Special Publication No. 15-12

2015 Bristol Bay Sockeye Salmon Processing Capacity Survey Summary

by

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and

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March 2015

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

Symbols and Abbreviations

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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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March 2015

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This document should be cited as:
Lewis, B., and J. Shriver. 2015. 2015 Bristol Bay sockeye salmon processing capacity survey summary. Alaska Department of Fish and Game, Special Publication No. 15-12, Anchorage.

TABLE OF CONTENTS

Page

LIST OF TABLES i
LIST OF FIGURES i
LIST OF APPENDICES i
ABSTRACT 1
INTRODUCTION 1
BACKGROUND 2
METHODS 3
BRISTOL BAY SOCKEYE SALMON PROCESSING CAPACITY 3
Total Intended Purchases 3
Daily Processing Capacity 3
In-Bristol-Bay Tender Fleet 4
Long Haul Tender Fleet 4
Ugashik 5
SUMMARY 5
FIGURES AND TABLES 7

LIST OF TABLES

1. Mean Bristol Bay sockeye salmon weights in pounds, 2001–2014 8
2. Comparison of the 2015 Bristol Bay sockeye salmon harvest forecast and projected processing capacity. 8
3. Projected daily processing capacity, duration, and start date for 2015 Bristol Bay sockeye salmon. 8
4. Sockeye salmon daily landings, 10 year daily mean, minimum, and maximum, in numbers of fish, Bristol Bay, 2005–2014 9
5. Estimated in-Bristol-Bay tender fleet holding capacity. 10
6. Estimated daily and season capacity of the long-haul tender fleet. 10

LIST OF FIGURES

1. Bristol Bay area commercial fisheries salmon management districts. 11
2. Bristol Bay commercial sockeye salmon harvests, in thousands of fish, 1893–2014, with 2015 projected harvest and historical average 12
3. Bristol Bay sockeye salmon daily landings, 2010–2014, with 10-year daily mean, and 2015 estimated daily capacity 13

LIST OF APPENDICES

A. 2015 BRISTOL BAY SOCKEYE SALMON FORECAST 15
B. 2015 BRISTOL BAY SOCKEYE SALMON SURVEY 21

ABSTRACT

The 2015 *Bristol Bay Sockeye Salmon Processing Capacity Survey Summary* reports results of the Alaska Department of Fish and Game, Division of Commercial Fisheries survey of the 14 major processors of Bristol Bay sockeye salmon *Oncorhynchus nerka*. There was a 100% response rate from those processors that in concert account for 99.0% of all 2014 sockeye salmon purchased in Bristol Bay. This survey provides estimates of total intended purchases, daily processing capacity, *in-Bristol-Bay* tender fleet capacity, long-haul tender fleet capacity, and intended purchases in the Ugashik District. The results of this survey found the 2015 Bristol Bay total intended purchases of 35.5 million fish is approximately 2.1 million fish (6%) lower than the forecast harvest of 37.6 million fish. The survey estimated a maximum daily capacity of 2.5 million fish per day, which could be sustained for approximately 21 days.

Keywords: Bristol Bay, salmon, processing capacity, forecast

INTRODUCTION

The Alaska Department of Fish and Game (ADF&G) completed a survey of 14 salmon processors that are intending to buy sockeye salmon *Oncorhynchus nerka* in Bristol Bay during the 2015 season. This 2015 Bristol Bay sockeye salmon processing capacity survey had a 100% response rate. All 14 processing companies completed and returned the survey before the March 2, 2015 deadline. All the processors surveyed had purchased salmon in Bristol Bay during the 2014 season and taken together accounted for 99.0% of the sockeye salmon purchased in Bristol Bay during the 2014 season. Individual processor salmon capacities are protected as confidential information under Alaska Statute (AS 16.05.815(a)). This document provides a nonconfidential summary of the 2015 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 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 while 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 sockeye salmon forecast released by ADF&G. The 2015 forecast for sockeye salmon returning to Bristol Bay is 53.9 million fish, with a range of 44.8 to 63.1 million. Escapement goals for all Bristol Bay systems are calculated to be 14.4 million. A return of this size is expected to produce a harvestable surplus of 37.6 million sockeye salmon in Bristol Bay and would be the third largest since 1960 (Figure 2). The harvestable surplus estimate is 900,000 lower than the figure found in the 2015 forecast (Appendix A). That difference is due to the Board of Fisheries adopting Proposal 277 on March 18, 2015, which changed escapement goals and concomitantly lowered harvest forecast. Only 2 years, 1995 and 1993, produced larger sockeye catches than the 2015 projected harvest. The harvestable surplus is 42% greater than the previous 10-year mean harvest

(26.5 million; range of 15.4 to 31.1 million) and 56% greater than the long-term mean of 24.1 million. A copy of the 2015 Bristol Bay sockeye salmon forecast is provided in 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.

BACKGROUND

The ADF&G Division of Commercial Fisheries conducted the first statewide salmon processing capacity survey in 1978. The division 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 that 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 for Bristol Bay. Bristol Bay surveys were not conducted from 2012 to 2014, as processing capacity was not a preseason concern. The division decided to conduct a survey of processing capacity in 2015 in light of the forecasted harvestable surplus of 37.6 million sockeye salmon. A harvest of this size has 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. While there have been no inquires this year, 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. The Magnuson-Stevens Fishery Conservation and Management Act requires the governor to determine whether adequate domestic processing capacity exists and whether that capacity will be used to process the available harvest before allowing any foreign processors into state waters (16 U.S.C. § 1821). 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 2015, 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, or numbers of fish, that they intend to purchase and process during the upcoming Bristol Bay salmon fishing season. Information collected in this survey helps ADF&G plan for the expected return of salmon and is used for management purposes during the commercial fishing season.

Results of the 2015 Bristol Bay sockeye salmon capacity survey should be interpreted as a snapshot of anticipated processing capacity. This point-in-time estimate is made months before the fishery opens. The 2015 Bristol Bay sockeye salmon forecast was released on November 13, 2014. Processors were asked to provide their best estimate of their capacity by March 2, 2015, several months before the summer salmon fishing season begins. 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 of their salmon.

METHODS

Processors were selected to receive survey forms based on 2 sources of information: ADF&G 2013 Commercial Operator's Annual Report (COAR) data and 2014 ADF&G fish ticket data. 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 2013 COAR reports or if, according to fish ticket records, the processor bought more than 100,000 pounds of Bristol Bay sockeye salmon in 2014. In the survey, processors were asked to estimate the amount of sockeye salmon they intended to purchase during the 2015 season from Bristol Bay. A copy of the ADF&G 2015 Bristol Bay sockeye salmon forecast was provided with the survey forms. A copy of the forecast is provided in Appendix A, and a copy of the survey is provided in Appendix B.

The criteria outlined above identified 14 commercial salmon processing companies to receive surveys. Surveys were mailed on January 8, 2015, via certified mail. Processors were requested to return completed surveys by March 2, 2015. Compilation and analysis of the survey data began on March 2, 2015.

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 mean weight per fish for sockeye salmon to convert capacity to numbers of fish. There is considerable interannual variability in the mean weight of sockeye salmon returning to Bristol Bay (Table 1). Many factors affect the mean weight of returning sockeye, and it is not possible to know with certainty the mean weight before the season begins. The 2014 mean weight of 5.6 pounds per sockeye was unusually low due to a higher than average proportion of younger fish returning to Bristol Bay in 2014. As such, the 5-year (2010–2014) mean weight of 5.8 pounds per fish was used to convert capacity from pounds to numbers of fish throughout this report. 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 14 surveyed processors indicated that they are prepared to purchase and process 206.0 million pounds or 35.5 million sockeye salmon during the 2015 Bristol Bay salmon season (Table 2). All processors that responded to the survey reported their total intended purchases in pounds. The 2015 Bristol Bay sockeye salmon total intended purchases is approximately 2.1 million fish (6%) below the forecast harvest of 37.6 million fish (Table 2).

DAILY PROCESSING CAPACITY

In the 2015 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 14.5 million pounds or 2.5 million fish (Table 3). Surveyed processors expect to be able to sustain daily processing capacity for approximately 21 days. Some processors provided the number of days they could sustain daily processing capacity as a range (e.g., 10–15 days). As a result, the mean number of days that daily capacity could be sustained is reported in a range in Table 3. The mean date processors expect to be at their reported daily capacity is June 25, 2015 (Table 3).

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. While the total intended purchases falls slightly short (6%) of the forecast harvest, the projected daily capacity exceeds most historic peak daily harvests. At the maximum projected daily harvest capacity of 2.5 million fish per day, the forecast 37.6 million fish harvest could be achieved in 15 days. The preseason processor survey indicates that the daily capacity of 2.5 million could be sustained for approximately 21 days. The 2015 projected 2.5 million fish daily processing capacity has only been exceeded twice in the past 10 years (Table 4). In the most recent 10-year period, daily landings exceeded 2.0 million fish for a total of 6 days (Figure 3 and Table 4). 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 a number of factors that include, but are not limited to, mechanical operations, logistics, 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. Processors may choose to limit the number of permit holders from whom they purchase salmon and still processes the number of fish available for harvest.

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 2015 season, their in-Bristol-Bay tender fleet's 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 14 companies surveyed, 13 will provide tenders inside Bristol Bay waters. The reported in-Bristol-Bay tender fleet holding capacity is 38.0 million pounds, or 6.6 million salmon (Table 5). The mean date that the companies expect to have their tenders available is June 19, 2015.

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 2015 season, their long-haul tender daily capacity, season capacity, and the date they expect to have their long-haul tenders available by.

Of the 14 companies surveyed, 5 reported that they will provide long-haul tender services. The mean date that the companies expect to have their tenders available is June 19, 2015. Processors reported their long-haul tender seasonal and daily capacity in ranges (e.g., 100,000–150,000 pounds). Long-haul tender use could add capacity to increase daily harvest by as much as 600,000 fish and allow an additional harvest of 2 million fish over the season (Table 6). 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.

UGASHIK

The Ugashik District is the only fishing district that the surveyed processors were asked about specifically. The Ugashik District can be underserved by processing capacity; this section of the survey is to give managers an idea of processing capacity in the Ugashik District. Surveyed processors were asked if their company intended to purchase sockeye salmon in the Ugashik District in 2015, and, if so, would their company be purchasing more sockeye salmon compared to the 2014 season. Surveyed processors bought an aggregated 100.0% of the total 2014 sockeye salmon harvest from the Ugashik District.

While the exact number of processors that will purchase and process sockeye salmon in the Ugashik District is unknown at this early date, out of the 14 companies surveyed, 9 of the companies reported that their companies intend to operate in the Ugashik District in 2015. Of the 9 companies that intend to purchase sockeye in the Ugashik District, 3 intend to purchase more salmon than in 2015, 5 were unsure if they would purchase more salmon than in 2014, and 1 would purchase about the same as in 2014.

SUMMARY

The 2015 Bristol Bay sockeye salmon processing capacity survey had a 100% response rate from the 14 processing companies surveyed before the March 2, 2015 deadline. 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 2015 Bristol Bay sockeye salmon total intended purchases is approximately 2.1 million fish (6%) lower than the forecast harvest of 37.6 million fish. The survey estimated a maximum daily harvest capacity of 2.5 million fish per day, which could be sustained for 21 days. The survey also shows that the processing capacity has increased since the last survey that was conducted in 2011. Much of that increase in capacity is attributed to the entry of a new processor into the fishery. This added a new processing plant with a capacity on par with many of the larger processors in Bristol Bay. Additionally, many processors indicated incremental increases in processing capacity associated with various types of equipment upgrades over time. Total processing capacity, as estimated from total intended purchases, from the 2015 survey of 206.0 million pounds (35.5 million fish) is 9% greater than the 2011 estimated season capacity of 195.6 million pounds (33.7 million fish). Similarly, the 2015 estimated daily processing capacity of 14.5 million pounds (2.5 million salmon) is 8% greater than the 2011 daily capacity of 12.0 million pounds (2.1 million fish). These estimates are not directly comparable for a variety of reasons (e.g., fish weight, forecast, tender numbers) but are useful to provide context and understand this year's processing capabilities. The 9% increase of total intended purchases still falls 6% short of this year's harvest forecast.

FIGURES AND TABLES

Table 1.–Mean Bristol Bay sockeye salmon weights in pounds, 2001–2014.

Year	Mean weight
2001	6.7
2002	6.1
2003	6.3
2004	5.8
2005	6.3
2006	5.8
2007	5.8
2008	5.8
2009	5.9
2010	5.8
2011	6.1
2012	5.7
2013	6.0
2014	5.6
5-yr Avg.	5.8

Table 2.–Comparison of the 2015 Bristol Bay sockeye salmon harvest forecast and projected intended purchases.

	Number of salmon	Pounds of salmon
Projected Harvest	37.6 million	218.1 million
Projected Intended Purchases	35.5 million	206.0 million
Difference	2.1 million	12.1 million

Table 3.–Projected daily processing capacity, duration, and start date for 2015 Bristol Bay sockeye salmon.

Number of salmon	Pounds of salmon	Duration	Mean start date
2.5 million	14.5 million	20.6–21.3 Days	6/25/2015

Table 4.–Sockeye salmon daily landings, 10-year daily mean, minimum, and maximum, in numbers of fish, Bristol Bay, 2005–2014.

Date Landed	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	10-year daily mean	10-year daily minimum	10-year daily maximum
06/25	318,620	598,378	472,046	150,337	979,598	738,806	497,932	236,470	939,243	1,458,791	639,022	150,337	1,458,791
06/26	1,060,495	855,701	535,951	656,482	1,205,859	1,111,657	1,396,661	366,589	1,191,241	1,902,966	1,028,360	366,589	1,902,966
06/27	1,178,240	889,029	880,512	684,574	1,350,326	1,242,919	1,475,687	864,863	851,459	2,655,966	1,207,358	684,574	2,655,966
06/28	944,786	905,401	765,692	856,865	2,053,623	1,782,934	1,149,366	570,833	966,002	2,094,836	1,209,034	570,833	2,094,836
06/29	1,186,433	949,689	801,177	1,169,836	2,123,463	898,716	1,434,091	791,392	933,169	1,273,626	1,156,159	791,392	2,123,463
06/30	1,203,956	1,053,398	995,166	1,262,228	1,349,172	857,950	1,603,764	1,095,340	1,481,104	1,265,110	1,216,719	857,950	1,603,764
07/01	1,876,438	1,078,687	1,378,584	1,603,301	1,230,663	1,215,539	1,461,489	948,548	1,196,211	1,045,787	1,303,525	948,548	1,876,438
07/02	1,384,784	1,074,144	877,704	2,628,496	1,815,481	921,730	1,816,913	1,397,607	775,245	1,384,480	1,407,658	775,245	2,628,496
07/03	1,358,494	1,028,279	2,099,295	2,063,748	2,126,877	1,396,672	1,246,319	1,448,759	571,279	1,600,119	1,493,984	571,279	2,126,877
07/04	1,204,153	1,473,717	1,952,318	1,604,651	1,795,565	1,663,434	1,516,598	1,986,592	349,930	1,895,292	1,544,225	349,930	1,986,592
07/05	1,607,051	1,754,799	1,648,242	1,658,797	1,725,578	1,095,152	1,178,472	2,037,036	142,548	1,994,551	1,484,223	142,548	2,037,036
07/06	1,587,662	1,503,211	1,553,910	1,830,794	1,609,455	1,284,031	1,002,838	1,827,163	182,304	1,250,002	1,363,137	182,304	1,830,794
07/07	1,466,284	1,438,633	1,566,318	1,573,565	1,603,672	1,612,432	732,322	1,495,548	78,718	964,051	1,253,154	78,718	1,612,432
07/08	1,497,658	1,641,546	1,735,605	1,599,854	1,632,660	1,160,600	328,551	1,357,513	199,246	1,498,389	1,265,162	199,246	1,735,605
07/09	1,305,016	1,259,583	1,572,564	1,912,873	1,452,020	1,600,639	441,748	1,435,330	310,819	1,463,862	1,275,445	310,819	1,912,873
07/10	829,099	1,228,414	1,773,336	1,446,124	1,059,846	1,520,126	244,680	694,300	740,952	1,002,443	1,053,932	244,680	1,773,336
07/11	891,970	1,489,542	1,880,275	811,041	698,187	1,974,555	368,935	639,185	339,417	994,566	1,008,767	339,417	1,974,555
07/12	467,642	1,356,884	1,713,291	974,284	580,018	943,437	178,226	319,692	289,343	1,158,866	798,168	178,226	1,713,291
07/13	765,684	1,762,365	1,166,363	1,037,483	511,215	711,917	152,107	350,196	182,531	635,340	727,520	152,107	1,762,365
07/14	709,626	1,504,684	944,600	455,446	403,469	1,259,429	639,613	282,147	105,620	386,287	669,092	105,620	1,504,684
07/15	579,803	1,018,420	1,132,117	696,766	343,798	1,105,916	419,053	216,706	108,044	209,838	583,046	108,044	1,132,117
07/16	529,405	370,699	1,227,842	491,170	339,180	621,458	219,999	268,766	93,335	138,441	430,030	93,335	1,227,842
07/17	333,046	882,084	566,262	327,862	210,118	557,393	155,341	195,985	67,976	112,016	340,808	67,976	882,084
07/18	242,710	602,996	379,165	300,019	136,121	496,161	231,531	184,723	47,657	99,543	272,063	47,657	602,996
07/19	267,309	509,940	401,052	196,286	69,924	505,437	156,190	113,491	17,484	31,909	226,902	17,484	509,940
07/20	186,903	544,928	355,483	156,387	154,430	320,839	129,191	68,843	2,034	27,889	194,693	2,034	544,928

Table 5.–Estimated in-Bristol-Bay tender fleet holding capacity.

Number of salmon	Pounds of salmon
6.6 million	38.0 million

Table 6.–Estimated daily and season capacity of the long-haul tender fleet.

	Number of salmon	Pounds of salmon
Daily Capacity	603,448–612,069	3.5–3.6 million
Season Capacity	1.9–2.2 million	11.2–12.7 million

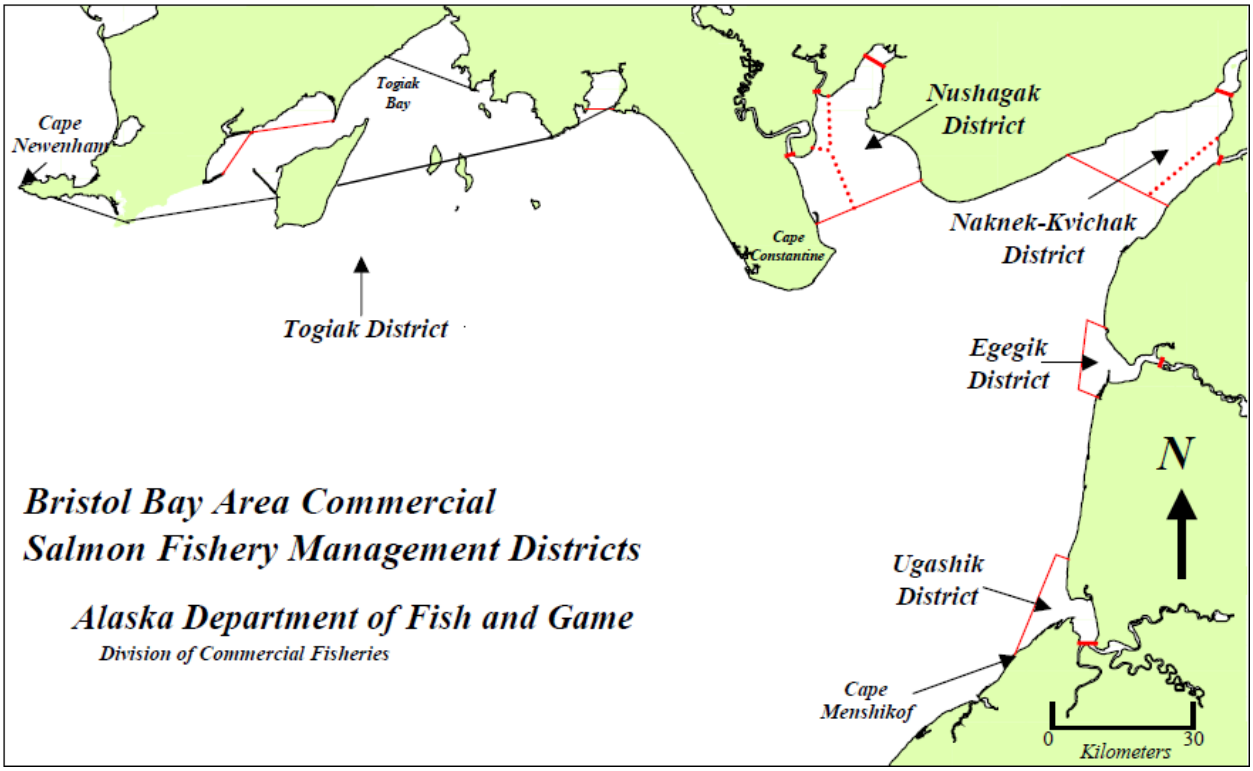

Figure 1.–Bristol Bay area commercial fisheries salmon management districts.

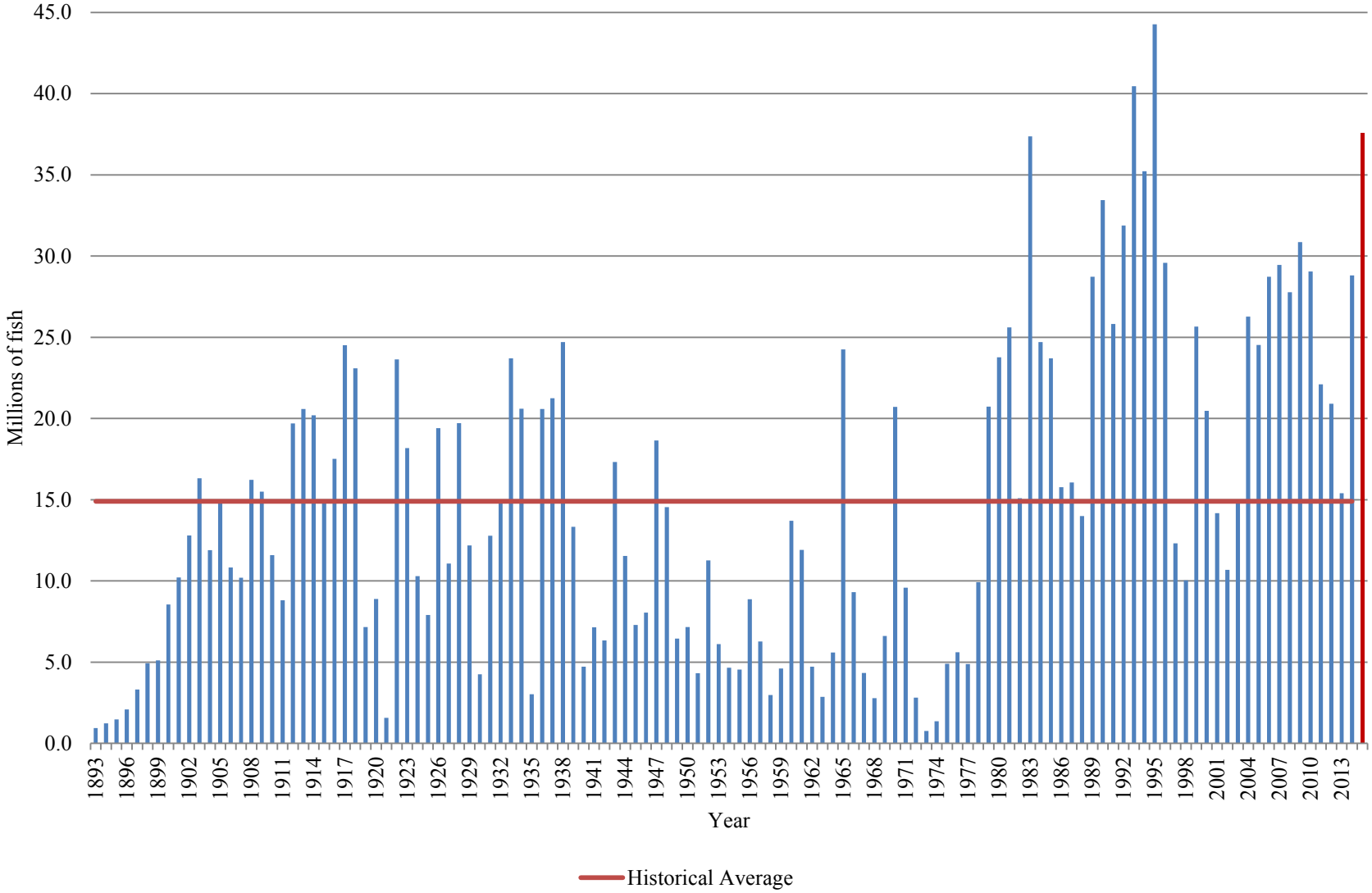

Figure 2.–Bristol Bay commercial sockeye salmon harvests, in thousands of fish, 1893–2014, with 2015 projected harvest and historical average.

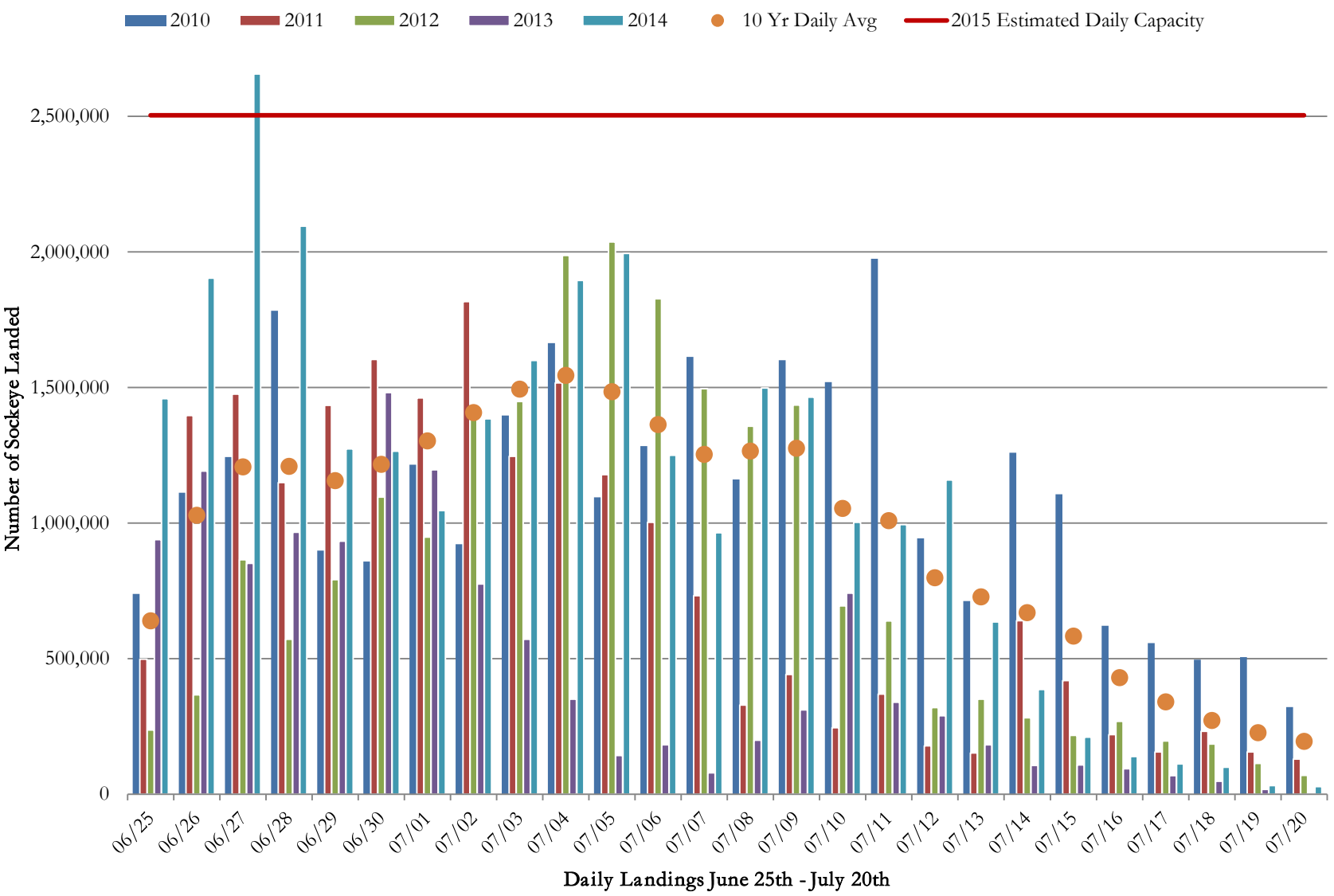

Figure 3.–Bristol Bay sockeye salmon daily landings, 2010–2014, with 10-year daily mean, and 2015 estimated daily capacity.

APPENDIX A: 2015 BRISTOL BAY SOCKEYE SALMON FORECAST

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

Cora Campbell, Commissioner
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Anchorage Office
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Date Issued: 11/13/2014
Time: 2:00 p.m.

2015 BRISTOL BAY SOCKEYE SALMON FORECAST

The 2015 Bristol Bay sockeye salmon forecast and harvest projections are provided below.

FORECAST AREA: **Bristol Bay**

SPECIES: **Sockeye Salmon**

FORECAST OF THE 2015 RUN:

TOTAL PRODUCTION:	Forecast (millions)	Forecast Range (millions)
Total Run	53.98	44.83–63.13
Escapement	13.46	
Commercial Common Property Harvest	40.52	
Bristol Bay Harvest	38.51	
South Peninsula Harvest	2.01	

METHODS

The 2015 Bristol Bay sockeye salmon forecast is the sum of individual predictions for nine river systems (Kvichak, Alagnak, Naknek, Egegik, Ugashik, Wood, Igushik, Nushagak-Mulchatna, 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 Nushagak River). Adult escapement and return data from brood years 1972–2011 were used in the analyses.

Predictions for each age class returning to a river system were calculated from models based on the relationship between adult returns and spawners or siblings from previous years. Tested models included simple linear regression and recent year averages. Models chosen were those with statistically significant parameters having the greatest past reliability (accuracy and precision)

based on mean absolute deviation, mean absolute percent error, and mean percent error between forecasts and actual returns for two time periods, 2012 through 2014 and 2010 through 2014.

The forecast range was the upper and lower values of the 80% confidence bounds for the total run forecast. The confidence bounds were calculated using deviations of actual runs from published predictions from 2001 through 2014.

RESULTS

A total of 53.98 million sockeye salmon (range 44.83–63.13 million) are expected to return to Bristol Bay in 2015. This prediction is 40% greater than the previous 10-year mean of total runs and 51% greater than the long-term mean of 32.43 million. All systems are expected to meet their spawning escapement goals.

A run of 53.98 million sockeye salmon can produce a potential total harvest of 40.52 million fish. The projected harvest includes 38.51 million fish in Bristol Bay and 2.01 million fish in the South Peninsula fisheries. A Bristol Bay harvest of 38.51 million would be 45% greater than the previous 10-year mean harvest (26.48 million; range of 15.42 million to 31.10 million), and 60% greater than the long-term mean of 24.05 million.

The run forecast to each district and river system is as follows: 28.80 million to Naknek-Kvichak District (15.38 million to Kvichak River; 1.24 million to Alagnak River; 12.18 million to Naknek River); 12.50 million to Egegik District; 3.70 million to Ugashik District; 8.37 million to Nushagak District (5.55 million to Wood River; 1.81 million to Nushagak River; 1.02 million to Igushik River); and 0.61 million to Togiak District (Table 1).

The total run forecast of 53.98 million sockeye salmon is expected to be comprised of 18.37 million age-1.3 fish (34%) followed by 16.87 million age-2.2 fish (31%), 13.61 million age-1.2 fish (25%), 5.01 million age-2.3 fish (9%), with minor age classes contributing to the remainder of the return (Table 1).

DISCUSSION

Forecasting future salmon returns is inherently difficult and uncertain. We have used similar methods since 2001 to produce the Bristol Bay sockeye salmon forecast. These forecast methods have performed well when looking at the Baywide forecast. Forecasts since 2001 have averaged 8.2% below the actual total run. Run forecast differences have ranged from 35.9% below actual run in 2014 to 20.6% above actual run in 2011. Forecasted harvests have averaged 2.2% below actual harvest since 2001 and harvest differences have ranged from 39% below actual harvest in 2014 to 35% above actual harvest in 2011.

Individual river forecasts have greater uncertainty compared to Baywide forecasts. Since 2001, on average, we have under-forecasted the returns to the Alagnak (-24%), Togiak (-15%), Kvichak (-11%), Wood (-7%), and Naknek (-3%) rivers and over-forecasted returns to Igushik (56%), Egegik (29%), Ugashik (13%), and Nushagak (1%) rivers.

The overall Bristol Bay forecasts have been fairly accurate since 2001 in spite of a large amount of individual river forecast variability. This is the result of over-forecasting returns to some rivers and under-forecasting returns to other rivers. The forecasts to individual rivers offset each other such that the overall Bristol Bay forecast has been more accurate than the individual forecasts.

Historically, total runs of sockeye salmon to Bristol Bay have been highly variable. The 2015 forecast of 53.98 million is above the long-term (1963–2014) historical average of 32.43 million, and above the recent ten-year (2005–20014) average of 38.64 million from 2005 to 2014.

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Alaska Department of Fish and Game
Division of Commercial Fisheries
Bristol Bay Research Staff
Anchorage

Table 1.–Forecast of total run, escapement, and harvest of major age classes of sockeye salmon returning to Bristol Bay river systems in 2015.

	Millions of Sockeye Salmon							
DISTRICT	Forecasted Production by Age Class					Forecasted		South
River	1.2	2.2	1.3	2.3	Total	Escapement	Harvest	Peninsula [a]
NAKNEK-KVICHAK								
Kvichak	3.15	9.71	1.68	0.83	15.38	7.69	7.12	0.57
Alagnak	0.48	0.04	0.61	0.12	1.24	0.62 [b]	0.58	0.05
Naknek	2.97	1.26	7.32	0.63	12.18	1.10	10.63	0.45
Total	6.60	11.01	9.60	1.58	28.80	9.41	18.32	1.07
EGEGIK	2.63	5.12	1.62	3.14	12.50	1.10	10.94	0.46
UGASHIK	2.05	0.52	0.97	0.16	3.70	0.85	2.71	0.14
NUSHAGAK [c]								
Wood	1.93	0.17	3.36	0.09	5.55	1.10	4.24	0.21
Igushik	0.16	0.02	0.82	0.02	1.02	0.23	0.76	0.04
Nushagak	0.12	0.01	1.56	0.01	1.81 [d]	0.60	1.14	0.07
Total	2.20	0.20	5.74	0.11	8.37	1.93	6.14	0.31
TOGIAK [e]	0.12	0.03	0.43	0.03	0.61	0.18	0.41	0.02
BRISTOL BAY	13.61	16.87	18.37	5.01	53.98	13.46	38.51	2.01
	25%	31%	34%	9%	100%			

Note: This table summarizes the forecast of sockeye salmon in millions of fish. Any differences in addition are due to rounding.

[a] The projected harvest accounts for the harvest of Bristol Bay sockeye salmon in the South Peninsula commercial salmon fisheries. The South Peninsula harvest has averaged 3.7% of the total Bristol Bay sockeye salmon production during the last 5 years.

[b] The projected escapement to the Alagnak River was estimated based on exploiting the Alagnak River at the same exploitation rate as the Kvichak River.

[c] Forecast for Snake River system was not included (1971–1991 average escapement was 18,000).

[d] Nushagak River forecast includes age-0.3 (16,756) and age-1.4 (101,994) fish.

[e] Forecasts for Kulukak, Kanik, Osviak, and Matogak river systems were not included. These systems contribute approximately 50,000 to Togiak District harvest each year.

APPENDIX B: 2015 BRISTOL BAY SOCKEYE SALMON SURVEY

Alaska Department of Fish and Game
2015 Bristol Bay Sockeye Salmon
Processing Capacity Survey

Please answer the following questions about your plans to purchase sockeye salmon in Bristol Bay in 2015. Please complete, sign, and send your survey form via email: Jennifer.shriver@alaska.gov; Fax: (907) 465 -2604, or mail to Jennifer Shriver, ADF&G – CF, PO Box 115526, Juneau, AK, 99811, by **March 2, 2015.** Thank you for your time and quick response to this survey. Your cooperation is greatly appreciated. If you have any questions, please phone Jennifer at (907) 465-6133 or Bert Lewis at (907) 267-2173.

1. **Does your company intend to purchase and process Bristol Bay sockeye salmon during the 2015 season?** ☐ **Yes** ☐ **No**

   If "Yes," please answer questions 2 -7.
   If "No," the survey is complete please sign, scan, and email to Jennifer Shriver at jennifer.shriver@alaska.gov or fax to 907- 465-2604.

2. **Planned Purchases in 2015 Bristol Bay Season**

2a.	Amount of Sockeye Salmon your company intends to purchase in Bristol Bay in the 2015 season:	
2b.	Is this total in **Numbers** of fish or **Pounds** of fish?	

3. **Daily Processing Capacity**

3a.	**Daily Processing Capacity** of sockeye salmon in Bristol Bay in 2015:	
3b.	Is this total in **Numbers** of fish or **Pounds** of fish?	
3c.	What **Date** do you expect to be at the daily processing capacity listed in 3a?	
3d.	How many days could your company sustain the daily processing capacity?	
3e.	Comments on Daily Processing Capacity?	

4. **Tenders**

4a.	Does your company provide tenders? **(yes or no)**	
4b.	If "Yes" what is your tender fleet's "In-Bristol Bay" holding capacity in **Pounds** of fish? ***Please DO NOT include long hauls.***	
4c.	What **Date** do you expect to have all your tenders in Bristol Bay?	

5. **Long Haul Tender Fleet**

5a.	Will your company provide long haul tenders? **(yes or no)**	
5b.	If "Yes", what is the daily capacity of your long haul tender fleet in **Pounds** of fish?	
5c.	What is the **Season Capacity** of your long haul tender fleet in **Pounds** of fish?	
5d.	What **Date** do you expect to have all your long haul tender fleet available by?	

6. **Sockeye Purchases in the Ugashik District**

6a.	Does your company plan to purchase sockeye salmon in the Ugashik District in 2015? **(yes or no)**	
6b.	If "Yes", will your company be purchasing more than in 2014?	

7. **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?**

_____

_____

_____

_____

_____

_____

_____

_____

Note: All capacity data provided in this survey is protected as confidential information under Alaska Statute 16.05.815.

Survey Respondent Information

Name:_____ **Position:**_____

Email:_____ **Phone:**_____

Signature: _____ **Date:**_____