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**Norton Sound Nome Subdistrict Chum Salmon Stock
Status and Action Plan, 2007; a Report to the Alaska
Board of Fisheries**

by

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and

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Alaska Department of Fish and Game

Divisions of Sport Fish and Commercial Fisheries



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Weights and measures (metric)		General		Measures (fisheries)	
centimeter	cm	Alaska Administrative		fork length	FL
deciliter	dL	Code	AAC	mid-eye-to-fork	MEF
gram	g	all commonly accepted		mid-eye-to-tail-fork	METF
hectare	ha	abbreviations	e.g., Mr., Mrs., AM, PM, etc.	standard length	SL
kilogram	kg			total length	TL
kilometer	km	all commonly accepted			
liter	L	professional titles	e.g., Dr., Ph.D., R.N., etc.		
meter	m	at	@	Mathematics, statistics	
milliliter	mL	compass directions:		<i>all standard mathematical</i>	
millimeter	mm	east	E	<i>signs, symbols and</i>	
		north	N	<i>abbreviations</i>	
		south	S	alternate hypothesis	H _A
		west	W	base of natural logarithm	<i>e</i>
		copyright	©	catch per unit effort	CPUE
		corporate suffixes:		coefficient of variation	CV
		Company	Co.	common test statistics	(F, t, χ^2 , etc.)
		Corporation	Corp.	confidence interval	CI
		Incorporated	Inc.	correlation coefficient	
		Limited	Ltd.	(multiple)	R
		District of Columbia	D.C.	correlation coefficient	
		et alii (and others)	et al.	(simple)	r
		et cetera (and so forth)	etc.	covariance	cov
		exempli gratia	e.g.	degree (angular)	°
		(for example)		degrees of freedom	df
		Federal Information	FIC	expected value	<i>E</i>
		Code		greater than	>
		id est (that is)	i.e.	greater than or equal to	≥
		latitude or longitude	lat. or long.	harvest per unit effort	HPUE
		monetary symbols		less than	<
		(U.S.)	\$, ¢	less than or equal to	≤
		months (tables and		logarithm (natural)	ln
		figures): first three		logarithm (base 10)	log
		letters	Jan, ..., Dec	logarithm (specify base)	log ₂ , etc.
		registered trademark	®	minute (angular)	'
		trademark	™	not significant	NS
		United States		null hypothesis	H ₀
		(adjective)	U.S.	percent	%
		United States of		probability	P
		America (noun)	USA	probability of a type I error	
		U.S.C.	United States	(rejection of the null	
			Code	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

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	pH
(negative log of)	
parts per million	ppm
parts per thousand	ppt, ‰
volts	V
watts	W

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STATUS AND ACTION PLAN, 2007; A REPORT TO THE
ALASKA BOARD OF FISHERIES**

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ABSTRACT

In response to the guidelines established in the *Policy for the Management of Sustainable Salmon Fisheries* (SSFP; 5 AAC 39.222), the Alaska Board of Fisheries (BOF) classified the Norton Sound Nome Subdistrict (Subdistrict 1) chum salmon *Oncorhynchus keta* stock as a stock of management concern at the September 2000 work session. A “management concern” is defined as, “a concern arising from a chronic inability, despite use of specific management measures, to maintain escapements for salmon stocks within the bound of Sustainable Escapement Goal (SEG), Biological Escapement Goal (BEG), Optimal Escapement Goal (OEG), or other specified objectives for the fishery.” An action plan was developed by the Alaska Department of Fish and Game (ADF&G, department) 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 Nome Subdistrict chum salmon, to reassess the stock of concern status. In 2003, the department recommended continuation of this classification as a stock of management concern, which was supported by the BOF at its January 2004 meeting. Since that time, a majority of chum salmon escapement goals were achieved in the Nome Subdistrict from 2002 to 2006. Hence, the Nome Subdistrict chum salmon stock no longer meets the definition for a management concern as defined in SSFP. However, the recent yield remains well below historical levels despite use of specific management measures. Based on the definitions provided in the SSFP, ADF&G recommends changing the stock of concern classification of the Nome Subdistrict chum salmon stock from a management concern to a yield concern. The department recommends that management continue under the current plans through the next board cycle.

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

INTRODUCTION

The *Policy for the Management of Sustainable Salmon Fisheries* (SSFP; 5 AAC 39.222 Effective 2000, amended 2001) 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 salmon stocks that present a concern related to yield, management, or conservation during regular BOF meetings. This report provides ADF&G’s reassessment of the Norton Sound Nome Subdistrict (Subdistrict 1) chum salmon stock of concern, which has been classified as a management concern.

In response to the guidelines established in SSFP (5 AAC 39.222(f)(21)), the BOF classified the Nome Subdistrict chum salmon stock as a management concern at the September 2000 work session. A stock of management concern is defined as “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), Biological Escapement Goal (BEG), Optimal Escapement Goal (OEG), or other specified management objectives for the fishery” (5 AAC 39.222(f)(21)). The SSFP further goes on to define chronic inability as “the continuing or anticipated inability to meet escapement objectives over a 4 to 5 year period”. The stock of concern determination was a result of the persistent low chum salmon productivity since the mid-1980s. Commercial and sport fishing for chum salmon are closed in the Nome Subdistrict and subsistence salmon management is among the most restrictive in Alaska with the only Tier II fishery in the state. An action plan was subsequently developed by ADF&G (Bue 2000) and acted upon by the BOF in January 2001. The classification as a management concern was continued at the January 2004 BOF meeting.

Based on definitions provided in SSFP (5 AAC 39.222(f)(21) and (42)), only the most recent 5-year yield and escapement history (2002–2006) and the historical level of yield or harvestable

surpluses was considered in our current analysis and subsequent recommendations regarding stock of concern status. Accordingly, the department recommended a change in status of the Nome Subdistrict chum salmon stock from a management concern to a yield concern at the October 2006 BOF work session. The SSFP (5 AAC 39.222(f)(42)) defines a yield concern 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”. During the past 5 years a majority of chum salmon escapement goals have been achieved in the Nome Subdistrict. In 2004 and 2005 all Tier II applicants received a chum salmon fishing permit, and for the 2006 fishing season the Nome Subdistrict reverted back to Tier I fishing regulations because of a projected large run of chum salmon. ADF&G’s recommendation to classify this stock as a yield concern was based on low harvest levels for the previous 5-year period (2002–2006) compared to recent historic yields in the 1980s.

STOCK ASSESSMENT BACKGROUND

The Norton Sound District is composed of six commercial fishing subdistricts (Figure 1). Most subdistricts have several rivers where subsistence fishing occurs, and except for the Nome Subdistrict, there are few restrictions (Kohler et al. 2005). In the Nome Subdistrict the larger chum runs are often east of Nome particularly in the Eldorado and Flambeau Rivers (Figure 2).

ESCAPEMENT

In 2001, ADF&G recommended, and then later established, a chum salmon BEG for the Nome Subdistrict chum salmon stock of 23,000 to 35,000 chum salmon (Clark 2001). In January 2001, the BOF established OEG ranges for chum salmon on three rivers in the Nome Subdistrict: Nome, Snake, and Eldorado Rivers, in order to index the district-wide BEG. Chum salmon have been counted via a tower or weir on these rivers since 1994, 1995, and 1997, respectively (Table 1). ADF&G also established SEG ranges based on aerial survey information, on four other rivers in the Nome Subdistrict. All BOF-established OEG’s and ADF&G-established SEG’s were set in conjunction with the overall Nome Subdistrict BEG and have been used to assess the overall escapement to the Nome Subdistrict in relation to the BEG. The Nome Subdistrict BEG was achieved from 2002 through 2006, except for 2003 (Figure 3). During this same time period (2002–2006), the OEG has been attained each year at Snake River (Figure 4) and in 3 of the most recent 5 (2002–2006) years at Eldorado (Figure 5) and Nome rivers (Figure 6). Comparing the escapement goals established in 2001 to escapements in prior years shows there has not been a chronic inability to meet escapement goals (Figures 3–6).

YIELD

Subsistence chum salmon harvests in Nome Subdistrict have gradually increased since statehood until the last decade, when harvests decreased with increasing subsistence restrictions on chum salmon because of low runs (Table 2). Although chum harvests have decreased (Figures 3 and 7), escapements did not increase in the late 1990s and early 2000s in response to less fishing pressure (Figures 3–6). Furthermore, salmon escapement was lower in early 2000s and most of the decreasing harvests were due to weak chum salmon runs in the Nome Subdistrict requiring subsistence restrictions. However, in recent years, as chum salmon runs have started increasing, subsistence harvests remain low. In 2004 and 2005 all Tier II applicants received a permit, but harvests still remained below 1,000 chum salmon (Figures 3 and 7). In 2006, Tier II restrictions were suspended allowing all Alaska residents to subsistence fish for chum salmon. Additionally, chum salmon limits were waived the second week of July 2006, but harvest still remained less

than 1,000 chum salmon. The low subsistence harvest of chum salmon may be the result of record pink and coho salmon runs in the Nome Subdistrict in recent years allowing subsistence permit holders to target those species. Additionally, beginning in 2003, record sockeye salmon runs have been returning to the Pilgrim River in the Port Clarence District, resulting in a nearly tenfold increase of permits issued since 1999. In 2006, there was a record subsistence coho harvest in the Nome Subdistrict (Table 2) and a record sockeye harvest from the Pilgrim River (Table 3). Although this was the first time since 1990 that the regular subsistence fishing schedule was in effect during the chum salmon run, the chum escapement was the highest in over a decade (Table 1). An overview of management actions in the Nome Subdistrict is listed in Table 4.

In summary, Tier II subsistence fishing was liberalized to Tier I subsistence fishing regulations the past 3 years (2004–2006) during which a majority of escapement goals were achieved. However, during the most recent 5-year period (2002–2006), the average total chum salmon harvest, which only consists of the subsistence harvest, and the available yield, continues to be well below the historical yield (combined subsistence and commercial harvests) of the 1980s and early 1990s (Table 2 and Figure 7).

STOCK OF CONCERN RECOMMENDATION

Given that a majority of chum salmon escapement goals have been achieved during the past 5 years, there is not a chronic inability to meet escapement goals. Therefore, the Norton Sound Subdistrict 1 chum salmon stock no longer meets the stock of management concern criteria. However, the recent yield remains well below historical levels during the 1980s despite use of specific management measures. Based on the definitions provided in the Policy for the Management of Sustainable Salmon Fisheries of 5 AAC 39.222(f)(21) and (42), ADF&G recommends changing the stock of concern classification of the Nome Subdistrict chum salmon stock from a management concern to a yield concern. Note, however, that in 2006, the total chum salmon run into the Nome Subdistrict was approximately 87,223 (Table 1; Figure 3). Only a small fraction of this run, a total of 901 chum salmon, were harvested for subsistence use (Figure 3). Approximately 51,000 to 54,000 additional chum salmon were available for harvest in Subdistrict 1 but were not harvested. Similar to other places in the AYK Region, the 2001 brood year exceeded production expectations.

OUTLOOK

The Nome Subdistrict chum salmon run is expected to be below average in 2007 based on parent year escapements but much better than weak runs in the early 2000s. Information from Bering-Aleutian Salmon International Survey (BASIS) studies and trawl bycatch information indicates a high abundance of all salmon species, although not as high for chum salmon as last year. Depending on the origin of these salmon, the 2007 chum salmon run is expected to be less than last year, but sufficient to provide for escapement and subsistence uses.

ALASKA BOARD OF FISHERIES ACTION

In response to the guidelines established in the SSFP, it is anticipated that the Alaska Board of Fisheries will change the stock of concern classification of the Norton Sound Subdistrict 1 chum salmon stock from a management concern to a yield concern during the January 31–February 5, 2007 regulatory meeting.

ESCAPEMENT GOAL EVALUATION

ADF&G has undertaken a review of escapement goals for several Norton Sound salmon stocks where long-term escapement, catch, and age composition data exist that enable the development of biological escapement goals or sustainable escapement goals based on analysis of production consistent with the escapement goal policy. In January 2001, the BOF established optimal escapement goal ranges for chum salmon on three rivers in the Nome Subdistrict: Nome River, Snake River, and Eldorado River. These OEG ranges are the same as the ADF&G established SEG ranges. These three rivers have weir projects. ADF&G established aerial-survey based SEG ranges on four other rivers in Subdistrict 1. Escapement information from all seven rivers provides an index of escapement for Subdistrict 1. ADF&G established a BEG of 23,000 to 35,000 chum salmon for Subdistrict 1 (Clark 2001). Escapement goals developed in 2000 were reviewed during the 2004 BOF cycle utilizing additional data since the escapement goals were established (ADF&G 2004). This evaluation resulted in no numerical changes. However, all of the goals except for the subdistrict wide goal were recommended and later adopted by ADF&G to be classified as SEGs rather than BEGs, because system specific goals may not provide maximum sustained yield (MSY) from that individual river. 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).

List of current and proposed escapement goals for Nome Subdistrict chum stocks

Stream	Current Goal	Current Goal	Proposed Goal
Sinuk River Aerial Expanded	4,000–6,200	SEG	No Change
Snake River	1,600–2,500	SEG and OEG	No Change
Nome River	2,900–4,300	SEG and OEG	No Change
Eldorado	6,000–9,200	SEG and OEG	No Change
Flambeau River Aerial Expanded	4,100–6,300	SEG	No Change
Bonanza River Aerial Expanded	2,300–3,400	SEG	No Change
Solomon River Aerial Expanded	1,100–1,600	SEG	No Change
Subdistrict 1	23,000–35,000	BEG	No Change

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

NORTON SOUND SUBDISTRICT 1 CHUM SALMON MANAGEMENT PLAN REVIEW/DEVELOPMENT

Current Stock Status

In response to the guidelines established in the Policy for the Management of Sustainable Salmon Fisheries (5 AAC 39.222), the department recommended changing the stock of concern classification of the Norton Sound Subdistrict 1 chum salmon stock from a management concern to a yield concern at the October 2006 BOF work session. The Alaska Board of Fisheries, after reviewing stock status information and public input during the January 31–February 5, 2007 regulatory meeting, is anticipated to change the classification of Norton Sound Subdistrict 1 chum salmon stock from a management concern to a yield concern. This determination is

anticipated to be based on achieving a majority of chum salmon escapement goals during the last 5 years, but the inability, despite the use of specific management measures, to consistently maintain expected yields, or harvestable surpluses, above a stock's escapement needs during the last 5 years.

Customary and Traditional Use Finding and the Amount Necessary

The BOF has made a positive finding for Customary and Traditional Use for chum salmon in the Nome Subdistrict. Amounts reasonably necessary for subsistence uses (ANS) have been determined to be 3,430–5,716 chum salmon seasonally in the Nome Subdistrict and 96,000–160,000 salmon for the Norton Sound-Port Clarence Area.

HABITAT FACTORS ADVERSELY AFFECTING CHUM SALMON STOCKS

Nome Subdistrict has been subjected to significant gold mining over a long time-period. While historical mining did cause significant damage, most of the direct physical damage was to tributary streams and/or headwaters. For the most part, prime chum salmon spawning areas were not affected (except for the Nome, Snake and Solomon rivers). In addition, there are other issues, such as road and narrow gauge railroad construction, which have contributed to loss of fish habitat. A discussion of habitat issues impacting Nome Subdistrict chum salmon production is contained in the Norton Sound/Bering Strait Regional Comprehensive Salmon Plan 1996–2010 (Norton Sound/Bering Strait Regional Planning Team 1996).

The following excerpts from the Comprehensive Plan describe some of the problems:

1. The **Snake River** “was heavily impacted by gold mining activities which played a significant role in damaging salmon spawning and rearing habitats as well as impacting the returns of the different species of salmon. A few Snake River tributaries (predominantly Anvil Creek) are still actively mined today.” (page 43)
2. “Prior mining activity on the **Nome River** and its tributaries as well as road construction has adversely impacted salmon populations over the years.” (page 44)
3. In the **Solomon River** “early mining activity was substantial; at least 13 dredges were operated on the Solomon River and its’ tributaries. Considerable damage was done to some sections of river as a result of these activities. Additionally road construction has resulted [in] redirection of portions of the river that may require stream channelization work for complete recovery.” (page 45)

In addition to existing mining activities, a new large-scale mine activity will open in the future. Explorations have identified a lode deposit on Rock Creek, a tributary of the Snake River, and a 1,000-acre pit mine is expected to open in 2007. The lode consists of two ore structures, the Albion and Tension zones. These two zones have distinct geochemical characteristics that may influence long-term environmental behavior. An assessment program is under development to evaluate the acid-generating potential of both deposits as well as their neutralizing potential. Mine site development and reclamation plans will need to consider these factors to ensure that water quality in the Snake River is maintained during and after completion of mining. Electro-shocking and minnow trapping have not revealed the recent presence of any fish in Rock Creek, although a few juvenile Dolly Varden have been documented in lower Rock Creek in the past. It is not clear what impact this mining activity may have on Snake River chum salmon. Additionally, there is the possibility of renewed interest in mining adjacent to the Big Hurrah River, a tributary of the Solomon River.

Projects Needed

1. Survey of the loss of chum salmon spawning and rearing habitat due to mining and instream gravel extraction (historic practice), especially in the Snake, Nome, and Solomon Rivers and an assessment of the feasibility and cost of restoration.
2. Solomon River restoration to correct loss of habitat due to historical dredging and material extraction (road construction).
3. Intensive monitoring of existing and future projects to determine whether or not chum salmon and their habitat are being impacted.

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 caught as bycatch in the Bering Sea groundfish fishery. The chum salmon bycatch greatly increased from 2003 through 2006.

EXISTING MANAGEMENT PLAN

5 AAC 01.190. SUBDISTRICT 1 OF THE NORTON SOUND DISTRICT CHUM SALMON MANAGEMENT PLAN.

ACTION PLAN DEVELOPMENT

NORTON SOUND SUBDISTRICT 1 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, the BOF adopted the following plan:

5 AAC 01.190. Subdistrict 1 of the Norton Sound District Chum Salmon Management Plan.

The purpose of this management plan is to provide the department with conservative management guidelines for the sustained yield of chum salmon stocks in Subdistrict 1 of the Norton Sound District. The department shall manage Subdistrict 1 to achieve optimal escapement goals for chum salmon spawning streams and to restore chum salmon abundance so that a Tier II subsistence fishery will not be necessary. The department shall manage chum salmon as follows:

(1) commercial fishing for chum salmon is closed and will be reopened only after,

(A) the harvestable surplus of chum salmon has met Tier I subsistence needs for 4 consecutive years; and

(B) the department has proposed to the Board of Fisheries and the board has adopted an abundance-based management plan supported by inseason enumerator counts of abundance;

(2) in the subsistence fishery,

(A) subsistence chum salmon fishing will be opened and closed by emergency order on a stream-by-stream basis, to be determined by the department, when chum salmon stocks are abundant enough to provide for optimal escapement goals and a harvestable surplus;

(B) a subsistence fishing permit under 5 AAC 01.180 is required and will be issued to a household; the permit will identify the body of water to be fished, the annual limit for each salmon species, and the allowable gear;

(C) in Subdistrict 1, pink salmon may be taken only with gillnets that have a mesh size of 4½ inches or less.

The BOF repealed existing escapement goal ranges in 5 AAC 04.358 and adopted the following optimal escapement goal ranges for chum salmon in Subdistrict 1:

- (1) Snake River – 1,600 to 2,500 chum salmon
- (2) Nome River – 2,900 to 4,300 chum salmon
- (3) Eldorado River – 6,000 to 9,200 chum salmon

The Cripple and Penny Rivers were closed to subsistence salmon fishing.

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 the following regulations: subsistence salmon fishers using hook and line attached to a rod or pole were required to obtain subsistence salmon permits and 5 AAC 01.190(2)(C) was repealed.

Management Review

Conservative management strategies employed by ADF&G from 2001 through 2003 were based on the management action plan adopted by the Board in 2001. Subdistrict 1 was closed to all salmon fishing in mid-June and reopened in ocean waters to Tier II chum salmon permit holders in later June. In 2003, the Nome Subdistrict escapement goal was not reached and Tier II chum salmon fishing was suspended. In the years 2000–2002 there were regular Tier II fishing periods in the ocean and some rivers had Tier II fishing periods. In 2004 and 2005, there were regular Tier II subsistence fishing periods in the ocean and some fresh water areas also had Tier II fishing periods. As escapements were met in rivers, Tier I fishing was allowed and chum salmon harvest limits were waived.

The number of successful Tier II permit applicants was 30 in 2001, and 40 in 2002 and 2003. After 2003, ADF&G reviewed the 5 years of fishing history since Tier II went into effect in 1999. Analyses showed that some successful applicants were not picking up permits and some permit holders were not fishing. Also, average harvests were 33 chum salmon per permit although the limit was 100. Because of limited fishing effort and limited catches, the number of permits issued was increased to 50 in 2004 and 2005 with the possibility of issuing an additional 10 conditional permits. All applicants were successful in 2004 (57) and 2005 (59) with 52 Tier II permits issued in 2004 and 49 issued in 2005. The number of permits issued was less than the number of applicants, as some applicants never picked up their permit.

A trend in subsistence harvests was noticed in 2004 and 2005 that approximately one-half of Tier II permit holders were harvesting chum salmon. Other permit holders were using the Tier II permits as an opportunity to fish for other salmon species, particularly pink salmon, during Tier II openings. In 2006, ADF&G suspended Tier II restrictions after considering that the projection for a strong chum salmon run would easily exceed the ANS and that the trend of limited effort targeting chum salmon observed in recent years would continue. For the first time since 1990, the Nome Subdistrict did not close to salmon fishing in mid-June, but went to the subsistence fishing schedule in regulation. At the start of the season almost all salmon limits in marine waters and rivers were doubled from previous years and were later waived for pink (July 6), chum (July 10), sockeye (July 14) and coho (August 19 in marine waters and September 1 in rivers) salmon. Although there was much more opportunity to subsistence fish this year, and the chum salmon run was the best in nearly two decades, chum catches were still 20% below 2002 (Table 2 and Figure 3). The lower chum harvests may be the result of subsistence fishers harvesting other species (Figure 8). In 2006, subsistence harvests of coho salmon were record breaking and pink salmon subsistence harvests were second highest in 20 years. The 3 most recent years (2004 through 2006) have been the three highest subsistence salmon harvests in 10 years. Likewise, the 3 most recent years have been the three highest subsistence salmon harvests in 20 years if the Pilgrim River catch is included with the Nome Subdistrict catch (Tables 2–3 and Figure 8).

ACTION PLAN ALTERNATIVES

No new action plans necessary, continue under current plans.

2007 BOARD OF FISHERIES REGULATORY PROPOSALS AFFECTING NORTON SOUND SUBDISTRICT 1 CHUM SALMON

Subsistence

- 144 – Expand hook and line use for subsistence
- 140 – Clarify permit limits for subsistence gear
- 142 – Modify closed subsistence area in Nome River
- 143 – Open portions of Penny and Cripple rivers to subsistence fishing
- 145 – Repeal annual subsistence permit limit for Norton Sound Subdistrict 1
- 148 – Allow cash exchange of subsistence caught fish

Miscellaneous

- 154 – Establish controlled use area for Nome River along highway

Most proposals before the BOF affecting Nome Subdistrict chum salmon are in regards to subsistence hook and line methods and means, and bag and possession limits; modifying waters open to subsistence fishing; and permit harvest limits. Additionally, a proposal seeks to allow limited sales of subsistence caught fish and another proposal seeks regulations regarding road maintenance along the Nome River by Alaska Department of Transportation and Public Facilities.

RESEARCH PLAN

NORTON SOUND INITIATIVE AND AYK SUSTAINABLE SALMON INITIATIVE

A Norton Sound Research and Restoration Initiative (NSI) Steering Committee was formed that identified and prioritized 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. The NSI projects have been operational since 2001 and completed field work in 2006 and a final report is scheduled to be issued in 2007. 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 developed an AYK Salmon Research and Restoration Plan designed to identify significant knowledge gaps and establish research priorities that complement other relevant research programs in the region. The AYK-SSI is in the process of determining project funding for the 2007 field season.

The NSI had funded many projects occurring in Norton Sound including several projects in Subdistrict 1. The escapement projects on the Nome, Snake, and Eldorado Rivers received funding to sample the chum salmon for age, sex, and length (ASL) data. These data helped managers determine age class return strength that can improve run projections. Environmental monitoring on stream conditions occurred year-round through data loggers on the Nome and Snake Rivers. Juvenile chum salmon studies were conducted in Subdistrict 1 to determine the outmigration timing of juvenile salmon. Results from 2002 studies showed the majority of chum fry outmigration from the Eldorado-Flambeau River system was in late July (Nemeth et al. *Unpublished*) as opposed to a belief that outmigration occurred mainly in late June. The NSI also funds one ADF&G research position, stationed in Nome, through June 2007.

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TABLES AND FIGURES

Table 1.–Nome Subdistrict chum salmon estimated escapement, 1993–2006.

Year	Solomon River^a	Bonanza River^a	Flambeau River^a	Sinuk River^a	Eldorado River^b	Snake River^c	Nome River^d	Subdistrict Total
1993	2,525	3,007	6,103	6,052	9,048	2,115	5,925	34,775
1994	1,066	5,178	12,889	4,905	13,202	3,519	2,893	43,652
1995	2,106	11,182	16,474	9,464	18,955	4,395	5,093	67,669
1996	2,141	7,049	13,613	6,658	32,970	2,772	3,339	68,542
1997	2,111	4,140	9,455	9,212	14,302	6,184	5,147	50,551
1998	925	4,552	9,129	6,720	13,808	11,067	1,930	48,131
1999	637	2,304	637	6,370	4,218	484	1,048	15,698
2000	1,294	4,876	3,947	7,198	11,617	1,911	4,056	34,899
2001	1,949	4,745	10,465	10,718	11,635	2,182	2,859	44,553
2002	2,150	3,199	6,804	6,333	10,243	2,776	1,720	33,225
2003	806	1,664	3,380	3,482	3,591	2,201	1,957	17,081
2004	1,436	2,166	7,667	3,197	3,273	2,145	3,903	23,787
2005	1,914	5,534	7,692	4,710	10,426	2,948	5,584	38,808
2006	2,062	708	27,828	4,834	41,985	4,128	5,678	87,223
Average 2001–2005	1,651	3,462	7,202	5,688	7,834	2,450	3,205	31,491
Average 1996–2005	1,536	4,023	7,279	6,460	11,608	3,467	3,154	37,528

^a The Bonanza, Flambeau, Sinuk and Solomon Rivers escapement estimate is obtained by expanding aerial survey counts and expanding by calculation from Clark, J.H. 2001.

^b The Eldorado River escapement estimate is the same method as in Clark, J.H. 2001 for 1993–1996. From 1997–2002 escapement estimates are from counting tower and from 2003–2006 by weir.

^c The Snake River escapement estimate is the same method as in Clark 2001 for 1993–1994. From 1995–2002 escapement estimates are from counting tower and from 2003–2006 by weir.

^d The Nome River escapement estimate is the same method as in Clark, J.H. 2001 for 1993. From 1994–1995 escapement estimates are from counting tower and from 1996–2006 by weir.

Table 2.—Commercial and subsistence salmon catch by species, by year in Nome Subdistrict, Norton Sound District, 1964–2006.

NOME (SUBDISTRICT 1)																			
Year	Commercial						Subsistence						Combined						
	Chinook	Sockeye	Coho	Pink	Chum	Total	Chinook	Sockeye	Coho	Pink	Chum	Total	Chinook	Sockeye	Coho	Pink	Chum	Total	
1964	5	-	-	1	1,194	1,200	-	-	-	-	-	-	5	-	-	1	1,194	1,200	
1965	1	-	-	193	1,941	2,135	-	-	-	780	1,825	2,605	1	-	-	973	3,766	4,740	
1966	1	-	32	1	581	615	12	-	-	1,794	1,762	3,568	13	-	32	1,795	2,343	4,183	
1967	-	-	-	72	406	478	11	-	-	349	627	987	11	-	-	421	1,033	1,465	
1968	-	-	-	50	102	152	7	-	-	6,507	621	7,135	7	-	-	6,557	723	7,287	
1969	-	-	63	330	601	994	2	-	-	3,649	508	4,159	2	-	63	3,979	1,109	5,153	
1970	-	-	6	55	960	1,021	-	-	35	5,001	458	5,494	0	-	41	5,056	1,418	6,515	
1971	11	-	-	14	2,315	2,340	-	-	122	5,457	2,900	8,479	11	-	122	5,471	5,215	10,819	
1972	15	-	-	12	2,643	2,670	19	-	52	4,684	315	5,070	34	-	52	4,696	2,958	7,740	
1973	-	-	-	321	1,132	1,453	14	-	120	5,108	1,863	7,105	14	-	120	5,429	2,995	8,558	
1974	19	-	123	7,722	10,431	18,295	8	-	5	3,818	183	4,014	27	-	128	11,540	10,614	22,309	
1975	2	-	319	2,163	8,364	10,848	2	-	97	6,267	2,858	9,224	4	-	416	8,430	11,222	20,072	
1976	2	10	26	1,331	7,620	8,989	13	-	189	5,492	1,705	7,399	15	10	215	6,823	9,325	16,388	
1977	8	-	58	65	15,998	16,129	35	-	498	2,773	12,192	15,498	43	-	556	2,838	28,190	31,627	
1978	19	-	-	22,869	8,782	31,670	35	-	225	13,063	4,295	17,618	54	-	225	35,932	13,077	49,288	
1979	9	-	29	5,860	5,391	11,289	11	-	1,120	6,353	3,273	10,757	20	-	1,149	12,213	8,664	22,046	
1980	8	-	-	10,007	13,922	23,937	129	-	2,157	22,246	5,983	30,515	137	-	2,157	32,253	19,905	54,452	
1981	4	-	508	3,202	18,666	22,380	35	14	1,726	5,584	8,579	15,938	39	14	2,234	8,786	27,245	38,318	
1982	20	-	1,183	18,512	13,447	33,162	21	6	1,829	19,202	4,831	25,889	41	6	3,012	37,714	18,278	59,051	
1983	23	-	261	308	11,691	12,283	74	53	1,911	8,086	7,091	17,215	97	53	2,172	8,394	18,782	29,498	
1984	7	-	820	-	3,744	4,571	83	16	1,795	17,182	4,883	23,959	90	16	2,615	17,182	8,627	28,530	
1985	21	-	356	-	6,219	6,596	56	114	1,054	2,117	5,667	9,008	77	114	1,410	2,117	11,886	15,604	
1986	6	-	50	-	8,160	8,216	150	107	688	8,720	8,085	17,750	156	107	738	8,720	16,245	25,966	
1987	3	-	577	-	5,646	6,226	200	107	1,100	1,251	8,394	11,052	203	107	1,677	1,251	14,040	17,278	
1988	2	-	54	182	1,628	1,866	63	133	1,076	2,159	5,952	9,383	65	133	1,130	2,341	7,580	11,249	
1989	2	0	0	123	492	617	24	131	469	924	3,399	4,947	26	131	469	1,047	3,891	5,564	

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Table 2.–Page 2 of 2.

NOME (SUBDISTRICT 1)																		
Year	Commercial						Subsistence ^a						Combined					
	Chinook	Sockeye	Coho	Pink	Chum	Total	Chinook	Sockeye	Coho	Pink	Chum	Total	Chinook	Sockeye	Coho	Pink	Chum	Total
1990	0	0	0	0	0	0	58	234	510	2,233	4,246	7,281	58	234	510	2,233	4,246	7,281
1991	0	0	0	0	0	0	83	166	1,279	194	3,715	5,437	83	166	1,279	194	3,715	5,437
1992	1	2	693	185	881	1,762	152	163	1,481	7,351	1,684	10,831	153	165	2,174	7,536	2,565	12,593
1993	0	2	611	0	132	745	52	80	2,070	873	1,766	4,841	52	82	2,681	873	1,898	5,586
1994	0	1	287	0	66	354	23	69	983	6,556	1,673	9,304	23	70	1,270	6,556	1,739	9,658
1995	0	1	369	0	122	492	26	148	1,365	336	3,794	5,669	26	149	1,734	336	3,916	6,161
1996	0	0	9	13	3	25	9	185	828	3,510	2,287	6,819	9	185	837	3,523	2,290	6,844
1997	0	0	0	0	0	0	10	50	325	175	2,696	3,256	10	50	325	175	2,696	3,256
1998	0	0	0	0	0	0	15	14	1,057	4,797	964	6,847	15	14	1,057	4,797	964	6,847
1999 ^b	0	0	0	0	0	0	11	85	161	58	337	652	11	85	161	58	337	652
2000	0	0	0	0	0	0	7	26	747	2,657	535	3,972	7	26	747	2,657	535	3,972
2001	0	0	0	0	0	0	2	92	425	113	858	1,490	2	92	425	113	858	1,490
2002	0	0	0	0	0	0	4	79	666	3,161	1,114	5,024	4	79	666	3,161	1,114	5,024
2003	0	0	0	0	0	0	63	76	351	507	565	1,562	63	76	351	507	565	1,562
2004 ^c	0	0	0	0	0	0	100	106	1,574	15,047	685	17,512	100	106	1,574	15,047	685	17,512
2005 ^c	0	0	0	0	0	0	62	177	1,287	5,075	803	7,404	62	177	1,287	5,075	803	7,404
2006 ^d	0	0	0	0	0	0	24	162	3,647	9,405	901	14,139	24	162	3,647	9,405	901	14,139
5-year avg. ^e	0	0	0	0	0	0	46	106	861	4,781	805	6,598	46	106	861	4,781	805	6,598
10-year avg. ^f	0	0	1	1	0	3	28	89	742	3,510	1,084	5,454	28	89	743	3,511	1,085	5,456

^a Subsistence harvest data are incomplete prior to 1975. From 1975–2006 a permit was required to subsistence fish and harvest numbers are from permits returned.

^b Beginning in 1999 Tier II chum salmon fishing restrictions limited the number of permit holders that could fish for chum salmon.

^c In 2004 and 2005 all applicants for Tier II qualified to fish for chum salmon. In 2004 there were 52 Tier II permits issued and in 2005 there were 49 Tier II permits issued.

^d In 2006 Tier II chum salmon fishing restrictions were suspended for the entire season.

^e 2001–2005.

^f 1996–2005.

Table 3.—Subsistence harvest from Pilgrim River and Salmon Lake, 1963–2006.

Year	Number of Permits Issued	Chinook	Sockeye	Coho	Pink	Chum
1963	16	0	3,586	25	865	419
1964	22	17	1,475	227	371	1,049
1965	23	12	1,267	164	222	671
1966	11	5	130	16	84	297
1967	13	7	337	6	5	21
1968	6	3	107	5	7	19
1969	7	0	55	0	10	0
1970	7	0	62	6	25	55
1971	8	7	127	5	14	49
1972	0					
1973	0					
1974	4	0	28	0	0	0
1975	8	0	28	0	0	75
1976	9	3	91	20	236	226
1977	4	0	0	0	0	0
1978	0					
1979	2	0	0	0	6	8
1980	0					
1981	0					
1982	2	0	0	0	0	0
1983	2	0	0	0	6	8
1984	1	0	0	0	0	20
1985	1	0	0	0	0	9
1986	^a					
1987	3	0	0	0	0	20
1988	^a					
1989	^a					
1990	^a					
1991	26	8	110	34	25	98
1992	9	0	12	0	1	7
1993	8	0	0	0	0	0
1994	4	0	6	0	0	0
1995	14	4	99	6	0	6
1996	3	0	0	0	0	0
1997	17	0	18	0	2	13
1998	12	1	30	0	3	1
1999	33	28	180	20	0	91
2000	15	2	61	36	22	43
2001	20	3	169	20	0	6
2002	25	18	165	20	4	13
2003	101	56	1,421	67	136	84
2004	223	57	3,546	50	222	53
2005	214	13	4,754	42	176	132
2006	199	27	5,486	22	90	313
5-year average ^b	117	29	2,011	40	108	58
10-year average ^c	66	18	1,034	26	57	44

^a Information not available.^b 2001–2005.^c 1996–2005.

Table 4.–Nome Subdistrict historical management actions.

- 1962 Norton Sound District divided into subdistricts to focus management near terminal harvest areas.
- 1968 Subsistence registration permits required for fishing in the Sinuk, Snake, Nome and Solomon Rivers with bag limits and standard fishing times for entire sub-district.
- Late 1970s -The Alaska Board of Fisheries set commercial guideline harvest range between 5,000 and 15,000 chum salmon.
- Commercial fishing period length reduced by half.
 - Subsistence permits required for all Nome area waters beginning in 1975.
- 1984 Salmon management shifted focus from commercial to subsistence.
- Commercial harvest area reduced by half to protect subsistence harvest areas.
 - Commercial fishing time greatly reduced to allow for subsistence needs and adequate escapements.
 - Sport fish chum and coho bag limits reduced.
 - Subsistence season bag limits reduced to 20 chum and 20 coho.
- 1987 -Commercial fishery nearly eliminated by current regulations and management due to low chum and pink stocks
- Sport fish chum and coho bag limits further reduced.
 - Subsistence disallowed beach seines as a legal gear type in specific waters.
- 1988 -Sport fishing for chum closed in the Nome River.
- Subsistence gillnets reduced to 50 feet maximum length in Nome River.
- 1990 Subsistence fishing closure on Nome River to allow for chum escapement.
- 1991 Commercial, Sport, and Subsistence closures of nearly the entire subdistrict due to low chum and pink escapements. Restrictions were lifted once they became no longer effective and other species could be targeted.
- 1992 Similar to 1991 except that subsistence restrictions were lifted incrementally as the abundant pinks returned while protecting the chum stocks. Beach seines were allowed as a legal gear type for pinks only.
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Table 4.–Page 2 of 4.

	-Subsistence gillnet gear was restricted to 50 feet maximum length for all inland waters of the Nome area by regulation.
1993	Same as 1991.
1994	Commercial fishing closed until August 1 when coho salmon could be targeted. Sport harvest of chum closed for entire season. Subsistence restrictions similar to 1992.
1995	Management similar to 1994 except: sport fishing for chum salmon became closed by regulation; beach seine gear was allowed in areas with adequate chum escapements; subsistence fishing time increased for marine waters to allow for more flexibility to deal with more harsh fishing conditions.
1996	Management similar to 1995 except that beach seine fishing targeted pink salmon and did not allow chum salmon to be retained.
1997	Management similar to 1995 except that no beach seine fishing was allowed.
1998	-Initial all salmon subsistence closure for all waters except marine west of Nome Jetty. -Incremental relaxing of individual areas to subsistence with gear restrictions to avoid chum salmon. -No commercial coho season.
1999	BOF implements Tier II subsistence chum fishing regulations which awards limited fishing opportunity to individuals with the longest history and greatest dependence on the Nome chum resource based on the inability of the Nome chum stock to fully support all subsistence user's needs. -Open Tier II only subsistence chum fishing, issuing 20 permits and restricting effort to marine waters east of Cape Nome. -Close all subsistence chum fishing due to very weak runs. -No commercial coho season, close sport and subsistence fishing for coho. -Open Tier II only subsistence chum fishing, issuing 10 permits and restricting effort to marine waters east of Cape Nome. -Open Tier I beach seining for pink salmon and later small mesh gillnets to take advantage of the strong pink run while protecting chum. -General subsistence fishing reopened to coho in all usual waters of the subdistrict.

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- 2001 -BOF updates escapement goals for Nome Subdistrict rivers.
- Open Tier II only subsistence chum fishing in late June, issuing 20 permits and restricting effort to marine waters east of Cape Nome. Tier II fishing opened in Eldorado, Flambeau and Bonanza Rivers in mid-July. An additional 10 Tier II permits are issued in mid-July.
 - Open Tier I subsistence chum salmon in Eldorado-Flambeau Rivers after July 18.
 - General subsistence fishing reopened in August to coho fishing.
 - Subsistence coho fishing time reduced from August 20 to September 15. Sport coho fishing closed.
 - Hook and line attached to a rod or pole adopted as legal subsistence gear.
- 2002 -Open Tier II only subsistence chum fishing in late June, issuing 30 permits and restricting effort to marine waters east of Cape Nome. An additional 10 Tier II permits are issued in late June.
- Open Tier II fishing in Eldorado and Flambeau Rivers after July 4.
- 2002 -Open Tier I fishing for pink salmon in marine waters 2nd week of July.
- Open Tier I fishing open in fresh waters east of Cape Nome in mid-July and then all rivers except Nome.
 - General subsistence fishing reopened in August to coho fishing.
 - Subsistence and sport coho fishing closed for two weeks beginning mid-August and then a restricted fresh water schedule in September.
- 2003 -Open Tier II only subsistence chum fishing in late June, issuing 30 permits and restricting effort to marine waters east of Cape Nome. An additional 10 Tier II permits are issued in early July.
- Close all subsistence fishing in mid-July because of weak chum runs.
 - General subsistence fishing reopened in August to coho fishing.
 - Subsistence and sport fishing for coho salmon closed in mid-August.
- 2004 -All applicants for Tier II subsistence chum salmon fishing permits are successful.
- 57 applicants (including those applying during 10 day appeal process).
 - 52 applicants eventually pick up permits and 49 permit holders fish.
 - Tier II opens in marine waters east of Cape Nome on June 15.
 - Eldorado, Flambeau, and Sinuk freshwater subsistence zones opened in late June.
 - Rod and reel Tier I subsistence fishing opens to target record pink salmon run.
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- Marine waters west of Cape Nome opened to Tier II gillnets from July 1 to July 3.
 - Tier II fishing was allowed in all chum subsistence areas the second half of July, except for the Eldorado and Solomon Rivers.
 - Tier I chum salmon fishing was allowed in rivers that had made the escapement goal.
 - Marine and fresh waters opened on July 26 opened to coho salmon Tier I and Tier II subsistence fishing.
 - Anvil Creek closed to protect spawning coho salmon.
- 2005
- All applicants for Tier II subsistence chum salmon fishing permits are successful.
 - 59 applicants (including those applying during the 10 day appeal process).
 - 49 applicants eventually pick up permits and 44 permit holders fish.
 - Tier II opens in marine waters east of Cape Nome on June 15.
 - Eldorado, Flambeau, and Sinuk freshwater subsistence zones opened on June 29 to set gillnet fishing for Tier II permit holders.
 - Rod and Reel Tier I subsistence fishing opened on June 30.
 - In mid July Tier II restrictions rescinded.
 - In late July, Tier I subsistence chum salmon limits were waived.
 - Anvil Creek closed to protect spawning coho salmon.
- 2006
- No Tier II restrictions as chum salmon are projected to surpass the ANS.
 - Beginning mid-June the Nome Subdistrict is on the regular subsistence schedule for the first time since 1990.
 - Opened beach seining during gillnet fishing schedule on July 6 and pink salmon limits waived. Chum salmon limits were waived on July 10.
 - Coho salmon limits were waived on August 19 in the marine waters and on September 1 in freshwater subsistence areas.
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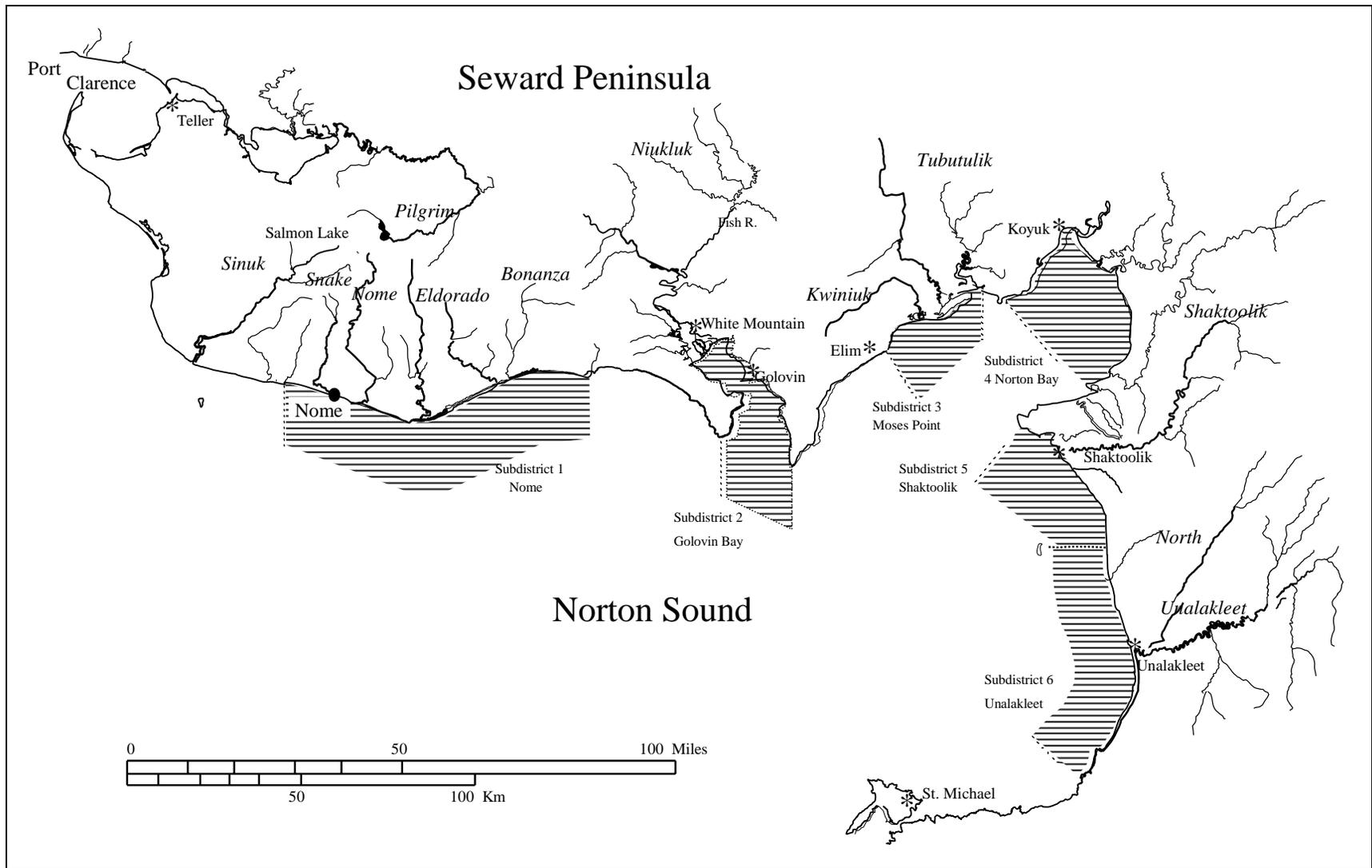


Figure 1.–Norton Sound commercial salmon fishing districts and subdistricts.

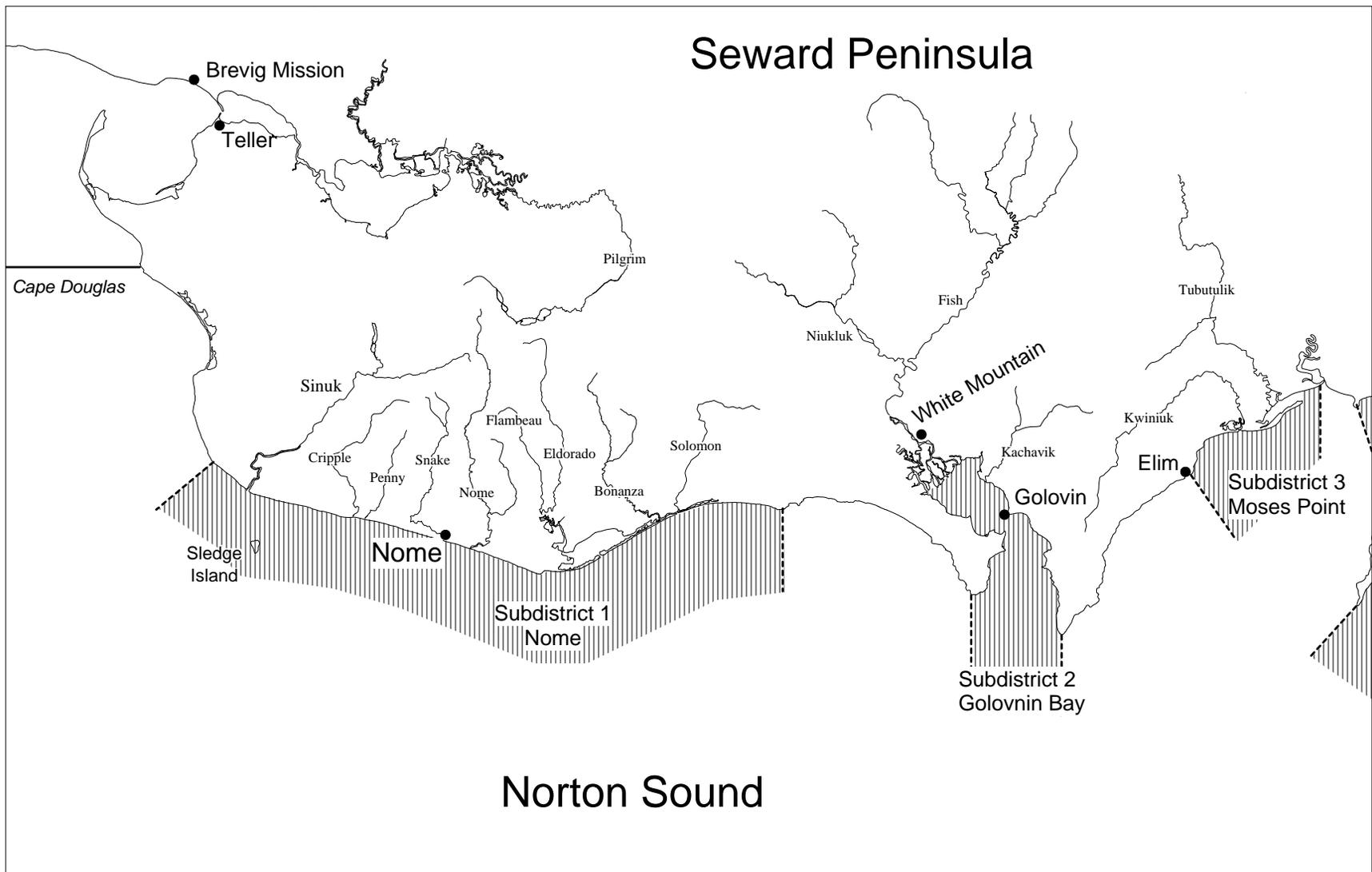


Figure 2.—Northern Norton Sound area rivers.

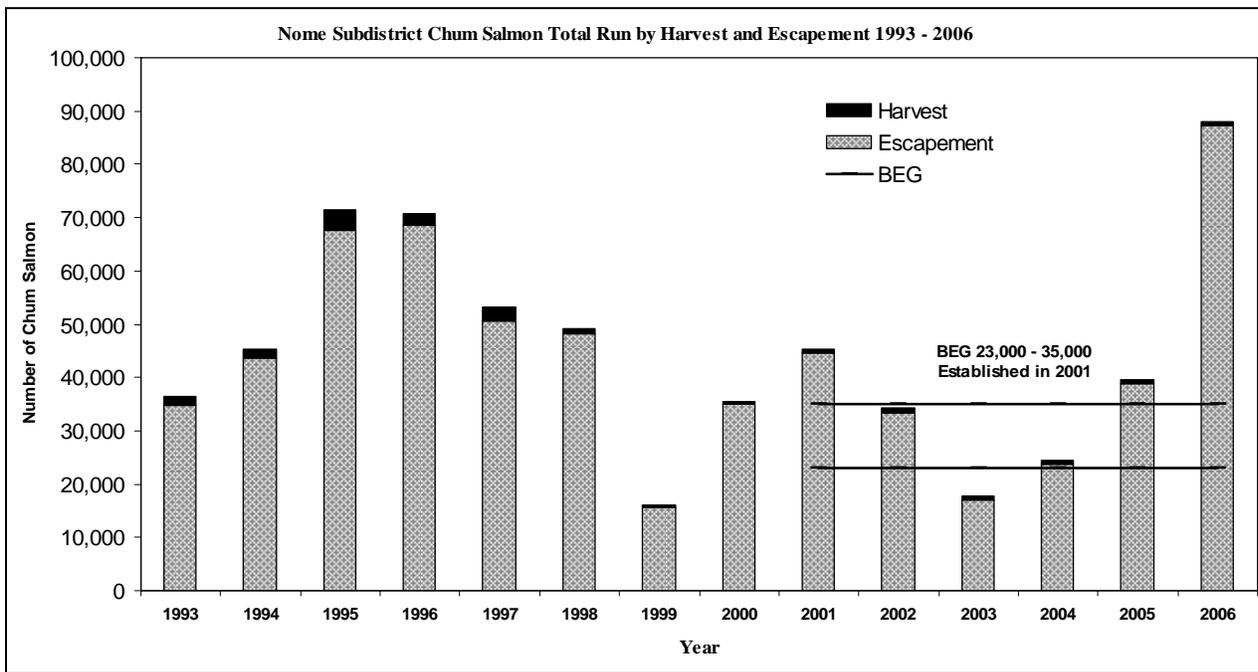


Figure 3.—Nome Subdistrict total chum salmon run by harvest and escapement with escapement compared to the BEG, 1993–2006.

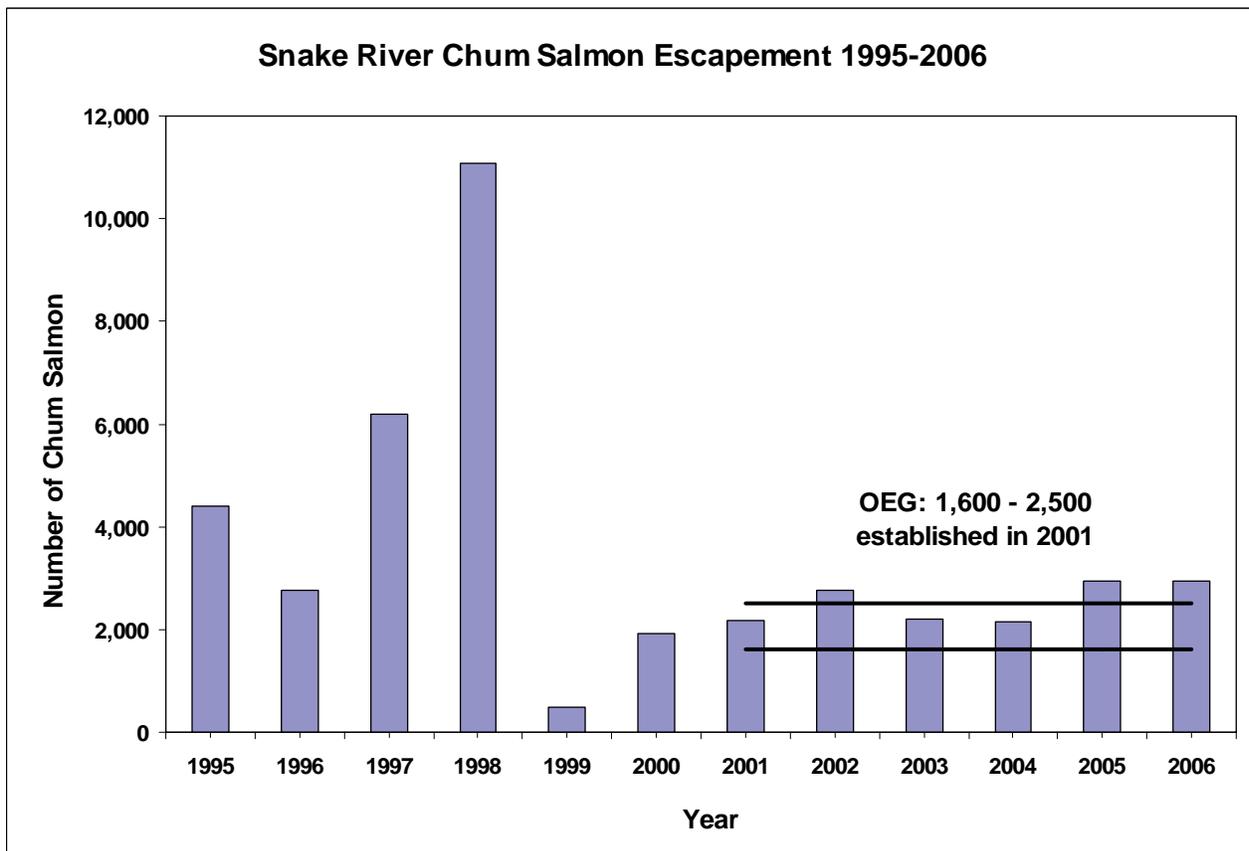


Figure 4.—Snake River chum salmon escapement, 1995–2006.

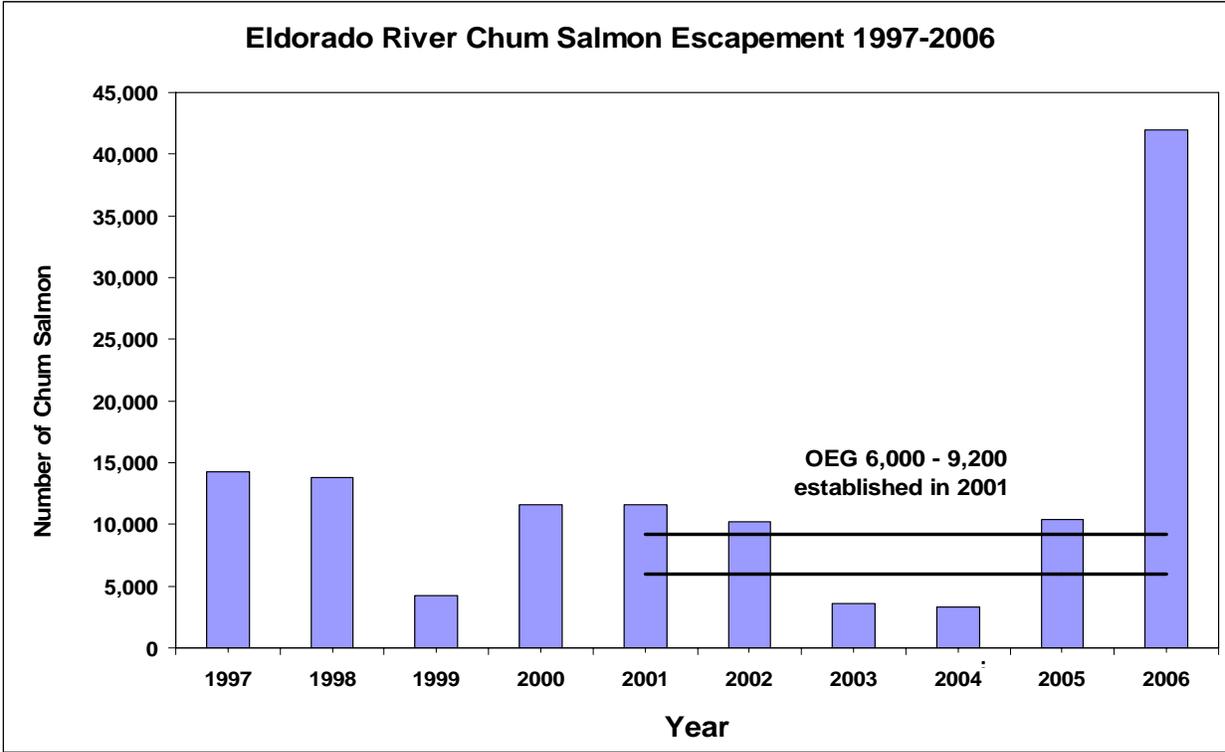


Figure 5.—Eldorado River chum salmon escapement, 1997–2006.

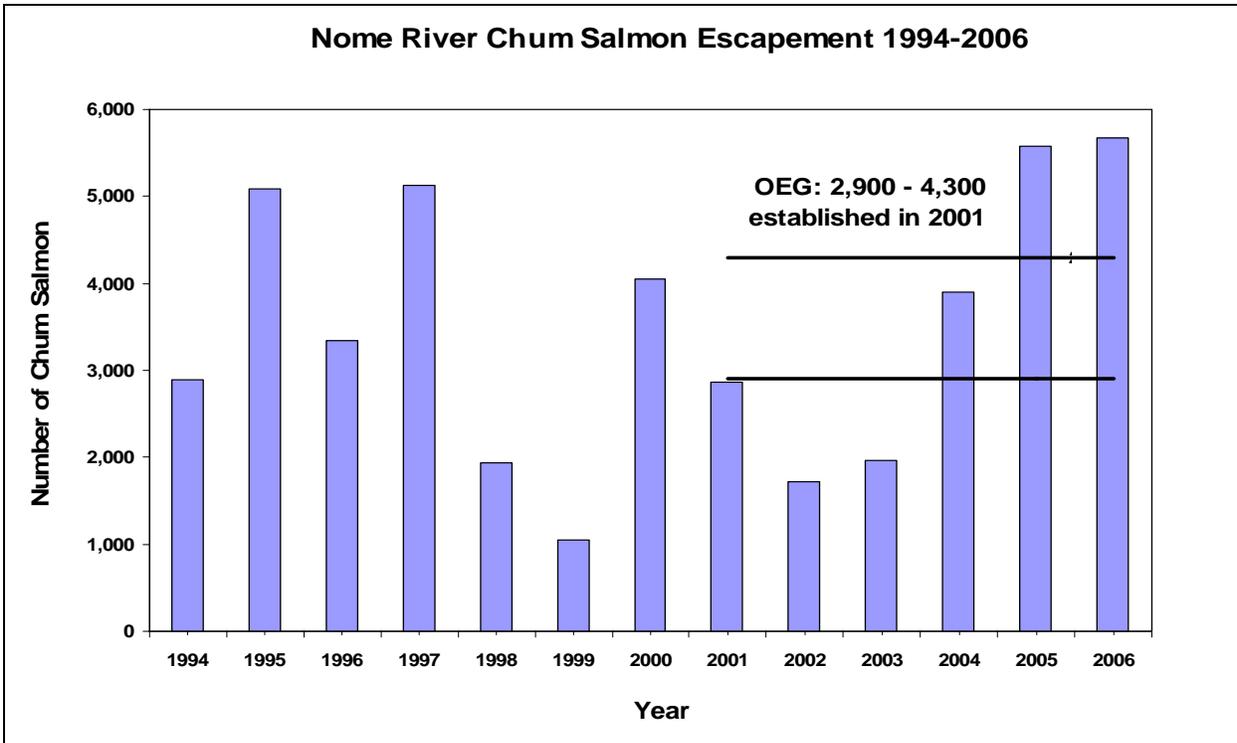
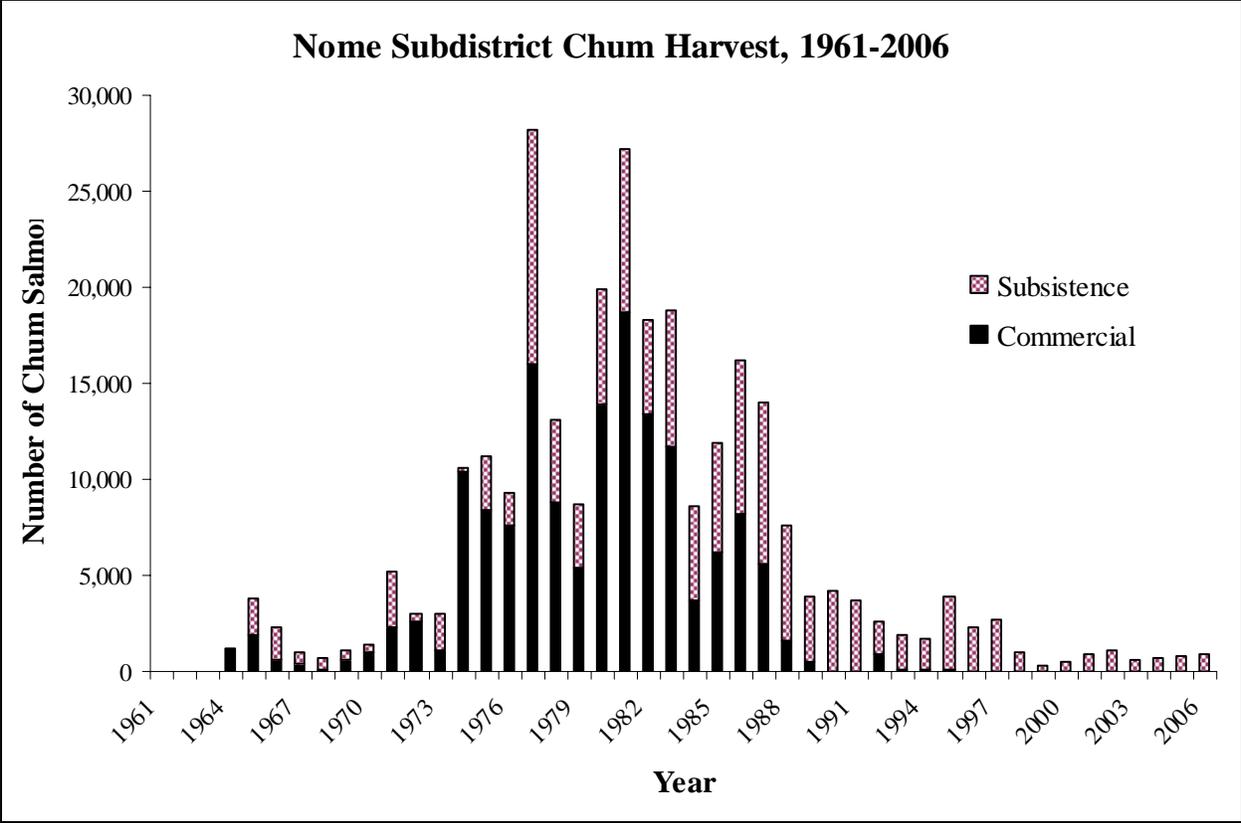


Figure 6.—Nome River chum salmon escapement, 1994–2006.



Note: Subsistence harvest data not available for all years and incomplete for other years prior to 1975.

Figure 7.—Nome Subdistrict chum salmon harvest, 1961–2006.

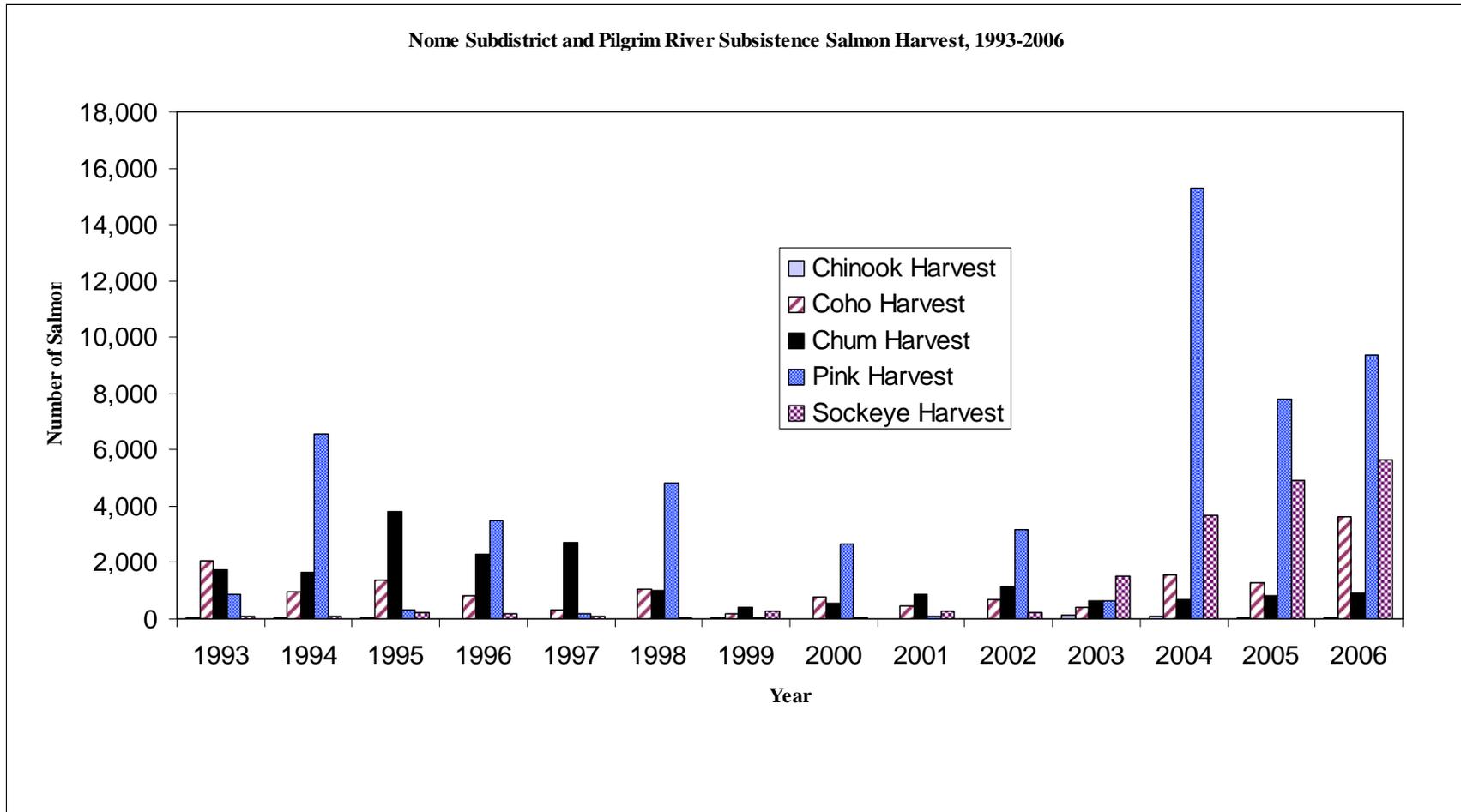


Figure 8.—Nome Subdistrict and Pilgrim River combined subsistence salmon harvest, 1993–2006.