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2019 Bristol Bay Sockeye Salmon Processing Capacity Survey Summary

by

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and

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May 2019

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

Symbols and Abbreviations

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

Weights and measures (metric)

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

Weights and measures (English)

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

Time and temperature

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

Physics and chemistry

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

General

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

Mathematics, statistics

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

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ABSTRACT

The *2019 Bristol Bay Sockeye Salmon Processing Capacity Survey Summary* reports results of the Alaska Department of Fish and Game, Division of Commercial Fisheries survey of 15 major Bristol Bay sockeye salmon processors. There was a 93% response rate from those processors who account for 99.8% of all 2018 sockeye salmon purchased in Bristol Bay. This survey provides estimates of total intended purchases, daily processing capacity, *in-Bristol Bay* tender fleet capacity, and long-haul tender fleet capacity. The results of this survey found the 2019 Bristol Bay total intended purchases of 39.82 million fish is approximately 13.71 million higher than the forecast harvest of 26.11 million. The survey estimated a maximum daily processing capacity of 2.54 million fish per day, which could be sustained for approximately 20 days.

Keywords: Bristol Bay, salmon, processing capacity, forecast

INTRODUCTION

The Alaska Department of Fish and Game (ADF&G) completed a survey of 15 commercial salmon processor companies who intend to buy sockeye salmon in Bristol Bay during the 2019 season. This 2019 Bristol Bay sockeye salmon processing capacity survey had a 93% response rate. All but one processing company completed and returned the survey. All the processors surveyed had purchased salmon in Bristol Bay during the 2018 season; taken together, they accounted for 99.8% of the sockeye salmon purchased in Bristol Bay during the 2018 season. Individual processors' salmon capacities are protected as confidential information under Alaska statute (AS 16.05.815(a)). This document provides a nonconfidential summary of the 2019 Bristol Bay sockeye salmon processing capacity survey.

The Bristol Bay area commercial salmon fishery includes all coastal and inland waters east of a line from Cape Newenham to Cape Menshikof (Figure 1). The area includes 9 major river systems: Naknek, Kvichak, Alagnak, Egegik, Ugashik, Wood, Nushagak, Igushik, and Togiak. Collectively, these rivers are home to the largest commercial sockeye salmon *Oncorhynchus nerka* fishery in the world. Sockeye salmon are by far the most abundant salmon species that return to Bristol Bay each year, but Chinook *O. tshawytscha*, chum *O. keta*, coho *O. kisutch*, and—in even years—pink salmon *O. gorbuscha* returns are important to the fishery as well. The Bristol Bay area is divided into 5 management districts (Naknek-Kvichak, Egegik, Ugashik, Nushagak, and Togiak) that correspond to major river systems. The management objective for each river is to achieve salmon escapements within established ranges and harvesting fish in excess of those ranges through orderly fisheries. In addition, regulatory management plans have been adopted for individual species in certain districts. The Bristol Bay sockeye salmon capacity survey estimates processing capacity for the entire Bristol Bay area and does not breakup capacity by district.

Results of the processing capacity survey should be viewed in relationship to the ADF&G sockeye salmon forecast (Appendix A). The primary function of the salmon forecast has always been to provide processors and harvesters an indication of what ADF&G is anticipating in salmon returns for the coming season. The 2019 sockeye salmon forecast for Bristol Bay is 40.18 million fish (range 27.90–52.46 million). This is 10% smaller than the most recent 10-year average of Bristol Bay total runs (44.4 million), and 16% greater than the long-term (1963–2018) average of 34.2 million fish. All systems are expected to meet their spawning escapement goals.

Escapement goals for all Bristol Bay river systems are calculated to be 12.2 million. A run of 40.18 million sockeye salmon would allow for a potential total harvest of 27.60 million fish—26.11 million fish in Bristol Bay and 1.49 million fish in the South Peninsula fisheries. A Bristol Bay harvest of this size is 8% smaller than the most recent 10-year harvest of 30.0 million

(range 15.4–41.9 million), and 23% greater than the long-term average harvest of 21.2 million (1963 to present).

BACKGROUND

The ADF&G Division of Commercial Fisheries conducted the first statewide salmon processing capacity survey in 1978 and continued conducting voluntary and informal surveys of statewide processing capacity throughout the 1990s. Beginning in 2001, ADF&G conducted formal salmon capacity surveys in which survey forms were mailed to selected processors who represented the majority of processing capacity in Alaska. These surveys were formal but still voluntary. The voluntary nature of the surveys changed in 2004, when regulations were enacted that made participation a regulatory requirement (5 AAC 39.132). In addition, the regulations clarified that individual surveys were confidential under AS 16.05.815(a). In 2008, the division phased out salmon capacity surveys for all fishing regions except Bristol Bay. Bristol Bay surveys were not conducted in the years 2012 to 2014 because processing capacity was not a preseason concern. The division decided to resume processing capacity surveys in light of the large forecasts that began in 2015. Large harvests have the potential to cause processing capacity bottlenecks, especially if run timing is compressed.

A large projected harvestable surplus can prompt questions about allowing foreign processing vessels into the internal waters of the State of Alaska. The Bristol Bay sockeye salmon processing capacity survey is an instrument that can be used to determine whether domestic processors have enough capacity to handle the expected harvest. The Magnuson–Stevens Fishery Conservation and Management Act provides the framework requirements that must be met before foreign processing ships are allowed into the internal waters of the state: (1) requires the governor to determine if adequate domestic processing capacity exists, and (2) whether that capacity will be used to process the available harvest [16 U.S.C. §1856(c)]. Should the governor receive a request to bring foreign processing ships into the internal waters of the state to process salmon in Bristol Bay in 2019, information from this survey would be considered by the governor, along with other information, in determining whether foreign vessels should be allowed to enter the internal waters of the State of Alaska to process salmon [16 U.S. Code §1856(c); 5 AAC 39.198].

Capacity is measured as a combination of actual physical processing capacity and the intent of processors to purchase and process salmon during the season in aggregate. Processors were asked to report the maximum amount of sockeye salmon in pounds that they intend to purchase and process during the upcoming Bristol Bay salmon fishing season.

Results of the 2019 Bristol Bay sockeye salmon capacity survey should be interpreted as a snapshot of anticipated processing capacity that is made months before the fishery opens. As processors finalize operational plans and assess the domestic and world markets for salmon, their plans may change between the time of the survey and the salmon fishing season. The salmon capacity estimated in this report is not guaranteed, nor is there an implied guarantee that all fishermen will have buyers for all their salmon.

METHODS

Processors were selected to receive survey forms based on 2 sources of information: the 2017 Commercial Operator's Annual Report (COAR) and 2018 commercial fishery fish tickets. Processors were selected for inclusion in the survey if the processor reported buying more than 100,000 pounds of Bristol Bay sockeye salmon on their 2017 COAR report, or if according to fish

ticket records the processor purchased more than 100,000 pounds of Bristol Bay sockeye salmon in 2018. These criteria identified 15 commercial salmon processing companies to receive surveys. These 15 companies represented 22 processing operations (as determined by distinct processor code) in Bristol Bay. Surveys were emailed on January 28, 2019, with a completion deadline of February 28, 2019. In the survey, processors were asked to estimate the amount of sockeye salmon they intended to purchase during the 2019 season from Bristol Bay. A copy of the ADF&G 2019 Bristol Bay sockeye salmon forecast was provided with the survey forms (Appendix A).

All processors that responded to the survey reported their intended purchases and capacity in pounds. To compare the survey capacity with the forecasted harvest (in numbers of fish), the survey capacity in pounds was divided by the 5-year (2014–2018) mean weight of 5.35 pounds per fish (Table 1) to convert capacity to numbers of fish. After the survey capacity was converted to numbers of fish, the projected capacity was compared to the forecasted return.

BRISTOL BAY SOCKEYE SALMON PROCESSING CAPACITY

TOTAL INTENDED PURCHASES

This survey provides an estimate of the total intended purchases for the entire season. The 15 processors surveyed indicated that they are prepared to purchase and process 213.1 million pounds (39.82 million fish) during the 2019 Bristol Bay salmon season (Table 2). The total intended purchases are approximately 13.71 million fish above the forecast harvest of 26.11 million fish (Table 2).

DAILY PROCESSING CAPACITY

In the 2019 Bristol Bay sockeye salmon processing capacity survey (Appendix B), processors were asked to estimate their daily processing capacity and to estimate the number of days their facility could operate at that daily capacity. They were also asked by what date they expect their facility to operate at their quoted daily capacity.

The total daily capacity reported in the survey was 13.65 million pounds (2.54 million fish; Table 3). The mean date processors expect to be at their reported daily capacity is June 27, 2019. Surveyed processors expect to be able to sustain daily processing capacity for approximately 20 days.

The comparison of projected capacity to harvest forecast and past peak daily harvests allows an evaluation of the industry's capability to harvest this year's forecast. The projected daily capacity exceeds most historical peak daily harvests. At the maximum projected daily harvest capacity of 2.54 million fish per day, the forecasted harvest of 26.11 million fish could be achieved in approximately 10 days. The 2019 projected 2.54 million fish daily processing capacity has been exceeded 3 times in the past 5 years (Table 4; Figure 2). It should be noted that processor limits likely restricted the daily maximums listed in Table 4, but it is not accounted for in this review.

Operating at maximum daily capacity is contingent on several factors including fish size and run timing, mechanical operations, logistics (tender performance, grading systems, etc.), and employee availability. Although it appears that if every processor is operating at their reported daily capacity there would be sufficient daily capacity to handle a peak landing of salmon, this does not guarantee that all Bristol Bay salmon permit holders will have a buyer at all times during this season.

IN-BRISTOL BAY TENDER FLEET

Most Bristol Bay processors provide tenders that service locally inside of Bristol Bay waters. This fleet of tenders is considered the *in-Bristol Bay* tender fleet. Surveyed processors were asked if their company intends to provide tenders during the 2019 season, their tender fleet's *in-Bristol Bay* holding capacity, and the date they expect to have all their tenders available. Processors were asked to consider only their *in-Bristol Bay* fleet's capacity and exclude any additional capacity provided by their long-haul tender fleet.

Of the 15 companies surveyed, 10 will provide tenders inside Bristol Bay waters. The reported *in-Bristol Bay* tender fleet holding capacity is 48.25 million pounds, or 9.01 million fish (Table 3). The mean date that the companies expect to have their tenders available is June 25, 2019.

LONG-HAUL TENDER FLEET

Some Bristol Bay processors provide long-haul tenders that transport fish from Bristol Bay to other processing facilities around the state. Long-haul tenders allow processors to purchase more salmon during the peak of the season. Surveyed processors were asked if their company intends to provide long-haul tenders during the 2019 season, as well as their long-haul tender daily capacity and season capacity if applicable.

Of the 15 companies surveyed, 3 reported that they will provide long-haul tender services. The reported long-haul tender daily capacity is 3.46 million pounds (647,000 fish; Table 3). The season capacity was reported as 9.63 million pounds (1.8 million fish; Table 3). There is no way to predict when and where long-haul tenders will be used, and it is unlikely that all will deploy at the same time.

SUMMARY

The 2019 Bristol Bay sockeye salmon processing capacity survey had a 93% response rate from the 15 processing companies surveyed. The capacity survey is an estimate of the aggregate capacity for the entire season and is made many months before the start of the season.

The results of this survey found the 2019 Bristol Bay sockeye salmon total intended purchases is approximately 13.71 million fish higher than the forecast harvest of 26.11 million fish. The survey estimated a maximum daily harvest capacity of 2.54 million fish per day, which could be sustained for approximately 20 days. Total processing capacity, as estimated from total intended purchases, from the 2019 survey of 213.1 million pounds (39.82 million fish) decreased by 16.7 million pounds (1.89 million fish) from the 2018 estimated total processing capacity (41.71 million fish). The 2019 estimated daily processing capacity of 13.65 million pounds (2.54 million fish) is slightly higher when compared with the 2018 estimated daily capacity of 13.38 million pounds (2.43 million fish). These estimates are not directly comparable for a variety of reasons (fish weight, forecast, tender numbers, etc.) but are useful to provide context and understand this year's processing capabilities. It is also helpful to note that the processing capacity survey in recent years (2015–2018) has provided a reliable estimate of total capacity in that the total purchases were similar to the survey's projected total purchases.

TABLES AND FIGURES

Table 1.–Mean Bristol Bay sockeye salmon weights in pounds, calculated using commercial fisheries fish tickets, 2014–2018.

Year	Mean weight
2014	5.56
2015	5.32
2016	5.35
2017	5.36
2018	5.15
5-yr. Avg.	5.35

Table 2.–Comparison of the 2019 Bristol Bay sockeye salmon harvest forecast and projected intended purchases.

	Number of salmon	Pounds of salmon
Projected Harvest	26.11 million	139.89 million
Projected Intended Purchases	39.82 million	213.10 million
Difference (surplus of capacity)	13.71 million	73.21 million

Table 3.–Projected processing capacities for 2019 Bristol Bay sockeye salmon.

	Number of salmon	Pounds of salmon
Daily Capacity	2.54 million	13.65 million
In-Bristol Bay Tender Capacity	9.01 million	48.25 million
Daily Long Haul Tender Capacity	0.65 million	3.46 million
Season Long Haul Tender Capacity	1.8 million	9.63 million

Table 4.–Salmon daily landings, 5-year daily mean, minimum, and maximum, in numbers of fish, Bristol Bay, 2014–2018.

Date of Landing (MM/DD)	2014[a]	2015[a]	2016	2017[a]	2018	5-Yr. Daily Mean	5-Yr. Daily Minimum	5 Yr. Maximum
06/25	1,458,791	222,338	119,964	859,780	907,078	713,590	119,964	1,458,791
06/26	1,903,878	266,935	277,999	1,534,471	1,075,114	1,011,679	266,935	1,903,878
06/27	2,656,823	359,254	586,872	734,605	921,045	1,051,720	359,254	2,656,823
06/28	2,094,884	602,857	443,786	365,105	408,467	783,020	365,105	2,094,884
06/29	1,273,626	677,687	358,455	144,042	505,913	591,945	144,042	1,273,626
06/30	1,265,110	962,114	531,335	232,201	1,692,318	936,616	232,201	1,692,318
07/01	1,046,503	984,353	917,902	71,230	2,045,337	1,013,065	71,230	2,045,337
07/02	1,384,731	1,335,670	1,114,978	642,456	1,590,832	1,213,733	642,456	1,590,832
07/03	1,600,237	1,371,061	1,531,181	3,716,432	1,005,255	1,844,833	1,005,255	3,716,432
07/04	1,895,292	1,119,434	1,133,039	2,916,221	1,271,788	1,667,155	1,119,434	2,916,221
07/05	1,998,527	713,686	1,154,506	1,767,668	1,449,801	1,416,838	713,686	1,998,527
07/06	1,250,072	958,028	1,495,947	2,310,840	1,575,475	1,518,072	958,028	2,310,840
07/07	964,051	1,042,702	1,509,926	2,284,010	1,240,024	1,408,143	964,051	2,284,010
07/08	1,498,389	1,475,821	1,692,683	2,116,335	1,259,689	1,608,583	1,259,689	2,116,335
07/09	1,463,862	1,953,972	1,584,331	2,230,949	1,228,606	1,692,344	1,228,606	2,230,949
07/10	1,002,443	2,305,153	2,376,205	1,848,042	2,119,482	1,930,265	1,002,443	2,376,205
07/11	994,526	2,495,292	1,646,800	1,543,234	2,298,889	1,795,748	994,526	2,495,292
07/12	1,158,866	2,231,846	2,154,526	1,982,925	1,720,185	1,849,670	1,158,866	2,231,846
07/13	635,340	2,098,899	2,077,066	1,619,271	1,662,806	1,618,676	635,340	2,098,899
07/14	386,287	2,161,125	2,108,358	1,706,941	1,924,251	1,657,392	386,287	2,161,125
07/15	209,838	2,414,858	2,526,160	1,506,853	1,295,091	1,590,560	209,838	2,526,160
07/16	138,441	1,664,051	1,810,609	898,324	1,889,582	1,280,201	138,441	1,889,582
07/17	112,016	1,660,494	1,578,994	1,084,927	1,844,424	1,256,171	112,016	1,844,424
07/18	99,278	1,362,440	1,457,706	1,251,305	1,236,067	1,081,359	99,278	1,457,706
07/19	31,909	1,132,118	1,338,268	623,853	1,321,167	889,463	31,909	1,338,268
07/20	27,889	784,126	1,182,134	325,297	1,269,705	717,830	27,889	1,269,705

[a] Daily processor capacity limits constrained daily landings during portions of 2014, 2015, and 2017.

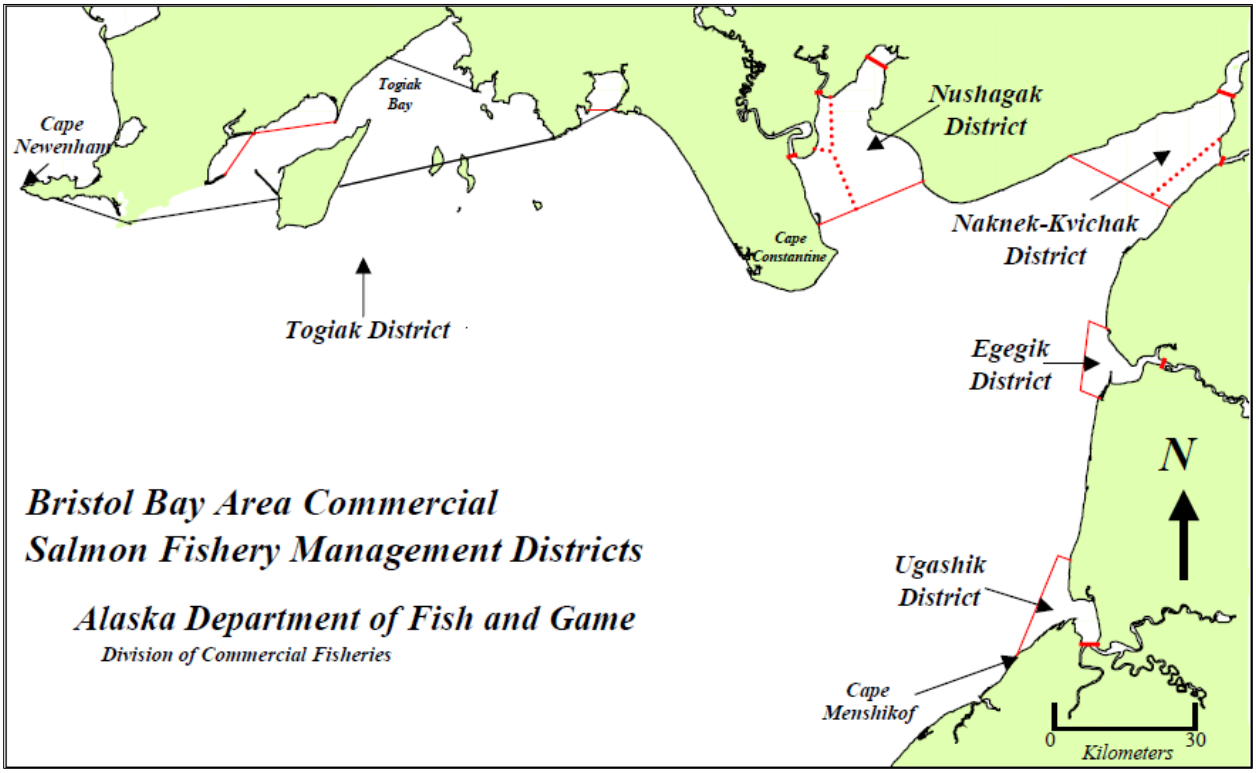


Figure 1.–Bristol Bay area commercial salmon fisheries management districts.

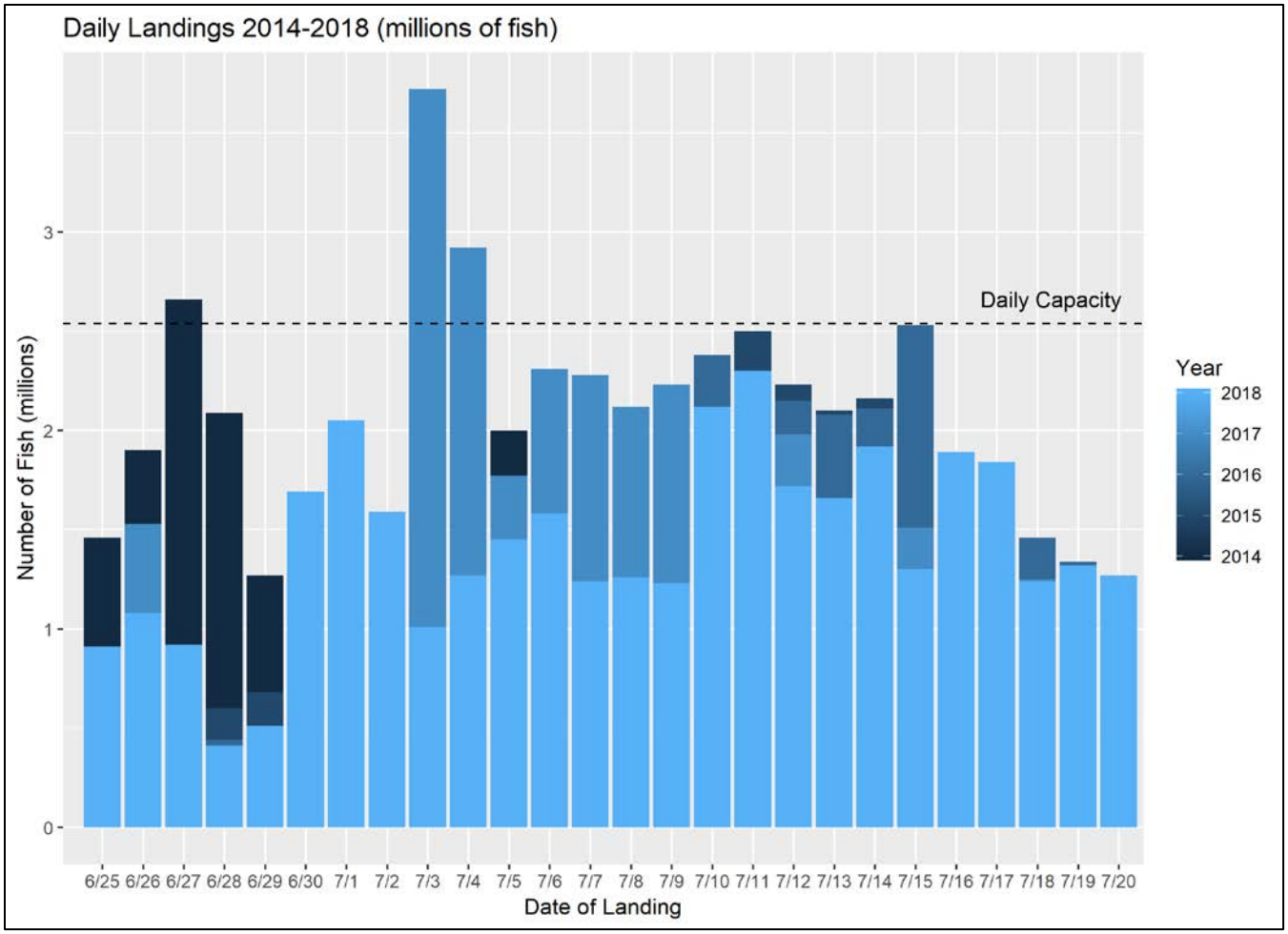


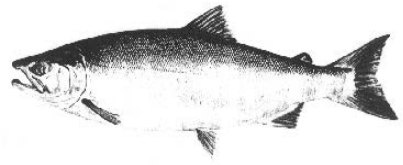
Figure 2.–Bristol Bay sockeye salmon daily landings, 2014–2018, with the 2018 estimated daily capacity.

Note: Daily processor capacity limits constrained daily landings during portions of 2014, 2015, and 2017.

APPENDICES

ALASKA DEPARTMENT OF FISH AND GAME
DIVISION OF COMMERCIAL FISHERIES
NEWS RELEASE

Sam Cotten, Commissioner
Forrest R. Bowers, Acting Director



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2019 BRISTOL BAY SOCKEYE SALMON FORECAST

FORECAST AREA: Bristol Bay

SPECIES: Sockeye Salmon

FORECAST OF THE 2019 RUN:

TOTAL PRODUCTION:	Forecast (millions)	Forecast Range (millions)
Total Run	40.18	27.90–52.46
Escapement	12.58	
Commercial Common Property Harvest	27.60	
Bristol Bay Harvest	26.11	
South Peninsula Harvest	1.49	
Inshore Run	38.70	

METHODS

The 2019 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 four 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.

-continued-

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 with statistically significant parameters and/or the best past performance (accuracy and precision) were chosen. Performance was evaluated using mean absolute deviation, mean absolute percent error, mean arctangent absolute percent error, and mean percent error between forecasted and observed returns. These performance metrics were calculated and considered for each model across the most recent 3-, 5-, and 9-year time frames. In certain cases, competing models were averaged in a hybrid model approach.

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 2018.

RESULTS

A total of 40.18 million sockeye salmon (range 27.90–52.46 million) are expected to return to Bristol Bay in 2019. This is 10% smaller than the most recent 10-year average of Bristol Bay total runs (44.4 million), and 16% greater than the long-term (1963–2018) average of 34.2 million fish. 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 (Egegik, Nushagak, and Togiak Rivers), as the midpoint (50th quartile) of the escapement range if the forecast is in line with the historical trend (Ugashik and Igushik Rivers), and as the 25th quartile of the escapement goal range if the forecast is below the historical trend line (Kvichak and Wood Rivers in 2019; Table A1). Because it is passively managed, the Alagnak River exploitation rate is assumed to be the same as the Kvichak River exploitation rate; 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 40.18 million sockeye salmon would allow for a potential total harvest of 27.60 million fish: 26.11 million fish in Bristol Bay and 1.49 million fish in the South Peninsula fisheries. A Bristol Bay harvest of this size is 8% smaller than the most recent 10-year harvest of 30.0 million (range 15.4–41.9 million), and 23% greater than the long-term average harvest of 21.2 million (1963 to present).

The run forecast for each district and river system is as follows: 16.12 million to Naknek-Kvichak District (6.95 million to the Kvichak River, 3.97 million to the Alagnak River, and 5.21 million to the Naknek River); 9.07 million to the Egegik District; 3.46 million to the Ugashik District; 10.38 million to the Nushagak District (4.62 million to the Wood River, 4.18 million to the Nushagak River, and 1.58 million to the Igushik River); and 1.15 million to the Togiak District (Table A1).

We forecast that the 2019 run will consist of 15.16 million age-1.2 fish (38% of the total run), 5.49 million age-2.2 fish (14% of the total run), 17.05 million age-1.3 fish (42% of the total run), and 2.42 million age-2.3 fish (6% of the total run; Table A1).

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DISCUSSION

Historically, sockeye salmon runs to Bristol Bay have been highly variable. The Bristol Bay total run has averaged 34.2 million from 1963 through 2018, and has averaged 44.4 million fish 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 under-forecast returns to the Alagnak (–39%), Togiak (–12%), Kvichak (–22%), Wood (–17%), Nushagak (–21%), Ugashik (–0.2%), and Naknek (–12%) Rivers, and overforecast returns to Igushik (+13%) and Egegik Rivers (+18%). Overforecasting returns to some rivers and underforecasting returns to other rivers means that the overall Bristol Bay forecast is often more accurate than the forecast to any individual river. The Nushagak District had another record return in 2018. These record returns have been driven by robust returns from the 2013 and 2014 brood years. Evidence regarding the strength of the 2015 brood year in the Nushagak District is mixed with a very high level of jacks (age-1.1 fish) in the Nushagak River and a very low level of jacks in the Wood River 2018 return.

ADF&G would like to thank the Bristol Bay Fisheries Collaborative (BBFC) for funding assistance in 2018. The BBFC began in 2016 and is an agreement between ADF&G and the Bristol Bay Science and Research Institute (BBSRI) 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, BBSRI, 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 2018, as well as additional information about this agreement can be found at https://www.bbsri.org/bbfc.

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Table A1.–Forecast of total run, escapement, and harvest of major age classes of sockeye salmon returning to Bristol Bay river systems in 2019.

	Millions of Sockeye Salmon								
DISTRICT	Forecasted Production by Age Class					Forecasted			
River	1.2	2.2	1.3	2.3	Total	Escapement	Harvest	South Peninsula [a]	BB Inshore
NAKNEK-KVICHAK									
Kvichak	2.95	1.08	2.87	0.05	6.95	4.00	2.69	0.26	6.69
Alagnak	1.88	0.19	1.88	0.02	3.97	2.28	1.54	0.15	3.82
Naknek	2.18	0.58	2.00	0.45	5.21	1.40	3.61	0.19	5.01
Total	7.01	1.84	6.74	0.53	16.12	7.68	7.84	0.60	15.53
EGEGIK	2.51	3.04	1.81	1.72	9.07	1.70	7.04	0.34	8.74
UGASHIK	1.31	0.33	1.72	0.10	3.46	0.95	2.38	0.13	3.33
NUSHAGAK									
Wood	2.41	0.23	1.94	0.04	4.62 [b]	0.98	3.47	0.17	4.45
Igushik	0.62	0.01	0.94	0.01	1.58	0.28	1.25	0.06	1.52
Nushagak	1.12	0.02	2.95	0.02	4.18	0.77	3.26	0.15	4.02
Total	4.14	0.26	5.83	0.07	10.38	2.02	7.97	0.38	9.99
TOGIAK	0.18	0.01	0.95	0.01	1.15	0.23	0.87 [c]	0.04	1.10
BRISTOL BAY	15.16	5.49	17.05	2.42	40.18	12.58	26.11	1.49	38.70
	38%	14%	42%	6%	100%				

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

[a] Projected harvest is based on the current 5 year running average exploitation rate of 3.7%.

[b] Nushagak River forecast total includes age-0.3 and age-1.4 fish.

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

Appendix B.–2019 Bristol Bay sockeye salmon survey questions.

1. Does your company intend to purchase and process Bristol Bay sockeye salmon during the 2019 season?
2. Please enter the amount of sockeye salmon your company intends to purchase in Bristol Bay in the 2019 season. Please provide this answer in POUNDS of fish
3. Daily Processing Capacity of sockeye salmon in POUNDS of fish.
4. How many days could your company sustain the daily processing capacity?
5. What Date do you expect to be at the daily processing capacity listed in 3?
6. Comments on Daily Processing Capacity?
7. Does your company provide tenders? (yes or no)
8. If "Yes" what is your tender fleet's "In-Bristol Bay" holding capacity in Pounds of fish? *Please DO NOT include long hauls*.
9. What Date do you expect to have all your tenders in Bristol Bay?
10. Comments on Daily Processing Capacity?
11. Will your company provide long haul tenders? (yes or no)
12. If "Yes", what is the daily capacity of your long haul tender fleet in Pounds of fish?
13. What is the Season Capacity of your long haul tender fleet in Pounds of fish?
14. Comments on Daily Processing Capacity?
15. Are there factors that would affect your company's ability to increase average daily capacity, and sustain this capacity at peak level, that you would like to tell us about such as changes in fleet size, access to processing worker, etc.?