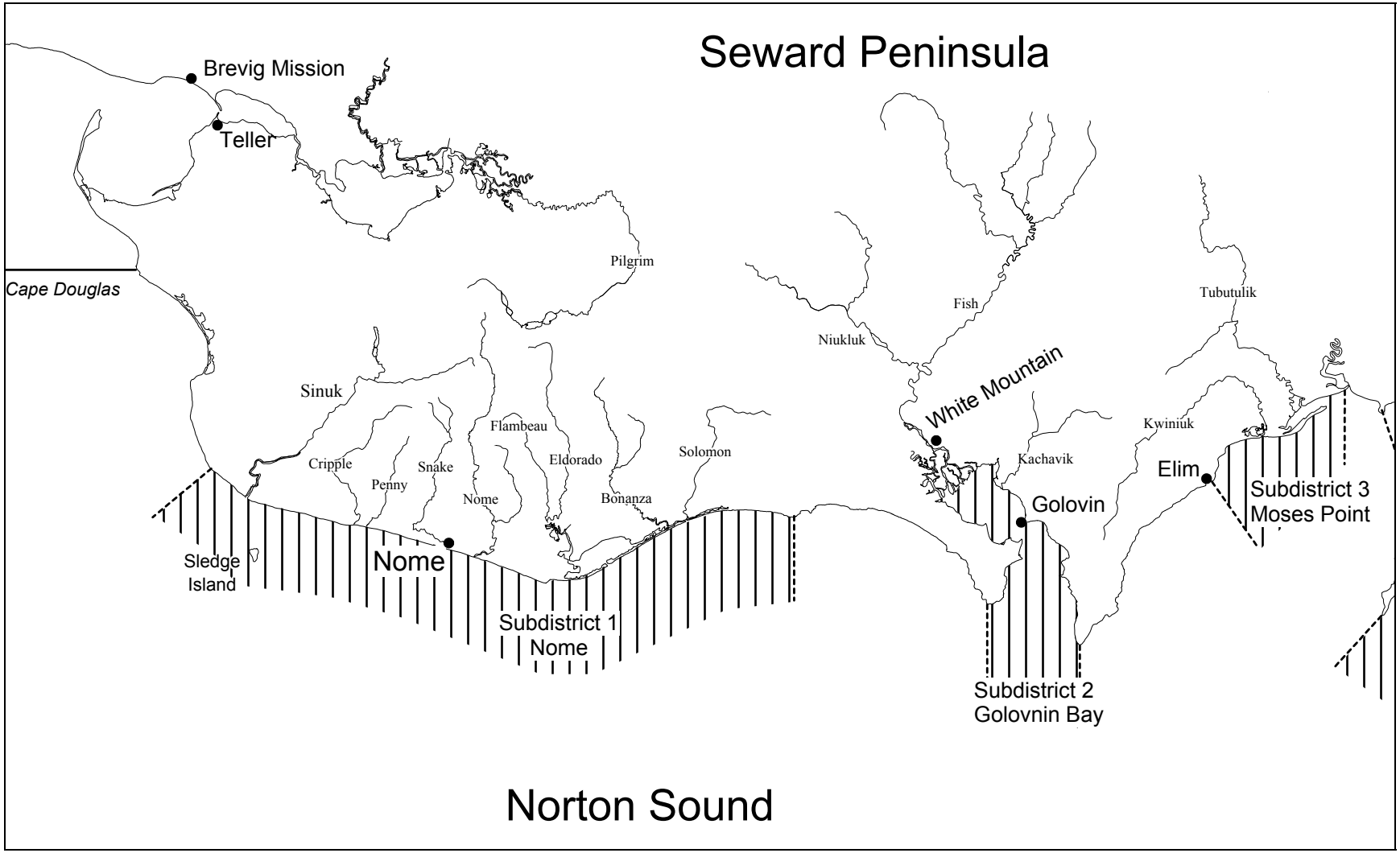


Figure 2.–Northern Norton Sound area rivers.

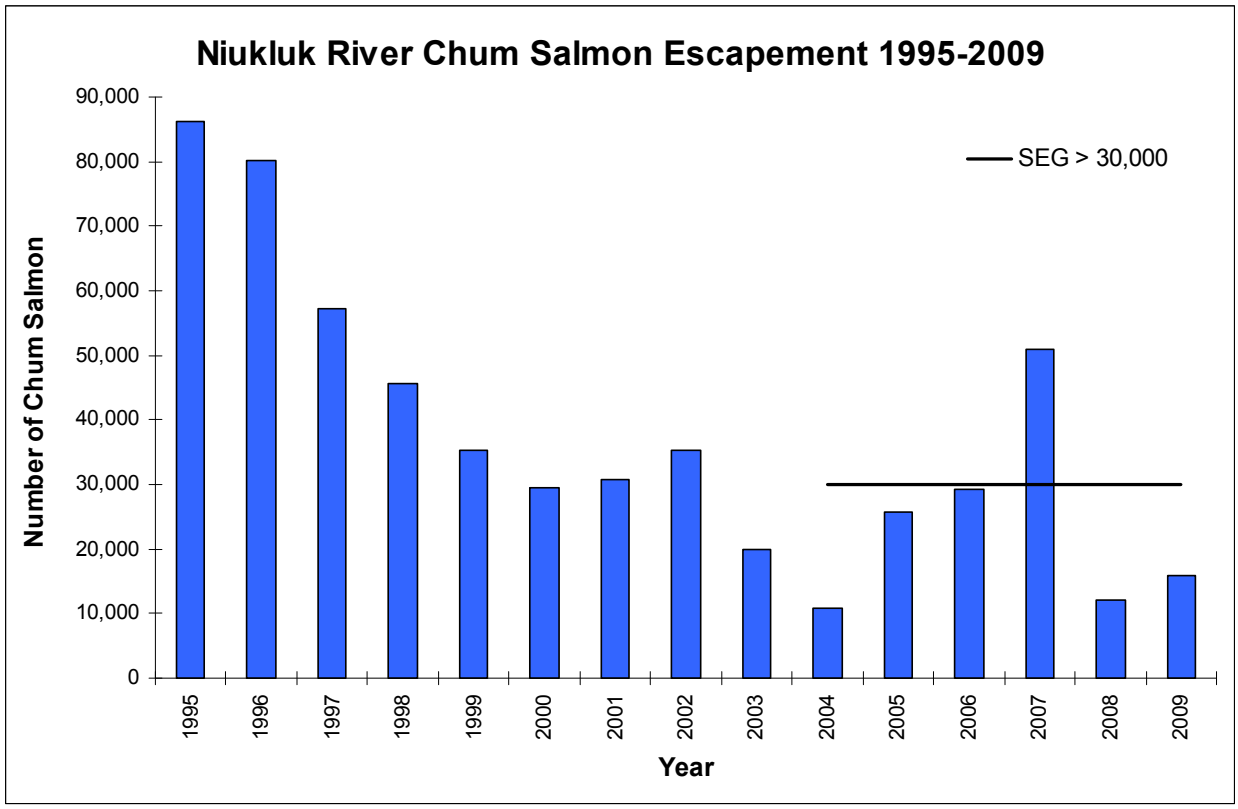
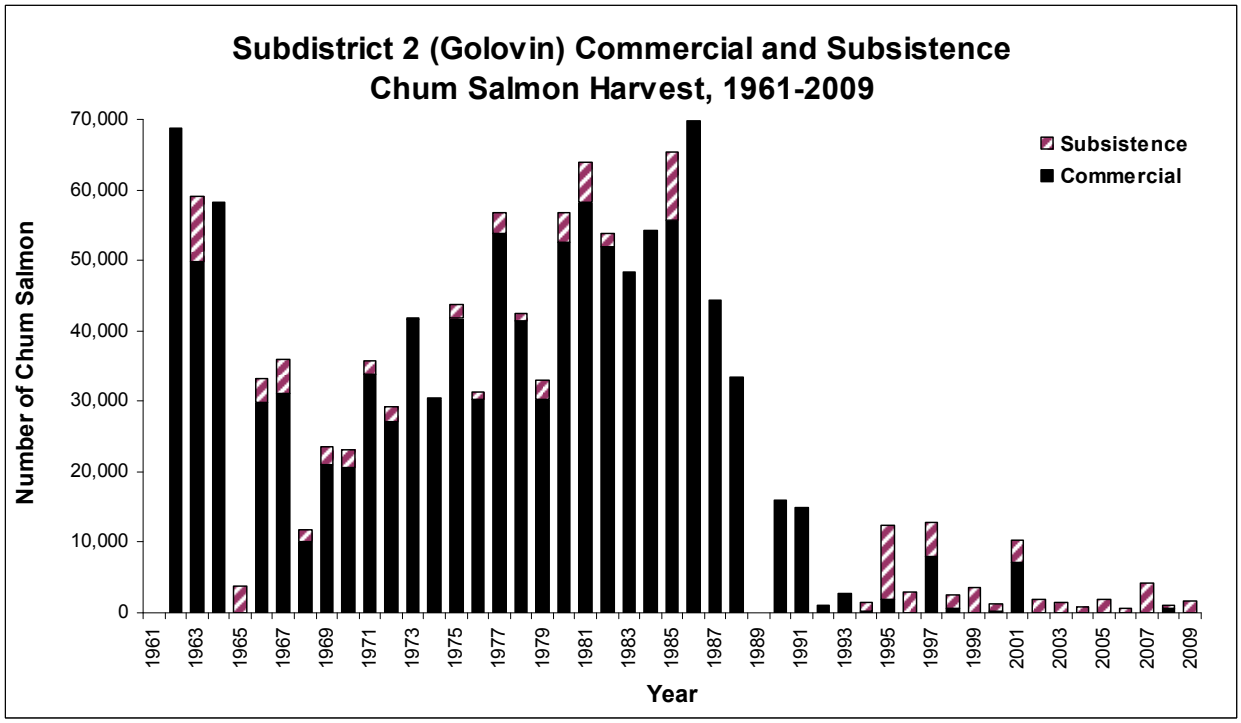


Figure 3.–Niukluk River chum salmon escapement 1995–2009.



Note: Subsistence data not available for all years.

Figure 4.–Subdistrict 2 (Golovin) commercial and subsistence chum salmon harvests, 1961–2009.

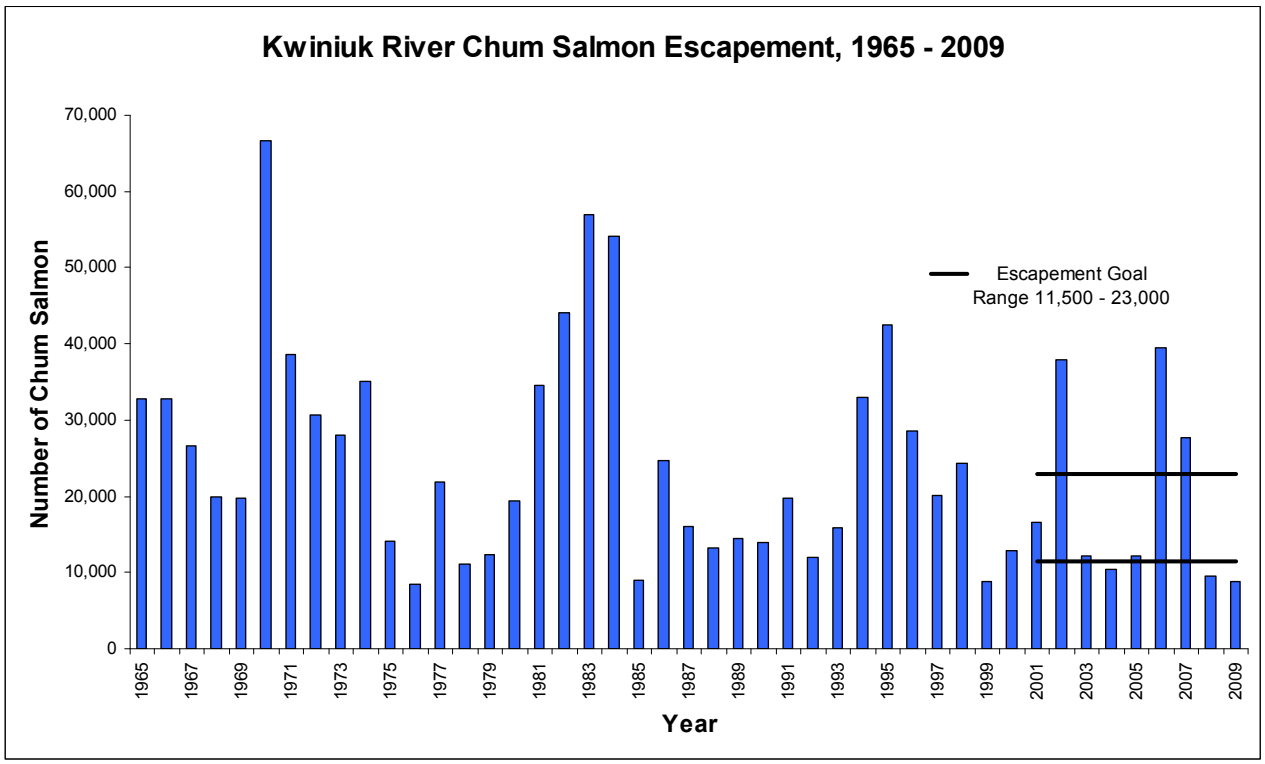
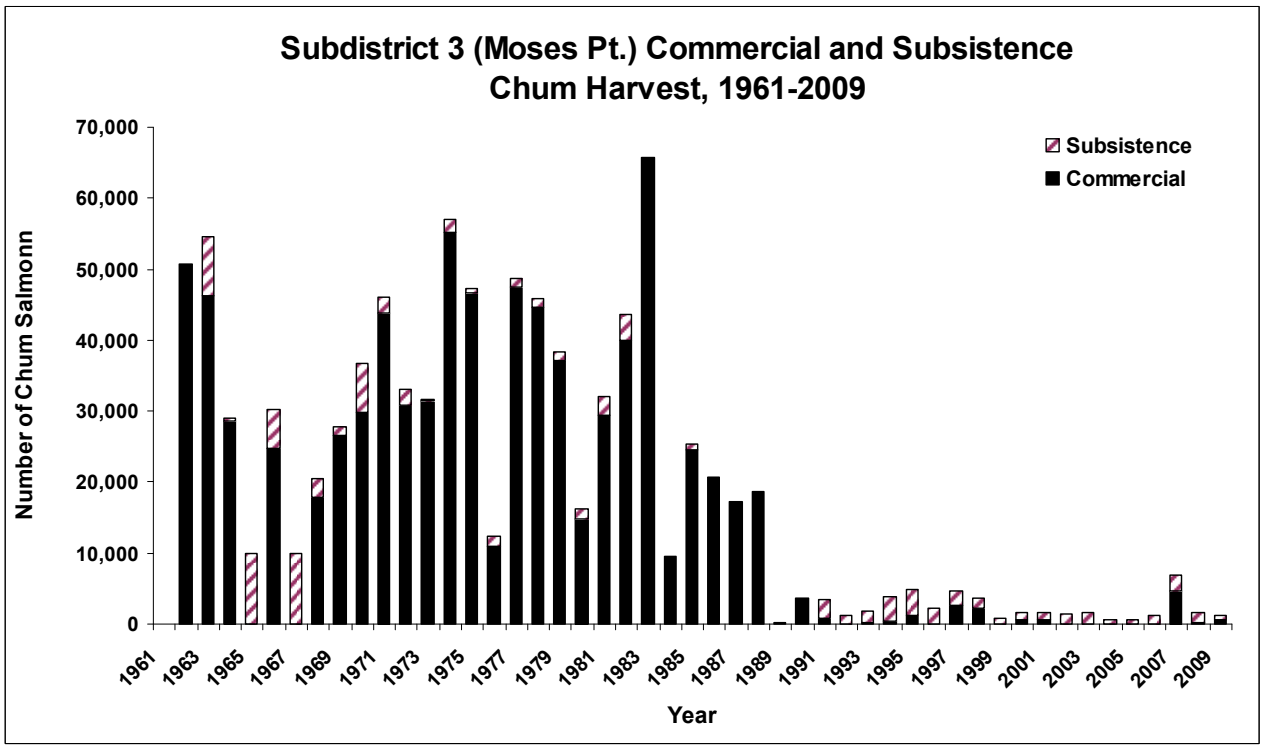


Figure 5.–Kwiniuk River chum salmon escapement 1965–2009.



Note: Subsistence data not available for all years.

Figure 6.–Subdistrict 3 (Moses Point) chum salmon harvests 1961–2009.

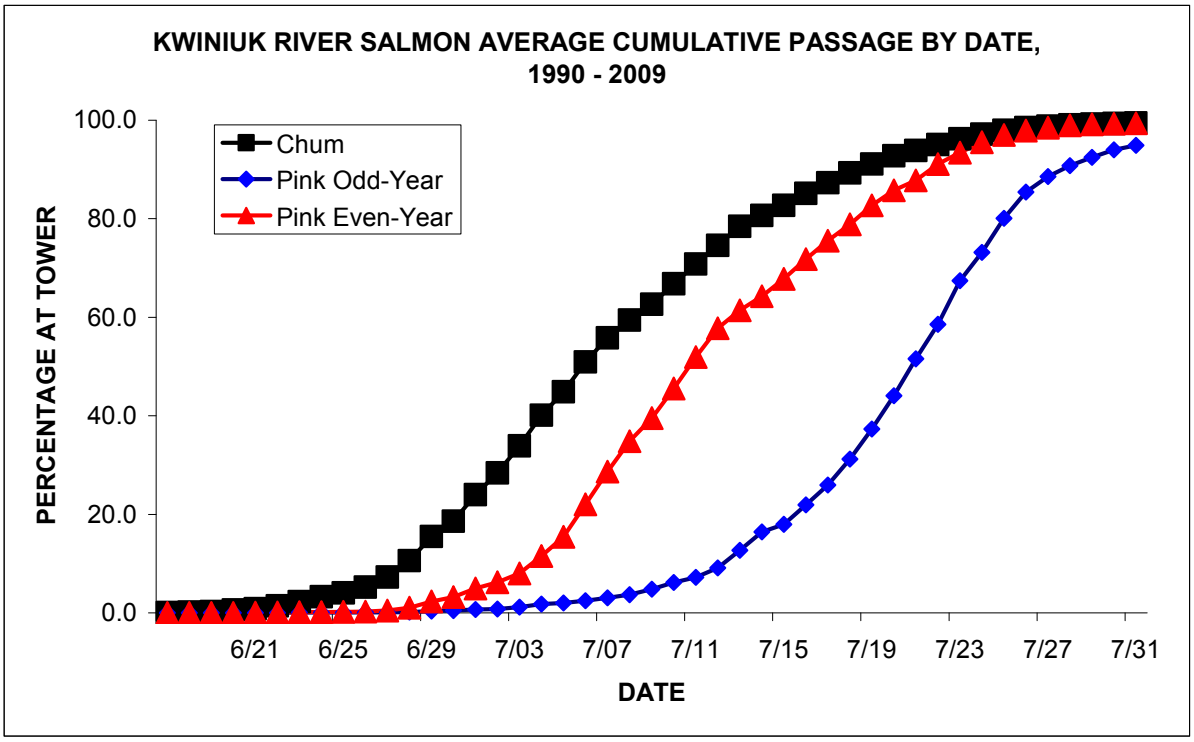


Figure 7.–Kwiniuk River counting tower run timing by date 1990–2009.

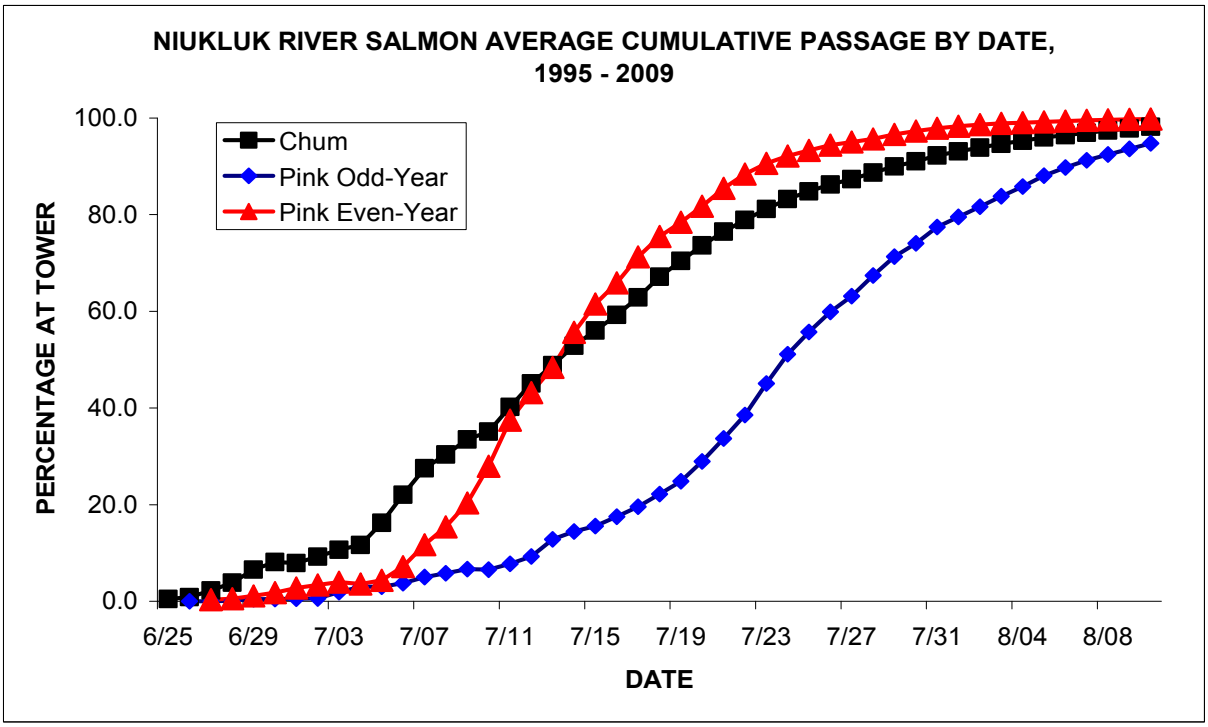


Figure 8.–Niukluk River counting tower run timing by date 1995–2009.

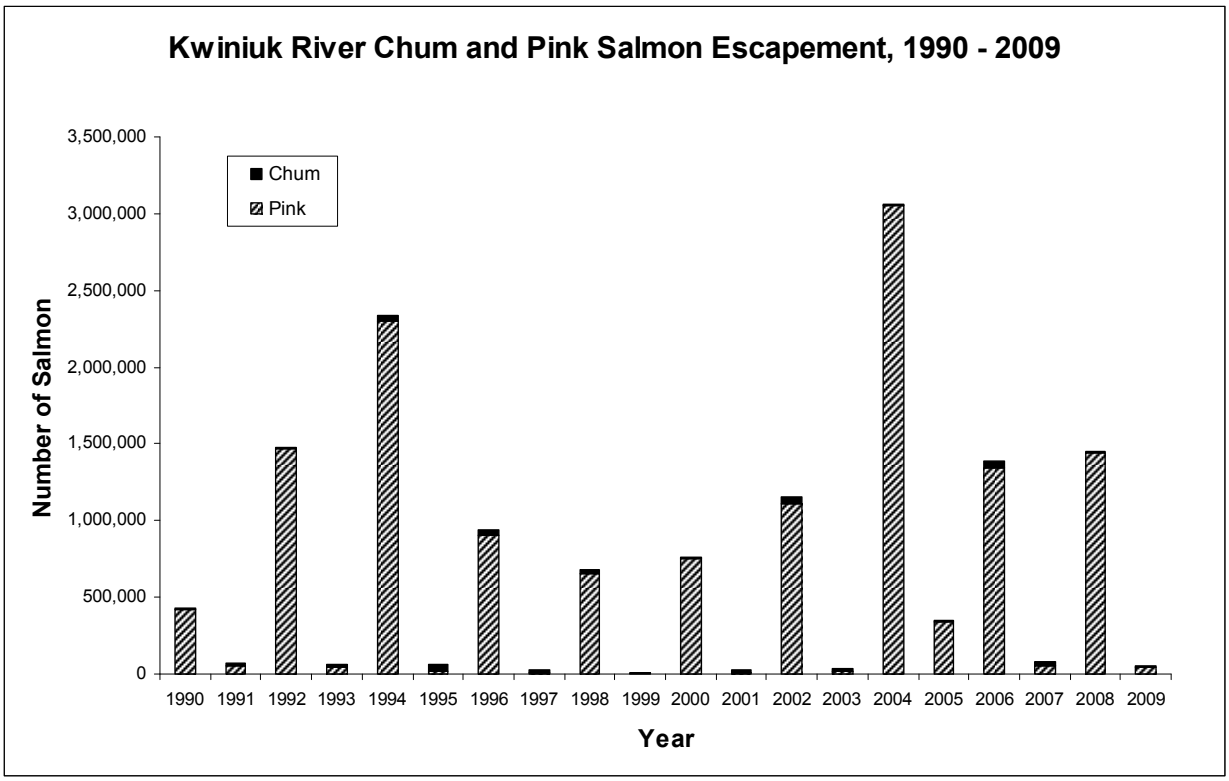


Figure 9.–Kwiniuk River counting tower chum and pink salmon escapement 1990–2009.

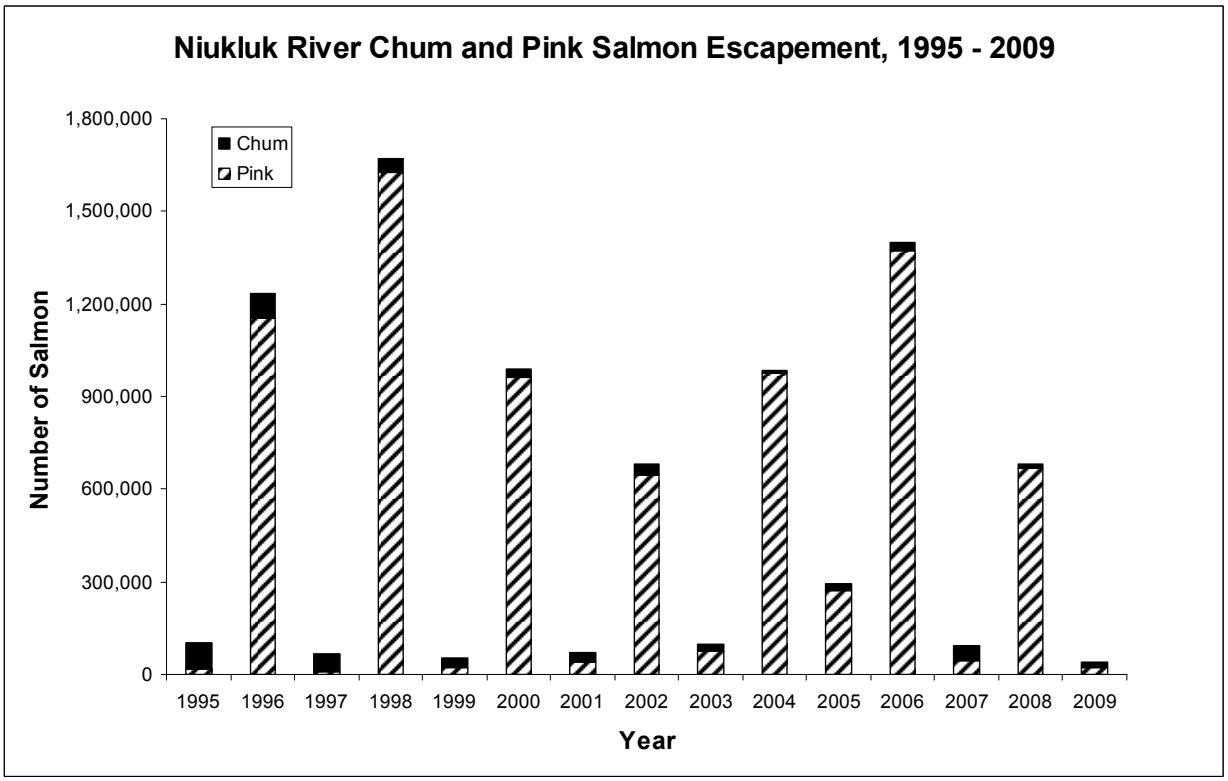


Figure 10.–Niukluk River counting tower chum and pink salmon escapement 1995–2009.

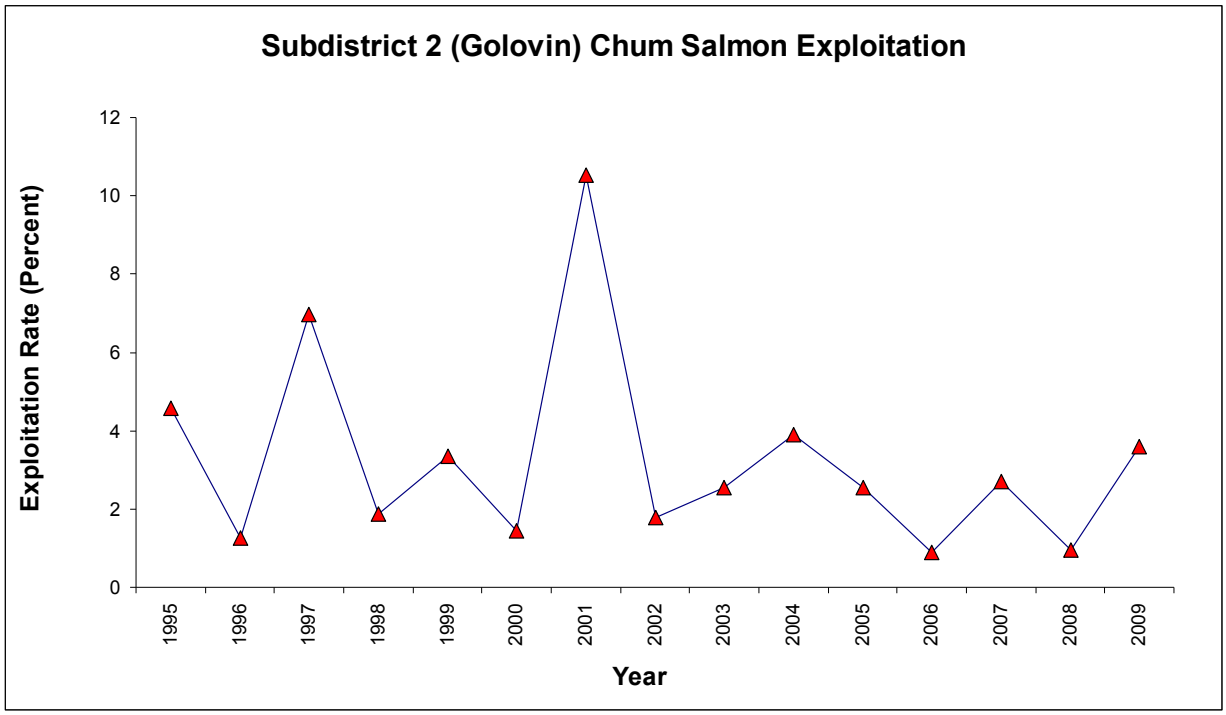


Figure 11.–Subdistrict 2 (Golovin) chum salmon exploitation based on commercial and subsistence harvests.

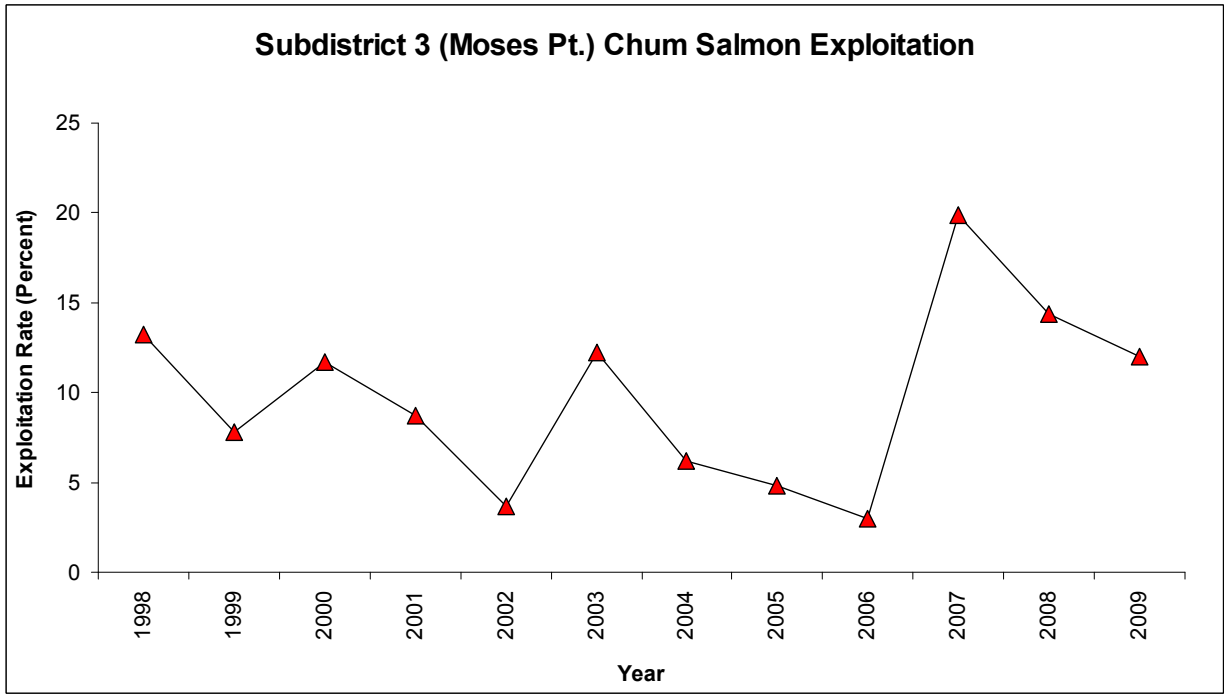


Figure 12.–Subdistrict 3 (Moses Pt) chum salmon exploitation based on commercial and subsistence harvests.