

Special Publication 18-09

**Run Forecasts and Harvest Projections for 2018
Alaska Salmon Fisheries and Review of the 2017
Season**

Edited by

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March 2018

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	AAC	<i>all standard mathematical signs, symbols and abbreviations</i>	
deciliter	dL	all commonly accepted abbreviations	e.g., Mr., Mrs., AM, PM, etc.	alternate hypothesis	H_A
gram	g	all commonly accepted professional titles	e.g., Dr., Ph.D., R.N., etc.	base of natural logarithm	e
hectare	ha	at	@	catch per unit effort	CPUE
kilogram	kg	compass directions:		coefficient of variation	CV
kilometer	km	east	E	common test statistics	(F, t, χ^2 , etc.)
liter	L	north	N	confidence interval	CI
meter	m	south	S	correlation coefficient	
milliliter	mL	west	W	(multiple)	R
millimeter	mm	copyright	©	correlation coefficient	
		corporate suffixes:		(simple)	r
Weights and measures (English)		Company	Co.	covariance	cov
cubic feet per second	ft ³ /s	Corporation	Corp.	degree (angular)	°
foot	ft	Incorporated	Inc.	degrees of freedom	df
gallon	gal	Limited	Ltd.	expected value	E
inch	in	District of Columbia	D.C.	greater than	>
mile	mi	et alii (and others)	et al.	greater than or equal to	≥
nautical mile	nmi	et cetera (and so forth)	etc.	harvest per unit effort	HPUE
ounce	oz	exempli gratia		less than	<
pound	lb	(for example)	e.g.	less than or equal to	≤
quart	qt	Federal Information Code	FIC	logarithm (natural)	ln
yard	yd	id est (that is)	i.e.	logarithm (base 10)	log
		latitude or longitude	lat or long	logarithm (specify base)	log ₂ , etc.
Time and temperature		monetary symbols		minute (angular)	'
day	d	(U.S.)	\$, ¢	not significant	NS
degrees Celsius	°C	months (tables and figures): first three letters	Jan, ..., Dec	null hypothesis	H_0
degrees Fahrenheit	°F	registered trademark	®	percent	%
degrees kelvin	K	trademark	™	probability	P
hour	h	United States (adjective)	U.S.	probability of a type I error	
minute	min	United States of America (noun)	USA	(rejection of the null hypothesis when true)	α
second	s	U.S.C.	United States Code	probability of a type II error	
		U.S. state	use two-letter abbreviations (e.g., AK, WA)	(acceptance of the null hypothesis when false)	β
Physics and chemistry				second (angular)	"
all atomic symbols				standard deviation	SD
alternating current	AC			standard error	SE
ampere	A			variance	
calorie	cal			population	Var
direct current	DC			sample	var
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 18-09

**RUN FORECASTS AND HARVEST PROJECTIONS FOR 2018 ALASKA
SALMON FISHERIES AND REVIEW OF THE 2017 SEASON**

Edited by

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Division of Sport Fish, Research and Technical Services
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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. (Also see <i>optimum escapement goal</i> .)
Commercial harvest	Harvests of fish that are used for commercial purposes. This includes fish caught by the commercial common property fishery (see below) and by hatchery operators for cost recovery; it excludes sport, subsistence, and personal use harvests.
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.
Common property harvest	Harvests taken by the commercial common property fisheries (see above), 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.
Enhancement of 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.
Escapement, spawning population, or broodstock	The portion of a salmon run that is not harvested and survives to reach the spawning grounds or hatchery.
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.
Optimum escapement goal	The number of salmon in a particular stock that should be allowed to spawn to achieve sustainable runs based on biological needs of the stock, as well as consideration of social and allocative needs.
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.
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.
Return	Return refers to an aggregation of salmon over several or more years that represent the surviving adult offspring from a single brood year.

NAMES FOR ALASKA'S PACIFIC SALMON SPECIES

Common Name	Vernacular Name	Scientific Name
Chinook	king	<i>Oncorhynchus tshawytscha</i>
sockeye	red	<i>Oncorhynchus nerka</i>
coho	silver	<i>Oncorhynchus kisutch</i>
pink	humpy, humpback	<i>Oncorhynchus gorbuscha</i>
chum	dog	<i>Oncorhynchus keta</i>

ABSTRACT

This report contains a detailed review of Alaska's 2017 commercial salmon season and forecasts for 2018. The Alaska all-species salmon harvest for 2017 totaled 225.7 million, which was about 21.4 million more than the preseason forecast of 204.3 million. This combined harvest was composed of 262,000 Chinook salmon *Oncorhynchus tshawytscha*, 53.6 million sockeye salmon *O. nerka*, 5.3 million coho salmon *O. kisutch*, 141.6 million pink salmon *O. gorbuscha*, and a record 25 million chum salmon *O. keta*. The Alaska Department of Fish and Game is expecting a decrease in commercial salmon harvests in 2018, mostly due to a decrease in pink salmon harvests compared to 2017. The 2018 total commercial salmon harvest (all species) projection of 147.3 million is expected to include 99,000 Chinook salmon in areas outside Southeast Alaska, 51.6 million sockeye salmon, 4.9 million coho salmon, 69.7 million pink salmon, and 21 million chum salmon. Thus, compared to 2017 commercial harvests, the projected 2018 commercial harvests are expected to be as follows: pink salmon, 72 million fewer; sockeye salmon, 2.0 million fewer; coho salmon, 301,000 fewer; and chum salmon, 4.0 million fewer.

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 recent survival rates observed for hatchery releases. Other projections were based on averages of recent catch levels. Fishing effort influences average catch levels, 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 harvest levels.

Key words: pink salmon, *Oncorhynchus gorbuscha*, 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 2018 as well as a detailed review of Alaska's 2017 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 are preliminary and supersede any data previously published.

ADF&G is expecting a decrease in commercial salmon harvest in 2018. The 2018 total commercial salmon harvest (all species) projection of 147.3 million is expected to include 99,000 Chinook salmon in areas outside Southeast Alaska, 51.6 million sockeye, 4.9 million coho, 69.7 million pink, and 21 million chum salmon. The projected pink salmon harvest is about 72 million fewer than harvested in 2017; the sockeye salmon harvest is expected to be about 2.0 million fewer than were harvested in 2017; the coho salmon harvest is expected to be about 301,000 fewer than were harvested in 2017; and the chum salmon harvest is expected to be about 4.0 million fewer than were harvested in 2017. However, we note that pink salmon forecasts are generally based on average returns from previous brood years; thus, the low pink salmon run forecast for 2018 is an artifact of this method and the small run size of 2016.

Table 1 shows specific harvest projection numbers by species and fishing area. These projections reflect potential harvests for most of the major sockeye salmon fisheries as well as for large hatchery runs, including pink, sockeye, and chum salmon to the Southeast Alaska, Kodiak, and Prince William Sound areas. Fishing effort influences average catch levels, and effort is partly determined by market conditions and the size of salmon runs. Therefore, these projections may not be indicative of actual harvest levels. With the exception of 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 managers have the primary goal of maintaining spawning population sizes—not of reaching preseason catch projections.

Table 1.—Projections of 2018 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		1,090	2,115	22,484	1,498	27,186
Hatchery Production ^a		206	895	516	8,486	10,103
Southeast Region Total		^b 1,296 ^c	3,010 ^c	23,000	9,984	37,290
Prince William Sound						
Natural Production	14	1,024 ^d	284 ^e	2,054	407	3,783
Hatchery Production ^f		801	124	30,698	3,594	35,216
Lower Cook Inlet						
Natural Production	1 ^c	112 ^c	4 ^c	140	101 ^c	358
Hatchery Production		342 ^g		1,528		1,870
Upper Cook Inlet	7 ^c	1,900	203 ^c	389 ^c	177 ^c	2,676
Bristol Bay	32 ^c	37,598	158 ^c	917 ^h	993 ^c	39,698
Central Region Total	54	41,777	773	35,726	5,271	83,601
Kodiak						
Natural Production	13 ^c	2,246 ⁱ	266 ^c	6,600	754 ^c	9,879
Hatchery Production		365 ^j	134	2,100 ^g	263	2,861
Chignik	9 ^c	834 ^k	114 ^c	702 ^h	208 ^c	1,866
South Peninsula & Aleutians	18 ^c	2,513 ^c	278 ^c	1,494 ^l	898 ^c	5,200
North Alaska Peninsula	2 ^c	2,556 ^m	55 ^c	11 ^h	125 ^c	2,748
Westward Region Total	42	8,512	846	10,907	2,247	22,554
Arctic-Yukon-Kuskokwim Total	4	4	320	50	3,475	3,853
Statewide Total	99	51,589	4,949	69,682	20,977	147,297

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

- ^a Hatchery chum 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 (500,000). Wild chum salmon catch estimated as 20% of total catch. All other hatchery projections are five-year average harvest (2013–2017), or, for pink salmon, average harvest from past five even years.
- ^b Southeast Chinook 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 2018 Release of the 2018 Chinook salmon quota for Southeast Alaska is expected in late March or early April.
- ^c Average harvest of the previous 5 years (2013–2017).
- ^d Includes harvest estimates for Coghill and Copper River sockeye salmon.
- ^e Ten-year average harvest (2008–2017) in the PWS Area.
- ^f Hatchery projections made by Prince William Sound Aquaculture Corporation and Valdez Fisheries Development Association. Gulkana Hatchery projection made by ADF&G.
- ^g Includes common property plus cost-recovery harvests.
- ^h Average of previous 5 even-year harvests (2008–2016).
- ⁱ Total Kodiak harvest of 2.246 million natural run sockeye salmon includes projected harvests from formally forecasted systems, projected Chignik harvest at Cape Igvak, and projected harvest from additional minor systems totaling 895,000 fish.
- ^j Hatchery projections made by Kodiak Regional Aquaculture Association (KRAA). Sockeye salmon hatchery projections include enhanced Spiridon Lake sockeye salmon run harvest forecast and other KRAA projections (365,000 total).
- ^k Chignik sockeye salmon harvest estimate based on a formal forecast with projected harvest at Igvak and Southeastern District Mainland excluded.
- ^l Based on South Peninsula formal forecast and the average of previous 4 even-year harvests for the Aleutian Islands.
- ^m Five-year average harvest (2013–2017); includes formal forecasts for Bear River late run (152,000) and Nelson River (270,000) sockeye salmon stocks.

The Alaska all-species salmon harvest for 2017 totaled 225.7 million, which was about 21.4 million more salmon than the preseason forecast of 204.3 million. This combined harvest contained 262,000 Chinook, 53.6 million sockeye, 5.3 million coho, 141.6 million pink, and record 25 million chum salmon. Table 2 shows 2017 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 pounds harvested. Tables 4–7 provide detailed information on the 2017 harvest by species and area.

Table 2.—Preliminary 2017 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	174	801	2,854	34,807	11,428	50,064
Prince William Sound	15	1,437	559	48,591	5,391	55,993
Lower Cook Inlet ^b	1	294	15	2,018	198	2,525
Upper Cook Inlet	8	1,849	304	168	244	2,572
Bristol Bay	41	38,790	241	35	1,495	40,602
Central Region Total	65	42,370	1,118	50,812	7,327	101,692
Kodiak Area	7	2,477	366	27,103	1,891	31,845
Chignik	4	895	227	7,078	609	8,813
South Peninsula and Aleutians	10	3,216	348	21,819	1,948	27,342
North Peninsula	3	3,862	7	11	82	3,965
Westward Region Total	24	10,449	948	56,011	4,531	71,964
Arctic-Yukon-Kuskokwim Region Total	0	3	330	19	1,672	2,025
Total Alaska	262	53,624	5,251	141,649	24,958	225,744

Note: Missing data indicates no harvest, and zeros indicate harvest activity but <500 fish.

Note: Columns may not total exactly due to rounding.

^a Total commercial harvest of Chinook salmon for the October 1, 2016–September 30, 2017 catch accounting period.

^b Commercial harvest in Lower Cook Inlet includes commercial common property, hatchery cost-recovery, hatchery-donated fish, and homepack, but not broodstock, hatchery carcasses sold, or sportfish derby caught/commercially sold fish.

Table 3.—Preliminary 2017 Alaska commercial salmon harvests, by fishing area and species, in thousands of pounds.

Fishing Area	Species					Total
	Chinook	Sockeye	Coho	Pink	Chum	
Southeast Region Total^a	1,976	4,487	16,197	127,951	95,204	245,816
Prince William Sound	298	8,072	4,504	187,489	40,534	240,897
Lower Cook Inlet ^b	11	1,393	90	7,065	1,550	10,109
Upper Cook Inlet	168	10,598	1,902	596	1,992	15,255
Bristol Bay	477	208,073	1,531	129	9,501	219,711
Central Region Total	953	228,135	8,027	195,280	53,577	485,972
Kodiak Area	66	12,904	2,822	99,403	14,467	129,660
Chignik	37	5,484	1,562	25,305	4,644	37,033
South Peninsula and Aleutians	102	17,998	2,055	74,838	13,431	108,423
North Peninsula	47	22,571	43	39	576	23,275
Westward Region Total	252	58,956	6,482	199,584	33,117	298,391
Arctic-Yukon-Kuskokwim Region Total	4	17	2,181	73	11,848	14,123
Total Alaska	3,185	291,596	32,886	522,888	193,746	1,044,301

Note: Columns may not total exactly due to rounding.

^a Total commercial harvest of Chinook salmon for the October 1, 2016–September 30, 2017, catch accounting period.

^b Commercial harvest in Lower Cook Inlet includes commercial common property and hatchery cost-recovery harvest, but not homepack, broodstock, or hatchery donated fish.

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

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.

Although ADF&G does not produce formal run size forecasts for all salmon runs in the state, local salmon biologists prepare harvest projections or harvest outlooks for all areas. Projections are based on formal forecasts when available. When the formal forecasts are not available, local biologists use average historical catches and local knowledge of recent events to develop these outlooks.

This report contains a detailed review of Alaska's 2017 commercial salmon season. We normally release it before final catch figures are available to provide preliminary information to the Alaska Board of Fisheries, the fishing industry, and the public.



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

PRELIMINARY REVIEW OF THE 2017 ALASKA COMMERCIAL SALMON FISHERIES

SOUTHEAST ALASKA AND YAKUTAT REGION

The Region I cumulative commercial salmon harvest by all harvest categories, including hatchery cost recovery, was 50.1 million fish in 2017. Total common property commercial harvest was 44.8 million fish, 89% of total harvest. Overall harvest in numbers of salmon in 2017 was 158% of 2016. The 2017 harvests by species compared with 2016 were as follows: Chinook 51%, sockeye 53%, coho 123%, pink 189%, and chum salmon 125%. The Region I total commercial salmon harvest proportions by species were as follows: Chinook <1%, sockeye 2%, coho 6%, pink 70%, and chum salmon 23%. The 2017 combined-gear, large Chinook salmon harvest of 174,000 fish was 56% of the most recent 10-year average and 57% of the long-term average. The sockeye salmon harvest of 801,000 was 68% of the recent 10-year average and 60% of the long-term average. The coho salmon harvest of 2.9 million fish was 109% of the 10-year average and 132% of the long-term average. The pink salmon harvest of 34.8 million was 89% of the 10-year average and 112% of the long-term average. The chum salmon harvest of 11.4 million was 113% of the 10-year average and 192% of the long-term average. The all species total harvest was 94% of the recent 10-year average harvest and 123% of the long-term average harvest.

CHINOOK SALMON

The Chinook salmon harvest of 174,000 in 2017 was below both the recent 10-year and long-term averages and ranks lowest over the previous 56 years. The average total Chinook salmon harvest since 1962 is around 300,000. Preliminary harvests of coastwide Chinook salmon accountable under the Pacific Salmon Treaty included 123,000 by troll gear, 3,000 by seine gear, and 4,000 by gillnet gear. Total commercial harvests of Alaska hatchery origin Chinook salmon were 28,000, 16% of total Chinook salmon harvests; 9,000 Chinook salmon were harvested in private hatchery cost-recovery fisheries.

SOCKEYE SALMON

The harvest of Southeast sockeye salmon was 801,000 in 2017. This harvest was below both the recent 10-year average of 1.2 million and the long-term average of 1.3 million. The 2017 sockeye salmon harvest ranks 46th over the previous 56 years since 1962. The Southeast Alaska Area purse seine fishery harvest of 288,000 was below the recent and long-term averages and accounted for 36% of the regional total harvest. The drift gillnet fishery harvest of 239,000 was below the recent and long-term averages and accounted for 30% of the regional total harvest. The set gillnet fishery harvest of 121,000 was below the recent and long-term averages and accounted for 15% of the regional total harvest.

COHO SALMON

The 2017 Southeast coho salmon harvest was 2.9 million. This harvest was above the long-term and recent averages. The 2017 coho salmon harvest ranks 17th of the 56 years since 1962. The

coho salmon harvest in the troll fishery was 2.1 million, more than the long-term and recent average, and accounted for 75% of the harvest. Purse seine and drift gillnet harvests of coho salmon were below long-term and recent averages. The set gillnet harvest of coho salmon was more than the recent and slightly less than the long-term averages.

PINK SALMON

The 2017 Southeast pink salmon harvest was 34.8 million, accounting for 70% of the total region pink salmon harvest. The purse seine pink salmon harvest was 32.0 million, 92% of the total Southeast pink salmon harvest. The 2017 Southeast pink salmon harvest was below the recent and above the long-term averages, ranking as the 24th largest harvest since 1962.

CHUM SALMON

The 2017 Southeast chum salmon harvest of 11.4 million ranks 10th since statehood and was above the recent average of 10.1 million. Most chum salmon production in the region is attributable to hatchery production. Before hatchery chum salmon production became significant in 1984, the 1962–1983 regional average harvest was 1.6 million.

Table 4.–Preliminary 2017 Southeast Region commercial salmon harvests, by fishing area and species in thousands of fish.

Fishery	Species					Total
	Chinook ^a	Sockeye	Coho	Pink	Chum	
Purse Seine						
Southern Purse Seine Traditional	1	152	79	7,912	973	9,118
Northern Purse Seine Traditional	2	130	177	23,725	1,357	25,390
Hatchery Terminal	8	6	14	406	1,714	2,148
Total Purse Seine	11	288	270	32,044	4,044	36,656
Drift Gillnet						
Tree Point	2	25	34	223	222	506
Prince of Wales	2	45	49	302	234	632
Stikine	4	14	14	49	177	258
Taku-Snettisham	1	114	16	230	886	1,247
Lynn Canal	1	32	29	85	1,103	1,250
Drift Gillnet Hatchery Terminal	8	10	16	130	989	1,153
Total Drift Gillnet	17	239	158	1,019	3,611	5,046
Set Gillnet (Yakutat)	1	121	141	92	1	355
Troll						
Hand Troll						
Traditional	5	0	102	4	3	114
Hatchery Terminal	0	0	1	0	3	4
Spring Areas	2	0	0	0	0	2
Total Hand Troll	7	0	103	4	5	120
Power Troll						
Traditional	106	5	2,037	47	275	2,470
Hatchery Terminal	1	0	6	1	120	129
Spring Areas	16	0	2	1	1	20
Total Power Troll	122	5	2,045	49	397	2,618
Total Troll	129	5	2,147	54	402	2,738
Annette Island Reservation						
Seine	1	6	7	728	61	802
Drift Gillnet	1	5	29	151	188	374
Troll	0	0	0	0	0	0
Hand Troll	0	0	0	0	0	0
Power Troll	0	0	0	0	0	0
Trap						
Total Annette Island Reservation	2	11	36	878	249	1,177
Hatchery Cost Recovery	13	135	97	641	3,095	3,981
Miscellaneous ^b	0	2	4	79	26	111
Southeast Region Total	174	801	2,854	34,807	11,428	50,065

Note: Missing data indicates 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. Catch accounting period for the 2017 Chinook salmon season goes from October 1, 2016, to September 30, 2017.

^b Includes salmon that were confiscated or caught in sport fish derbies or commercial test fisheries and sold.

CENTRAL REGION

PRELIMINARY 2017 PRINCE WILLIAM SOUND SALMON SEASON SUMMARY

The 2017 Prince William Sound (PWS) area commercial salmon harvest was 56 million (Table 5). Harvest was composed of 48.59 million pink, 1.44 million sockeye, 5.39 million chum, 559,000 coho, and 15,000 Chinook salmon. The 2017 harvest included more than 50 million (90%) commercial common property fishery (CCPF), and 5.8 million (approximately 10%) hatchery cost recovery and broodstock fish.

Gillnet Fisheries

Copper River District

The 2017 preseason commercial harvest forecast for the Copper River District was 4,000 Chinook, 889,000 sockeye, and 207,000 coho salmon. Gulkana Hatchery was projected to contribute 173,000 sockeye salmon to the CCPF harvest. A conservative management strategy was implemented due to the weak Chinook and sockeye salmon forecast. This strategy included reduced frequency and duration of fishing periods to match salmon run entry. The inside closure area was expanded and remained closed until mid-June. The expanded area included waters inside the barrier islands east of Kokinhenik Bar and west of Grass Island Bar. The anticipated first fishing period was skipped and the district opened on Thursday, May 18. Total fishing time through July was reduced by 40% compared to the 10-year average. The Copper River sockeye salmon harvest of 570,000 was 60% less than the previous 10-year (2007–2016) harvest average of 1.43 million and 36% below forecast. The average sockeye salmon weight of 5.5 pounds was the third smallest on record. The number of wild sockeye salmon in the Copper River District CCPF harvest was 530,000, or 93% of the harvest. Gulkana Hatchery contribution to the sockeye salmon commercial harvest was 29,300, or 5% of the harvest, and was 90% below forecast. Main Bay Hatchery contributed 10,500, or 2% of the harvest. The CCPF harvest of 13,100 Chinook salmon was below the previous 10-year (2007–2016) average harvest of 15,400. The current season total coho salmon commercial harvest of 288,000 is well above the previous 10-year (2007–2016) harvest average of 206,000. The 2017 preliminary sonar inriver estimate was 723,426 and was within the range (712,000–1,100,000) of the inriver goal. Sockeye salmon spawning escapement to Copper River delta systems based on aerial survey indices was 57,000, and was within the sustainable escapement goal (SEG) range (55,000–130,000). Copper River Delta coho salmon spawning escapement monitoring is ongoing, but peak escapement counts are within the SEG range (32,000–67,000). The Native Village of Eyak's Copper River mark-recapture estimate of inriver Chinook salmon abundance was 40,725 fish.

Bering River District

The 2017 preseason commercial harvest forecast for the Bering River District was 4,000 sockeye and 48,000 coho salmon. The sockeye salmon commercial harvest of 2,600 was 30% below the previous 10-year (2007–2016) harvest average of 3,700. The coho salmon commercial harvest of 111,000 was more than double the previous 10-year (2007–2016) harvest average of 47,900. Commercial fishing effort in the coho salmon fisheries was high due in part to productive fishing in the eastern portion of the Copper River Delta. The aerial escapement index of 18,800 sockeye salmon was within the SEG range (15,000–33,000). Bering River District coho salmon spawning escapement monitoring is ongoing, but peak escapement counts are within the SEG range (13,000–33,000).

Coghill District (Drift Gillnet)

Prince William Sound Aquaculture Corporation (PWSAC) forecast a 2017 run of 1.97 million chum and 230,000 coho salmon to Wally Noerenberg Hatchery (WNH) and required 818,000 (42%) chum and 2,700 (1%) coho salmon for cost recovery and broodstock. The CCPF drift gillnet harvest of chum salmon in the Coghill District was 2.17 million. The proportion of wild chum salmon in the Coghill District CCPF harvest was 5%. PWSAC harvested 724,000 chum salmon for cost recovery and broodstock. The total chum salmon return to WNH was 3.26 million and was 65% above forecast. The CCPF drift gillnet harvest of sockeye salmon in the Coghill District was 112,200. The proportion of wild sockeye salmon in the Coghill District CCPF harvest was 24% (28,300). Pink salmon CCPF drift gillnet harvest in the Coghill District was 662,000. The proportion of wild pink salmon in the Coghill District CCPF harvest was 69%. The CCPF drift gillnet harvest of coho salmon in the Coghill District was 14,200, 93% below forecast.

The sockeye salmon run forecast for Coghill River was 74,000. The Coghill River weir passed 50,312 sockeye salmon, which is within the SEG range (20,000–60,000).

Eshamy District

PWSAC forecast a run of 1.15 million Main Bay Hatchery enhanced sockeye salmon. The CCPF harvest of sockeye salmon in the Eshamy District was 621,000, 46% below the forecast. The proportion of wild sockeye salmon in the Eshamy District CCPF harvest was 9% (55,800). PWSAC utilized approximately 10,000 sockeye salmon for broodstock and culled 40,000 jack sockeye salmon. The CCPF drift gillnet harvest of chum salmon in the Coghill District was 120,000. The proportion of wild chum salmon in the Eshamy District CCPF harvest was 22%. Pink salmon CCPF drift gillnet harvest in the Eshamy District was 349,000. The proportion of wild pink salmon in the Eshamy District CCPF harvest was 72%.

Unakwik District

Unakwik District CCPF drift gillnet harvest was 764 sockeye salmon, which was well below the 10-year average of 3,000.

Purse Seine Fisheries

Chum Salmon

The 2017 chum salmon total run forecast was 3.17 million, with 2.80 million (70%) projected to be of PWSAC origin. The purse seine fleet was expected to harvest 456,000 at Armin F. Koernig Hatchery and 383,000 at Port Chalmers. The purse seine gear group had access to the Port Chalmers Subdistrict in 2017 under the Prince William Sound Management and Salmon Enhancement Allocation Plan.

Based on ADF&G's wild chum salmon forecast of 371,000, there was a preseason expectation for the potential CCPF harvest of 171,000 wild chum salmon in PWS, leaving 200,000 for escapement.

Total commercial chum salmon harvest in PWS was 5.42 million, including 724,000 for WNH broodstock and cost recovery. A record 2.39 million chum salmon were harvested in the purse seine CCPF compared to a 595,000 recent 10-year (2007–2016) harvest average. Purse seine chum salmon harvest in PWS was predominantly from the Montague, Southwestern, Eastern, and Coghill districts. Chum salmon commercial harvest in the Southwestern District was 445,000, nearly matching the forecast. Montague District chum salmon commercial harvest was 539,000,

41% above forecast, of which 299,000 were of WNH origin. Eastern District chum salmon commercial harvest was 317,000. The purse seine fleet was allowed into the Coghill District starting on July 15 to harvest a buildup of poor quality fish in the WNH Terminal Harvest Area/Special Harvest Area; the fleet harvested approximately 862,000 chum salmon.

Pink Salmon

The 2017 pink salmon total run forecast for PWS was 67.16 million, of which 58.92 million were estimated to be available for CCPF harvest. This estimate included 27.40 million PWSAC enhanced salmon, a record 21.01 million wild salmon, and 18.75 million Valdez Fisheries Development Association (VFDA) enhanced salmon. Approximately 3.20 million (12%) of PWSAC's pink salmon forecast was projected for cost recovery and broodstock with the remaining 24.20 million expected to be available for CCPF harvest. Approximately 3.30 million (18%) of VFDA's pink salmon forecast were projected for cost recovery and broodstock. The remaining 15.48 million VFDA fish were expected to be available for CCPF harvest. A total harvest of 19.65 million wild stock pink salmon was forecasted for CCPF harvest in PWS, leaving 1.45 million for escapement.

The CCPF harvest of 43.67 million pink salmon was 9.93 million less than the 5-year odd year average, and 26% below the 58.92 million CCPF preseason forecast. Total pink salmon harvest was 48.73 million, including 5.06 million for hatchery cost recovery, broodstock, and raceway sales (3.46 million for PWSAC and 1.60 million for VFDA). The number of active permits fished in the PWS purse seine fishery was the highest number since 1991 at 229 permits. Pink salmon otolith contributions estimate CCPF harvest contributions of 20.27 million wild stock salmon, 12.54 million Solomon Gulch Hatchery salmon, and 10.69 million PWSAC salmon. The VFDA pink salmon run was 25% (4.61 million) below the preseason forecast of 18.75 million. The PWSAC pink salmon run was 48% (13.26 million) below the preseason forecast of 27.40 million.

For the 2017 season, inseason pink salmon aerial survey escapement estimates were above anticipated escapement thresholds in most districts for most of the season. This allowed for expanded time and area for fishing effort targeting surplus wild and enhanced pink salmon. The area-under-the-curve estimate of pink salmon escapement is not yet available, but considering that inseason escapement indices were above anticipated counts, overall escapement was likely within or above the odd-year SEG range for all districts.

Coho Salmon

The VFDA coho salmon run was anticipated to be 105,000. Total CCPF harvest of coho salmon in PWS (excluding Copper River and Bering River districts) was 107,000.

COOK INLET

Lower Cook Inlet

The 2017 Lower Cook Inlet Area commercial salmon harvest was 2.5 million, based on preliminary fish ticket data. The total harvest was composed of 665 Chinook, 293,743 sockeye, 14,664 coho, 2.0 million pink, and 197,731 chum salmon (Table 5). The harvest included 2.3 million (92.0%) CCPF harvested fish, and 202,000 (8.0%) hatchery cost-recovery fish.

Southern District

The 2017 preseason CCPF harvest forecast for the Southern District was 58,800 sockeye and 117,400 pink salmon, with an additional 24,000 hatchery-produced sockeye salmon returning to hatchery release sites. No hatchery-produced pink salmon were anticipated to be available to CCPF permit holders in 2017. The preliminary CCPF purse seine harvest estimate for the 2017 season was 166 Chinook, 62,715 sockeye, 3,493 coho, 361,751 pink, and 3,892 chum salmon. This compares to a previous 10-year average harvest of 57 Chinook, 36,681 sockeye, 729 coho, 58,755 pink, and 736 chum salmon. The preliminary set gillnet harvest estimate was 435 Chinook, 36,689 sockeye, 9,353 coho, 43,904 pink, and 7,852 chum salmon. The previous 10-year average harvest for this gear type was 292 Chinook, 26,835 sockeye, 1,114 coho, 7,471 pink, and 3,119 chum salmon. In addition, 37,638 sockeye, and 110,152 pink salmon were harvested by Cook Inlet Aquaculture Association (CIAA) from the Tutka Lagoon Special Harvest Area (SHA) for cost-recovery purposes. The preliminary passage estimate at the English Bay River weir was 20,751 sockeye salmon, which exceeded the SEG (6,000–13,500) for this system. There are 7 streams in the Southern District that have a total of 8 SEGs. Of those goals, 6 are for pink, 1 is for chum, and 1 is for sockeye salmon. Escapement for both the chum and sockeye salmon goals was above the SEG range for those systems. Of the 6 systems with pink salmon SEGs, 3 were within their respective goals, 1 stream (China Poot Creek) did not achieve its SEG, and 2 streams (Tutka Creek and Barabara Creek) exceeded the upper end of their SEG.

Kamishak Bay District

The 2017 preseason commercial harvest forecast for the Kamishak Bay District was 27,500 sockeye, 61,200 pink, and 4,200 chum salmon. CIAA forecasted a run of 13,020 sockeye salmon to the Kirschner Lake remote release site. Total preliminary estimated CCPF harvest was 102,810 sockeye, 185 coho, 254,440 pink, and 34,275 chum salmon. This compares to a previous 10-year average of 63,086 sockeye, 118 coho, 24,594 pink, and 20,529 chum salmon harvested in the CCPF. In addition, 22,593 sockeye salmon were harvested by CIAA from the Kirschner Lake SHA for cost-recovery purposes. There are 12 systems in the Kamishak District that have a total of 13 SEGs. Of those goals, 7 are for chum, 3 are for sockeye, and 3 are for pink salmon. Escapement for sockeye salmon was within the SEG at Mikfik Lake and Amakdedori Creek, and exceeded the SEG at Chenik Lake. Pink salmon escapement was within the SEG range at Sunday Creek and in the Bruin River. The pink salmon SEG was exceeded at Brown's Peak Creek. Chum salmon escapement was within the SEG at 4 systems: Little Kamishak River, McNeil River, Cottonwood Creek, and Iniskin River. The chum salmon SEG was exceeded at the Big Kamishak River, Bruin River, and in Ursus Cove. Escapement levels for salmon in the Kamishak District may have been underestimated due to poor weather conditions that prevented regular aerial surveys of that area.

Outer District

The 2017 preseason commercial harvest forecast for the Outer District was 14,300 sockeye, 194,000 pink, and 56,800 chum salmon. Preliminary total harvest estimates, from the 17 permit holders that participated, were 1 Chinook, 260 sockeye, 389 coho, 1.2 million pink, and 151,356 chum salmon. This harvest compares to previous 10-year averages of 11,180 sockeye, 149 coho, 956,481 pink, and 45,515 chum salmon. There are 11 streams in the Outer District that have a total of 15 SEGs. Of those goals, 2 are for sockeye, 9 are for pink, and 4 are for chum salmon. Sockeye salmon escapement to Delight and Desire lakes was within their SEG ranges. Pink salmon escapement was above the SEG at Port Chatham and in Dogfish Bay, and below the SEG at South

Nuka Island Creek, and within the SEG at the remaining systems. Chum salmon escapement was within the SEG range at Port Dick and Island creeks and above the SEG at Dogfish Bay and in the Rocky River. Escapement levels for salmon in the Outer District may have been underestimated due to poor weather conditions that prevented regular aerial and ground surveys of that area.

Eastern District

Due to small runs in the last 10 years, no wild stock sockeye or pink salmon were forecast to be available for CCPF harvest from the Eastern District in 2017. CIAA forecasted a total run of 120,583 sockeye salmon to Resurrection Bay facilities, with all but 10,000 anticipated to be used for broodstock or cost-recovery purposes. Total cost-recovery harvest from this district was 25,914 sockeye salmon, with 3,063 donated at the weir to members of the public. Although portions of Resurrection Bay were open for CCPF harvest from June 26 through July 14, no harvests were reported. Total sockeye salmon passage through the Bear Creek weir was 12,948, with 3,746 harvested by CIAA for use as hatchery broodstock. The remaining 9,202 sockeye salmon were allowed to spawn naturally in Bear Lake. This was above the SEG range (700–8,300) for this system. The only other index system in the Eastern District is Aialik Lake sockeye salmon where the final escapement was within the SEG range.

Upper Cook Inlet

The 2017 Upper Cook Inlet (UCI) commercial harvest of approximately 2.6 million was 26% less than the recent 10-year average annual harvest of 3.5 million (Table 5).

Currently, there are 7 sockeye salmon systems with escapement/inriver goals that are monitored in UCI. Sonar was used to estimate sockeye salmon passage in the Kenai and Kasilof rivers, whereas weirs were operated at Larson, Chelatna, Judd, and Big (Fish Creek) lakes. Remote video technology was utilized to evaluate the SEG at Packers Lake. For the 2017 season, escapement objectives were exceeded at 3 systems (Kenai and Kasilof rivers and Fish Creek) and met at 3 systems (Larson, Chelatna, and Judd lakes); the final escapement for Packers Lake will not be known until all of the video is processed.

Chinook Salmon

In UCI, there are 2 commercial fisheries where the majority of Chinook salmon are harvested, which are the set gillnet fisheries in the Northern District and in the Upper Subdistrict of the Central District. Moderate improvements have been seen in Chinook salmon numbers for the past 3 years; however, runs were again expected to be below average in watersheds throughout Southcentral Alaska during the 2017 season. Therefore, it was uncertain if restrictions to sport and commercial fisheries beyond those identified in management plans would be required to ensure escapement objectives were achieved. Since 2011 in the Northern District, management actions in the Northern District directed Chinook salmon set gillnet fishery have included area closures, time restrictions, and/or regularly scheduled fishing period closures in order to reduce the harvest of northern Cook Inlet Chinook salmon. Because Chinook salmon escapements have improved modestly in the Northern District in recent years, this has resulted in a relaxation of some sport fish restrictions in the Deshka and Little Susitna rivers. Harvest and escapement data over recent years, in combination with recent strength of age class relationships derived from data collected at the Deshka and Little Susitna weirs, indicated that additional harvest over 2013–2016 levels was sustainable for these systems only. Therefore, the 2017 Northern District directed Chinook salmon commercial fishery started the season fishing regularly scheduled 12-hour fishing periods. In total,

there were 4 periods scheduled during the directed Chinook salmon commercial fishery: May 29, and June 5, 12, and 19. The Deshka River is the primary system in northern Cook Inlet where Chinook salmon escapement has been monitored inseason with a weir to meet an SEG (13,000–28,000). Based on weir counts of approximately 6,400 through June 17, achieving the SEG in the Deshka River was uncertain without a reduction in harvest of this stock. Therefore, the final Northern District set gillnet commercial fishing period on June 19 was reduced from 12 hours to 6 hours in duration. Bait was removed from the Deshka River sport fishery via EO a few days later. The estimated final escapement of Chinook salmon in the Deshka River was approximately 11,400, which was below the lower end of the SEG and was 34% less than the previous 10-year average of 17,195.

The Alaska Board of Fisheries adopted a new Chinook salmon SEG (2,100–4,300) for the Little Susitna River at its 2017 UCI finfish meeting. The estimated escapement in 2017 was approximately 2,500, which meant the SEG was achieved.

The estimated Chinook salmon harvest in the Northern District directed fishery in 2017 was 1,927, nearly identical to the previous 10-year average annual harvest of 1,926.

A number of regulatory changes were made to the *Kenai River Late-Run King Salmon Management Plan* by the Alaska Board of Fisheries during the 2017 UCI finfish meeting. Kenai River late-run Chinook salmon were now to be managed to meet an SEG of 13,500–27,000 large (>75 cm mid eye to tail fork) fish. If restrictions were implemented in the sport fishery in order to achieve the SEG (from July 1–31), restrictive actions were also required in the Eastside Setnet (ESSN) fishery. In August, after the Kenai River sport fishery is closed, the ESSN fishery was to be managed to meet both Chinook and sockeye salmon escapement goals. The 2017 preseason forecast was for a total run of approximately 33,600 large Kenai River late-run Chinook salmon. Few, if any, restrictive actions were anticipated in either the sport or commercial ESSN fishery if the total run was close to forecast. No restrictions were made to either fishery for Chinook salmon conservation in 2017.

The estimated harvest of all Chinook salmon stocks in the 2017 ESSN fishery was 4,779 fish. The stock composition of the harvest will not be known until genetic samples collected during the fishery are processed by ADF&G's Gene Conservation Laboratory (<http://www.adfg.alaska.gov/index.cfm?adfg=fishinggeneconservationlab.main>). Large late-run Chinook salmon passage in the Kenai River was enumerated at the River Mile 14 sonar site. The total estimated inriver mortality (harvest and catch and release mortality) above the sonar was 6,082 fish with an estimated number of Chinook salmon spawning downstream of the sonar of 829 fish. This resulted in a preliminary escapement estimate of 20,731 Chinook salmon, which was within the SEG of 13,500–27,000 large fish.

Similar to 2016, harvest of Chinook salmon was again allowed in the Kenai River during the early-run Chinook salmon sport fishery. An emergency order (EO) opened the lower 18 miles of the Kenai River with bait from June 21 to June 30. The estimated passage of early-run large Chinook salmon was 7,237; the optimal escapement goal for Kenai River early-run large Chinook salmon is 3,900–6,600. Therefore, after harvest above the River Mile 14 sonar site is subtracted from the passage estimate, it is likely the upper end of the optimal escapement goal was exceeded.

In all of UCI, approximately 7,660 Chinook salmon were commercially harvested in 2017, which was 19% less than the previous 10-year (2007–2016) average annual harvest of 9,427.

Sockeye Salmon

The total run, which includes estimates of commercial, sport, personal use, education, and subsistence harvests and escapement, of approximately 4.6 million sockeye salmon to UCI was 14% more than the preseason forecast (Table 3). The Kenai River run exceeded the forecast by approximately 726,000 and Fish Creek exceeded the forecast by 14,000. The Kasilof River sockeye salmon total run estimate was very close to forecast with approximately 4,000 less than expected, whereas the number returning to the Susitna River and all other systems (minor systems) was less than forecast.

The UCI commercial harvest of 1.8 million sockeye salmon was approximately 18% less than the previous 10-year (2007–2016) average annual harvest of 2.9 million, and also the smallest harvest in the last 10 years.

Upper Subdistrict Set Gillnet and Central District Drift Gillnet

The 2017 UCI preseason forecast projected a total run of approximately 4.0 million sockeye salmon (Table 3), with a total harvest estimate (sport, personal use and commercial) of 2.6 million and a commercial fisheries harvest of approximately 1.7 million.

Drift gillnetting opens in the Central District only by regulation on the third Monday in June or June 19, whichever is later. In 2017, the third Monday in June fell on June 19; therefore, the drift gillnet season opened on June 19. The Kasilof Section set gillnet fishery (statistical areas 244-21, 244-22, and 244-31) opens by regulation on or after June 25, but may open any time after June 20 if 50,000 sockeye salmon are estimated to have entered the Kasilof River. On June 23, a total of 47,451 sockeye salmon had passed the Kasilof River sonar counter with a daily passage estimate of approximately 3,650. Thus, the Kasilof Section was opened to set gillnetting beginning on Saturday, June 24. Sockeye salmon passage in the Kasilof River through midnight on June 24 was 50,525. The Kenai and East Foreland sections set gillnet fishery (statistical areas 244-32, 244-41, and 244-42) open by regulation on the first Monday or Thursday on or after July 8, which meant Monday, July 10, was the first day of fishing in these areas in 2017.

The sockeye salmon run forecast to the Kenai River in 2017 was 2.1 million, which meant that management of drift and set gillnet fisheries fell under provisions for Kenai River runs less than 2.3 million. Specifically, this meant that from July 8 through August 10 the Upper Subdistrict set gillnet fishery (often referred to as the ESSN fishery) would be open for regular 12-hour Monday and Thursday fishing periods and no more than 24 additional fishing hours per week. Under this run size tier, there were no mandatory closed fishing periods (windows) each week (Sunday to Saturday). In the drift gillnet fishery for Kenai River sockeye salmon runs less than 2.3 million, from July 16 to July 31 fishing during all regular 12-hour fishing periods and any extra fishing time is to be restricted to the Expanded Kenai and Expanded Kasilof sections.

The total commercial harvest of sockeye salmon through Thursday, July 20, was nearly 1.4 million, or about 82% of the expected harvest for the season. Yet, sockeye salmon passage in the Kenai River was only 265,000, with the run typically about 40% complete. Based on this, achieving the Kenai River minimum inriver goal of 900,000 would require a reduction in harvest of this stock so that passage rates would increase. Kasilof River sockeye salmon passage is typically about 66% complete through July 20 and the total passage estimate of 174,000 through July 20 suggested that the biological escapement goal (BEG; 160,000–340,000) would be met even with a reduction in harvest of this stock. Therefore, the regularly scheduled fishing periods on

Monday, July 24, and Thursday, July 27, were closed to both the Central District drift gillnet and ESSN fisheries in order to increase sockeye salmon passage in the Kenai River. By Friday, July 28, the cumulative sockeye salmon passage estimate in the Kenai River had increased to 635,000. Based on this figure, and assuming the run would be 2–4 days late, the inriver goal was now projected to be met. Thus, both the ESSN and drift gillnet fisheries were reopened on Saturday, July 29.

On July 28, Division of Commercial Fisheries staff made a formal inseason estimate of the total sockeye salmon run to date, including an estimate of the run yet to come. Based on Offshore Test Fish data, the 2017 sockeye salmon run was expected to be 2–4 days late and the Kenai River sockeye salmon run was now expected to exceed 2.3 million. With this inseason assessment, management of the ESSN and Central District drift fisheries now followed the provisions for Kenai River sockeye salmon run sizes of 2.3–4.6 million. In this run size tier, the Kenai River inriver goal range increased to 1.0–1.3 million. The ESSN fishery could now be open for up to 51 additional hours per week beyond the 12-hour regular periods on Monday and Thursday. In addition, the ESSN fishery was to be closed during 2 time periods each week as follows: for 24 consecutive hours beginning between 7:00 p.m. on Monday and 7:00 a.m. on Wednesday, and for 36 consecutive hours beginning between 7:00 a.m. on Thursday and 7:00 a.m. on Friday. The increase in run size also meant the drift gillnet fishing period on Monday, July 31, could be fished in one or more of the following areas: Expanded Kasilof Section, Expanded Kenai Section, Anchor Point Section, Drift Area 1, or all waters of the Central District.

From June 24 through August 15, the Kasilof Section set gillnet fishery was open on 23 different days, harvesting approximately 552,000 sockeye salmon. The previous 10-year average annual harvest in the Kasilof Section (excluding 2012 due to significant restrictions to the ESSN fishery for Chinook salmon conservation) was 646,000. From July 10 through August 14, the Kenai and East Foreland sections were open on 13 different days, producing a total sockeye salmon harvest of 270,000; the previous 10-year (excluding 2012) average annual sockeye salmon harvest in these sections was 489,000. The Kasilof River SHA was not opened in 2017.

From June 19 through August 14, the drift fleet fished a total of 25 days as follows: 5 days in the regular Kasilof Section, 4 days in the Expanded Kenai/Kasilof sections, 3 days in the Expanded Kenai/Kasilof and Anchor Point sections, 3 days in Drift Area 1, and 8 days in all of the Central District. Beginning on Thursday, August 17, all Monday/Thursday regular fishing periods were restricted by management plan to Drift Areas 3 and 4. In addition, Chinitna Bay was opened to drift gillnetting for 12-hour fishing periods on Tuesdays and Fridays, beginning on Friday, August 18. This area was opened when an aerial survey of the Chinitna River/Clearwater Creek showed that the chum salmon SEG had been achieved. The total drift gillnet harvest in 2017 was approximately 881,000 sockeye salmon, which was about 18% less than the previous 10-year average annual harvest of 1.07 million. The peak day of harvest in the drift fleet occurred on Thursday, July 13, where 396 vessels harvested approximately 183,000 sockeye salmon, or 463 fish/boat. This was the highest peak day in the past 3 years, but still much less than the previous 10-year average peak harvest of 919 fish/boat.

An examination of the 2017 sockeye salmon harvest in the ESSN and drift gillnet fisheries shows that harvest between set and drift gillnet gear was very close to the previous 10-year average. The drift harvest of 881,000 was 58% of the total harvest between the 2 gear types; their previous 10-year average was 56% (2012 was excluded). The ESSN fishery harvest of approximately 822,000 was 42% of the total harvest; their previous 10-year average was 44%.

In the Ninilchik set gillnet statistical area (244-21), which is that area of beach from the Ninilchik River north to Clam Gulch access road, approximately 309,000 sockeye salmon were harvested, which was 38% of the total ESSN harvest of 822,000. The previous 10-year average harvest in statistical area 244-21 was 274,000, or 23% (range 16–28%) of the total ESSN harvest. Thus, the 2017 sockeye salmon harvest in statistical area 244-21 represented a 63% increase over the previous 10-year average.

The pattern of sockeye salmon passage in the Kenai River observed in 2017 was similar to that observed in 2015 and 2016. For the third year in a row, the peak day of sockeye salmon passage in the Kenai River was much lower than peak enumeration days in previous years. In 2017, the peak day of passage occurred on July 26, where 71,910 fish were estimated to have migrated past the River Mile 19 sonar site. This compares to the previous 10-year average (2007–2016) peak day of passage of approximately 130,000. The 2017 figure represented the second lowest peak day of passage in the past 10 years; it was lower than expected because commercial fishing on this stock had been closed for the previous 6 days to increase daily passage into the Kenai River.

Western Subdistrict

By regulation, the Western Subdistrict set gillnet fishery opened for regular periods on Monday, June 19. This fishery primarily harvests sockeye salmon returning to the Crescent River. The Crescent River sonar program was discontinued in 2014. In 2017, sockeye salmon harvest rates in the set gillnet fishery from the beaches near the Crescent River area were consistent with historical harvest rates when the fishery was provided additional fishing time due to increased sockeye salmon passage into the Crescent River. Therefore, an EO was issued on July 8 opening that portion of the Western Subdistrict south of the Redoubt Point latitude from 6:00 a.m. until 10:00 p.m. on Mondays, Thursdays, and Saturdays each week from July 10 through August 7. In 2017, approximately 31,500 sockeye salmon were harvested by setnetters in the Western Subdistrict; which was 27% less than the previous 10-year average annual harvest of approximately 43,000.

Kustatan Subdistrict

The Kustatan Subdistrict includes those waters from the Drift River terminal to the Northern District boundary near the West Forelands. From 1993 to 2016, approximately 9 permit holders per year have reported harvest from this area. The majority of participation and harvest (more than 92% of the harvest) typically comes from the Big River sockeye salmon fishery, which is an early season fishery limited to 1 net per permit holder and occurs June 1–24. Approximately 4,000 sockeye salmon were harvested in the Kustatan Subdistrict in 2017, with nearly 3,590 of these harvested during the Big River fishery. The 2017 sockeye salmon harvest was approximately 31% greater than the previous 10-year average annual harvest of 3,097.

Kalgin Island Subdistrict

The Kalgin Island Subdistrict opened for regular fishing periods beginning June 27; however, the west side of Kalgin Island was open for commercial fishing on Mondays, Wednesdays, and Fridays June 1–24 as part of the Big River sockeye salmon fishery. In 2017, approximately 44,000 sockeye salmon were harvested from the Kalgin Island Subdistrict, with nearly 11,400 (26%) of those fish taken during the Big River sockeye salmon fishery. The previous 10-year average annual sockeye salmon harvest on Kalgin Island was approximately 56,700, with roughly 11,500 of those fish harvested during the early season Big River fishery. A remote video system was deployed at Packers Creek to monitor sockeye salmon escapement into Packers Lake. A review of the video

data mid-season did not support any additional fishing periods beyond Monday and Thursday regular periods in the Kalgin Island Subdistrict in 2017.

Northern District

Commercial fishing in the Northern District opened on May 29 for the directed Chinook salmon fishery (see Chinook salmon section below) and for regular periods beginning on June 26. In 2017, approximately 57,000 sockeye salmon were harvested in the Northern District, with about 4,400 of these fish harvested during the 4 directed Chinook salmon fishing periods. The 2017 sockeye salmon harvest was 64% greater than the previous 10-year (2007–2016) average annual harvest of 34,700, but approximately 34% less than the 1966–2016 average of nearly 85,000.

Coho Salmon

The 2017 harvest estimate of approximately 304,000 coho salmon in all commercial fisheries in UCI was 81% greater than the recent 10-year (2007–2016) average annual harvest of approximately 167,000 (Table 5). The 2017 drift gillnet harvest of 191,000 coho salmon was 94% greater than the recent 10-year average of approximately 99,000 and was the largest drift harvest of coho salmon since 2004. The Northern District set gillnet harvest of about 53,000 coho salmon in 2017 was the largest harvest since 2000 and approximately 60% greater than the previous 10-year average annual harvest (33,000).

In UCI, there are 3 coho salmon systems with escapement goals that are monitored inseason with weirs: Fish Creek, Little Susitna, and Deshka rivers. The goal at Fish Creek is an SEG of 1,200–4,400. Coho salmon enumeration at the Fish Creek weir occurred from July 20 to September 24 and produced a final count of 8,794, nearly doubling the upper end of the SEG. During the 2017 season, the sport fishing bag and possession limit for coho salmon was increased to 4 fish beginning at 5 a.m. on August 22 in waters open to salmon fishing on Fish Creek. In addition, fishing was allowed at Fish Creek 7 days per week, from 5 a.m. to 10 p.m.

The Little Susitna River has a coho salmon SEG of 10,100–17,700. Coho salmon escapement was enumerated at the Little Susitna weir from July 5 through September 9, with a passage estimate of 17,781. Although the upper end of the SEG was exceeded, the coho salmon run was many days late in run timing, prompting an EO from the Division of Sport Fish prohibiting the use of bait in the Little Susitna River sport fishery from August 6 until August 23. This action was taken in response to lagging escapement of coho salmon that made projecting the SEG uncertain without a reduction in harvest. In response to this EO, the commercial drift gillnet fishery was restricted from districtwide fishing periods to Drift Gillnet Area 1 and the Expanded Kenai and Expanded Kasilof sections on August 7, 10, and 14. The entire Northern District set gillnet fishery was reduced from a 12-hour fishing period to a 6-hour fishing period on August 7, and that portion of the General Subdistrict of the Northern District east of the Susitna River, including Fire Island, was restricted to fishing 6-hour regular periods on August 10, 14, 17, and 21 in an effort to reduce the harvest of Little Susitna River coho salmon.

A new SEG (10,200–24,100) was adopted at the 2017 UCI Alaska Board of Fisheries meeting for Deshka River coho salmon. In the inaugural year of assessing coho salmon escapement in this drainage as it related to the SEG, nearly 37,000 fish were counted through the weir. In response to the strong coho salmon escapement, the Division of Sport fish issued an EO on August 22 increasing the sport fishing bag and possession limit for coho salmon to 4 fish per day and 8 fish in possession, in all waters open to salmon fishing in the Susitna River Drainage

Finally, there is a coho salmon foot survey SEG (450–1,400) at McRobert’s Creek, which drains into Jim Creek, both located in the Knik River drainage. In 2017, the foot survey was conducted on September 27 and produced a count of 607 fish, which meant the SEG was achieved for this system.

Pink Salmon

Pink salmon runs in UCI are even-year dominant, with odd-year average annual harvests typically less than one-sixth of even-year harvests. The 2017 UCI commercial pink salmon harvest was estimated to be approximately 168,000, which was 124% greater than the average annual harvest of nearly 75,000 from the previous 10-years of odd-year harvests (Table 5).

Chum Salmon

The 2017 harvest of 244,000 chum salmon was approximately 63% greater than the previous 10-year average annual harvest of 149,000 (Table 5). There is only 1 chum salmon escapement goal in UCI, which is an aerial survey SEG (3,800–8,000) in Clearwater Creek, the major tributary that drains into Chinitna Bay. Approximately 7,000 chum salmon were observed in this watershed during an August 14 aerial survey flight. Chinitna Bay was opened to set and drift gillnetting for 12-hour fishing periods on Tuesdays and Fridays, beginning on Friday, August 18.

BRISTOL BAY

The 2017 inshore Bristol Bay sockeye salmon run of 59.5 million ranks second out of the last 20 years (1997–2016) and was 65 % above the 36.2 million average run for the same period. The run to the Nushagak District was the largest in the history of the fishery. This year’s Bristol Bay sockeye salmon run was an under forecast of 30.4%. The Nushagak, Egegik, Togiak and Ugashik districts were higher than the preseason forecast, and the Naknek-Kvichak District was less than predicted. All escapement goals were met or exceeded, with a total sockeye salmon escapement of 18.8 million. A total of 41,402 Chinook salmon were harvested in Bristol Bay in 2017. The harvests for other species are 1.5 million chum, 240,885 coho, and 34,557 pink salmon. The 2017 sockeye salmon run exhibited 2 distinct run timings this year; the Nushagak District run began strong on June 22 and stayed that way all season, whereas the eastside districts can be described as compressed and slightly late. The compression was exemplified by the 7-day span from July 3 to July 9 where baywide catch and escapement totaled 24.5 million (average of 3.5 million per day). This compression caused processing capacity to be exceeded and limits or suspensions were in place from July 3 until July 15 depending on processor and/or district. Limits and suspensions contributed to escapements being above the established ranges in the Wood, Nushagak, Igushik, and Egegik rivers. The average sockeye salmon weight of 5.5 pounds was below the 20-year (1997–2016) average of 5.9 pounds.

Chinook Salmon

Chinook salmon harvests in Bristol Bay were below average in all districts. No directed Chinook salmon fishing periods occurred in the Nushagak District in 2017. Chinook salmon were caught during directed sockeye salmon periods in all commercial districts; 41,402 fish were harvested, which is above the 20-year average of 40,369. Chinook salmon escapement into the Nushagak River was 56,961, 60% of below the inriver goal of 95,000. The Chinook salmon escapement into the Alagnak River was 435 based on aerial surveys and was below escapement goal of 2,700.

Sockeye Salmon

This year's Bristol Bay sockeye salmon run of 59.5 million was a 30% under forecast of the observed run. Sockeye salmon escapement goals were met in Naknek, Kvichak, Alagnak, Togiak and Ugashik rivers. Escapement goal ranges were exceeded in Wood, Nushagak, Igushik, and Egegik rivers.

Coho Salmon

The preliminary total coho salmon harvest in 2017 was 240,885, higher than the 20-year average of 82,014. Typically the Nushagak District is the largest coho salmon producer. The 167,347 fish harvested in the Nushagak District was above the 20-year average.

Pink Salmon

Pink salmon return to Bristol Bay predominantly in even years. The preliminary harvest in 2017 was 34,557. The majority of pink salmon are harvested in the Togiak and Nushagak districts.

Chum Salmon

The 2017 preliminary Bristol Bay chum salmon harvest was 1,494,636, higher than the 20-year average of 949,842. Harvest was above the 20-year average in all districts; Nushagak District was the largest producer of chum salmon (804,878 harvested).

Bristol Bay Acknowledgments

ADF&G would like to thank the Bristol Bay Fisheries Collaborative (BBFC) for funding assistance in 2017. The BBFC began in 2016 and is an agreement between ADF&G and the Bristol Bay Science and Research Institute to work together with stakeholders to restore a world-class fishery management system and raise funds to support and maintain it. This agreement is supported by ADF&G, Bristol Bay Science and Research Institute, drift and set net fishermen, processors, municipalities, villages, support industries, and other stakeholders. A list of organizations that committed financial support to the BBFC in 2017, as well as additional information about this agreement, can be found at <https://www.bbsri.org/bbfc>.

Table 5.–Preliminary 2017 Central Region commercial salmon harvests, by fishing area and species, in thousands of fish.

Fishing Area	Species					Total
	Chinook	Sockeye	Coho	Pink	Chum	
Purse Seine						
Eastern District	0	15	46	17,632	293	17,986
Northern District	0	17	6	7,420	91	7,534
Coghill District	0	5	0	417	857	1,280
Northwestern District	0	21	1	1,508	45	1,574
Southwestern District	0	50	20	11,575	445	12,090
Montague District	0	10	7	3,239	539	3,795
Southeastern District	0	1	1	676	52	730
Unakwik District	0	0	0	0	0	0
Drift Gillnet						
Bering River District	0	3	119	0	0	122
Copper River District	15	594	308	70	13	1,000
Coghill District	0	113	14	636	2,210	2,973
Eshamy District	0	0	0	6	0	6
Montague District	0	425	4	322	103	854
Unakwik District	0	1	0	0	0	1
Set Gillnet						
Eshamy District	0	183	0	38	18	239
Hatchery ^a	0	0	31	5,053	725	5,809
Prince William Sound Total	15	1,437	559	48,591	5,391	55,993
Southern District	1	100	13	406	12	531
Kamishak District	0	103	0	254	34	392
Outer District	0	0	0	1,244	151	1,396
Eastern District	0	0	0	0	0	0
Hatchery ^b	0	91	1	114	0	206
Lower Cook Inlet Total^c	1	294	15	2,018	198	2,525
Central District	5	1,792	251	158	239	2,445
Northern District	2	57	53	10	5	127
Upper Cook Inlet Total	8	1,849	304	168	244	2,572
Naknek-Kvichak District	2	8,262	5	0	250	8,519
Nushagak District	32	12,325	167	7	805	13,336
Egegik District	1	11,981	14	0	147	12,144
Ugashik District	1	5,706	0	0	88	5,796
Togiak District	5	516	55	27	205	807
Bristol Bay Total	41	38,790	241	35	1,495	40,602
Central Region Total	65	42,370	1,118	50,812	7,327	101,692

Note: Missing data indicates no harvest and zeros indicate harvest activity but <500.

Note: Columns may not total exactly due to rounding.

^a Hatchery sales for operating expenses and broodstock harvests.

^b LCI hatchery harvest includes hatchery cost recovery and hatchery donated fish but not broodstock.

^c LCI total includes commercially harvested fish retained for “homepack.”

ARCTIC-YUKON-KUSKOKWIM REGION

Arctic-Yukon-Kuskokwim (AYK) Region harvests totaled 2,024,439 salmon (Table 6). Cumulative all-gear commercial harvest included 398 Chinook, 2,806 sockeye, 330,112 coho, 1,672,169 chum, and 18,954 pink salmon. Commercial salmon harvests for sockeye, chum, and pink salmon, which comigrate with Chinook salmon, were limited by conservation measures to protect Chinook salmon. Chum salmon abundance was variable throughout the region, with large abundance occurring in the Yukon River and Kotzebue. Sockeye and coho salmon abundance was generally strong throughout the region in locations where they occur. Landings were made by 1,168 limited entry permit holders in 2017.

KUSKOKWIM AREA

The 2017 fishing season was the second consecutive year since statehood that there were no large-scale commercial salmon buyer/processors in the Kuskokwim Area. This resulted in very little opportunity for fishermen in District 1 and no opportunity for fishermen in District 4 (Quinhagak) and District 5 (Goodnews Bay).

Escapement goals were either achieved or exceeded for sockeye, chum, and coho salmon at all locations with 1 exception. However, only 10 of 14 escapement goals were met for Chinook salmon. In general, run timing throughout Kuskokwim area for Chinook, sockeye, chum, and coho salmon was characterized as late.

Kuskokwim River

In 2017, the following preseason and inseason management actions were taken in an attempt to conserve Chinook salmon and achieve escapement goals.

Preseason management actions including early season subsistence fishing closures, tributary closures, time and area restrictions, gillnet mesh size and length restrictions, and live release requirements were jointly recommended by ADF&G and the US Fish and Wildlife Service to achieve escapement goals. The Kuskokwim River Salmon Management Working Group and the Kuskokwim River Inter-Tribal Fish Commission voted to support the management actions.

Early season subsistence fishing closures were initiated as follows: May 20 from the mouth of the Kuskokwim River up to Tuluksak, May 25 from Tuluksak up to the Yukon Delta Refuge Boundary at Aniak, June 1 from the Yukon Delta boundary at Aniak up to the Holitna River mouth, and upstream of Holitna River mouth beginning June 4, 2017. With the closure came additional restrictions, including tributary closures and live release of Chinook salmon requirements. During the front end closure there were 3 gillnet opportunities with 4-inch or less mesh to allow subsistence fishers to harvest nonsalmon species. These openings occurred on May 27, June 3, and June 10.

Beginning June 12, the Federal Subsistence Board adopted a Special Action to close the Kuskokwim Chinook salmon fishery to non-Federally qualified users within the boundary of the Yukon Delta National Wildlife Refuge. The US Fish and Wildlife Service managed the subsistence fishery within the Yukon Delta National Wildlife Refuge through July 6, at which time ADF&G resumed management of the entire Kuskokwim River.

Subsistence management under ADF&G consisted of a June 12, 24-hour 6-inch or less mesh, 25-fathom gillnet opportunity from the refuge boundary at Aniak to the Holitna River, and removal

of subsistence gillnet restriction in waters upstream of the Holitna River. Two 12-hour, 6-inch or less mesh, 25-fathom gillnet opportunities occurred on June 24 and July 3 in state waters from Aniak to the Holitna River mouth. Beginning July 8, the entirety of the mainstem of the Kuskokwim River was open to 6-inch or less mesh, 25-fathom gillnets until further notice. Mainstem gear restrictions were removed on July 27 and the tributary restrictions were finally lifted on August 17. The tributary restrictions were kept in place beyond the mainstem restrictions for the purpose of conservation while Chinook salmon were on their spawning grounds.

Chinook salmon escapement at KogrukluK and George River weirs exceeded their respective SEG ranges, and escapement at Kwethluk River weir was within the SEG. Seven tributaries have aerial survey SEGs; of these, 5 tributaries were within the respective SEG ranges and 2 were either below the SEG or weather prevented the survey from being conducted. The Kuskokwim River drainagewide SEG was probably achieved.

Overall, sockeye salmon escapement was well above average across the drainage. The KogrukluK River weir has the only established sockeye salmon escapement goal with 2017 escapement achieving the SEG. The Telaquana weir observed the highest escapement of sockeye salmon since the project was established in 2010.

Chum salmon run timing was late and all escapement projects showed an above average run. Escapement at the KogrukluK River weir exceeded the established SEG.

High water conditions hampered efforts to assess the coho salmon run at escapement projects drainagewide. Coho salmon passage at the Kwethluk River weir met the SEG for that system. Counts at KogrukluK River weir are considered incomplete due to high water.

Kuskokwim Bay District 4 (Quinhagak) and District 5 (Goodnews Bay)

There were no commercial salmon fishing periods in District 4 and District 5 during the 2017 season due to a lack of a commercial buyer/processor.

The Kanektok River weir was not operated in 2017 due to a lack of funding. Subsequently, aerial surveys were not conducted due to poor weather conditions during the established survey period.

The Middle Fork Goodnews River Chinook salmon BEG (1,500–2,900) was exceeded with an escapement of 6,576. The sockeye salmon BEG (18,000–40,000) was exceeded with an escapement of 179,452. The chum salmon lower bound SEG (12,000) was also exceeded with an escapement of 41,729. The Middle Fork Goodnews River weir was removed on July 31 due to a loss of funding that would cover weir operations through the end of August. An aerial survey of the North Fork Goodnews River was not conducted due to poor weather conditions during the established survey period.

YUKON AREA

The 2017 Yukon River total commercial harvest was 168 Chinook, 555,296 summer chum, 489,702 fall chum, 138,915 coho, and 0 pink salmon for the Alaska portion of the drainage. A total of 393,165 summer chum, 463,078 fall chum, 129,259 coho, and 0 pink salmon were harvested in the lower Yukon River (Districts 1–3) and 162,131 summer chum, 26,624 fall chum, and 9,656 coho salmon were harvested in the upper Yukon River (Districts 4–6). A total of 476 permit holders sold fish in the Yukon Management Area in 2017.

Summer Season

The 2017 preseason Chinook salmon outlook was a range of 140,000–195,000 fish, and the 2016 preseason summer chum salmon outlook was for approximately 2.4 million fish. As with previous years, restrictions to Chinook salmon-directed subsistence fishing were taken in response to poor Chinook salmon runs in recent years. For the 10th consecutive year, Chinook salmon-directed commercial fishing was not allowed. However, commercial fishing opportunity was provided to target summer chum salmon in Districts 1, 2, 4, and 6. The sale of incidentally caught Chinook salmon was prohibited by EO during the entire summer commercial fishing season to dissuade fishermen from targeting Chinook salmon during commercial fishing periods.

Because Chinook salmon are encountered incidentally in the commercial summer chum salmon fishery, a suite of strategies was used to conservatively manage the fishery in order to minimize the impact to the Chinook salmon run. In Districts 1 and 2, dip nets and beach seines were used, and in District 4, manned fish wheels were used. Chinook salmon are required to be released alive from these selective gear types. Once commercial fishing was allowed with gillnets, all Chinook salmon could be released alive or kept for subsistence use.

Selective fishing for summer chum salmon using dip nets and beach seines began June 10 in District 1. The first commercial fishing period in District 2 was provided on June 21. ADF&G allowed ten 12-hour periods in District 1 and two 6-hour and five 8-hour periods in District 2 using dip nets and beach seines only. The combined harvest in Districts 1 and 2 with selective gear types was 135,043 summer chum salmon. The use of gillnets in the summer chum commercial fishery was delayed until after the midpoint of the Chinook salmon run and the passage estimate at Pilot Station sonar was around 166,000 fish. In District 1, commercial opportunity with 5.5-inch or smaller mesh size gillnets not exceeding 30 meshes in depth was provided for 4 periods beginning June 23 in order to reduce the incidental harvest of Chinook salmon. Gillnet opportunity with 6-inch or smaller mesh was provided beginning July 1 in District 1 for 8 periods. The 5.5-inch gillnet gear restriction was not applied in District 2 because most fishermen do not have that gear type. Commercial fishing with 6-inch or smaller mesh gillnets began July 11 in District 2 and was open for 2 periods in the summer season. Fishermen were required to report any Chinook salmon released alive or caught but not sold on fish tickets. An estimated 4,618 Chinook salmon were reported released alive, and 5,589 Chinook salmon were kept for personal use in Districts 1 and 2 during the summer season commercial fishery.

Commercial fishing opened in District 4 on June 25, with 34 periods offered through July 31 with live-release fish wheels. Less than 50 Chinook salmon were encountered and released alive in District 4.

The District 4 summer chum salmon harvest of 157,831 was the largest harvest since 1996.

In District 6, commercial fishing opened on July 14. ADF&G scheduled 8 commercial fishing periods. Gear restrictions were not implemented during the commercial fishery; fishermen could use 7.5-inch or smaller mesh gillnets and fish wheels. Chinook salmon could not be sold but could be retained for subsistence use. The preliminary cumulative harvest was 4,300 summer chum salmon and 185 Chinook salmon kept for personal use. The 2017 District 6 commercial summer chum salmon harvest was 14% below the recent 5-year average of 5,029.

The cumulative summer chum salmon commercial harvest for Districts 1 and 2 for all gear types combined was 393,165. No pink or coho salmon were sold during the summer season. The Lower

Yukon Area summer chum salmon harvest was 4% above the 2012–2016 average harvest of 378,054. The Upper Yukon Area summer chum salmon harvest was 162,131, which was nearly 2.5 times greater than the 2012–2016 average of 66,051. The total 2017 commercial harvest for the entire Yukon Area was 555,296 summer chum salmon, which was 25% above the 2012–2016 average harvest of 444,105. The total 2017 summer chum harvest was the largest on record since 1996.

A total of 401 permit holders participated in the summer chum salmon commercial fishery, approximately 9% below the previous 10-year (2007–2016) average of 440 permit holders. The Lower Yukon Area (Districts 1–3) and Upper Yukon Area (Districts 4–6) are separate Commercial Fisheries Entry Commission permit areas. A total of 388 permit holders fished in the Lower Yukon Area in 2017, which is below the previous 10-year (2007–2016) average of 430 permits. In the Upper Yukon Area, at least 13 permit holders fished, which was above the previous 10-year (2007–2016) average of 11.

In the 2017 fall season, the sale of Chinook salmon was allowed for 1 period, during which 1,804 pounds were sold at an average price of \$5.50/pound.

Although below average, the 2017 Chinook salmon run came in above the upper end of the preseason outlook range. In 2017, escapement assessment for Chinook salmon was hampered by high water conditions for tower counting projects. Sonar estimates of passage were collected at Chena and Salcha rivers but the estimates will not be available until later this winter. The SEG at the East Fork Andreafsky River Weir was met with a passage of 2,970 Chinook salmon. Preliminary Chinook salmon passage at the border sonar project near Eagle was approximately 71,815, which exceeded the Interim Management Escapement Goal (42,500–55,000).

Fall Season

The Yukon Area fall season began by regulation on July 16 in District 1. The subsequent transition of upriver districts and subdistricts to fall season management followed the migration timing of fall chum salmon. Initial management was based on a preseason projection of greater than 1 million. All districts and subdistricts were placed on their full regulatory subsistence fishing schedules commensurate with switching over to fall management (some subsistence restrictions were taken in the US portion of the mainstem Porcupine River). By mid-August, subsistence fishing in all mainstem Yukon River districts was open 7 days per week, 24 hours per day, except for closures before, during, and after commercial periods in Districts 1 and 2.

The 2017 fall chum salmon run entered the Yukon River in 7 distinct pulses. The fourth pulse was the largest (approximately 1.1 million). The pulse was 7 days in duration with the peak daily passage at the mainstem sonar near Pilot Station occurring on August 16. Cumulative fall chum salmon passage past the mainstem sonar remained well above the historical median the entire season. Inseason run projections remained well above the 550,000 threshold necessary to allow fall chum salmon-directed commercial fishing. Run timing for fall chum salmon was only slightly late, averaging 2 days late over all the assessment projects.

The cumulative coho salmon passage past the mainstem sonar near Pilot Station tracked with the historical median throughout the season. The preliminary coho salmon passage estimate at the mainstem sonar project near Pilot Station was 166,300, which was above the historical median of 160,300.

There were 71 commercial periods in 2017. Fall chum salmon commercial fishing occurred throughout the drainage: Districts 1, 2, and 6; Subdistrict 4-A; and Subdistricts 5-A and 5-B. ADF&G identified a coho salmon surplus in addition to what was harvested in the fall chum salmon commercial fishery, so a coho salmon-directed fishery was allowed in District 1 from September 1 to September 10, and in District 6 from October 1 to October 5. The majority of fall season commercial harvest occurred in Districts 1 and 2. Limited markets resulted in low fishing effort and relatively small harvests in the remaining areas. The total commercial harvest for the Yukon River in the Alaska portion of the drainage was 489,702 fall chum salmon and 138,915 coho salmon. The commercial harvest of fall chum salmon in 2017 eclipsed the previous record of 467,687 harvested in 1981, and was higher than the 465,511 harvested in 2016. The coho salmon harvest was down from 2016 but above the 2012–2015 average. The average weight of fall chum salmon caught commercially in Districts 1 and 2 was 7.3 pounds; the average weight of coho salmon was 6.3 pounds. All fall chum and coho salmon were sold in the round except for small amounts of fall chum salmon roe sold in Districts 5 and 6. The average price per pound paid in Districts 1 and 2 was \$0.60 for fall chum salmon and \$1.00 for coho salmon. A total of 451 individual permit holders participated in the fall chum and coho salmon fishery: 438 in Districts 1 and 2 combined, and 13 in Districts 4–6. Participation is near the recent the 5-year average of 453 permits in the Yukon Area.

The preliminary 2017 fall chum salmon run size is estimated to be 2.2 million, which exceeded both the forecast and the preseason projections. The preliminary drainagewide escapement estimate for fall chum salmon is 1.6 million which exceeded the upper end of the SEG range (300,000–600,000). All other fall chum salmon escapement goals were met or exceeded. The large run size observed this year was due to the exceptionally high return of age-4 fish combined with an above average return of age-5 fish. Preliminary coho salmon run size is estimated to be 315,700, which is above historical median of 206,000. The Delta Clearwater River has the only established escapement goal for coho salmon in the Yukon Area, an SEG range of 5,200–17,000. A boat survey conducted in the Delta Clearwater River in late October observed just over 9,600 coho salmon which was within the goal range.

NORTON SOUND AREA

Highlights of the 2017 Norton Sound District salmon fishery included well above average to near record runs of chum, pink, sockeye, and coho salmon. The coho salmon harvest was a record and the chum salmon harvest was the ninth highest on record and the best since 1983. The sockeye salmon harvest—although a small portion of the overall harvest—was the second highest in history at nearly 3,000 fish. The pink salmon run was one of the greatest runs for an odd-numbered year and pink salmon escapements surpassed many of the usually much higher even-numbered year escapements. Restrictions were taken in the subsistence fishery in southern Norton Sound to protect Chinook salmon, but escapements were poorer than recent years. Another big run of sockeye salmon to the Pilgrim River on the Nome road system resulted in a near record 477 subsistence salmon permits issued and a record catch of over 11,000 sockeye salmon.

Commercial permit holder participation was the second highest in over 20 years with 139 fishing, and was just below 2016 when 141 permit holders fished. Commercial salmon harvests were 230 Chinook, 2,806 sockeye, 191,197 coho, 18,954 pink, and 163,422 chum salmon.

The 2017 forecasted commercial chum salmon harvest range was 50,000–80,000. The harvest was over double the forecast even though during the first 2 weeks of fishing the buyer restricted fishing time in half from the usual two 48-hour periods per week.

The pink salmon run was also much stronger than expected, but there was little interest by the buyer and there were no directed pink salmon commercial fishing periods. The pink salmon harvest was an incidental catch during chum and coho salmon-directed fishing periods and the harvest was below the forecast (50,000–75,000).

The 2017 coho salmon harvest was over double the forecast range (90,000–120,000). Record harvests occurred in 4 of the 6 subdistricts (Nome, Elim, Shaktoolik, and Unalakleet Subdistricts).

Escapement goal ranges were exceeded for all salmon species, except for Chinook salmon. Both Chinook salmon minimum escapement goals in Norton Sound were not reached.

KOTZEBUE SOUND AREA

The Kotzebue Sound chum salmon harvest in 2017 was the second highest in over 30 years and was only the seventh time the harvest exceeded 400,000; the commercial harvest of 463,749 was the sixth highest in history. The harvest was slightly above the forecast (250,000–450,000). There was increased commercial fishing time because there were 2 major buyers (there was only 1 major buyer the 2 previous years); the new buyer this year had a floating processor that arrived in late July, allowing for more fishing time because the fishery was no longer restricted by airplane cargo capacity.

There were 100 permit holders that sold chum salmon in 2017. This year’s participation by permit holders was 16% above last year’s participation (86 permit holders sold fish) and was the second highest permit holder participation in over 20 years. The highest fishing effort occurred on August 7 when 74 permit holders fished. Buyers only purchased chum salmon, but harvest retained for personal use included 115 Chinook, 129 sockeye, 1,017 pink, and 58 coho salmon, 523 Dolly Varden, 349 sheefish, and 1 whitefish.

A total of 3,832,578 pounds of chum salmon (average 8.3 pounds) were sold at an average price of \$0.48/pound. This year’s average price was 45% higher than last year’s price of \$0.33/ pound.

High water prevented aerial surveys, but the test fish chum salmon catch index ranked eighth highest out of 25 years.

Table 6.–Preliminary 2017 Arctic-Yukon-Kuskokwim Region commercial salmon harvests, by fishing area and species, in thousands of fish.

Fishing Area	Species					Total ^a
	Chinook	Sockeye	Coho	Pink	Chum	
Kuskokwim River	0	0	0	0	0	0
Kuskokwim Bay	0	0	0	0	0	0
Kuskokwim Area Total	0	0	0	0	0	0
Lower Yukon River	0	0	129	0	856	986
Upper Yukon River	0	0	10	0	189	198
Yukon River Total	0	0	139	0	1045	1184
Norton Sound	0	3	191	19	163	377
Kotzebue Sound	0	0	0	0	464	464
AYK Region Total	0	3	330	19	1,672	2,025

Note: Zeros indicates no harvest or fewer than 500 fish harvested. Columns and rows may not total exactly due to rounding error.

^a Confidential information not included.

WESTWARD REGION

KODIAK MANAGEMENT AREA

The commercial fishing effort in 2017 was average compared to recent years. Of the 592 eligible commercial salmon permits, 309 (52%) made commercial landings. By gear type, a total of 163 purse seine, 3 beach seine, and 143 set gillnet permit holders made deliveries in 2017. Participation by purse seine permit holders was slightly above average and set gillnet permit holder participation was below the previous 10-year average.

The 2017 commercial harvest (not including personal use or ADF&G Test Fishery) in the Kodiak Management Area (KMA) was 7,101 Chinook, 2,476,502 sockeye, 366,395 coho, 27,103,276 pink, and 1,891,299 chum salmon. The total Kodiak areawide harvest (including Kodiak Regional Aquaculture Association cost recovery) of 31,844,573 was above the 2017 forecast and above the previous 10-year average of approximately 21,171,000.

Commercial Harvest Summary

Chinook Salmon

There are no directed Chinook salmon commercial fisheries in the KMA but incidental commercial harvest occurs during targeted sockeye and pink salmon fisheries. The Ayakulik and Karluk river systems both support small populations of Chinook salmon. By regulation, nonretention of Chinook salmon was implemented for the seine fleet areawide from June 1 through July 5. Due to both Karluk and Ayakulik not meeting their respective escapement goals, nonretention of Chinook salmon was extended for the 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 2017 commercial harvest of Chinook salmon in the KMA totaled approximately 7,100, which was below the previous 10-year average (14,738) and below the 2017 forecast (9,000).

Sockeye Salmon

The 2017 commercial harvest of sockeye salmon totaled 2,467,502. The harvest was above the recent 10-year average (2,248,808) but slightly below forecast (2,516,000).

Early-season management for much of the Westside of Kodiak Island is driven by Karluk early-run sockeye salmon. Extended fishing time was allowed along much of the Westside of Kodiak until the management focus turned to pink salmon. Approximately 592,000 sockeye salmon were harvested in early-season Westside areas opened based on Karluk early-run sockeye salmon. Westside sockeye salmon numbers include an estimated contribution of approximately 111,000 sockeye salmon from the enhanced Spiridon Lake run.

Late-season management for much of the Westside of Kodiak is driven by the Kodiak Island pink salmon fishery and Karluk late-run sockeye salmon. Approximately 1,071,000 sockeye salmon were commercially harvested in late-season Westside areas opened based on local pink and chum salmon as well as Karluk late-run sockeye salmon. Westside sockeye salmon numbers include an estimated contribution of approximately 123,000 sockeye salmon from the enhanced Spiridon Lake run.

The Ayakulik sockeye salmon run was weak and there were only 2 fishing periods during early-run sockeye salmon management. Approximately 30,000 sockeye salmon were harvested in areas managed based on Ayakulik early-run sockeye salmon. The strength of the Ayakulik late-run

sockeye salmon was adequate to allow for 3 openings in July and liberal fishing time in August. Approximately 25,000 sockeye salmon were harvested in areas managed based on Ayakulik late-run sockeye salmon. Approximately 55,000 sockeye salmon were harvested from Westside sections opened based on Ayakulik returns, which was well below the 2017 forecast of 151,000.

Frazer Lake and Upper Station sockeye salmon runs came in weaker than forecasted, although both runs were strong enough to allow for commercial salmon openings in the traditional fishing areas (i.e., seine and gillnet sections of the Alitak District). The Alitak District early-run sockeye salmon harvest was approximately 39,000, below the projected harvest of 130,000.

Upper Station late-run sockeye salmon run came in stronger than expected and several fishing periods were permitted. The total harvest of the Alitak District late-run sockeye salmon was approximately 176,000, which was above the forecasted harvest of 59,000.

Cape Igvak Salmon Management Plan

This regulatory management plan (5 AAC 18.360) allocates up to 15% of the total Chignik-bound sockeye salmon harvest to KMA fishermen in the Cape Igvak Section. Based on regulations, 90% of all sockeye salmon caught prior to July 25 in the Cape Igvak Section are considered to be Chignik-bound.

Both Chignik sockeye salmon runs were weaker than forecast but the allocative and biological criteria were met throughout the year. Fishing time was allowed in the Cape Igvak Section in June, but not in July, with approximately 131,000 sockeye salmon harvested during the allocation period (14% of the Chignik-bound sockeye salmon). This was below the preseason forecast of 186,000.

North Shelikof Sockeye Salmon Management Plan

From July 6 to July 25, this regulatory management plan (5 AAC 18.363) places harvest limits on areas along the northern Shelikof Strait to limit interception of sockeye salmon that are considered Cook Inlet-bound. During the period that this management plan is in effect, KMA fisheries are managed based on local pink salmon runs. If it appears that the sockeye salmon harvest will meet or exceed limits set by the management plan, then fisheries are to be restricted to inshore *Shoreward Zones* only, and offshore *Seaward Zones* are closed (Figure 2).

An ADF&G biologist was present on the grounds to determine the sockeye salmon catch and to facilitate orderly and short notice closures if the harvest limits are met. A Seaward Zone closure was implemented in the North Shelikof Unit at 1:00 p.m. July 14 when it was estimated that the cumulative sockeye salmon harvest had approached the limit (15,000). The total July 6 to July 25 harvest in the North Shelikof Unit was approximately 68,000, which included both the Shoreward and Seaward Zone harvests. A Seaward Zone closure did not take place in the Southwest Afognak Section and the harvest cap of 50,000 was never exceeded. Approximately 19,239 sockeye salmon were harvested in the Southwest Afognak Section between July 6 and July 25.

Terminal and Special Harvest Areas

Some fisheries occur in areas where salmon enhancement projects create surplus production.

There was average effort and harvest in the Foul Bay SHA with approximately of 21,000 sockeye salmon harvested.

In the Spiridon Bay SHA (Telrod Cove) and the Spiridon Bay Section, approximately 109,000 sockeye salmon were harvested. This includes cost-recovery fish harvested by Kodiak Regional

Aquaculture Association. The harvest in the Spiridon Bay SHA and the Spiridon Bay Section represents only a portion of the total harvest of Spiridon enhancement fish, the remainder is harvested in traditional fisheries along the Westside of Kodiak. It is estimated that approximately 234,000 Spiridon enhancement fish were harvested outside of Telrod Cove and the Spiridon Bay Section, bringing the total Spiridon enhancement sockeye salmon harvest to approximately 343,000.

The Kitoi Bay Hatchery harvest was approximately 15,000 sockeye salmon, which was below the forecast of 65,000. This includes the commercial harvest of both enhanced and wild salmon from the Inner Kitoi Bay, Outer Kitoi Bay, Duck Bay, and Izhut Bay sections. Additional enhanced sockeye salmon may have been harvested in adjacent sections, but stock separation data are not available.

Coho Salmon

The commercial coho salmon harvest of approximately 366,000 was similar to the forecast (364,000) and above the previous 10-year average (295,254). The majority of the coho salmon were caught in the Westside Kodiak fishery.

Pink Salmon

The 2017 pink salmon harvest of approximately 27,103,000 was similar to the forecast (28,100,000) and well above the previous 10-year average harvest of 17,880,012.

The wild stock pink salmon harvest was approximately 25,100,000 in the KMA (18,400,000 forecast). The majority of the pink salmon were harvested on the Westside but the Eastside/Northend and Alitak District of Kodiak had significant harvests as well.

Westside pink salmon fisheries (Raspberry Cape to Ayakulik) accounted for approximately 15,000,000, the Eastside/Northend Kodiak fisheries had a combined harvest of approximately 4,400,000, and the Alitak District had a harvest of approximately 3,400,000.

The Kitoi Bay Hatchery pink salmon run was much weaker than expected with approximately 2,000,000 harvested in sections near the hatchery (9,700,000). Kitoi-bound pink salmon were likely harvested along the west and east sides of Kodiak and Afognak islands. Likewise, additional wild stock salmon were likely harvested in areas associated with Kitoi Bay Hatchery. However, ADF&G does not have a stock separation program for pink salmon and is unable to differentiate stocks. There was a cost-recovery fishery near the hatchery with sockeye, pink, and chum salmon harvested and sold by the Kodiak Regional Aquaculture Association.

Chum Salmon

The chum salmon harvest of approximately 1,891,000 was well above the forecast (637,000) and was the largest harvest since at least 1970 in the KMA. Additionally, the Kitoi Bay Hatchery chum salmon harvest of approximately 157,000 was well above the forecast of 45,000.

Escapement Summary

Fish counting weirs were operated on 8 systems in 2017, including the Karluk, Ayakulik, Upper Station, Dog Salmon, Litnik, Buskin, Saltery, and Pasagshak systems. Four observers also flew several aerial surveys, and several observers conducted foot and skiff survey escapement estimates. Due to the lack of sufficient funding peak aerial surveys were not conducted in much of the KMA.

Chinook Salmon

The total Chinook salmon escapement (6,387) was above the previous 10-year average. Escapement goals for Chinook salmon have been developed for the Karluk and Ayakulik rivers, and escapements are estimated using fish counting weirs.

The Chinook salmon escapement through the Karluk River weir (2,600) was below the BEG range (3,000–6,000). Chinook salmon escapement through the Ayakulik River weir (3,712) was below the BEG range (4,800–8,400).

Sockeye Salmon

Sockeye salmon runs in many systems in the KMA were average. All of the major systems met their established escapement goals. The entire KMA estimated sockeye salmon escapement of (1,522,210) was above the previous 10-year average (1,249,000).

Coho Salmon

The only established coho salmon escapement goals occur in the Northeast Kodiak and Eastside Kodiak districts for the following systems: American (400), Olds (1,000), Buskin (4,700–9,600) and the Pasagshak rivers (1,200). At the time of this report the final estimated escapement numbers have not been calculated.

Coho salmon enter systems in the fall after most of the weirs have been removed. Due to the limitations of funding and fall weather, the areawide coho salmon escapement numbers do not reflect the actual KMA coho salmon escapement. From limited foot surveys on streams conducted near the city of Kodiak and the Islands of Afognak and Shuyak, coho salmon escapement looked average. However, similar to pink salmon, many of the runs were later than usual.

Pink Salmon

The KMA pink salmon escapement of 6,089,116 was well above the previous 10-year average (3,900,000). 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 (5,079,016) was slightly above the escapement goal range (2.0–5.0 million; Table 5). The Mainland District pink salmon escapement of 1,010,100 was slightly above the established escapement goal range (250,000–1,000,000).

Chum Salmon

The overall chum salmon escapement of 764,500 was well above the previous 10-year average (316,262). A peak indexed escapement goal based on 17 streams in on the Kodiak Archipelago has been established. The 2017 peak indexed escapement (175,000) was above the goal (101,000).

CHIGNIK MANAGEMENT AREA SEASON SUMMARY

The Chignik River watershed supports 2 genetically distinct sockeye salmon runs which traditionally provide the majority of directed harvest opportunities within the Chignik Management Area (CMA). In 2017, the early- and late-run Chignik River sockeye salmon combined total run was well below the recent 10-year average. The first commercial fishing period in the CMA began on June 10 and the final fishing period closed on August 31. A total of 68 permits made deliveries in 2017 (including the ADF&G's test fishery permit).

Escapement Summary

Escapement through the Chignik River weir was monitored using underwater digital video equipment from June 2 through September 6. Two underwater gates in the weir were open to provide uninterrupted escapement. Fish passing the weir were counted, by species, for the first 10 minutes of each hour. The counts were expanded to obtain hourly escapement estimates, and then summed to provide an estimate of daily fish passage. A digital video archive was kept of each 10-minute counting period.

From August 10 through September 6, 2 DIDSON (Dual Identification Sonar) acoustic units were also installed in the Chignik River simultaneous to weir operations. The numbers of fish passing upstream of the DIDSONs were counted for the first 10 minutes of each hour. The counts were then expanded to obtain hourly escapement estimates. Species apportionment was determined by fishing with a seine net at least every other day. The results of the fishing samples will be applied to the DIDSON escapement estimates postseason. This project is funded by an Alaska Sustainable Salmon Fund grant intended to provide a direct comparison between the 2 enumeration methods to develop a correction factor between the 2 methods. This was the second year of the 3-year Alaska Sustainable Salmon Fund grant. At this time, ADF&G has decided not to include DIDSON escapement estimates in final escapement numbers until all data from the entire 3-year project can be analyzed. Therefore, escapement numbers in this document include only weir counts as postseason analysis unless otherwise noted.

Aerial surveys were flown throughout the season to monitor escapement into other CMA streams. Peak aerial survey counts, by index stream and species, were summed and compared to available escapement goals established by Schaberg et al. (2015). Pink and chum salmon escapements were measured against established areawide SEG.

Chinook Salmon

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 for Chinook salmon into the Chignik River watershed is 1,300–2,700 (Schaberg et. al. 2015). The 2017 Chignik River Chinook salmon escapement above the weir (1,137) did not meet the escapement goal and was below recent averages. State subsistence and sport fishery harvest of Chinook salmon will not be known until permits and questionnaires are returned and tabulated by the spring of 2018.

Sockeye Salmon

Sockeye salmon escapement to the Chignik River is managed based on separate escapement objectives for early- and late-run sockeye salmon. The early-run SEG (350,000–450,000) was exceeded with an estimated escapement of 453,257. The early-run sockeye salmon escapement was similar to or above the 5-year and 10-year average escapements.

The Chignik River also has an inriver run goal (IRRG) of 75,000 sockeye salmon (25,000 in August and 50,000 in September) to provide for additional freshwater subsistence fishing opportunity. The IRRG is incorporated into the late-run SEG (275,000–400,000). In 2017, the late-run SEG was met with an estimated total escapement of 339,303. Of these fish, an estimated 17,529 late-run sockeye salmon were estimated for the time period of September 7–30 using a time series analysis. Sockeye salmon escapement in August was estimated at 111,615, meeting the minimum escapement requirements for the month (50,000), as well as the August IRRG component (25,000). Approximately 25,995 sockeye salmon escaped during September 1–30 and were included in the

total late-run escapement estimate. September escapement did not meet the September IRRG component (50,000). The total late-run estimated escapement was similar to the 10-year average escapement and below the 5-year average escapement.

Coho Salmon

Coho salmon begin to enter CMA drainages in mid-August and continue through November. The coho salmon run is generally building when the weir is removed. The 2017 Chignik River coho salmon escapement through the weir through September 6 (33,270) was above the most recent 5- and 10-year average escapement estimates.

Aerial surveys of coho salmon in the Chignik Management Area are often sporadic and conducted prior to the peak of the runs due to departure of management staff in the fall. In 2017, aerial surveys were not flown because of inclement weather.

Pink Salmon

An estimated 123,531 pink salmon passed the Chignik River weir in 2017, which was well above the previous 5- and 10-year average escapements. Pink salmon escapements into other CMA streams were estimated via aerial surveys. A new odd-year pink salmon SEG was adopted at the 2016 Alaska Board of Fisheries meeting (260,000–450,000) for all districts combined and is based on 8 index streams within the districts. In 2017, pink salmon peak estimated escapement was very strong in the CMA and exceeded the escapement goal. Pink salmon estimated total peak escapement was 586,000 for all index streams.

Chum Salmon

The 2017 Chignik River chum salmon escapement was 615, which was well above average for the Chignik River. Chum salmon escapements to other CMA streams were estimated via aerial surveys. A new chum salmon SEG was adopted at the 2016 Alaska Board of Fisheries meeting (45,000–110,000) based on escapement into 6 index streams within the districts (Schaberg et al. 2015). The 2017 estimated total peak chum salmon escapement for all index streams (96,900) was within the escapement goal range.

Commercial Fishery Summary

The CMA was open to commercial salmon fishing for approximately 54 days during the 2017 commercial salmon season. A total of 68 permit holders (including ADF&G's test fishery permit) made a total of 2,408 landings.

In June, commercial salmon fishing is based on the strength of the Chignik River early-run sockeye salmon. The first commercial fishing period occurred in the Chignik Bay Central and Eastern districts on June 10. Throughout June to mid-July, fishing periods ranged from 2 days to a week, interspersed by closures ranging from a few days to a week. Commercial fishery openers were based on escapement monitored at the weir, with extensions occurring based on escapement and commercial fishery performance. Closures between fishing periods allowed for additional escapement into the river to achieve escapement goals.

In 2017, genetic samples were once again taken at the weir to determine the proportion of early- to late-run fish during the peak of the overlap period (late June to mid-July). Results after the first 4 sets of samples (June 25, July 1, July 7, and July 13) indicated that normal run transition timing from early- to late-run fish was occurring. The estimated 50/50 date of early- to late-run fish was approximately July 10–11. Based on this information, management of the Chignik River sockeye

salmon runs switched to being based on the strength of the late run. Escapement levels at the time showed that the early run was within escapement goals, but the late run was well below interim escapement objectives. As a result, commercial salmon fishing targeting sockeye salmon was closed from July 7 through July 15. After several days of good escapement, the late run was within interim escapement objectives and a short commercial fishing period for the entire CMA occurred beginning July 16. Both the fifth set of genetic samples taken on July 18 and the sixth set taken on July 23 showed that the proportion of early-run fish was much higher than indicated in the fourth sample, and as a result the fishery targeting sockeye salmon was once again closed as escapement tracked lower end goals.

There were several fishing periods in mid- to late July (July 9–10, 21–22, and 29–30) in specific inner bays of the Chignik Management Area to target the early pink and chum salmon returning to local streams. Each of the inner bay fishing periods was 48 hours in length. After August 1, apart from 2 short closures, the majority of the CMA was open to commercial salmon fishing. The Eastern District was closed until August 10 due to low water in streams preventing pink and chum salmon escapement. In September, sockeye salmon escapement lacked the necessary number of fish required to meet the month's IRRG component for the Chignik River; therefore, the fishery remained closed.

Harvest Summary

Chinook Salmon

A total of 3,946 Chinook salmon were commercially harvested in 2017, which was well below recent average harvests. Due to poor escapement, Chinook salmon greater than 28 inches were not allowed to be retained in the commercial salmon fishery beginning July 16 in the Chignik Bay District and beginning August 1 in the Central District. The majority of the 2017 CMA Chinook salmon harvest occurred in the Central and Western districts.

Sockeye Salmon

A total of 895,041 sockeye salmon were commercially harvested in the CMA during 2017, which was well below the most recent 5-year and 10-year average harvest. The largest harvest of sockeye salmon by district in 2017 came from the Chignik Bay District.

In 2017, the Southeastern District Mainland (SEDM) in the Alaska Peninsula Management Area (Area M) opened to commercial salmon fishing on June 13 and the Cape Igvak Section in the Kodiak Management Area (Area K) opened on June 14. A total of 54,662 sockeye salmon (43,730 considered Chignik-bound) were harvested in the SEDM during the allocation period through July 25. Cape Igvak fisherman harvested 131,223 sockeye salmon (118,101 considered Chignik-bound) during the allocation period.

Coho Salmon

A total of 226,829 coho salmon were commercially harvested in 2017, which was well above the recent 10-year average harvests. The majority of the coho salmon harvest in 2017 took place in the Western and Perryville districts.

Pink Salmon

A total of 7,077,924 pink salmon were commercially harvested in the CMA in 2017. The 2017 total pink salmon harvest was nearly 5 times larger than the recent odd-year average CMA harvest. The majority of the pink salmon harvest occurred in the Perryville and Western districts.

Chum Salmon

A total of 609,236 chum salmon were commercially harvested in 2017, which was also well above the 5-year and 10-year average harvests. The majority of the chum salmon harvest in 2017 took place in the Eastern and Western districts.

ADF&G Test Fishery Summary

ADF&G conducted a cost-recovery test fishery and 1 run assessment test fishery in Chignik Lagoon in 2017. An estimated 2,448 sockeye salmon were harvested, which provided approximately \$22,250 to offset the cost of vessel charters and operations at the Chignik River weir.

ALASKA PENINSULA, ALEUTIAN ISLANDS, AND ATKA-AMLIA ISLANDS MANAGEMENT AREAS SALMON SEASON SUMMARY

The 2017 commercial salmon harvest in the Alaska Peninsula, Aleutian Islands, and Atka-Amlia Islands Management areas totaled 12,683 Chinook, 7,103,315 sockeye, 358,967 coho, 21,830,532 pink, and 2,031,987 chum salmon (Table 7). Subsistence salmon harvest will be reported in the 2017 annual management report. Data detailed in this report are considered preliminary.

South Unimak and Shumagin Islands June Fisheries

The South Unimak and Shumagin Islands commercial salmon fishery began on June 7 for set gillnet gear and on June 10 for seine and drift gillnet gear. There were four 88-hour and one 64-hour fishing periods for set gillnet gear and four 88-hour fishing periods for seine and drift gillnet gear. The commercial salmon harvest for the June fishery consisted of 4,955 Chinook, 1,954,409 sockeye, 43 coho, 1,714,307 pink, and 640,488 chum salmon.

Consistent with the Alaska Board of Fisheries regulatory changes from the February 2016 meeting, commercial salmon fishing was closed in the West Pavlof Bay Section south of Black Point and the Volcano Bay Section on July 22 when the sockeye salmon harvest exceeded 191,000 as shown by fish ticket information. The Dolgoi Island Area remained closed through July 25; however, the portion of the West Pavlof Bay Section south of Black Point reopened to commercial salmon fishing on July 17 concurrent with scheduled fishing periods during the post-June fishery. Beginning July 26, the Dolgoi Island Area was managed concurrently with the scheduled fishing periods during the post-June fishery.

Southeastern District Mainland

From June 1 to July 25, the Southeastern District Mainland (SEDM; excluding the Northwest Stepovak Section beginning July 1) is managed based on the strength of the Chignik sockeye salmon run. During years in which it appears that sockeye salmon harvest will be greater than 600,000 in the CMA, and the first run begins to develop as anticipated, followed by a commercial salmon opening in the CMA, commercial salmon fishing can be allowed in the East Stepovak, Stepovak Flats, Southwest Stepovak, Balboa Bay and Beaver Bay sections of the SEDM. The first 48-hour commercial salmon opening in the SEDM occurred on June 13; the second 48-hour opening occurred on June 17, and was extended for another 48 hours on June 19. A total of 34 Chinook, 54,662 sockeye, 0 coho, 1,475 pink, and 1,599 chum salmon were harvested during the allocation period (June 1 – July 25).

Beginning July 1, the Northwest Stepovak Section of the SEDM is managed on the strength of the Orzinski Lake sockeye salmon run. The Orzinski Lake sockeye salmon escapement of 20,989 exceeded the SEG (15,000–20,000). The first commercial fishing period in the Northwest Stepovak Section began on July 8. The total harvest in the Northwest Stepovak Section from July 1 through July 25 was 5 Chinook, 39,256 sockeye, 154 coho, 4,002 pink, and 3,474 chum salmon.

From July 26 through August 31, the SEDM is managed based on the abundance of local salmon stocks. Due to very strong returns of pink salmon into SEDM streams, fishing periods during August and September were the maximum allowed by regulation (closed for 36 hours within a 7-day period, open all other times beginning August 5). The total harvest in SEDM from July 26 through September 30 for the 2017 season was 60 Chinook, 106,438 sockeye, 11,536 coho, 2,277,687 pink, and 106,750 chum salmon.

From June 1 through July 25, 80% of the sockeye salmon harvested in the SEDM are considered Chignik bound, excluding the Northwest Stepovak Section beginning July 1. Through the end of the 2017 allocation period, SEDM sockeye salmon harvest considered Chignik bound totaled 6.44% of the CMA harvest through July 25.

South Peninsula Post-June Fishery

Prior to the South Peninsula Post-June fishery, ADF&G conducts a test fishery to determine immature salmon abundance in the Shumagin Islands. Test fishing occurred on July 2, 3, 5, 9, 12, 13, and 16. Test fisheries on July 2, 3, 5, and 9 resulted in an average of 533, 348, 584, and 249 immature salmon per set, respectively. The test fisheries on July 12 and July 13 resulted in an average of 373 and 169 immature salmon per set, respectively. As a result, the seine fleet was closed to commercial salmon fishing in the Shumagin Island Section of the Southeastern District during the periods that were scheduled to occur on July 6, July 10, and July 14. The final test fishery, which occurred on July 16, resulted in an average of 84 immature salmon per set. Reduced harvest of immature salmon on July 16 allowed for the Shumagin Island Section to open to seine gear for the July 18 commercial salmon fishing period.

From July 6 through July 31, there was one 33-hour fishing period, followed by a 63-hour closure, followed by six 36-hour fishing periods, separated by 60-hour closures. During August, the Post-June fishery is managed based on the abundance of local pink and chum salmon stocks. In September and October, management focuses on coho salmon returns, though the status of late pink and chum salmon returns may also be taken into consideration. The very high number of pink and chum salmon returning to local streams resulted in extensive commercial fishing opportunity in the South Peninsula during August. Above average coho salmon harvest in September along with continued large numbers of pink and chum salmon allowed for continuous commercial fishery openings until participation in the fishery ceased.

The total commercial harvest for the South Peninsula Post-June fishery (including the SEDM from July 26–October 31) was 4,672 Chinook, 1,164,150 sockeye, 348,135 coho, 20,099,320 pink, and 1,302,507 chum salmon.

South Peninsula Escapement

The South Peninsula sockeye salmon escapement of 106,542 was above the management objective range (48,200–86,400) and escapement into Mortensens Lagoon (15,500) exceeded its SEG range (3,200–6,400). Escapement into Thin Point Lagoon (39,300) was above the SEG range (14,000–28,000). Pink salmon total indexed escapement of 5,663,637 was well above the SEG

range (1,750,000–4,000,000). Chum salmon indexed total escapement of 1,773,626 (Table 6) was also well above the cumulative district escapement goal range (330,400–660,800). There were 5,100 coho salmon observed in South Peninsula streams. Some of the major coho salmon systems are typically not surveyed or surveyed during off-peak times. 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 during peak coho salmon runs.

Aleutian Islands Fishery and Escapement

The Aleutian Islands Area may open to commercial salmon fishing by EO if adequate escapement is observed and there is interest from the fishing industry. During an aerial survey of the Aleutian Islands in early August, an adequate amount of pink salmon (approximately 960,000) were observed in streams. The abundance of pink salmon in the Unalaska Area would have allowed for a commercial salmon fishery to occur in 2017; however, lack of industry interest resulted in no commercial openings announced. Late run timing and low numbers of sockeye salmon escaping into McLees Lake resulted in restricted subsistence fishing to outside 500 yards from the stream mouth from July 10 until July 22. McLees Lake had a sockeye salmon escapement of 13,195 and was within the SEG range (10,000–60,000).

North Alaska Peninsula

In 2017, 162 Area M permit holders participated in commercial salmon fisheries along the North Alaska Peninsula. There was no effort by Area T permit holders. The number of Area M permit holders participating in 2017 was far below the historical numbers observed during the 1990s.

The North Alaska Peninsula fishery is predominantly a sockeye salmon fishery; although depending on market conditions, directed Chinook, coho, and chum salmon fisheries occur in some locations. During even-numbered years, depending on market conditions, pink salmon runs are frequently targeted in the Northwestern District.

During early August a fire disabled the sole shore-based processor located in Port Moller on the North Alaska Peninsula. As a result, most of the late run of sockeye salmon at Bear River (which traditionally starts August 1) was not targeted, and neither was the coho salmon run at Nelson Lagoon, which is traditionally targeted beginning August 15. About 3 weeks of fishing time was lost by the North Peninsula fleets due to the fire. Prior to the fire, harvest on the North Peninsula was on track to be the largest sockeye salmon harvest on record, and escapements at all local river systems had either been met or—more often—far exceeded.

Northwestern District

In the 2017 Northwestern District commercial salmon fishery, a total of 16 Chinook, 89,360 sockeye, 143 coho, 5,050 pink, and 57,855 chum salmon were harvested. A total of 16 permit holders participated in the fishery, consisting of 4 purse seiners and 12 drift gillnetters.

In the Northwestern District, the chum salmon escapement of 195,700 was within the SEG (100,000–215,000). This escapement estimate represents a minimum; the actual escapement was likely greater due to poor survey conditions in 1 of the major chum salmon producing streams in the Northwestern District. The sockeye salmon escapement for 2017 in the Northwestern District was above the escapement goal range (52,600–106,000) with a total escapement of 307,962.

Black Hills Section

Due to the lack of extensive closures during 2017 in the Bear, Three Hills, and Ilnik sections in the Northern District, effort by the drift gillnet fleet in the Black Hills Section was limited. A total of 15,822 sockeye and 2,966 chum salmon were harvested in the Black Hills Section in 2017. Weekly fishing periods occurred throughout the season in the Black Hills Section. North Creek is the only system in the Black Hills Section with a sockeye salmon escapement goal. The 2017 North Creek sockeye salmon escapement of 5,800 (determined by aerial surveys) met the escapement goal (4,400–8,800).

Nelson Lagoon Section

The Nelson (Sapsuk) River total run of 728,562 sockeye salmon (includes harvest and escapement) was above the estimated forecast of 585,000. From the total run, 347,562 sockeye salmon were harvested in Nelson Lagoon and 381,000 escaped in the Nelson River. The 2017 sockeye salmon escapement into Nelson River exceeded the BEG (97,000–219,000).

The Nelson Lagoon Section was opened for all weekly fishing periods along with many extensions in fishing time in 2017. Beginning August 15, the Nelson Lagoon Section is managed on local coho salmon runs. In 2017, 19,000 coho salmon were observed in Nelson River escapement exceeding the Nelson River SEG threshold (18,000). A fire occurred at the sole processing facility that bought coho salmon from Nelson Lagoon in early August, resulting in no directed coho salmon fishery occurring in 2017.

Bear River and Three Hills Sections

By regulation, the Bear River Section opens to commercial salmon fishing on May 1 and the Three Hills Section opens June 25. Both areas are managed based on the sockeye salmon run strength into Bear and Sandy rivers. Both the early and late runs of sockeye salmon at Bear River were above average; extensive closures during the season were not necessary. During the fishing season large closed water buffers were utilized around streams when needed to ensure adequate escapement. A total of 288,927 sockeye salmon were harvested in the Bear River Section during 2017, and 89,133 sockeye salmon were harvested in the Three Hills Section.

The Bear River early-run (through July 31) sockeye salmon escapement of 570,840 exceeded the escapement goal (176,000–293,000). The Bear River late-run (after July 31) sockeye salmon escapement of 229,160 exceeded the late-run escapement goal (117,000–195,000). The Bear River season sockeye salmon escapement was 800,000, which far surpassed the combined early- and late-run escapement goal (293,000–488,000).

The 2017 Sandy River sockeye salmon escapement of 145,000 exceeded the season ending escapement goal range (34,000–74,000) and was the second largest escapement on record.

Ilnik Section

In 2017, the Ilnik River system sockeye salmon escapement through the weir was 238,000, exceeding the Ilnik River escapement goal (40,000–60,000), and was the largest escapement on record. The observed escapement into the Ocean River (a major tributary of the Ilnik River) was 85,000, which exceeded the escapement goal (8,000–12,000). The total Ilnik River system sockeye salmon escapement of 238,000 includes the Ocean River escapement (85,000). By regulation, the Ilnik Section can open to commercial salmon fishing on June 20. Sockeye salmon escapement into Ilnik River exceeded interim escapement objectives throughout the season. A total of 2.5 million

sockeye salmon were harvested in the Ilnik section, well above average, and the highest on record. No commercial fishing effort occurred in Ilnik Lagoon in 2017 despite weekly fishing periods.

Beginning August 15, the Ilnik Section is managed for coho salmon runs into Ilnik Lagoon; however, due to the processor fire in mid-August no market existed for coho salmon during the 2017 fishing season. All coho salmon harvested in the Ilnik Section were incidental to targeted sockeye salmon fisheries.

Inner and Outer Port Heiden Sections

Aerial escapement surveys of the Meshik River began on June 16. Subsequent surveys occurred throughout the season and the final sockeye salmon escapement into the Meshik River system was 191,725, far exceeding the escapement goal (8,000–86,000). This includes escapement into the Meshik River and tributaries, as well as Red Bluff and Yellow Bluff creeks.

Fishing time in the Outer Port Heiden Section is based on Meshik River sockeye salmon abundance unless management actions are taken for the conservation of Ugashik River sockeye salmon in the Egegik District. By regulation, the Outer Port Heiden Section can be open to commercial salmon fishing from June 20 to July 31. The weekly fishing periods in the Outer Port Heiden Section are scheduled from 6:00 a.m. Monday to 6:00 p.m. Wednesday. The Outer Port Heiden Section opened on June 25 and had openings of no more than 2½ days per week until the section closed on July 31. In 2017, a total of 502,531 sockeye salmon were harvested from the Outer Port Heiden Section.

Cinder River Section

In 2017, the commercial fishing effort in the Cinder River Section was minimal, despite weekly fishing periods of 2½ days per week for the entire season. Effort in 2017 in the Cinder River Section targeted coho salmon, and the fishery was open continuously due to low effort. Confidentiality rules prohibit the reporting of the Cinder River Section harvest because of the low effort. The total Cinder River (including Mud Creek) sockeye salmon escapement estimate of 234,800 exceeded the escapement goal (36,000–94,000) and was the largest on record.

Northern District Escapement

Chinook Salmon

Nelson River is the only river in Area M with a Chinook salmon escapement goal. At the Nelson River weir a total of 1,852 Chinook salmon escaped, and was below the goal (2,400–4,400). The total Northern District escapement of 7,967 was below the most recent 10-year average (13,826).

Chum Salmon

The Northern District has a districtwide chum salmon escapement goal (119,600–239,200). This goal was met with an escapement of 234,440, which is above the most recent 10-year average (180,439). The bulk of the chum salmon escapement occurred in the Herendeen-Moller Bay Section (71,400) and the Inner Port Heiden Section (64,200).

Coho Salmon

Coho salmon surveys were done on all Northern District streams in late August which is a week to 10 days earlier than the surveys usually occur. Early surveys were done because management staff left Port Moller earlier than planned due to the cannery fire; fishing operations ceased 3 weeks earlier than usual and because the ADF&G office in Port Moller, which relies on power from the processor, lost power. Coho salmon runs continue through September, so escapements tabulated

from aerial surveys are considered minimum estimates. Both the Nelson and Ilnik rivers have coho salmon lower-bound escapement goals in the Northern District. The Nelson River escapement of 19,000 coho salmon met the lower bound escapement goal (18,000). A total of 6,000 fish were observed at the end of August in the Ilnik River in 2017, which did not meet the lower bound escapement goal of (9,000). Like Nelson River, it is expected that more coho salmon entered the system beginning in September. The coho salmon escapement into the Cinder River was 20,000, and 44,000 coho salmon escaped into the Meshik River system (Meshik River and Landlocked Creek) as observed by aerial survey during late August.

Table 7.—Preliminary 2017 Westward Region commercial salmon harvests, by fishing area and species, in thousands of fish.

Fishing Area	Species					Total
	Chinook	Sockeye	Coho	Pink	Chum	
Kodiak	7	2,477	366	27,103	1,891	31,845
Chignik	4	895	227	7,078	609	8,813
South Peninsula and Aleutians Islands ^a	10	3,216	348	21,819	1,948	27,342
North Peninsula ^a	3	3,862	7	11	82	3,965
Alaska Peninsula Total	13	7,078	355	21,830	2,031	31,306
Westward Region Total	24	10,449	948	56,011	4,531	71,964

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

^a Catches include test fishery catch.

PRELIMINARY FORECASTS OF 2018 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. For the 2018 fishing year, forecast fisheries are as follows:

Southeast	pink salmon
Prince William Sound & Copper River	wild Chinook, sockeye, chum, and pink salmon
Upper Cook Inlet	sockeye salmon
Lower Cook Inlet	pink salmon
Kodiak	
Kodiak Management Area	pink salmon
Ayakulik River	sockeye salmon
Karluk River	sockeye salmon (early and late runs)
Alitak District (Frazer Lake and Upper Station)	sockeye salmon
Chignik Management Area	
Chignik River	sockeye salmon (early and late runs)
Bristol Bay	sockeye salmon
Alaska Peninsula	
South Alaska Peninsula	pink salmon
Bear River	sockeye salmon (late run)
Nelson River	sockeye salmon
Arctic-Yukon-Kuskokwim	
Yukon Area	fall chum salmon

A variety of information is used to forecast salmon runs. In most cases the principal indicator of future abundance is the escapement magnitudes of parental stocks. Other information that might have been considered includes spawning stock distribution, outmigrating smolt numbers, returns to date from sibling age classes of the projected return, and environmental conditions. A range of run possibilities are predicted for each forecasted fishery. In general, based on past experience, the actual run can be expected to fall within the range (between the lower and upper limits) less than half the time. Please see the appendices for further details.

Catch projections based on quantitative forecasts of salmon runs generally reflect potential harvests and are made for most of major sockeye salmon fisheries and pink salmon fisheries in Southeast Alaska, PWS, Cook Inlet, Kodiak, and the Alaska Peninsula. Forecasts for large hatchery runs including sockeye, pink, and chum salmon runs to the Southeast Alaska, PWS, and Kodiak areas are provided by private nonprofit operators. For other fisheries, the catch projections are made based on recent catch levels and are reflective of recent levels of fishing effort. Recent harvest levels have been constrained in many areas by historically low fishing effort; thus, recent catch levels are reflective of both market conditions and recent levels of salmon runs. Harvest projections for these fisheries may not be indicative of potential harvest levels.

SALMON SPECIES CATCH AND PROJECTIONS

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

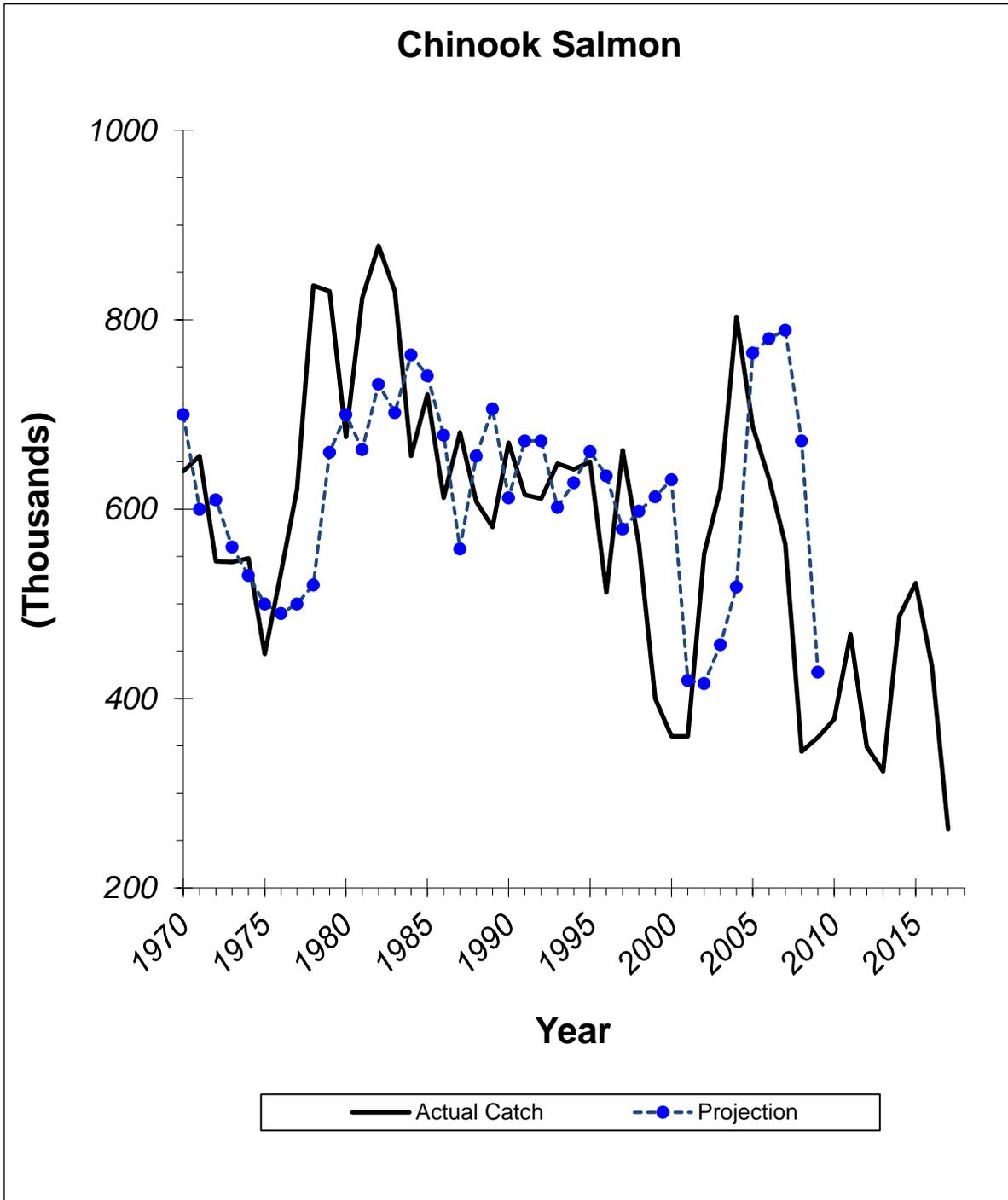


Figure 2.—Relationship between actual catch and projected catch in thousands, for Alaska Chinook salmon fisheries from 1970 to 2017; 2010–2018 projections are not available.

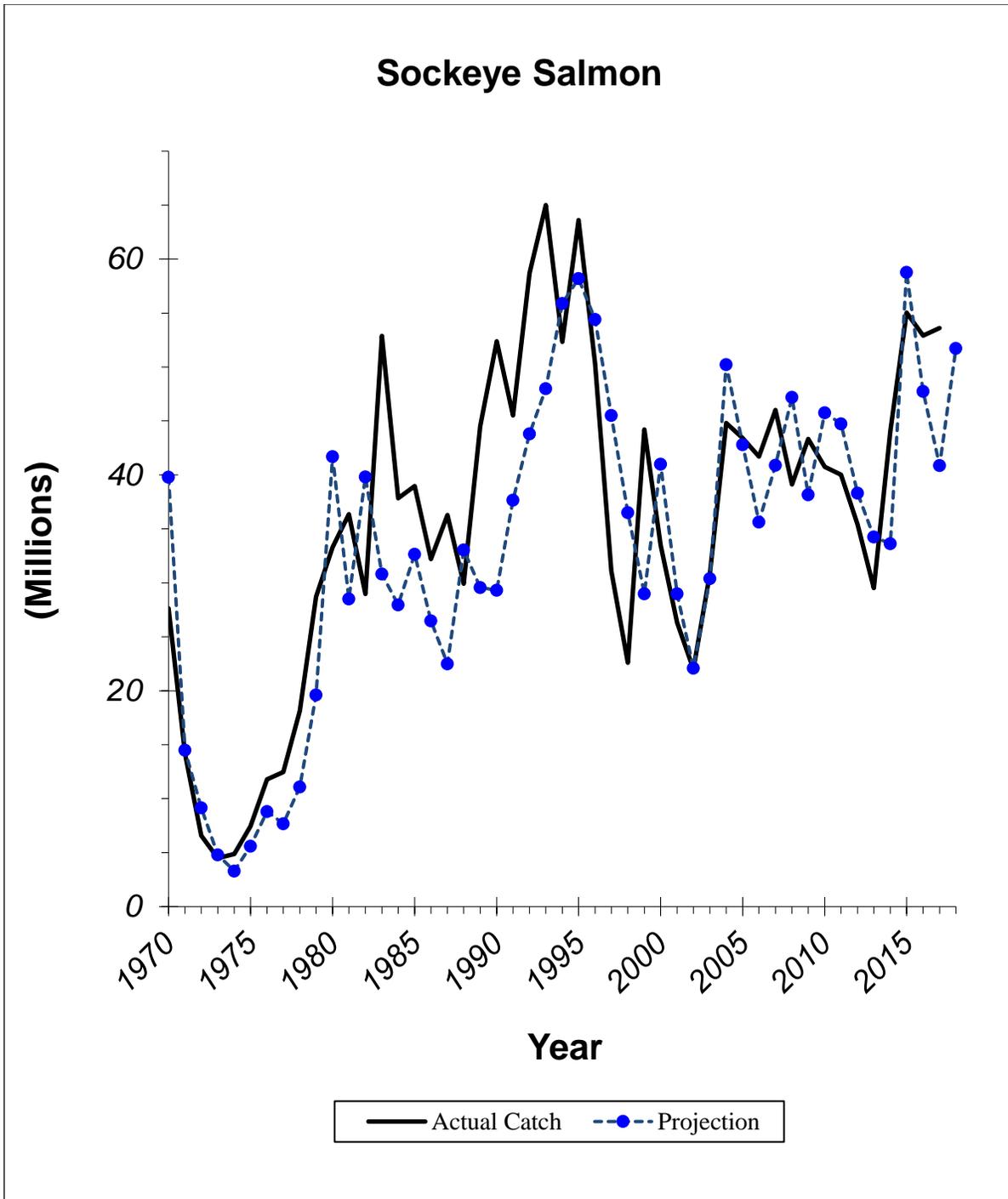


Figure 3.—Relationship between actual catch and projected catch in millions, for Alaska sockeye salmon fisheries from 1970 to 2017, with the 2018 projection.

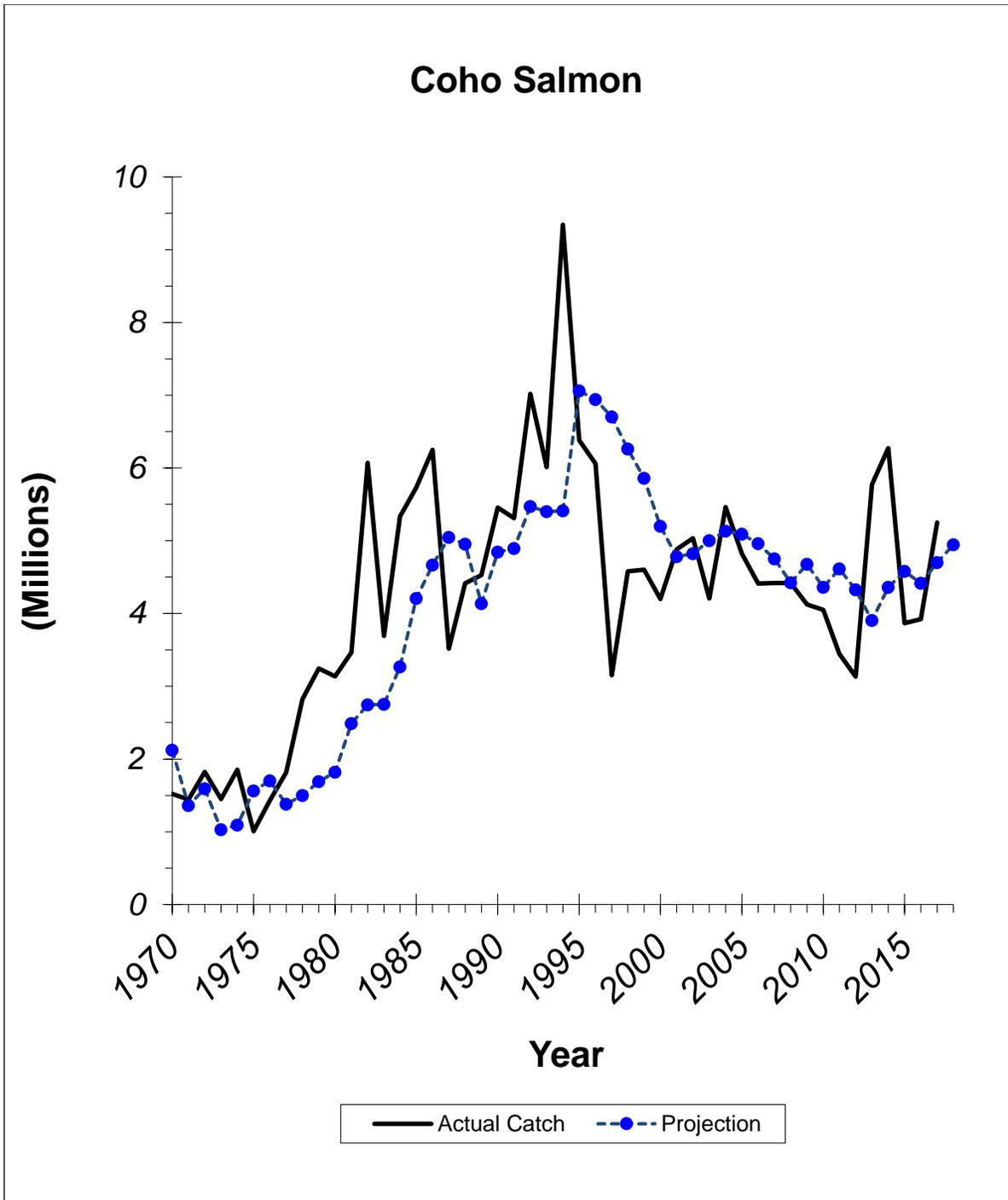


Figure 4.—Relationship between actual catch and projected catch in millions, for Alaska coho salmon fisheries from 1970 to 2017, with the 2018 projection.

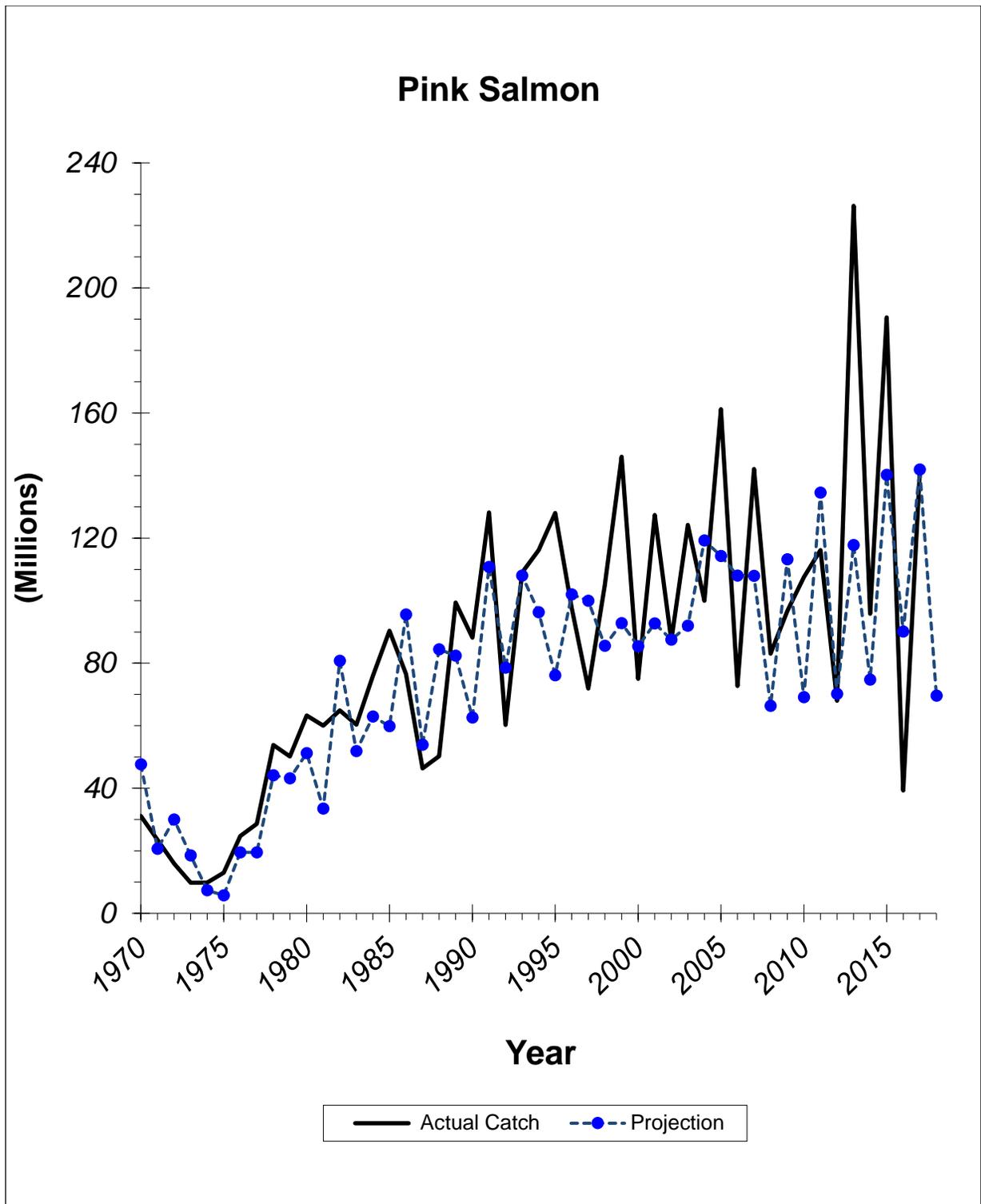


Figure 5.—Relationship between actual catch and projected catch in millions, for Alaska pink salmon fisheries from 1970 to 2017, with the 2018 projection.

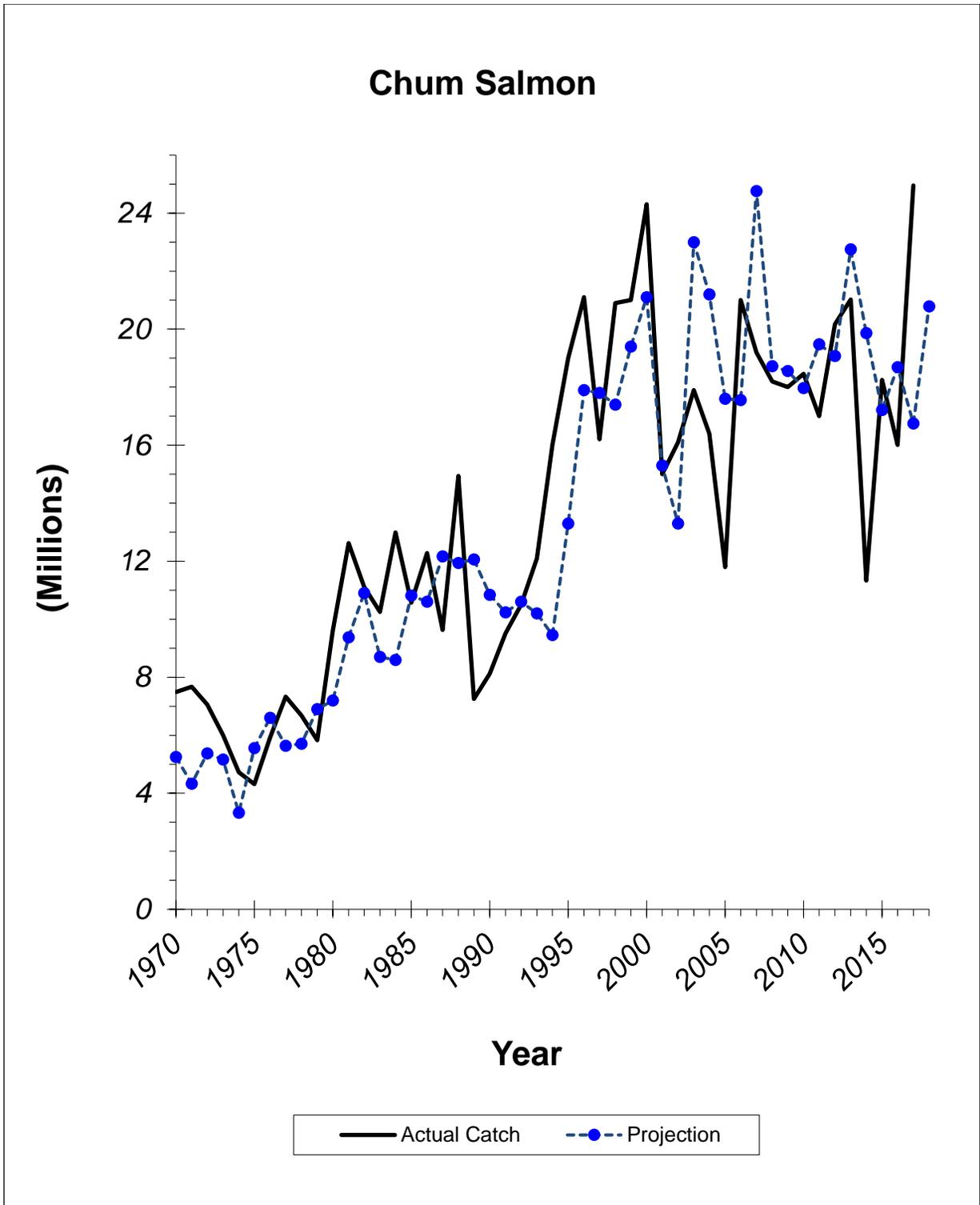


Figure 6.—Relationship between actual catch and projected catch in millions, for Alaska chum salmon fisheries from 1970 to 2017, with the 2018 projection.

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This report is based on information contributed by Division of Commercial Fisheries biologists located in field offices throughout the state. Contributing regional and area biologists, statistical technicians, research analysts, and analyst programmers include Todd Anderson, Bonnie Borba, Jeremy Botz, Charles Brazil, Greg Buck, Jack Erickson, Jeff Estensen, Heather Finkle, Ethan Ford, M. Birch Foster, Lisa Fox, Dan Gray, Stormy Haught, Steve Heintz, Glenn Hollowell, Kathrine Howard, Sabrina Garcia, Christine Gleason, James Jackson, Deena Jallen, Reid Johnson, Brad Kalb, Holly Krenz, Colton Lipka, Mary Beth Loewen, Randy Mason, James Menard, Steve Moffitt, Bob Murphy, Ted Otis, Andrew Piston, Aaron Poetter, Charles Russell, Paul Salomone, Tim Sands, Kevin Schaberg, Katie Sechrist, Pat Shields, Lucas Stempf, Mark Stopha, Aaron Tiernan, Stacy Vega, Jeff Wadle, Michelle Wattum, Fred West, Dawn Wilburn, and Mark Willette. Individual credit for forecast material is contained in area forecast discussions in the Appendix. Area biologists throughout the state supplied reviews of the 2017 fishing season. We thank Sabrina Larsen for GIS support.

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APPENDIX A: SOUTHEAST ALASKA

Forecast Area: Southeast Alaska
Species: Pink Salmon

The Southeast Alaska (SEAK) pink salmon harvest in 2018 is predicted to be in the *average* range with a point estimate of 23 million (80% confidence interval: 3–44 million). The categorical ranges of pink salmon harvest in SEAK were formulated from the 20th, 40th, 60th, and 80th percentiles of historical harvest over the 57-year period 1960 to 2016:

Category	Range (millions)	Percentile
Poor	Less than 11	Less than 20th
Weak	11 to 19	20th to 40th
Average	19 to 34	40th to 60th
Strong	34 to 51	60th to 80th
Excellent	Greater than 51	Greater than 80th

Forecast Methods

The 2018 SEAK pink salmon harvest forecast was based on the average of 5 recent even-year harvests (2008, 2010, 2012, 2014, and 2016). We first examined forecasts based on the general methods we have used since 2007: a simple trend forecast of the harvest that was then adjusted using juvenile pink salmon abundance indices provided by the NOAA Fisheries, Alaska Fisheries Science Center, Auke Bay Laboratories. These data were obtained from systematic surveys conducted annually in upper Chatham and Icy straits in conjunction with NOAA’s Southeast Coastal Monitoring Project and are highly correlated with the harvest of adult pink salmon in the following year.^a Juvenile pink salmon abundance indices obtained in 2017, however, were the lowest in the 21 years that NOAA has been conducting Southeast Coastal Monitoring Project surveys, and were well outside of the range of previous observations. Forecasts using these data and forecast models used in the past resulted in extremely low (<10 million) or negative predictions for 2018. As a result, we chose to use simpler trend models for the 2018 forecast.

Trend forecast methods examined included exponential smoothing and 5-, 3-, and 2-year running averages of past harvests. Each method was examined for odd and even years combined and for the even-year brood line only. We also produced forecasts for each of the 3 major subregions of SEAK separately (Northern Southeast Inside, Northern Southeast Outside, and Southern Southeast) and for all SEAK using each method. Most of these methods produced SEAK harvest forecasts in the low-to-mid 20 million range. The forecast based on the 5-year average of even-year SEAK pink salmon harvests had the lowest mean percent error, mean absolute percent error, and mean absolute scaled error (Hyndman and Koehler 2006) compared to forecasts based on exponential smoothing

^a We gratefully acknowledge the assistance of Jim Murphy, Joe Orsi (retired), and Alex Wertheimer (retired) and their colleagues at the NOAA Auke Bay Laboratories. However, we accept responsibility for this forecast, and we accept sole responsibility for this use of their data. For a detailed description of these NOAA research activities see: Wertheimer, A. C., J. A. Orsi, E. A. Fergusson, and M. V. Sturdevant. 2011. Forecasting pink salmon harvest in Southeast Alaska from juvenile salmon abundance and associated environmental parameters: 2010 returns and 2011 forecast (NPAFC Doc. 1343) Auke Bay Lab., Alaska Fisheries Science Center, National Marine Fisheries Service, NOAA, 17109 Point Lena Loop Road, Juneau, AK 99801-8626, USA, http://www.npafc.org/new/pub_documents.html

and 3- and 2-year running averages of even-year regionwide pink salmon harvests, and was thus chosen as the best forecast for 2018 (Figure A1). The forecast range (3–44 million) is the 80% confidence interval calculated from the mean squared error of the hindcast predictions.

Forecast Discussion

The 2018 harvest forecast of 23 million is below the recent 10-year average harvest of 38 million, but it is very close to the average even-year harvest since 1960 (25 million). The NOAA Auke Bay Lab’s 2017 peak June–July juvenile pink salmon index value (0.31) from upper Chatham and Icy straits in northern SEAK ranked 21st out of the 21 years that information has been collected and was approximately 25% of the previous lowest index value. There are no directly comparable values, but pink salmon harvests associated with juvenile indices below a value of 2.0 ranged from 16 to 37 million. Although NOAA trawl indices have worked relatively well for forecasting the regionwide pink salmon harvest, the data are more strongly correlated ($R^2 = 0.68$) with the harvest in the Northern Southeast Inside Subregion of SEAK where the surveys are conducted. The very low 2017 juvenile index value and very poor recent even-year harvests in the Northern Southeast Inside Subregion strongly suggest harvests in the northern half of the region will be very low in 2018, particularly on inside waters away from the outer coast. Harvests in the Southern Southeast Subregion, however, averaged 19 million over the past 5 even years (range: 14–33 million), and it is at least plausible that the harvest in 2018 will be in line with recent averages for southern SEAK.

One potential source of uncertainty regarding the 2018 pink salmon return is the anomalously warm sea surface temperatures that persisted throughout the Gulf of Alaska from fall 2013 through much of 2016. Pink salmon that went to sea from 2014 to 2016 returned in numbers below expectation and below recent odd- and even-year averages. Although sea surface temperatures moderated in the Gulf of Alaska in 2017, effects on the Gulf ecosystem may persist and pink salmon that went to sea in 2017 (and set to return in 2018) may have experienced reduced survival. In addition, weak even-year returns to northern Southeast inside waters have persisted since 2012 and there may be mechanisms that promote brood line dominance once it is established (Krkosek et al. 2011).

The NOAA Auke Bay Laboratories continues to conduct research that has improved our ability to forecast pink salmon harvests in SEAK. NOAA has been using juvenile pink salmon catch and associated biophysical data to forecast adult pink salmon harvest in SEAK since 2004.^b ADF&G forecasts have been adjusted using NOAA’s juvenile pink salmon data since 2007 and overall forecast performance is much improved (mean absolute percent error = 30%) over forecasts made prior to 2007 (mean absolute percent error = 58%; Figure A2).

Recent forecasts have also performed better than naïve forecasting models (e.g., 5-year running average, brood-year average harvest, unadjusted exponential smooth). Although we are not using NOAA’s juvenile pink salmon data to adjust our 2018 forecast, the information is still valuable for predicting that the harvest in northern SEAK is likely to be very low. Once we can compare the record low 2017 juvenile abundance indices with the corresponding harvest of adults in 2018 we anticipate incorporating NOAA’s data into our forecast for 2019.

^b The 2018 NOAA forecast can be found at the following link: http://www.afsc.noaa.gov/ABL/EMA/EMA_PSF.htm.

ADF&G will manage the 2018 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.

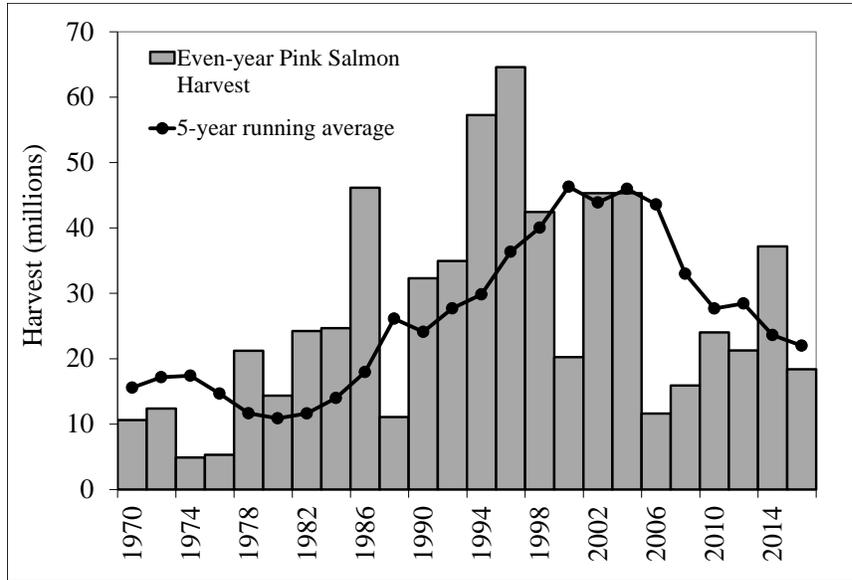


Figure A1.–Comparison of the annual even-year harvest of pink salmon in SEAK and 5-year running average values of the harvest. This method produced a 2018 harvest forecast of 23 million pink salmon.

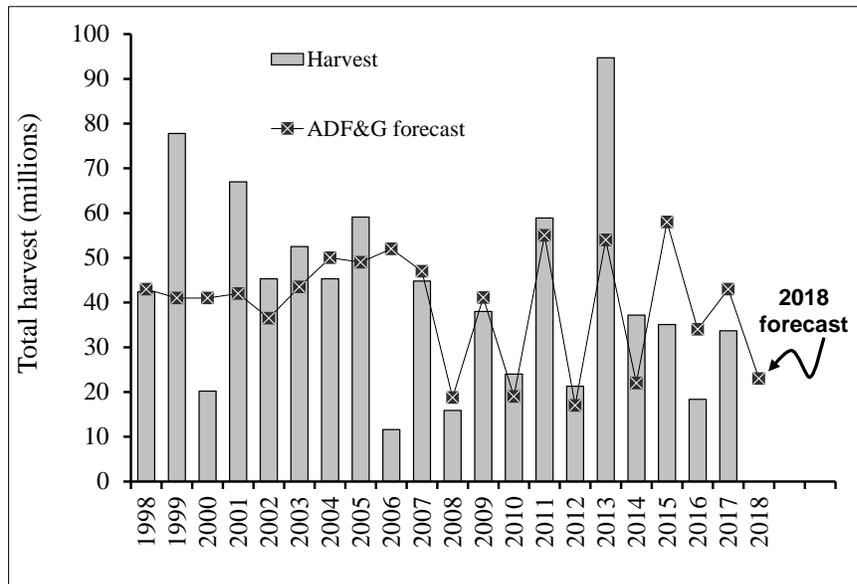


Figure A2.–Annual harvest of pink salmon in SEAK compared to the ADF&G preseason harvest forecast, 1998–2017. The 2007–2017 ADF&G harvest forecasts were adjusted using NOAA’s juvenile pink salmon data.

Andy Piston, Pink and Chum Salmon Project Leader, Ketchikan
Steve Heintz, Regional Research Biologist, Ketchikan

APPENDIX B: PRINCE WILLIAM SOUND AND COPPER RIVER

Forecast Area: Prince William Sound and Copper River

Formal forecasts of total run size for Prince William Sound (PWS) and Copper River were calculated for Copper River Chinook and sockeye salmon, Gulkana Hatchery sockeye salmon, and Coghill Lake sockeye salmon. Formal forecasts of commercial common property fishery (CCPF) harvest were calculated for wild PWS pink and chum salmon. Prince William Sound Aquaculture Corporation and Valdez Fisheries Development Association provide additional forecasts for hatchery-specific stocks (Table B1). In addition to formal forecasts, a summary of recent 10-year averages (2008–2017) of CCPF harvest for most wild stocks and Gulkana Hatchery production are also included (Table B2).

Table B1.–2018 Prince William Sound Area formal salmon forecast summary (thousands of fish).

Area/Production Type	Species	Forecast Type	Forecast Point	Forecast Range	% Above/Below 10-yr Average
Copper River					
<i>Wild Production</i>	Chinook salmon	Total Run	43	19–66	4.4% Below
<i>Wild Production</i>	Sockeye salmon	Total Run	1,736	1,264–2,208	16.5% Below
<i>Gulkana Hatchery Production</i>	Sockeye salmon	Total Run	148	108–188	
<i>Total Production</i>	Sockeye salmon	Total Run	1,884	1,391–2,376	
Coghill Lake					
<i>Wild Production</i>	Sockeye salmon	Total Run	183	95–407	22.0% Above
Prince William Sound					
<i>Wild Production</i>	Pink salmon	CCPF Harvest	2,020	310–13,151	20.7% Below
<i>Wild Production</i>	Chum salmon	CCPF Harvest	391	189–594	83.6% Above

Table B2.–Prince William Sound Area recent 10-year (2008–2017) average CCPF salmon harvest by species (thousands of fish).

Area/Production Type	Chinook	Sockeye	Coho	Pink	Chum	Total
Bering River						
<i>Wild Production</i>	0	3	59	0	0	62
Copper River						
<i>Wild Production</i>	13	1,294	226	34	16	1,583
<i>Hatchery Production</i>	0	205	0	0	0	205
<i>Total Production</i>	13	1,499	226	34	16	1,788
Prince William Sound						
<i>Wild Production</i>	1	165	N/A ^a	2,548 ^b	213	2,927
Area Totals						
<i>Wild Production</i>	14	1,667	285	2,582	229	4,777

^a Estimates of wild coho salmon harvests in are not available due to limited samples of thermally marked coho salmon otoliths from the commercial harvest.

^b Recent 10 even-year CCPF harvest (1998–2016).

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Forecast Area: Copper River

Species: Chinook Salmon

The 2018 Copper River Chinook salmon total run point estimate is 43,000 (80% confidence interval: 19,000–66,000). Subtracting the lower bound SEG of 24,000 from the total run forecast results in a common property harvest point estimate (all fisheries) of 19,000 (range: 0–42,000). The recent 10-year average (2008–2017) Copper River Chinook salmon total run is 45,000.

Forecast Methods

Following a detailed biometric retrospective review of Copper River Chinook salmon forecast methods ADF&G concluded the use of complex sibling models to forecast Copper River Chinook salmon is not appropriate due to poor performance. Running averages of total run consistently outperformed the more complex sibling models. Several forecast methods were examined for the 2018 Copper River Chinook salmon total run forecast, including exponential smoothing and 2-, 3-, and 5-year running averages of total run. Exponential smoothing and moving average models all produced similar forecast results in the 42,000–47,000 range, and the 2-year moving average forecast outperformed the other models when compared retrospectively. Total run size 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 19 years (1999–2017) of inriver abundance estimates available for this analysis. The 80% confidence intervals were calculated from the mean squared error of the retrospective forecast predictions.

Forecast Area: Copper River
Species: Sockeye Salmon

The 2018 wild Copper River sockeye salmon total run point estimate is 1,736,000 (80% prediction interval: 1,264,000–2,208,000). The recent 10-year average (2008–2017) Copper River wild sockeye salmon total run is 2,078,000. Gulkana Hatchery sockeye salmon total return is predicted to be 148,000 (80% prediction interval: 108,000–188,000) for a total Copper River sockeye salmon return (wild + hatchery production) of 1,884,000 (80% prediction interval: 1,391,000–2,376,000). Total Copper River sockeye salmon common property harvest (all fisheries) is predicted to be 1,220,000 (80% prediction interval: 815,000–1,626,000) with a CCPF harvest of 942,000 (80% prediction interval: 536,000–1,347,000).

Forecast Methods

A detailed biometric retrospective review of Copper River sockeye salmon forecast methods determined that the more complex sibling relationship models outperform more simplistic average return models. Forecast models examined for wild Copper River sockeye salmon for 2018 included mean total run size estimates (2-, 3-, 4-, 5-, 10-, and all-year averages), mean return of individual age classes, and regression models of sibling relationships. The forecast of natural sockeye salmon to the Copper River is the total of estimates for 6 age classes. Linear regression models with log-transformed data were used to predict returns for age-1.2, -1.3, and -2.2 sockeye salmon. These 3 age classes were predicted from the relationship between returns of each age class and returns of the age class 1 year younger from the same brood year (sibling model). Predicted return of age-1.1, -0.3, and -2.3 sockeye salmon were calculated as the 5-year (2013–2017) mean return of those age classes. The 2018 run to Gulkana Hatchery was estimated as the recent 3-year average fry-to-adult survival estimate (0.67%) from all Gulkana I and Gulkana II hatcheries releases combined (onsite and remote). The run was apportioned to brood year using a maturity schedule of 17% age 4 and 83% age 5.

The total common property harvest forecast 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 CCPF harvest estimate was calculated by subtracting inriver goal categories (5 AAC 24.360(b)) and 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 2018. There are currently 53 years (1965–2017) of harvest, escapement, and age composition data available for this analysis. Total run 80% prediction intervals were calculated as the sum of the individual age class forecast point estimates plus/minus the square root of the sum of the squared differences between the age class forecast point estimates and age class forecast 80% prediction intervals.

Forecast Area: Prince William Sound
Species: Sockeye Salmon (Coghill Lake)

The 2018 wild Coghill Lake sockeye salmon total run point estimate is 183,000 (80% prediction interval: 95,000–407,000). Subtracting the escapement target of 30,000 from the total run forecast results in a common property harvest point estimate (all fisheries) of 153,000 (range: 65,000–377,000). The recent 10-year average (2008–2017) Coghill Lake sockeye salmon total run is 150,000.

Forecast Methods

Forecast models examined for Coghill Lake sockeye salmon for 2018 included mean total run size estimates (2-, 3-, 4-, 5-, 10-, and all-year averages), mean return of individual age classes, and regression models of sibling relationships. The natural sockeye salmon run forecast to Coghill Lake is the total of estimates for 5 age classes. Natural run by year was estimated as the total commercial harvest contribution combined with the Coghill River weir escapement count. A linear regression model with log-transformed data was used to predict returns of age-1.3 sockeye salmon. This linear regression model was parameterized using the historical relationship between returns of age-1.3 sockeye salmon and returns of the age-1.2 fish 1 year previous (sibling model), which are from the same brood year. For example, the model to predict the return of age-1.3 sockeye salmon in 2018 used the return of age-1.2 fish in 2017 as the input parameter. Predicted returns of age-1.1, -1.2, -2.2, and -2.3 sockeye salmon were calculated as the 2008–2017 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 reduced forecast reliability. Therefore, only data collected since 1974 were used. The 80% prediction intervals for the Coghill Lake sockeye salmon total run were calculated using the method described previously for Copper River sockeye salmon.

Forecast Area: Prince William Sound
Species: Pink Salmon (natural run only)

The PWS wild pink salmon CCPF harvest point estimate is 2,020,000 (80% confidence interval: 310,000–13,150,000). The recent 10 even-year average (1998–2016) PWS wild pink salmon CCPF harvest is 2,548,000.

Forecast Methods

Recent changes in assessment methods for PWS pink and chum salmon escapements have occurred as a result of budget reductions. Beginning in 2015, the number of index streams surveyed was reduced from 214 to 134 streams. In response to the reduced number of stream surveyed by ADF&G, PWS pink and chum salmon escapement goals were changed in 2017 to be comparable to the reduced set of index streams. Yearly total natural run is estimated by adding the wild component of commercial harvest to escapement indices. Aerial escapement indices are used to assess and manage pink and chum salmon escapements in PWS. Estimating the escapement component of total run by expanding escapement indices from a small number of streams to a soundwide total escapement is probably associated with a large amount of error. Because of this, the decision was made to forecast CCPF harvest in 2018. CCPF harvests contributions of natural stock pink salmon were determined through systematic sampling of thermal marked otoliths (1997–2017) and coded wire tags (1985–1996), and through average fry-to-adult survival estimates multiplied by fry release numbers and estimated exploitation rates (1977–1984).

Several trend forecast models were examined for the 2018 PWS wild pink salmon CCPF harvest forecast, including exponential smoothing and 2-, 3-, and 5-year running averages of past even-year CCPF harvests. Exponential smoothing and moving average models produced similar forecast results in the 2,020,000–2,380,000 range, and the 2-year moving average using log-transformed data outperformed the other models. The 80% confidence intervals were calculated from the mean squared error of the retrospective forecast predictions.

Forecast Area: Prince William Sound

Species: Chum Salmon (natural run only)

The PWS wild chum salmon CCPF harvest point estimate is 391,000 (80% confidence interval: 189,000–594,000). The recent 10-year average (2008–2017) PWS wild chum salmon CCPF harvest is 213,000.

Forecast Methods

See pink salmon forecast methods for details on recent changes to assessment and forecast methods. Several trend forecast models were examined for the 2018 PWS wild chum salmon CCPF harvest forecast including exponential smoothing and 2-, 3-, and 5-year running averages of past commercial harvests. The selected 2018 forecast was based on the average of the 2 most recent year CCPF harvests. Exponential smoothing and moving average models all produced forecast results in the 222,000–391,000 range, and the 2-year moving average outperformed the other models. Our ability to accurately forecast natural chum salmon stocks is limited by the lack of data available on the wild component of CCPF harvest before 2004. CCPF harvest contributions of natural stock chum salmon were estimated using prehatchery average natural runs (1998–2003) or thermally marked otolith estimates (2004–2017) for each district in PWS. The 80% confidence intervals were calculated from the mean squared error of the retrospective forecast predictions.

Stormy Hought, Area Finfish Research Biologist, Cordova

Stacy Vega, Finfish Management/Research Biologist, Cordova

APPENDIX C: UPPER AND LOWER COOK INLET

Forecast Area: Upper Cook Inlet
Species: Sockeye Salmon

The forecasts of the 2018 Upper Cook Inlet sockeye salmon run and harvests are as follows:

	Forecast Estimate (millions)	Forecast Range (millions)
TOTAL PRODUCTION:		
Total Run	4.6	3.6–5.5
Escapement	2.0	
UCI Commercial Harvest	1.9	
Other UCI Harvests	0.7	

Forecast Methods

The major sockeye salmon systems in Upper Cook Inlet (UCI) are the Kenai, Kasilof, and Susitna rivers, and Fish Creek. Available escapement (spawner abundance), return, sibling, fry, and smolt data were examined for each system. Four models were evaluated to forecast the total run of sockeye salmon to UCI in 2018: (1) the relationship between adult returns and spawners, (2) the relationship between adult returns and fall fry, (3) the relationship between adult returns and smolts, and (4) the relationship between sibling adult returns. Several forecast models were evaluated for each stock and age class. Models providing the smallest mean absolute percent error (MAPE) between the forecast and actual runs over the past 10 years were typically selected. Forecast model predictions were compared to evaluate uncertainty.

The return of age-1.3 Kenai River sockeye salmon in 2018 was forecasted using a sibling model. The sibling model prediction of the return of age-1.3 salmon is based on the abundance of age-1.2 salmon that returned in 2017. A spawner–recruit model predicts the age-1.2 salmon return based upon the spawning escapement in 2014. The Kenai River return of age-2.2 salmon was forecasted using a sibling model based upon the abundance of age-2.1 salmon that returned in 2017, and the return of age-2.3 salmon was forecasted using a fry model based upon the abundance of age-1 fry rearing in Skilak and Kenai lakes in the fall of 2014. The returns of age-1.2, -1.3, and -2.2 Kasilof River sockeye salmon in 2018 were forecasted using sibling models based upon returns of age-1.1, -1.2, and -2.1 salmon in 2017. A smolt model based upon age-1 smolt abundance in 2015 was used to forecast the return of age-2.3 Kasilof River sockeye salmon in 2018.

The returns of age-0.3, -1.2, -1.3, -2.2 and -2.3 Susitna River sockeye salmon were forecasted using mean return per spawner by age class for brood years 2006–2013. Mark–recapture estimates of inriver run and genetic estimates of commercial harvest were available for these brood years.

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,

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Eagle River, and many other smaller systems in the area. The fraction of the total run destined for unmonitored systems was estimated using genetic estimates of the stock composition of offshore test fishery harvests.

The total harvest by all user groups was estimated by subtracting the aggregate escapement from the total run forecast for all stocks. Aggregate escapement was estimated from 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, which was estimated as 17% of the escapement into monitored systems. Commercial harvest was estimated from the average fraction (2011–2015) of total harvest taken in the commercial fishery. The harvest by all other user groups (sport, personal use, and subsistence) was estimated by subtracting commercial harvest from total harvest.

The total UCI run forecast range was calculated by multiplying the forecast by the MAPE of the actual UCI runs from published UCI run forecasts from 2008 through 2017.

Forecast Discussion

In 2018, a run of approximately 4.6 million sockeye salmon is forecasted to return to UCI with a commercial harvest of 1.9 million. The forecasted commercial harvest in 2018 is 900,000 less than the 20-year average harvest.

The run forecast for the Kenai River is approximately 2.5 million, which is 1.1 million less than the 20-year average run of 3.6 million. A sibling model based upon the return of age-1.2 salmon in 2017 (201,000; 391,000 20-year average) predicted a return of 1.2 million age-1.3 salmon. A fry model based upon the abundance of age-0 fry rearing in Skilak and Kenai lakes in the fall of 2014 (16.2 million; 17.3 million 20-year average) and the average weight of age-0 fall fry rearing in Skilak Lake (0.8 grams; 1.1 grams 20-year average) predicted a return of 1.1 million age-1.3 salmon. The sibling model was used for this forecast, because the 10-year MAPE was lower for the sibling (21%) than the fry model (26%). A fry model based upon the abundance of age-1 fry rearing in Skilak and Kenai lakes in the fall of 2014 (1.4 million; 2.1 million 20-year average) predicted a return of 718,000 age-2.3 salmon in 2018. A sibling model based upon the return of age-2.2 salmon in 2017 (89,000; 247,000 20-year average) predicted a return of 315,000 age-2.3 salmon. The fry model was used for this forecast, because the 10-year MAPE was lower for the fry (37%) than the sibling model (49%). The predominant age classes in the 2018 run forecast are age 1.2 (17%), age 1.3 (47%) and age 2.3 (29%). The 10-year MAPE for the set of models used for the 2018 Kenai sockeye salmon run forecast is 14%.

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The Kasilof River sockeye salmon run forecast is 866,000, which is 11% less than the 20-year average of 971,000. A sibling model based upon the return of age-1.2 salmon in 2017 (295,000; 313,000 20-year average) was used to forecast a return of 294,000 age-1.3 salmon in 2018. A smolt model based upon the abundance of age-1 smolt in 2015 (5.3 million; 4.3 million 20-year average) predicted a return of 320,000 age-1.3 salmon. The sibling model was used for this forecast, because the 10-year MAPE was lower for the sibling (31%) than the smolt model (64%). A sibling model based upon the return of age-1.1 salmon in 2017 was used to forecast a return of 254,000 age-1.2 salmon in 2018. A spawner–recruit model based upon spawner abundance in 2014 forecasted a return of 278,000 age-1.2 salmon. The sibling model was used for this forecast, because the 10-year MAPE was lower for the sibling (47%) than the spawner–recruit model (61%). A sibling model based upon the return of age-2.1 salmon in 2017 was used to forecast a return of 226,000 age-2.2 salmon in 2018. A spawner–recruit model forecast for age-2.2 salmon was 294,000. The sibling model was used for this forecast, because the 10-year MAPE was lower for the sibling (16%) than the spawner–recruit model (19%). The predominant age classes in the 2018 run forecast are age 1.2 (29%), age 1.3 (34%), and age 2.2 (26%). The 10-year MAPE for the set of models used for the 2018 Kasilof sockeye salmon run forecast is 21%.

The Susitna River sockeye salmon run forecast is 329,000, which is 18% less than the 10-year average of 398,000. This forecast was derived using mean return per spawner by age class and mark–recapture estimates of spawner abundance for brood years 2006–2014. Sonar estimates of spawner abundance were not used, because mark–recapture studies have shown that the Yentna sonar project underestimated sockeye salmon escapement causing estimates of adult returns to also be underestimated. The 5-year MAPE for this forecast method is 17%. The predominant age classes in the 2018 Susitna sockeye salmon run forecast are age 1.2 (20%) and age 1.3 (57%).

The Fish Creek sockeye salmon run forecast is 211,000, which is 276% greater than the 20-year average run of 76,000. A sibling model based upon the return of age-1.1 salmon in 2017 (15,000; 3,000 20-year average) was used to forecast a return of 164,000 age-1.2 salmon. A spawner–recruit model forecasted a return of 68,000 age-1.2 salmon. The sibling model was used for this forecast because the 10-year MAPE was lower for the sibling (94%) than the spawner–recruit model (143%). Sibling models were also used to forecast the returns of age-1.3, -2.2 and -2.3 salmon. The predominant age classes in the 2018 Fish Creek run forecast are age 1.2 (78%) and age 1.3 (11%). The 10-year MAPE for the Fish Creek sockeye salmon run forecast is 69%.

Table C1.–Sockeye salmon run forecasts, 20-year average runs and escapement goals (in thousands of fish) to individual freshwater systems in Upper Cook Inlet.

System		Major Age Classes				Total Run ^a	Escapement Goals ^b
		1.2	1.3	2.2	2.3		
Kenai River	Forecast	428	1,167	127	718	2,485	1,000 – 1,300 ^c
	20-yr average	391	2,072	247	768	3,556	
Kasilof River	Forecast	254	294	226	75	866	160 – 340
	20-yr average	313	312	244	83	971	
Susitna River	Forecast	67	186	24	20	329	No Goal ^d
	20-yr average	93	193	27	43	398	
Fish Creek	Forecast	164	23	11	1	211	15 – 45
	20-yr average	43	20	6	3	76	
Unmonitored	Forecast	156	286	66	139	665	No Goal
	20-yr average	144	444	89	153	855	
Total Run	Forecast	1,069	1,956	454	953	4,556	
	20-yr average	984	3,041	613	1,050	5,856	

^a Total run includes all age classes.

^b Goals listed here are as follows, Kenai River: Inriver; Kasilof River: BEG; Susitna River: SEG (weir goals); and Fish Creek: SEG.

^c This is the inriver sockeye salmon goal for runs between 2.3 and 4.6 million measured using sonar at river mile 19 on the Kenai River.

^d Susitna sockeye salmon are managed to achieve escapement goals at Larson, Chelatna and Judd lakes. Current escapement goals for these lakes are as follows: Larson (15,000–35,000), Chelatna (20,000–45,000), and Judd (15,000–40,000).

OTHER SALMON SPECIES

The forecast of the 2018 commercial harvest of other salmon species is as follows:

Commercial Harvest Forecasts	
Pink salmon	389,000
Chum salmon	177,000
Coho salmon	203,000
Chinook salmon	7,400

Forecast Methods

The recent 5-year average commercial harvest was used to forecast the harvest of chum, coho, and Chinook salmon in 2018. The forecast for pink salmon is based upon the average harvest during the past 5 even-numbered years.

Forecast Discussion

The recent 5-year average commercial harvest was used in the forecast, because harvests in these years likely best represent harvests under current regulations with a sockeye salmon run below average.

For more information contact Mark Willette or Pat Shields at the Soldotna ADF&G office at (907) 262-9368.

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Forecast Area: Lower Cook Inlet
Species: Pink Salmon

Preliminary forecast of the 2018 run.

	Forecast Estimate (thousands)	Forecast Range (thousands)
Commercial Common Property Harvest (CCPF)	140	29–687

Note: CCPF harvest refers to fish available for harvest outside of hatchery special harvest areas (SHAs); no prediction of fishing effort is made. Additional CCPF and hatchery cost-recovery harvests may be expected from hatchery returns in and around SHAs. Lower Cook Inlet hatchery forecasts are available from Cook Inlet Aquaculture Association (CIAA): <http://www.ciaa.net.org>

Forecast Methods

A naïve forecast based on historical even-year pink salmon harvests (1960–2016) was used to predict the 2018 CCPF harvest in Lower Cook Inlet (LCI). Similar to methods used in Prince William Sound (PWS) and Southeast Alaska (SEAK), several models were evaluated to determine which best fit the data, including exponential smoothing and 2-, 3-, and 5-year running averages of past even-year CCPF harvests. Exponential smoothing and moving average models using log-transformed data inputs produced point forecasts in the 140,000–234,000 range, and the 2-year moving average outperformed the other models based on comparison of several performance metrics [e.g., bias, mean percentage error (MPE), mean absolute percentage error (MAPE), mean square error (MSE), and root mean square error (RMSE)]. The 80% confidence intervals were calculated from the MSE of the retrospective forecast predictions.

Forecast Discussion

Before this year, the 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/supplemental production forecast provided by Cook Inlet Aquaculture Association. However, preliminary results from catch and escapement otolith sampling in LCI during 2014–2017 suggest high proportions of hatchery marked fish in the harvest and escapement samples may confound the viability of spawner–recruit-based run forecasts. Because of this, the decision was made to produce a CCPF harvest forecast in 2018 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, dominance of one line is typically short lived, lasting 2–6 generations before the opposing line becomes dominant. 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 the short term dominance cycles.

In 2016, LCI experienced below-average pink salmon runs. Only 6 of 18 index streams monitored for escapement achieved their respective escapement goal. The 2018 CCP harvest forecast of 140,000 pink salmon has a forecast range of 29,000–687,000. Poor parent-year runs

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in 2016 and average marine survival of pink salmon adults that returned in 2017 suggest the 2018 pink salmon run is more likely to be closer to the midpoint of the forecast range than the high end. If realized, a CCP harvest of 140,000 pink salmon would be approximately 29% of the recent 10-year average CCP harvest of 486,000 for even-year returns between 1998 and 2016. If the low-end of the forecast range is achieved, escapements to some index streams may be insufficient to reach the low end of their respective escapement goal ranges.

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APPENDIX D: KODIAK

Forecast Area: Kodiak
Species: Pink Salmon

Preliminary forecast of the 2018 run.

Total Production	Forecast Estimate (millions)	Forecast Range (millions)
KMA Wild Stock Total Run	11.6	6.5–16.7
KMA Escapement Goal ^a	5.0	
KMA Wild Stock Harvest	6.6	1.5–11.7
Kitoy Bay Hatchery Harvest ^b	2.1	1.5–2.7
Total KMA Pink Salmon Harvest	8.7	2.9–14.4

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

^a The 2018 estimated escapement is within the range of the even-year aggregate escapement goals for the Kodiak Archipelago (3.0–7.0 million) and the Mainland District (250,000–1.0 million).

^b This figure is the total expected return (2.53 million) minus the broodstock collection goal of 430,000; the Kitoy Bay Hatchery is tentatively not planning on conducting cost-recovery harvest.

The 2018 Kodiak Management Area (KMA) predicted pink salmon harvest is expected to be in the *Weak* category with a point estimate of 8.7 million combining the wild stock and Kitoy Bay Hatchery harvest estimates. Harvest categories were delimited from the 20th, 40th, 60th, and 80th percentiles of historical commercial harvest in the KMA from 1978 to 2017.

KMA Harvest Category	Range (millions)	Percentile
<i>Poor</i>	Less than 7.4	Less than 20th
<i>Weak</i>	7.4 to 11.0	21st to 40th
<i>Average</i>	11.0 to 16.7	41st to 60th
<i>Strong</i>	16.7 to 25.7	61st to 80th
<i>Excellent</i>	Greater than 25.7	81st to 100th

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). The total run estimates were derived from a combination of Karluk and Ayakulik weir count, aerial survey index, and harvest estimates.

For the 2018 KMA wild stock pink salmon forecast, a linear regression model was fit to the odd-year KMA returns from 1980 to 2016.

The regression model utilizes a composite created from 4 separate forecast indices affecting pink salmon returns: (1) escapement (mean district escapement estimate total run correlation anomalies); (2) environment (mean monthly air temperature, total precipitation, and peak precipitation total run correlation anomalies) climate variables from August to June; (3) previous year return (previous odd-year return estimate total run correlation anomalies); and (4) mean multivariate El Niño/Southern oscillation index (MEI) July–October prior to return. A composite of the 4 indices was constructed and regressed against total return.

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Weighting of individual indices to form the composite was done by minimizing the model sum of squares. Weighting estimates in order of importance were (1) environment (0.44); (2) escapement (0.24); (3) MEI (0.19); and (4) previous odd-year pink salmon return (0.10). 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 (Kodiak airport) of average air temperature, total precipitation, and peak precipitation from August to June were considered. Forecast range was estimated using the 80% confidence intervals of the absolute percent error of the composite model hindcast estimates.

The 2018 Kitoi Bay Hatchery pink salmon forecast was prepared by evaluating pink salmon survivals from even brood years 1994–2014, when releases from the facility were in excess of 100 million fry. Brood years 1996–2014 are particularly important to the forecasting model because all pink fry were released on the same day in order 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, but does experience an average strength even-year return every fourth year, which will occur in 2018. The total return estimate of 2.53 million reflects a marine survival of 3.8% and is an average of the previous 6 cyclical returns (2014, 2010, 2006, 2002, 1998, and 1994). A total of 66.6 million fry were released (1.01 g), above the traditional target size (0.80 g).

Forecast Discussion

The 2018 KMA wild stock pink salmon total run (11.6 million) is predicted to be a weak return but still similar to the 5-year even-year wild stock average (Figure D1). Whereas the environmental conditions predictor and MEI were both positive, indicating above average conditions correlated with above average returns, the remaining 2 indicators (escapement and previous year returns) were well below average, suggesting conditions correlated with poor returns. The composite total return predictor has been low for the last 5 even-year return years (Figure D2) and 2018 is no exception. Furthermore, the escapement indicator is the lowest in the time series, creating even more uncertainty in the prediction.

The 2018 Kitoi Bay Hatchery pink salmon production is expected to be 2.5 million. The brood stock collection goal is 425,000, resulting in a total hatchery harvest projection of about 2.1 million. Currently, there are no plans to conduct cost-recovery operations at Kitoi Bay in 2018.

Confidence in the 2018 forecast estimate is only fair considering the unpredictable nature of pink salmon returns. 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 should allow an initial weekly fishing period length of 57 hours (2½ days) for most of the KMA during the initial general pink salmon fisheries (beginning July 6, 2018). By the third week of July, fishing time likely will be restricted, by section or district, to ensure escapement goals will be met.

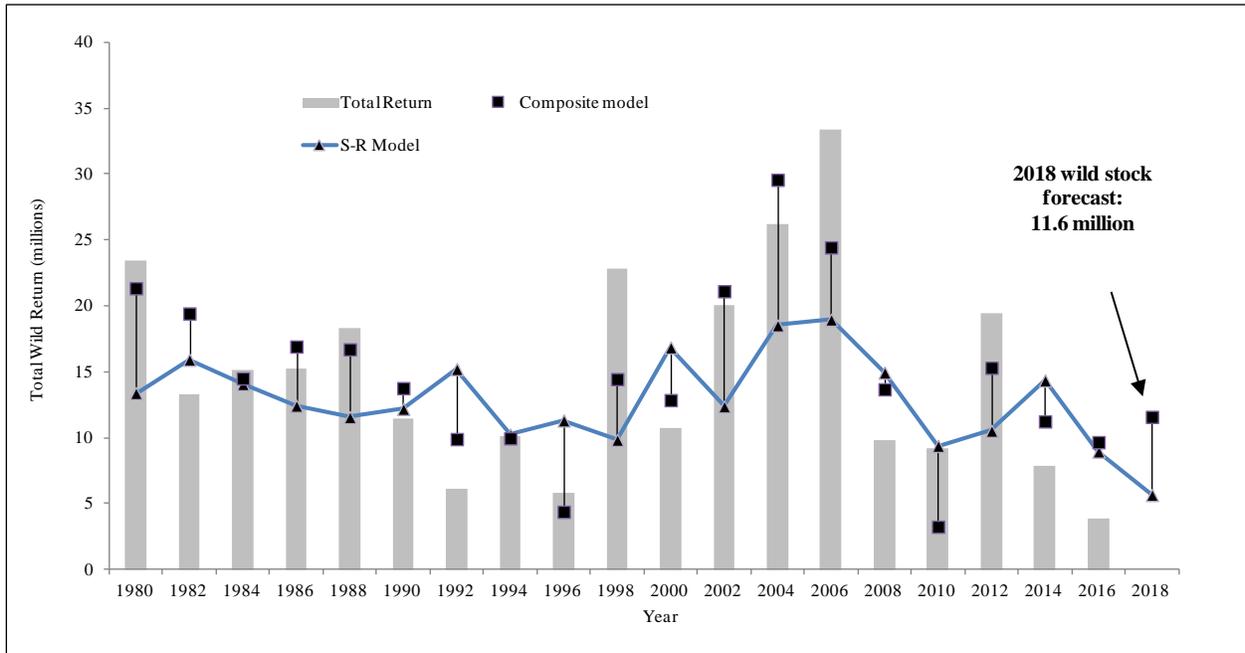


Figure D1.–Kodiak even-year pink salmon wild stock total return compared to S-R estimates and full model estimates, 1980–2016, and 2018 forecast.

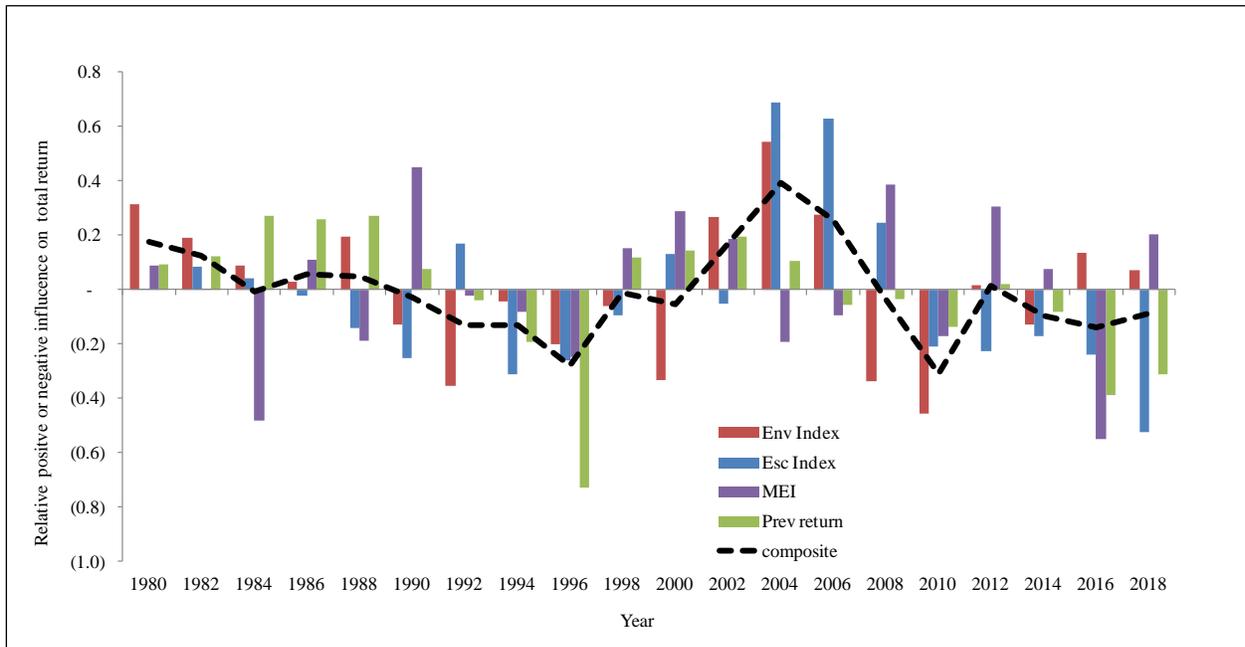


Figure D2.–Forecast model individual and composite indicators correlated with Kodiak even-year pink salmon wild stock total returns.

M. Birch Foster, Finfish Research Biologist, Westward Region

Randy Mason, Kitoi Bay Hatchery Manager, Kodiak Regional Aquaculture Association

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Forecast Area: Kodiak, Ayakulik River
Species: Sockeye Salmon

Preliminary Forecast of the 2018 run.

Total Production	Forecast Estimate (thousands)	Forecast Range (thousands)
Total Run Estimate	493	251–736
Escapement Goal ^a	300	200–400
Harvest Estimate	193	

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

Forecast Methods

The 2018 Ayakulik River sockeye salmon forecast 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.

The age-.2 sockeye salmon were predicted from prior year age-.1 returns using outmigration years (1994–2015). Age-.1, -.3, and -.4 sockeye salmon were predicted by the median return since 1998. Regression and median estimates were summed to estimate the total Ayakulik sockeye salmon run for 2018. The range was estimated as the overall 80% prediction intervals and calculated as the square root of the sum of the squared 80% prediction intervals for each age class forecasted.

Forecast Discussion

The 2018 Ayakulik forecast of 493,000 is about 46,000 more than the actual 2017 run estimate of 447,000, and 11,000 more than the most recent 10-year average. The 2018 run is estimated to be composed of approximately 68% age-.2 fish and 28% age-.3 fish. The confidence in the 2018 Ayakulik forecast is good, due to the regression relationship. The projected harvest of 193,000 is based on the achievement of the midpoint of the combined escapement goal ranges (300,000). 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 (2012–2014), approximately 71% of the total run will occur in the early portion of the run.

M. Birch Foster, Finfish Research Biologist, Westward Region

Forecast Area: Kodiak, Karluk River
Species: Sockeye Salmon

Preliminary Forecast of the 2018 run.

Total Production		Forecast Estimate (thousands)	Forecast Range (thousands)
Early Run	Total Run Estimate	392	251–533
	Escapement Goal ^a	200	150–250
	Harvest Estimate	192	
Late Run	Total Run Estimate	948	519–1,377
	Escapement Goal ^a	325	200–450
	Harvest Estimate	623	
Total Karluk River System	Total Run Estimate	1,339	770–1,909
	Escapement Goal ^a	525	350–700
	Harvest Estimate	814	

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

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

Forecast Methods

The 2018 Karluk River sockeye salmon forecast was prepared primarily by investigating simple linear regression models utilizing recent age class relationships. Each model was assessed with standard diagnostic procedures. 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.

For the early run, age-.2 sockeye salmon returns were predicted based on the abundance of the prior-year return of age-.1 sockeye salmon using outmigration years (2005–2015). Age-.3 sockeye salmon returns were predicted based on the abundance of the prior-year return of age-.2 sockeye salmon using recent outmigration years (1987–2014). The age-.1 and -.4 return predictions were calculated using their pooled 10-year median contribution.

For the late run, age-.2 sockeye salmon returns were predicted based on the abundance of the prior-year return of age-2.1 sockeye salmon using recent outmigration years (2005–2015). The age-.1, -.3, and -.4 return predictions were calculated using their pooled 10-year median contribution.

Regression and median estimates were summed to estimate the total Karluk sockeye salmon run for 2018. The range was estimated as the overall 80% prediction intervals and calculated as the square root of the sum of the squared 80% prediction intervals for each age class forecasted. 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.

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Forecast Discussion

The total 2018 sockeye salmon run to the Karluk River is expected to be approximately 1,339,000 (Figure D3). The early run is expected to be approximately 392,000, which is about 138,000 above the recent 10-year average (254,000) and 40,000 below the 2017 run (432,000). The late run is expected to be approximately 948,000 which is 299,000 above the recent 10-year average (649,000) and 81,000 less than the 2017 run (1,029,000).

The projected harvest estimate for the early run (192,000) is based on achievement of the midpoint of the early-run escapement goal. The projected harvest estimate for the late run (623,000) is based on achievement of the midpoint of the late-run escapement goal. The vast majority of both runs is expected to be age-.2 fish. The overall confidence in the Karluk sockeye salmon forecast is good.

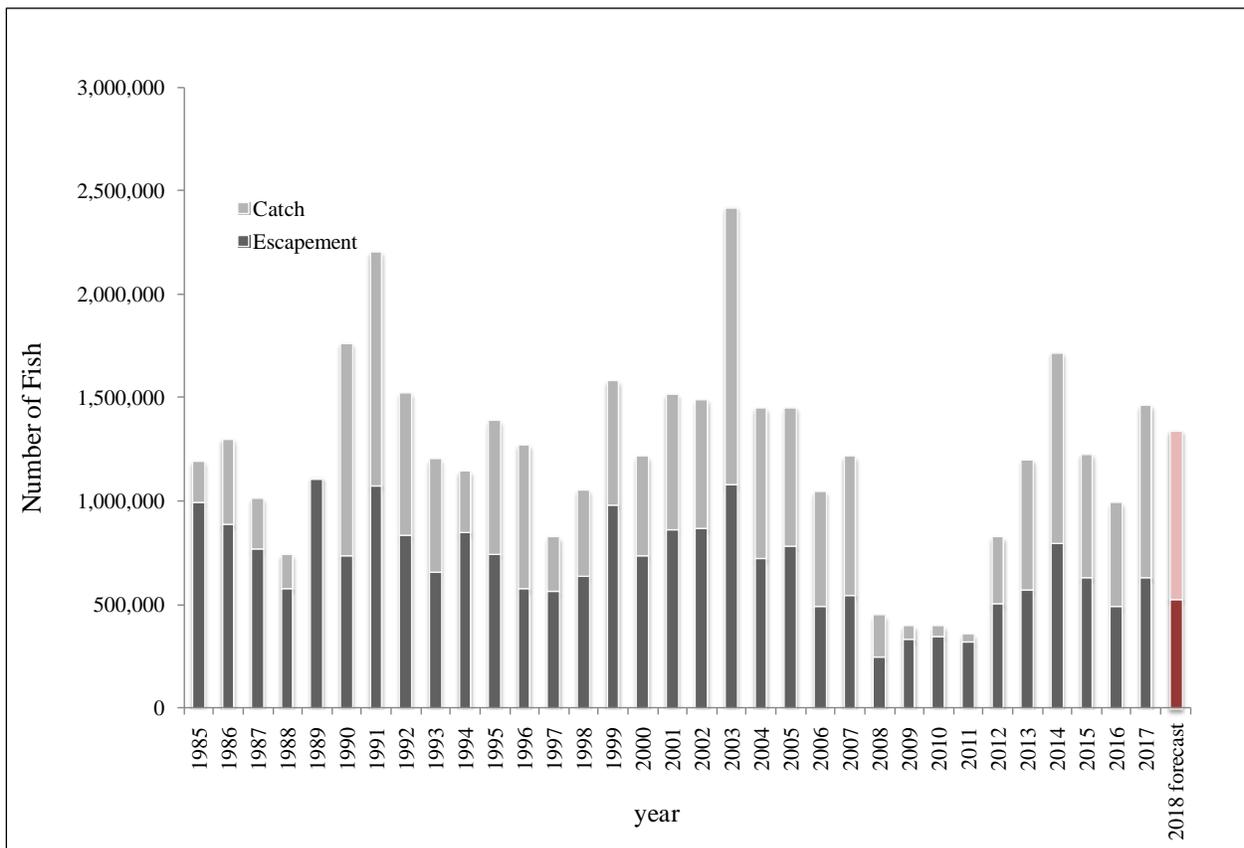


Figure D3.–Karluk River sockeye salmon annual run (combined early and late) estimates showing catch and escapement by year, 1985–2017, and the 2018 forecast.

M. Birch Foster, Finfish Research Biologist, Westward Region

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**Forecast Area: Kodiak, Alitak District (Frazer Lake and Upper Station)
Species: Sockeye Salmon**

Preliminary Forecast of the 2018 run.

Total Production		Forecast Estimate (thousands)	Forecast Range (thousands)
Early Upper Station	Total Run Estimate	79	48–111
	Escapement Goal ^a	65	43–93
	Harvest Estimate ^b	14	
Late Upper Station	Total Run Estimate	293	189–397
	Escapement Goal	186	120–265
	Harvest Estimate ^b	107	
Frazer Lake	Total Run Estimate	239	77–401
	Escapement Goal ^c	137	95–190
	Harvest Estimate ^b	102	
Total Alitak District	Total Run Estimate	611	314–909
	Escapement Goal	388	258–548
	Harvest Estimate ^b	223	

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 of 30,000 in 2017; the Upper Station early run is now managed for a BEG of 43,000–93,000.

^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, which is the 20-year median of the number of fish that pass through Dog Salmon weir but do not ascend the Frazer Lake fish pass.

Forecast Methods

The 2018 sockeye salmon run to the Alitak District was forecasted with linear regression models using age class relationships by system from recent outmigration years. 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.

Upper Station early-run age-.2 fish were forecasted using prior year age-.1 returns (outmigration years: 2003–2016), Kodiak airport April precipitation, and the Oceanic Niño Index for May in a multiple regression model. Precipitation data were lagged to correspond to freshwater rearing conditions in Olga Lake, and smolt outmigration events and Oceanic Niño Index data were lagged to reflect marine rearing conditions that would affect parental escapement. Upper Station early-run age-.3 and Upper Station late-run age-.2 and -.3 salmon returns were each predicted using their respective prior year age-.1 and -.2 returns (early-run outmigration years: 1988–2014; late-run outmigration years: 1998–2015 and 1999–2014). Upper Station early- and late-run age-.1 and -.4 returns were calculated using the pooled median contributions by stock and ocean age from the last 10 years. Frazer age-.3 salmon were predicted using prior year age-.2 returns (outmigration years: 2003–2014). Frazer age-.1, -.2, and -.4 returns were calculated using the pooled median contributions from the last 15 years.

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Regression and median estimates were summed to estimate the total Alitak District sockeye salmon run for 2018. The prediction interval ranges for each stock were calculated as the square root of the sum of the squared prediction intervals for each age class forecasted. The combined Alitak District prediction interval was calculated by summing the lower and upper prediction bounds of the 3 runs.

Forecast Discussion

The 2018 sockeye salmon run to the Alitak District is expected to be approximately 611,000, approximately 46,000 less than the recent 10-year average run (657,000) and 14,000 less than the 2017 run (625,000). The Upper Station early run is expected to be approximately 79,000, which is greater than the recent 10-year average run (68,000). The Upper Station late run is expected to be approximately 293,000, which exceeds the recent 10-year average run (240,000). The Frazer Lake run is expected to be approximately 239,000, which is below the recent 10-year average (349,000). The 2017 Alitak District sockeye salmon run should be composed of approximately 72% age-.2, 22% age-.3, and 7% age-.1 fish. Overall, our confidence in the forecast is only fair based on the strength of the regression models and the large prediction interval.

The projected harvest estimate of 223,000 is based on achieving the S_{MSY} estimates for both the Upper Station early and late runs and the S_{MSY} estimate plus an additional 20,000 (20-year median of the number of fish that pass through Dog Salmon 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.

Heather Finkle, Finfish Research Biologists, Kodiak

APPENDIX E: CHIGNIK

Forecast Area: Chignik
Species: Sockeye Salmon

Preliminary Forecast of the 2018 run.

Total Production		Forecast Estimate (thousands)	Forecast Range (thousands)
Early Run (Black Lake)	Total Run Estimate	848	0–1,914
	Escapement Goal ^a	400	350–450
	Harvest Estimate ^b	447	
Late Run (Chignik Lake)	Total Run Estimate	901	411–1,392
	Escapement Goal ^a	338	275–400
	Harvest Estimate ^b	563	
Total Chignik System	Total Run Estimate	1,749	411–3,306
	Harvest Estimate ^b	1,011	
	Chignik Area	834	
	SEDM Area	57	
	Cape Igvak Section	120	

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 75,000 sockeye salmon is added to the lower bound of the late-run escapement goal.

^b Includes anticipated harvests of Chignik-bound fish in Southeastern District Mainland and Cape Igvak fisheries.

Forecast Methods

Simple linear regressions models using age class relationships were used to forecast the 2018 early- and late- Chignik sockeye salmon runs. Each regression model was assessed with standard regression diagnostic procedures. 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 1995 to the present; median prediction intervals were calculated from the 10th and 90th percentiles of the data.

For the early run, prior year age-.2 returns predicted age-.3 returns using data from the 2000 outmigration year to the present. Prior year early-run age-.1 returns predicted age-.2 returns (outmigration years 1998 to present). For the late run, prior year age-.2 sockeye salmon returns predicted age-.3 returns using data from the 2000 outmigration year to the present. Prior year age-.1 early- and late-run returns were combined to predict late-run age-.2 returns (outmigration years 1988 to present).

The early- and late-run regression and median estimates were summed to estimate the total Chignik River sockeye salmon run for 2018. The prediction interval range was calculated as the square root of the sum of the squared 80% prediction intervals for each age class forecasted. The combined early- and late-run 80% prediction interval was calculated by summing the lower and upper prediction bounds of the 2 runs.

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Forecast Discussion

The 2018 Chignik sockeye salmon early run is forecasted to be 848,000, which is 528,000 less than the 10-year average run of 1.38 million and almost 301,000 less than the 2017 early run of 1.15 million. The early run is predicted to be composed of approximately 75% age-.3 and 25% age-.2 fish. The late run is forecasted to be 901,000, which is approximately 212,000 less than the 10-year average run of 1.11 million and 198,000 more than the 2017 late run of 703,000. The 2018 late run is predicted to be composed of approximately 76% age-.3, 23% age-.2, and 1% age-.1 and -.4 fish. The 2018 total Chignik sockeye salmon run is expected to be 1.75 million, which is approximately 740,000 less than the 10-year average of 2.49 million and roughly 103,000 less than the 2017 total run of 1.85 million.

Inseason genetic estimates of each run were used to manage the fishery in 2017 and will continue to be used in 2018. The projected 2018 early-run total harvest estimate of 447,000 is based on achievement of the midpoint of the early-run escapement goal range. The projected late-run harvest estimate of 563,000 is based on achieving the midpoint (338,000) of the late-run goal, which includes the inriver run goal of 75,000 added to the lower bound (200,000) of the escapement goal. Sockeye salmon harvest estimates for both runs include fish harvested in the Chignik Management Area, Chignik-bound fish harvested in the Cape Igvak Section of the Kodiak Management Area, and in the Southeastern District Mainland of the Alaska Peninsula Management Area.

The wide confidence intervals around the point estimate of the 2018 forecasts reflect the uncertainty inherent in the forecast models. The early run is typically more variable than the late run, resulting in wider confidence intervals for early run. Exploratory analysis using other sibling relationships and environmental variables corroborated this formal forecast. Similar methods have been used for forecasting the early and late runs since 2004. Due to the range of variation in the relationships used in these forecasts and their historical accuracy, our confidence in them is fair.

Heather Finkle, Finfish Research Biologist, Westward Region

APPENDIX F: BRISTOL BAY

Forecast Area: Bristol Bay
Species: Sockeye Salmon

Forecast of the 2018 run.

TOTAL PRODUCTION	Forecast (millions)	Forecast Range (millions)
Total Run	51.28	40.68–61.88
Escapement	12.20	
Commercial Common Property Harvest	39.08	
Bristol Bay Harvest	37.59	
South Peninsula Harvest	1.49	
Inshore Run	49.79	

Forecast Methods

The 2018 Bristol Bay sockeye salmon forecast is the sum of individual predictions of 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, plus ages 0.3 and 1.4 for the Nushagak River). Adult escapement and return data from brood years 1972–2014 were used in the analyses.

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. Models based on the most recent 3 and 5 years of returns were also evaluated. In general, models chosen were those with statistically significant parameters and/or the best past performance (accuracy and precision). Performance was evaluated using absolute deviation, absolute percent error, and percent error between forecasted and observed returns. These performance metrics were calculated and considered for each model across the most recent 10-year time frame.

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 2001 through 2016.

Forecast Discussion

A total of 51.28 million sockeye salmon (range 40.68–61.88 million) are expected to return to Bristol Bay in 2018. This is 18% greater than the most recent 10-year average of Bristol Bay total runs (42.71 million) and 41% greater than the long-term mean of 33.78 million. All systems are expected to meet their spawning escapement goals.

Where practical, ADF&G will manage escapements proportional to the run size and relative to the historical record (5AAC 06.355(d)(1)). Escapement is projected as the 75th quartile of the escapement range if the forecast is above the historical trend line (Wood, Igushik, Nushagak, and Togiak rivers).

Escapement is projected as the midpoint (50th quartile) of the escapement range if the forecast is in line with the historical trend (Egegik River). Escapement is projected as the 25th quartile of the escapement goal range if the forecast is below the historical trend line (Kvichak, Naknek, and Ugashik rivers in

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2018; Table F1). 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 harvest. Preseason harvest projections are provided to aid industry in planning. Once the run begins to develop ADF&G relies on catch and escapement data for management decisions.

A run of 51.28 million sockeye salmon would allow for a potential total harvest of 39.08 million: 37.59 million in Bristol Bay and 1.49 million in the South Peninsula fisheries. A Bristol Bay harvest of this size is 35% greater than the most recent 10-year harvest of 28.91 million (range of 15.43–38.81 million) and is 87% greater than the long-term harvest average of 20.85 million (1963 to present).

The run forecast for each district and river system is as follows: 16.64 million to Naknek-Kvichak District (8.36 million to the Kvichak River, 4.41 million to the Alagnak River, and 3.87 million to the Naknek River); 9.12 million to the Egegik District; 2.87 million to the Ugashik District; 21.79 million to the Nushagak District (12.31 million to the Wood River, 7.36 million to the Nushagak River, and 2.13 million to the Igushik River); and 860,000 to the Togiak District (Figures F1–F9).

We forecast the 2018 total run will consist of 18.43 million age-1.2 fish (36%), 6.03 million age-2.2 fish (12%), 22.55 million age-1.3 fish (44%), and 4.13 million age-2.3 fish (8%; Table F1).

Historically, sockeye salmon runs to Bristol Bay have been highly variable. The Bristol Bay total run has averaged 33.78 million from 1963 to 2017 and has averaged 42.71 million during the most recent 10-year period. Forecasting future salmon returns is inherently difficult and uncertain. We have used similar methods since 2001 to produce the Bristol Bay sockeye salmon forecast which have performed well when applied to Bristol Bay as a whole. Since 2001, our forecasts have, on average, underforecast the run by 11% and have ranged from 44% below actual run in 2014 to 19% above actual run in 2011. Forecasted harvests have had a mean absolute percent error of 14% since 2001.

Individual river forecasts have greater uncertainty compared to Bay-wide forecasts. Since 2001, on average, we have underforecasted the returns to the Alagnak (–46%), Togiak (–20%), Kvichak (–21%), Wood (–13%), Nushagak (–20%), and Naknek (–7%) rivers, and overforecasted returns to Igushik (14%), Egegik (16%), and Ugashik (0.4%). Overforecasting returns to some rivers and underforecasting returns to other rivers means that the overall Bristol Bay forecast is generally more accurate than the forecast to any individual river. The Nushagak District had a record breaking run in 2017. This was largely driven by robust returns from the 2013 brood year, which manifested as very large age-1.1 returns in the Wood River in 2016 and age-1.2 returns in the Wood and Nushagak rivers in 2017. Whether or not the 2013 brood year can sustain these very large returns and produce a large age-1.3 return in the Nushagak River is a major point of uncertainty in the 2018 forecast. Returns of the 2013 brood year to multiple stocks have been impressive to date, particularly in the Nushagak District. It is unclear how much longer the 2013 brood year can overperform relative to the historical record.

ADF&G would like to thank the Bristol Bay Fisheries Collaborative for funding assistance in 2017. The Bristol Bay Fisheries Collaborative began in 2016 and is an agreement between ADF&G and the Bristol Bay Science and Research Institute to work together with stakeholders to restore a world-class fishery management system and raise funds to support and maintain management. This agreement is supported by ADF&G, Bristol Bay Science and Research Institute, drift and set net fishermen, processors, municipalities, villages, support industries and other stakeholders.

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A list of organizations that committed financial support to the Bristol Bay Fisheries Collaborative in 2017, as well as additional information about this agreement, can be found at <https://www.bbsri.org/bbfc>.

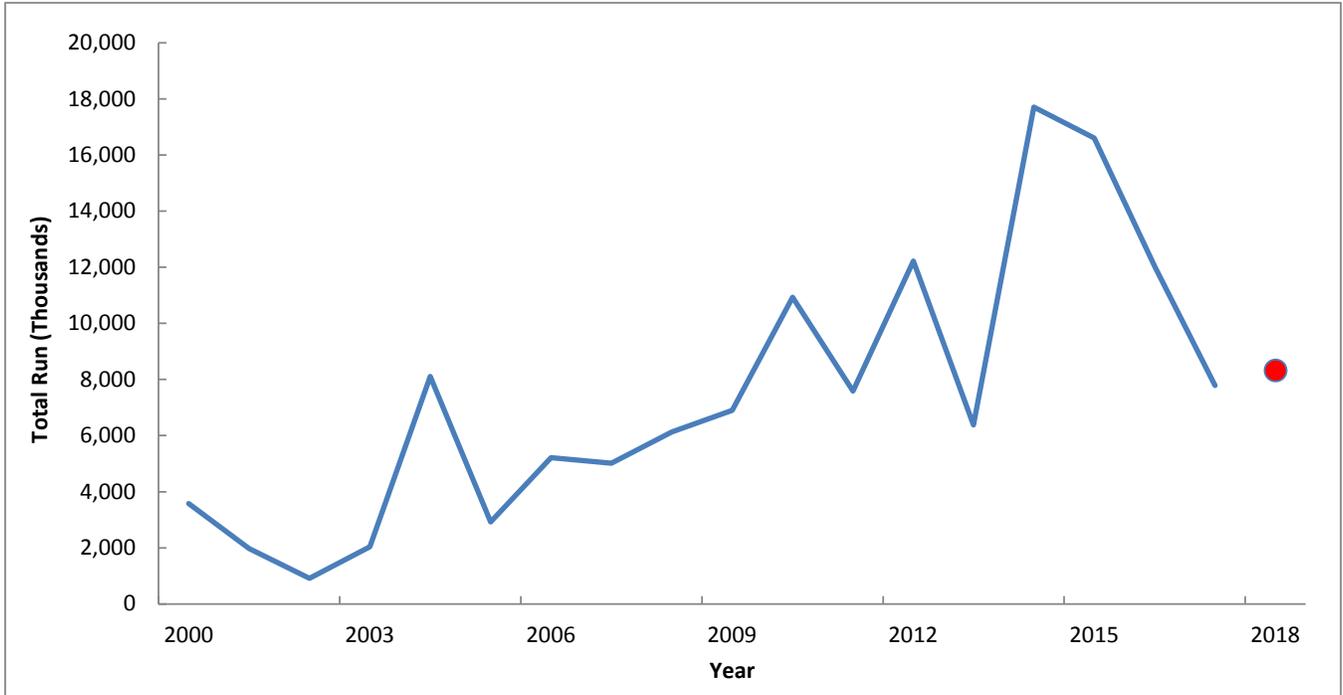


Figure F1.—Kvichak River total sockeye salmon run 2000–2017 (line) and the 2018 forecast (circle).

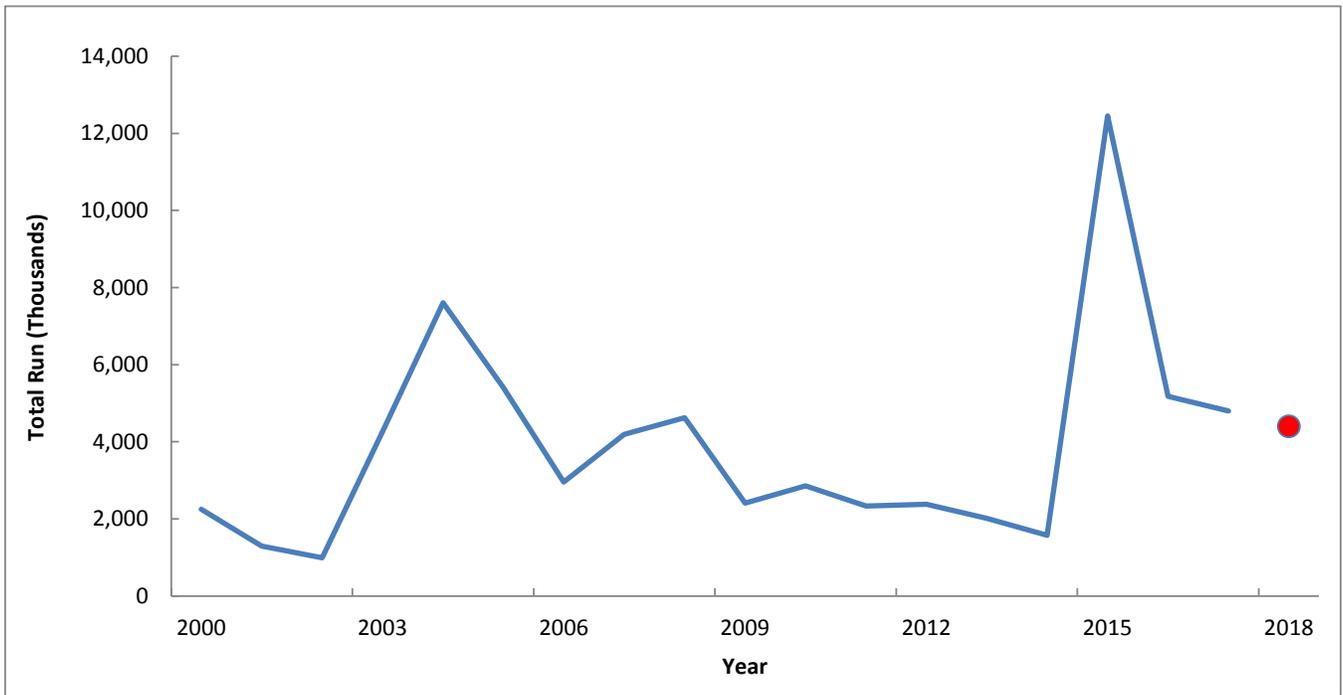


Figure F2.—Alagnak River total sockeye salmon run 2000–2017 (line) and the 2018 forecast (circle).

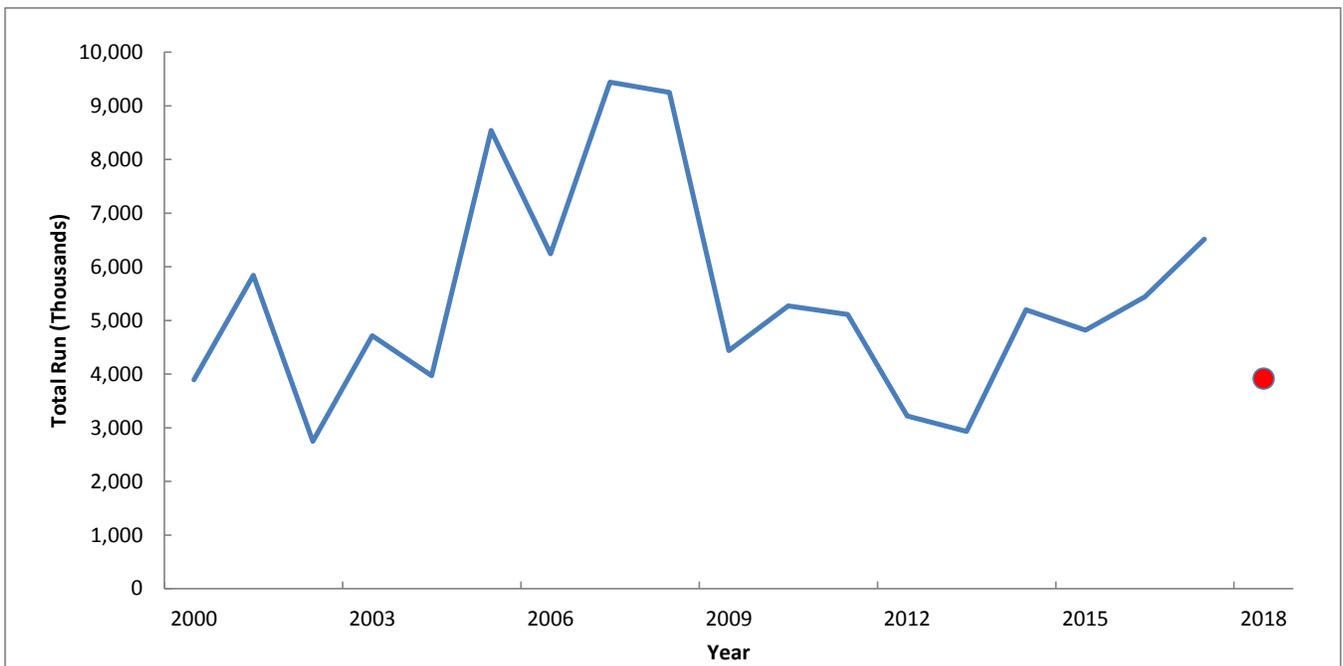


Figure F3.—Naknek River total sockeye salmon run 2000–2017 (line) and the 2018 forecast (circle).

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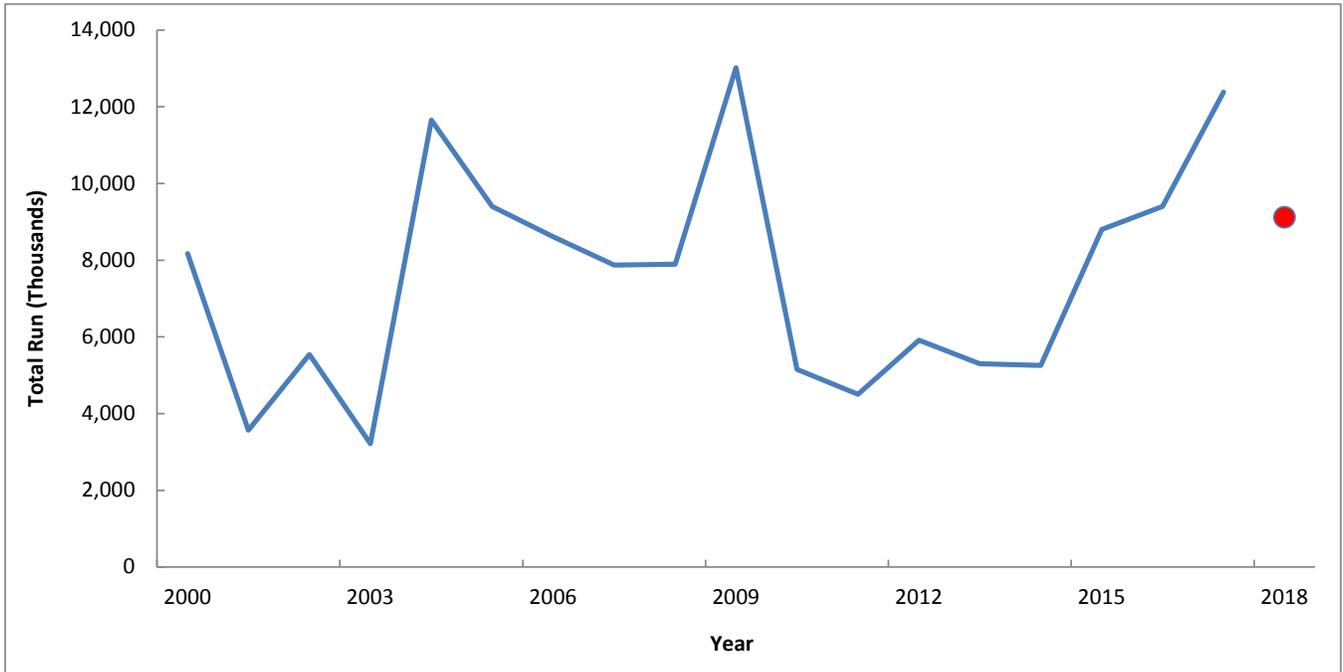


Figure F4.—Egegik River total sockeye salmon run 2000–2017 (line) and the 2018 forecast (circle).

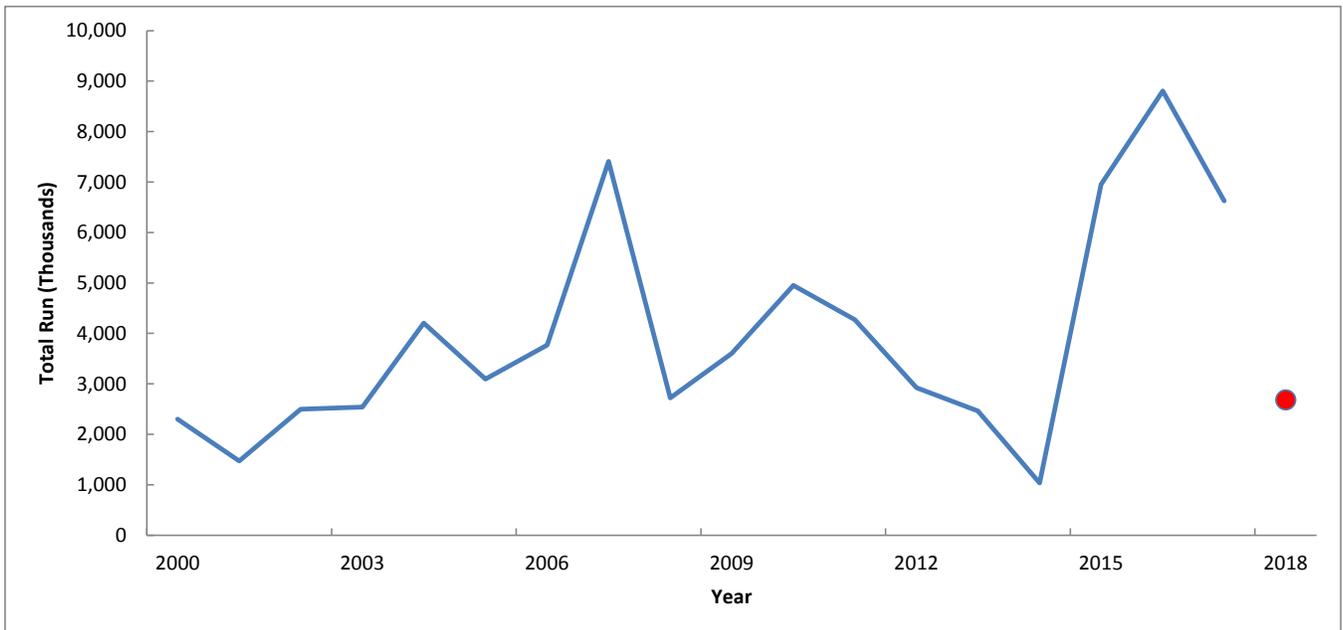


Figure F5.—Ugashik River total sockeye salmon run 2000–2017 (line) and the 2018 forecast (circle).

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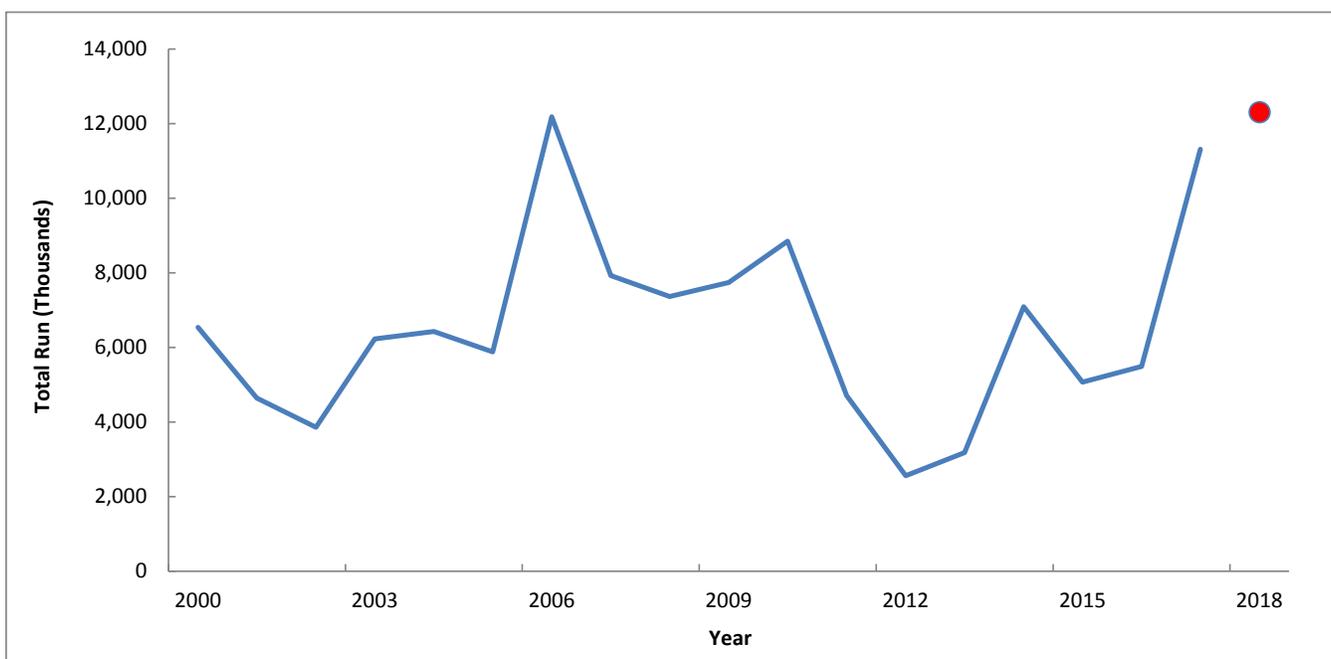


Figure F6.—Wood River total sockeye salmon run 2000–2017 (line) and the 2018 forecast (circle).

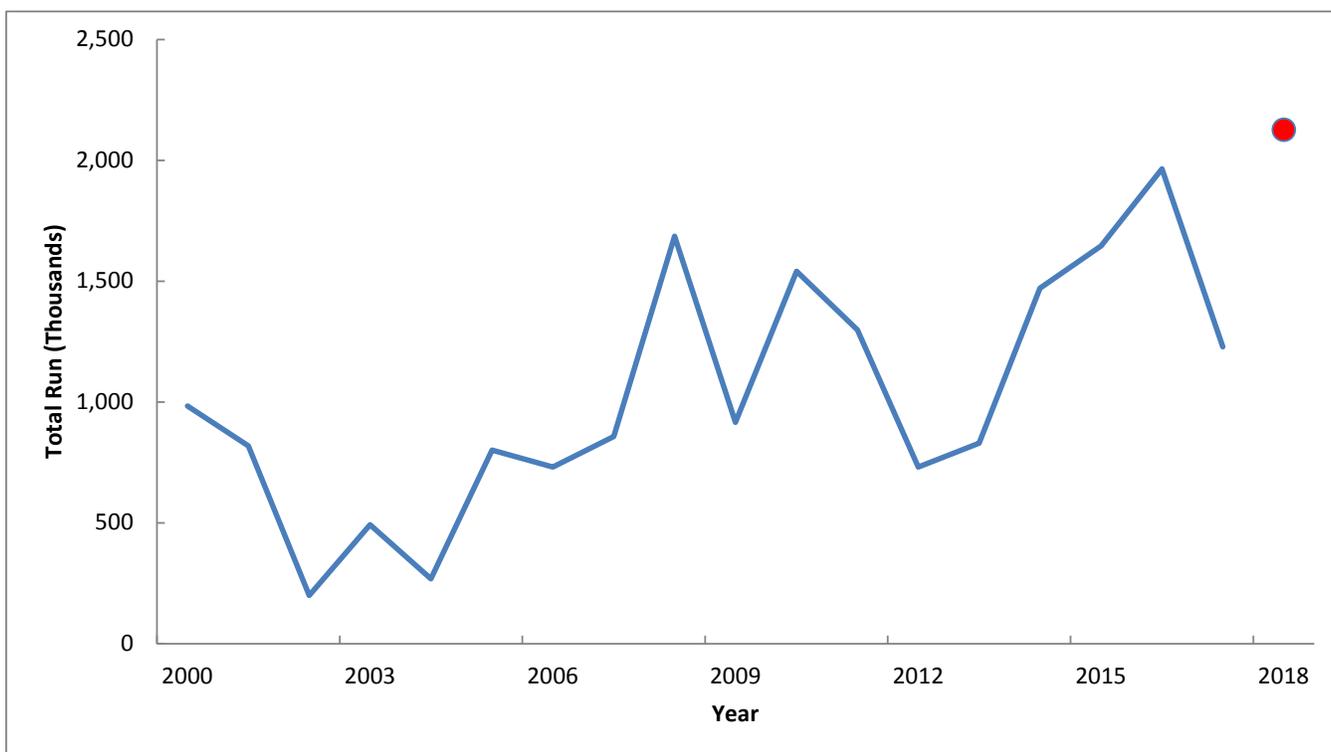


Figure F7.—Igushik River total sockeye salmon run 2000–2017 (line) and the 2018 forecast (circle).

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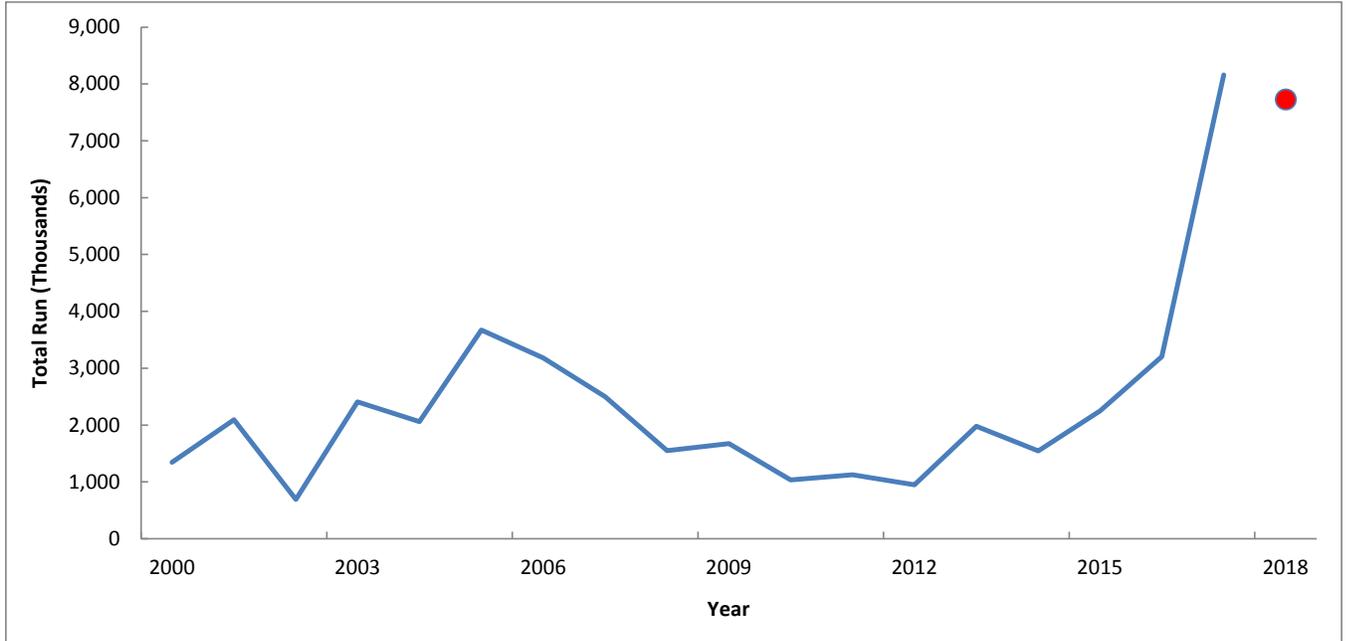


Figure F8.—Nushagak River total sockeye salmon run 2000–2017 (line) and the 2018 forecast (circle).

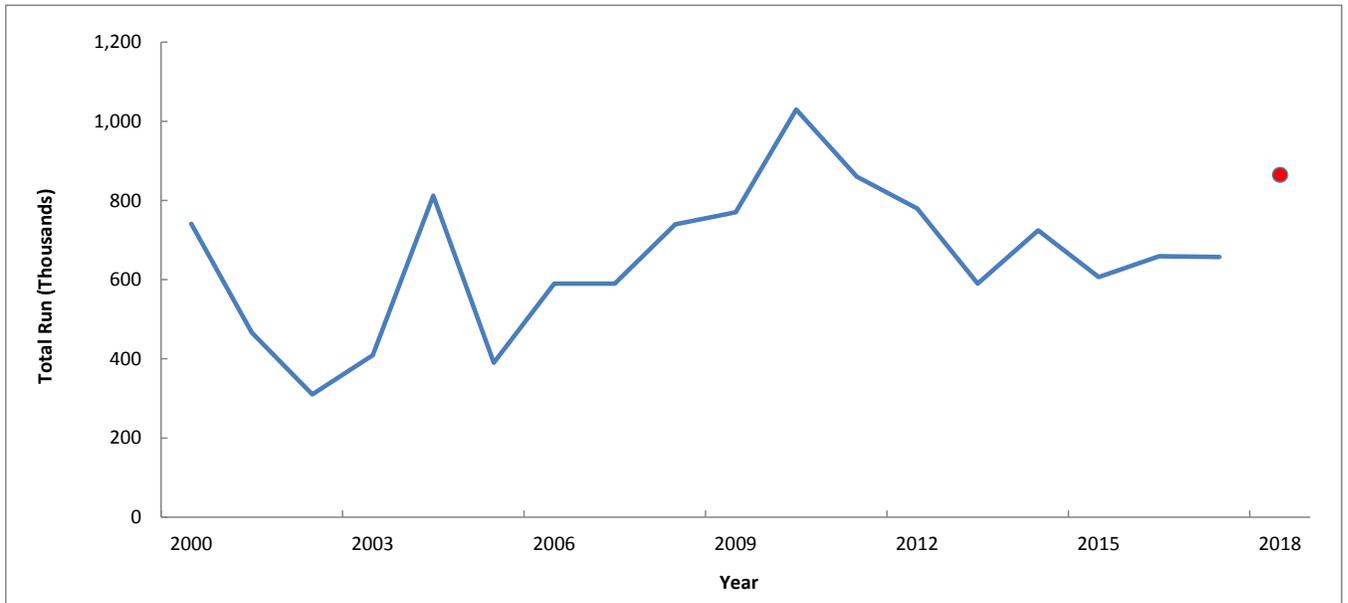


Figure F9.—Togiak River total sockeye salmon run 2000–2017 (line) and the 2018 forecast (circle).

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Table F1.–Forecast of total run, escapement, and harvest of major age classes of sockeye salmon returning to Bristol Bay river systems, 2018.

DISTRICT	River	Millions of Sockeye Salmon							South Peninsula ^a	BB Inshore
		Forecasted Production by Age Class				Total	Forecasted			
		1.2	2.2	1.3	2.3		Escapement	Harvest		
NAKNEK-KVICHAK										
	Kvichak	4.30	1.05	2.61	0.40	8.36	4.00	4.12	0.24	8.12
	Alagnak	1.67	0.01	2.72	0.01	4.41	2.11	2.17	0.13	4.28
	Naknek	1.51	0.53	1.25	0.58	3.87	1.10	2.65	0.11	3.75
	Total	7.48	1.59	6.58	0.99	16.64	7.21	8.95	0.48	16.16
	EGEGIK	1.19	3.67	1.48	2.77	9.12	1.40	7.45	0.27	8.85
	UGASHIK	0.42	0.62	1.54	0.29	2.87	0.73	2.06	0.08	2.78
	NUSHAGAK									
	Wood	8.00	0.13	4.13	0.04	12.31 ^b	1.53	10.42	0.36	11.95
	Igushik	0.59	0.01	1.50	0.02	2.13	0.34	1.73	0.06	2.06
	Nushagak	0.56	0.00	6.64	0.01	7.36	0.77	6.38	0.21	7.14
	Total	9.16	0.14	12.28	0.07	21.79	2.63	18.53	0.63	21.16
	TOGIAK	0.18	0.01	0.66	0.01	0.86	0.23	0.61 ^c	0.03	0.84
	BRISTOL BAY	18.43	6.03	22.55	4.13	51.28	12.20	37.59	1.49	49.79
		36%	12%	44%	8%	100%				

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

^a Projected harvest is based on the current 5 year running average exploitation rate of 2.9%.

^b Nushagak River forecast includes age-0.3 (91) and age-1.4 (137,507) 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.

Greg Buck, Area Research Biologist, Bristol Bay

Katie Sechrist, Assistant Area Research Biologist, Bristol Bay

APPENDIX G: ALASKA PENINSULA

Forecast Area: Alaska Peninsula, Bear Lake (Late Run)
Species: Sockeye Salmon

Preliminary forecast of the 2018 run.

Total Production	Forecast Estimate (thousands)	Forecast Range (thousands)
Total Run Estimate	308	117–500
Escapement Goal ^a	156	117–195
Harvest Estimate	152	

^a The escapement estimate is the midpoint of the escapement goal range (117,000–195,000) in 2018.

Forecast Methods

The 2018 forecast of the Bear Lake sockeye salmon late run 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 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 80% prediction interval of the medians.

Age-2.3 sockeye salmon were predicted from prior year age-2.2 returns from brood years 1991 to 2011. 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 2018. The range was estimated as the overall 80% prediction intervals and calculated as the square root of the sum of the squared 80% prediction intervals for each age class forecasted.

Forecast Discussion

The 2018 Bear Lake late-run forecast of 308,000 sockeye salmon is 87,000 less than the 10-year average of approximately 395,000 and 20,000 less than the 2017 run of 328,000. The 2018 late run is expected to be composed of 3% age-1., 75% age-.2, and 22% age-.3 fish. The projected harvest of 152,000 is based on achieving the midpoint of the late-run escapement goal range (156,000) 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 sockeye salmon returns. Over the last 10 years, age-2.2 fish have made up an average of 55% of the annual run, but this proportion has varied from 16% (2011) to 78% (2014). Based on uncertainty associated with the variable predictive capabilities of sibling age class, our confidence in this forecast is fair.

Reid Johnson, Fishery Biologist, Alaska Peninsula
Kevin Schaberg, Fishery Biologist, Alaska Peninsula

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Forecast Area: Alaska Peninsula/Aleutian Islands Management Area, Nelson River
Species: Sockeye Salmon

Preliminary forecast of the 2018 run.

Total production	Forecast estimate (thousands)	Forecast range (thousands)
Total run estimate	428	213–642
Escapement goal ^a	158	97–219
Harvest estimate	270	

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 2018.

Forecast Methods

The 2018 Nelson River sockeye salmon run was forecasted using simple linear regression and generalized Ricker models of age class, precipitation, and air temperature from the past 29 years. Air temperature and precipitation indices were constructed from Cold Bay Airport data. Standard regression diagnostics were used to evaluate each model. Prediction intervals (80%) for the regression estimates were calculated using the variances of the regression models. 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.

Age-.2 sockeye salmon returns were forecast with a generalized Ricker model that used parental escapement of predominant age-2.2 fish from 1984 to 2013, May precipitation anomalies corresponding to outmigration year, and temperature anomalies of averaged November air temperatures from the years prior to and during outmigration. The age-.1, -.3, and -.4 returns were calculated from median estimates for each 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 2018. The range was estimated as the overall 80% prediction intervals and calculated as the square root of the sum of the squared 80% prediction intervals for each age class forecasted.

Forecast Discussion

The 2017 Nelson River forecast of 428,000 sockeye salmon is about 17,000 more than the most recent 10-year average (2008–2017) of 410,000 and is approximately 301,000 less than the 2017 run of about 729,000. The 2018 run should be composed mainly of age-.2 (71%) and -.3 (27%) fish. Regression relationships predicting age-.2 sockeye salmon are significant and represent the majority of the run. However, the Nelson River sockeye salmon run has been notoriously unpredictable. Therefore, confidence in this forecast is fair. The projected harvest of 270,000 is based on achieving the midpoint (158,000) of the escapement goal range.

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Forecast Area: Alaska Peninsula, South Alaska Peninsula Aggregate
Species: Pink Salmon

Preliminary forecast of the 2018 run.

Total Production	Forecast Estimate (millions)	Forecast Range (millions)
Total Run Estimate	3.9	0.9–7.0
Escapement Goal ^a	2.9	1.8–4.0
Harvest Estimate	1.0	0.9–3.0

^a The escapement estimate is the median of the aggregate goal range (1.8–4.0 million) in 2018.

The 2018 South Alaska Peninsula predicted pink salmon harvest is expected to be in the *poor* category with a point estimate of 1.0 million (900,000 to 3.0 million). Harvest categories were calculated from the 20th, 40th, 60th, and 80th percentiles of historical commercial harvest on the South Alaska Peninsula from 1984 to 2017.

S. Pen Harvest Category	Range (millions)	Percentile
<i>Poor</i>	Less than 2.6	Less than 20 th
<i>Weak</i>	2.7 to 4.3	21 st to 40 th
<i>Average</i>	4.4 to 7.6	41 st to 60 th
<i>Strong</i>	7.7 to 9.8	61 st to 80 th
<i>Excellent</i>	Greater than 9.9	81 st to 100 th

Forecast Methods

The 2018 South Alaska Peninsula pink salmon harvest forecast is derived from a total run forecast minus the median (2.9 million) of the combined even- and odd-year South Alaska Peninsula escapement goal range. The total run was forecasted with an exponential smoothing model using the Holt method. The model was fit to even-year South Peninsula pink salmon returns from 1964 through 2016.

Forecast Discussion

The 2018 South Alaska Peninsula pink salmon total harvest (1.0 million) is predicted to be poor. Although forecasts of pink salmon returns to the South Alaska Peninsula have only been published since 2011, even-year forecasts of pink salmon on the South Alaska Peninsula have generally been less accurate than odd years. This has been emphasized with changing ocean conditions and recent years’ average temperatures have been outside the ranges in the historical dataset; therefore, the forecast’s predictive power has been diminished. The largest potential source of uncertainty in anticipated returns of pink salmon may be warm sea surface temperature in the Gulf of Alaska and increasing total run size differences between even- and odd-year returns. Pink salmon that migrated to sea in 2015 returned in 2016 in numbers well below forecasted returns (3.9 million), and it is likely that pink salmon that went to sea in 2017 experienced similar conditions and the 2018 return is expected to also be poor. Due to the relative strength of the predictive model, but accounting for uncertainty in changing environmental conditions, confidence in the forecast is fair.

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APPENDIX H: ARCTIC-YUKON-KUSKOKWIM

Forecast Area: Arctic-Yukon-Kuskokwim

Species: All Salmon

ADF&G does not produce formal run forecasts for most salmon runs in the Arctic-Yukon-Kuskokwim (AYK) Region. Many of the salmon run outlooks presented in this report are qualitative in nature because of a lack of information with which to develop more rigorous forecasts. Consequently, these commercial harvest outlooks are typically based upon available parent year spawning escapement indicators, age composition information, recent year trends, and the likely level of commercial harvest that can be expected to be available from such indicators given the fishery management plans in place. Although commercial harvest outlooks provide for a general level of expectation, fisheries management is based on inseason run assessment (Table H1). A formal forecast of Yukon River fall chum salmon is provided. A Canadian-origin Yukon River Chinook salmon forecast is produced each year and typically agreed upon in the Joint Technical Committee process, and will be made prior to the meeting of US/Canada Yukon River Panel in the spring of 2018. The Canadian-origin forecast informs the drainagewide Chinook salmon outlook, as typically the Canadian-origin run represents approximately 40% of the total run. This year's preliminary assessment indicates a run size similar to 2017, which could allow for a full subsistence harvest and some harvestable surplus of Chinook salmon for commercial harvest. There has not been Chinook salmon-directed harvest on the Yukon since 2008, the harvest of Chinook salmon in recent years has been as incidental catch during the chum salmon commercial fishery, and those harvests are the basis of the projected harvest in Table H1.

In the AYK Region, salmon production notably decreased for many stocks from 1998 to 2002, but increased rapidly beginning in 2003 to record and near-record runs from 2004 to 2006. Since 2007, Chinook salmon production has shown a sharp decline. Currently, Yukon River and southeastern Norton Sound Chinook salmon stocks and northern Norton Sound chum salmon stocks are classified as *stocks of yield concern* under the Sustainable Salmon Fisheries Policy.

The northeastern Bering Sea is the primary rearing habitat for juvenile Yukon and Norton Sound salmon during their first summer at sea. Marine surveys in the northeastern Bering Sea were initiated in 2002 by NOAA and have continued in recent years in partnership with ADF&G. These surveys occur primarily in September using surface trawls to capture juvenile salmon after they experience a critical transition from freshwater to marine environments. Surveys have been demonstrated to provide a leading indicator of Canadian-origin Yukon River Chinook salmon run abundance, but may provide some indication of marine production trends for other northeastern Bering Sea stocks as well.

In general, management for anticipated low Chinook salmon abundance in 2018, and small processing capacity in some areas, will probably result in chum and sockeye salmon harvests that are lower than the outlook projections in the AYK Region.

Table H1.–The 2018 commercial harvest outlook by management area, in thousands of fish.

Management Area	Salmon Species					
	Chinook	Sockeye	Coho	Pink	Chum	Fall Chum
Kuskokwim River						
Kuskokwim Bay						
Kuskokwim Area Total ^a						
Yukon	0-6	0	50-200	0	1,200–1,900	1,150–1,350
Norton Sound	0–2	3–5	170–220	25–75	150–200	
Kotzebue Sound					400–600	

^a There is not anticipated to be a commercial buyer in the Kuskokwim area in 2018.

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Forecast Area: Yukon Area
Species: Fall Chum Salmon

Preliminary Forecast of the 2018 run.

Total Production	Forecast Estimate (thousands)	Forecast Range (thousands)
Total Run Estimate	1,700	1,600–1,800
Escapement Goal	450	300–600
Harvest Estimate ^a	1,250	1,150–1,350

^a Includes harvests from subsistence (~100,000) and commercial fisheries.

Forecast Methods

The forecast for the 2018 Yukon Area fall chum salmon run is based on run reconstruction of 5 river systems (Tanana, Chandalar, Sheenjek, Fishing Branch and the mainstem Yukon River in Canada) and 4 age classes: age-3 through age-6 (with age-4 fish dominating) followed by age-5 fish. Adult escapement and return data was used from the complete brood years 1974 to 2011, production from incomplete brood years 2012 and 2013 was estimated based on return per spawner from brood year returns, and an auto-regressive Ricker model was used to predict returns from the 2014 and 2015 parent years.

Predicted returns were multiplied by corresponding average maturity schedules for even- and odd-numbered parent years to estimate 2018 run size, and rounded to the nearest thousand fish. The odd/even maturity schedule from 1974 to 2011 was used to estimate the 2018 return. The forecast range is the upper and lower values of the 80% confidence bounds for the total run forecast. Confidence bounds are calculated using deviation of the run projection point estimates and the observed returns from 1987 to 2017.

The 2018 projected run size of fall chum salmon for the Yukon Area is approximately 1.7 million. This forecast is above average for even-numbered year runs; however, recent runs have fluctuated more widely and have produced runs as low as 252,000 in 2000 to as high as 2.2 million in 2005. The 80% confidence bounds for the 2018 forecast range from 1.6 to 1.8 million fall chum salmon. If the run materializes as forecasted, abundance would be sufficient to meet escapement goals, including Canadian border passage and harvest sharing objectives, provide an average subsistence harvest, and a surplus for commercial harvest.

Drainagewide escapements between 300,000 and 600,000 provide a mean yield of 446,000 fall chum salmon. The mean subsistence harvest from 2007 to 2016 for Alaskan subsistence and Canadian aboriginal harvests is 92,000 fall chum salmon. Commercial harvests may be allowed on the amount above 550,000 based on inseason assessments of run size. Targeting the midpoint of the escapement goal of 450,000 fall chum salmon, ADF&G anticipates a subsistence harvest of approximately 100,000 and an available commercial harvest between 1,050,000 and 1,250,000. In mid-July, a projection based on the relationship of summer chum salmon to fall chum salmon returns to the Yukon River will be developed and used for initial management. The actual harvest will be dependent on inseason assessment of run size as applied to the guidelines of the 5 AAC 01.249 *Yukon River Drainage Fall Chum Salmon Management Plan* with further considerations of fishing effort and buying capacity.

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The forecasted total run of 1,700,000 fall chum salmon is expected to be composed of 60% age-4 and 37% age-5 fish. The age-4 component of fall chum salmon runs has varied widely, ranging from 37% (1992) to 94% (2005). Fall chum salmon exhibit an even-odd abundance cycle (averaging 829,000 in even-numbered years and >1,200,000 in odd-numbered years) that was consistent between 1974 and 1992. Since 1993 the cycle has deteriorated and now wide swings in production are being observed. These swings are primarily thought to be due to conditions in the marine environment, although density dependence may also be a cause in some years. The effect of the even-odd cycle was restricted between 1993 and 2002 during which most years' (1993 and 1997–2002) stocks were severely depressed, with peaks of high returns occurring in 1995, 2005 and 2017. Age-4 fish contributed greater than 90% (record levels) during the runs in 2003 and 2005. However, based on this analysis, the extremely large escapement observed in 2005 only produced an estimated 0.27 return per spawner (R/S). Further, prior to the 2013 brood year, escapements of over 800,000 produced yield above replacement only 1 year out of 9.

Forecast Discussion

Point projections for expected returns have been developed since 1987 for fall chum salmon in the Yukon River drainage. Forecast methods were changed to provide ranges beginning in 1999. From 1999 to 2005, adjustments to the point estimates were made by reducing them by the average ratio of observed to predicted returns in attempts to reflect expected poor runs. From 2006 to 2018, the ranges were developed around the point estimate based on the 80% confidence bounds, using the standard deviation between the annual point estimates and observed returns (Figure H1). High and low cycles in production have changed approximately 33-fold (based on 38 brood year returns) with the most drastic fluctuations occurring between brood years 2001 and 2005; therefore, forecasts of run size remain difficult to determine with accuracy.

Since forecasted ranges were established in 1999, 47% of the observed runs were within the range, 21% were below, and 32% were above. Returns of age-4 fish in odd-numbered years are typically 15% higher than even-numbered years. Sibling relationships for this stock are weak. Both the age-4 and age-5 components are returning from large escapements, each above the upper end of the drainagewide escapement goal. Productivity was at its lowest in 2005 followed by a peak in the 2009 brood year (2.39 R/S). Currently, the predicted R/S for the 2013 brood year appears to be exceptional (R/S of 3.08, ranking the third highest on record) and production is estimated to be well above replacement. The forecasted run in 2018 is predicting an above average R/S (2.13) for the age-4 component from brood year 2014 as well. The 2018 point estimate of 1.7 million fall chum salmon should be dominated by the age-4 component; however, the age-5 return is forecasted to contribute a higher than average proportion of the run. Based on the 2 primary parent years, the forecast is for an above average return in 2018. The forecasted run size of 1.7 million fall chum salmon would provide for a commercial harvest of over 1.0 million based on the current management plan.

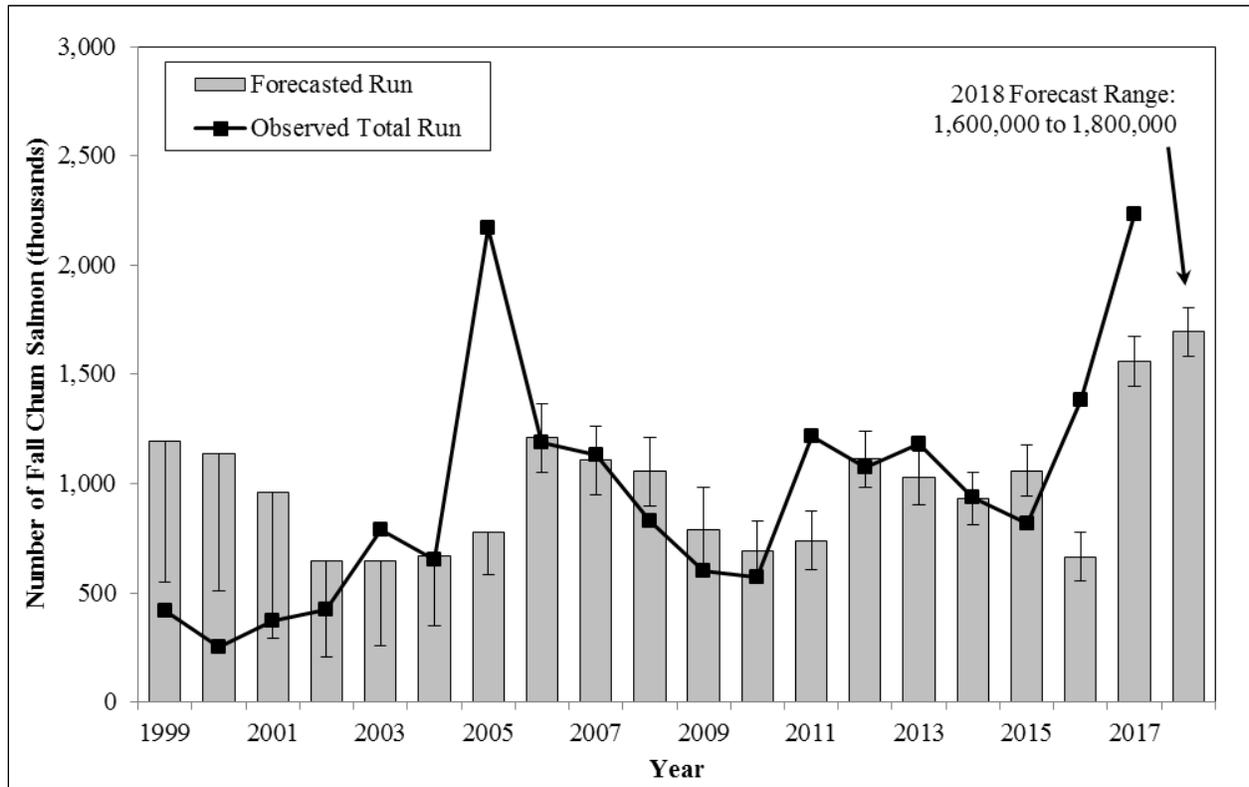


Figure H1.—Observed total run of fall chum salmon compared to the spawner–recruit estimates used in the annual forecast, Yukon River, 1999–2018.

Note: The different methods used for determining bounds are documented in annual Yukon River U.S./Canada Joint Technical Committee reports.

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