

**Annual Project Report No. FIS 00-032**  
**USFWS Office of Subsistence Management**  
**Fisheries Resource Monitoring Program**

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**Stock Assessment of Sockeye Salmon from the Buskin  
River, Kodiak, Alaska, 2002**

by

**Donn Tracy**

and

**Suzanne Schmidt**

May 2003

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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 <sup>3</sup> /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 <sub>A</sub>
base of natural logarithm	e
catch per unit effort	CPUE
coefficient of variation	CV
common test statistics	F, t, $\chi^2$ , 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 <sub>2</sub> , etc.
mid-eye-to-fork	MEF
minute (angular)	'
multiplied by	x
not significant	NS
null hypothesis	H <sub>0</sub>
percent	%
probability	P
probability of a type I error (rejection of the null hypothesis when true)	$\alpha$
probability of a type II error (acceptance of the null hypothesis when false)	$\beta$
second (angular)	"
standard deviation	SD
standard error	SE
standard length	SL
total length	TL
variance	Var

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FISHERIES RESOURCE MONITORING PROGRAM***

**STOCK ASSESSMENT OF SOCKEYE SALMON FROM THE BUSKIN  
RIVER, KODIAK, ALASKA, 2002**

By

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May 2003

This investigation was partially financed by the U.S. Fish and Wildlife Service, Office of Subsistence Management through the Fisheries Resource Monitoring Program, under agreement number 70181-0J283.

This is an annual report to the U.S. Fish and Wildlife Service, Office of Subsistence Management, Fisheries Resource Monitoring Program and has not undergone biometric or peer review by the Division of Sport Fish, Alaska Department of Fish and Game. Thus, information contained herein should be considered preliminary and is subject to revision.

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*This document should be cited as:*

*Tracy, D. and S. Schmidt. 2003. Stock assessment of sockeye salmon from the Buskin River, Kodiak, Alaska, 2002. Federal Subsistence Fishery Monitoring Program, Annual Project Report No. FIS 00-032. U. S. Fish and Wildlife Service, Office of Subsistence Management, Fisheries Resource Monitoring Program, Anchorage, Alaska*

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## Annual Report Summary Page

**Title:** Stock assessment of sockeye salmon from the Buskin River, Kodiak, Alaska, 2002

**Study Number:** FIS 00-032

**Investigator(s)/Affiliation(s):** Donn Tracy, Len Schwarz and Suzanne Schmidt, Alaska Department of Fish and Game, 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:** \$72,600

**Study Duration:** May 20, 2002– August 15, 2002

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

**Citation:** Tracy, D. and S. Schmidt. 2003. Stock assessment of sockeye salmon from the Buskin River, Kodiak, Alaska, 2002. Federal Subsistence Fishery Monitoring Program, Annual Project Report No. FIS 00-032. U. S. Fish and Wildlife Service, Office of Subsistence Management, Fisheries Resource Monitoring Program, Anchorage, Alaska

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## ABSTRACT

Salmon weirs were operated on the Buskin River drainage on Kodiak Island, Alaska, from May 22 – August 8, 2002 to enumerate sockeye salmon *Oncorhynchus nerka*. A total of 17,174 sockeye salmon, the second largest recorded escapement, was counted into Buskin Lake. A total of 3,242 sockeye salmon was also counted into the Lake Louise tributary. The midpoint of the Buskin Lake run occurred on June 14; the midpoint of the Lake Louise tributary run occurred on July 23. Most sockeye salmon in the Buskin Lake escapement were aged 1.3 or 2.3; salmon in the Lake Louise tributary run were aged 1.2 or 1.3. The preliminary 2002 subsistence harvest was 10,804 sockeye salmon, most of which were aged 1.3 or 2.3.

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

## INTRODUCTION

The Buskin River drainage (Figure 1), located approximately 2 miles from the city of Kodiak, supports a subsistence fishery in marine waters near the mouth of the river and harvests relatively large numbers of sockeye salmon *Oncorhynchus nerka*. Between 1980 and 1998 annual subsistence harvests averaged 4,837 sockeye salmon (Schwarz et al. 2002), but increased to more than 10,000 fish in 2001 (Table 1). Currently, the Buskin River is the single largest source of subsistence salmon harvests in federally managed waters within the Kodiak area.

Sockeye salmon from the Buskin River are also harvested by a sport fishery, monitored since 1980 by the Alaska Department of Fish and Game (ADF&G), Sport Fish Division. Sport harvests averaged 1,650 sockeye salmon from 1990-2001. Recent angler effort represented an average of 35% of the annual freshwater sport fishing effort in the Kodiak Management Area (Schwarz et al. 2002), although this statistic also represents sport fishing effort targeting other species. Buskin River sockeye salmon are also harvested commercially, but to a much lesser degree than by subsistence and sport fisheries, at less than 100 fish annually during recent years.

Annual escapements of sockeye salmon returning to the Buskin River have been monitored by ADF&G since 1980. Between 1980 and 1984 escapements were indexed using aerial survey counts and since 1985 a weir has been used to enumerate total escapements. From 1990-2001 sockeye salmon escapements into the Buskin River averaged more than 12,000 fish (Table 2).

Although sockeye salmon harvests and escapements have been monitored, age data from returns of adult fish have been collected consistently only since 1993 (Schwarz and Clapsadl 2000). (Due to budget constraints, age data were not collected in 1999.) Consequently, at the present time there is inadequate information available to assess productivity of this salmon stock and to evaluate the biological escapement goal (BEG).

The Buskin River originates at Buskin Lake, although several other tributaries that terminate in small lakes also drain into the Buskin River. Along with Buskin Lake, these small lakes are utilized by sockeye salmon for spawning and rearing habitat. Because the ADF&G weir is operated near the outlet of Buskin Lake rather than further downstream, some portion of the inriver return of sockeye salmon is not documented there. The weir is operated at the outlet because sites further downstream are prone to extreme flooding and frequent weir washouts. Installation of a weir in 2002 on the main tributary stream from Lake Louise to the Buskin River provided complete escapement counts of sockeye salmon returning to the drainage. Operation of the tributary weir will continue annually for the duration of the stock assessment project.

Estimates of total return by age from sampling the escapement and subsistence harvest are needed to reconstruct the run and develop brood tables. Cumulative weir counts are needed for comparison to historic time of entry data to ensure fisheries are managed so that the biological escapement goal (BEG) is achieved. Results from this project will ensure that the health of the Buskin River sockeye salmon stock is not negatively impacted by subsistence, recreational, or commercial fisheries.

## **OBJECTIVES**

During 2002 the objectives of this stock assessment study were to census the sockeye salmon escapement into the Buskin River and to estimate the age composition of the subsistence harvest and escapement of sockeye salmon returning to the Buskin River. This information, along with historic data and sport and commercial harvest estimates, will be used to begin development of a brood table to evaluate the sockeye salmon BEG.

## **METHODS**

### **BUSKIN RIVER WEIR**

The spawning escapement of sockeye salmon was censused through a weir at the outlet of Buskin Lake (Figure 2) from May 22 – August 8, 2002. Fish migrating upstream were enumerated as they passed through the weir. Daily counts of sockeye salmon were entered on ADF&G salmon weir count data forms. After August 8, the weir was moved to a downstream location to enumerate coho salmon.

A weir site was selected in the tributary stream flowing into the Buskin River from the Lake Louise drainage (Figure 2) and a new weir was installed on June 1 and operated through August 14, 2002. Operating a weir at this location and at the outlet of Buskin Lake allowed for complete enumeration of the post-fisheries spawning escapement for the entire drainage.

### **AGE-SEX-LENGTH SAMPLING**

Sockeye salmon were sampled from the Buskin River and Lake Louise escapements during each of three temporal strata: May 20 – June 15, June 16-30, and July 1-31. 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. When large numbers (>100) of sockeye salmon were present behind the weir, fish were sampled during the early, middle and late portions of the time interval required for their passage upstream.

The subsistence harvest was sampled for age, sex, and length on the same schedule as the escapement. Harvested fish were sampled from subsistence fishers opportunistically within each time stratum. Sampling was conducted either from a boat on the fishing grounds or dockside at local boat harbors.

Fish were measured from mid-eye to fork-of-tail and sex determined. 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 when necessary, although only within the area bounded dorsally by the fourth row of scales above the lateral line, ventrally by the lateral line, and between lines drawn vertically from the posterior insertion of the dorsal fin and the anterior insertion of the

anal fin. If scales were not available in the preferred region on the left side of the fish, scales were collected from 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 each source. If differences were detected at  $\alpha = 0.05$ , 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  $i$  ( $i = 1,2,3$ ) in age/sex class  $j$  was estimated as a binomial proportion by:

$$\hat{p}_{hij} = \frac{n_{hij}}{n_{hi}} \quad (1)$$

and its variance by:

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

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,  $N_{Si}$  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:

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

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 of 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

During the 2002 sockeye salmon run a total of 16,630 adult fish were counted through the Buskin River weir (Table 3). The highest daily count of 1,551 sockeye salmon occurred on June 8 and the midpoint of the run occurred on June 14 (Figure 3). Age, length and sex data were collected from 490 sampled fish, and sex and length only data from an additional 41 fish. Age composition was significantly different among temporal strata and were subsequently stratified. Most fish in the escapement were ages 1.3 or 2.3 (Appendix A1). Mean length of females in the escapement was 505 mm (SE = 3); mean length of males was 544 mm (SE = 4).

A total of 3,242 sockeye salmon were counted through the Lake Louise tributary weir (Table 4). We counted an additional 339 sockeye salmon during a foot survey on August 15. The highest daily count of 512 sockeye salmon occurred on July 23 as did the midpoint of the run (Figure 4). Age, length and sex data were collected from 171 sampled fish, and sex and length only data from an additional 13 fish. Age composition was not significantly different among temporal strata. Most fish bound for Lake Louise were ages 1.2 and 1.3 (Appendix A2). Mean length of Lake Louise females was 500 mm (SE = 4), while mean length for males was 498 mm (SE = 8).

Preliminary subsistence harvest in 2002 was 10,804 sockeye salmon (Table 1). There was not a significant difference in age compositions by temporal strata. Most fish in the subsistence harvest were ages 1.3 or 2.3 (Appendix A3). Mean length of females in the subsistence harvest was 532 mm (SE = 3), and 562 mm (SE = 4) for males.

The age composition of the Buskin River escapement was significantly different from the subsistence harvest.

## DISCUSSION, CONCLUSIONS, AND RECOMMENDATIONS

The 2002 escapement of sockeye salmon into the Buskin River was the second highest on record since weir operations began in 1985. The 2002 subsistence harvest was the largest on record. Escapements, subsistence harvests, and age estimates obtained from this project during 2002 are being used with sport and commercial harvest data to construct brood tables. This information will then be used to evaluate and refine escapement goals for Buskin River sockeye salmon. This project should be continued to collect these data so that brood tables can be constructed, escapement goals set, and monitoring of the Buskin River and Lake Louise sockeye salmon stock can continue.

## **ACKNOWLEDGMENTS**

The U.S. Fish and Wildlife Service, Office of Subsistence Management provided \$72,600 in funding support for this project through the Fisheries Resource Monitoring Program, under agreement number 70181-0-J283.

## **LITERATURE CITED**

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

Schwarz, L., and M. Clapsadl. 2000. Area management report for the recreational fisheries of the Kodiak and Alaska Peninsula/Aleutian Islands regulatory areas, 1997 and 1998. Alaska Department of Fish and Game, Fishery Management Report No. 00-1, Anchorage.

Schwarz, L., D. Tracy, and S. Schmidt. 2002. Area management report for the recreational fisheries of the Kodiak and Alaska Peninsula/Aleutian Islands regulatory areas, 1999 and 2000. Alaska Department of Fish and Game, Fishery Management Report No. 02-02, Anchorage.

## **TABLES**

**Table 1.-Subsistence harvests of Buskin River sockeye salmon, 1980-2002.**

Year	Harvest
1980	4,279
1981	4,742
1982	6,748
1983	5,690
1984	565
1985	5,326
1986	5,303
1987	3,375
1988	3,099
1989	3,312
1990	3,448
1991	4,301
1992	3,295
1993	4,779
1994	4,899
1995	5,547
1996	5,403
1997	5,890
1998	6,011
1999	7,985
2000	7,315
2001	10,260
2002	10,804 <sup>a</sup>

Source: 1980-2000 from Schwarz et al. (2002); data for 2001 and 2002 from ADF&G Commercial Fisheries Division, Kodiak.

<sup>a</sup> Preliminary.

**Table 2.-Escapement of sockeye salmon into the Buskin River, 1985-2002.**

Year	Escapement
1985	18,010
1986	8,939
1987	12,690
1988	12,144
1989	17,853
1990	10,528
1991	9,789
1992	9,782
1993	9,526
1994	11,783
1995	15,520
1996	9,661
1997	9,840
1998	14,767
1999	10,812
2000	11,233
2001	20,556
2002	17,174

Notes: From 1985-1989 the weir was operated upstream of Bridge #1 from April through October. Beginning in 1990, the weir has been located at the outlet of Buskin Lake during the sockeye immigration (June and July) and then moved to upstream of Bridge #1 during the coho immigration (mid-July through September). From 1990-1992 the weir at the lake outlet was also operated during the spring Dolly Varden emigration. Sockeye entering the tributary lakes of Louise and Genevieve are not counted at the upriver location.

Sources: 1985-1998 data from Schwarz and Clapsadl (2000); 1999-2000 data from Schwarz et al. (2002).

**Table 3.-Immigration of sockeye salmon through the Buskin River weir by date, 2002.**

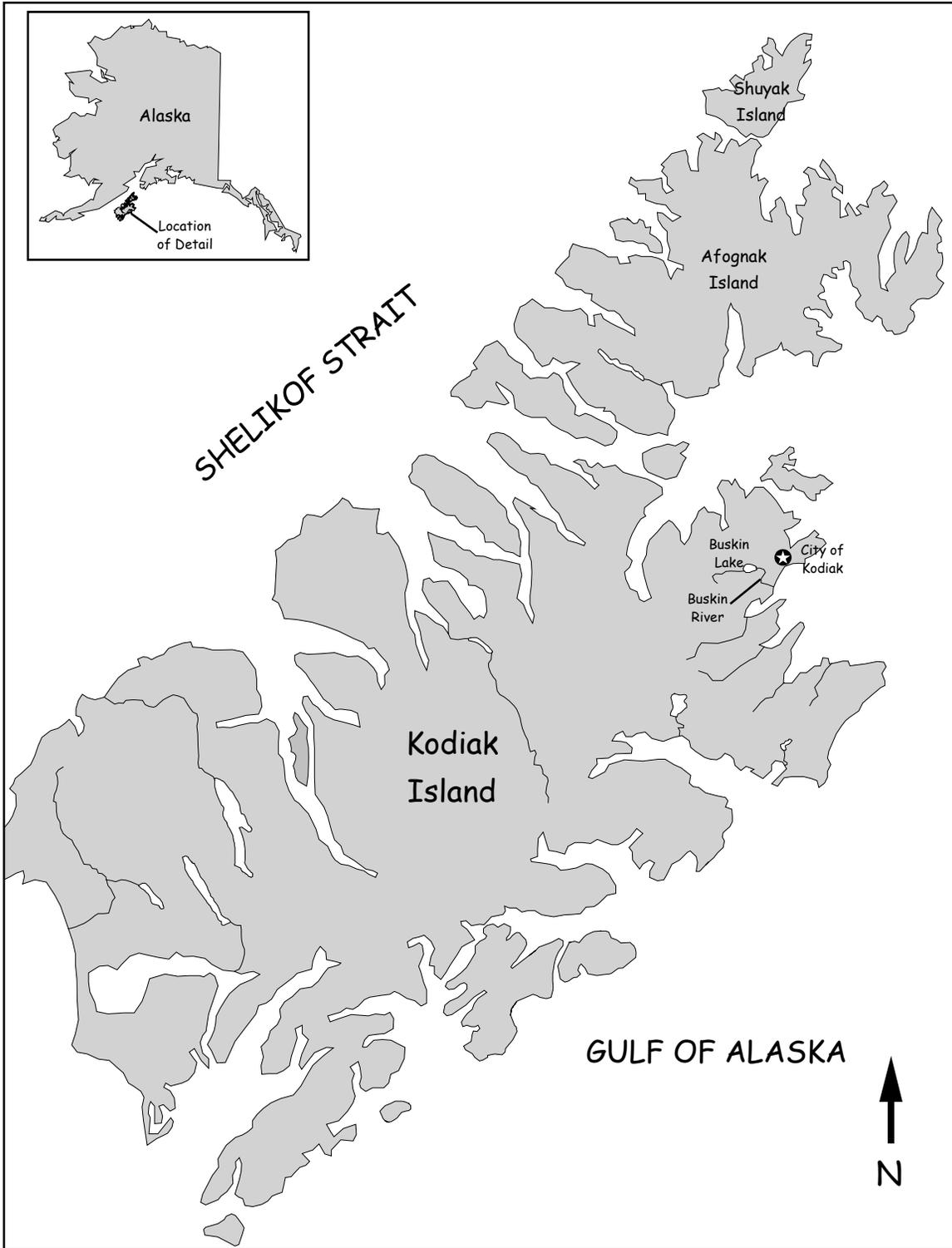
Date	Daily	<u>Cumulative</u>		Date	Daily	<u>Cumulative</u>	
	Count	Count	%		Count	Count	%
23-May	36	36	0.2	1-Jul	239	13,518	81.3
24-May	8	44	0.3	2-Jul	98	13,616	81.9
25-May	3	47	0.3	3-Jul	124	13,740	82.6
26-May	99	146	0.9	4-Jul	322	14,062	84.6
27-May	122	268	1.6	5-Jul	171	14,233	85.6
28-May	12	280	1.7	6-Jul	72	14,305	86.0
29-May	394	674	4.1	7-Jul	78	14,383	86.5
30-May	984	1,658	10.0	8-Jul	19	14,402	86.6
31-May	80	1,738	10.5	9-Jul	19	14,421	86.7
1-Jun	310	2,048	12.3	10-Jul	705	15,126	91.0
2-Jun	3	2,051	12.3	11-Jul	42	15,168	91.2
3-Jun	140	2,191	13.2	12-Jul	40	15,208	91.4
4-Jun	112	2,303	13.8	13-Jul	121	15,329	92.2
5-Jun	210	2,513	15.1	14-Jul	9	15,338	92.2
6-Jun	1,175	3,688	22.2	15-Jul	380	15,718	94.5
7-Jun	631	4,319	26.0	16-Jul	9	15,727	94.6
8-Jun	1,551	5,870	35.3	17-Jul	10	15,737	94.6
9-Jun	714	6,584	39.6	18-Jul	4	15,741	94.7
10-Jun	731	7,315	44.0	19-Jul	62	15,803	95.0
11-Jun	175	7,490	45.0	20-Jul	18	15,821	95.1
12-Jun	147	7,637	45.9	21-Jul	111	15,932	95.8
13-Jun	525	8,162	49.1	22-Jul	80	16,012	96.3
14-Jun	133	8,295	49.9	23-Jul	320	16,332	98.2
15-Jun	544	8,839	53.2	24-Jul	45	16,377	98.5
16-Jun	102	8,941	53.8	25-Jul	12	16,389	98.6
17-Jun	401	9,342	56.2	26-Jul	6	16,395	98.6
18-Jun	833	10,175	61.2	27-Jul	38	16,433	98.8
19-Jun	284	10,459	62.9	28-Jul	4	16,437	98.8
20-Jun	380	10,839	65.2	29-Jul	40	16,477	99.1
21-Jun	151	10,990	66.1	30-Jul	3	16,480	99.1
22-Jun	402	11,392	68.5	31-Jul	14	16,494	99.2
23-Jun	64	11,456	68.9	1-Aug	9	16,503	99.2
24-Jun	574	12,030	72.3	2-Aug	55	16,558	99.6
25-Jun	451	12,481	75.1	3-Aug	22	16,580	99.7
26-Jun	351	12,832	77.2	4-Aug	4	16,584	99.7
27-Jun	84	12,916	77.7	5-Aug	4	16,588	99.7
28-Jun	32	12,948	77.9	6-Aug	16	16,604	99.8
29-Jun	309	13,257	79.7	7-Aug	21	16,625	100.0
30-Jun	22	13,279	79.8	8-Aug	5	16,630	100.0

**Table 4.-Immigration of sockeye salmon through the Lake Louise weir by date, 2002.**

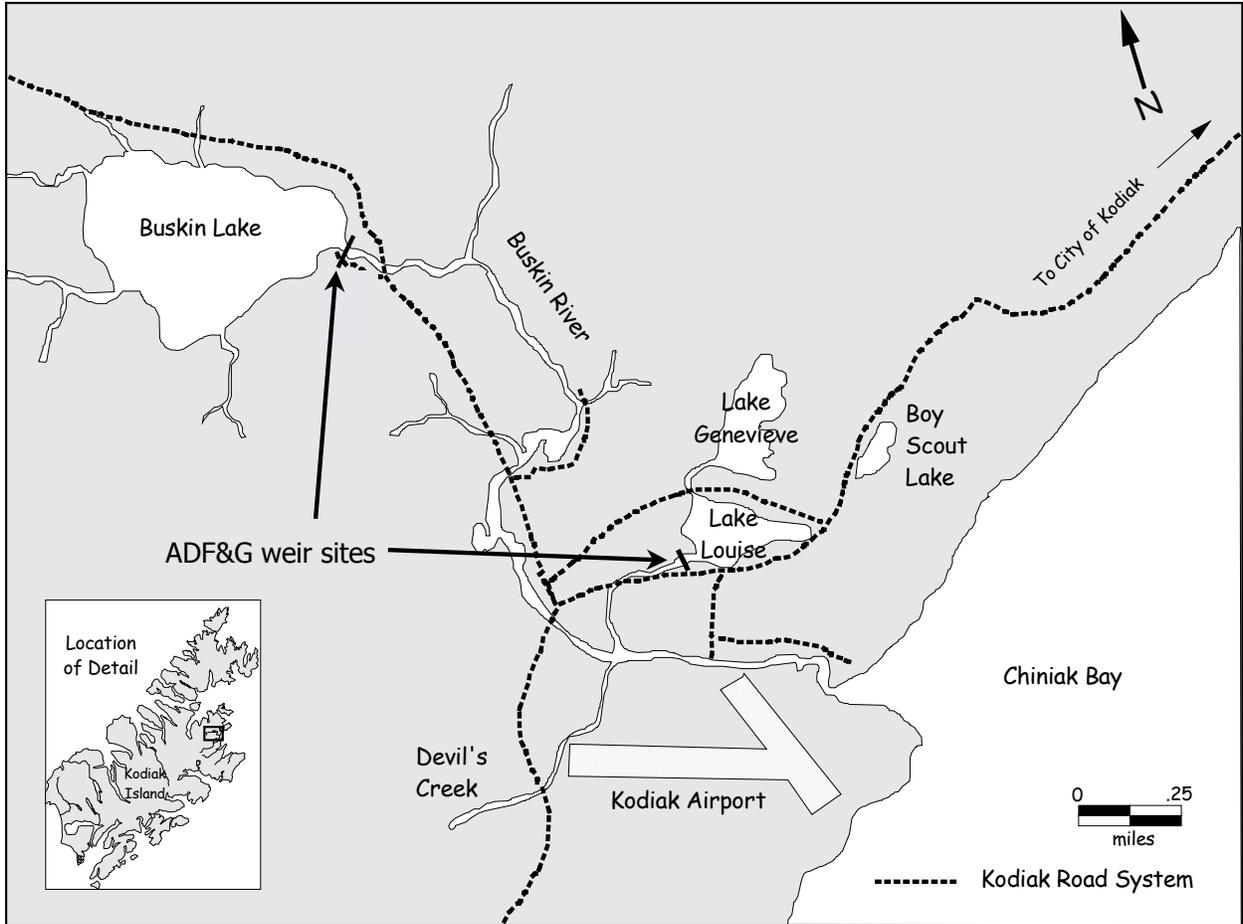
Date	Daily	<u>Cumulative</u>		Date	Daily	<u>Cumulative</u>	
	Count	Count	%		Count	Count	%
1-Jun	0	0	0.0	9-Jul	27	768	21.4
2-Jun	0	0	0.0	10-Jul	10	778	21.7
3-Jun	0	0	0.0	11-Jul	7	785	21.9
4-Jun	0	0	0.0	12-Jul	6	791	22.1
5-Jun	0	0	0.0	13-Jul	28	819	22.9
6-Jun	0	0	0.0	14-Jul	1	820	22.9
7-Jun	2	2	0.1	15-Jul	244	1,064	29.7
8-Jun	0	2	0.1	16-Jul	3	1,067	29.8
9-Jun	0	2	0.1	17-Jul	6	1,073	30.0
10-Jun	0	2	0.1	18-Jul	17	1,090	30.4
11-Jun	0	2	0.1	19-Jul	20	1,110	31.0
12-Jun	0	2	0.1	20-Jul	24	1,134	31.7
13-Jun	0	2	0.1	21-Jul	104	1,238	34.6
14-Jun	1	3	0.1	22-Jul	298	1,536	42.9
15-Jun	0	3	0.1	23-Jul	512	2,048	57.2
16-Jun	0	3	0.1	24-Jul	205	2,253	62.9
17-Jun	1	4	0.1	25-Jul	134	2,387	66.7
18-Jun	0	4	0.1	26-Jul	100	2,487	69.4
19-Jun	0	4	0.1	27-Jul	48	2,535	70.8
20-Jun	0	4	0.1	28-Jul	59	2,594	72.4
21-Jun	3	7	0.2	29-Jul	41	2,635	73.6
22-Jun	34	41	1.1	30-Jul	26	2,661	74.3
23-Jun	12	53	1.5	31-Jul	28	2,689	75.1
24-Jun	2	55	1.5	1-Aug	39	2,728	76.2
25-Jun	116	171	4.8	2-Aug	30	2,758	77.0
26-Jun	23	194	5.4	3-Aug	17	2,775	77.5
27-Jun	49	243	6.8	4-Aug	2	2,777	77.5
28-Jun	73	316	8.8	5-Aug	4	2,781	77.7
29-Jun	61	377	10.5	6-Aug	5	2,786	77.8
30-Jun	85	462	12.9	7-Aug	5	2,791	77.9
1-Jul	61	523	14.6	8-Aug	1	2,792	78.0
2-Jul	30	553	15.4	9-Aug	2	2,794	78.0
3-Jul	50	603	16.8	10-Aug	303	3,097	86.5
4-Jul	25	628	17.5	11-Aug	25	3,122	87.2
5-Jul	33	661	18.5	12-Aug	113	3,235	90.3
6-Jul	44	705	19.7	13-Aug	7	3,242	90.5
7-Jul	27	732	20.4	14-Aug	0	3,242	90.5
8-Jul	9	741	20.7	15-Aug	339 <sup>a</sup>	3,581	100.0

<sup>a</sup> Fish counted during a foot survey on 15 August.

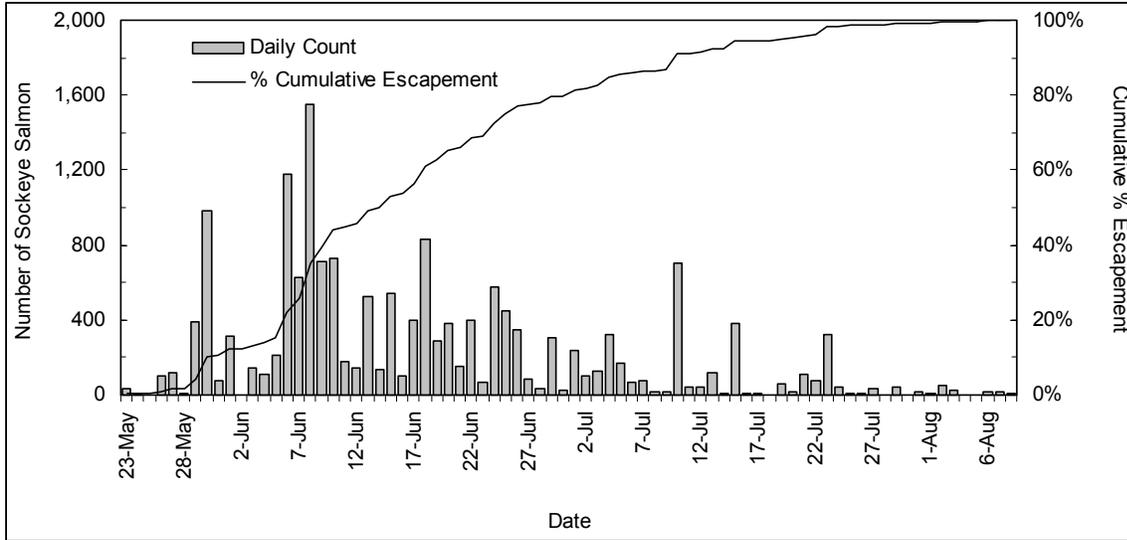
## **FIGURES**



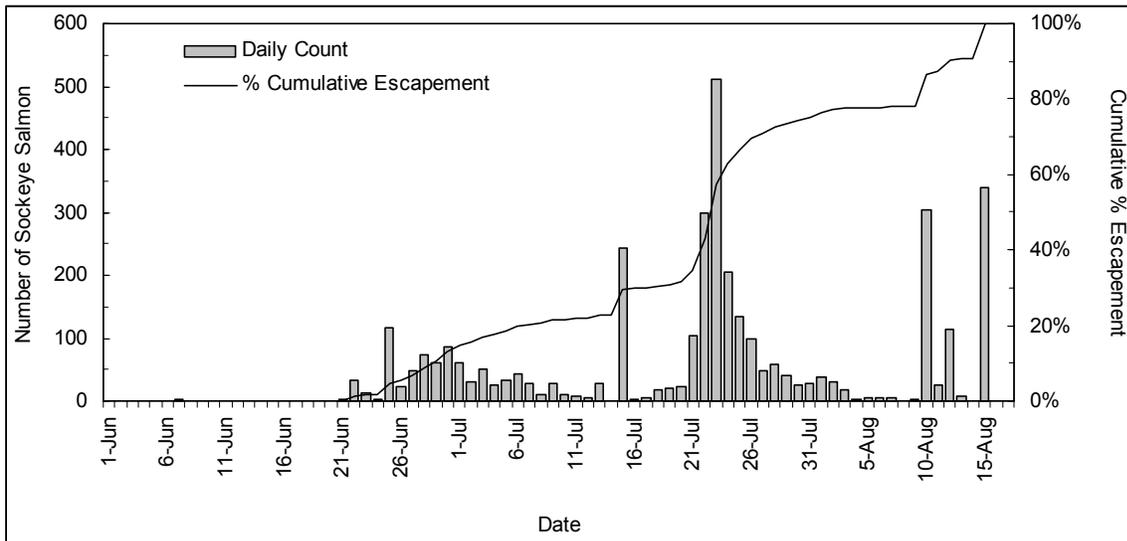
**Figure 1.-Map of Kodiak Island showing Buskin River drainage.**



**Figure 2.-Location of the Buskin River drainage weirs, 2002.**



**Figure 3.-Buskin River daily and cumulative sockeye salmon escapement, 2002.**



**Figure 4.-Lake Louise daily and cumulative sockeye salmon escapement, 2002.**

## **APPENDIX A. SUPPORTING DATA**

**Appendix A1.-Estimated age composition of Buskin River sockeye salmon escapement, 2002.**

Sex	Age									Total
	0.2	0.3	1.1	1.2	1.3	1.4	2.1	2.2	2.3	
<b>Females</b>										
Estimated Run	0	0	34	1,324	2,138	0	34	1,731	2,613	7,874
SE Run	0	0	0	16	32	0	0	24	43	178
Proportion	0.00	0.00	0.00	0.08	0.13	0.00	0.00	0.10	0.16	0.47
SE Proportion	0.0000	0.0000	0.0020	0.0122	0.0151	0.0000	0.0020	0.0138	0.0165	0.0226
<b>Males</b>										
Estimated Run	0	0	102	1,188	2,715	68	68	1,425	3,190	8,756
SE Run	0	0	0	14	45	0	0	18	57	198
Proportion	0.00	0.00	0.01	0.07	0.16	0.00	0.00	0.09	0.19	0.53
SE Proportion	0.0000	0.0000	0.0035	0.0116	0.0167	0.0029	0.0029	0.0127	0.0178	0.0226
<b>Total</b>										
Estimated Run	0	0	135	2,491	4,848	67	101	3,164	5,824	16,630
SE Run	0	0	1	40	100	0	0	56	126	
Proportion	0.00	0.00	0.01	0.15	0.29	0.00	0.01	0.19	0.35	1.00
SE Proportion	0.0000	0.0000	0.0041	0.0161	0.0206	0.0029	0.0035	0.0178	0.0216	

**Appendix A2.-Estimated age composition of Lake Louise sockeye salmon escapement,2002.**

Sex	Age									Total
	0.2	0.3	1.1	1.2	1.3	1.4	2.1	2.2	2.3	
<b>Females</b>										
Estimated Run	0	0	19	362	801	0	0	305	38	1,526
SE Run	0	0	0	9	27	0	0	7	0	59
Proportion	0.00	0.00	0.01	0.11	0.25	0.00	0.00	0.09	0.01	0.47
SE Proportion	0.0000	0.0000	0.0059	0.0242	0.0332	0.0000	0.0000	0.0231	0.0083	0.0384
<b>Males</b>										
Estimated Run	0	19	229	496	610	38	19	286	19	1,716
SE Run	0	0	5	14	18	0	0	6	0	66
Proportion	0.00	0.01	0.07	0.15	0.19	0.01	0.01	0.09	0.01	0.53
SE Proportion	0.0000	0.0059	0.0197	0.0277	0.0301	0.0083	0.0059	0.0218	0.0059	0.0384
<b>Total</b>										
Estimated Run	0	0	248	858	1,411	38	19	610	57	3,242
SE Run	0	0	5	29	54	0	0	18	1	
Proportion	0.00	0.00	0.08	0.26	0.44	0.01	0.01	0.19	0.02	1.00
SE Proportion	0.0000	0.0000	0.0204	0.0339	0.0381	0.0083	0.0059	0.0301	0.0101	

**Appendix A3.-Estimated age composition of Buskin River sockeye salmon subsistence harvest, 2002.**

Sex	Age									Total
	0.2	0.3	1.1	1.2	1.3	1.4	2.1	2.2	2.3	
<b>Females</b>										
Estimated Run	0	0	0	442	2,843	126	0	316	1,706	5,434
SE Run	0	0	0	7	96	1	0	4	48	208
Proportion	0.00	0.00	0.00	0.04	0.26	0.01	0.00	0.03	0.16	0.50
SE Proportion	0.0000	0.0000	0.0000	0.0152	0.0338	0.0082	0.0000	0.0129	0.0280	0.0383
<b>Males</b>										
Estimated Run	0	0	0	379	2,590	126	0	695	1,580	5,370
SE Run	0	0	0	5	85	1	0	13	43	206
Proportion	0.00	0.00	0.00	0.04	0.24	0.01	0.00	0.06	0.15	0.50
SE Proportion	0.0000	0.0000	0.0000	0.0141	0.0327	0.0082	0.0000	0.0188	0.0271	0.0383
<b>Total</b>										
Estimated Run	0	0	0	821	5,434	253	0	1,011	3,285	10,804
SE Run	0	0	0	17	208	3	0	23	116	
Proportion	0.00	0.00	0.00	0.08	0.50	0.02	0.00	0.09	0.30	1.00
SE Proportion	0.0000	0.0000	0.0000	0.0203	0.0383	0.0116	0.0000	0.0223	0.0353	

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