

Special Publication No. 23-10

**Run Forecasts and Harvest Projections for 2023
Alaska Salmon Fisheries and Review of the 2022
Season**

Edited 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		Mathematics, statistics	
centimeter	cm	Alaska Administrative Code		<i>all standard mathematical signs, symbols and abbreviations</i>	
deciliter	dL	all commonly accepted abbreviations	AAC	alternate hypothesis	H_A
gram	g		e.g., Mr., Mrs., AM, PM, etc.	base of natural logarithm	e
hectare	ha			catch per unit effort	CPUE
kilogram	kg	all commonly accepted professional titles	e.g., Dr., Ph.D., R.N., etc.	coefficient of variation	CV
kilometer	km			common test statistics	(F, t, χ^2 , etc.)
liter	L	at	@	confidence interval	CI
meter	m	compass directions:		correlation coefficient (multiple)	R
milliliter	mL	east	E	correlation coefficient (simple)	r
millimeter	mm	north	N	covariance	cov
		south	S	degree (angular)	$^\circ$
Weights and measures (English)		west	W	degrees of freedom	df
cubic feet per second	ft ³ /s	copyright	©	expected value	E
foot	ft	corporate suffixes:		greater than	>
gallon	gal	Company	Co.	greater than or equal to	≥
inch	in	Corporation	Corp.	harvest per unit effort	HPUE
mile	mi	Incorporated	Inc.	less than	<
nautical mile	nmi	Limited	Ltd.	less than or equal to	≤
ounce	oz	District of Columbia	D.C.	logarithm (natural)	ln
pound	lb	et alii (and others)	et al.	logarithm (base 10)	log
quart	qt	et cetera (and so forth)	etc.	logarithm (specify base)	log ₂ , etc.
yard	yd	exempli gratia (for example)	e.g.	minute (angular)	'
		Federal Information Code	FIC	not significant	NS
Time and temperature		id est (that is)	i.e.	null hypothesis	H_0
day	d	latitude or longitude	lat or long	percent	%
degrees Celsius	°C	monetary symbols (U.S.)	\$, ¢	probability	P
degrees Fahrenheit	°F	months (tables and figures): first three letters	Jan, ..., Dec	probability of a type I error (rejection of the null hypothesis when true)	α
degrees kelvin	K	registered trademark	®	probability of a type II error (acceptance of the null hypothesis when false)	β
hour	h	trademark	™	second (angular)	"
minute	min	United States (adjective)	U.S.	standard deviation	SD
second	s	United States of America (noun)	USA	standard error	SE
		U.S.C.	United States Code	variance	
Physics and chemistry		U.S. state	use two-letter abbreviations (e.g., AK, WA)	population	Var
all atomic symbols				sample	var
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				

SPECIAL PUBLICATION NO. 23-10

**RUN FORECASTS AND HARVEST PROJECTIONS FOR 2023 ALASKA
SALMON FISHERIES AND REVIEW OF THE 2022 SEASON**

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DEFINITION OF TERMS

Biological escapement goal	The number of salmon in a particular stock that the Alaska Department of Fish and Game has determined should be allowed to escape the fishery to spawn to achieve the maximum yield (human use). This determination is based on biological information about the fish stock in question. See 5 AAC 39.222(f)(3). (Also see <i>optimum escapement goal</i> .)
Commercial common property harvest	Harvests taken by traditional, competitive commercial fisheries (gillnet, purse seine, and troll), as opposed to commercial harvests resulting from hatchery cost recovery, fishing derbies, and sale of confiscated fish.
Commercial harvest	Harvests of fish that are used for commercial purposes. This includes fish caught by the commercial common property fishery and by hatchery operators for cost recovery; it excludes sport, subsistence, and personal use harvests.
Common property harvest	Harvests taken by the commercial common property fisheries, as well as the sport, subsistence, and personal use fisheries. This category excludes hatchery cost-recovery harvests.
Cost-recovery harvest	Harvests of salmon by hatchery operators in specially designated areas to fund the operation of hatcheries and other enhancement activities.
Enhanced salmon stock, runs	Hatcheries and other means of artificial propagation to create salmon runs or make existing salmon runs larger. Enhancement includes remote fish stocking, fertilization of lakes, and other techniques. See 5 AAC 39.222(f)(9).
Escapement, spawning population, or broodstock	The portion of a salmon run that is not harvested and survives to reach the spawning grounds or hatchery. See 5 AAC 39.222(f)(10).
Harvest projections or harvest outlooks	Harvest outlooks are the best available estimates of upcoming harvest levels. Prepared by local biologists, outlooks are based on formal run forecasts when available. At other times outlooks are based on historical average catches, subjectively adjusted based on recent trends and local knowledge.
Optimal escapement goal	The number of salmon in a particular stock that should be allowed to spawn to both achieve sustainable runs based on biological needs of the stock and meet social and allocative needs. See 5 AAC 39.222(f)(25).
Return	Return refers to an aggregation of salmon over several or more years that represent the surviving adult offspring from a single brood year. See 5 AAC 39.222(f)(30).
Run forecast	Forecasts of a run (harvest + escapement) are estimates of the fish that will return in a given year based on such information as parent-year escapements, subsequent fry abundance, and spring seawater temperatures. Run forecasts are generally thought to be more reliable than harvest outlooks, but run forecasts are provided only for selected areas.
Salmon run	Run refers to the total number of mature fish returning in a given year from ocean-rearing areas to spawn. See 5 AAC 39.222(f)(31).
Sustainable escapement goal	Sustainable escapement goal is defined as a level of escapement, indicated by an index or a range of escapement estimates, that is known to have provided for sustained yield over a 5- to 10-year period. A sustainable escapement goal is used in situations where a biological escapement goal cannot be estimated due to the absence of a stock-specific catch estimate. See 5 AAC 39.222(f)(36).

ABSTRACT

This report contains salmon run forecasts and harvest projections for 2023 as well as a detailed review of Alaska's 2022 commercial salmon season. The Alaska all-species salmon harvest for 2022 totaled approximately 163.2 million fish, about 2.6 million more fish than the preseason forecast of 160.6 million fish. This combined harvest was composed of approximately 319,000 Chinook (*Oncorhynchus tshawytscha*), 75.5 million sockeye (*O. nerka*), 1.9 million coho (*O. kisutch*), 69.5 million pink (*O. gorbushcha*), and just under 16.0 million chum salmon (*O. keta*). The Alaska Department of Fish and Game is expecting an increase in commercial salmon harvests in 2023. The 2023 total commercial salmon harvest (all species) projection of 189.4 million fish is expected to include 78,000 Chinook salmon, 48.2 million sockeye salmon, under 3.0 million coho salmon, 122.2 million pink salmon, and 16.0 million chum salmon. Compared to 2022 commercial harvests, the projected 2023 commercial harvests are expected to be as follows: 52.7 million more pink salmon, 27.3 million fewer sockeye salmon, 1.0 million more coho salmon, and 24,000 more chum salmon.

Keywords: pink salmon, *Oncorhynchus gorbushcha*, sockeye salmon, *O. nerka*, chum salmon, *O. keta*, Chinook salmon, *O. tshawytscha*, coho salmon, *O. kisutch*, catch projection, run forecast, harvest projection, smolt outmigrations, sibling age classes, hatchery releases, fishing effort, salmon management

INTRODUCTION

This report contains salmon run forecasts and harvest projections for 2023 as well as a detailed review of Alaska's 2022 commercial salmon season. Salmon escapement and harvest estimates reported in this document were summarized from the Alaska Department of Fish and Game (ADF&G) escapement and fish ticket databases. Data provided in this report supersede any data previously published.

ADF&G is expecting an increase in overall commercial salmon harvest in 2023, mostly due to an increase in pink salmon *Oncorhynchus gorbushcha* harvests compared to 2022. The 2023 total commercial salmon harvest (all species) projection of 189.4 million fish is expected to include 78,000 Chinook salmon *O. tshawytscha*, 48.2 million sockeye salmon *O. nerka*, 3.0 million coho salmon *O. kisutch*, 122.2 million pink salmon, and 16.0 million chum salmon *O. keta*. Compared to 2022 commercial harvests, the projected 2023 commercial harvests are expected to be as follows: 52.7 million more pink salmon, 27.3 million fewer sockeye salmon, 1.0 million more coho salmon, and 24,000 more chum salmon.

There is a great deal of uncertainty in forecasting pink salmon returns due to their fixed 2-year life history and therefore limited information to serve as the basis for predictions (i.e., no siblings returning during prior years). As a result, pink salmon harvest forecasts are generally based on harvests from previous brood years. A notable exception is Southeast Alaska where a joint ADF&G and National Oceanic and Atmospheric Administration (NOAA) survey and juvenile pink salmon outmigration index is the basis for predicting harvests the following year. During recent decades, Alaska-wide pink salmon returns have tended to be larger during odd years than during adjacent even years, although there is much regional variation to this trend.

Table 1 shows specific harvest projection numbers by species and fishing area, and the "Preliminary Forecasts" section of this document provides forecast details for specific runs by area. When the appropriate data were available, harvest forecasts were arrived at through quantitative projections based on information of previous spawning levels, smolt outmigrations, returns of sibling age classes, and survival rates for hatchery releases. Other projections were based on averages of recent harvests. Fishing effort influences harvests, and effort is partly determined by market conditions in addition to the size of salmon runs. Therefore, these projections may not be indicative of actual harvests.

Except for the Southeast Alaska Chinook salmon fisheries and the South Peninsula June fisheries, Alaska salmon management will be based on inseason estimates of salmon run strength. Alaska fishery managers have the primary goal of maintaining spawning population sizes, not of reaching pre-season harvest projections.

Salmon productivity, survival, and resulting returns are probably influenced by many freshwater and marine drivers including spawning escapements, hatchery releases, temperature, and complex trophic interactions such as prey availability, predation, and competition. Although a review of this topic is well beyond the scope of this report, NOAA’s Ecosystem Status Reports provide a summary of recent physical and ecological conditions encountered by a variety of species in the North Pacific, including salmon during their marine phase (Ferriss and Zador 2022, Siddon 2022; available at <https://www.fisheries.noaa.gov/alaska/ecosystems/ecosystem-status-reports-gulf-alaska-bering-sea-and-aleutian-islands>).

Table 1.—Projections of 2023 Alaska commercial salmon harvests, by fishing area and species, in thousands of fish.

Region & Area	Species					Total
	Chinook	Sockeye	Coho	Pink	Chum	
Southeast Alaska						
Natural production	–	729 ^a	1,017 ^a	19,000	885	21,630
Hatchery production ^b	–	141	478	478	8,946	10,041
Southeast Region Total	– ^c	869	1,494	19,478	9,831	31,672
Prince William Sound						
Natural production	26	1,460 ^d	197 ^a	18,392	220	20,295
Hatchery production ^c	–	924	194	42,839	2,819	46,775
Lower Cook Inlet						
Natural production	0 ^a	146 ^a	2	1,801	37 ^a	1,986
Hatchery production	–	191 ^f	12	1,457	–	1,659
Upper Cook Inlet	NA ^g	NA ^h	157 ^a	83 ^a	89 ^a	NA ^h
Bristol Bay	21 ^a	36,660	85 ^a	10 ⁱ	767 ^a	37,542
Central Region Total	47	39,384 ^h	645	64,581	3,931	108,589 ^h
Kodiak						
Natural production	8 ^a	1,651 ^j	254 ^a	20,952	395 ^a	23,260
Hatchery production ^k	–	138	127	5,291	80	5,635
Chignik	2 ^a	937 ^l	75 ^a	2,740 ⁱ	55 ^a	3,808
South Peninsula	18 ^a	2,599 ^a	269 ^a	8,962	1,228 ^a	13,076
North Peninsula	2 ^a	2,609 ^a	46 ^a	134 ⁱ	98 ^a	2,888
Westward Region Total	30	7,933	770	38,079	1,855	48,668
Arctic-Yukon-Kuskokwim Total	<1	<1	50	75	388	514
Statewide Total	78	48,188 ^g	2,960	122,213	16,004	189,442 ^g

Note: En dashes indicate no projection and zeros indicate projection of <500 fish.

Note: Columns and rows may not total exactly due to rounding.

^a Average harvest of the previous 5 years (2018–2022).

^b Hatchery salmon projections made by Southern Southeast Regional Aquaculture Association, Northern Southeast Regional Aquaculture Association, Douglas Island Pink and Chum, Armstrong-Keta Inc., Kake Nonprofit Fisheries Corporation, and Metlakatla Indian Community less broodstock (5-year average), and excess. Wild chum salmon catch estimated as 9% of total catch.

^c Southeast Chinook salmon treaty forecast not available. The allowable catch of Chinook salmon in Southeast Alaska is determined by the Pacific Salmon Commission, which has not published the quota for 2023. Release of the 2023 Chinook salmon quota for Southeast Alaska is expected in late March or early April.

Table 1.–Page 2 of 2.

- ^d Includes formal natural harvest estimates for Prince William Sound and Copper/Bering River districts.
- ^e Hatchery salmon projections made by Prince William Sound Aquaculture Corporation and Valdez Fisheries Development Association. Gulkana Hatchery projection made by ADF&G, less broodstock (5-year average).
- ^f Hatchery salmon projections made by Cook Inlet Aquaculture Corporation minus broodstock (5-year average).
- ^g An Upper Cook Inlet Chinook salmon harvest forecast is not available for 2023.
- ^h Upper Cook Inlet commercial harvest forecast for sockeye salmon is not available. Central Region and Statewide totals include 3.12 million fish available for harvest to all user groups.
- ⁱ Average of previous 5 odd-year harvests (2013–2021).
- ^j Total Kodiak harvest of natural run sockeye salmon includes projected harvests from formally forecasted systems, projected Chignik harvest at Cape Igvak, and projected harvest from additional minor systems.
- ^k Hatchery projections made by Kodiak Regional Aquaculture Association (KRAA), minus estimates of broodstock. Sockeye salmon hatchery projections include enhanced Spiridon Lake sockeye salmon run harvest forecast and other KRAA projections.
- ^l Chignik sockeye salmon harvest estimate based on a formal forecast with projected harvest at Igvak and Southeastern District Mainland excluded.

The Alaska all-species salmon harvest for 2022 totaled approximately 163.2 million fish, about 2.6 million more fish than the preseason forecast of 160.6 million fish. This combined harvest was composed of approximately 319,000 Chinook, 75.5 million sockeye, 1.9 million coho, 69.5 million pink, and just under 16.0 million chum salmon. Table 2 shows 2022 harvest numbers by salmon species and fishing area in units of thousands of fish harvested, and Table 3 provides this information in units of thousands of whole pounds harvested. Tables 4–7 provide detailed information on the 2022 harvest by area and species.

Table 2.–2022 Alaska commercial salmon harvests, by fishing area and species, in thousands of fish.

Fishing area	Species					Total
	Chinook	Sockeye	Coho	Pink	Chum	
Southeast Region Total ^{a,b,c}	266	1,201	1,496	18,322	10,456	31,741
Prince William Sound ^{a,d}	14	1,693	105	28,438	3,105	33,354
Lower Cook Inlet ^{a,e,f}	0	256	1	403	52	713
Upper Cook Inlet ^{f,g}	2	1,126	103	101	99	1,431
Bristol Bay ^g	8	60,531	18	115	303	60,976
Central Region Total	24	63,607	227	29,057	3,560	96,475
Kodiak Area ^{f,g}	11	2,365	88	15,222	550	18,237
Chignik ^g	4	335	40	1,043	71	1,493
South Peninsula ^{f,g}	14	4,369	47	5,807	820	11,057
North Peninsula	1	3,604	8	12	14	3,639
Westward Region Total	30	10,673	183	22,084	1,455	34,426
Arctic-Yukon-Kuskokwim Region Total ^{f,g}	–	1	13	84	507	606
Total Alaska	319	75,482	1,919	69,548	15,979	163,247

Note: En dashes indicate no harvest, and zeros indicate harvest activity but <500 fish.

Note: Columns may not total exactly due to rounding.

Note: Confidential data omitted.

^a Chinook salmon adults and jacks are totaled.

^b Catch accounting period for the 2022 Chinook salmon troll season spans from October 1, 2021, to September 30, 2022.

^c Total includes fish that were confiscated, harvested in sport fisheries derbies and later sold, and harvested in test fisheries.

^d Total includes hatchery sales for operating expenses and broodstock harvests.

^e Total includes hatchery sales for operating expenses and hatchery donated fish but not broodstock.

^f Total includes commercially harvested fish retained for personal use.

^g Total includes commercial harvest that was discarded, confiscated, seized, or donated.

Table 3.—2022 Alaska commercial salmon harvests, by fishing area and species, in thousands of whole lb.

Fishing area	Species					Total
	Chinook	Sockeye	Coho	Pink	Chum	
Southeast Region Total ^{a,b,c}	3,009	6,850	8,660	63,328	74,447	161,294
Prince William Sound ^{a,d}	191	8,723	768	99,939	20,448	130,070
Lower Cook Inlet ^{a,e,f}	3	1,278	7	1,373	391	3,053
Upper Cook Inlet ^{f,g}	27	6,032	567	369	659	7,655
Bristol Bay ^g	70	307,342	110	401	1,699	309,622
Central Region Total	290	323,376	1,452	102,083	23,198	450,399
Kodiak Area ^{f,g}	60	10,646	605	49,313	3,632	64,257
Chignik ^g	20	1,657	235	3,735	424	6,070
South Peninsula ^{f,g}	95	20,840	281	19,670	4,703	45,589
North Peninsula	12	19,476	54	43	103	19,687
Westward Region Total	187	52,619	1,175	72,761	8,862	135,604
Arctic-Yukon-Kuskokwim Region Total ^{f,g}	—	7	76	287	3,855	4,225
Total Alaska	3,486	382,852	11,364	243,458	110,362	751,522

Note: Dashes indicate no harvest, and zeros indicate harvest activity but <500 fish.

Note: Columns may not total exactly due to rounding.

Note: Confidential data omitted.

^a Chinook salmon adults and jacks are totaled.

^b Catch accounting period for the 2022 Chinook salmon troll season goes from October 1, 2021, to September 30, 2022.

^c Total includes fish that were confiscated, harvested in sport fish derbies and later sold, and harvested in test fisheries.

^d Total includes hatchery sales for operating expenses and broodstock harvests.

^e Total includes hatchery sales for operating expenses and hatchery donated fish but not broodstock.

^f Total includes commercially harvested fish retained for personal use.

^g Total includes harvest that was discarded, confiscated, seized, or donated.

Inseason harvest information, postseason statistics, and other information about salmon in Alaska can be found online on at <http://www.adfg.alaska.gov/index.cfm?adfg=fishingCommercial.main>.

ADF&G's 4 major commercial fishery management regions (Southeast, Central, Arctic-Yukon-Kuskokwim, and Westward) are shown in Figure 1. These regions supersede any references to ADF&G's former statistical regions.



Revised 03.03.2021

Figure 1.—The 4 ADF&G fishery management regions (Southeast, Central, Arctic-Yukon-Kuskokwim, and Westward) of the Division of Commercial Fisheries.

REVIEW OF THE 2022 ALASKA COMMERCIAL SALMON FISHERIES

SOUTHEAST REGION

SOUTHEAST ALASKA AND YAKUTAT AREAS

The combined 2022 Southeast Alaska and Yakutat Area (SEAK) cumulative commercial salmon harvest, including hatchery cost recovery, was nearly 31.7 million fish (Table 4). Total common property commercial harvest was 25 million fish (79% of the total harvest). The 2022 overall harvest in numbers of salmon was slightly more than half the 2021 overall harvest but was more than double the 2020 harvest. The 2022 harvest was the 33rd highest harvest since 1962. The total commercial salmon harvest proportions by species were: 1% Chinook, 4% sockeye, 5% coho, 58% pink, and 33% chum salmon. The 2022 combined-gear Chinook salmon harvest of 266,000 fish was greater than the recent 10-year average (2012–2021) of 261,000 fish and 90% of the long-term average (1962–2021) of 295,000 fish. The sockeye salmon harvest of 1.2 million fish was above the recent 10-year average but below the long-term average. The coho salmon harvest of 1.5 million fish was 65% of the recent average and 70% of the long-term average. The pink salmon harvest of 18.3 million fish was 56% of the recent 10-year average of 32.8 million fish. The chum salmon harvest of 10.5 million fish was 108% of the recent 10-year average (9.7 million fish) and 169% of the long-term average (6.2 million fish). The all-species total harvest was 69% of the recent 10-year average (46.1 million fish) and 79% of the long-term average (40.1 million fish).

Chinook Salmon

Harvest Summary: The 2022 Chinook salmon harvest of 265,601 fish was above the 10-year average but below long-term averages. Preliminary harvests of coastwide Chinook salmon accountable under the Pacific Salmon Treaty included 187,600 fish by troll gear, 14,800 fish by purse seine gear, and 1,900 fish by gillnet gear. In 2022, a total of 38,500 Alaska hatchery-origin Chinook salmon were commercially harvested in the SEAK, and 22,700 hatchery-origin Chinook salmon were harvested in private hatchery cost-recovery fisheries.

Sockeye Salmon

Harvest Summary: The 2022 harvest of sockeye salmon was slightly higher than 1.2 million fish and ranks 29th of the 61 years since 1962. The SEAK purse seine fishery harvest of 629,374 fish accounted for approximately 52% of the regional total sockeye salmon harvest. The sockeye salmon drift gillnet fishery harvest of 479,728 fish accounted for 40% of the regional total sockeye salmon harvest. The set gillnet fishery harvest of 48,374 fish accounted for 4% of the regional total sockeye salmon harvest.

Coho Salmon

Harvest Summary: The 2022 coho salmon harvest of approximately 1.5 million fish ranks 44th since 1962. The coho salmon harvest in the troll fishery was 854,270 fish and accounted for approximately 57% of the regional coho salmon harvest. Total drift gillnet harvest of 132,522 fish

accounted for approximately 9% of the regional coho salmon harvest, and set gillnet harvest of 62,888 coho salmon accounted for 4% of the regional coho salmon harvest. Total purse seine harvests of 162,379 fish accounted for 11% of the regional coho salmon harvest.

Pink Salmon

Harvest Summary: The 2022 commercial pink salmon harvest was just over 18.3 million fish, approximately 58% of the total regional salmon harvest. The purse seine pink salmon harvest was 14.7 million fish, 80% of the total regional pink salmon harvest. This year's pink salmon harvest was near the preseason forecast of 16 million fish and ranked 41st since 1962.

Chum Salmon

Harvest Summary: The 2022 chum salmon harvest in SEAK was 10.5 million fish. Most chum salmon harvest in the SEAK Area is attributable to hatchery production. Before hatchery chum salmon production became significant in 1984, the 1962–1983 regional average chum salmon harvest was 1.6 million fish. Most chum salmon were harvested in the purse seine fishery (33%) and by hatchery cost recovery (33%). Troll harvest of chum salmon made up 10% of the region's chum salmon harvest.

Summary by Troy Thynes, Southeast Region Salmon/Herring Fisheries Management Coordinator, ADF&G, Petersburg.

Table 4.–2022 Southeast Region commercial salmon harvests, by fishing area and species in thousands of fish.

Fishery	Species					Total
	Chinook ^{a,b}	Sockeye	Coho	Pink	Chum	
Purse seine						
Southern purse seine traditional	15	604	145	11,711	1,671	14,147
Northern purse seine traditional	0	21	13	2,775	363	3,172
Hatchery terminal	12	4	5	252	1,427	1,699
Total purse seine	27	629	162	14,738	3,461	19,018
Drift gillnet						
Tree Point	2	27	27	382	332	770
Prince of Wales	1	45	51	86	173	357
Stikine	0	6	14	12	73	105
Taku-Snettisham	1	113	15	53	314	496
Lynn Canal	1	275	16	40	737	1,069
Drift gillnet hatchery terminal	11	14	8	60	765	858
Total drift gillnet	16	480	133	633	2,394	3,656
Set gillnet (Yakutat)	0	48	63	23	0	135
Troll						
Hand troll						
Traditional	4	0	17	3	3	27
Hatchery terminal	1	0	2	1	0	4
Spring areas	1	0	0	0	0	1
Total hand troll	5	0	19	4	4	32
Power troll						
Traditional	177	2	833	68	988	2,068
Hatchery terminal	1	0	3	7	53	64
Spring areas	13	0	0	0	1	14
Total power troll	192	2	836	75	1,042	2,146
Total troll	197	2	854	79	1,046	2,178
Annette Island Reservation						
Seine	0	10	6	1,709	46	1,771
Drift gillnet	1	4	6	282	73	366
Troll	0	–	0	–	–	0
Hand troll	0	–	0	–	–	0
Power troll	0	–	–	–	–	0
Trap	–	–	–	–	–	–
Total Annette Island Reservation	2	14	12	1,991	119	2,138
Hatchery cost recovery	23	25	271	820	3,421	4,559
Miscellaneous ^c	1	2	1	38	15	57
Southeast Region Total	266	1,201	1,496	18,322	10,456	31,741

Note: En dashes indicate no harvest, and zeros indicate harvest activity but <500 fish.

Note: Columns may not total exactly due to rounding.

^a Chinook salmon adults and jacks are totaled.

^b Catch accounting period for the 2022 Chinook salmon troll season spans from October 1, 2021, to September 30, 2022.

^c Includes fish that were confiscated, harvested in sport fishery derbies and later sold, and harvested in test fisheries.

CENTRAL REGION

PRINCE WILLIAM SOUND AREA

The 2022 cumulative Prince William Sound Area (PWS) commercial common property fishery (CCPF) and hatchery salmon harvest was 33.4 million fish (Table 5). Overall harvest was composed of approximately 14,000 Chinook, 1.7 million sockeye, 105,000 coho, 28.4 million pink, and 3.1 million chum salmon. The CCPF accounted for 86% (nearly 28.6 million fish) of the total harvest; the remaining 14% of the harvest (4.7 million fish) was attributed to hatchery cost-recovery fisheries and broodstock collection.

Chinook Salmon

Run and Escapement Summary: The 2022 preseason common property fishery (CPF) harvest forecast for the Copper River District was 14,000 Chinook salmon. Preliminary Chinook salmon abundance estimates indicate spawning escapement was above the lower bound of the sustainable escapement goal (SEG) of 21,000 fish.

Harvest Summary: The CCPF harvest of 12,262 Chinook salmon in the Copper River District was approximately 2% above the 10-year average harvest of 11,964 fish.

Sockeye Salmon

Run and Escapement Summary: The 2022 preseason CCPF harvest forecast for the Copper River District was 716,000 sockeye salmon. Gulkana Hatchery was projected to contribute 31,000 fish to this CCPF harvest projection.

The 2022 Miles Lake sonar passage was 785,509 salmon, within the inriver run goal range of 656,000–1,046,000 fish. Considering preliminary projections of inriver harvest, the Copper River sockeye salmon escapement goal range of 360,000–750,000 fish was likely achieved. Sockeye salmon escapement to the Copper River Delta was 55,100 fish, which is within the SEG range of 55,000–130,000 fish.

The 2022 forecast of the sockeye salmon run to Coghill Lake was 414,000 fish, with 384,000 fish available for CPF harvest. Approximately 34,100 sockeye salmon passed through the Coghill River weir, 71% above the upper end of the SEG range of 20,000–75,000 fish.

Prince William Sound Aquaculture Corporation (PWSAC) forecast a run of approximately 841,000 Main Bay Hatchery enhanced sockeye salmon in 2022.

Harvest Summary: The 2022 Copper River District CCPF sockeye salmon harvest was below average and was the 7th smallest CCPF harvest since 1976. The Copper River District sockeye salmon CCPF harvest of 601,009 fish was 45% less than the 10-year average harvest of under 1.1 million fish. Sockeye salmon average weight of 5.3 pounds in 2022 was 0.6 pounds smaller than the 30-year average (1992–2021) of 5.9 pounds. Wild sockeye salmon accounted for 97% (581,100 fish) of the CCPF harvest in the Copper River District. Of the remainder, 3% (16,400 fish) were from the Gulkana Hatchery, and more than 1% (3,500 fish) were from the Main Bay hatchery. The Gulkana Hatchery CCPF harvest was the 3rd lowest harvest in 20 years.

The Coghill District sockeye salmon CCPF harvest of 228,947 fish was 79% wild fish, 98% of the 10-year average of 184,000 fish.

The CCPF harvest of sockeye salmon in the Eshamy District gillnet (drift and set) fishery was 627,822 fish. The proportion of wild sockeye salmon in the Eshamy District CCPF harvest was 17%. PWSAC harvested approximately 125,000 sockeye salmon for cost recovery.

The Unakwik District CCPF gillnet harvest (drift and set) of sockeye salmon was 28,197 fish, more than 6 times the 10-year average of 4,300 fish.

Coho Salmon

Run and Escapement Summary: The Copper River District's 2022 preseason CCPF harvest forecast was 211,000 coho salmon. The Copper River Delta sum of peak escapement counts of 30,340 fish were below the SEG range of 32,000–50,000 fish. The Bering River District coho salmon spawning escapement counts of 4,685 fish were below the SEG range of 13,000–25,000 fish.

PWSAC forecasted a 2022 run of 138,000 coho salmon to Wally Noerenberg Hatchery.

The Valdez Fisheries Development Association (VFDA) enhanced coho salmon forecast was 74,600 fish, yielding a projected CCPF harvest of 29,000 fish.

Harvest Summary: The season total CCPF drift gillnet coho salmon harvest in the Copper River District of 44,128 fish was 80% below the 10-year average of 221,189 fish. Similarly, the Bering River District CCPF drift gillnet harvest of 9,603 coho salmon was 85% below the 10-year average harvest of 63,847 fish.

The Coghill District coho salmon CCPF harvest (purse seine and drift gillnet) of 39,591 fish was approximately 7% above the 10-year average of 37,157 fish. Coho salmon harvest in the Eastern District was 5,921 fish, much lower than the VFDA preseason forecast of 74,600 fish with a forecasted commercial harvest of 29,000 fish.

Enhanced coho salmon from VFDA are managed primarily as a sport fishery, but the commercial fleet inadvertently harvests them throughout PWS. The CCPF harvest of VFDA coho salmon is unknown due to the absence of otolith sampling. However, it is assumed that VFDA coho salmon compose a significant proportion of coho salmon harvest in the Eastern District purse seine fishery.

Pink Salmon

Run and Escapement Summary: The 2022 pink salmon season consisted of a strong VFDA run, a wild stock run that came in as forecasted, and a PWSAC run that came in significantly lower than anticipated. The pink salmon forecast was for a total run of under 26.8 million fish, apportioned among 3 returns: 50% VFDA, 31% PWSAC, and 19% wild. The projected harvest was for 19.0 million pink salmon, after accounting for wild escapement, cost recovery, and broodstock.

The total observed run in 2022 was 29.8 million pink salmon, 11% above forecast. The run composition was as follows: 65% VFDA, 12% PSWAC, and 23% wild. Compositions are based on otolith contributions. Pink salmon escapement goals were met in all PWS districts.

Combined with an aerial escapement index of 1.4 million fish, the estimated wild pink salmon return in 2022 was approximately 6.8 million fish, which is above the even-year (2012–2020) average of 4.6 million fish. The total run of 3.6 million PSWAC pink salmon was 57% below the forecast and 65% below the even-year average of 10.1 million fish. In total, 72% (approximately 2.6 million fish) of the PWSAC run was collected for cost recovery and broodstock. The total run of nearly 19.5 million VFDA pink salmon was 44% above forecast and 53% above the even-year

average of approximately 9.2 million fish. In total, 7% (1.3 million fish) of the VFDA run was collected for cost recovery and broodstock.

Harvest Summary: The 2022 PWS pink salmon harvest (including all CCPF harvest, hatchery cost recovery, broodstock, and raceway sales) was 28.4 million fish, 8% above the even-year average of 26.4 million fish. Approximately 23.8 million fish were harvested in the purse seine CCPF compared to the even-year average CCPF purse seine harvest of 21.3 million fish. The number of permits fished in the PWS purse seine fishery dropped from 212 permits in 2021 to 205 permits in 2022. This season was also the first season dual permits were allowed to operate in PWS. Under a dual permit operation, 2 PWS purse seine permit holders may concurrently fish from the same vessel and jointly operate up to 250 fathoms, in aggregate, of seine and lead. There were an estimated 22 dual permit operations in PWS for the 2022 season.

Pink salmon CCPF drift gillnet harvest in the Coghill District was 393,428 fish. The proportion of wild pink salmon in the Coghill District CCPF harvest was 61%.

In the Eshamy District, 289,599 pink salmon were harvested in the CCPF gillnet (drift and set) fishery. The proportion of wild pink salmon in the Eshamy District CCPF harvest was 76%.

Chum Salmon

Run and Escapement Summary: The 2022 chum salmon total run forecast was approximately 3.5 million fish, with a commercial harvest forecast of under 2.0 million fish. Most of the total run forecast, 3.1 million fish (90%), was attributed to PWSAC hatchery production. Approximately 360,000 fish returned to the Armin F. Koernig hatchery (AFK) and 280,000 fish returned to Port Chalmers Subdistrict purse seine fisheries. Based on the department's wild stock chum salmon forecast of 332,000 fish, there was a total commercial harvest forecast of 197,000 wild chum salmon. Managing for each district's escapement goal, the department's objective was to secure a combined escapement total of 135,000 wild chum salmon to all 5 districts.

Wild chum salmon escapements were below average across PWS, with 3 out of the 5 district SEGs unmet.

Harvest Summary: The 2022 CCPF harvest of chum salmon was approximately 2.4 million fish, 20% above the preseason harvest forecast of under 2.0 million fish and approximately 12% below the 10-year average of 2.7 million fish. PWSAC harvested 701,433 chum salmon for cost recovery and broodstock.

The CCPF harvest of enhanced chum salmon at the Port Chalmers remote release site, based on contribution estimates, was 707,000 fish, well above the preseason forecast of 280,000 fish. In the Southwestern District, the CCPF harvest of enhanced chum salmon at AFK was 180,000 fish, 50% below the preseason forecast of 360,000 fish.

Summary by Heather Scannell, Jeremy Botz, and Matt Olson, Area Management Biologists, ADF&G, Cordova.

LOWER COOK INLET AREA

The 2022 Lower Cook Inlet (LCI) Area commercial salmon harvest was 713,000 fish. Harvest was composed of approximately 300 Chinook, 256,000 sockeye, 1,000 coho, 403,000 pink, and 52,000 chum salmon (Table 5). Approximately 518,000 fish (73%) were harvested in the commercial fishery, and 195,000 fish (27%) were harvested through hatchery cost recovery.

Chinook Salmon

Harvest Summary: The 2022 combined CCPF and hatchery cost-recovery harvest was 286 Chinook salmon, which was below the 10-year average harvest of 535 fish. The set gillnet harvest for the Southern District (including homepack) was 189 fish, which was less than the 10-year average harvest of 373 fish. An additional 97 Chinook salmon were harvested by purse seine gear in the Southern and Outer districts.

Sockeye Salmon

Run and Escapement Summary: Cook Inlet Aquaculture Association (CIAA) forecasted a run of 30,300 sockeye salmon to the Kirschner Lake remote release site. CIAA also forecasted a total run of 78,100 sockeye salmon to Resurrection Bay facilities with all but 6,500 of these fish anticipated to be used for broodstock or cost-recovery purposes. An additional 114,800 fish were forecast to return to Kachemak Bay release sites with 35,500 of these fish anticipated to be used for cost recovery or brood harvest.

Sockeye salmon escapement in the Kamishak District was above the SEG range for Chenik Lake, within the range for the Amakdedori River, and below the SEG range at Mikfik Lake.

Sockeye salmon escapements to both Delight and Desire Lakes in the Outer District were above their respective SEG ranges for those systems.

Escapement of 12,760 sockeye salmon through the weir at Bear Creek was within the desired inriver passage goal range of 5,620–13,220 fish. This goal is the combination of the SEG range (700–8,300 fish) and the estimated 4,920 fish required for broodstock for the CIAA Resurrection Bay sockeye salmon program at the Trail Lakes Hatchery. CIAA harvested fewer broodstock than anticipated (2,798 fish), allowing 9,962 sockeye salmon to remain in the lake and spawn naturally. This is above the SEG range of 700–8,300 fish for this system. The only other index stock in the Eastern District is Aialik Lake, where the final escapement of 2,863 fish was below the SEG range of 3,200–5,400 fish.

Harvest Summary: The 2022 CCPF purse seine harvest (including homepack) for the Southern District was 82,124 sockeye salmon, which was higher than the 10-year average harvest of 46,783 fish. The set gillnet harvest (including homepack) for the Southern District was 26,855 fish, which was above the previous 10-year average harvest of 24,348 fish.

The Kamishak Bay District CCPF sockeye salmon harvest was confidential due to fewer than 3 permit holders reporting deliveries. The 10-year average harvest is 43,049 fish.

The Outer District harvest was 16,442 sockeye salmon, which was above the 10-year average harvest of 4,268 fish.

Due to small runs during the previous 10 years, no wild sockeye salmon were forecast to be available for commercial harvest from the Eastern District in 2022. Portions of Resurrection Bay were open for commercial harvest from June 22 through July 15. Due to the small number of

participants during these commercial fishing periods, State of Alaska confidentiality requirements prohibit release of the harvest information.

Coho Salmon

Harvest Summary: The 2022 purse seine harvest (including homepack) for the Southern District was 184 coho salmon, which is above the 10-year average harvest of 1,394 fish. The set gillnet harvest (including homepack) for the Southern District was 774 fish, which is less than the 10-year average harvest of 2,658 fish.

The Kamishak Bay District CCPF coho salmon harvest was confidential. The 10-year average harvest is 1,319 fish.

The Outer District harvest was 41 coho salmon, which was lower than the 10-year average harvest of 390 fish.

Pink Salmon

Run and Escapement Summary: In the Southern District, the pink salmon SEGs for China Poot, Humpy, and Seldovia Creeks were not achieved. The Tutka Creek SEG was exceeded. Escapement for the remaining pink salmon index streams—Barabara Creek and the Port Graham River—were within their assigned SEG ranges.

In the Kamishak Bay District, pink salmon escapement was below the SEG range in the Bruin River, Brown's Peak Creek, and Sunday Creek.

In the Outer District, pink salmon escapement was above the SEG range for Dogfish Bay Creeks, Windy Bay Creek Right, and Windy Bay Creek Left. Index systems within SEG ranges were Rocky River, Port Dick Creek, and Desire Lake Creek. Port Chatham Creeks, Island Creek, and South Nuka Creek were below SEG ranges.

Harvest Summary: The 2022 purse seine harvest (including homepack) for the Southern District was 5,770 pink salmon, less than the 10-year average harvest of 147,359 fish. The set gillnet harvest (including homepack) for the Southern District was 8,793 fish, less than the previous 10-year average harvest of 21,049 fish.

The Kamishak Bay District CCPF pink salmon harvest was confidential. The 10-year average for pink salmon harvest from this district is 46,880 fish.

The Outer District pink salmon harvest was 324,836 fish, which was lower than the 10-year average harvest of 1.2 million fish.

Chum Salmon

Run and Escapement Summary: The chum salmon SEG was not met at the Port Graham River in the Southern District for the fourth consecutive year. Chum salmon escapement in the Outer District was above the SEG range for Rocky River and below for Island and Dogfish Lagoon Creeks. Escapement was within SEG ranges for Port Dick Creek. In the Kamishak District, chum salmon escapement was below the SEG range at the McNeil River, Bruin River, and Ursus Cove Creeks and above the minimum SEG at the Little Kamishak River. Big Kamishak River, Cottonwood Creek, and Iniskin River were all within SEG ranges.

Harvest Summary: The 2022 purse seine harvest (including homepack) for the Southern District was 308 chum salmon, which was lower than the 10-year average harvest of 1,248 fish. The set

gillnet harvest (including homepack) for the Southern District was 2,986 chum salmon, which was less than the 10-year average harvest of 4,277 fish.

The Kamishak Bay District CCPF chum salmon harvest was confidential. The 10-year average annual chum salmon harvest from this district is 10,171 fish.

The Outer District harvest was 48,970 chum salmon, which was lower than the 10-year average harvest of 55,604 fish.

Summary by Glenn Hollowell, Area Management Biologist, ADF&G, Homer.

UPPER COOK INLET AREA

The 2022 Upper Cook Inlet Area (UCI) sockeye salmon estimated total run of 5.2 million fish was 300,000 fish larger than the preseason forecast of 4.9 million fish. The commercial salmon fishery harvest of 1.4 million salmon was 44% less than the recent 10-year average harvest of 2.5 million fish. Harvest was composed of approximately 2,000 Chinook, 1.1 million sockeye, 103,000 coho, 101,000 pink, and 99,000 chum salmon (Table 5).

Chinook Salmon

Run and Escapement Summary: In UCI, there are 2 commercial fisheries where most Chinook salmon are harvested. These include the set gillnet fisheries in the Northern District and in the Upper Subdistrict of the Central District. Chinook salmon runs were expected to be below average across Southcentral Alaska for the 2022 season. As expected, the 2022 Chinook salmon run was below average and was even lower than the preseason forecasts. This led to both preseason and inseason conservation measures in all fisheries to reduce the harvest of Chinook salmon.

The 2022 preseason run forecast for Deshka River Chinook salmon of 9,332 fish suggested harvest should be limited to achieve the biological escapement goal (BEG) range of 9,000–18,000 fish. The department issued preseason restrictions limiting Units 1–6 to catch-and-release angling only, with single unbaited hooks. The directed Chinook salmon fishery is normally 12 hours on Mondays, but because the Deshka River Chinook salmon sport fishery was restricted to catch-and-release, commercial fishing time was reduced by 50% to 6 hours (EO 2S-01-22) in accordance with the Northern District King Salmon Management Plan (NDKSMP). Additionally, the area of the Northern District from the wood chip dock to the Susitna River was closed to commercial fishing in conjunction with the sport fishery closure of the Chuitna River. Subsequently, commercial salmon fishing in the Northern District was closed on June 20 (EO 2S-03-22) in congruence with closure of the Deshka River sport fisheries (EO 2-KS-2-32-22) due to poor Chinook salmon passage and inseason projections that indicated the SEG would not be achieved.

The final escapement estimate of Chinook salmon in the Deshka River was 5,436 fish, which did not achieve the SEG range of 9,000–18,000 fish. The Little Susitna River Chinook salmon SEG range of 2,100–4,300 fish was achieved in 2022 with the incomplete weir count of 2,288 Chinook salmon. Results of the aerial escapement goals for the various other Susitna drainage Chinook salmon systems are still preliminary and are pending data analysis to determine whether goals have been achieved.

Kasilof River and Kenai River late-run Chinook salmon are the primary Chinook salmon stocks harvested in the eastside set gillnet (ESSN) fishery. Kenai River late-run Chinook salmon were managed to meet the optimal escapement goal (OEG) range of 15,000–30,000 large Chinook salmon (≥ 75 cm mid eye to tail fork length). By regulation, if restrictions are implemented in the sport fishery to achieve the OEG, restrictive “paired” actions are also required in the ESSN fishery.

The total estimated passage at the river mile 14 sonar through August 19 was 13,425 large Chinook salmon. The department applies harvest, catch-and-release mortality estimates, and spawning downstream of the sonar estimates to generate a preliminary spawning escapement estimate. The 2022 preliminary spawning escapement estimate was 13,952 large fish with a total run estimate of 13,994 large fish. The midpoint of the run occurred on July 27, which is on the mean historical midpoint. The OEG range of 15,000–30,000 large fish was not achieved and the SEG range of 13,500–27,000 large fish was achieved in 2022. The SEG has been achieved in 3 of the last 6 years. The lower bound of the OEG goal has not been achieved since establishment in 2020. The 2022 preseason forecast was for a total run of approximately 16,000 large Kenai River late-run Chinook salmon. Based on low preseason forecasts, the 2022 late-run Chinook salmon sport fishery was restricted to catch-and-release only with 1 unbaited, single-hook, or artificial lure to begin the season and later closed on July 17 for the remainder of the season. Subsequently, the ESSN commercial fishery openings began restricted, and closed with the sport fishery for the season.

Of the 3 southern Kenai Peninsula Chinook salmon systems, the SEG was not achieved at 2 systems and not assessed in the third. The Anchor River preliminary escapement estimate was 3,147 fish (SEG range 3,800–7,600 fish) and Ninilchik River wild run count was 687 fish (SEG range 750–1,300 fish). The Deep Creek Chinook salmon run was not assessed due to lack of funding. All 3 sport fisheries were restricted preseason and subsequently closed.

Harvest Summary: The 2022 UCI commercial harvest of Chinook salmon was 2,278 fish, which was 58% less than the previous 10-year average of 5,461 fish. Of this total, the ESSN fishery harvested 341 Chinook salmon, or 15% of the total UCI commercial harvest. The Chinook salmon harvested in the ESSN fishery included an estimated 32 fish that were of large Kenai River late-run origin. The drift gillnet fishery harvested 167 Chinook salmon of all sizes and all stocks.

In the Northern District, the directed Chinook salmon set gillnet fishery was opened, but fishing time was reduced by 50% to 6 hours, 1 day per week. The estimated total Chinook salmon harvest in the Northern District in 2022 was 1,328 fish with approximately 1,313 fish harvested during the directed Chinook salmon fishery.

Sockeye Salmon

Run and Escapement Summary: The 2022 UCI preseason total run forecast of 4.9 million sockeye salmon contained a harvest estimate (sport, personal use, and commercial) of 3.0 million fish, including a commercial fisheries harvest of 1.1 million fish. The 2022 preliminary total run estimate (harvest and escapement) of 5.2 million sockeye salmon was 289,000 fish greater, or 6% more than the preseason forecast. Sockeye salmon run abundance to the Kenai River was less than forecasted by 220,000 fish; the run abundance to the Kasilof River exceeded the forecast by 554,000 fish. The number of sockeye salmon returning to Fish Creek was 16,000 fish less than forecasted (incomplete count 58,351 fish escapement: 15,000–45,000 fish escapement goal range). The Susitna River sockeye salmon run estimate was 36,000 more fish than forecasted. For all other systems combined (minor systems), inseason abundance was 136,000 fish less than forecasted. A

weak Kenai River late-run Chinook salmon run resulted in paired restrictive actions in the Kenai River sport fishery and the ESSN commercial fishery. For the ESSN fishery, this meant less fishing time and gear restrictions. The final passage estimated at the river mile 19 sonar of 1,567,750 sockeye salmon exceeded the Kenai River sockeye salmon middle tier inriver goal range (1,100,000–1,400,000 fish). Applying the recent 10-year average sport fish harvest upstream of the sonar (304,570 fish), the SEG range (750,000–1,300,000 fish) was probably achieved. The peak day of sockeye salmon passage in the Kenai River occurred on July 20 with a count of 189,420 fish. During the previous 10 years, the average date when 50% of the sonar passage occurred in the Kenai River was July 28. In 2022, the midpoint of total sockeye salmon passage occurred on July 23, which is 5 days earlier than the previous 10-year average but is the same date as the long-term average (1979–2021). Approximately 20% of the sockeye salmon run arrived in the Kenai River during the month of August.

The Kasilof River sockeye salmon sonar count of 971,604 fish was the largest on record and exceeded the Kasilof River BEG range of 140,000–320,000 fish and the OEG range of 140,000–370,000 fish. The passage midpoint for Kasilof River sockeye salmon occurred on July 19, which was 3 days later than the average midpoint of July 16. Peak daily Kasilof River sockeye salmon passage of 125,628 fish occurred on July 20.

Harvest Summary: The 2022 total UCI commercial harvest of 1.1 million sockeye salmon was approximately 43% less than the 10-year average annual harvest of 1.9 million fish. The total 2022 sockeye salmon harvest in the ESSN fishery was 104,678 fish. From June 23 through July 20, the Kasilof Section was open on 7 different days, with approximately 81,591 sockeye salmon harvested, which was 75% less than the previous 10-year average of 332,490 fish. From July 8 through July 17, the Kenai and East Foreland Sections were open on 2 different days, with a total of 23,087 sockeye salmon harvested. This was 92% less than the previous 10-year average annual sockeye salmon harvest of 287,816 fish for those sections.

From June 20 through August 15, the drift gillnet fleet fished a total of 28 days as follows: 1 day in the regular Kasilof Section, 2 days in the Expanded Corridors, 12 days in the Expanded Corridors and Anchor Point sections, 8 days in Drift Gillnet Area 1, and 5 days in the Central District. Beginning on Monday, August 15, all Monday/Thursday regulatory drift gillnet fishing periods were restricted to Drift Gillnet Areas 3 and 4. The total UCI drift gillnet harvest was 893,743 sockeye salmon, which was 22% less than the previous 10-year average harvest of approximately 1.2 million fish. The peak day of harvest for the drift gillnet fleet occurred on Monday, July 18, of 167,131 sockeye salmon.

In 2022, approximately 32,672 sockeye salmon were harvested by set gillnetters in the Western Subdistrict. This was 5% less than the average annual harvest of approximately 34,404 fish during the previous 10 years.

Approximately 5,618 sockeye salmon were harvested in the Kustatan Subdistrict in 2022, of which 3,165 fish were harvested during the Big River fishery. The 2022 sockeye salmon harvest for the Kustatan Subdistrict was 25% larger than the recent 10-year average harvest of 4,475 fish.

In 2022, approximately 37,718 sockeye salmon were harvested from the Kalgin Island Subdistrict, with 8,138 fish taken during the Big River sockeye salmon fishery. The average annual sockeye salmon harvest in the Kalgin Island Subdistrict during the previous 10 years was approximately 46,053 fish, with roughly 8,422 fish harvested during the early season Big River fishery.

In 2022, approximately 51,831 sockeye salmon were harvested in the Northern District. This harvest was 6% greater than the 10-year average annual harvest of 48,868 sockeye salmon. As in past years, restrictions to the Northern District salmon fishery that limited the number of nets allowed were implemented from July 20 to August 6, to conserve Susitna River sockeye salmon.

Coho Salmon

Run and Escapement Summary: In UCI, there are 4 coho salmon systems with escapement goals. Weirs are used to assess escapement on the Fish Creek, Little Susitna River, and Deshka River; and McRoberts Creek is assessed with foot surveys.

The Little Susitna weir was inundated by flood waters for the majority of the coho salmon season. Projected escapement was within the SEG range going into a flood that overtopped the weir at the historical quarter point of the run (August 6) and then lasted for one month. Even though the count was lost due to flooding, the SEG range of 9,200–17,700 fish probably would have been attained. A weir count of 3,162 fish is considered an incomplete and minimum count.

Due to budget reductions and impending flood waters, the Deshka weir was pulled August 8. Through this date 3,168 coho salmon were counted, which is considered an incomplete and minimum count. The weir at Fish Creek was pulled at the end of July. The coho salmon run was not counted this season due to budget constraints. The SEG range for Jim Creek of 250–700 coho salmon is assessed postseason by a foot survey of McRoberts Creek, a small spawning tributary within the Jim Creek system. The survey resulted in 1,899 coho salmon, which exceeds the SEG.

Harvest Summary: The 2022 commercial harvest estimate of 102,630 coho salmon in UCI was 44% less than the previous 10-year average of 185,532 fish. The 2022 drift gillnet harvest of 51,306 coho salmon was 52% less than the 10-year average of 107,614 fish. The Northern District set gillnet fishery harvested 36,895 coho salmon, which was 16% less than the recent 10-year average of 43,992 fish.

Pink Salmon

Harvest Summary: Pink salmon runs in UCI are even-year dominant, with odd-year average harvests typically less than one-sixth of even-year harvests. The 2022 UCI commercial pink salmon harvest was estimated to be 100,998 fish, which was 72% lower than the average annual harvest of 363,813 fish from the previous 10 years of even-year harvests.

Chum Salmon

Run and Escapement Summary: An aerial survey of Chinitna River/Clearwater Creek was conducted on August 3. This survey produced an estimate of approximately 4,681 chum salmon within these streams, which was within the SEG range of 3,500–8,000 fish. Therefore, Chinitna Bay was opened to set and drift gillnetting on Tuesdays and Fridays. Regularly scheduled Monday and Thursday drift gillnet fishing periods for Drift Gillnet Areas 3 and 4 began August 15.

Harvest Summary: The 2022 harvest of 99,294 chum salmon was 34% lower than the 10-year average annual harvest of 151,247 fish.

Summary by Colton Lipka and Lucas Stumpf, Area Management Biologists, ADF&G, Soldotna.

BRISTOL BAY AREA

The 2022 inshore sockeye salmon run of approximately 79.2 million fish was the largest run recorded and was 82% above the 43.7 million fish average run for the latest 20-year period (2002–2021). Additionally, it was the second consecutive season the Bristol Bay inshore sockeye salmon run exceeded 65.0 million fish. All sockeye salmon escapement goals were met or exceeded, with a total baywide escapement of 18.8 million fish.

Commercial harvest of salmon in Bristol Bay for 2022 totaled 60.9 million fish, which is 98% above the recent 20-year average of 30.9 million fish. Sockeye salmon accounted for most of the harvest at 60.5 million fish. Harvest for the other species were approximately 8,000 Chinook, 303,000 chum, 115,000 pink, and 18,000 coho salmon, all of which are below their respective averages.

Chinook Salmon

Run and Escapement Summary: The Nushagak River Chinook salmon inriver run estimate at Portage Creek Sonar was 44,434 fish, which does not meet the escapement goal range of 55,000–120,000 fish. However, it is probable that some Chinook salmon went undetected at the sonar because they were masked by the high sockeye salmon passage. High sockeye salmon passage saturates the test fishing nets at the sonar project, a situation shown to bias the Chinook salmon count low in previous years. This is supported by reported inseason sport fishery catch rates, along with postseason aerial surveys indicating that the run was larger than the final sonar count.

Harvest Summary: Chinook salmon harvested in Bristol Bay were incidentally caught during directed sockeye salmon fishing periods. The Nushagak District, which is the main contributor of Chinook salmon in Bristol Bay, was actively managed to reduce Chinook salmon harvest, ensuring achievement of the established escapement goal for the Nushagak River. Overall, the 2022 Chinook salmon harvests were below average in all districts of Bristol Bay. A total of 7,733 Chinook salmon were harvested, which is below the most recent 20-year average of 39,040 fish, and the second-lowest harvest since 1955. The Nushagak District Chinook salmon harvest was 4,661 fish, which is well below the 20-year average harvest of 34,260 fish.

Sockeye Salmon

Run and Escapement Summary: The 2022 inshore Bristol Bay sockeye salmon run of 79.2 million fish is the largest total run on record and was 82% above the 43.7 million average run for the latest 20-year period. Additionally, it was the 4th time on record the Bristol Bay inshore sockeye salmon run exceeded 60.0 million fish. All sockeye salmon escapement goals were met or exceeded, with a total baywide escapement of 18.8 million fish. The 2022 Bristol Bay inshore sockeye salmon run was 8% above the preseason forecast of 73.4 million fish. Runs to every district, except the Togiak District, were larger than the preseason forecast.

Harvest Summary: The commercial harvest of approximately 60.5 million sockeye salmon was just above the preseason forecast of 59.9 million fish. The 2022 harvest was the largest recorded in Bristol Bay since 1893 and was the 4th time in the last 5 years harvest has exceeded 40.0 million fish.

Coho Salmon

Harvest Summary: The commercial harvest of coho salmon was 18,035 fish, which was below the recent 20-year average of 97,139 fish. Coho salmon harvest was below average in all districts with

the largest commercial harvest being in the Egegik District. Approximately 10,730 coho salmon were harvested in the Egegik District, which was below the recent 20-year average of 13,910 fish. Harvests of coho salmon can be variable from year to year depending on processor availability, market conditions, and overall fishing effort.

Pink Salmon

Harvest Summary: Bristol Bay has a dominant even-year pink salmon cycle. In 2022, the baywide pink salmon harvest was 115,214 fish, which is below the most recent 20-year average (even years only) of 511,587 fish.

Chum Salmon

Escapement Summary: The Nushagak River sonar project is the only chum salmon escapement assessment project in Bristol Bay. The escapement of 116,692 fish was below the lower-bound SEG of 200,000 fish.

Harvest Summary: In 2022, the baywide commercial harvest of 303,473 chum salmon was the third-lowest harvest recorded. Chum salmon harvests were below the 20-year averages in all districts.

Summary by Tim Sands, Travis Elison, and Aaron Tiernan, Area Management Biologists, ADF&G, Dillingham and Anchorage.

Table 5.–2022 Central Region commercial salmon harvests, by area and species, in thousands of fish.

Fishing area	Species					Total
	Chinook ^a	Sockeye	Coho	Pink	Chum	
Drift gillnet						
Bering River District	0	5	10	–	1	15
Coghill District	0	229	39	393	1,117	1,780
Copper River District	12	601	44	67	14	738
Eshamy District	0	446	0	218	119	784
Montague District	–	–	–	–	–	–
Unakwik District	Masked due to confidentiality requirements ^b					
Purse seine						
Coghill District	0	6	0	109	5	120
Eastern District	0	9	6	21,083	169	21,267
Montague District	1	6	0	178	707	891
Northern District	–	4	0	1,054	21	1,080
Northwestern District	–	4	0	317	16	337
Southwestern District	0	48	2	1,016	201	1,267
Southeastern District	–	0	0	39	3	42
Unakwik District	Confidential					
Set Gillnet						
Eshamy District	0	182	0	71	26	279
Hatchery ^c	–	125	3	3,891	702	4,720
Prince William Sound Total	14	1,693	105	28,438	3,105	33,354
Southern District Purse Seine						
Southern District Purse Seine	0	82	0	6	0	88
Southern District Set Gillnet	0	27	1	9	3	40
Southern District Total	0	109	1	15	3	128
Kamishak District						
Outer District	0	16	0	325	49	390
Eastern District	–	–	–	–	–	–
Hatchery ^d	–	130	0	64	0	195
Lower Cook Inlet Total^{e,f}	0	256	1	403	52	713
Central District Drift Gillnet						
Central District Drift Gillnet	0	894	51	90	92	1,127
Central District Set Gillnet	1	181	14	3	3	202
Central District Total	1	1,074	66	93	95	1,329
Northern District	1	52	37	8	4	102
Upper Cook Inlet Total^{e,f}	2	1,126	103	101	99	1,431
Naknek-Kvichak District						
Naknek-Kvichak District	1	14,362	1	19	34	14,418
Nushagak District						
Nushagak District	5	22,719	5	31	172	22,933
Egegik District						
Egegik District	0	16,544	11	4	28	16,587
Ugashik District						
Ugashik District	0	6,321	0	0	16	6,338
Togiak District						
Togiak District	1	585	1	60	53	700
Bristol Bay Total^f	8	60,531	18	115	303	60,976
Central Region Total	24	63,607	227	29,057	3,560	96,475

Notes: Dashes indicate no harvest, and zeros indicate harvest activity but <500 fish. Columns may not total exactly due to rounding.

Confidential data omitted.

^a Chinook salmon adults and jacks are totaled.

^b Harvest is not confidential on its own; however, releasing this information violates confidentiality for the Unakwik purse seine fishery.

^c Total includes hatchery sales for operating expenses and broodstock harvests.

^d Total includes cost recovery and hatchery donated fish but not broodstock.

^e Total includes commercially harvested fish retained for personal use.

^f Total includes harvest that was discarded, confiscated, seized, or donated.

ARCTIC-YUKON-KUSKOKWIM REGION

The Arctic-Yukon-Kuskokwim (AYK) Region 2022 harvests totaled under 606,000 fish (Table 6). Cumulative all-gear commercial harvest included approximately 1,000 sockeye, 13,000 coho, 507,000 chum, and 84,000 pink salmon all harvested in the Norton Sound and Kotzebue areas.

KUSKOKWIM AREA

The 2022 Kuskokwim River Chinook salmon forecast was for a range of 99,000–161,000 fish. The drainagewide Chinook salmon escapement goal range is 65,000–120,000 fish. If the run came back as projected, the drainagewide and tributary escapement goals were expected to be achieved with a limited subsistence harvest. The 2022 season was managed in accordance with the *Kuskokwim River Salmon Management Plan* (5 AAC 07.365) with input from the Kuskokwim River Salmon Management Working Group (Working Group). It was the intent of the department to manage all Kuskokwim River salmon stocks in a conservative manner, consistent with the Policy for the Management of Sustainable Salmon Fisheries under 5 AAC 39.222, to meet escapement goals and the subsistence priority.

Preseason management actions that were intended to achieve escapement goals included early season subsistence fishing closures, tributary closures, time and area restrictions, gillnet mesh size and length restrictions, and live-release requirements.

An early season gillnet subsistence fishing closure (i.e., “front-end closure”) began on June 1, from the Yukon Delta National Wildlife Refuge (YDNWR) boundary at the mouth of the Kuskokwim River upriver to the Yukon Delta Refuge boundary at Aniak and upstream of the Yukon Delta Refuge boundary at Aniak beginning June 9. With the closure came additional restrictions, including tributary closures and required live release of Chinook salmon captured in selective gears. During the front-end closure, there were three 16-hour set gillnet opportunities with 6-inch or less mesh. These openings occurred on June 1, 4, and 8.

Between June 1 and July 21, a Federal Special Action (FSA) closed the Kuskokwim River gillnet fishery to non-Federally qualified users within the boundary of the YDNWR (Subsistence Sections 1–3). During the FSA, the United States Fish and Wildlife Service (USFWS) offered 6-inch set gillnet opportunities running concurrently to the 6-inch opportunities offered by the department on June 1, 4, and 8. Additionally, USFWS offered four 12-hour gillnet fishing periods on June 12, 16, 22 and July 9 with 6-inch or less mesh, 25 fathoms in length above the Johnson River mouth and 50 fathoms in length below the Johnson River mouth. USFWS offered two 36-hour set gillnet fishing periods on June 29 and July 3 and two 16-hour set gillnet fishing periods on July 10 and 16. On June 20, USFWS opened those waters between the Kalskag Bluffs to the YDNWR boundary at Aniak to subsistence fishing until further notice with 6-inch or less mesh, 25 fathoms in length gillnets.

Beginning June 12, subsistence sections 4 (from the refuge boundary at Aniak to the Holitna River mouth) and 5 (Holitna River mouth to headwaters) were opened to subsistence fishing until further notice with 6-inch or less mesh, 25 fathoms in length, gillnets. These sections are located outside the YDNWR boundary and not subject to the FSA.

Chum salmon abundance was assessed to be extremely low based on Bethel Test Fishery catches, subsistence harvest reports, and Kuskokwim River Sonar passage, whereas sockeye salmon abundance was estimated to be average to above average. Beginning July 1, the release of chum

salmon captured in fish wheels and beach seines was required throughout Kuskokwim River subsistence sections 4 and 5.

On July 23, when on average 98–100% of the Chinook salmon run, 98–100% of the sockeye salmon run, and 90–97% of the chum salmon run had passed Bethel, the entire Kuskokwim River was opened to subsistence fishing with gillnets and most mainstem gear restrictions were rescinded. The tributary restrictions were kept in place beyond the mainstem restrictions for the purpose of conservation while Chinook and chum salmon were on their spawning grounds.

In late July and early August, inseason assessments indicated that coho salmon escapement goals at the Kwethluk and Kogruklu River weirs would not be met. Given the poor coho salmon run, fishing restrictions and gillnet closures were needed for coho salmon protection. Subsistence fishing was closed in all flowing waters of the Kuskokwim River and its tributaries between August 17 and September 15.

Chinook Salmon

Run and Escapement Summary: The preliminary Kuskokwim River total run estimate is 144,000 Chinook salmon (95% CI = 107,000–194,000 fish), and an estimated 106,000 Chinook salmon (95% CI = 69,000–156,000 fish) escaped Kuskokwim River fisheries, which met the drainagewide SEG range of 65,000–120,000 fish.

All weir-based escapement goals for Chinook salmon assessed in 2022 were met or exceeded within the Kuskokwim River drainage. The established SEG range of 4,800–8,800 fish at Kogruklu River weir was met (5,837 fish), as was the SEG range of 4,100–7,500 fish at the Kwethluk River weir (6,808 fish). The established SEG range of 1,800–3,300 fish at George River was exceeded (4,318 fish). Aerial surveys were not conducted in 2022 due to weather and pilot availability. No salmon assessments occurred in Kuskokwim Bay during 2022.

Harvest Summary: Postseason subsistence harvest surveys are being conducted. An assessment of subsistence salmon harvest in 2022 will not be available until after postseason harvest surveys have been completed, data have been analyzed, and preliminary harvest estimates are produced. Average subsistence Chinook salmon harvest on the Kuskokwim River is 84,000 fish.

Sockeye Salmon

Run and Escapement Summary: Overall, sockeye salmon escapement was mixed throughout the drainage with above-average lake-type sockeye salmon escapement and below-average river-type sockeye salmon escapement. The Kogruklu River weir escapement of 10,278 sockeye salmon met the established SEG range of 4,400–17,000 fish. The Telaquana weir observed the fourth-highest escapement of sockeye salmon since the project was established in 2010 with a count of 153,374 fish. No salmon assessments occurred in Kuskokwim Bay during 2022.

Harvest Summary: Postseason subsistence harvest surveys are being conducted. An assessment of subsistence sockeye salmon harvest in 2022 will not be available until after postseason harvest surveys have been completed, data have been analyzed, and preliminary harvest estimates are produced. Average subsistence sockeye salmon harvest on the Kuskokwim River is 43,000 fish.

Coho Salmon

Run and Escapement Summary: Coho salmon escapement was evaluated at 2 Kuskokwim River weirs in 2022. The Kwethluk River weir coho salmon escapement of 8,702 fish was well below the most recent 10-year average of 38,277 fish and below the established SEG of at least 19,000

fish. The George River weir coho salmon escapement of 9,261 fish was well below the most recent 10-year average of 22,417 fish.

Harvest Summary: Postseason subsistence harvest surveys are being conducted. An assessment of subsistence salmon harvest in 2022 will not be available until after postseason harvest surveys have been completed, data have been analyzed, and preliminary harvest estimates are produced. Average subsistence coho salmon harvest on the Kuskokwim River is 36,000 fish.

Chum Salmon

Run and Escapement Summary: Chum salmon escapements at all weir projects in the Kuskokwim River were well below average. The escapement count of 13,471 fish at the Kogruklu River weir did not meet the established SEG range of 15,000–49,000 fish.

Harvest Summary: Postseason subsistence harvest surveys are being conducted. An assessment of subsistence salmon harvest in 2022 will not be available until after postseason harvest surveys have been completed, data have been analyzed, and preliminary harvest estimates are produced. Average subsistence chum salmon harvest on the Kuskokwim River is 65,000 fish.

Summary by Nick Smith, Area Management Biologist, ADF&G, Anchorage

YUKON AREA

No commercial fishing occurred in the Lower or Upper Yukon Areas during the summer or fall seasons in 2022 (Table 6).

The Yukon River summer season spans from early May through July 15 in District 1. On July 16, management in District 1 transitions to the fall season and becomes focused on fall chum and coho salmon entering the mouth of the Yukon River. However, summer season management continues beyond this date in upper river districts as Chinook and summer chum salmon migration progresses upstream. The subsequent transition of upriver districts to the fall season is based on the migration timing of fall chum salmon.

Summer Season

Chum Salmon

Run and Escapement Summary: Approximately 463,800 summer chum salmon were counted at the Pilot Station sonar (90% CI = 138,989–488,623 fish), which was well below the historical median from years with late run timing (1.6 million fish). Season total counts of summer chum salmon at the Pilot Station sonar were the fourth lowest in all the years of project operations (1995–2022); however, the run was within the preseason forecast of 162,000–542,000 fish.

Three pulses of summer chum salmon were detected at the sonar project; the largest group consisted of approximately 202,000 fish and passed by the sonar between June 25 and July 2. The first quarter point, midpoint, and third quarter point at the Pilot Station sonar were June 27, July 2, and July 12. This indicated the summer chum salmon run was approximately 4 days later than average and the latest on record based on the midpoint at the sonar project.

Three escapement goals exist for summer chum salmon: a drainagewide goal range of 500,000–1,200,000 fish (established in 2016), and goals at the East Fork Andreafsky and the Anvik Rivers. The estimated drainagewide escapement was 483,000 summer chum salmon. The Anvik Sonar

count was 46,440 summer chum salmon, which was well below the goal range of 350,000–700,000 fish and below the historical median of 455,880 fish. Escapement counts at other projects (Henshaw Creek weir, and Chena and Salcha River sonars) were well below the historical medians. The East Fork Andreafsky River weir did not operate due to forest fires and high water; conditions during aerial surveys were poor.

Harvest Summary: No commercial fishing occurred in 2022. Subsistence fishing for chum salmon remained closed all season throughout the Yukon Area; however, a small number of fish were caught in test fisheries or as incidental harvest in nonsalmon gear.

Chinook Salmon

Run and Escapement Summary: The cumulative passage estimate at the Pilot Station sonar was approximately 48,440 Chinook salmon (90% CI = 41,060–55,818 fish). This passage was lowest in all the years of project operations and was below the lower end of the outlook of 99,000–150,000 fish. Most Chinook salmon entered the river in 3 pulses consisting of approximately 12,483 fish, 16,148 fish, and 7,881 fish. However, like in 2020 and 2021, the front end of the run had an unusually long and consistent flow of “tricklers” that lasted for 2 weeks before the more distinctive first pulse arrived. The first quarter point, midpoint, and third quarter point for Chinook salmon at the Pilot Station sonar project took place on June 24, June 28, and July 3. The 2022 Chinook salmon run appears to have been 4 days later than average based on the midpoint at the sonar project.

Most assessment projects operated as normal in 2022. However, the Henshaw Weir was not operated this year due to necessary repairs, and the East Fork Andreafsky weir was not operated due to forest fires early in the season and high water levels preventing weir deployment. Gisasa River weir had high water conditions for part of the season. Chena and Salcha River projects were operated as counting towers due to technical difficulties with the sonar systems. Despite these setbacks, most assessment projects resulted in successful counts for nearly all days of operation. Aerial surveys of the East and West Forks of the Andreafsky River, Anvik River, and Nulato River were conducted under various conditions but very few fish were observed, and counts were well below average.

Passage at the U.S./Canada border was much lower than expected based on the inseason abundance estimate of approximately 21,600 Canada-origin salmon. The preliminary cumulative passage estimate at the Eagle sonar was 12,025 Chinook salmon (90% CI = 11,829–12,221 fish). This passage did not meet the lower end of the interim management escapement goal (IMEG) range of 42,500–55,000 salmon and does not provide the Canadian harvest share as outlined in the Salmon Agreement with Canada. Fishing for Chinook salmon remained closed all season throughout the Yukon Area; however, a small number of fish were caught in test fisheries or as incidental harvest in nonsalmon gear.

Harvest Summary: For the 15th consecutive year, no commercial periods targeting Chinook salmon were allowed in the Yukon Management Area during the summer season.

Fall Season

Fall Chum Salmon

Run and Escapement Summary: In 2022, the preliminary estimate of the drainagewide total run size was 242,500 fall chum salmon. The drainagewide escapement (after preliminary harvest estimates from U.S. and Canada were removed) was estimated to be 240,000 fall chum salmon, which is well below the SEG range of 300,000–600,000 fish. This is the 3rd year in a row the run was less than 300,000 fall chum salmon. Prior to 2020, the previous lowest run occurred in the year 2000.

None of the fall chum salmon escapement goals in Alaska (U.S.) were achieved (drainagewide, Teedriinjik/Chandalar and Delta Rivers) and neither were the treaty obligations with Canada on the upper Porcupine and the mainstem Yukon Rivers. The Teedriinjik (Chandalar River) sonar operated in 2022 and provided an estimated passage of 69,333 fall chum salmon (estimate includes expansion beyond project termination). This level of fall chum salmon escapement in the Teedriinjik river was well below the SEG range of 85,000–234,000 fish. The Delta River, a tributary of the Tanana River drainage, was monitored using replicate ground surveys, providing an escapement estimate of 5,670 fall chum salmon. This level of escapement in the Delta River was the 6th lowest on record (since 1974) and below the SEG range of 7,000–20,000 fish. Escapement in the Delta River has abruptly changed from the large escapements observed from 2013–2019, which averaged 37,000 fall chum salmon and were well above the upper end of the SEG. The Sheenjek River sonar project was reestablished in 2022 providing an estimated passage of 13,957 fall chum salmon. The Sheenjek River was previously monitored from 1974–2012 with an average passage of 96,000 fall chum salmon.

In Canada, the upper Porcupine sonar (downstream of the Yukon Territory community of Old Crow) was operational in 2022 and provided a preliminary estimate of 3,673 fall chum salmon (no goal established for this location). In the Fishing Branch River (headwaters of the Porcupine River), a weir/video/sonar project provided an escapement estimate of 2,695 fall chum salmon. This level of escapement in the Fishing Branch River was the second lowest in history based on monitoring back to 1971 and well below the lower end of the IMEG range of 22,000–49,000 fish. The production in the Fishing Branch River has been noted to be declining when compared to other monitored areas in Alaska and Canada.

The larger component of Canada-origin fall chum salmon stocks pass into Canada via the mainstem Yukon River. The fall chum salmon passage estimate at the mainstem Yukon River sonar project near Eagle was 21,063 fish (SE = 162 fish) for the dates September 1 through October 6. Because of continued passage at the termination of the project, the fall chum salmon estimate was subsequently adjusted to 22,075 fish. The preliminary escapement for the mainstem Yukon River in Canada is derived by subtracting the upstream U.S. and Canadian harvests from the expanded sonar estimate. The preliminary mainstem Yukon River escapement estimate was 22,059 fall chum salmon, which is the lowest on record and the third time in the last 21 years the estimate fell below the IMEG range (70,000–104,000 fish).

Stock composition estimates, provided by USFWS Conservation Genetics Laboratory, were determined using tissue samples (fin clips) collected from chum salmon captured in the mainstem Yukon River sonar test net fishery. Chum salmon genetic samples processed from 4 strata between July 19 and September 7 (fall season) indicated that stocks represented approximately 27% summer fish. Within the fall components, the 3 main stock groupings were 31% Border U.S.

(Teedriinjik/Sheenjok/Draanjik), 10% Canadian, and 59% Tanana. In 2022, the upper Yukon U.S. and the Tanana River stocks were higher, whereas the Canadian component was lower when compared to the 2004–2021 averages (36% Border U.S., 32% Canadian, and 32% Tanana).

Harvest Summary: There was no commercial fishing for salmon in the Yukon Area during the fall season because of poor returns of both fall chum and coho salmon. Subsistence fishing for fall chum salmon remained closed throughout the Yukon Area; however, a small number of fish were caught in test fisheries or as incidental harvest in nonsalmon gear. Subsistence harvest estimates will be available in early 2023.

Coho Salmon

Run and Escapement Summary: There are few coho salmon spawning escapement assessment projects in the Yukon River drainage because of funding limitations and late timing relative to onset of winter. The sonar in the mainstem Yukon River near Pilot Station was operated through September 7 and provided an estimated passage of 92,102 coho salmon (90% CI = 84,602–99,602 fish), which is well below the historical average of 145,400 fish. The Delta Clearwater River has the only established escapement goal for coho salmon, an SEG range of 5,200–17,000 fish. A boat survey conducted on the Delta Clearwater River in early November resulted in an estimated 1,750 coho salmon, which was well below the escapement goal. Escapement count estimates for coho salmon were conducted by aerial surveys in other areas within the Tanana River drainage and all escapements were below their 1974–2021 averages.

Harvest Summary: There was no commercial fishing for salmon in the Yukon Area during the fall season because of poor returns of both fall chum and coho salmon. Subsistence fishing for salmon remained closed for most of the season throughout the Yukon Area. However, a small number of salmon were caught in test fisheries; in selective gear such as dip nets where retention of coho, pink, and sockeye salmon were allowed; or as incidental harvest in nonsalmon gear.

Summary by Deena Jallen and Christy Gleason, Area Management Biologists, and Bonnie Borba, Research Biologist, ADF&G, Fairbanks.

NORTON SOUND AREA

Poor runs of chum and coho salmon in 2022 resulted in low commercial salmon harvest for those species. The pink salmon run was near average; however, limited buyer interest and capacity resulted in pink salmon harvest less than one-third of the 2021 season harvest. Escapement goal ranges were reached for 4 of 5 chum salmon stocks, 2 of 3 coho salmon stocks, and all 3 pink salmon stocks. Escapement goals were not attained for Chinook or sockeye salmon. There were 108 commercial permits fished in 2022, slightly below the recent 5-year (137 permits) and 10-year (133 permits) averages. Total commercial salmon harvests in 2022 were approximately 1,000 sockeye, 13,000 coho, 84,000 pink, and 31,000 chum salmon (Table 6). In addition to the commercial harvest, 29 Chinook, 55 sockeye, 30 coho, 63 pink, and 102 chum salmon commercially harvested were retained for personal use.

Chinook Salmon

Harvest Summary: Commercial fishing targeting Chinook salmon was prohibited during the 2022 season. Although better than last year, the runs remain below historical averages.

Sockeye Salmon

Harvest Summary: Although sockeye salmon harvest accounts for a small portion of the overall harvest in Norton Sound, the 2022 commercial harvest of 1,233 fish, not including personal use, was less than one-half of the record harvests from recent years.

Coho Salmon

Harvest Summary: The 2022 coho salmon harvest of 13,464 fish, not including personal use, was 11% of the recent 5-year average (122,676 fish). Like last year, the average weight of coho salmon (5.7 lb) was the lowest on record.

Pink Salmon

Harvest Summary: The pink salmon run was average, unlike the 5 previous years of record runs in Norton Sound. Limited buyer interest resulted in an odd-numbered year harvest of 84,261 pink salmon in 2022, which does not include fish retained for personal use.

Chum Salmon

Harvest Summary: The 2022 chum salmon harvest of 31,249 fish (not including personal use) was 26% of the recent 5-year average (118,392 fish).

Summary by Kevin Clark, Assistant Area Management Biologist, ADF&G, Nome.

KOTZEBUE SOUND AREA

There were 65 permit holders that commercially harvested fish in the Kotzebue Sound Area in 2022. The highest fishing effort this season occurred on August 12 when 44 permit holders made landings.

Chinook Salmon

Harvest Summary: Fewer than 3 commercial permit holders retained Chinook salmon for personal use in 2022.

Sockeye Salmon

Harvest Summary: Buyers in the Kotzebue Sound Area purchased 6 sockeye salmon in 2022. Permit holders retained 24 sockeye salmon for personal use.

Coho Salmon

Harvest Summary: Permit holders retained 16 coho salmon for personal use in 2022.

Pink Salmon

Harvest Summary: Permit holders retained 95 pink salmon for personal use in 2022.

Chum Salmon

Run and Escapement Summary: No aerial surveys were flown in 2022. The Kobuk River test fish project was ineffective in catching fish because of flooding conditions.

Harvest Summary: The Kotzebue Sound chum salmon harvest of 475,624 fish was the 8th highest harvest in the 61-year history of the fishery and well above the forecast of 100,000–200,000 fish.

Summary by Kevin Clark, Assistant Area Management Biologist, ADF&G, Nome.

Table 6.–2022 Arctic-Yukon-Kuskokwim Region commercial salmon harvests, by fishing area and species, in thousands of fish.

Fishing area	Species					Total
	Chinook	Sockeye	Coho	Pink	Chum	
Kuskokwim River	–	–	–	–	–	–
Kuskokwim Bay	–	–	–	–	–	–
Kuskokwim Area Total	–	–	–	–	–	–
Lower Yukon River	–	–	–	–	–	–
Upper Yukon River	–	–	–	–	–	–
Yukon River Total	–	–	–	–	–	–
Norton Sound ^a	–	1	13	84	31	130
Kotzebue Sound ^a	–	0	–	–	476	476
AYK Region Total	–	1	13	84	507	606

Note: Dashes indicate no harvest, and zeros indicate harvest activity but <500 fish.

Note: Columns may not total exactly due to rounding.

^a Total includes commercial harvest that was discarded, confiscated, seized, or donated.

WESTWARD REGION

KODIAK AREA

The 2022 commercial harvest (not including personal use or ADF&G test fishery) in the Kodiak Management Area (KMA) was approximately 11,000 Chinook salmon, 2.4 million sockeye salmon, 88,000 coho salmon, 15.2 million pink salmon, and 550,000 chum salmon. The total KMA salmon harvest of 18.2 million fish was below both the 2022 forecast and the previous 10-year average of approximately 24.0 million fish.

Commercial fishing effort in 2022 was below average compared to recent years. Of the 586 eligible commercial salmon permits, only 308 (52%) made commercial landings. By gear type, a total of 170 purse seine and 137 set gillnet permit holders made deliveries in 2022. Less than 3 beach seine permits were fished in 2022. Participation rates for purse seine were average (45%), but participation of set gillnet was below average (73%).

Chinook Salmon

Run and Escapement Summary: The total Chinook salmon escapement of 5,532 fish was below the 10-year average of 5,715 fish.

Escapement goals for Chinook salmon have been developed for the Karluk and Ayakulik rivers. The Chinook salmon escapement through the Karluk River weir (2,629 fish) was below the BEG range of 3,000–6,000 fish. Chinook salmon escapement through the Ayakulik River weir (2,845 fish) was below the BEG range of 4,800–8,400 fish.

Harvest Summary: There are no directed Chinook salmon commercial fisheries in the KMA, but incidental commercial harvest occurs during targeted sockeye salmon and pink salmon fisheries. By regulation, nonretention of Chinook salmon was implemented for the purse seine fleet areawide from June 1 through July 5. Due to poor Chinook salmon runs to both the Karluk and Ayakulik Rivers, nonretention of Chinook salmon was extended for the purse seine fleet from July 6 until the end of the season along the Westside of Kodiak from the latitude of Cape Kuliuk to the latitude of Low Cape. The 2022 commercial harvest of Chinook salmon in the KMA totaled 11,409 fish, which was above the 10-year average (10,852 fish) and above the 2022 forecast (7,150 fish).

Sockeye Salmon

Run and Escapement Summary: Sockeye salmon runs in most systems in the KMA were average and all escapement goals for the KMA were achieved in 2022. The KMA estimated sockeye salmon escapement of approximately 1.36 million fish was slightly below the previous 10-year average of 1.44 million fish.

Harvest Summary: The 2022 commercial harvest of sockeye salmon totaled approximately 2.4 million fish. The harvest was below the recent 10-year average (2.5 million fish) and the preseason forecast (3.3 million fish).

Early-season management for much of the Westside of Kodiak Island is driven by Karluk River early-run sockeye salmon. The 2022 Karluk River early run was weak, but escapement was adequate to allow for several weekly fishing periods along much of the westside of Kodiak until the management focus turned to pink salmon (July 6). A total of 320,760 sockeye salmon were harvested in early-season Westside areas based on Karluk River early-run sockeye salmon and the beginning of the pink salmon fishery (June 1–July 15). Westside sockeye salmon numbers include

an estimated contribution of 64,714 sockeye salmon from the enhanced Spiridon Lake sockeye salmon run harvested outside of the Spiridon Bay Special Harvest Area (SHA).

Late-season management for much of the westside of Kodiak is driven by the Kodiak Island pink and chum salmon fishery and the Karluk River late-run sockeye salmon run. Most of the wild pink salmon runs to the westside of Kodiak Island were average, and weekly fishing time was allowed in July and early August. The Karluk River late-run sockeye salmon run was average but a large buildup of sockeye salmon in Karluk Lagoon in mid-August allowed for liberal fishing time in August. However, a very weak coho salmon run to most of the KMA made for only short weekly fishing periods from mid-September through the end of the season. A total of 752,320 sockeye salmon were commercially harvested in late-season westside areas opened based on Karluk River late-run sockeye salmon and westside Kodiak pink and chum salmon abundance. Westside sockeye salmon numbers include an estimated contribution of 83,771 sockeye salmon from the enhanced Spiridon Lake sockeye salmon run, harvested outside of the Spiridon Bay SHA.

The Ayakulik River early-run sockeye salmon run was moderately strong and weekly fishing time was allowed in the Outer Ayakulik Section and Halibut Bay Section of the Southwest Kodiak District during early-run sockeye salmon management. A total of 293,542 sockeye salmon were harvested in areas managed based on abundance of Ayakulik River early-run sockeye salmon.

The Ayakulik River late-run sockeye salmon run and the Ayakulik pink salmon run were also strong and liberal fishing time was allowed in the Outer Ayakulik Section of the Southwest Kodiak District. A total of 254,909 sockeye salmon were harvested in areas managed based on Ayakulik River late-run sockeye salmon. A total of 548,451 sockeye salmon were harvested from Westside sections opened based on abundance of Ayakulik River sockeye salmon.

Upper Station early-run sockeye salmon escapement was again strong and the traditional fishing areas of the Alitak District (i.e., purse seine and set gillnet sections) were open for weekly fishing periods for most of June. The Frazer Lake sockeye salmon escapement was below average, but escapement was adequate to allow for Alitak District early-run sockeye salmon commercial salmon openings through July 15. The Alitak District early-run sockeye salmon harvest was approximately 170,888 fish.

The Upper Station late-run sockeye salmon run was below average. The Alitak District late-run sockeye salmon harvest was 153,392 fish. The total harvest of the Alitak District late-run sockeye salmon was 324,280 fish.

Coho Salmon

Run and Escapement Summary: Although substantial coho salmon runs occur in the KMA, the department no longer has funds to monitor most stocks. The only established coho salmon escapement goals exist in the Northeast Kodiak District and Eastside Kodiak District. Coho salmon runs in many systems in the KMA were strong in 2022. All escapement goals were met except for the American River escapement goal.

Harvest Summary: The commercial coho salmon harvest of 88,293 fish was below the forecast (453,900 fish) and below the previous 10-year average (349,799 fish). A majority of coho salmon were harvested in the Westside Kodiak fishery in August and September.

Pink Salmon

Run and Escapement Summary: The KMA pink salmon escapement of approximately 5.7 million fish was above the previous 10-year average of 5.1 million fish. Pink salmon escapement goals have been established as aggregate goals for the entire Kodiak Archipelago and the Mainland District. The escapement for the Kodiak Archipelago (over 5.1 million fish) was within the escapement goal range of 3,000,000–7,000,000 fish. The Mainland District pink salmon escapement of 579,900 fish was average and within the established escapement goal range (250,000–1,000,000 fish).

Harvest Summary: The 2022 KMA pink salmon harvest of approximately 15.2 million fish was below the forecast (19.1 million fish) and slightly below the previous 10-year average harvest of 15.2 million fish. Pink salmon harvested in the areas managed on KMA wild stocks totaled nearly 11.5 million fish (14.9 million fish forecast).

The Kitoi Bay Hatchery pink salmon run was average with just approximately 3.7 million pink salmon harvested in sections near the hatchery (4.5 million fish forecast). Kitoi-bound pink salmon are probably harvested along the west and east sides of Kodiak and Afognak Islands. Likewise, additional wild stock salmon are likely harvested in areas associated with Kitoi Bay Hatchery. The department does not have a stock separation program for pink salmon and is unable to differentiate between KMA wild and hatchery stocks.

Chum Salmon

Run and Escapement Summary: The overall KMA chum salmon escapement of 307,775 fish was below the previous 10-year average (368,388 fish). Chum salmon runs were weak in many KMA districts. A peak indexed escapement goal based on 17 streams on Kodiak Island has been established; the 2022 peak indexed escapement of 102,300 fish was above the goal of 101,000 fish.

Harvest Summary: Most of the KMA wild chum salmon are harvested during the directed pink and chum salmon fisheries in July. Many of the 2022 KMA chum salmon runs were weak, and closures were necessary to achieve escapement. The 2022 KMA chum salmon harvest of 550,409 fish was well below the forecast (777,500 fish). Additionally, the Kitoi Bay Hatchery chum salmon harvest of 116,429 chum salmon was above the forecast of 96,300 fish.

Summary by James Jackson, Geoff Spalinger, and Todd Anderson, Area Management Biologists, ADF&G, Kodiak.

CHIGNIK AREA

Commercial salmon fishing effort in the Chignik Management Area (CMA) was below average, with only 35 permits participating. Since 2018, the early run of sockeye salmon into the Chignik River watershed has failed to develop, and both the early and late runs failed to develop in 2018 and 2020. The failure of CMA sockeye salmon runs to develop is the major contributing factor to low participation. Prior to 2018, between 50 and 70 permits participated in CMA commercial fisheries on any given year.

The 2022 commercial harvest in the CMA was approximately 4,000 Chinook, 335,000 sockeye, 40,000 coho, 1.0 million pink, and 71,000 chum salmon (Table 7).

On July 11, commercial salmon fishing was allowed in the Eastern, Central, Western, and Perryville Districts for 48 hours to assess the development of incoming sockeye salmon. This initial commercial salmon fishing period was extended, and starting July 13, the Chignik Bay District was opened to commercial salmon fishing as well. Due to a small fleet size, sockeye salmon escapement into the Chignik River system was not significantly reduced, allowing all districts to be continuously extended for the season through midnight of September 16. Harvest effort ceased on August 24 when processors concluded fish purchasing operations.

Chinook Salmon

Run and Escapement Summary: The Chignik River is the only major Chinook salmon-producing stream within the CMA, and one of the largest Chinook salmon streams on the South Alaska Peninsula. The BEG range for Chinook salmon into the Chignik River watershed is 1,300–2,700 fish. The 2022 Chignik River Chinook salmon escapement (above the weir) of 761 fish did not meet the escapement goal and was below recent escapement averages. State subsistence and sport fishery harvest of Chinook salmon will not be known until permits and questionnaires are returned and tabulated.

Harvest Summary: A total of 3,623 Chinook salmon were harvested during the 2022 season, between recent 5- and 10-year averages. Most of the harvest occurred in the Central and Western Districts and Chinook salmon harvest was incidental to fisheries targeting other species. Chinook salmon escapements into the Chignik River system were lowest in recent history throughout the season, resulting in restrictions on commercial salmon harvest opportunities. From July 13 through the end of the commercial salmon fishing season, Chinook salmon 28 inches or greater could not be retained in the commercial salmon fishery.

Sockeye Salmon

Run and Escapement Summary: The Chignik River watershed supports 2 genetically distinct sockeye salmon runs that traditionally provide most directed harvest opportunities within the CMA: an early run and a late run. The early-run starts in May, continues through June, and decreases in July, whereas the late-run of sockeye salmon starts in June, continues through July, and decreases throughout August and into September. The early-run escapement was 412,228 fish and was within the early-run BEG range of 350,000–450,000 fish for the first time since 2017. The late-run estimated escapement of 396,858 fish met the late-run SEG range of 200,000–400,000 fish. Chignik Lake has an inriver run goal of 20,000 sockeye salmon: 10,000 sockeye salmon in August and 10,000 sockeye salmon in September. The inriver run goal is in addition to the SEG range of 200,000–400,000 fish. The inriver run goal was met during 2022 with 116,626 fish escaping upriver in August and 27,292 fish escaping upriver in September.

Harvest Summary: Harvest opportunity targeting sockeye salmon in the CMA is based upon the escapement of both early and late-run sockeye salmon in the Chignik River watershed. Due to the significant overlap of early and late runs of sockeye salmon, management must allow opportunity to harvest surplus fish without jeopardizing either run.

The 2022 Chignik River early-run of sockeye salmon did not develop until early July and no directed sockeye salmon commercial fishing periods were scheduled from June through early July. The 2022 CMA sockeye salmon harvest of 334,644 fish was in line with the recent 5-year average and well below the recent 10- and 20-year average sockeye salmon harvests. Most sockeye salmon

harvest came from the Chignik Bay and Western Districts. Sockeye salmon harvest in the CMA occurred from mid-July through August with the majority occurring within July.

Coho Salmon

Run and Escapement Summary: Coho salmon start to enter CMA drainages in mid-August and generally continue through November. In 2022 the weir ceased operations on September 1 at which point 10,903 coho salmon had passed the weir. Late season coho salmon stream surveys were not conducted in the CMA in 2022 due to staff departure from Chignik.

Due to late season run timing and limited directed effort, escapement goals for coho salmon have not been established in the CMA.

Harvest Summary: A total of 40,099 coho salmon were harvested during the 2022 commercial salmon fishing season. Coho salmon harvest was incidental to efforts targeting sockeye salmon. The most recent 10-year average harvest of coho salmon in the CMA is 93,410 fish.

Pink Salmon

Run and Escapement Summary: The CMA has an even-year areawide aggregate pink salmon escapement goal range of 170,000–280,000 fish. The aggregate pink salmon escapement is the sum of pink salmon escapement into 8 different area streams. In 2022, the aggregate pink salmon escapement was 303,600 fish, which met the SEG range. Escapements into most other CMA streams were monitored via aerial surveys to assess areawide run timing and distribution.

Pink salmon were observed migrating past the Chignik River weir starting in mid-June. Substantial numbers of pink salmon continued to migrate past the weir until September 1 when the weir was removed. The pink salmon escapement should be considered a minimum because runs continue through August and into September. An estimated total of 12,558 pink salmon were observed migrating past the Chignik River weir in 2022.

Chum Salmon

Run and Escapement Summary: Chum salmon escaping into CMA streams were estimated via aerial surveys, except for the Chignik River, which was enumerated using the Chignik River weir. The chum salmon SEG range of 45,000–110,000 fish is based on escapement of 6 total index streams within 4 of the 5 districts. The 2022 estimated total peak chum salmon escapement for the 6 index streams was 73,200 fish, which was above the established SEG.

At the Chignik River weir, a total of 90 chum salmon were observed passing in 2022.

Harvest Summary: A total of 70,886 chum salmon were harvested in the CMA. The harvest of chum salmon was below the recent 10-year average of 141,154 fish. The majority of chum salmon harvest occurred in the Western District. The first day of harvest opportunity occurred on July 11 in the Eastern, Central, Western, and Perryville districts. The last day of fishing occurred on August 24 when processors ceased buying operations.

Summary by Carl Burnside, Area Management Biologist, ADF&G, Kodiak.

ALASKA PENINSULA, ALEUTIAN ISLANDS, AND ATKA-AMLIA ISLANDS AREAS

The 2022 commercial salmon harvest in the Alaska Peninsula, Aleutian Islands, and Atka-Amlia Islands Management areas (Area M) totaled approximately 15,000 Chinook, 8.0 million sockeye, 55,000 coho, 5.8 million pink, and 834,000 chum salmon (Table 7).

Chinook Salmon

Run and Escapement Summary: Nelson River is the only river in Area M with a Chinook salmon escapement goal. At the Nelson River weir, a total of 3,785 Chinook salmon escaped, meeting the escapement goal range of 2,400–5,000 fish. The total Northern District Chinook salmon escapement of 12,174 fish was comparable to the most recent 10-year average of 11,310 fish.

Harvest Summary: On the North Alaska Peninsula, 887 Chinook salmon were harvested, which was below the 10-year average harvest of 1,879 fish. The total commercial harvest for the South Peninsula fishery (including the Southeastern District Mainland [SEDM] from July 26 to October 31) was 14,036 Chinook salmon.

Sockeye Salmon

Run and Escapement Summary: The Orzinski Lake sockeye salmon escapement of 17,283 fish was slightly above the SEG range of 15,000–20,000 fish.

The South Peninsula sockeye salmon escapement of 56,723 fish was within the management objective range of 48,200–86,400 fish. Escapement into Mortensens Lagoon (3,900 fish) was within the SEG range of 3,200–6,400 fish. Escapement into Thin Point Lagoon (17,900 fish) was within the SEG range of 14,000–28,000 fish.

The 2022 sockeye salmon escapement in the Northwestern District was within the escapement objective range of 52,600–106,000 fish, with a total escapement of 62,480 fish.

In the Northern District, the 2022 North Creek escapement estimate of 9,900 sockeye salmon met the escapement goal range of 7,500–10,000 fish.

The Nelson Lagoon Section was open during regularly scheduled weekly fishing periods except when closed early or delayed, allowing for additional escapement. The Nelson (Sapsuk) River total run of 156,499 sockeye salmon (including harvest and escapement) was below the estimated forecast of 285,000 fish. From the total run, 58,499 fish were harvested in Nelson Lagoon and 98,000 fish escaped in the Nelson River. The 2022 escapement met the BEG range of 97,000–219,000 fish.

The Bear River early-run (through July 31) sockeye salmon escapement of 365,699 fish exceeded the escapement goal range of 176,000–293,000 fish. The Bear River late-run (after July 31) sockeye salmon escapement of 151,301 fish exceeded the escapement goal range of 117,000–195,000 fish. The Bear River season sockeye salmon escapement was 561,000 fish, surpassing the combined early- and late-run sockeye salmon escapement goal range of 293,000–488,000 fish.

The Sandy River sockeye salmon escapement of 41,565 fish met the escapement goal range of 34,000–74,000 fish.

The Ilnik River system sockeye salmon escapement through the weir was 110,500 fish, exceeding the Ilnik River escapement goal range of 40,000–60,000 fish.

The McLees Lake sockeye salmon escapement through the weir was 14,015 fish, meeting the sustainable escapement goal of 10,000 sockeye salmon.

Aerial escapement surveys of the Meshik River began on June 21. Subsequent surveys occurred throughout the season and the final sockeye salmon escapement into the Meshik River system was 112,700 fish, exceeding the escapement goal range of 48,000–86,000 fish. This estimate includes escapement into the Meshik River and tributaries, as well as Red Bluff and Yellow Bluff Creeks.

The total Cinder River (including Mud Creek) sockeye salmon escapement estimate of 120,900 fish exceeded the escapement goal range of 36,000–94,000 fish.

Harvest Summary: The total commercial harvest for the South Peninsula fishery (including the SEDM from July 26–October 31) was approximately 4.4 million fish.

On the North Peninsula, approximately 3.6 million sockeye salmon were harvested, which was above the 10-year average of 2.2 million fish.

Coho Salmon

Run and Escapement Summary: There were no coho salmon surveys flown on the South Peninsula streams in 2022. A lack of escapement information for coho salmon is due to the departure of management staff from the South Peninsula region prior to peak coho salmon runs and poor weather conditions preventing aerial surveys from being conducted.

Coho salmon surveys were conducted on most Northern District streams in early September before the peak of the run. Although coho salmon runs continue through September and October, budgetary and logistic constraints do not permit coho salmon surveys to take place later in the fall. Escapement estimates that are tabulated from aerial surveys are considered minimum estimates. The total coho salmon escapement in the Northern District was 191,920 fish. Both the Nelson and Ilnik Rivers have coho salmon lower-bound escapement goals. The Nelson River escapement of 21,500 coho salmon exceeded the lower-bound SEG of 18,000 fish. A total of 34,000 coho salmon were observed during early September in the Ilnik River, exceeding the lower-bound SEG of 9,000 fish. It is expected that more coho salmon entered the Ilnik and Nelson River systems during September and October. Coho salmon escapement into the Cinder River was 35,000 fish, and aerial surveys observed 96,000 fish escaping into the Meshik River system.

Harvest Summary: The total commercial harvest for the South Peninsula fishery (including the SEDM from July 26–October 31) was 46,844 coho salmon. A total of 7,711 coho salmon were harvested in the North Peninsula.

Pink Salmon

Run and Escapement Summary: The South Peninsula pink salmon total indexed escapement of 5.2 million fish was above the SEG range of 1,750,000–4,000,000 million fish.

There are no escapement goals for pink salmon on the North Peninsula. In some years, depending on market conditions, a directed pink salmon fishery may occur; however, this did not happen in 2022. A total of 47,789 pink salmon were observed in the Northern District in 2022, and 31,800 pink salmon were observed in the Northwestern District.

Harvest Summary: The total commercial harvest for the South Peninsula fishery (including the July 26 to October 31 SEDM fishery) was 5.8 million fish. A total of 12,362 pink salmon were commercially harvested in the North Peninsula Area fisheries.

Chum Salmon

Run and Escapement Summary: The South Peninsula chum salmon indexed total escapement of 398,302 fish was within the cumulative district escapement goal range of 218,300–410,600 fish.

In the Northwestern District, the chum salmon escapement of 47,200 fish was below the SEG range of 100,000–215,000 fish.

The Northern District has a districtwide chum salmon escapement goal range of 119,600–239,200 fish. The 2022 escapement estimate of 163,882 fish was just below the lower end of the districtwide escapement goal.

Harvest Summary: The total commercial harvest for the South Peninsula fishery (including the SEDM from July 26 to October 31) was 820,095 fish. During the 2022 commercial chum salmon fishery 14,095 fish were harvested in the North Peninsula.

Summary by Lisa Fox, Matt Keyse, Tyler Lawson, and Charles Russell, Area Management Biologists, ADF&G, Kodiak.

Table 7.—2022 Westward Region commercial salmon harvests, by fishing area and species, in thousands of fish.

Fishing area	Species					Total
	Chinook	Sockeye	Coho	Pink	Chum	
Kodiak ^a	11	2,365	88	15,222	550	18,237
Chignik ^a	4	335	40	1,043	71	1,493
South Peninsula ^{a,b}	14	4,369	47	5,807	820	11,057
North Peninsula	1	3,604	8	12	14	3,639
Alaska Peninsula Total	15	7,973	55	5,819	834	14,696
Westward Region Total	30	10,673	183	22,084	1,455	34,426

Note: Columns may not total exactly due to rounding.

^a Total includes commercial harvest that was discarded, confiscated, seized, or donated.

^b Total includes commercially harvested fish retained for personal use.

SALMON SPECIES CATCH AND PROJECTIONS

Figures 2–6 show actual catch and projected catch for Chinook, sockeye, coho, pink, and chum salmon.

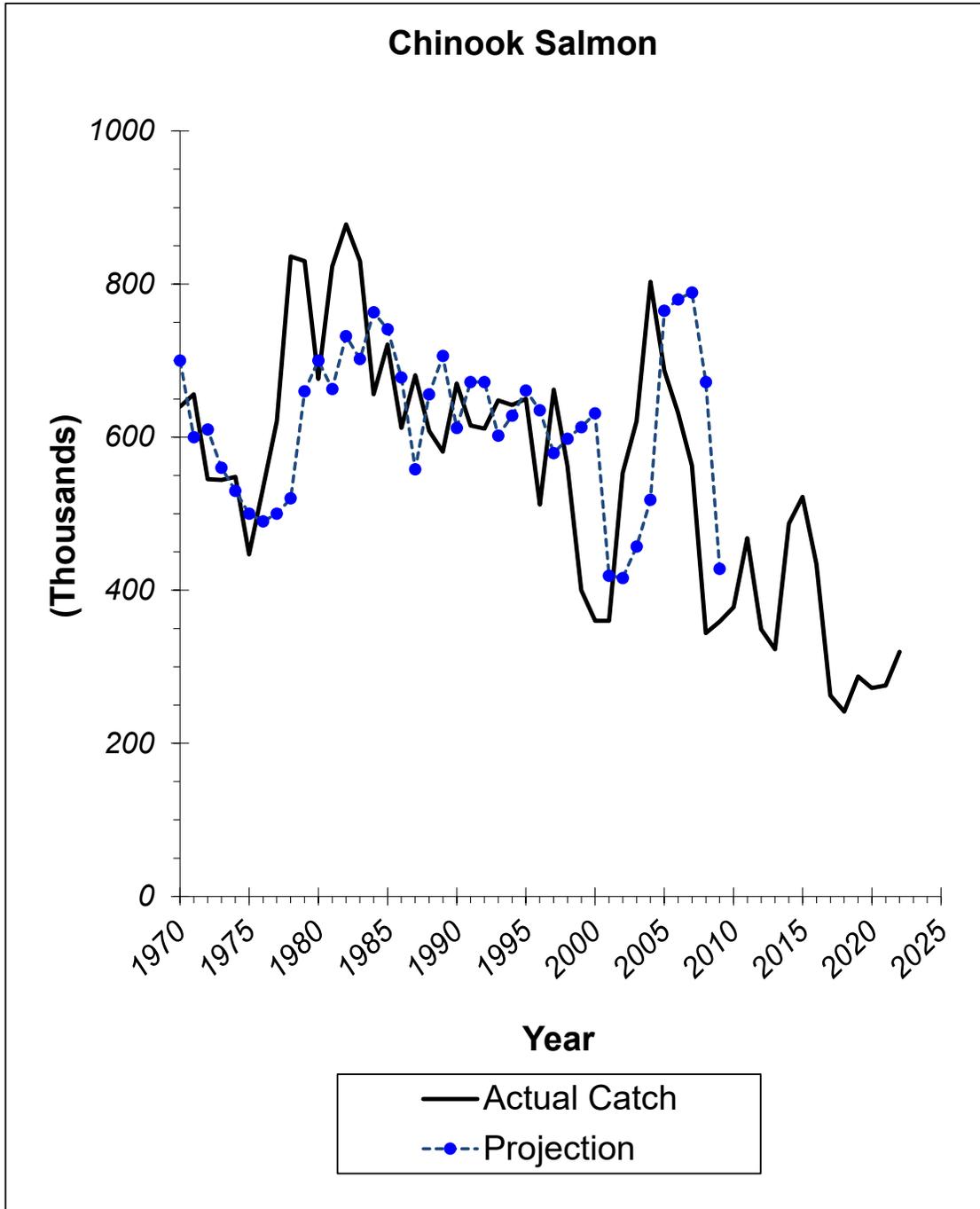


Figure 2.—Relationship between actual catch and projected catch in thousands, for Alaska Chinook salmon fisheries from 1970 to 2022; 2010–2023 projections are not available.

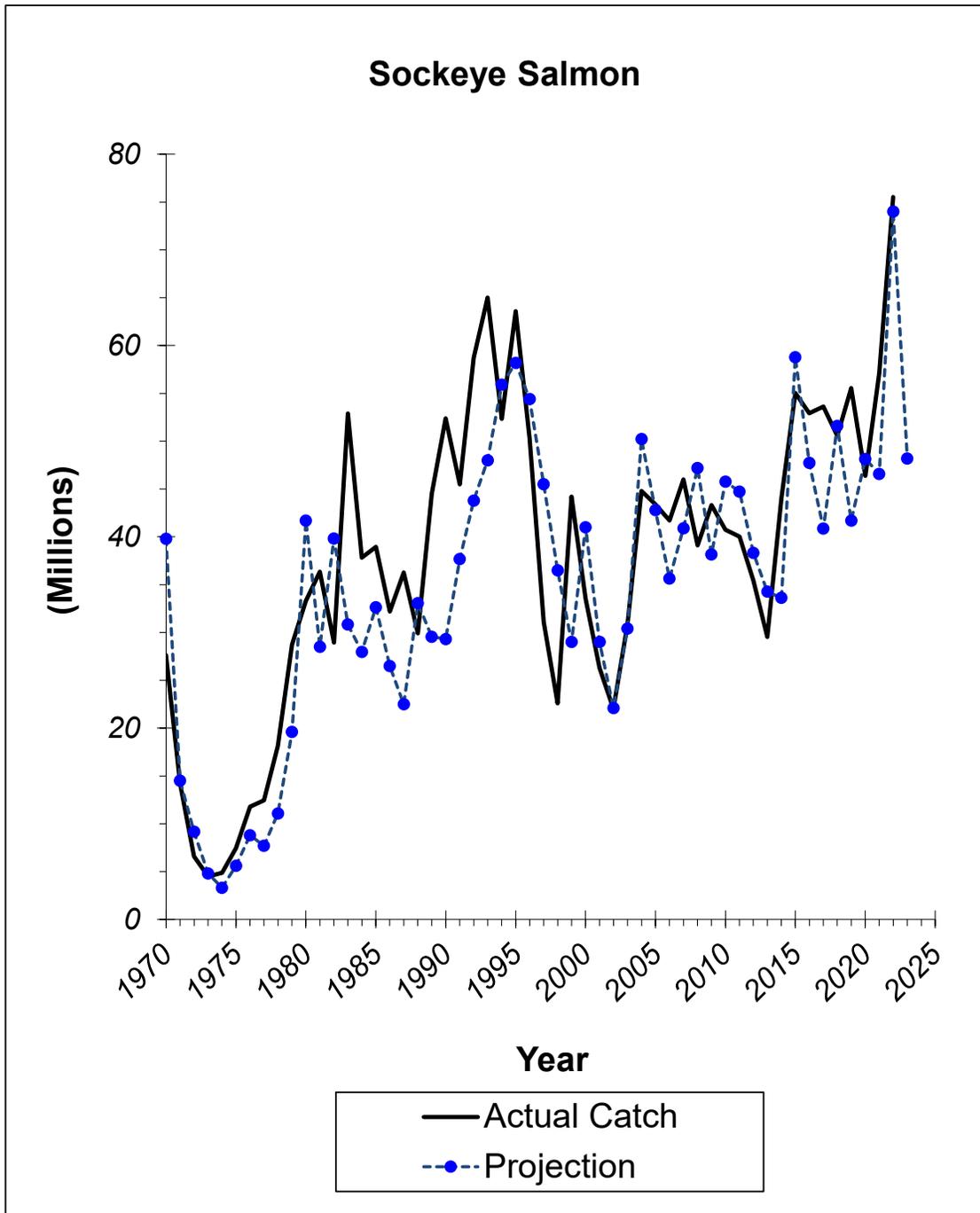


Figure 3.—Relationship between actual catch and projected catch in millions, for Alaska sockeye salmon fisheries from 1970 to 2022, with the 2023 projection.

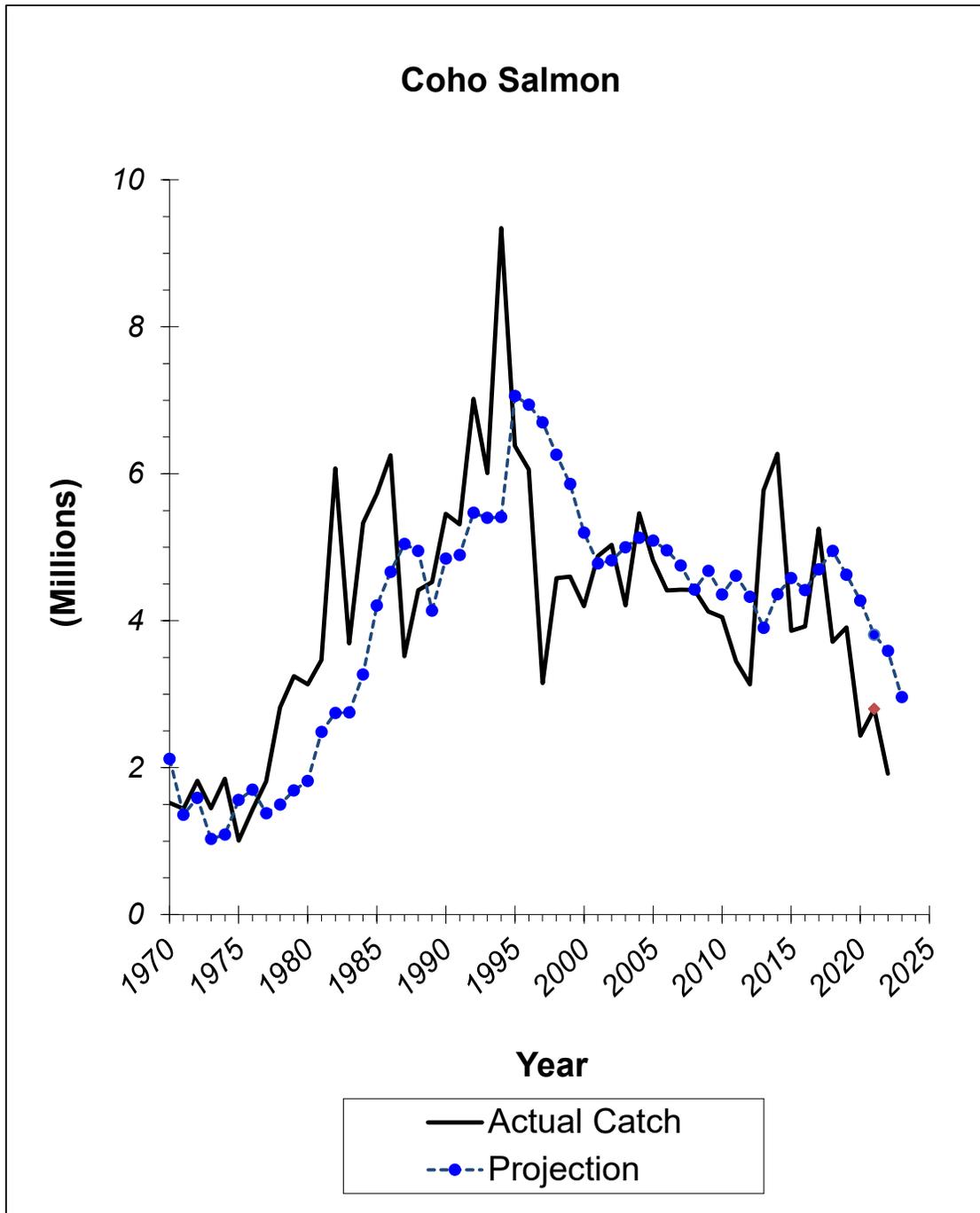


Figure 4.—Relationship between actual catch and projected catch in millions, for Alaska coho salmon fisheries from 1970 to 2022, with the 2023 projection.

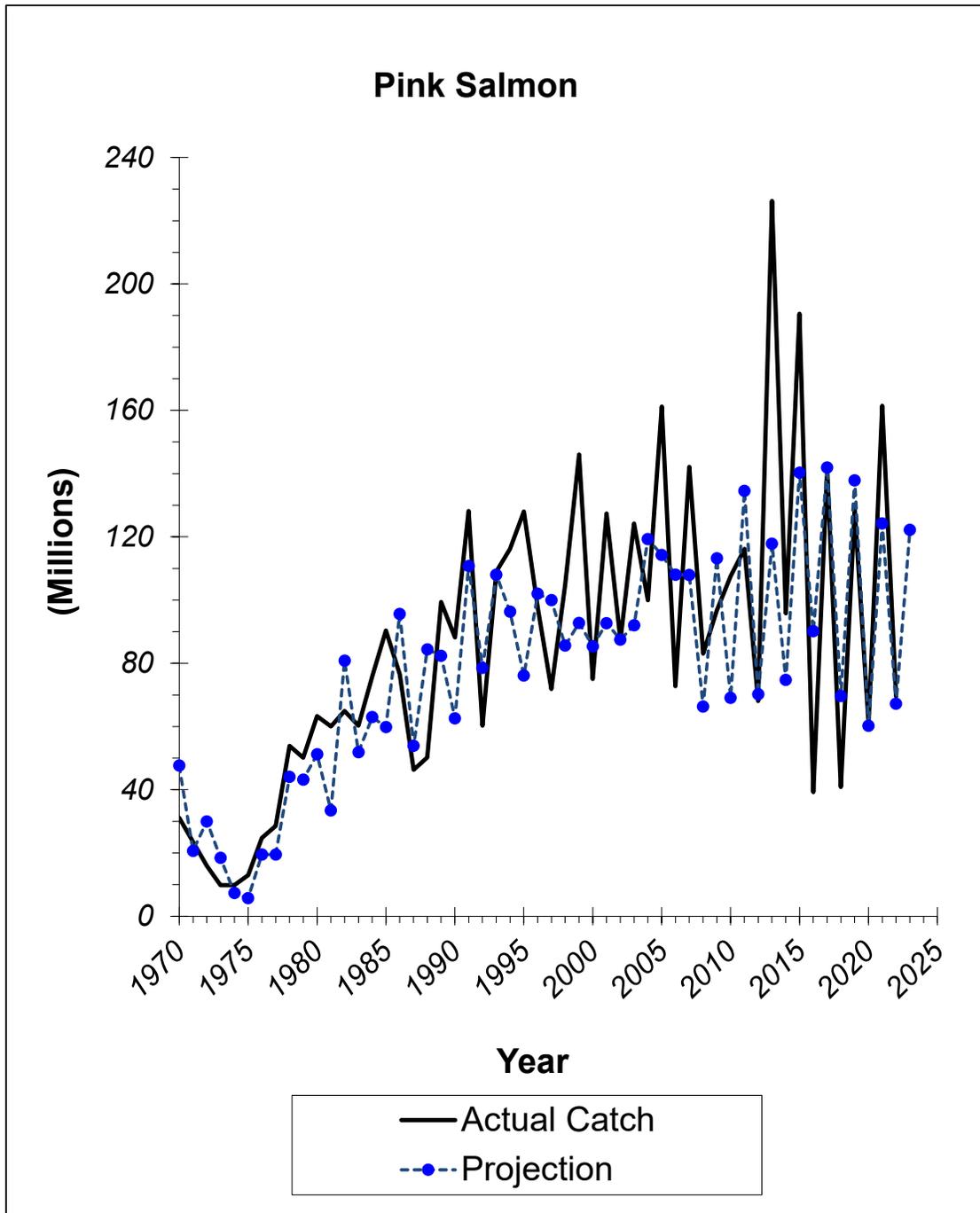


Figure 5.—Relationship between actual catch and projected catch in millions, for Alaska pink salmon fisheries from 1970 to 2022, with the 2023 projection.

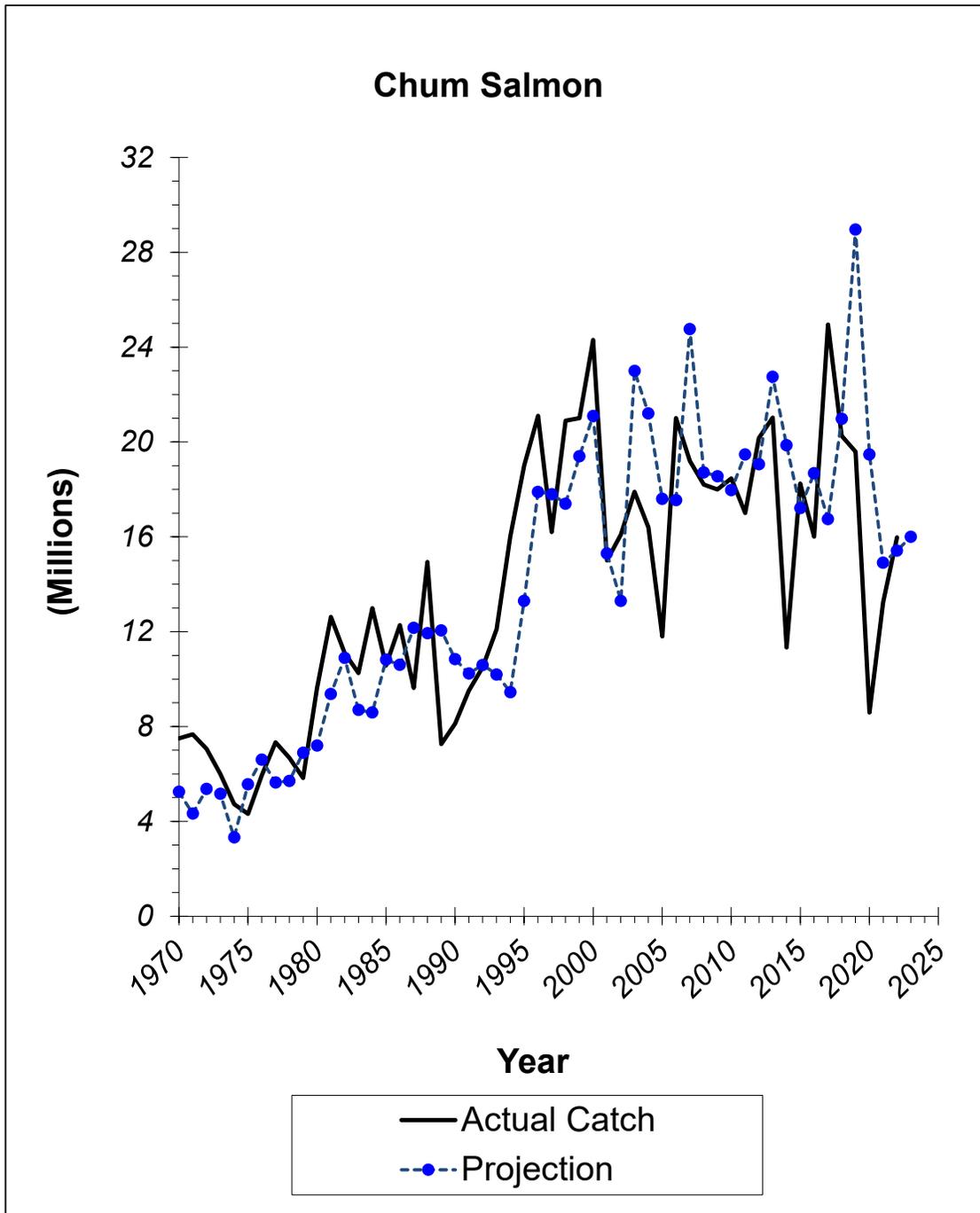


Figure 6.—Relationship between actual catch and projected catch in millions, for Alaska chum salmon fisheries from 1970 to 2022, with the 2023 projection.

PRELIMINARY FORECASTS OF 2023 SALMON RUNS TO SELECTED ALASKA FISHERIES

ADF&G prepares forecasts for salmon runs that affect major fisheries around the state. Salmon runs to be forecasted are selected using several criteria, including economic importance, feasibility, compatibility with existing programs, and management needs (Table 8).

Table 8.—Forecast fisheries for the 2023 fishing year.

Fishing area	Targeted species
Southeast Region	pink salmon
Central Region	
Copper River and Prince William Sound	wild Chinook, sockeye, pink, and chum salmon
Upper Cook Inlet	sockeye salmon
Lower Cook Inlet	pink salmon
Bristol Bay	sockeye salmon
Arctic-Yukon-Kuskokwim Region	
Yukon Management Area	fall chum salmon
Westward Region	
Kodiak Management Area	pink salmon
Ayakulik River	sockeye salmon
Karluk River	sockeye salmon
Alitak District (Frazer Lake and Upper Station)	sockeye salmon
Spiridon Lake	sockeye salmon
Chignik Management Area	sockeye salmon (early and late runs)
Alaska Peninsula/Aleutian Islands	sockeye salmon
Bear Lake	sockeye salmon (late run)
Nelson River	sockeye salmon
South Alaska Peninsula Aggregate	pink salmon

A variety of information is used to forecast salmon runs and associated harvests. The escapement of parental stocks is an important first determinant of future run strength potential; however, other information that might be considered in forecasts includes outmigrating smolt numbers, returns from sibling age classes of the projected return, and environmental conditions. A range of run possibilities are predicted for each forecasted fishery. In general, the actual run can be expected to fall within the range (between the lower and upper limits) less than half the time.

Harvest projections based on quantitative forecasts of salmon runs generally reflect potential harvests and are made for most of the major sockeye salmon fisheries and pink salmon fisheries in SEAK, PWS, Cook Inlet, Kodiak, and the Alaska Peninsula. Forecasts for large hatchery runs including sockeye, pink, and chum salmon runs to the SEAK, PWS, and Kodiak areas are provided by private nonprofit operators. For other fisheries, the harvest projections are made based on harvests levels from previous years and are reflective of fishing effort; thus, harvests are reflective of both market conditions and salmon run strength.

SOUTHEAST REGION

Pink Salmon

The SEAK pink salmon harvest in 2023 is predicted to be in the *weak* range with a point estimate of 19 million fish (80% prediction interval: 12–29 million fish). The categorical ranges of pink salmon harvest in SEAK were formulated from the 20th, 40th, 60th, and 80th percentiles of historical harvest over the 62-year period 1960–2021 (Table 9):

Table 9.–Southeast Region pink salmon harvest categories.

Category	Range (millions)	Percentile
Poor	Less than 11	Less than 20 th
Weak	11 to 19	20 th to 40 th
Average	19 to 34	40 th to 60 th
Strong	34 to 48	60 th to 80 th
Excellent	Greater than 48	Greater than 80 th

Forecast Methods: The NOAA Alaska Fisheries Science Center, Auke Bay Laboratories initiated the Southeast Alaska Coastal Monitoring (SECM) project in 1997 to better understand the effects of climate and nearshore ocean conditions on year-class strength of salmon and ecologically related species (Orsi et al. 2000). Since 2018, the SECM project has been conducted cooperatively by NOAA and ADF&G using the ADF&G research vessel *Medeia*, and the 2 agencies have combined efforts to produce a joint pink salmon harvest forecast using SECM data (Piston et al. 2019). We plan to continue working toward increased coordination between agencies and will continue to look for ways to focus and expand the SECM survey to provide a wide variety of valuable information to the fishing industry.

The 2023 SEAK pink salmon harvest forecast (Figures 7 and 8) was primarily based on juvenile pink salmon abundance indices collected by the SECM project in northern SEAK inside waters. These data were obtained from systematic surface trawl surveys conducted annually in June and July in upper Chatham and Icy Straits and are highly correlated with the harvest of adult pink salmon in the following year (Wertheimer et al. 2011). The 2022 juvenile pink salmon abundance index (natural log monthly peak juvenile CPUE; standardized catch based on 20-minute trawl sets) of 1.45 was the second lowest even-year juvenile index in the 26 years of SECM surveys.

Forecasts were developed using an approach described by Murphy et al. (2019). A multiple regression model was developed using the juvenile pink salmon abundance index and temperature. The model used is:

$$E(y) = \alpha + \beta_1 X_1 + \beta_2 X_2 + \varepsilon$$

where $E(y)$ is the expected value for y , the natural log of SEAK pink salmon harvest; β_1 is the coefficient for the natural log of CPUE +1; β_2 is the coefficient for water temperature; and ε represents the normally distributed error term. The water temperature index was either the May–July upper 20 m integrated water column temperature collected during the SECM survey and averaged into an Icy Strait Temperature Index (ISTI) or one of 16 temporal and geographical combinations of Southeast Alaska satellite sea surface temperature data (Miller et al. 2022). A one-step-ahead mean absolute percent error (MAPE) model performance metric (for the last 5- and 10-year periods) and significant coefficients (i.e., covariates) were used to evaluate and compare the forecast accuracy of the 18 models considered (17 with a temperature variable and one without).

The 80% prediction interval around the forecast was calculated using the *car* package (Fox and Weisberg 2019) in program R version 4.1.2 (R Core Team 2021).¹

Forecast Discussion: The 2023 harvest forecast of 19 million pink salmon is just over half of the recent 10-year average harvest of 33 million pink salmon. A forecast of 19 million pink salmon would be a significant drop from the previous odd-year harvest in 2021 (48.5 million fish) and is only 39% of the average harvest over the past 10 odd years (49 million fish). The 2022 peak June–July juvenile pink salmon index value (1.45) ranked 21st out of the 26 years that SECM information has been collected. Pink salmon harvests associated with juvenile indices below 2.0 have ranged from 8 to 21 million fish (mean = 16 million fish).

Temperature has been included in most historical NOAA pink salmon forecast models and several different measures of temperature have been used since 2004 (Wertheimer et al. 2013). Temperature is a significant negative covariate in the forecast model. The negative linear relationship between temperature and harvest, as well as the positive effect of temperature on pink salmon growth, suggests that temperature may impact forecasts through effects on juvenile distribution and migration (Murphy et al. 2019). In 2020 and 2021, we began exploring the potential use of satellite sea surface temperature data (available from the NOAA National Environmental Satellite data and Information Service²) in forecast models. Satellite data allow for averaging of temperature readings over an almost infinite variety of temporal and geographic units. The ISTI variable used in most recent forecasts incorporates water column temperature to a depth of 20 meters, which may better represent juvenile salmon habitat as they migrate through upper Chatham and Icy Straits. However, this temperature index is spatially restricted to the locations physically sampled during the survey.

Eighteen separate models were considered for the 2023 forecast, 17 of which included a marine water temperature variable (Miller et al. 2022). All models incorporating a temperature variable performed better than the single variable model (CPUE only), which demonstrates the importance of temperature in our forecast model. Although all 17 models incorporating temperature performed relatively well, the top 3 performing models, based on the MAPE model performance metric, all incorporated satellite sea surface temperature data for the month of May in either Icy Strait, Chatham Strait, or for all northern Southeast Alaska inside waters (Miller et al. 2022). Increased model performance when including May temperature suggests that juvenile migration patterns through inside waters, and survival, may already be determined by late spring. The top-performing model was based on juvenile CPUE and satellite sea surface temperature data for northern Southeast Alaska inside waters in May (Figures 9 and 10). Although this model performed better than the standard model incorporating the ISTI that we have used in most recent years, both models produced identical forecast point estimates of 19 million pink salmon for 2023 (Figure 9) with very similar prediction intervals.

The low juvenile abundance index in 2022 was unexpected given generally robust escapements in most of the region in 2021. In southern Southeast Alaska, escapement indices exceeded the upper bound of management targets for 10 of 18 stock groups. The most notable environmental event potentially related to brood year 2021 juvenile salmon survival was a record-setting and extended cold snap that encompassed Southeast Alaska from early December 2021 through early January 2022. Low temperatures at the Juneau airport were in the teens or single digits in all but one day

¹ The R project for statistical computing. <http://www.r-project.org/index.html>.

² <https://www.nesdis.noaa.gov/>

from 12 December 2021 to 9 January 2022, including 3 days near the end of the cold snap that were more than 20°F below normal (minimum -8°F). Similarly, at Ketchikan in the southern part of the region, low temperatures were below freezing from 2 December 2021 to 10 January 2022, and new record lows were set in December. It is possible that this extended period of freezing temperatures in early winter negatively impacted developing embryos, but we do not know for certain what caused the low juvenile abundance in the 2022 SECM survey. Juvenile pink salmon caught in 2022 SECM survey trawls were near average in size (in length) for the 26-year time series and further growth and survival will depend on favorable resources in the Gulf of Alaska.

Despite the uncertainties that surround every salmon forecast, the track record of our pink salmon harvest forecasts has been relatively good (Figure 8), especially considering the difficulties unique to forecasting pink salmon runs (Haeseker et al. 2005). The department will manage the 2023 commercial purse seine fisheries inseason based on the strength of salmon runs. Aerial escapement surveys and fishery performance data will continue, as always, to be essential in making inseason management decisions.

Forecast by Andy Piston, Steve Heintz, Sara Miller, and Rich Brenner, ADF&G; and Wesley Strasburger, Jim Murphy, Emily Fergusson, and Andrew Gray, NOAA, Auke Bay Lab, Alaska Fisheries Science Center.

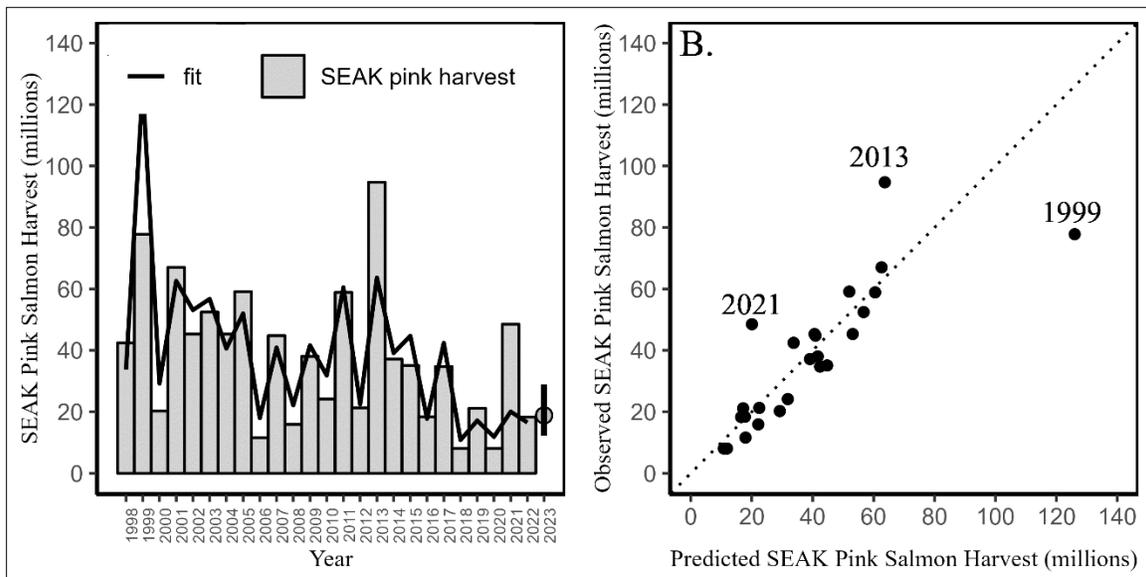


Figure 7.—Forecast model fit (hindcasts) for total Southeast Alaska (SEAK) pink salmon harvest, 1998–2022 by year (A) and by the fitted values (B) for the model based on CPUE and satellite sea surface temperature readings in northern Southeast Alaska inside waters. In panel A, the 2023 forecast is shown as a gray circle with the 80% prediction interval as a black vertical line. The observed SEAK pink salmon harvest is represented by the gray bars and the model fit is shown by the black line. In panel B, the dotted line represents a one-to-one line; circles above the line represent hindcasts that produced a point estimate lower than the actual harvest, and circles below the line represent hindcasts that produced a point estimate higher than the actual harvest.

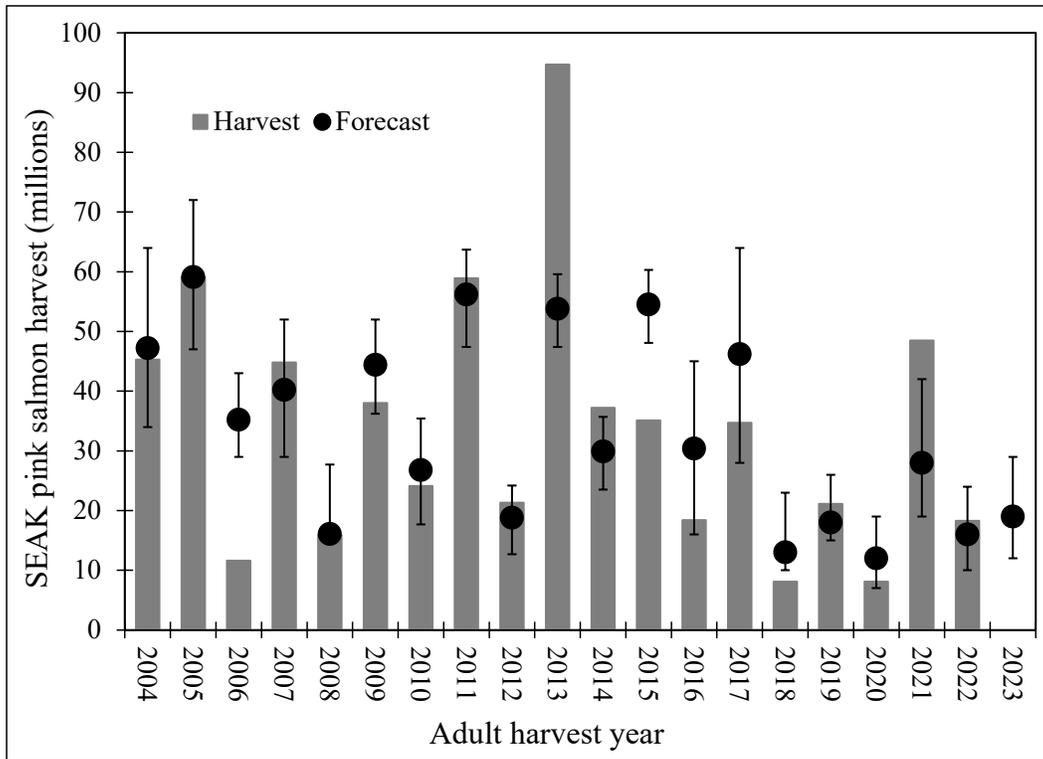


Figure 8.—SECM preseason forecasts compared to the annual SEAK pink salmon harvest, 2004–2023. The error bars represent either 80% confidence or 80% prediction intervals of the forecasts, depending on the modeling method used.

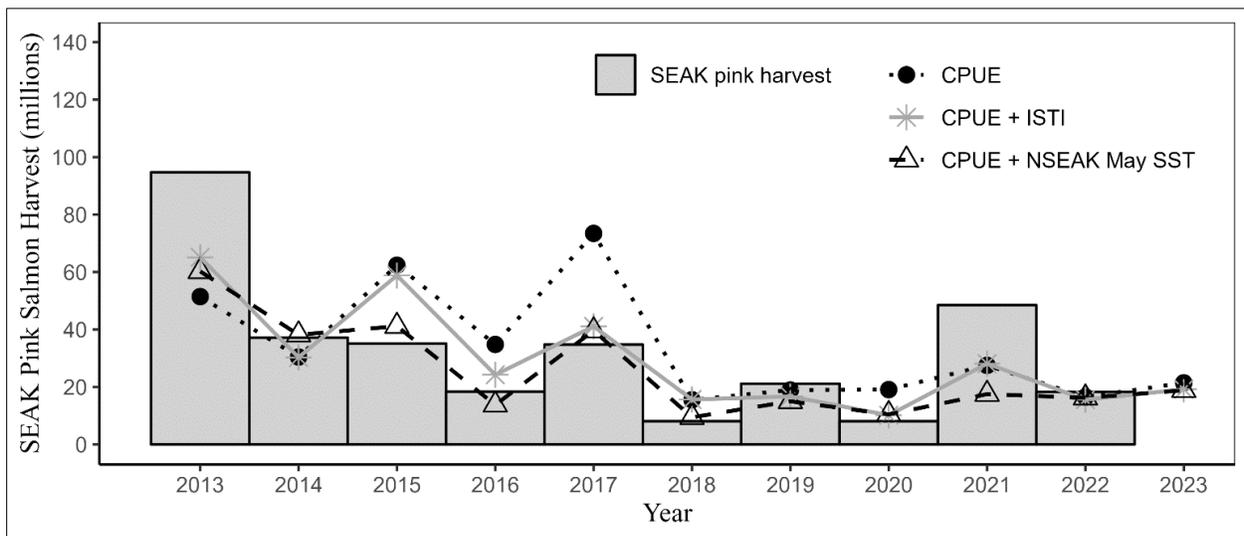


Figure 9.—SEAK pink salmon harvest (millions) by year, 2013–2022, compared to one-step-ahead forecasts for three models: 1) CPUE only model, 2) a model that includes CPUE and the ISTI temperature index, and 3) a model that includes CPUE and a May temperature index based on northern SEAK satellite SST data.

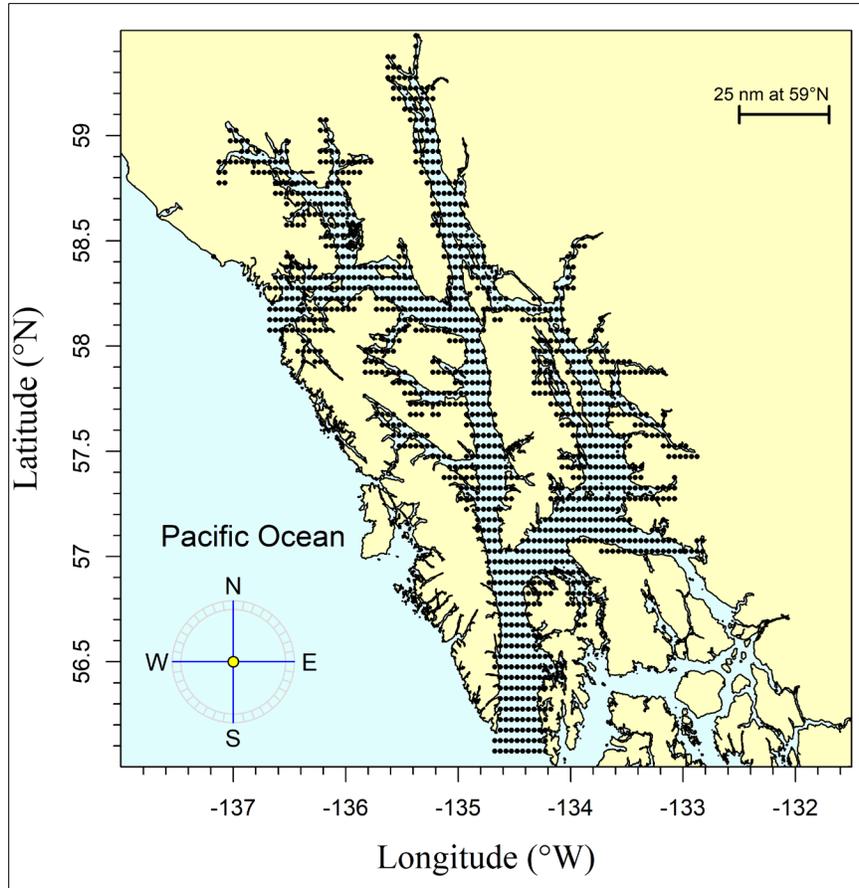


Figure 10.—The northern Southeast Alaska (NSEAK) region encompasses northern Southeast Alaska inside waters from 59.475 to 56.075° north latitude and from -137.175 to -132.825° west longitude. There are 1,344 satellite data points (black circles) in the NSEAK region.

CENTRAL REGION

COPPER RIVER AND PRINCE WILLIAM SOUND

Forecasts of total run were calculated for Copper River Chinook salmon, Copper River wild sockeye salmon, Gulkana Hatchery sockeye salmon, Coghill Lake sockeye salmon, and wild PWS pink and chum salmon (Table 10). PWSAC and VFDA provide additional forecasts for hatchery-specific stocks. Salmon forecasts are inherently uncertain and are primarily used to gauge the general magnitude of expected runs and set early-season harvest management strategy. Categorical ranges of total run strength for forecasts were developed from the 20th, 40th, 60th, and 80th percentiles of historical runs (Table 11). In 2023, the department will continue to manage PWS and Copper River area commercial salmon fisheries inseason based primarily on the strength of salmon abundance indices including sonar counts, weir passage, aerial escapement surveys, and fishery performance data.

Table 10.–2023 Prince William Sound Area salmon run forecast summary (thousands of fish) and percentile category.

Area/run type	Species	Forecast point	Forecast range	% Above/below 10-yr average	Total run 10-yr average	Category
Copper River						
<i>Wild</i>	Chinook salmon	53	38–74	15% Above	46	Average
<i>Wild</i>	Sockeye salmon	1,646	1,017–2,275	9% Below	1,806	Average
<i>Gulkana Hatchery</i>	Sockeye salmon	49	30–68	68% Below	155	Weak
<i>Total Run</i>	Sockeye salmon	1,695	1,047–2,343	14% Below	1,961	Average
Coghill Lake						
<i>Wild</i>	Sockeye salmon	453	357–549	165% Above	171	Excellent
Prince William Sound						
<i>Wild</i>	Pink salmon	20,230	10,420–30,040	26% Above	16,100	Strong
<i>Wild</i>	Chum salmon	389	154–625	17% Below	470	Weak

Table 11.–Copper River and Prince William Sound categorical ranges of total run.

Category	Percentile
Poor	Less than 20th
Weak	20th to 40th
Average	40th to 60th
Strong	60th to 80th
Excellent	Greater than 80th

Copper River Chinook Salmon

The 2023 Copper River Chinook salmon total run forecast point estimate is 53,000 fish (80% prediction interval: 38,000–74,000 fish; Table 12). This is 15% above the recent 10-year average total run of 46,000 fish (Figure 11). The SEG for Copper River Chinook salmon is 21,000–31,000 fish. The categorical ranges of Chinook salmon total run strength were formulated from the 20th, 40th, 60th, and 80th percentiles of historical total runs over the recent 10 years (Table 11).

Forecast Methods: For 2023, the Copper River Chinook salmon state-space model was chosen as the forecast method. This model simultaneously reconstructs runs and fits a spawner-recruit model to estimate total return, escapement, and recruitment of Copper River Chinook salmon from 1999 to 2022. Methods and details of this analysis are covered in separate reports (Joy et al. 2021; Saveriede et al. 2018). The model uses harvest, age composition, and direct measures of inriver run abundance to estimate parameters that describe the spawner-recruit relationship for this stock. Uncertainty from the run reconstruction is passed through to the spawner-recruit analysis and all relevant data are considered and weighted by their precision. The model accommodates missing data, measurement error in the data, and changes in age at maturity.

Several forecast methods were examined for the 2023 Copper River Chinook salmon total run forecast including exponential smoothing; 2-, 3-, and 5-year running averages of total run; and projections from the Copper River Chinook salmon state-space model. The state-space model performed similarly when compared retrospectively to the simple average-based methods historically used to forecast this stock, while using more biological information to predict future

runs (Table 12). The state-space model outperformed the average-based models by having a lower MAPE and mean percentage error (MPE) when compared retrospectively. Total run size in prior years was calculated as the sum of commercial and subsistence harvests of Chinook salmon below Miles Lake, and the mark–recapture point estimate of Chinook salmon inriver abundance. There are currently 24 years (1999–2022) of inriver abundance estimates available for this analysis. The 80% prediction intervals were calculated from the posterior distributions of the model parameters, including the predicted run-size for 2023.

Table 12.–2023 Copper River Chinook salmon forecast model performance summary. Model selected as the run forecast, lowest mean absolute percent error (MAPE), is shaded.

Stock/model	Prediction point estimate	80% prediction interval	MAPE
State-space	53,006	38,113-73,749	31%
Exponential	45,002	29,717-60,287	36%
2-year	40,997	19,120-62,873	38%
3-year	38,354	16,112-60,596	40%
5-year	48,146	27,912-68,380	33%

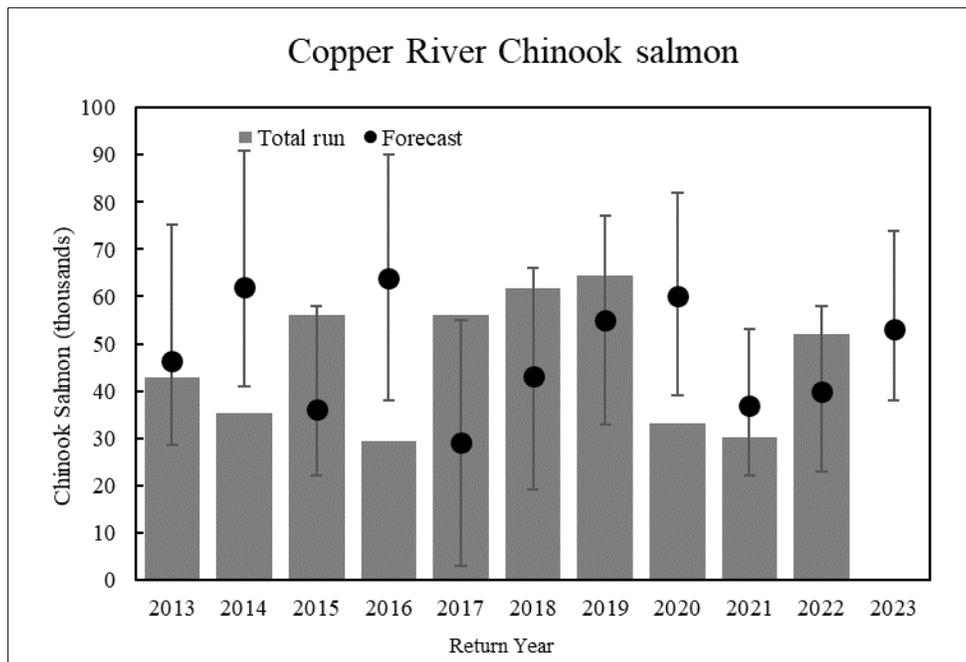


Figure 11.–Total run of Copper River Chinook salmon compared to preseason total run forecasts, 2013–2022, and the 2023 forecast. Error bars represent 80% prediction intervals of forecasts.

Copper River Sockeye Salmon

The 2023 wild Copper River sockeye salmon total run forecast point estimate is 1,646,000 fish (80% prediction interval: 1,017,000–2,275,000 fish). Gulkana Hatchery sockeye salmon total run is predicted to be 49,000 fish (80% prediction interval: 30,000–68,000 fish), for a total Copper River sockeye salmon run (wild + hatchery production) of 1,695,000 fish (80% prediction interval: 1,047,000–2,343,000 fish; Figure 12). This is 14% below the recent 10-year average total run of

1,956,000 fish. Total Copper River sockeye salmon harvest estimate (all fisheries) is predicted to be 1,193,000 fish (80% prediction interval: 826,000–1,560,000 fish) with a commercial harvest of 987,000 fish (80% prediction interval: 620,000–1,354,000 fish). The categorical ranges of sockeye salmon total run strength were formulated from the 20th, 40th, 60th, and 80th percentiles of historical total runs over the recent 10 years (Table 11).

Forecast Methods: The 2023 forecast of wild sockeye salmon to the Copper River is the sum of individual forecasts for 6 age classes. Linear regression models with log-transformed data were used to predict returns for age-1.2, -1.3, -2.2, and -2.3 sockeye salmon. Forecasts of these 4 age classes were developed from the relationship between returns of each age class and returns of the age class one year younger from the same brood year (sibling model; Table 13). The predicted return of age-1.1, and -0.3, sockeye salmon were calculated as the 5-year mean return of these age classes. The 2023 run to Gulkana Hatchery was estimated as the recent 5-year weighted average fry-to-adult survival estimate (0.33%) from all Gulkana I and Gulkana II hatchery releases combined (onsite and remote). The Gulkana Hatchery run was apportioned to brood year using a maturity schedule of 30% age-4 and 70% age-5.

The total harvest point estimate (all fisheries) was calculated by subtracting the Gulkana Hatchery broodstock, hatchery surplus, and wild stock escapement goal needs (upriver and Copper River Delta) from the total run forecast. The commercial harvest estimate was calculated by subtracting Copper River inriver goal categories (5 AAC 24.360 (b)) and the lower bound of the Copper River Delta spawning escapement goal, from the total run forecast. An estimated exploitation rate of 70% was used to project the total harvest of Gulkana Hatchery stocks in 2023. There are currently 58 years (1965–2022) of harvest, escapement, and age composition data available for this analysis. Total run 80% prediction intervals were calculated from the mean squared error (MSE) of the retrospective forecast predictions.

Table 13.—2023 Prince William Sound wild sockeye salmon forecast model summary. Models selected for inclusion in the run forecast (lowest MAPE) are shaded.

Stock/age class	Brood year	Model	Prediction	MAPE
Copper River wild sockeye				
0.3		5-year mean	54,256	
1.1		5-year mean	1,181	
1.2	2019	log 1.2 R/S x BYE	257,301	65%
		log 1.2 x log 1.1	232,376	56%
1.3	2018	1.3 x BYE	1,098,793	50%
		log 1.3R/S x BYE	1,057,191	42%
		log 1.3 x log 1.2	1,189,823	33%
		log 1.3 x log 0.3	995,870	44%
		1.3 x 1.2	1,247,384	47%
2.2	2018	log 2.2 x BYE	26,012	68%
		log 2.2 x log 1.2	30,327	64%
2.3	2017	log 2.3 x log 2.2	138,137	62%
		log 2.3 x log 1.3	90,452	70%
Total			1,646,100	
Coghill Lake sockeye				
1.1		10-year mean	5,686	
1.2	2019	log 1.2 R/S x BYE	29,170	180%
		log 1.2 x log 1.1	3,743	121%
1.3	2018	log R/S 1.3 x BYE	103,059	194%
		log 1.3 x log 1.2	429,149	76%
2.2	2018	10-year mean	8,267	
2.3	2017	10-year mean	6,235	
Total			453,079	

Note: R/S = Return per spawner; BYE = Brood year escapement

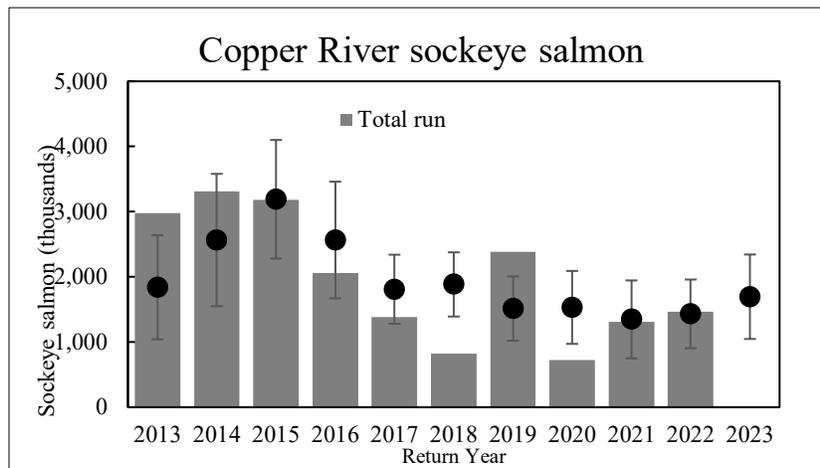


Figure 12.—Total run of Copper River sockeye salmon compared to preseason total run forecasts, 2013–2022, and the 2023 forecast. Error bars represent 80% prediction intervals of forecasts.

Coghill Lake Sockeye Salmon

The 2023 Coghill Lake sockeye salmon total run forecast point estimate is 453,000 fish (80% prediction interval: 357,000–549,000 fish). This is 165% above the 10-year average total run of 171,374 fish (Figure 13). Subtracting the escapement target of 30,000 fish from the total run forecast results in a harvest point estimate (all fisheries) of 423,000 fish (range: 327,100–519,000 fish). The categorical ranges of sockeye salmon total run strength were formulated from the 20th, 40th, 60th, and 80th percentiles of historical total runs over the recent 10 years (Table 11).

Forecast Methods: The 2023 sockeye salmon run forecast to Coghill Lake is the total of estimates for 5 age classes. Linear regression models with log-transformed data were used to predict returns of age-1.3 and -1.2 sockeye salmon (Table 13). These linear regression models were parameterized using the historical relationship between returns of age-1.3 sockeye salmon and returns of age-1.2 fish one year previous and returns of age-1.2 sockeye salmon and returns of the age-1.1 fish one year previous (sibling models). For example, the model chosen to predict the return of age-1.3 sockeye salmon in 2023 used the return of age-1.2 fish in 2022 as the input parameter. An estimated 244,400 age-1.2 sockeye salmon returned to Coghill Lake in 2022, over 4 times the recent 10-year average run of 52,400 age-1.2 fish, resulting in a forecast of 429,100 age-1.3 fish for 2023. This 2022 run component (as illustrated in Table 13) is the primary driver behind the 2023 forecast being more than double the recent 10-year total run average of 171,000 fish. Predicted returns of age-1.1, -2.2, and -2.3 sockeye salmon were calculated as the 2013–2022 mean return of that age class.

Harvest, escapement, and age composition data are available for Coghill Lake sockeye salmon runs since 1962; however, inclusion of escapements prior to the installation of a full weir in 1974 reduce forecast reliability. Therefore, only data collected since 1974 were used. Total run by year was estimated as the total commercial harvest contribution combined with the Coghill River weir escapement count. The 80% prediction intervals for the Coghill Lake sockeye salmon total run were calculated using the squared deviations between the 2018–2022 forecasts and actual runs as the forecast variance.

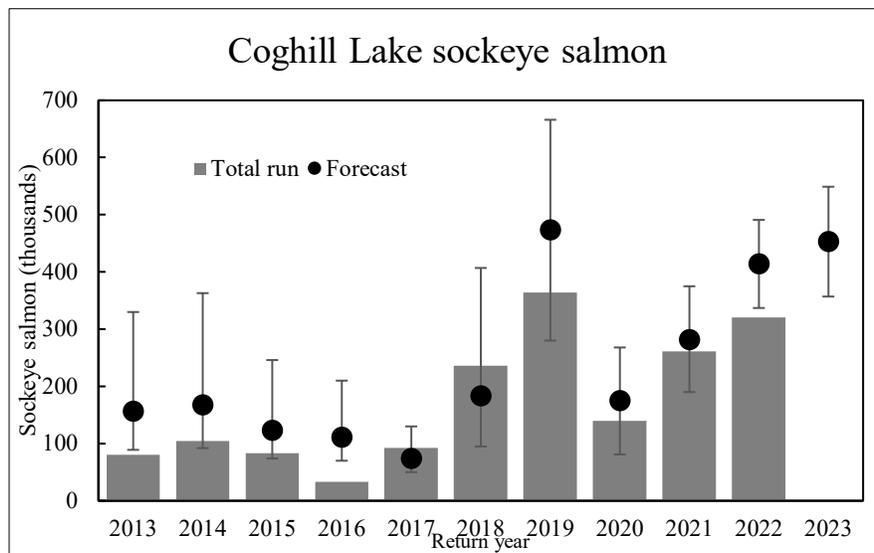


Figure 13.—Total run of Coghill Lake sockeye salmon compared to preseason total run forecasts, 2013–2022, and the 2023 forecast. Error bars represent 80% prediction intervals of forecasts.

PWS Odd-Year Wild Pink Salmon

The 2023 PWS wild pink salmon total run forecast point estimate is 20,230,000 fish (80% prediction interval: 10,420,000–30,040,000 fish). This is 26% above the recent 10 odd-year average (2001–2021) PWS wild pink salmon total run of 16,100,000 fish (Figure 14). Subtracting the midpoint of the odd-year sustainable escapement goal, 1,838,000 fish, from the total run forecast results in a harvest point estimate of 18,392,000 fish (range: 8,582,000 to 28,202,000 fish).

Forecast Methods: Several models were examined for the 2023 PWS wild pink salmon total run forecast including exponential smoothing and 2-, 3-, and 5-year running averages of past even-year total runs. The 2-year running average forecast was selected for 2023 because it outperformed other forecast models by having the lowest MAPE and median symmetrical accuracy (Table 14). The 80% prediction intervals were calculated from the MSE of the retrospective forecast predictions.

Total wild run of pink salmon by year was estimated as the total wild (non-hatchery) contribution to commercial harvests combined with stream escapement indices. The stream escapement index is calculated as the area under the curve of weekly aerial escapement surveys adjusted for estimates of stream life. Hatchery and wild stock contributions were determined from thermal marked otolith recoveries (1997–2022), coded wire tag recoveries (1985–1996), or average fry-to-adult survival estimates multiplied by fry release numbers and estimated exploitation rates (1977–1984).

Table 14.–2023 Prince William Sound wild pink and chum salmon forecast model performance summary. Models selected as the run forecast (lowest MAPE) are shaded.

Run	Prediction	MAPE
PWS wild pink		
Exponential	19,350,000	75%
2-year	20,230,000	72%
3-year	19,940,000	78%
5-year	22,610,000	97%
PWS wild chum		
Exponential	450,724	36%
2-year	389,105	30%
3-year	356,897	32%
5-year	455,668	35%

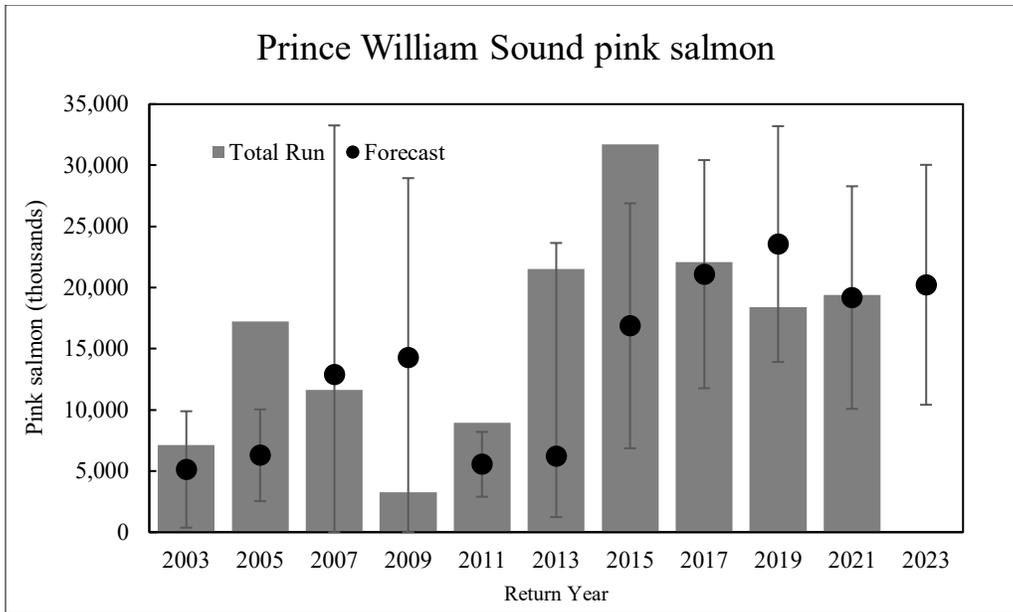


Figure 14.—Total run of Prince William Sound wild pink salmon compared to pre-season total run forecasts, 2013–2022, and the 2023 forecast. Error bars represent 80% prediction intervals of forecasts.

PWS Wild Chum Salmon

The 2023 PWS wild chum salmon total run forecast point estimate is 389,000 fish (80% prediction interval: 154,000–625,000 fish). This is 17% below the recent 10-year average PWS wild chum salmon total run of 470,000 fish. Subtracting the 10-year average escapement, 169,000 fish, from the total run forecast results in a harvest point estimate of 220,000 fish (range: 0–405,000 fish; Figure 15). The categorical ranges of chum salmon total run strength were formulated from the 20th, 40th, 60th, and 80th percentiles over the recent 10 years (Table 11).

Forecast Methods: The 2023 PWS wild chum salmon total run forecast uses the 2-year running average method. Several models were examined for the 2023 PWS wild chum total run forecast including exponential smoothing and 2-, 3-, and 5-year running averages of past total runs (Table 14). For 2023, 2-year running average outperformed the other models by having the lowest MAPE, mean absolute squared error (MASE) and median symmetrical accuracy. The 80% prediction intervals were calculated from the MSE of the retrospective forecast predictions.

Total wild run of chum salmon by year was estimated as the total wild (non-hatchery) contribution to commercial harvests combined with the stream escapement index. The stream escapement index is calculated as the area under the curve of weekly aerial escapement surveys adjusted for estimates of stream life. Hatchery and wild stock contributions were estimated using pre-hatchery average natural runs (1998–2003) or thermally marked otolith estimates (2004–2022) for each district in PWS.

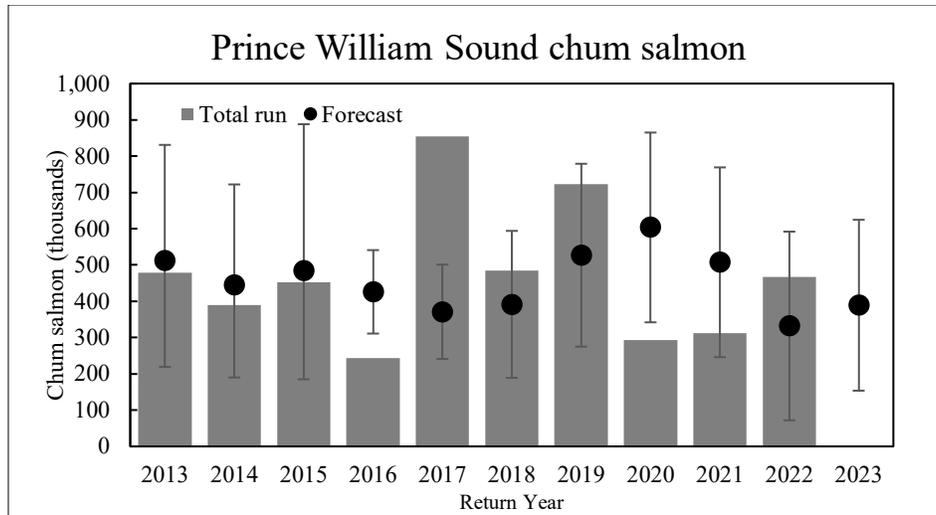


Figure 15.—Total run of Prince William Sound wild chum salmon compared to preseason total run forecasts, 2013–2022, and the 2023 forecast. Error bars represent 80% prediction intervals of forecasts.

Forecast by Jenni Morella, Area Finfish Research Biologist, ADF&G, Cordova.

UPPER COOK INLET

Sockeye Salmon

The UCI sockeye salmon total run forecast of 5.12 million fish (Table 15, Figure 16) is predicted to be average. The categorical ranges of sockeye salmon total run strength were developed from the 20th, 40th, 60th, and 80th percentiles of historical runs (Table 16). Fisheries salmon forecasts are inherently uncertain and are primarily used to gauge the general magnitude of expected runs and guide early-season management strategies.

Table 15.—2023 Upper Cook Inlet sockeye salmon run and harvests.

	Forecast Estimate (millions)	Forecast Range (millions)
TOTAL PRODUCTION:		
Total run	5.12	3.70–6.54
Escapement	2.00	
Available harvest	3.12	

Table 16.—Categorical ranges of Upper Cook Inlet sockeye salmon runs.

Category	Range (million)	Percentile
Poor	Less than 2.0	Less than 20th
Weak	2.0 to 4.0	20th to 40th
Average	4.0 to 6.0	40th to 60th
Strong	6.0 to 8.0	60th to 80th
Excellent	Greater than 8.0	Greater than 80th

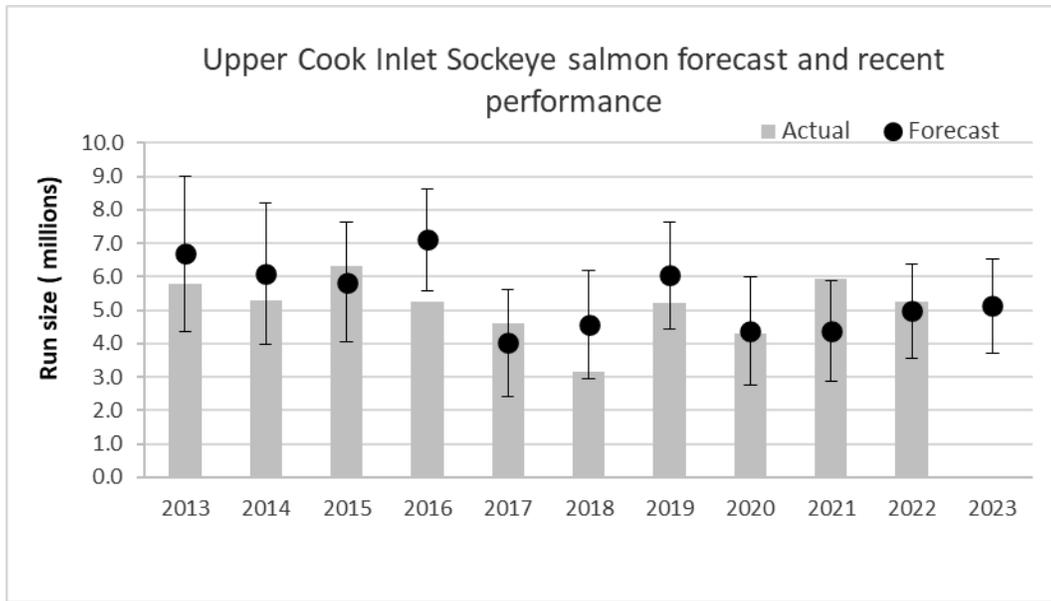


Figure 16.—Actual observed total run of sockeye salmon in Upper Cook Inlet compared to preseason total run forecasts, 2013–2022 and 2023 forecast. Error bars represent 80% confidence intervals of forecasts.

Forecast Methods: The major sockeye salmon systems in UCI are the Kenai, Kasilof, and Susitna Rivers, and Fish Creek. Available escapement (spawner abundance), return, sibling, fry, and smolt data were examined for Kenai and Kasilof River systems. Four model types were evaluated to forecast the total run of sockeye salmon to UCI in 2023: (1) brood-year spawners, (2) emigrating smolt, (3) fall fry, and (4) sibling returns. These forecast models were evaluated for the Kenai and Kasilof River age classes. Models that provided the smallest MAPE between the forecasts and actual runs over the past 10 years were selected for the 2023 forecast (Table 17).

The 2023 sockeye salmon forecasts for Fish Creek and the Susitna River were estimated from recent 5-year averages.

The sockeye salmon forecast for unmonitored systems in UCI was estimated as 17% of the aggregate forecast for the 4 monitored stocks. Unmonitored stocks include Crescent River, Big River, McArthur River, Chilligan River, Coal Creek, Cottonwood Creek, Wasilla Creek, Eagle River, and many other smaller systems in the area. The fraction of the total run destined for unmonitored systems was calculated using genetic estimates of the stock composition of offshore test fishery harvests.

The estimated available harvest of sockeye salmon to all user groups was calculated by subtracting the aggregate escapement from the total run forecast for all stocks. Aggregate escapement was estimated as the sum of the midpoints of the escapement goal ranges for each of the monitored sockeye salmon-producing systems and the escapement into unmonitored systems.

Forecast Discussion: In 2023, a run of approximately 5.12 million sockeye salmon is forecast to return to UCI with an estimate of 3.12 million fish available for harvest (commercial, sport, personal use, subsistence; Table 15). Based on the absolute percentage error (APE) for the recent 10-year forecasted UCI runs compared with the estimated runs, there is an 80% probability that the 2023 UCI forecast range falls between 3.70 million and 6.54 million fish (Table 15). This UCI forecast is average compared to historical total run estimates from 1986 to

present. The UCI preseason forecast has overestimated the total run by an average of 8% over the past 10 years with a range of -45% to 27% (Figure 16).

The Kenai River forecast of 2.82 million sockeye salmon is 765,000 less (21%) than the historical (1986–2022) average run of 3.59 million fish, but 300,000 less than the 5-year average of 3.12 million fish; Figure 17). The Kenai River preseason forecast has overestimated the total run by an average of 8% over the past 10 years with a range of -50% to 39%.

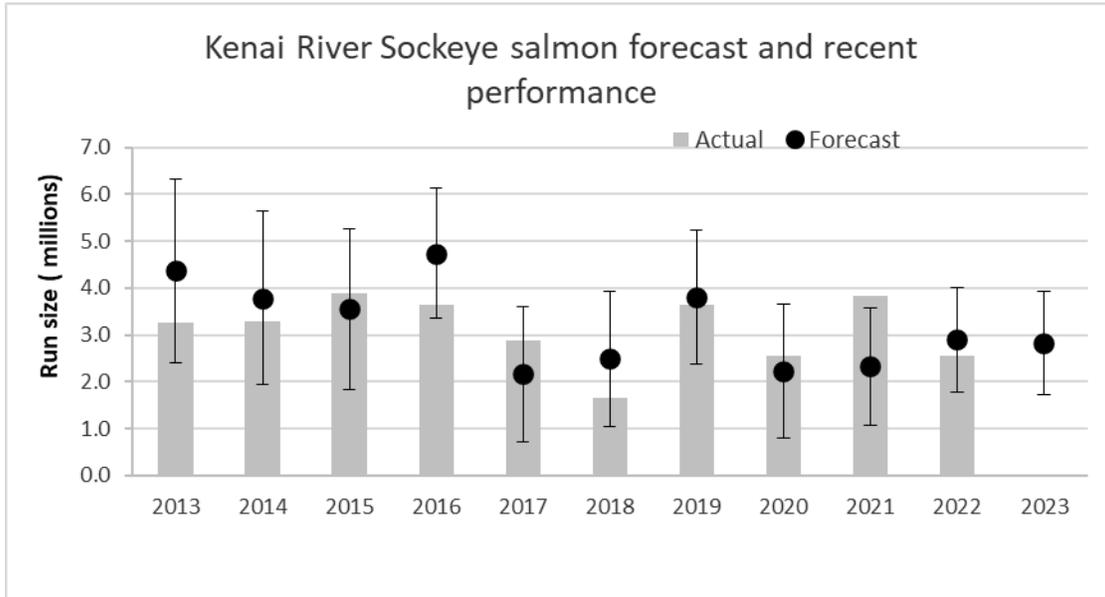


Figure 17.—Actual observed total run of Kenai River sockeye salmon compared to preseason total run forecasts, 2013–2022 and 2023 forecast. Error bars represent 80% confidence intervals of forecasts.

The Kasilof River sockeye salmon run forecast is approximately 1,126,000 fish (Figure 18). The Kasilof River preseason forecast has overestimated the total run by an average of 1% over the past 5 years with a range of -31% to 44%. The 2023 forecast is 180,000 fish greater (19%) than the historical (1986–2022) average but is 160,000 fish greater (17%) than the recent 10-year average.

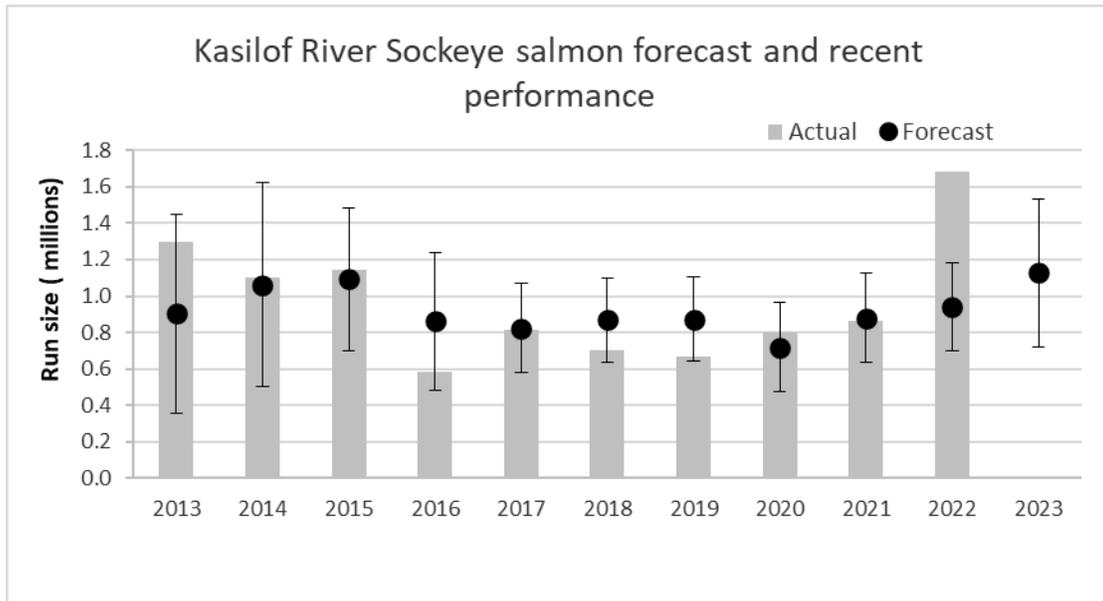


Figure 18.—Actual observed total run of Kasilof River sockeye salmon compared to preseason total run forecasts, 2013–2022 and 2023 forecast. Error bars represent 80% confidence intervals of forecasts.

Table 17.—2023 UCI forecast model, prediction, and 10-year mean absolute percent error (MAPE). Boxes indicate values chosen for inclusion in the 2023 preseason forecast.

River	Age class	Model	Prediction	10-year MAPE
Kenai	1.2	Log R vs Log S	428,846	0.452
		Standard Ricker	377,781	0.440
		Exponential smoothing	415,776	0.496
		Moving average	411,677	0.452
	1.3	Log R = Log Fry CFSWT	1,338,224	0.311
		Log Sibling	2,653,114	0.310
		Exponential smoothing	2,026,445	0.466
		Moving average	1,960,312	0.414
	2.2	Log R vs Log S	194,921	0.761
		Log Sibling	268,679	0.685
		Log Sibling AR1	210,832	0.569
		Exponential smoothing	129,924	0.912
		Moving average	155,041	0.959
	2.3	Log Fry AR1	485,315	2.437
		Log Sibling	236,888	0.863
		Sibling	353,636	1.312
		Exponential smoothing	476,913	3.193
		Moving average	542,950	3.575
	ALL	2023 Forecast	2,821,170	
	Kasilof	1.2	Log R vs Log S	316,692
Log R vs Log S AR1			568,142	0.387
Log Sibling			245,443	0.400
Exponential smoothing			854,237	0.388
Moving average			752,663	0.449
1.3		Log Sibling	562,376	0.580
		Log R vs Log Smolt	300,197	0.625
		Exponential smoothing	235,027	0.599
		Moving average	208,402	0.591
2.2		Log R vs Log S	250,346	1.025
		Log R vs Log S AR1	256,877	0.637
		Sibling AR1	129,100	0.534
		Log Sibling	177,225	0.435
		Log Sibling AR1	166,305	0.527
		Exponential smoothing	163,140	0.582
		Moving average	147,991	0.587
2.3		Sibling	85,837	5.367
		Sibling AR1	66,673	5.367
		Log Sibling	19,602	4.703
		Log Sibling vs Log Smolt	70,170	2.195
		Exponential smoothing	17,465	4.057
		Moving average	15,068	4.086
ALL		2023 Forecast	1,126,462	

Note: Average (1,995,669) of models was used to forecast age-1.3 Kenai River sockeye salmon.

The Susitna River sockeye salmon run 2023 forecast is 340,000 fish, which is the recent 5-year average run.

The Fish Creek sockeye salmon run forecast for 2023 is 90,000 fish. The 2023 forecast is the 5-year average run from 2016–2020. The years 2021 and 2022 were excluded from this analysis because the weir was not operated for the entire run.

Other Salmon Species

Forecast Methods: The recent 5-year average commercial harvest was used to forecast the harvest of chum and coho salmon for 2023 (Table 18). The forecast for pink salmon is based upon the average harvest during the previous 5 even-numbered years.

Table 18.—The forecast of the 2023 Upper Cook Inlet commercial harvest of other salmon species.

	Commercial harvest forecasts
Pink salmon	83,000
Chum salmon	89,000
Coho salmon	157,000

Forecast Discussion: The recent 5-year average commercial harvest was used to develop the 2023 the forecast, because harvests in these years probably best represent harvests under current regulations.

Forecast by Jack Erickson, ADF&G, Division of Commercial Fisheries, Anchorage and Colton Lipka, ADF&G, Division of Commercial Fisheries, Soldotna.

LOWER COOK INLET

Pink Salmon

The LCI wild pink salmon harvest in 2023 is predicted to be *excellent* (Table 19), with a point estimate of 1,801 thousand fish and a range of 412–3,189 thousand fish (80% confidence interval). The categorical ranges of wild pink salmon harvest were formulated from the 20th, 40th, 60th, and 80th percentiles of historical harvests over the 63-year period 1960–2022 (Table 19). Since adopting new forecast methods in 2018, the point forecasts have, on average, overforecast the harvest by 6%. However, estimates have ranged from 88% below the observed harvest in 2020 to 238% above the observed harvest in 2022 (Figure 19), highlighting the uncertainties that surround all salmon forecasts (Adkison and Peterman 2000) and pink salmon in particular (Adkison 2002, Haeseker et al. 2005).

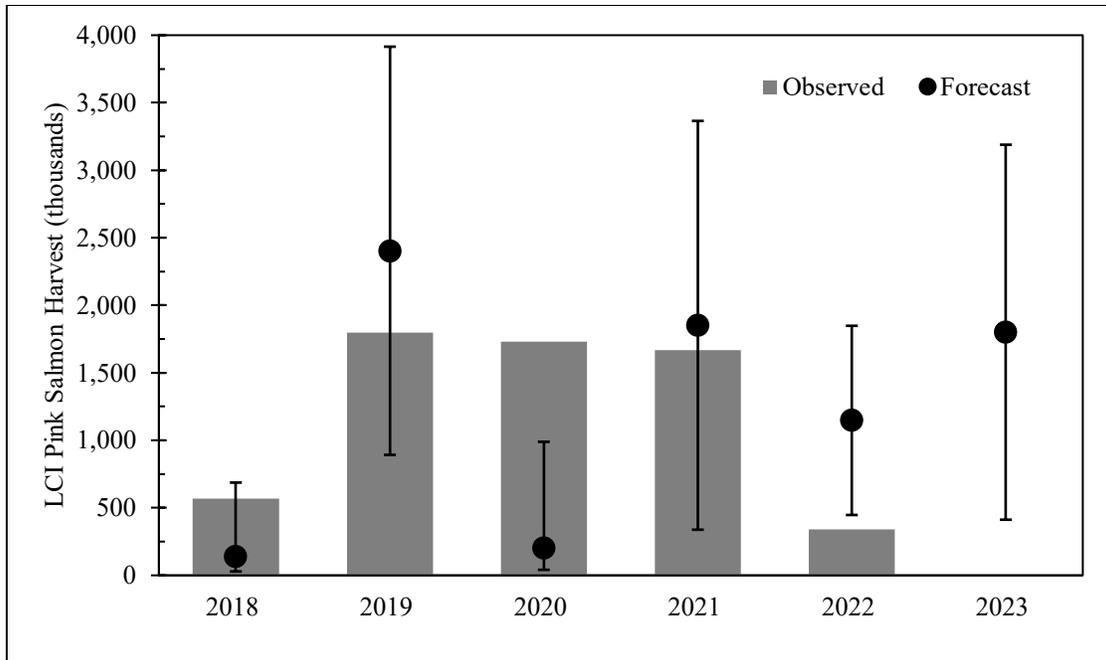


Figure 19.—Annual observed commercial harvest of wild pink salmon in LCI compared to preseason harvest forecasts, 2018–2023. Error bars represent 80% confidence intervals of forecasts.

Table 19.—Categorical ranges of pink salmon commercial harvest (wild run only) and this year’s forecast in bold.

LCI harvest category	Range (thousands)	Percentile
Poor	Less than 200	Less than 20th
Weak	200 to 360	20th to 40th
Average	360 to 990	40th to 60th
Strong	990 to 1,670	60th to 80th
Excellent	Greater than 1,670	Greater than 80th

Forecast Methods: A naive forecast based on historical odd-year pink salmon harvests (1961–2021) was used to predict the 2023 pink salmon CCPF harvest in LCI. Several trend forecast models were evaluated to determine which best fit the data, including exponential smoothing and 2-, 3-, and 5-year running averages of past odd-year CCPF harvests. Exponential smoothing and running average models using log-transformed and non-logged data inputs produced point forecasts ranging from 1,732–2,344 thousand fish. The exponential smoothing model using odd-year non-logged data inputs outperformed the other models based on comparison of several performance metrics (e.g., bias, mean percent error [MPE], and MAPE). The 80% confidence intervals were calculated from the MSE of the retrospective forecast predictions.

Forecast Discussion: The 2023 wild harvest forecast of 1,801 thousand pink salmon has a forecast range of 412–3,189 thousand fish. If realized, a harvest of 1,801 thousand pink salmon would be approximately 33% lower than the recent 5-year average CCPF harvest of 2,344 thousand fish for odd-year runs between 2013 and 2021.

Prior to 2018, the odd-year LCI pink salmon forecast consisted of a wild stock total run forecast based on a logarithmic regression of total run and escapement from over 50 years of observations on 10 index streams, and a hatchery production forecast provided by CIAA. However, preliminary results from otolith sampling in LCI during 2014–2021 suggest high proportions of hatchery-marked fish in the harvest and escapement samples collected from some index streams may confound the viability of spawner-recruit based run forecasts. Consequently, the decision was made to produce a CCPF harvest forecast in lieu of the total run forecast.

Because pink salmon exhibit a 2-year life cycle, comparisons of run size are stratified by odd and even years to account for dominance of one line over the other. In LCI overall, dominance of one line is typically short lived, lasting 2–6 generations before the opposing line becomes dominant. Odd/even-year dominance is not synchronous across individual stocks and line dominance can persist up to 9 generations (18 years) in some stocks. Overall, odd- and even-year runs across all stocks and years are only modestly dissimilar (odd-year runs ~19% higher). However, areawide total runs exhibit 4–12 year periods during which production from one line is 19–56% higher than the other, on average. So, despite the relative parity between odd- and even-year pink salmon runs in LCI over broad time scales, we continue to stratify run size comparisons by odd and even years to account for these short-term dominance cycles. The odd-year brood line has been dominant in LCI since 2011 (6 generations).

In 2021, the parent year for the upcoming 2023 return, LCI experienced generally robust escapements to pink salmon index streams. Only 2 of 18 stocks (11%) with SEGs failed to achieve the low end of their respective escapement goal ranges, while 8 stocks (44%) exceeded their SEG ranges, including several major producers in the Outer District (Dogfish, Port Chatham, Windy Bay Right, Port Dick, and Island creeks). It is difficult to predict shifts in dominance between odd- and even-year lines of pink salmon before they occur. After a decade of odd-year dominance, an unexpectedly large 2020 run suggested a shift to even-year dominance was forthcoming. However, the 2021 total run was 27% higher than 2020 and >400% higher than 2022, implying odd-year dominance is persisting. If so, the 2023 run of wild pink salmon has a good chance of producing a harvest equal to or greater than the point forecast of 1.8 million fish. Additional CCPF and hatchery cost-recovery harvests of pink salmon may be expected from hatchery runs in and around SHAs. LCI hatchery forecasts are available from CIAA: <http://www.ciaa.net.org>.

Other Salmon Species

Forecast Methods: Naive forecasts based on historical harvests (1960–2022) were used to predict the 2023 CCPF harvest of other, less abundant salmon species in LCI. Several trend forecast models were evaluated to determine which best fit the data, including exponential smoothing and 2-, 3-, and 5-year running averages of past CCPF harvests. Log-transformed and non-logged historical harvest data sets were evaluated with each model and the final forecast for each species was selected based on comparison of several performance metrics (e.g., bias, MSE, root mean square error [RMSE], MPE, MAPE, and MASE).

Forecast Discussion: Prior to 2018, the recent 5-year average harvest was used to forecast the LCI sockeye, chum, coho, and Chinook salmon CCPF harvest for the coming year. Beginning in 2018, for consistency, we transitioned to the same trend forecast methods we used for LCI pink salmon. Context for the relative strength of the current harvest forecast and how it compares to the recent 10-year average CCPF harvest for each species is provided in Table 20. Context for the relative performance of sockeye and chum salmon forecasts since 2018 are provided in Figures 20 and 21.

Table 20.—Preliminary forecast of the 2023 LCI CCPF harvest of other, less abundant salmon species.

Species	Model	Forecast (point)	Forecast (range)	% above/below 10-yr average	Forecast category
Sockeye salmon ^a	5-year running average	146,400	61,300–349,800	11% higher	Average
Chum salmon	5-year running average	36,500	8,000–166,700	49% lower	Weak
Coho salmon	2-year running average	1,700	300–9,700	72% lower	Poor
Chinook salmon	Exponential smoothing	290	120–730	46% lower	Weak

^a Additional CCPF and hatchery cost-recovery harvests of sockeye salmon may be expected from hatchery returns in and around hatchery Special Harvest Areas (SHAs). LCI hatchery forecasts are available from Cook Inlet Aquaculture Association: <http://www.ciaanet.org>.

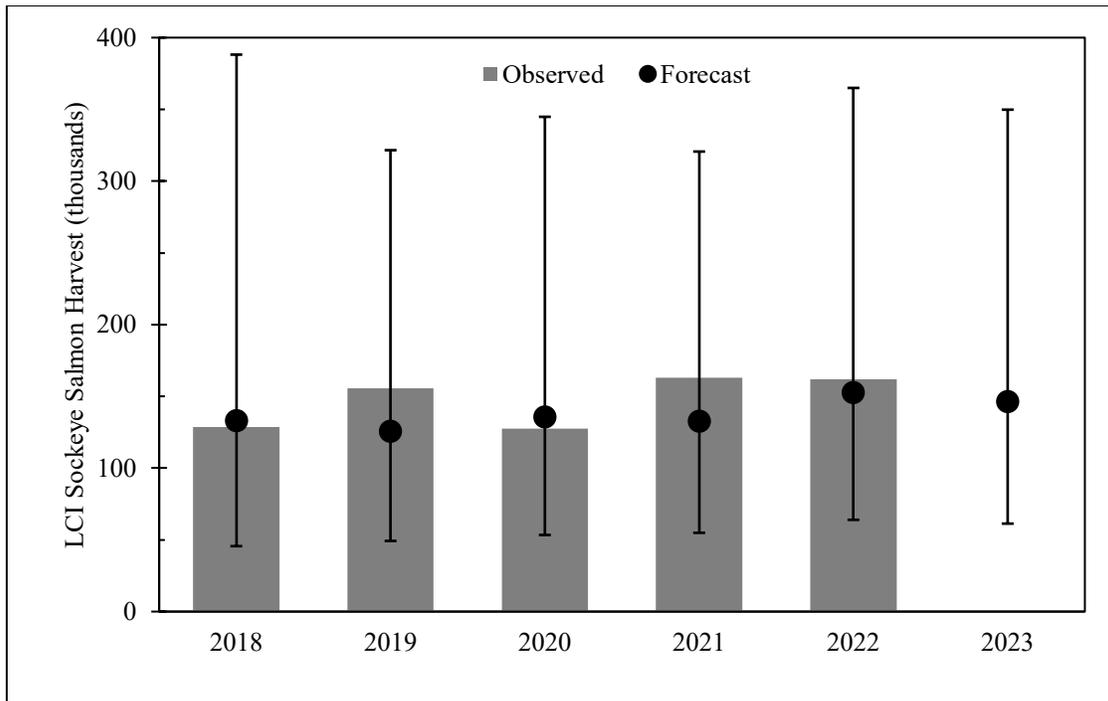


Figure 20.—Annual observed commercial harvest of sockeye salmon in LCI compared to preseason harvest forecasts, 2018–2023. Error bars represent 80% confidence intervals of forecasts.

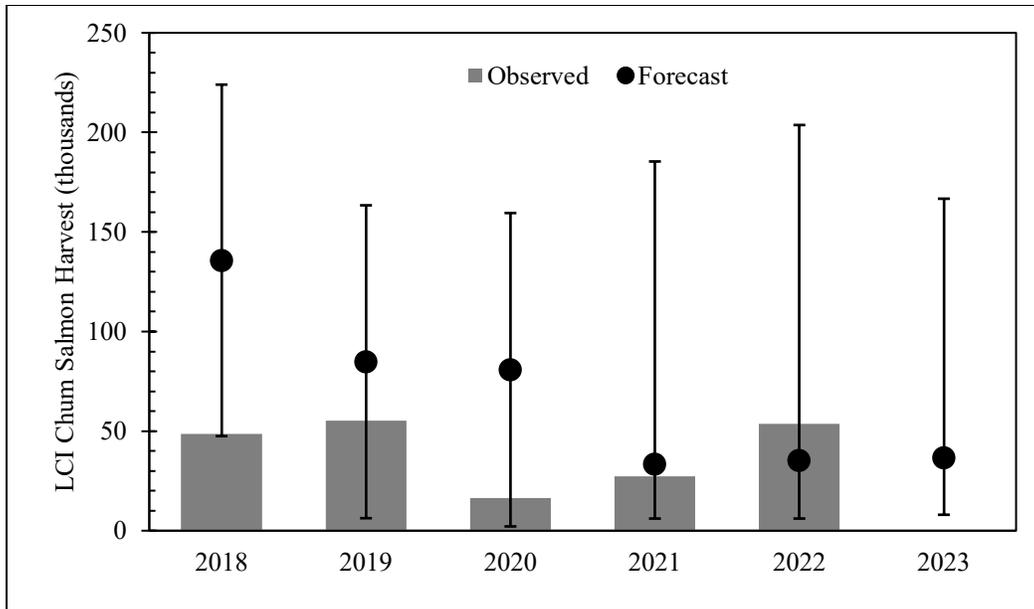


Figure 21.—Annual observed commercial harvest of chum salmon in LCI compared to preseason harvest forecasts, 2018–2023. Error bars represent 80% confidence intervals of forecasts.

Forecast by Edward O. Otis, Area Finfish Research Biologist, Homer; and Glenn J. Hollowell, Area Finfish Management Biologist, Homer.

BRISTOL BAY AREA

Sockeye Salmon

The sockeye salmon total run forecast for Bristol Bay in 2023 is predicted to be *strong* with a point estimate of 51.07 million fish and a range of 36.58–65.56 million fish (80% confidence interval; Table 21). The categorical ranges of sockeye salmon total run strength were formulated from the 20th, 40th, 60th, and 80th percentiles of historical total runs over the 61-year time series (1961–2022;

Table 22). Since 2001, the forecasts have underforecast the run by 14%, on average, ranging from 44% below the actual run in 2014 to 19% above the actual run in 2011 (Figure 22).

Table 21.—Preliminary forecast of the 2023 Bristol Bay area sockeye salmon run.

	Forecast (millions)	Forecast range (millions)
Total production:		
Total run	51.07	36.58–65.56
Escapement	13.01	
Total harvestable surplus	38.06	
Bristol Bay harvestable surplus	36.66	
South Peninsula	1.41	
Inshore Run	49.66	

Table 22.—Categorical ranges of sockeye salmon total run.

Category	Range (millions)	Percentile
Poor	Less than 19	Less than 20th
Weak	19 to 27	20th to 40th
Average	27 to 42	40th to 60th
Strong	42 to 52	60th to 80th
Excellent	Greater than 52	Greater than 80th

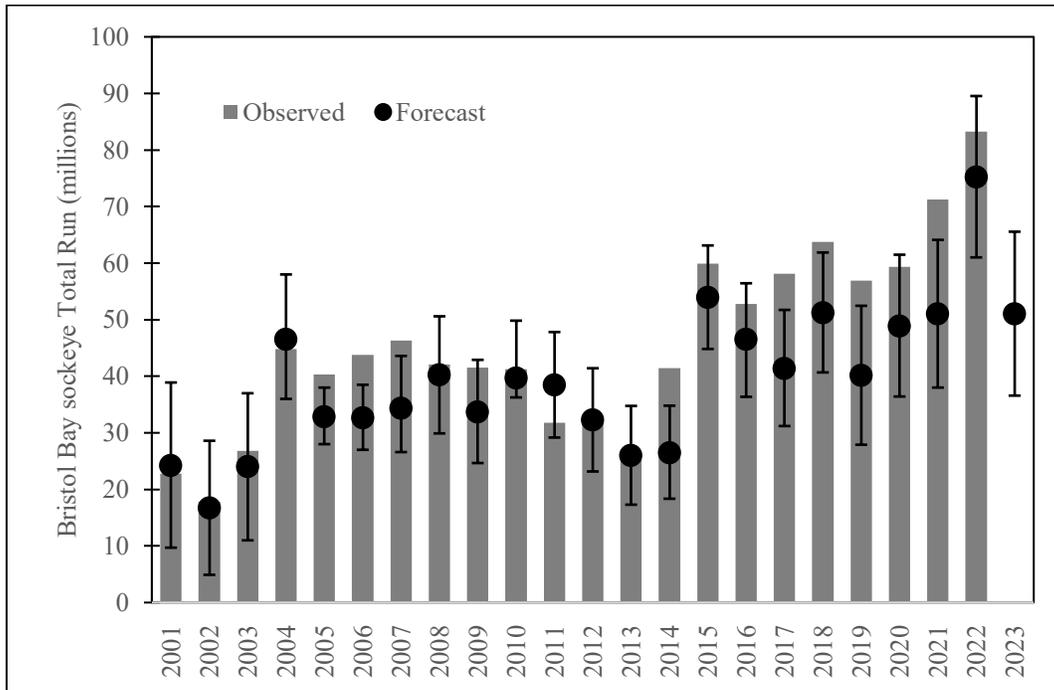


Figure 2223.—Annual observed total run of sockeye salmon in Bristol Bay compared to preseason total run forecasts, 2001–2023. Error bars represent 80% confidence intervals of forecasts.

Forecast Methods: The 2023 Bristol Bay sockeye salmon forecast is the sum of individual predictions from 9 river systems (Kvichak, Alagnak, Naknek, Egegik, Ugashik, Wood, Igushik, Nushagak, and Togiak Rivers) and 4 age classes (ages 1.2, 1.3, 2.2, and 2.3). Adult escapement and return data from brood years 1972–2019 were used in the analyses for most rivers.

Forecasts for each age class returning to a river system were derived from models based on the relationship between adult returns of that age class and either total returns or sibling returns from the same brood years. The average return over the last 5 years was also considered as a forecast model. In general, models with statistically significant parameters or best past performance metrics were chosen. Performance was evaluated using mean absolute deviation, MAPE, mean arctangent absolute percent error, and MPE between forecasted and observed returns measured across the most recent 3- and 5-year time frames. In certain cases, competing models were averaged in a weighted hybrid model approach.

Where practical, the department will manage escapements proportional to the run size and relative to the historical record (5 AAC 06.355 (d)(1)). Escapement is projected as the 75th percentile of the escapement goal range if the forecast is in the upper range of historical run sizes (Naknek, Egegik, Wood, Igushik, and Nushagak Rivers in 2023), as the 50th percentile of the escapement goal range if the forecast is in the midrange of historical run sizes (Togiak River in 2023), and as the 25th percentile of the escapement goal range if the forecast is in the lower range of historical run sizes (Kvichak and Ugashik Rivers in 2023; Table 23). Because it is passively managed, the Alagnak River exploitation rate is assumed to be the same as the Kvichak River exploitation rate, and therefore the escapement is projected to be the total run forecast minus expected harvestable surplus. Over the past 5 years, an average of 2.76% of the Bristol Bay return is thought to be harvested in the South Peninsula fisheries in June. Preseason harvestable surplus projections are provided to aid industry in planning.

Forecast Results: A total of 51.07 million sockeye salmon (within a range of 36.58–65.56 million fish) are expected to return to Bristol Bay in 2023 (Table 23). This is 10% smaller than the most recent 10-year average of Bristol Bay total runs (57.24 million fish) and 40% greater than the long-term (1963–2022) average of 36.52 million fish. All systems are expected to meet their spawning escapement goals. The forecast range is the upper and lower values of the 80% confidence interval for the total run forecast. The confidence bounds were calculated from the deviation of actual runs and run forecasts from 2005 through 2022.

A run of 51.07 million sockeye salmon would allow for a potential harvestable surplus of 38.06 million fish: 36.66 million fish in Bristol Bay and 1.41 million fish in the South Peninsula June fishery. A Bristol Bay harvest of this size is 3% less than the most recent 10-year average harvest of 37.81 million fish (ranging from 15.38 to 60.56 million fish), and 38% greater than the long-term average harvest of 22.79 million fish (1963 to 2022).

Age-specific forecasts for the 2023 run consists of 16.89 million age-1.2 fish (33% of the total run), 5.44 million age-2.2 fish (11% of the total run), 23.64 million age-1.3 fish (46% of the total run), and 4.77 million age-2.3 fish (9% of the total run; Table 23).

Table 23.–Forecast of total run, escapement, and harvest of major age classes of sockeye salmon returning to Bristol Bay River systems in 2022.

DISTRICT/River	Millions of sockeye salmon							Outside Area T ^a	Bristol Bay Inshore
	Forecasted production by age class					Forecasted			
	1.2	2.2	1.3	2.3	Total	Esc.	Harvest		
NAKNEK-KVICHAK									
Kvichak	2.77	1.20	3.76	0.41	8.14	4.00	3.91	0.22	7.91
Alagnak	1.62	0.17	2.19	0.20	4.18	2.06	2.01	0.12	4.07
Naknek	2.55	0.55	2.87	0.58	6.55	1.70	4.67	0.18	6.37
Total	6.94	1.91	8.82	1.19	18.86	7.76	10.59	0.52	18.34
EGEGIK									
EGEGIK	1.16	2.42	5.23	2.60	11.42	1.70	9.40	0.31	11.10
UGASHIK									
UGASHIK	1.36	0.54	1.25	0.20	3.35	0.73	2.53	0.09	3.26
NUSHAGAK									
Wood	4.85	0.43	2.27	0.46	8.01	1.53	6.27	0.22	7.79
Igushik	0.64	0.01	1.11	0.01	1.77	0.34	1.39	0.05	1.72
Nushagak ^b	1.72	0.13	4.48	0.30	6.95 ^b	0.77	5.99	0.19	6.76
Total	7.21	0.57	7.87	0.77	16.74	2.63	13.64	0.46	16.27
TOGIAK^c									
TOGIAK ^c	0.23	0.00	0.47	0.00	0.70	0.20	0.49 ^c	0.02	0.68
BRISTOL BAY									
	16.89	5.44	23.64	4.77	51.07	13.01	36.66	1.41	49.66
	33%	11%	46%	9%	100%				

Note: This table is a summary. Slight differences may appear due to rounding.

^a Projected harvest is based on the current 5-year running average exploitation rate of 2.76%.

^b Nushagak River forecast total includes approximately 324,000 age-1.4 fish.

^c Forecasts for Kulukak, Kanik, Osviak, and Matogak River systems are not included. These systems contribute approximately 50,000 sockeye salmon to Togiak District harvest each year.

Forecast Discussion: Forecasting future salmon returns is inherently difficult and uncertain. The department has used similar methods since 2001 to produce the Bristol Bay sockeye salmon forecasts, which have performed well when applied to Bristol Bay as a whole. Since 2001, our forecasts have, on average, underforecast the run by 14% and have ranged from 44% below the actual run in 2014 to 19% above the actual run in 2011. Forecasted harvestable surplus has had a MAPE of 15% since 2001.

Individual river forecasts have greater uncertainty compared to the baywide forecast. Since 2001, the Department has, on average, underforecast returns to the Alagnak (-32%), Togiak (-12%), Kvichak (-22%), Wood (-20%), Nushagak (-23%), Ugashik (-4%), and Naknek (-13%) Rivers, and overforecast returns to the Igushik (9%) and Egegik Rivers (12%). Overforecasting returns to some rivers while underforecasting returns to other rivers means that the overall Bristol Bay forecast is often more accurate than the forecast to any individual river.

Forecast by Jordan Head, and Stacy Vega, ADF&G, Division of Commercial Fisheries, Bristol Bay.

ARCTIC-YUKON-KUSKOKWIM REGION

All Salmon

The department prepares formal run forecasts annually for the following stocks in the AYK Region: Kuskokwim River Chinook salmon, Yukon River Chinook salmon, Canada-origin Yukon River Chinook salmon, Yukon River summer chum salmon, and Yukon River fall chum salmon. A summary of forecast methods and 2023 run size projections is provided.

The Kuskokwim River Chinook salmon run forecast is based on the estimated run size from the prior year (midpoint), and uncertainty is represented as the recent 7-year average percent error between forecasted and actual run estimates. The preliminary 2023 Kuskokwim River Chinook salmon forecast is for a range of 114,000–173,000 fish. The drainagewide Chinook salmon escapement goal is 65,000–120,000 fish. If the run comes back as projected, the drainagewide escapement goal is expected to be achieved and subsistence harvest opportunity provided. There is currently no commercial buyer in the Kuskokwim Area, and commercial harvest of Chinook salmon is not expected during the 2023 season.

Separate forecasts are prepared for Canadian-origin Yukon River Chinook salmon and total run. The Canadian-origin run forecast is produced by a U.S./Canada Joint Technical Committee and presented to the Yukon River Panel. The 2023 forecast is based on projections of brood year returns, sibling relationships, and juvenile abundance estimates from marine trawl surveys conducted in the northeastern Bering Sea. A Bayesian integrated forecast was produced, such that the model components that best fit the observed historical run sizes are given more weight. The 2023 Canadian-origin Chinook salmon forecast is for a run size of 26,000–43,000 fish (80% credible interval). The IMEG for this stock component has been 42,500–55,000 fish since 2010 but is currently under review by the Yukon River Panel. The Canadian-origin forecast is used to develop the drainagewide Chinook salmon outlook (all stocks), based on the assumption that the Canadian-origin run represents approximately 41% of the total run. The drainagewide forecast for Yukon River Chinook salmon is 62,000–104,000 fish. Yukon River Chinook salmon is classified as a *stock of yield concern* under the Policy for the Management of Sustainable Salmon Fisheries. Run size projections suggest that directed harvest of Yukon River Chinook salmon is not expected during the 2023 season, in any fishery.

The 2023 Yukon River summer chum salmon run forecast is developed by projecting the age-5 return based on sibling relationships and expanding the age-5 return estimate to total run based on the recent 10-year average age at maturity. The drainagewide summer chum salmon forecast is for a below-average run size of 280,000–900,000 fish (80% confidence interval). High forecast uncertainty is largely due to the 2019 elevated marine and inriver water temperatures that were linked to large-scale pre-spawn mortality of Yukon summer chum salmon. The strength of the 2019 brood year component that will return in 2023 as age-4 fish is highly uncertain. Given the potential for poor production of the 2019 brood, the 2023 run size may be aligned with the lower bound of the forecast range. The drainagewide escapement goal for this stock is 500,000–1,200,000 fish. If the 2023 summer chum salmon run is aligned with the lower half of the forecast range, there would be no or limited surplus for directed summer chum salmon fisheries. However, if the run size aligns with the upper half of the forecast range, drainagewide escapement needs would be met while providing for some level of subsistence harvest. Given the forecast and associated uncertainties, surplus for commercial fisheries is highly unlikely.

The 2023 Yukon River fall chum salmon run forecast is based on drainagewide projections of brood year returns and age class proportions using a spawner-recruit analysis. The forecast (and 80% confidence intervals) was then adjusted down due to the extreme low returns in recent years using the performance of last 4 years. The drainagewide fall chum salmon forecast point estimate is 251,000 fish. The forecast range is 112,000–602,000 fish and reflects uncertainty regarding the ongoing rebound of the stock. The drainagewide escapement goal is 300,000–600,000 fall chum salmon. If the 2023 run materializes on the lower end of the forecast range, the minimum drainagewide escapement will not be met and there will not be any surplus to support directed fishing opportunity. However, if the run comes in above the lower end of the escapement goal there is potential for some limited subsistence fisheries. Given the forecasted run size and associated uncertainties, commercial fisheries would most likely remain closed.

The department does not produce formal run forecasts for other salmon stocks returning to the Kuskokwim Area or Yukon Area, or any salmon stocks returning to the Norton Sound Area or Kotzebue Management Area. Consequently, commercial harvest outlooks for these stocks are typically based upon available parent-year spawning escapement indicators, age composition information, recent year trends, and the level of commercial harvest that can be expected given the fishery management plans in place and commercial processing capacity. Currently, southeastern Norton Sound Chinook salmon stocks are classified as *stocks of yield concern*. In general, low Chinook and chum salmon abundance in 2023 is anticipated throughout the AYK Region, resulting in no or well below average commercial harvest forecasts for all species (Table 24).

Forecasts by Sean Larson, Kuskokwim Area Research Biologist, ADF&G, Anchorage/Bethel; Bonnie Borba, Yukon Area Research Biologist, ADF&G, Fairbanks; and Fred West, Yukon Area Research Biologist, ADF&G, Anchorage.

Table 24.–The 2023 Arctic-Yukon-Kuskokwim area all-salmon commercial harvest outlook by management area, in thousands of fish.

Management area	Salmon species					
	Chinook	Sockeye	Coho	Pink	Summer chum	Fall chum
Kuskokwim River	0	0	0	0	0	0
Kuskokwim Bay	0	0	0	0	0	0
Kuskokwim Area Total ^a	0	0	0	0	0	0
Yukon	0	0	0	0	0	0
Norton Sound	0–1	0–1	25–75	50–100	25–50	0
Kotzebue Sound	0	0	0	0	0	300–400

^a There is not currently a confirmed commercial buyer in the Kuskokwim area for 2023.

WESTWARD REGION

KODIAK MANAGEMENT AREA

Pink Salmon

The 2023 KMA predicted pink salmon harvest is expected to be in the *Strong* category with a point estimate of 26.2 million fish combining the wild stock and Kitoi Bay Hatchery harvest estimates

(Table 25). Harvest categories were delimited from the 20th, 40th, 60th, and 80th percentiles of historical commercial harvest in the KMA from 1988 to 2022.

Forecast Methods: The KMA wild stock pink salmon harvest forecast is derived from a total run forecast minus the estimated KMA escapement (5.0 million fish). The total run estimates were derived from a combination of weir counts, aerial survey index, and harvest estimates.

The 2023 KMA wild stock pink salmon forecast (Table 26) was based on a simple linear regression model using environmental indices fit to the odd-year KMA returns from 1981 to 2021. The regression model utilizes a composite created from a series of forecast indices affecting pink salmon returns. Environmental variables used include mean monthly air temperature (September to June), total precipitation (September to June) and peak precipitation (August to September) total run correlation anomalies.

Table 25.—The 2023 Kodiak Management Area predicted pink salmon harvest categories.

KMA harvest category	Range (millions)	Percentile
Poor	Less than 8.7	Less than 20th
Weak	8.7 to 14.2	21st to 40th
Average	14.2 to 20.3	41st to 60th
Strong	20.3 to 27.8	61st to 80th
Excellent	Greater than 27.8	81st to 100th

Table 26.—Preliminary forecast of the 2023 Kodiak Management Area pink salmon run.

Total production	Forecast estimate (millions)	Forecast range (millions)
KMA Wild Stock Total Run	26.0	14.4–37.5
KMA Escapement Goal ^a	5.0	
KMA Wild Stock Harvest	21.0	9.4–32.5
Kitoi Bay Hatchery Harvest ^b	5.3	3.9–6.7
Total KMA Pink Salmon Harvest	26.2	13.3–39.2

Note: Column numbers may not total or correspond exactly with numbers in text due to rounding.

^a The 2023 estimated escapement is within the range of the odd-year aggregate escapement goals for the Kodiak Archipelago (3.0–5.0 million) and the Mainland District (0.25–1.0 million).

^b This figure is the total expected return (5.7 million) minus the broodstock collection goal of 0.43 million fish; the Kitoi Bay Hatchery has yet to determine cost-recovery goals (if any) for 2023.

It is assumed that environmental conditions affect the survival at early life history stages of pink salmon, and the year-class strength is primarily determined prior to outmigration. Monthly values of mean air temperature (Kodiak airport), total precipitation, and peak precipitation from August to June were considered. The range was estimated as 80% of the overall prediction intervals of the regression model.

The 2023 Kitoi Bay Hatchery pink salmon forecast was prepared by evaluating pink salmon survival from odd brood years (1995–2019) when releases from the facility were more than 100 million fry. These brood years are particularly important to the forecasting model because all pink salmon fry were released on the same day to saturate the release area with fry (predator satiation). This release strategy has proven to significantly improve fry-to-adult survival.

The pink salmon return to Kitoi Bay Hatchery is an odd-year dominant return that experiences exceptional marine survival every fourth year dating back to the first releases in 1977 (with the exception of 1997). The primary forecasting consideration for 2023 relates to this 4-year cyclical return, which is above average but is not the stronger of the 2 odd-year cycles. The midpoint estimate of 5.7 million fish reflects a marine survival of 2.91% for the 196 million fry released (0.61g), below the traditional target size (0.8 g). The average survival was calculated using the last two 4-year cyclical returns (parent class 2013 and 2017). The range was calculated as (+/-) 25% of the predicted marine survival.

Forecast Discussion: The 2023 KMA wild stock pink salmon total run (26.0 million fish) is predicted to be a strong return but similar in magnitude to the average last 5 odd-year returns (Figure 25). The environmental index predictor is above average in the odd-year cycle since 2004, suggesting early life history conditions were good; in addition, the 2021 district escapements were strong with 5.1 million fish indexed as escapement.

The 2023 Kitoi Bay Hatchery pink salmon production is expected to be 5.7 million fish (Figure 26). The broodstock collection goal is 425,000 fish, resulting in a total hatchery harvest projection of about 5.3 million fish. It has not been determined whether cost recovery will occur in 2023.

Confidence in the 2023 forecast estimate is fair considering the refinement of the forecasting models in the past years. Despite the strength of the forecast model, the authors recognize that return corollaries are often fleeting due to the dynamic nature of the Gulf of Alaska. This forecast level will allow an initial weekly fishing period length of 105 hours (4½ days) for most of the KMA during the initial general pink salmon fisheries (beginning July 6). Harvests during the initial period provide important data to assess run strength and subsequent fishing periods will be adjusted by section and district to ensure escapement goals will be met.

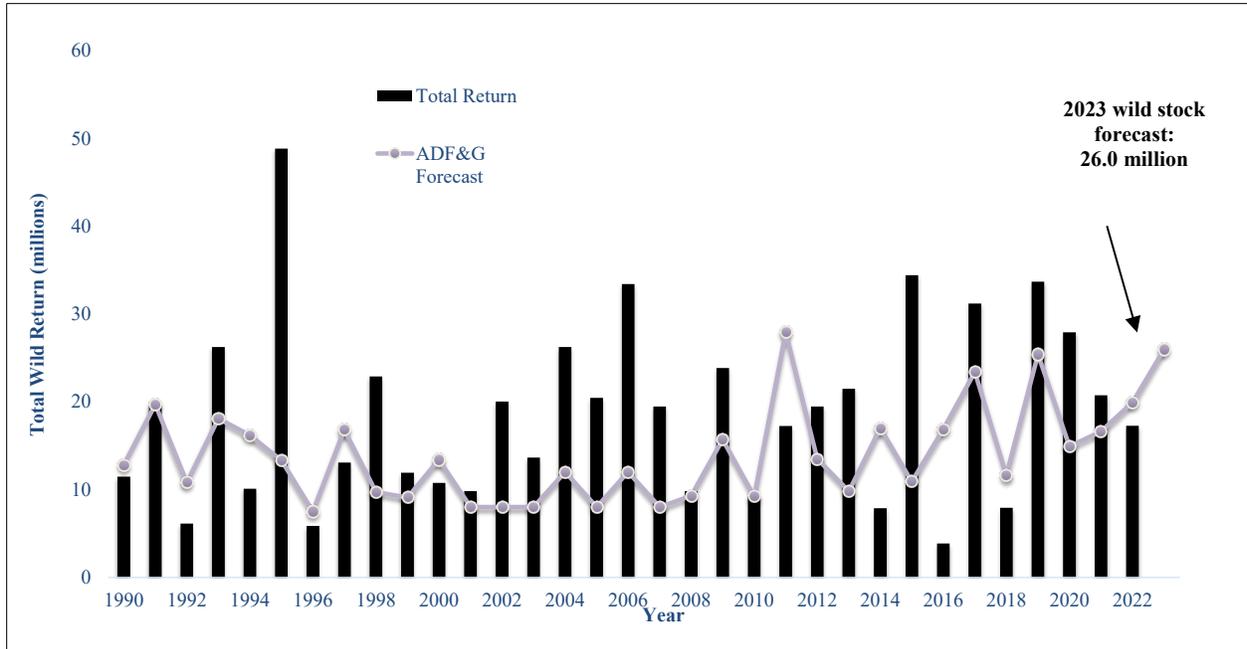


Figure 24.—Kodiak pink salmon wild stock total return compared to ADF&G forecasts, 1990 to 2021, and 2022 forecast.

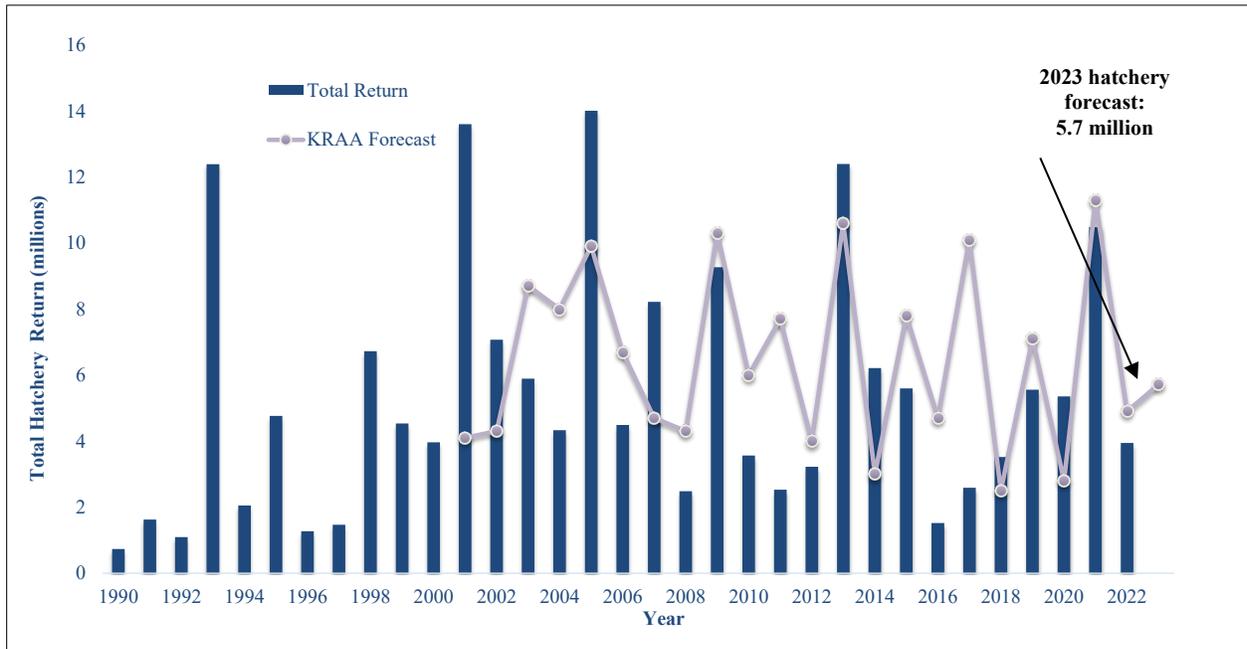


Figure 25.—Kitoi Bay hatchery pink salmon total return compared to KRAA forecasts, 1990 to 2021, and 2022 forecast.

Forecast by M. Birch Foster, Finfish Research Biologist, Westward Region; and Mike Wachter, Kitoi Bay Hatchery Manager, Kodiak Regional Aquaculture Association.

Ayakulik River

Sockeye Salmon

Forecast Methods: The 2023 Ayakulik River sockeye salmon forecast (Table 27) was prepared primarily by investigating simple linear regression models utilizing recent outmigration year age-class relationships. In constructing and evaluating each of the regression models, standard regression diagnostic procedures were used. Prediction intervals (80%) for the regression estimates were calculated using the variances of the regression models. The age classes that could not be estimated with one of these models were estimated using pooled medians and the 10th and 90th percentiles of the data were used to calculate the prediction interval of the median estimates.

Table 27.—Preliminary forecast of the 2023 Ayakulik River sockeye salmon run.

Total production	Forecast estimate (thousands)	Forecast range (thousands)
Total run estimate	574	235–935
Escapement goal ^a	400	200–400
Harvest estimate	274	

^a The escapement estimate is the sum of the upper end of escapement goals for the early (140,000–280,000) and late run (60,000–120,000).

The ocean-age-2 sockeye salmon were predicted from prior year ocean-age-1 returns (1992–present). Ocean-age-3 sockeye salmon were predicted from prior year ocean-age-2 returns (1992–present). Ocean-age-1 and all other age classes were predicted by the 20-year median return. Regression and median estimates were summed to estimate the total Ayakulik sockeye salmon run for 2023. The range was estimated as the sum of the individual 80% prediction intervals.

Forecast Discussion: The 2023 Ayakulik forecast of 573,000 sockeye salmon is about 386,000 fewer fish than the actual 2022 run estimate of approximately 960,000 fish, and about 71,000 fish less than the most recent 10-year average of approximately 645,000 fish. The 2023 run is estimated to be composed of approximately 52% ocean-age-3 fish. The Ayakulik sockeye salmon runs in 2021 and 2022 were the 2 largest back-to-back runs since 1998 and 1999; 2023 will probably be much smaller than those large runs, but confidence is only fair. The projected harvest of 274,000 fish is based on the achievement of the midpoint of the combined escapement goal ranges (300,000 fish). Ayakulik is managed based on both early- and late-run (post July 15) components. Based on brood-year escapement proportions from what will be the major contributing brood years (2017–2020), approximately 70% of the total run will occur in the early portion of the run.

Forecast by M. Birch Foster, Finfish Research Biologist, Westward Region.

Karluk River

Sockeye Salmon

Forecast Methods: The 2023 Karluk River sockeye salmon forecast (Table 28) was prepared primarily by investigating escapement, sibling age class relationships, moving average, and exponential smoothing methods.

Table 28.—Preliminary forecast of the 2023 Karluk River sockeye salmon run.

Total production		Forecast estimate (thousands)	Forecast range (thousands)
Early Run	Total run estimate	263	55–475
	Escapement goal ^a	200	150–250
	Harvest estimate	63	
Late Run	Total run estimate	814	371–1,304
	Escapement goal ^a	325	200–450
	Harvest estimate	489	
Total Karluk River System	Total run estimate	1,077	425–1,778
	Escapement goal ^a	525	350–700
	Harvest estimate	552	

Note: Column numbers may not total or correspond exactly with numbers in text due to rounding.

^a The escapement estimates are based on the midpoints of the early-run and late-run escapement goals and summed for the total run.

Karluk River sockeye salmon production demonstrates strong positive autocorrelation (i.e., good years followed by good years and bad years followed by bad years). As a result, recent year trends have been a good prognosticator of the near future at Karluk River. Utilizing sibling age-class relationships and regression models has been the preferred method since 1994. An exponential smoothing model was also fit to recent year early- and late-run total returns. Parameter estimates (early run $\alpha = 0.84$; and late run $\alpha = 0.67$) placed heavy weight on recent returns and outperformed 2-, 3-, and 5-year moving averages. However, the sibling age class forecasts for the early, late, and total runs outperformed the exponential smoothing model hindcast estimates (1994 to present) in terms of MSE. Therefore, the sibling age class methods were used for the 2023 forecast.

For the early run, ocean-age-2 sockeye salmon returns were predicted based on the abundance of the prior-year return of ocean-age-1 sockeye salmon (2005–present). The ocean-age-1, -3, and -4 return predictions were calculated using their pooled median contribution since 2005.

For the late run, ocean-age-2 sockeye salmon returns were predicted based on the abundance of the prior-year return of ocean-age-1 sockeye salmon (2005–present). The ocean-age-1, -3, and -4 return predictions were calculated using their pooled median contribution since 2005.

Regression and median estimates were summed to estimate the total Karluk sockeye salmon run for 2023. The range was estimated as the overall 80% prediction intervals. The combined early- and late-run 80% prediction interval was calculated by summing the lower prediction bounds and upper prediction bounds of the 2 runs.

Forecast Discussion: The total 2023 sockeye salmon run to the Karluk River using sibling relationships is predicted to be approximately 1,077,000 fish. The early run is expected to be approximately 263,000 fish, which is about 29,000 fish below the recent 10-year average (292,000 fish) and 57,000 fish above the 2022 run (206,000 fish). The late run is expected to be approximately 814,000 fish, which is 42,000 fish below the recent 10-year average (855,000 fish) and 225,000 fish more than the 2022 run (588,000 fish). The combined exponential smoothing estimates for the early and late runs is 841,000 fish for comparison.

The projected harvest estimate for the early run (63,000 fish) is based on achievement of the midpoint of the early-run escapement goal range. The projected harvest estimate for the late run

(489,000 fish) is based on achievement of the midpoint of the late-run escapement goal. The Karluk sockeye salmon run is expected to be predominated by ocean-age-2 fish (72%). The overall confidence in the Karluk sockeye salmon forecast is fair.

Forecast by M. Birch Foster, Finfish Research Biologist, Westward Region.

Alitak District (Frazer Lake and Upper Station)

Sockeye Salmon

Forecast Methods: The 2023 sockeye salmon run to the Alitak District (Table 29) was forecasted with linear regression models using ocean-age-class relationships by system from recent outmigration years and environmental indices. In constructing and evaluating each of the regression models, standard regression diagnostic procedures were used. Prediction intervals (80%) for the regression estimates were calculated using the variances of the regression models. The age classes that could not be estimated with one of these models were estimated using pooled medians and the 10th and 90th percentiles of the data were used to calculate the prediction interval of the median estimate.

Table 29.—Preliminary forecast of the 2023 Alitak District sockeye salmon run.

Total production		Forecast estimate (thousands)	Forecast range (thousands)
Early Upper Station	Total run estimate	76	40–156
	Escapement goal ^a	65	43–93
	Harvest estimate ^b	11	
Late Upper Station	Total run estimate	210	50–406
	Escapement goal	186	120–265
	Harvest estimate ^b	24	
Frazer Lake	Total run estimate	383	198–590
	Escapement goal ^c	143	95–190
	Harvest estimate ^b	240	
Total Alitak District	Total run estimate	669	288–1,152
	Escapement goal	394	258–548
	Harvest estimate ^b	275	

Note: Column numbers may not total or correspond exactly with numbers in text due to rounding.

^a The Alaska Board of Fisheries removed the Upper Station early-run optimal escapement goal (OEG) of 30,000 fish in 2017; the Upper Station early run is now managed for a biological escapement goal (BEG) of 43,000–93,000 fish.

^b The harvest of Upper Station-bound sockeye salmon is concurrent with the harvest of Frazer Lake-bound sockeye salmon and predominantly occurs within the Alitak District.

^c The Frazer Lake escapement goal (75,000–170,000) is increased here by an additional 20,000 fish, which is the 20-year median of the number of fish that escape the Dog Salmon weir but do not ascend the fish pass to reach Frazer Lake. The value of 143,000 fish is S_{MSY} plus 20,000 fish.

Upper Station early-run ocean-age-2 returns, which were log transformed, were forecasted using prior year ocean-age-1 returns (outmigration years: 2005–2021). Upper Station early-run ocean-age-2 salmon were used to predict log-transformed ocean-age-3 fish data from outmigration years 1992 to 2020. Upper Station late-run ocean-age-2 and log-transformed ocean-age-3 salmon returns were each predicted using their respective prior year ocean-age-1 and -2 returns (late-run outmigration years: 1998–2021 and 1983–2020). Upper Station early- and late-run ocean-age-1 and -4 returns were calculated using the pooled median contributions by stock and ocean age from the last 10 years. Frazer ocean-age-2 salmon were predicted using prior year ocean-age-1 returns (outmigration years: 2001–2021), December air temperature (Kodiak Airport), April precipitation,

May-September average 3 m Frazer Lake water temperature, and the North Pacific Gyre Oscillation (NPGO) index for December in a multiple regression model. Air temperature data were lagged to correspond to winter freshwater rearing conditions in Frazer Lake and NPGO, precipitation and lake temperature data were lagged to reflect conditions prior to smolt outmigration. Frazer ocean-age-3 salmon were predicted using prior year ocean-age-2 returns (outmigration years: 2003–2020). Frazer ocean-age-1 and -4 returns were calculated using the pooled median contributions from the last 15 years.

Regression and median estimates were summed to estimate the total Alitak District sockeye salmon run for 2023. The combined Alitak District prediction interval was calculated by summing the lower and upper prediction bounds of the three runs.

Forecast Discussion: The 2023 sockeye salmon run to the Alitak District is expected to be approximately 669,000 fish, approximately 30,000 less fish than the recent 10-year average run (699,000 fish) and equal to the 2022 run (669,000 fish). The Upper Station early run is expected to be approximately 76,000 fish, which is less than the recent 10-year average run (86,000 fish). The Upper Station late run is expected to be approximately 210,000 fish, which is also less than the recent 10-year average run (284,000 fish). The Frazer Lake run is expected to be approximately 383,000 fish, which is greater than the recent 10-year average (329,000 fish). The 2022 Alitak District sockeye salmon run should be composed of approximately 68% ocean-age-2 fish, 23% ocean-age-3 fish, and 8% ocean-age-1 fish. Overall, our confidence in the forecast is fair based on the strength of the regression models and the large prediction intervals.

The projected harvest estimate of 274,000 fish is based on achieving the S_{MSY} estimates for Upper Station early and late runs and S_{MSY} plus an additional 20,000 fish (20-year median of the number of fish that pass through the Dog Salmon weir but do not ascend the Frazer Lake fish pass) for the Frazer run. S_{MSY} is an estimate of the escapement that has the largest expectation of subsequent surplus production.

Forecast by Heather Finkle, Finfish Research Biologist, Westward Region.

Spiridon Lake

Sockeye Salmon

Forecast Methods: The 2023 Spiridon Lake sockeye salmon forecast (Table 30) is estimated by multiplying the estimated number of smolt released for both net pen and lake combined, by the mean smolt-to-adult survival proportions by ocean age and mean return by age proportion of each age class for completed brood years 2011–2015. The Spiridon Lake and Telrod Cove range estimates the 95% confidence intervals created using the Goodman’s variance equation (Goodman 1960).

Table 30.–Preliminary forecast of the 2023 Spiridon Lake sockeye salmon run.

Total production	Forecast estimate (thousands)	Forecast range (thousands)
Total run estimate	126	40–212
Spiridon	68	23–114
Telrod Cove net pen	57	17–98
Escapement goal	0	

Note: Column numbers may not total or correspond exactly with numbers in text due to rounding.

Forecast Discussion: Sockeye salmon are prevented from returning to Spiridon Lake because barrier falls block upstream migrations in the outlet creek (Telrod Creek). Therefore, all returning adult sockeye salmon are available for harvest, primarily in the Central Section of the Northwest Kodiak District and in the Spiridon Bay SHA in Telrod Cove. The point estimate forecast of 126,000 fish in 2023 is less than the 2022 forecast (196,000 fish). A significant increase in harvest of sockeye salmon bound for Telrod Cove during common property fishing within the Spiridon Bay Section (statistical area 254-41) was recently discovered. Production estimates now incorporate the combined harvests of Spiridon Bay and Telrod Cove sections to better approximate the run strength and total enhancement production.

The majority of the 2023 run will probably consist of 2 major age classes: 56.0% age-1.2 fish and 32% age-1.3 fish. Age-2.2 fish account for 8% of the run estimate. All other age classes will make up 4% of the remaining run estimate. If realized, this run will be below the recent 10-year average run of 234,000 fish. The peak of the Spiridon Lake sockeye salmon run timing through the Westside fishery is typically in early to mid-July.

The 2023 season will mark the 10th year of adult returns to Telrod Cove originating from net-pen releases. Of the returning fish to Telrod Cove in 2023, age-1.1, -1.2, -1.3, and -1.4 sockeye salmon will be apportioned between lake and net pen production through evaluation of differential otolith marks created during hatchery incubation.

Forecast by Nate Weber, Research and Monitoring Manager, Kodiak Regional Aquaculture Association.

CHIGNIK AREA

Sockeye Salmon

Forecast Methods: Simple linear regression models using age class relationships were used to forecast the 2023 Chignik River sockeye salmon total run (Table 31).

Each regression model was assessed with standard regression diagnostic procedures. Data were log transformed to address nonnormality or unequal variance. Prediction intervals (80%) for the regression estimates were calculated using the variances of the regression models. Age class returns not estimated with statistical models utilized pooled medians with data from 2000 to the present; median prediction intervals were calculated from the 10th and 90th percentiles of the data.

The 2023 total Chignik River sockeye salmon run was forecasted by modeling returns of stock components and summing those results by age. Early-run prior year log-transformed ocean-age-2 returns predicted early-run log-transformed ocean-age-3 returns using data from the 2000 outmigration year to the present. Prior year early-run ocean-age-1 returns predicted log-transformed ocean-age-2 returns (outmigration years 2000 to present). Late-run age-2.2 returns predicted late-run age-2.3 returns using data from the 2000 brood year to the present.

The early- and late-run regression and median estimates were summed to estimate the total Chignik River sockeye salmon run for 2023. The total run 80% prediction interval was calculated by summing the lower and upper prediction bounds of the 2 runs.

Table 31.–Preliminary Forecast of the 2022 Chignik area sockeye salmon run.

Total production		Forecast estimate (thousands)	Forecast range (thousands)
Total Chignik system	Total Run estimate	1,524	565–3,367
	Escapement goal ^a	635	470–800
	Harvest estimate ^b	889	

Note: Column numbers may not total or correspond exactly with numbers in text due to rounding.

^a Harvest represents the midpoint of the escapement goal. An inriver run goal of 20,000 sockeye salmon is added to the lower bound of the late-run escapement goal.

^b Projected harvest estimate includes Chignik River fish in CMA, Southeastern District Mainland and Cape Igvak.

Forecast Discussion: The 2023 Chignik River sockeye salmon total run is forecasted to be 1.52 million fish, which is 50,000 fish more than the 10-year average run of 1.47 million fish and almost 420,000 fish more than the 2022 total run of 1.10 million fish. The Chignik River sockeye salmon total run is predicted to be composed of approximately 84% ocean-age-3 and 16% ocean-age-2 fish.

The projected 2023 total harvest estimate of 889,000 Chignik-bound fish is based on achievement of the midpoint of the escapement goal range, which encompasses the inriver run goal of 20,000 fish added to the lower range of the escapement goal. The harvest estimate does not include other stocks caught when transiting through the CMA.

The wide confidence intervals around the point estimate of the 2023 forecasts reflect the uncertainty inherent in the forecast models. Given the sibling relationships used for forecasting the run and the low 2022 ocean-age 3 returns, the 2023 forecast may overestimate returns if environmental variables, which are unknown at this time, remain spurious. Due to the range of variation in the relationships used in these forecasts and their historical accuracy, our confidence in the forecast is fair.

Forecast by Heather Finkle, Finfish Research Biologist, Westward Region.

ALASKA PENINSULA/ALEUTIAN ISLANDS AREA

Bear Lake (Late run)

Sockeye Salmon

Forecast Methods: The 2023 forecast of the Bear Lake sockeye salmon late run (Table 32) was prepared using simple linear regressions of sibling age classes. Models were evaluated with standard regression diagnostics. Prediction intervals (80%) for the regression estimates were calculated using variances of the regression models. The age classes that could not be estimated with one of these models were estimated using pooled medians and the 10th and 90th percentiles of the data were used to calculate the 80% prediction interval of the medians.

Table 32.–Preliminary forecast of the 2023 Bear Lake (late run) sockeye salmon run.

Total production	Forecast estimate (thousands)	Forecast range (thousands)
Total run estimate	354	179–646
Escapement goal ^a	156	117–195
Harvest estimate	198	

^a The escapement estimate is the midpoint of the escapement goal range (117,000–195,000) in 2023.

Ocean-age-3 sockeye salmon were predicted from prior year ocean-age-2 returns from outmigration years 1990 to present. Remaining age-class components of the run were predicted by calculating median returns from the most recent 10 years.

Regression and median estimates were summed to estimate the total Bear Lake late-run sockeye salmon run for 2023. The forecast range was estimated using the sum of the 80% prediction intervals and 10th and 90th percentiles intervals for each age class forecasted.

Forecast Discussion: The 2023 Bear Lake late-run forecast of 354,000 sockeye salmon is 77,000 fish less than the 10-year average of approximately 431,000 fish and 105,000 fish more than the 2022 run of 249,000 sockeye salmon. The 2023 late run is expected to be composed of 4% ocean-age-1, 72% ocean-age-2, and 24% ocean-age-3 fish. The projected harvest of 198,000 fish is based on achieving the midpoint (156,000 fish) of the late-run escapement goal range and adequate run strength. Bear River late-run sockeye salmon returns have shown a general decline in the total run since 1990. The wide range around the point forecast is a result of large fluctuations in age-2.2 and age-2.3 sockeye salmon returns. Over the last 10 years, age-2.2 and age-2.3 fish have composed an average of 67% of the annual run, but this proportion has varied from 28% (2022) to 93% (2013). Based on uncertainty associated with the variable predictive capabilities of sibling age class, our confidence in this forecast is fair.

Forecast by Heather Finkle, Finfish Research Biologist, Westward Region.

Nelson River

Sockeye Salmon

Forecast Methods: The 2023 Nelson River sockeye salmon run (Table 33) was forecasted using simple linear regression of ocean-age-class and parental escapement data from the past 19 years. Standard regression diagnostics were used to evaluate each model. Prediction intervals (80%) for regression estimates were calculated using the variances of the regression models. Age classes that could not be estimated with modeling were estimated using pooled medians, and the 10th and 90th percentiles of the data were used to calculate the prediction interval of the median estimates.

Table 33.–Preliminary forecast of the 2023 Nelson River sockeye salmon run.

Total production	Forecast estimate (thousands)	Forecast range (thousands)
Total run estimate	177	0–393
Escapement goal ^a	158	97–219
Harvest estimate	19	

Note: Column numbers may not total or correspond exactly with numbers in text due to rounding.

^a The escapement estimate is the midpoint of the escapement goal range (97,000–219,000) in 2023.

Ocean-age-2 sockeye salmon returns corresponding to the year of outmigration between 2003 and 2021 were forecasted with simple linear regression using parental escapement aligned to age-2.2 fish to account for the overlap of freshwater rearing age classes. The ocean-age-1, -3, and -4 returns were calculated from median estimates for each ocean-age-class using run data from the previous 10 years.

Regression and median estimates were summed to estimate the total Nelson River sockeye salmon run for 2023. The range was estimated as an overall 80% prediction interval and calculated from the sum of the 80% prediction intervals for each age class forecasted.

Forecast Discussion: The 2023 Nelson River forecast of 177,000 sockeye salmon is about 227,000 fish less than the most recent 10-year average of 405,000 fish and is approximately 21,000 fish more than the 2022 run of about 156,000 fish. The 2023 run should be composed mainly of ocean-age-2 (40%) and -3 (52%) fish. The projected harvest of 19,000 fish is based on achieving the midpoint (158,000 fish) of the escapement goal range.

The Nelson River sockeye salmon run has been notoriously unpredictable. Therefore, confidence in this forecast is fair.

Forecast by Heather Finkle, Finfish Research Biologist, Westward Region.

South Alaska Peninsula Aggregate

Pink Salmon

The 2023 South Alaska Peninsula predicted pink salmon harvest is expected to be in the *Strong* category with a point estimate of 9.0 (2.8–15.1 million fish) million fish. Harvest categories were calculated from the 20th, 40th, 60th, and 80th percentiles of historical post-June commercial harvest on the South Alaska Peninsula from 1983 to 2022.

Table 34.–Preliminary forecast of the 2023 South Alaska Peninsula aggregate pink salmon run.

Total production	Forecast estimate (millions)	Forecast range (millions)
Total run estimate ^a	13.0	6.8–19.1
Escapement goal ^b	4.0	1.75–4.0
Post-June harvest estimate	9.0	2.8–15.1

^a Post-June harvest and escapement.

^b The escapement estimate is the minimum of the aggregate goal range (1.75–4.0 million) in 2023.

Table 35.–The 2023 South Alaska Peninsula pink salmon harvest categories, calculated from the 20th, 40th, 60th, and 80th percentiles of historical post-June commercial harvest on the South Alaska Peninsula from 1983 to 2022.

South Peninsula harvest category	Range (millions)	Percentile
Poor	Less than 2.0	Less than 20th
Weak	2.0 to 4.0	20th to 40th
Average	4.0 to 7.0	40th to 60th
Strong	7.0 to 9.9	60th to 80th
Excellent	Greater than 9.9	80th to 100th

Forecast Methods: The 2023 South Alaska Peninsula pink salmon harvest forecast is derived from a total run forecast minus the upper end (4 million fish) of the annual South Alaska Peninsula escapement goal range. Based on best model fit, the total run was forecasted fitting a simple linear regression using the average air temperature in Cold Bay between emergence (April) and early ocean survival (November). The regression model was fit to odd-year South Peninsula pink salmon returns lagged 2 years ahead from 1983 through 2021.

Forecast Discussion: June harvest of pink salmon has been omitted from the South Alaska Peninsula aggregate pink salmon forecast due to the variability of pink salmon harvest that occurs during the June fishery and the origin of these fish are unknown. The 5-year odd-year average harvest of pink salmon in June is approximately 3.1 million fish, with a range of 0.3–9.0 million fish.

The estimated 2023 South Alaska Peninsula pink salmon total harvest (9.0 million fish) is predicted to be strong. Robust escapement and favorable fresh water spawning environmental conditions in 2021 support the predicted forecast. 2021 November–April temperatures were the coolest since 2011 and suggest a more modest run than recent odd-years. Although forecasts of pink salmon returns to the South Alaska Peninsula have only been published since 2011, odd-year forecasts of pink salmon on the South Alaska Peninsula have been more accurate than even years. Accounting for uncertainty surrounding environmental conditions, confidence in the forecast is fair.

Forecast by Tyler Lawson, Alaska Peninsula–Aleutian Islands Assistant Area Management Biologist; and Heather Finkle, Finfish Research Biologist, Westward Region.

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