Annual Project Report No. FIS 07-402
USFWS Office of Subsistence Management
Fishery Information Services Division

Stock Assessment of Sockeye Salmon from the Buskin River, Kodiak, Alaska, 2008

by

Donn Tracy

and

Julia Schmidt

May 2009

Alaska Department of Fish and Game **Division of Sport Fish**

Symbols and Abbreviations

The following symbols and abbreviations, and others approved for the Système International d'Unités (SI), are used in Division of Sport Fish Fishery Manuscripts, Fishery Data Series Reports, Fishery Management Reports, and Special Publications without definition. All others must be defined in the text at first mention, as well as in the titles or footnotes of tables and in figures or figure captions.

Weights and measures (metric)

centimeter	cm
deciliter	dL
gram	g
hectare	ha
kilogram	kg
kilometer	km
liter	L
meter	m
metric ton	mt
milliliter	ml
millimeter	mm

Weights and measures (English)

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

Spell out acre and ton.

Time and temperature

day	d
degrees Celsius	°C
degrees Fahrenheit	°F
hour (spell out for 24-hour clock)	h
minute	min
second	s

Spell out year, month, and week.

Physics and chemistry

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

General

All commonly accepted abbreviations.	e.g., Mr., Mrs., a.m., p.m., etc.
All commonly accepted professional titles.	e.g., Dr., Ph.D., R.N., etc.
And	&
At	@
Compass directions:	
east	E
north	N
south	S
west	W
Copyright	©
Corporate suffixes:	
Company	Co.
Corporation	Corp.
Incorporated	Inc.
Limited	Ltd.
et alii (and other people)	et al.
et cetera (and so forth)	etc.
exempli gratia (for example)	e.g.,
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
number (before a number)	# (e.g., #10)
pounds (after a number)	# (e.g., 10#)
registered trademark	®
Trademark	™
United States (adjective)	U.S.
United States of America (noun)	USA
U.S. state and District of Columbia abbreviations	use two-letter abbreviations (e.g., AK, DC)

Mathematics, statistics, fisheries

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	C.I.
correlation coefficient	R (multiple)
correlation coefficient	r (simple)
covariance	cov
degree (angular or temperature)	°
degrees of freedom	df
divided by	÷ or / (in equations)
equals	=
expected value	E
fork length	FL
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.
mideye-to-fork	MEF
minute (angular)	'
multiplied by	x
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
standard length	SL
total length	TL
variance	Var

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By

Donn Tracy
and
Julia S. Schmidt

Division of Sport Fish, Kodiak

May 2009

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Annual Report Summary Page

Title: Stock assessment of sockeye salmon from the Buskin River, Kodiak, Alaska, 2008

Study Number: FIS 07-402

Investigator(s)/Affiliation(s): Donn Tracy, Len Schwarz and Julia S. Schmidt, Alaska Department of Fish and Game (ADF&G), Division of Sport Fish, 211 Mission Road, Kodiak, AK 99615-6399, USA.

Management Regions: Kodiak Area, Bristol Bay/Alaska Peninsula/Kodiak Region

Information Type: Stock Status and Trends

Issue Addressed: Data collected from the project will be used for inseason management and development of an escapement goal for this sockeye salmon stock.

Study Cost: $69,300

Study Duration: June 1 – August 15, 2008

Key Words: Age composition, Buskin River, Kodiak Island, sockeye salmon, *Oncorhynchus nerka*, subsistence harvest, weir.

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ABSTRACT

Salmon weirs were operated on the Buskin River drainage on Kodiak Island, Alaska, from May 20 – September 29, 2008 to enumerate sockeye salmon *Oncorhynchus nerka*. A total of 5,900 sockeye salmon were counted into Buskin Lake. A total of 833 sockeye salmon were also counted into the Catherine-Louise lakes tributary. The midpoint of the Buskin Lake run occurred on June 28; the midpoint of the Catherine-Louise lakes tributary run occurred on August 13. Most sockeye salmon in the Buskin Lake escapement were aged 2.3, 1.3 or 1.2 while Catherine-Louise lakes bound sockeye were aged either 1.2 or 2.2. The preliminary 2008 subsistence harvest was 2,149 sockeye salmon, most of which were aged 1.3.

Key words: Buskin River, Kodiak Island, sockeye salmon, *Oncorhynchus nerka*, weir, subsistence harvest, age composition.

INTRODUCTION

The Buskin River drainage (Figure 1), located approximately 2 miles from the city of Kodiak, supports a subsistence fishery occurring in marine waters near the mouth of the Buskin River, which harvests relatively large numbers of sockeye salmon *Oncorhynchus nerka*. Between 1999 and 2008 annual subsistence harvests have ranged as high as 13,000 fish and averaged around 8,800 (Table 1). Currently, the Buskin River is the single largest source of subsistence salmon harvests in federally managed waters within the Kodiak-Aleutians region.

Buskin River sockeye salmon are also targeted in a sport fishery which annually harvests approximately 1,750 fish (Table 2). Additionally, a small commercial fishery has recently accounted for less than 100 fish harvested per year.

Annual escapements of sockeye salmon returning to the Buskin River have been monitored since 1980. Between 1980 and 1984 escapements were indexed using aerial survey counts but since 1985 a weir has been used to enumerate total inriver returns. From 1999-2008 sockeye salmon escapements into the Buskin Lake have averaged more than 16,000 (Table 3).

Although sockeye salmon harvests and escapements have been monitored historically, age data from returns of adult fish have been collected consistently only since 1993 (Schwarz and Clapsadl 2000). Consequently, there is an ongoing need to assess productivity of this salmon stock and to evaluate the current biological escapement goal (BEG).

The Buskin River is fed primarily by Buskin Lake, although the drainage also contains a major downstream tributary terminating in the Catherine-Louise lakes. Along with Buskin Lake, these lakes are utilized by sockeye salmon for spawning and juvenile rearing. Since 1990 an ADF&G weir has been operated near the outlet of Buskin Lake to avoid weir washouts resulting from frequent inriver flooding. Consequently, the inriver return of sockeye salmon to Catherine-Louise lakes was not fully documented until 2002, when a second weir was installed on the outlet stream. Between 2002-2008 sockeye salmon escapements into Catherine-Louise lakes have averaged more than 2,700 fish (Table 3). Operation of this tributary weir will continue annually for the duration of the stock assessment study.

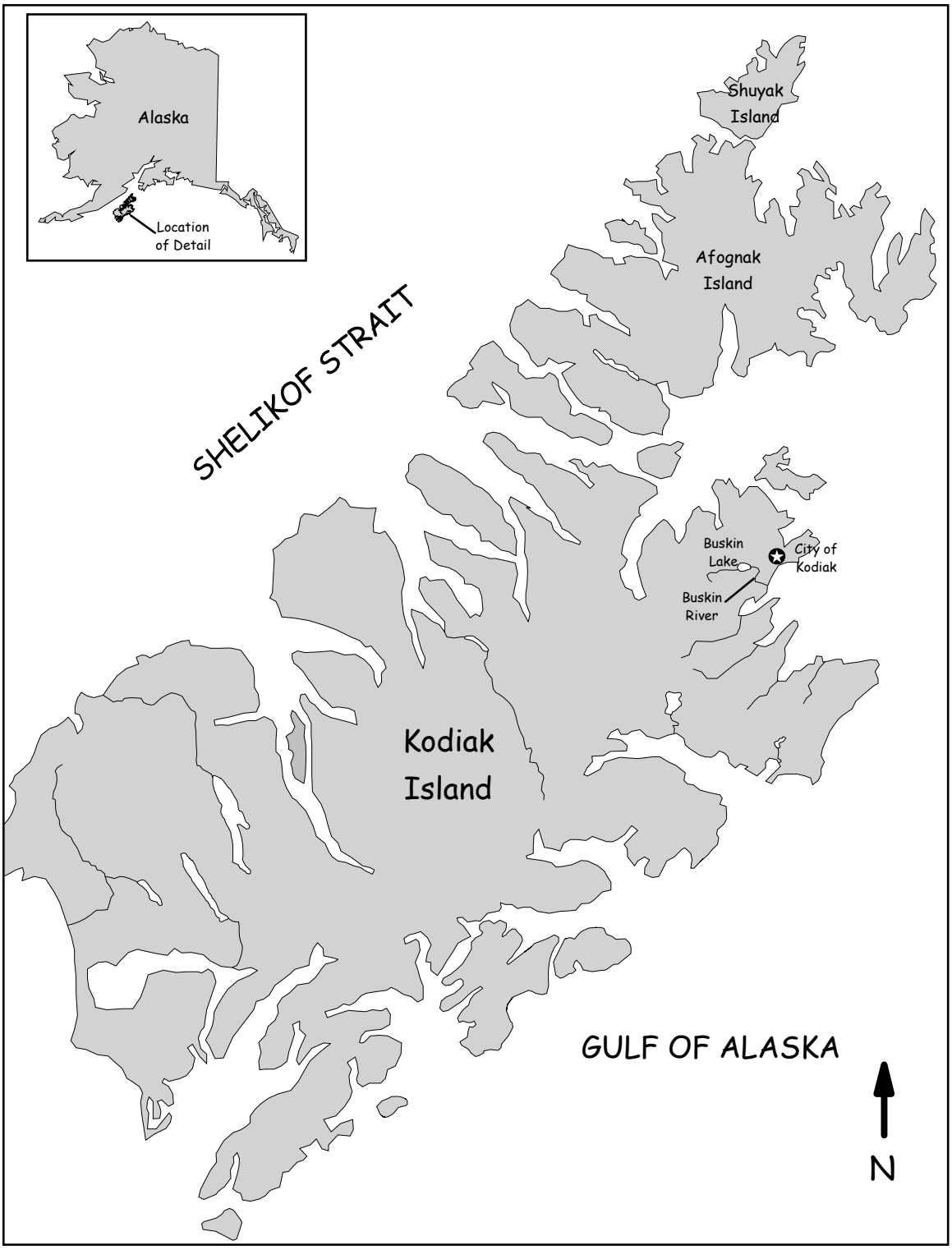

Figure 1.-Map of Kodiak Island showing Buskin River drainage.

In order to evaluate the sockeye salmon BEG, annual harvest figures from subsistence, sport and commercial fisheries plus estimated escapements and total returns by age from escapement and subsistence harvest sampling are needed to reconstruct the run and develop brood tables. Cumulative weir counts are needed not only to estimate escapements but also for comparison to historic time of entry data to ensure fisheries are managed to achieve the BEG. Results from this project will sustain productivity of the Buskin River sockeye salmon stock and provide harvestable surpluses for subsistence, recreational, or commercial fisheries.

Table 1.- Subsistence harvests of Buskin River sockeye salmon, 1999-2008.

Year	Reported Subsistence Fishery Harvest
1999	7,985
2000	7,315
2001	10,260
2002	13,366
2003	10,651
2004	9,421
2005	8,239
2006	7,577
2007	11,151
2008	2,149
Average	8,811

Source: ADF&G Commercial Fisheries Division, Kodiak; 2008 data preliminary.

Table 2.- Estimated sport fishery harvest of Buskin River sockeye salmon, 1998-2007.

Year	Estimated Sport Fishery Harvest
1998	1,983
1999	1,467
2000	2,041
2001	827
2002	2,204
2003	3,017
2004	1,379
2005	1,540
2006	1,577
2007	1,509
Average	1,754

Source: 1998-2000, Schwarz et al. 2002; 2001-2007 Schwarz et al. *in prep.*

Table 3.- Escapement of sockeye salmon into Buskin Lake, 1999-2008 and Catherine-Louise lakes 2002-2008.

Year	Buskin	Catherine-Louise
1999	10,812	
2000	11,233	
2001	20,556	
2002	17,174	3,541
2003	23,870	4,488
2004	22,023	2,086
2005	15,468	2,028
2006	17,734	4,586
2007	16,502	1,676
2008	5,900	833
Average	16,127	2,748

Source: 1998-2000 data from Schwarz et al 2002; 2001-2008 data from Schwarz et al. *in prep*.

During 2008 the objectives of the stock assessment study were to census the sockeye salmon escapement into Buskin River drainage and to estimate the age composition of the escapement and subsistence fishery harvest. This information, along with 2008 harvest data, will be used to augment a brood table in currently in development for evaluation of the BEG.

METHODS

WEIR OPERATIONS

In 2008 the escapement of sockeye salmon into Buskin Lake was censused from May 20 – July 30 (Table 4; Figure 2). Fish migrating upstream were enumerated as they passed through a weir located at the lake outlet. After July 30 the Buskin Lake weir was moved downstream to also enumerate escapement of coho salmon, and remained in operation through September 29. Daily counts of sockeye salmon at both locations were entered on salmon weir count data forms.

A second weir was operated on the Catherine-Louise lakes tributary stream beginning on June 8 and ending on September 8 (Table 5; Figure 3). Daily counts of sockeye salmon at this location were entered on salmon weir count data forms.

AGE-SEX-LENGTH SAMPLING

Sockeye salmon were sampled from the Buskin Lake escapement during each of five temporal strata: 16-31 May, 1-15 June, 16-30 June, 1-15 July and 16-31 July. Ideally, sampling was conducted on two days, one week apart, during each stratum. All fish captured on selected days were sampled, even if the daily sample goal was exceeded. On occasions when large numbers of sockeye salmon were observed behind the weir, fish were ideally sampled during the early, middle and late portions of the time interval required for their passage upstream.

The Catherine-Louise lakes sockeye escapement was sampled during each of four temporal strata: 1 June – 15 July, 16-31 July, 1-15 August and 16-31 August. All fish captured on selected days were sampled, even if the daily sample goal was exceeded.

The subsistence harvest was sampled for age, sex, and length during each of two temporal strata, 1-15 June and 16-30 June, to account for any significant changes in these attributes over the course of the fishery. Harvested fish were sampled opportunistically within each time stratum. Sampling was conducted either from a boat on the fishing grounds or dockside at local boat harbors.

Fish lengths were measured from mid-eye to fork-of-tail and sex determined based on morphology. Two scales were taken from each fish and mounted on a gum card. Scales were taken from the left side of the body, at a point on a diagonal line from the posterior insertion of the dorsal fin to the anterior insertion of the anal fin, two rows above the lateral line (Clutter and Whitesel 1956). Scales were taken proximal to the preferred region only when necessary, and if scales were not available in the preferred region on the left side of the fish, scales were collected within or proximal to the preferred region on the right side. Age was interpreted from scales using the criteria of Clutter and Whitesel (1956).

DATA ANALYSIS

Chi-squared statistics were used to test for differences in age and sex composition among temporal strata within each source (i.e., escapement or subsistence harvests) and also between sources. If differences were detected, estimates were stratified to minimize bias. If differences were not detected, age data were pooled to improve precision. The proportion of sockeye salmon from source h (escapement or subsistence harvest) during stratum i (i = 1,2,3,4) in age/sex class j was estimated as a binomial proportion by:

$$\hat{p}_{hij} = \frac{n_{hij}}{n_{hi}} \tag{1}$$

and its variance by:

$$\hat{V}(\hat{p}_{hij}) = \left[\frac{N_{hi} - n_{hi}}{N_{hi}}\right] \frac{\hat{p}_{hij}\left(1 - \hat{p}_{hij}\right)}{n_{hi} - 1}, \tag{2}$$

where:

n_{hij} = the number of sockeye salmon from source h during stratum i that were in age/sex class j,

n_{hi} = the number of sockeye salmon sampled from source h during stratum i, and

N_{hi} = the total number of sockeye salmon in source h during stratum i.

Weir counts and permit returns of subsistence harvests were treated as censuses with no variance. In the event that temporal stratification was required for the subsistence harvest, N_{Si} (total number of subsistence sockeye salmon harvested during stratum i) was calculated by multiplying the total subsistence harvest by the proportion of the sockeye salmon run passing through the weir in temporal stratum i.

The number of fish from source h during stratum i of age/sex class j was estimated by:

$$\hat{N}_{hij} = N_{hi}\hat{p}_{hij}, \quad (3)$$

where N_{hi} = the total number of sockeye salmon from source h during stratum i;

and its variance by:

$$\hat{V}(\hat{N}_{hij}) = N_{hi}^2\hat{V}(\hat{p}_{hij}). \quad (4)$$

The total number of fish from source h of age/sex class j was estimated as:

$$\hat{N}_{hj} = \sum_{i=1}^{t}\hat{N}_{hij} \quad (5)$$

where t = the number of strata; and the variance was estimated as the sum of the variances as:

$$V(\hat{N}_{hj}) = \sum V(\hat{N}_{hij}). \quad (6)$$

The proportion of sockeye salmon age age/sex class j for the total of source h was estimated as:

$$\hat{p}_{hj} = \frac{\hat{N}_{hj}}{N_h}, \quad (7)$$

where N_h = the total for source h.

The variance of the proportion was estimated by:

$$V(\hat{p}_{hj}) = \frac{V(\hat{N}_{hj})}{N_h^2}. \quad (8)$$

RESULTS

By 15 August a total of 5,862 adult fish were counted through the weir located at the outlet of Buskin Lake (Table 4). The entire 2008 weir count (including fish counted after August 15 at the lower weir site) eventually totaled 5,900 (Table 3). The highest daily count of 2,248 sockeye salmon occurred on June 11 and the midpoint of the run occurred on approximately June 28 (Table 4; Figure 3). Age, length and sex data were collected from 344 sampled fish, and sex and length only data from an additional 29. Age compositions were significantly different by temporal strata (χ^2 = 34.66, df = 6, P = 5.0E-06) and subsequently were stratified. A combined proportion of more than 80% of the total sample consisted of fish aged 1.2, 1.3 or 2.3 (Appendix A1). Mean length of sampled females was 499 mm (SD = 41); mean length of males was 506 mm (SD = 69).

A cumulative total of 833 sockeye salmon were counted through the weir located on the Catherine-Louise lakes tributary stream (Table 3). The single highest daily count of 644 sockeye salmon occurred on August 13, with nearly 90% of the run complete (Table 5; Figure 4). Age, length and sex data were collected from 75 sampled fish and sex and length only data from an additional 94 fish. Age compositions were not significantly different by temporal strata (χ^2 = 4.31, df = 2, P = 0.116) and subsequently were pooled. Most fish bound for Catherine-Louise lakes were aged 1.2 (43%), followed by age 2.2 (27%) and 1.3 (21%) (Appendix A2). Mean

length of Catherine-Louise lakes females was 485mm (SD = 41), while mean length of males was 492 mm (SD = 58).

At the time of this report, a preliminary tally of more than 2,149 sockeye salmon reported taken in the 2008 subsistence harvest likely reflects an incomplete accounting of the total harvest. There was not a significant difference in age composition of fish sampled from the harvest over temporal strata (χ^2 = .191, df = 1, P = 0.661). Nearly one-half of the subsistence harvest was comprised of age 1.3 fish (Appendix A3). Mean length of females was 534 mm (SD = 24), and 549 mm (SD = 40) for males.

Age composition of the Buskin Lake escapement was significantly different from the subsistence harvest (χ^2 = 21.38; df = 2; P = 2.3E-05).

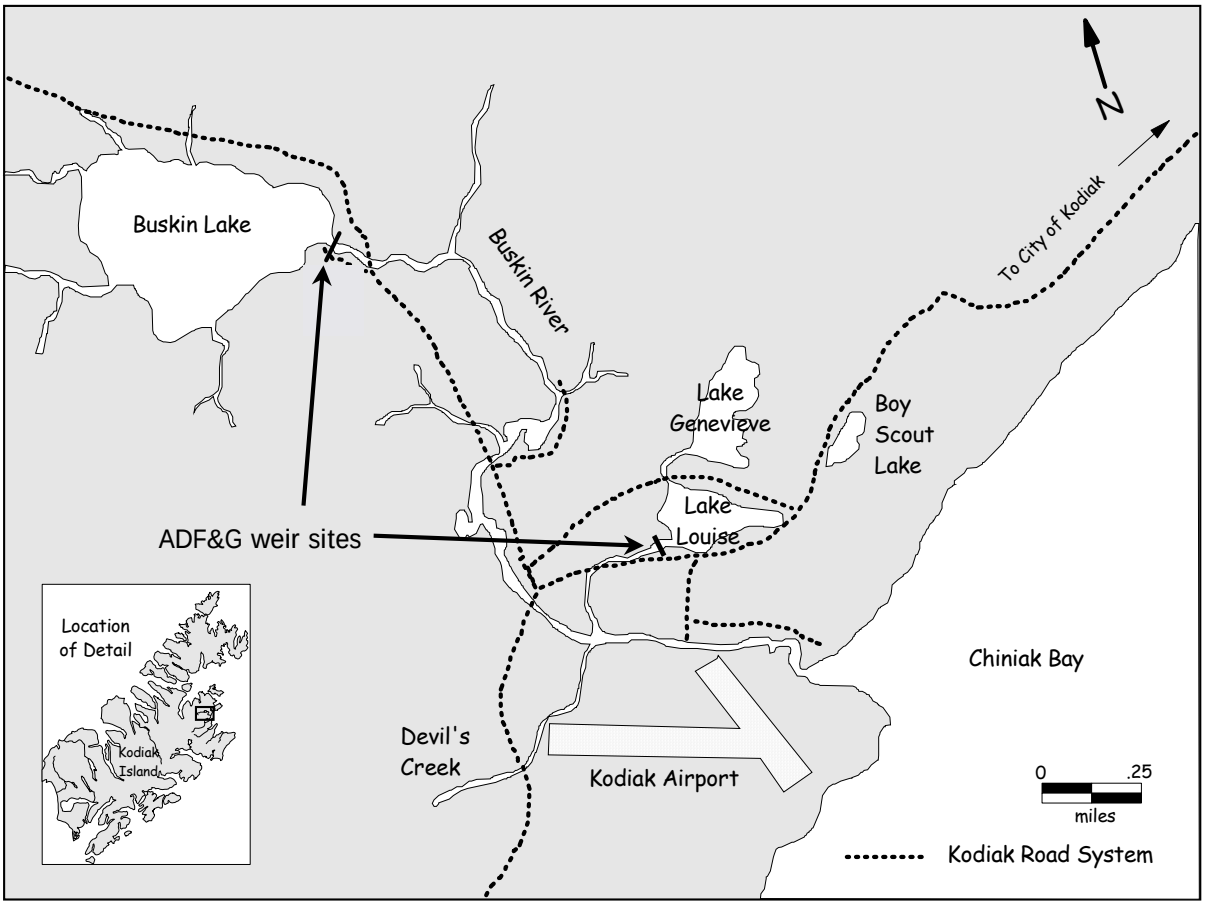

Figure 2.-Location of the Buskin River drainage weirs, 2008.

Table 4.-Immigration of sockeye salmon through the Buskin Lake outlet weir by date through August 15, 2008.

Date	Daily Count	Cumulative Count	% of Total	Date	Daily Count	Cumulative Count	% of Total
21-May	0	0	0%	4-Jul	85	4,235	72%
22-May	0	0	0%	5-Jul	0	4,235	72%
23-May	0	0	0%	6-Jul	9	4,244	72%
24-May	0	0	0%	7-Jul	37	4,281	73%
25-May	0	0	0%	8-Jul	21	4,302	73%
26-May	0	0	0%	9-Jul	99	4,401	75%
27-May	0	0	0%	10-Jul	1	4,402	75%
28-May	0	0	0%	11-Jul	1	4,403	75%
29-May	0	0	0%	12-Jul	184	4,587	78%
30-May	0	0	0%	13-Jul	71	4,658	79%
31-May	0	0	0%	14-Jul	0	4,658	79%
1-Jun	4	4	0%	15-Jul	6	4,664	79%
2-Jun	0	4	0%	16-Jul	16	4,680	79%
3-Jun	0	4	0%	17-Jul	90	4,770	81%
4-Jun	9	13	0%	18-Jul	7	4,777	81%
5-Jun	0	13	0%	19-Jul	0	4,777	81%
6-Jun	66	79	1%	20-Jul	0	4,777	81%
7-Jun	2	81	1%	21-Jul	8	4,785	81%
8-Jun	25	106	2%	22-Jul	2	4,787	81%
9-Jun	125	231	4%	23-Jul	0	4,787	81%
10-Jun	58	289	5%	24-Jul	203	4,990	85%
11-Jun	178	467	8%	25-Jul	53	5,043	85%
12-Jun	213	680	12%	26-Jul	1	5,044	85%
13-Jun	84	764	13%	27-Jul	1	5,045	86%
14-Jun	41	805	14%	28-Jul	5	5,050	86%
15-Jun	159	964	16%	29-Jul	362	5,412	92%
16-Jun	56	1,020	17%	30-Jul	29	5,441	92%
17-Jun	16	1,036	18%	31-Jul	25	5,466	93%
18-Jun	206	1,242	21%	1-Aug	20	5,486	93%
19-Jun	143	1,385	23%	2-Aug	17	5,503	93%
20-Jun	45	1,430	24%	3-Aug	18	5,521	94%
21-Jun	87	1,517	26%	4-Aug	17	5,538	94%
22-Jun	266	1,783	30%	5-Aug	24	5,562	94%
23-Jun	76	1,859	32%	6-Aug	8	5,570	94%
24-Jun	86	1,945	33%	7-Aug	8	5,578	95%
25-Jun	638	2,583	44%	8-Aug	11	5,589	95%
26-Jun	25	2,608	44%	9-Aug	3	5,592	95%
27-Jun	222	2,830	48%	10-Aug	16	5,608	95%
28-Jun	178	3,008	51%	11-Aug	31	5,639	96%
29-Jun	61	3,069	52%	12-Aug	21	5,660	96%
30-Jun	579	3,648	62%	13-Aug	1	5,661	96%
1-Jul	97	3,745	63%	14-Aug	197	5,858	99%
2-Jul	57	3,802	64%	15-Aug	4	5,862	99%
3-Jul	348	4,150	70%				

Table 5.-Immigration of sockeye salmon through the Catherine-Louise lakes weir by date through August 31, 2008.

Date	Daily Count	Cumulative Count	% of Total	Date	Daily Count	Cumulative Count	% of Total
8-Jun			0%	21-Jul	0	56	7%
9-Jun			0%	22-Jul	0	56	7%
10-Jun			0%	23-Jul	0	56	7%
11-Jun			0%	24-Jul	0	56	7%
12-Jun			0%	25-Jul	34	90	11%
13-Jun			0%	26-Jul	0	90	11%
14-Jun			0%	27-Jul	0	90	11%
15-Jun			0%	28-Jul	0	90	11%
16-Jun			0%	29-Jul	0	90	11%
17-Jun			0%	30-Jul	0	90	11%
18-Jun	1	1	0%	31-Jul	0	90	11%
19-Jun	0	1	0%	1-Aug	0	90	11%
20-Jun	0	1	0%	2-Aug	0	90	11%
21-Jun	0	1	0%	3-Aug	0	90	11%
22-Jun	0	1	0%	4-Aug	0	90	11%
23-Jun	0	1	0%	5-Aug	0	90	11%
24-Jun	0	1	0%	6-Aug	0	90	11%
25-Jun	0	1	0%	7-Aug	0	90	11%
26-Jun	0	1	0%	8-Aug	0	90	11%
27-Jun	0	1	0%	9-Aug	0	90	11%
28-Jun	4	5	1%	10-Aug	0	90	11%
29-Jun	8	13	2%	11-Aug	0	90	11%
30-Jun	0	13	2%	12-Aug	9	99	12%
1-Jul	0	13	2%	13-Aug	644	743	89%
2-Jul	0	13	2%	14-Aug	18	761	91%
3-Jul	19	32	4%	15-Aug	1	762	91%
4-Jul	19	51	6%	16-Aug	0	762	91%
5-Jul	0	51	6%	17-Aug	0	762	91%
6-Jul	0	51	6%	18-Aug	4	766	92%
7-Jul	1	52	6%	19-Aug	21	787	94%
8-Jul	4	56	7%	20-Aug	2	789	95%
9-Jul	0	56	7%	21-Aug	2	791	95%
10-Jul	0	56	7%	22-Aug	3	794	95%
11-Jul	0	56	7%	23-Aug	3	797	96%
12-Jul	0	56	7%	24-Aug	0	797	96%
13-Jul	0	56	7%	25-Aug	1	798	96%
14-Jul	0	56	7%	26-Aug	0	798	96%
15-Jul	0	56	7%	27-Aug	0	798	96%
16-Jul	0	56	7%	28-Aug	0	798	96%
17-Jul	0	56	7%	29-Aug	0	798	96%
18-Jul	0	56	7%	30-Aug	0	798	96%
19-Jul	0	56	7%	31-Aug	8	806	97%
20-Jul	0	56	7%				

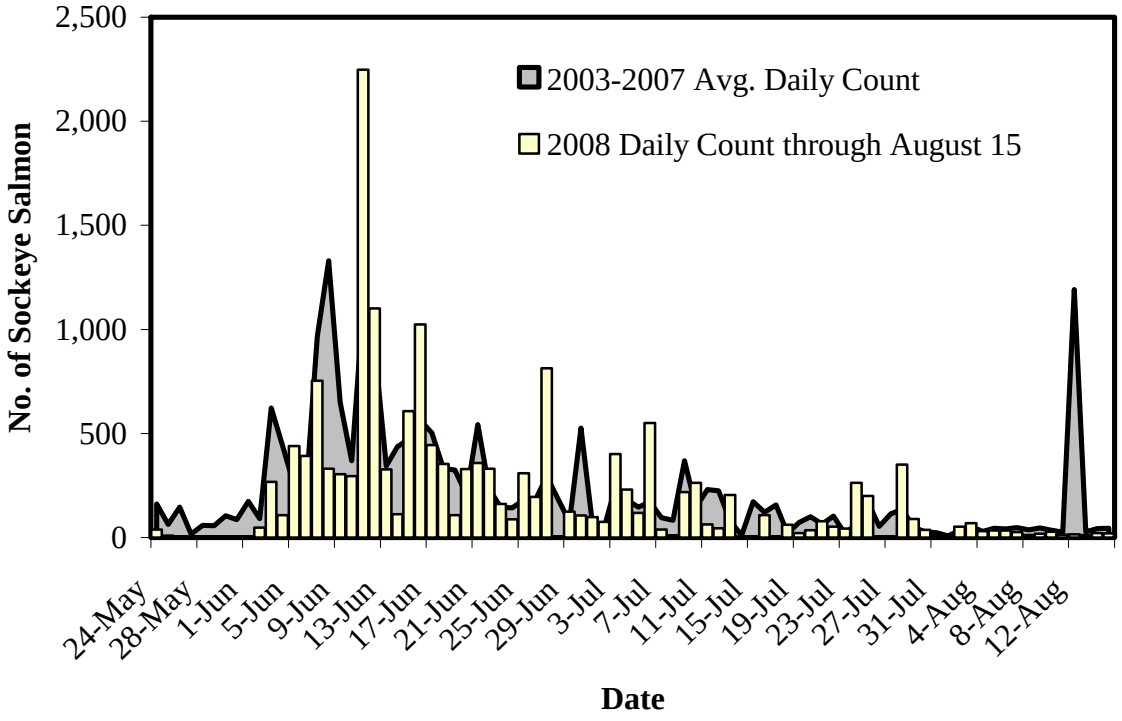

Figure 3.-Buskin River average daily sockeye salmon weir count, 2003-2007 and daily weir count through August 15, 2008.

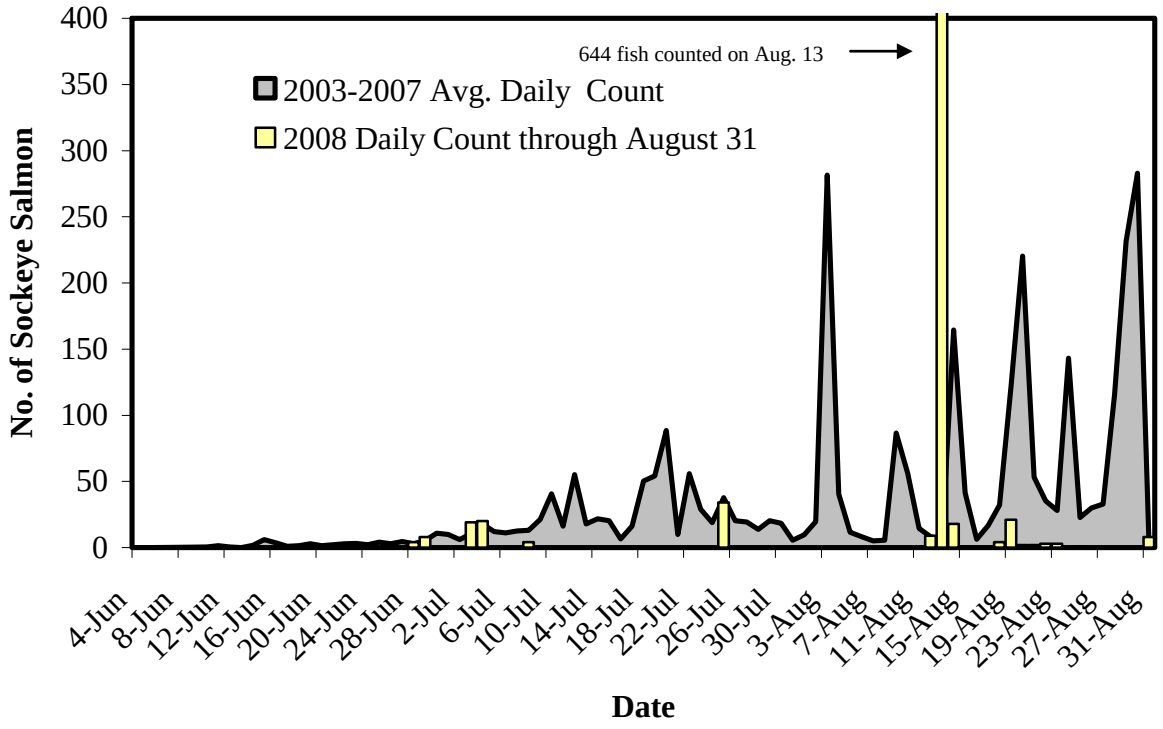

Figure 4.-Catherine-Louise lakes daily and cumulative sockeye salmon escapement through August 31, 2008.

DISCUSSION

The 2008 Buskin and Catherine-Louise lakes sockeye salmon weir counts were the lowest on record, with the Buskin Lake count also equaling less than one-third of the recent 5-year average weir count of 16,100. As a result of the poor daily and cumulative weir counts, on June 19 the sport and subsistence fisheries were both closed for the first time in history. Additionally, there were no commercial fishery openings targeting Buskin drainage sockeye salmon. The poor run and resultant early closure of the subsistence fishery were undoubtedly responsible for the preliminary 2008 harvest of just 2,150 fish. With the exception of the 2008 run, the Buskin River sockeye return has remained relatively stable, but also fully utilized by harvesters. Because of this fact, poor returns anticipated over the next several years may necessitate further inseason fishery restrictions similar to those instituted in 2008.

Information obtained from the stock assessment project through 2008 has been used for an updated, triennial evaluation of the sockeye salmon BEG, the results of which will be reported in May 2010. Escapements, subsistence harvests and corresponding age composition estimates from 2008 will be used along with sport and commercial harvest data to refine this evaluation through expanded development of a sockeye salmon brood table.

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LITERATURE CITED

Clutter, R., and L. Whitesel. 1956. Collection and interpretation of sockeye salmon scales. International Pacific Salmon Fishery Bulletin 9. 159 pp.

Goodman, L. A. 1960. On the exact product of variances. Journal American Statistical Association 66: 608-713.

Schwarz, L. J., Schmidt J. S. and D. Tracy. 2002. Area Management Report for the Recreational Fisheries of the Kodiak and Alaska Peninsula/Aleutian Islands Regulatory Areas, 1999 - 2000. Alaska Department of Fish and Game, Sport Fish Division, Fishery Management Report No. 02-02, Anchorage.

APPENDIX A. SUPPORTING DATA

Appendix A1.-Estimated age composition of Buskin River sockeye salmon escapement, 2008.

	Age										
Run Component	0.2	1.1	0.3	1.2	1.3	1.4	2.1	2.2	2.3	2.4	Total
Females											
Sample Proportion	0.0	0.0	0.6	9.0	15.7	1.5	0.3	6.1	15.4	1.5	50.0
SE	0.0	0.0	0.1	0.4	0.5	0.2	0.1	0.3	0.5	0.2	0.7
Estimated Escapement	0	0	34	532	926	86	17	360	909	86	2,950
SE	0	0	6	22	28	9	4	18	28	9	38
Males											
Sample Proportion	0.6	0.3	0.0	17.7	11.0	2.3	0.3	4.4	11.9	1.5	50.0
SE	0.1	0.1	0.0	0.5	0.4	0.2	0.1	0.3	0.4	0.2	0.7
Estimated Escapement	34	17	0	1,046	652	137	17	257	703	86	2,950
SE	6	4	0	29	24	12	4	16	25	9	38
Total											
Sample Proportion	0.6	0.3	0.6	26.7	26.7	3.8	0.6	10.5	27.3	2.9	100.0
SE	0.1	0.1	0.1	0.6	0.6	0.2	0.1	0.4	0.6	0.2	0.0
Estimated Escapement	34	17	34	1,578	1,578	223	34	617	1,612	172	5,900
SE	6	4	6	34	34	15	6	24	34	13	0

Appendix A2.-Estimated age composition of Catherine-Louise lakes sockeye salmon escapement, 2008.

	Age										
Run Component	0.2	1.1	0.3	1.2	1.3	1.4	2.1	2.2	2.3	2.4	Total
Females											
Sample Proportion	0.0	0.0	0.0	20.0	10.7	0.0	0.0	8.0	2.7	0.0	41.3
SE	0.0	0.0	0.0	1.4	1.1	0.0	0.0	0.9	0.6	0.0	1.7
Estimated Escapement	0	0	0	167	89	0	0	67	22	0	344
SE	0	0	0	12	9	0	0	8	5	0	
Males											
Sample Proportion	0.0	0.0	0.0	22.7	10.7	0.0	4.0	18.7	2.7	0.0	58.7
SE	0.0	0.0	0.0	1.5	1.1	0.0	0.7	1.4	0.6	0.0	1.7
Estimated Escapement	0	0	0	189	89	0	33	155	22	0	489
SE	0	0	0	12	9	0	6	11	5	0	14
Total											
Sample Proportion	0.0	0.0	0.0	42.7	21.3	0.0	4.0	26.7	5.3	0.0	100.0
SE	0.0	0.0	0.0	1.7	1.4	0.0	0.7	1.5	0.8	0.0	0.0
Estimated Escapement	0	0	0	355	178	0	33	222	44	0	833
SE	0	0	0	14	12	0	6	13	6	0	0

Appendix A3.-Estimated age composition of Buskin River sockeye salmon subsistence harvest, 2008.

	Age										
Run Component	0.2	1.1	0.3	1.2	1.3	1.4	2.1	2.2	2.3	2.4	Total
Females											
Sample Proportion	0.0	0.0	0.0	1.7	20.7	1.7	0.0	0.8	14.0	0.8	39.7
SE	0.0	0.0	0.0	0.3	0.9	0.3	0.0	0.2	0.7	0.2	1.1
Estimated Harvest	0	0	0	36	444	36	0	18	302	18	852
SE	0	0	0	6	19	6	0	4	16	4	23
Males											
Sample Proportion	0.0	0.0	0.0	8.3	25.6	3.3	0.0	2.5	19.8	0.8	60.3
SE	0.0	0.0	0.0	0.6	0.9	0.4	0.0	0.3	0.9	0.2	1.1
Estimated Harvest	0	0	0	178	551	71	0	53	426	18	1,297
SE	0	0	0	13	20	8	0	7	18	4	23
Total											
Sample Proportion	0.0	0.0	0.0	9.9	46.3	5.0	0.0	3.3	33.9	1.7	100.0
SE	0.0	0.0	0.0	0.6	1.1	0.5	0.0	0.4	1.0	0.3	0.0
Estimated Harvest	0	0	0	213	995	107	0	71	728	36	2,149
SE	0	0	0	14	23	10	0	8	22	6	0