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## **FALSE PASS CHUM SALMON, 1995**

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Pacific Seafood Processors Association

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## **KEY WORDS**

sockeye salmon, chum salmon, False Pass, Bristol Bay, Arctic-Yukon-Kuskokwim

## INTRODUCTION

The salmon fisheries on the south side of the Alaska Peninsula have been the subject of controversy since nearly the time of their inception in the early 1900s. The June fisheries in the Shumagin Islands and south of Unimak Island, which are collectively called the False Pass fishery or South Peninsula June fishery, target on non-local sockeye (*Oncorhynchus nerka*) salmon. Several studies, culminating in a 1987 tagging experiment by the Alaska Department of Fish and Game (ADFG), have clearly demonstrated that most of the sockeye salmon caught in the False Pass fishery (~80%) are bound for rivers in Bristol Bay (Eggers et al. 1991, Rogers 1990). The non-Bristol Bay contributions to the sockeye salmon catches in 1987 were mainly North Peninsula stocks (7%) in the South Unimak catch and stocks from Chignik (20%), North Peninsula (10%) and Kodiak (9%) in the Shumagin catch. For management purposes, ADFG has assumed that the entire False Pass sockeye salmon catch consists of Bristol Bay fish. Since 1975, the annual False Pass sockeye salmon catch has been based on a quota (guideline harvest) of 8.3% (Unimak, 6.8% and Shumagin, 1.5%) of the forecasted Bristol Bay and False Pass catch (McCullough et al. 1995). The average annual percent of the total Bristol Bay catch taken in the False Pass fishery over the past 10 years was 5.2% (range: 2.9–7.3%). The fishery has, thus, been managed in a very conservative manner, especially considering the historical high abundance of sockeye salmon over the past 10 years; however, the fishery is not without controversy because with the increase in sockeye salmon catch there was an increase in the catch of non-local chum (*O. keta*) salmon.

The 1987 tagging of chum salmon demonstrated that while Bristol Bay stocks still contributed the highest percentage to the False Pass catch (Unimak, 40%; Shumagin, 18%; and combined 38%), Asian stocks were the next major contributor in 1987 (Unimak 18%; Shumagin 39%; and combined 20%). Arctic and Yukon River stocks, for which there had been conservation concerns, were minor contributors to the 1987 False Pass chum salmon catch. However, it was argued to the Alaska Board of Fisheries that these northern stocks were in low abundance in 1987 and that their typical contribution to the False Pass catch was underestimated by the 1987 tagging. The fishery has operated with a chum salmon cap (second quota) since 1986 (with an exception in 1987) and the sockeye-targeted fishery has been closed early three times (1986, 1988, and 1991) because the chum cap was attained (McCullough et al. 1995). The resultant loss in sockeye salmon catch to the False Pass fishery for those 3 years was 1.8 million fish, while the gain to the coastal runs of chum salmon to the Arctic and Yukon areas was largely unmeasurable.

The potential impact of the False Pass fishery on a single stock or group of stocks will depend on the availability of the stock (the proportion migrating through the fishery) and the relative abundance of that stock and other contributing stocks; both are likely to vary from year to year. Our main purpose is to examine the year-to-year changes in chum salmon abundance with particular reference to (1) the abundance in 1987 and (2) a possible increase in the contribution of Asian chum salmon. In recent years, False Pass fishermen have noted a significant occurrence of chum salmon with a snake-like appearance. These chum salmon of poor condition (low weight for their length) are believed to originate from Japanese hatcheries, because Japan has increased production to the point of density-dependent growth. The occurrence of Asian chum salmon in the False Pass fishery may also be assessed from the presence of scale holes (focal scale resorption)

that are nearly unique to Asian stocks, both hatchery and wild (Bigler 1988 and 1989). The specific objectives of our work in 1995 were to (1) update estimates of chum salmon runs (catch and escapement) to North Pacific coastal regions, (2) measure the incidence of scale holes in the 1995 False Pass catch, and (3) examine frequency distributions of chum salmon condition factors from the 1995 catch.

## METHODS

The accuracy of estimates of the annual runs (catch and escapement) of sockeye and chum salmon to major North Pacific regions is quite variable. Annual catch statistics for sockeye and chum salmon since the 1950s are fairly accurate (probably within 10%) for most North American regions and Japan, but less so for Russia (Fredin 1980). There are accurate annual escapement estimates for sockeye salmon for most runs since the mid-1950s, but estimates for chum salmon escapements are either lacking, inaccurate, or only available for recent years. For most regions of Alaska, except the Arctic-Yukon-Kuskokwim (A-Y-K), chum salmon runs coincide with more valuable sockeye or more numerous pink (*O. gorbuscha*) salmon runs and therefore receive less monitoring for escapement. However, chum salmon runs can be estimated in these situations from the chum salmon catch and the rate of exploitation on the targeted species (Rogers 1987). The most important statistics for management are usually the most recent statistics, and these are only available in preliminary form or in-house reports. This report relies heavily on 1995 catch and escapement statistics provided by ADFG area management biologists in fall 1995.

Annual runs of chum salmon to North Pacific regions from 1970 to 1994 were estimated primarily from catch and escapement statistics that were presented in Rogers (1995). Sockeye salmon exploitation rates were utilized in Bristol Bay even though some aerial and sonar estimates of chum salmon escapement were available (Nushagak and Togiak). Sonar estimates of chum salmon escapement were available for a few recent years in the Yukon River and regressions of sonar count on spawning survey count were used to estimate escapements in years when only spawning survey counts were available (Rogers 1994). Expanded aerial survey and weir counts from selected spawning areas were used to estimate escapements in the Kotzebue, Norton Sound, and Kuskokwim regions. Aerial survey estimates were used for most estimates of chum salmon escapements to central Alaska; otherwise, assumed exploitation rates and chum salmon catches were used to estimate chum salmon runs.

Chum salmon from the 1995 False Pass catches (June 13–30) were sampled at the Peter Pan processing plant in King Cove. Fish were selected randomly from the processing line and measured for length (mid-eye to tail fork) and weight. Sex was determined from external appearance, and two scales were collected from the preferred region. Chum without scales in the preferred region were not included in the samples; these chum were usually the smaller fish. The first samples were collected from the June 16 catches and the last samples collected from the June 28 catches. Data from the field forms (date, location, scale card number, fish number, sex, length, and weight) were entered on to a computer file. Weights measured in pounds and ounces were transformed to kilograms.



Scales were aged and examined for focal scale resorption (holes) by an experienced scale reader who had been tutored by Mr. Brian Bigler (Wards Cove Packing Co., Seattle, Washington) on the identification of focal scale resorption. Ages and occurrences of scale holes were then added to the computer database. Data were stratified by location (South Unimak and Shumagin Is.), date, sex, and age. Weight-length scattergrams were examined for outliers, which were then removed prior to statistical analyses (e.g., means and standard deviations of lengths and weights, age compositions, and length-weight regressions). A condition factor was calculated from weight in grams divided by the cube of length in centimeters. Frequency distributions of condition factors were then graphed and examined for possible bimodality.

Catch statistics for the False Pass fisheries of past years were obtained from McCullough et al. (1995). Mr. A.R. Shaul (ADFG, Kodiak, Alaska) provided preliminary catches by gear, area, and date for 1995. These preliminary catches were used to weight stratified means (length, weight, age compositions) to obtain the annual means for 1995.

## RESULTS

### ABUNDANCE

Most sockeye salmon caught in the False Pass area during June are bound for Bristol Bay, and this fact was used by Eggers and Shaul (1987) to develop an in-season forecast ~10 days prior to the arrival of the fish in Bristol Bay (Fig. 1). I updated the database used by Eggers and Shaul (Table 1), added it to their database, and calculated a new regression to predict the western Alaska (Bristol Bay, North Peninsula, and Kuskokwim) run (Fig. 2). Sockeye salmon were difficult to catch in 1990, 1994, and again in 1995, probably because there were persistent offshore winds, so there was a low CPUE relative to the run. Omitting the 1990, 1994, and 1995 observations as outliers, the CPUE of sockeye salmon at South Unimak explained 58% of the annual variation in the western Alaska runs. This correlation is very good considering that the majority of Bristol Bay sockeye do not pass through the Shumagin Islands and south of Unimak Island on their homeward migration (Rogers 1987). The age composition of the sockeye salmon catch at False Pass has also been useful in forecasting the Bristol Bay runs (Table 2). In contrast, the chum salmon catches at False Pass have shown no correlation with the chum salmon runs to western Alaska even though these stocks were the most abundant stocks in the 1987 tagging (Fig. 2). Chum salmon abundance in the 1990s has changed relative to 1987 as follows: decreased for Bristol Bay/North Peninsula; about the same for the A-Y-K region (except 1995); and increased for Asian (primarily Japanese hatchery) stocks.

The species compositions (sockeye and chum salmon only) in the False Pass catches and the western Alaska runs have shown some correlation that has changed over the years along with an increase in the production from Japanese hatcheries (Table 3 and Fig. 3). The chum salmon percentage in the False Pass catch of 1995 was a little below average as was the chum salmon percentage in Western Alaska. Both runs were exceptionally large in 1995. Sockeye salmon abundance in 1995 was the highest in history while Bering Sea runs of chum salmon were the

fourth highest. The Japanese hatchery returns were the highest on record and total chum abundance was second largest on record (Tables 4–7). The impact of Japanese chum salmon on the False Pass fishery is evident in the correlation between the differences in chum salmon percentages between False Pass and Western Alaska as a function of the Japanese catch (hatchery return). The Japanese chum salmon catch explained 52% of the annual variation in the differences in False Pass and western Alaska chum salmon percentages (Fig. 3). With increases in Japanese hatchery chum salmon, the False Pass catches have contained a higher percentage of chum salmon than expected from the percentages of chum salmon in the Western Alaska runs.

One would expect the annual catch of chum salmon in the False Pass fishery to be somewhat correlated with the catch of the more abundant and targeted sockeye salmon, and this was so until the imposition of chum salmon caps on the fishery. For the years with a chum salmon cap, there has been no significant correlation between sockeye and chum salmon catches. A regression of False Pass chum salmon catch on the False Pass sockeye catch as a proportion of the Bristol Bay run has been used to predict the chum salmon catch given the sockeye salmon quota and Bristol Bay run (Eggers 1993). Although there was a significant correlation for all years since 1977, there was no correlation when only years with a chum salmon cap were considered. Assuming there is a chum salmon cap for 1996, there is at present no statistically significant relationship to predict the chum salmon catch given the sockeye quota and forecast for 1996.

## AGE, WEIGHT, AND LENGTH

About 94% of the chum salmon caught in the 1995 South Unimak and Shumagin fisheries were ages 0.3 and 0.4; however, there were higher percentages of both older (age 0.5 and 0.6) and younger (age 0.2) chum salmon in 1995 than in past years (Table 8). Chum salmon in 1995 were larger than in past years but condition factors were similar to 1994. The False Pass chums in 1995 were again much larger at each age than the average chum salmon in the Nushagak (Bristol Bay) catch (Table 9).

In the Nushagak catch, annual mean lengths of 3-ocean chum salmon and 3-ocean sockeye salmon have been significantly correlated (1967–1995,  $r = 0.81$ ). Nushagak and other Bristol Bay sockeye have been smaller than average since the consecutive large runs that began in 1989 (Fig. 4). The annual sizes of Bristol Bay sockeye are density dependent (large numbers/small size) and temperature dependent (cold spring/small size), and for recent years the small size has also caused some delay in maturation as fish have been spending a longer time at sea (Rogers and Ruggerone 1993). In the Nushagak catch, 3-ocean chum salmon tend to be shorter and lighter than 3-ocean sockeye salmon; however, annual mean lengths of chums were more closely correlated with the numbers of sockeye in the western Alaska runs ( $r = .77$ ) than were the mean lengths of Nushagak sockeye ( $r = .75$ ). There was no significant correlation between chum salmon mean lengths and Nushagak chum or sockeye runs (Table 9). Chum and sockeye salmon returning to Bristol Bay over the past 7 years would likely have been even smaller if the spring weather since 1989 had not been warmer than normal (Fig. 5). Early Bristol Bay runs have been associated with warm spring weather and

late runs with cold spring weather; however, the late run in 1994 was associated with average spring temperatures.

## FOCAL SCALE RESORPTION

Murphy (1993) presented a summary of the incidence of focal scale resorption for chum salmon in the False Pass fisheries, including our preliminary results for 1992. Scales had only been examined from South Unimak in 1990 (600) and from the Shumagins in 1989 (302) and 1990 (298). The final results for 1995 are given in Table 10. For the combined samples, 1.15% of the 1992 chum salmon, 1.53% of 1993, and 2.25% of 1994 had scale "holes." Thus, the 1995 samples with a combined percentage of 1.78% was typical of the past 2 years.

Assuming that the incidence of focal scale resorption is zero in Alaskan stocks and ~11.8% in Asian stocks (Murphy 1993), the Asian stock contribution has been close to the estimated 20% from the 1987 tagging. To obtain more precise estimates of Asian stock contribution, we need a measure of the year-to-year variation in the incidence in Asian stocks. From the tagging results in 1987, we would expect the incidence of "holes" to be much greater in the Shumagin samples than in the South Unimak samples, and this has been the case for the past 3 years.

## DISCUSSION

The catch of chum salmon in the 1995 False Pass fisheries (520,000) was well below the chum salmon cap of 700,000 and, even though there was a near record sockeye salmon run to Bristol Bay of 61 million, the False Pass fisheries could only catch about 1.6 million (less than half of the pre-season quota). In a normal year, ~25% of maturing Bristol Bay sockeye return from the central and eastern Gulf of Alaska, and many of these pass through the Shumagin and South Unimak fishing districts (Rogers 1987). In 1990, 1994 and again in 1995, a smaller than normal proportion of the Bristol Bay run returned from the Gulf or the sockeye returning from the Gulf migrated farther offshore than normal. The percentage of chum salmon in the catch (20%) was below average in 1995 but still 40% above the percentage of chums in western Alaska (14%). There was a record abundance of Japanese chum and the large runs of chum to other areas; however, as was the case with sockeye, chum were not very available to the False Pass fisheries in 1995. Fishing strategies by ADFG management and the False Pass fishermen to avoid areas and times of high chum salmon abundance have helped reduce catches of chum salmon in recent years; however, this has also made chum salmon catches and CPUE useless in forecasting either the abundance of chums in next year's False Pass catch or in the western Alaska runs.

## REFERENCES

- Bigler, B. 1988. Focal scale damage among chum salmon (*Onchorynchus keta*) of Hokkaido, Japan. Can. J. Fish. Aquat. Sci. 45:698-704.
- Bigler, B. 1989. Mechanism and occurrence of focal scale resorption among chum salmon (*Onchorynchus keta*) of the North Pacific Ocean. Can. J. Fish Aquat. Sci. 46:1147-1153.
- Eggers, D. 1993. Outlook for chum salmon catch in the 1994 South Alaska Peninsula June fishery. A handout of figures by ADFG. Juneau, AK.
- Eggers, D.M. and A.R. Shaul. 1987. Assessment of Bristol Bay sockeye salmon run strength based on in-season performance of the South Peninsula June interception fishery. ADFG Inform. Leaf. No. 264. 53 p.
- Eggers, D.M., K. Rowell and B. Barrett. 1991. Stock composition of sockeye and chum salmon catches in the southern Alaska Peninsula fisheries in June. ADFG Fish. Res. Bull. No. 91-01. 49 p.
- Fredin, R.A. 1980. Trends in North Pacific salmon fisheries. Pages 59-119 *in* W.J. McNeil and D.C. Himsworth (eds.), Salmonid Ecosystems of the North Pacific. Oregon State Univ. Press.
- McCullough, J.N., A.R. Shaul, Campbell and R.S. Berceli. 1995. South Peninsula annual salmon management report, 1994. ADFG Reg. Inform. Rep. 4K95-46. 296 p.
- Murphy, R.L. 1993. Occurrence of focal scale resorption in chum salmon from the June South Peninsula fisheries. ADFG Reg. Inform. Rep. No. 4K93-2. 19 p.
- Rogers, D.E. 1987. Pacific salmon. Pages 461-475 *in* D.W. Hood and S.T. Zimmerman (eds.), The Gulf of Alaska. US Dep. Commerce, NOAA.
- Rogers, D.E. 1990. Stock composition and timing of sockeye salmon in the False Pass fishery. Univ. Washington, School of Fisheries, Fish. Res. Inst. FRI-UW-9006. Seattle. 40 p.
- Rogers, D.E. 1994. False Pass chum salmon, 1993. Univ. Washington, School of Fisheries, Fish. Res. Inst. FRI-UW-9404. Seattle. 55 p.
- Rogers, D.E. 1995. False Pass chum salmon, 1994. Univ. Washington, School of Fisheries, Fish. Res. Inst. FRI-UW-9501. Seattle. 41 p.
- Rogers, D.E. and G.T. Ruggerone. 1993. Factors affecting marine growth of Bristol Bay sockeye salmon. Fish. Res. 18 (1993):89-103.
- Stratton, B.L. and D.L. Crawford. 1992. Abundance, age, sex, and size statistics for Pacific salmon in Bristol Bay, 1991. ADFG Tech. Fish. Rep. 92-17. 168 p.
- Yuen, H.J. and M.L. Nelson. 1984. Bristol Bay chum salmon (*Oncorhynchus keta*) sex, age, weight, and length statistics, 1960 to 1977. ADFG Tech. Data Rep. 127. 82 p.

## FIGURES



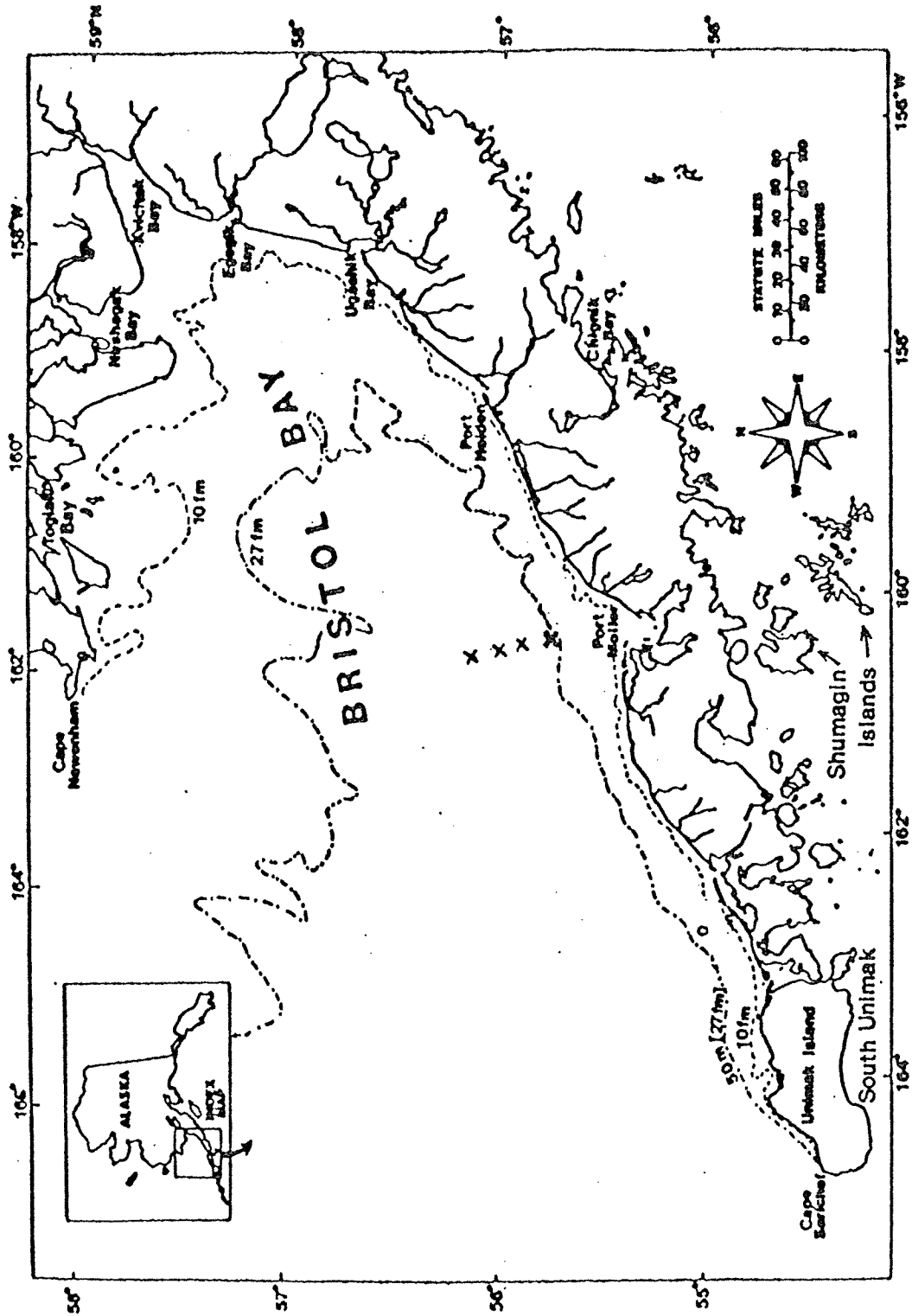


Figure 1. Bristol Bay and the Alaska Peninsula (x = Port Moller test boat stations).

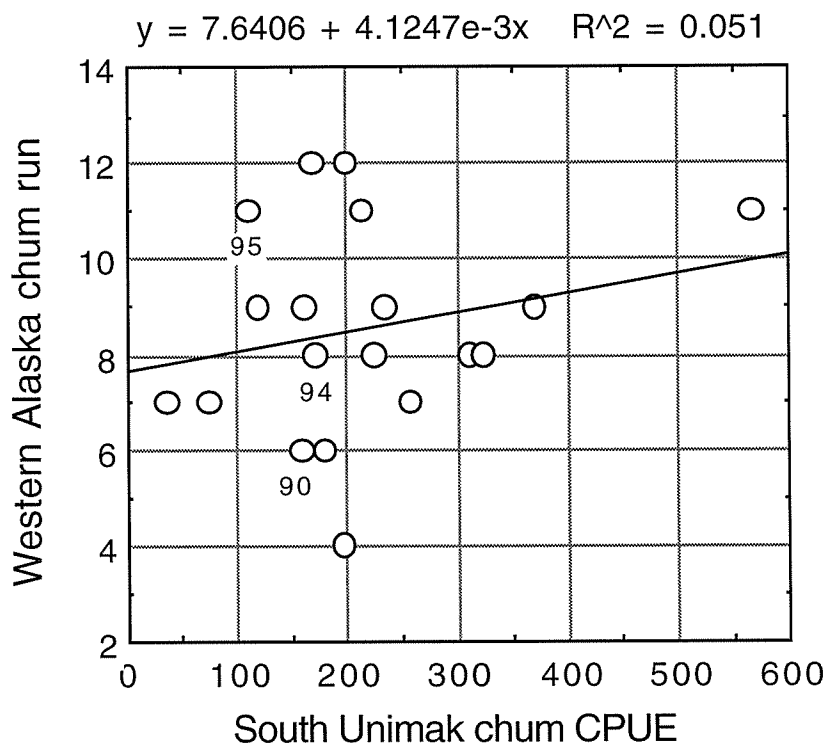
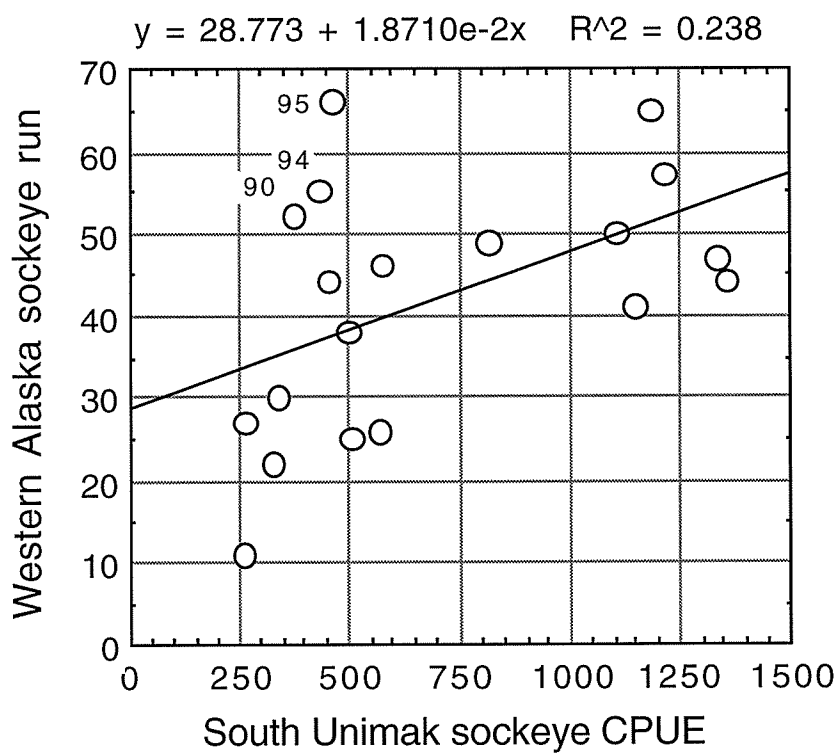


Figure 2. Western Alaska sockeye and chum salmon runs regressed on South Unimak CPUE.



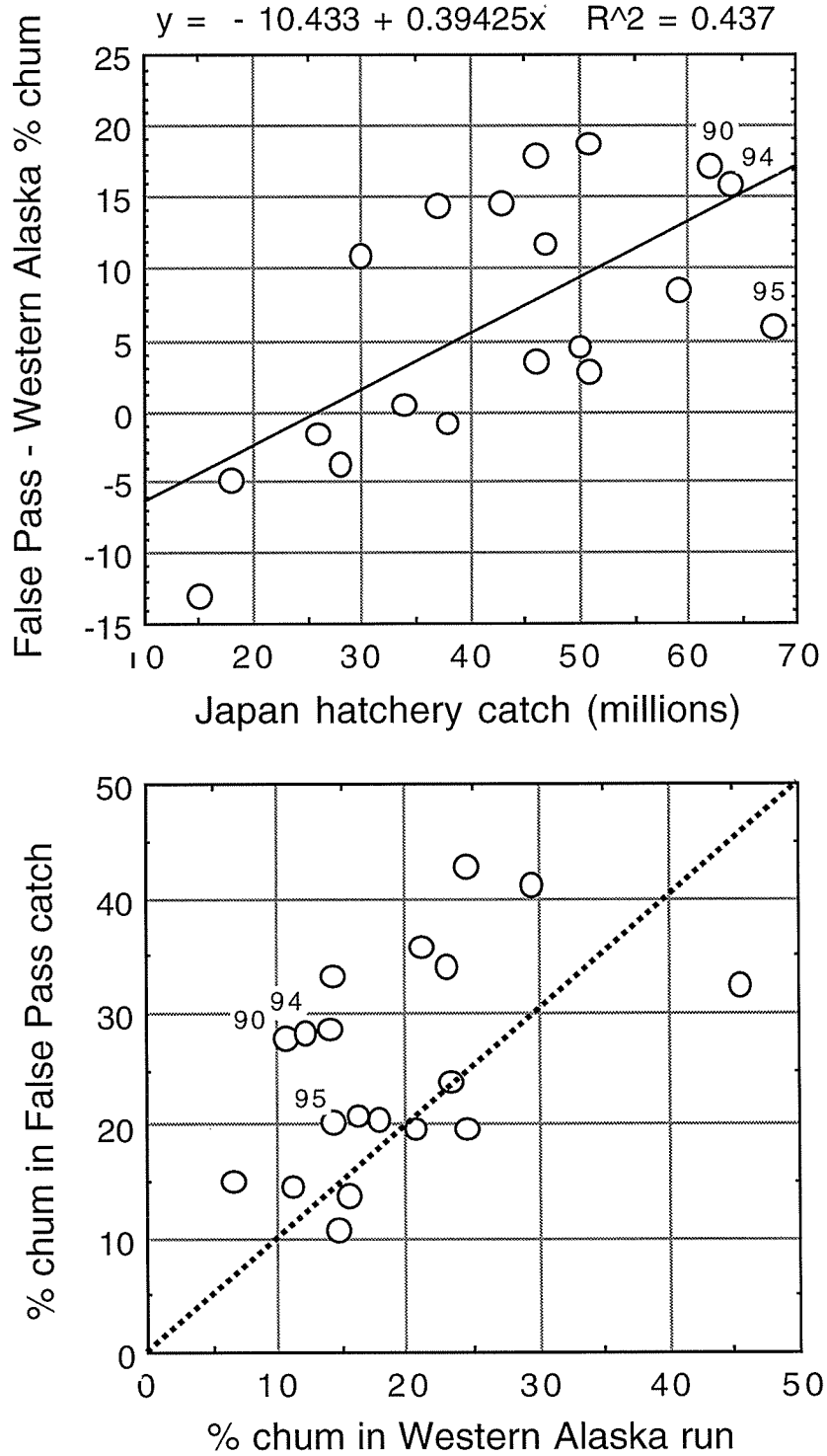


Figure 3. Top: The percentage of chum salmon in the False Pass catch plotted on the percent chums in the Western Alaska run. Bottom: Differences in the percent chum salmon in the False Pass catch and in the Western Alaska run regressed on Japanese hatchery catch.

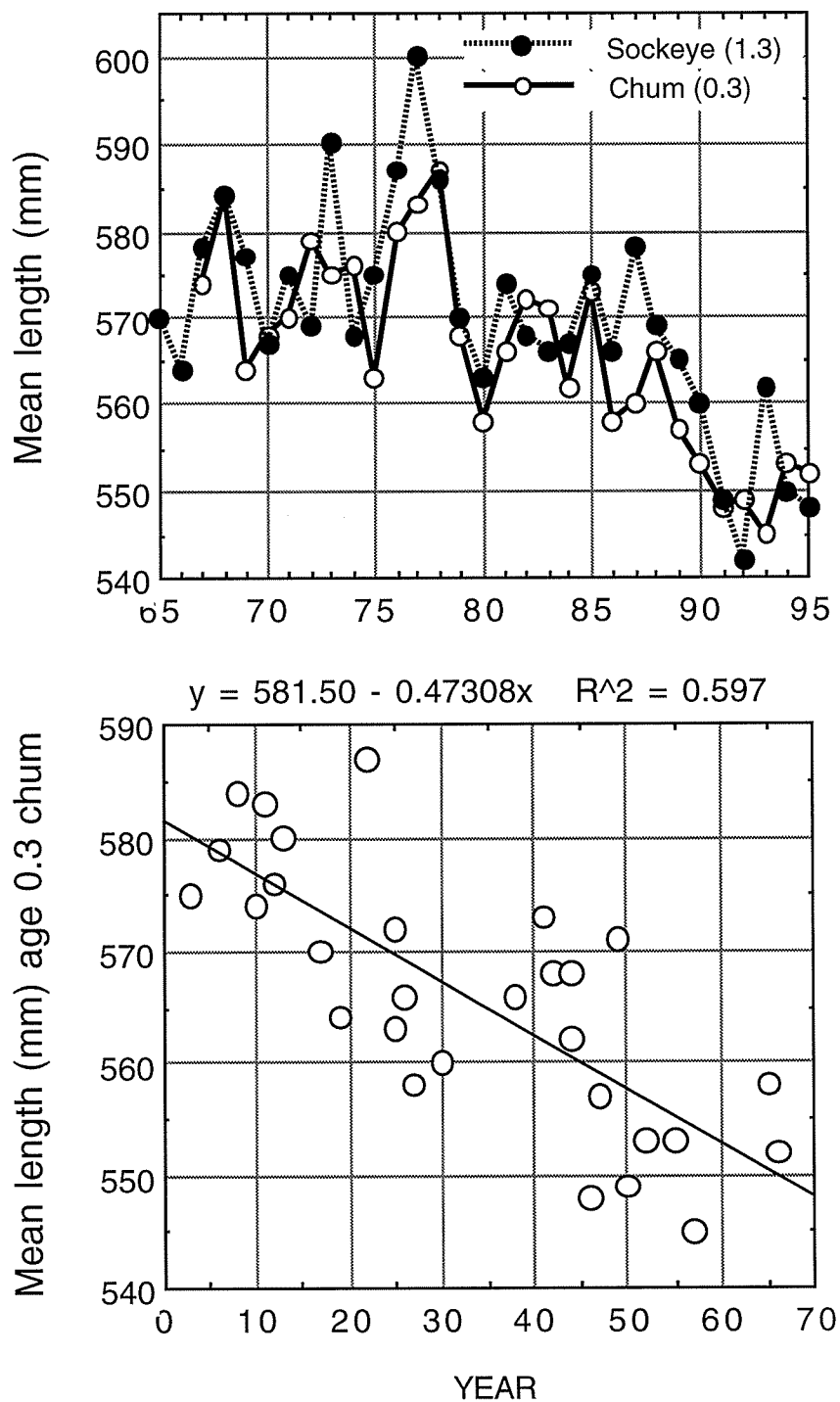


Figure 4. Top: the annual mean lengths of sockeye and chum salmon in the Nushagak catches. Bottom: Regression of mean length of Nushagak age 0.3 chum salmon on number of sockeye salmon in the western Alaska run.

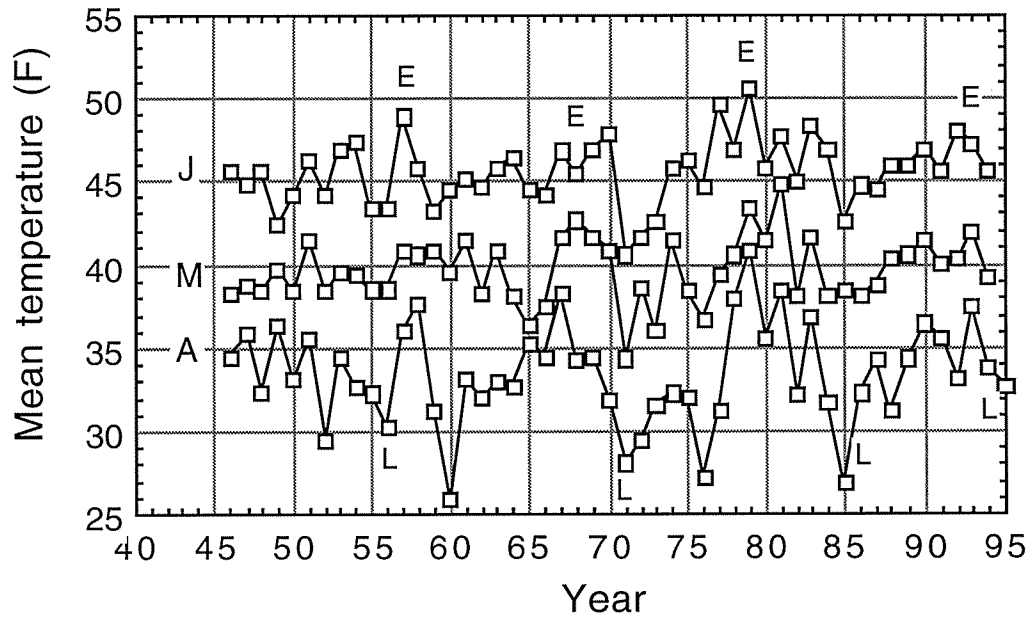


Figure 5. Air temperatures at Cold Bay during spring months, April-June (E = early runs and L = late runs).



## TABLES



Table 1. Sockeye and chum salmon catches in the South Unimak June fishery, 1987–1995.

		Hours	Catch (1,000s)		%	Sockeye			Hours	Catch (1,000s)		%	Sockeye	
Year	Date	open	Sockeye	Chum	chum	CPUE	Year	Date	open	Sockeye	Chum	chum	CPUE	
Q=.6 C=.6 no cap	87	10	18	14	16	53	79	92	15	18	214	26	11	1214
	(27)	11	20	18	22	55	153	(45)	16	24	132	22	14	610
		14	18	44	24	35	261	Q=2.0	17	24	245	37	13	888
		15	22	47	30	39	242	C=2.0	18	14	236	42	15	1229
		17	18	83	63	43	416	cap=.7	19	22	359	58	14	1073
		18	16	66	54	45	323		21	18	340	45	12	1307
		20	18	54	23	30	292		22	14	345	75	18	1352
		21	24	96	48	33	463		26	5	87	15	15	1410
		22	20	74	42	36	327	Sum	13-	139	1958	320	14	1105
		25	12	44	24	35	720							
	26	22	49	56	53	275								
Sum	13-	170	557	364	40	343								
Q=1.3 C= .5 cap=.5	88	11	14	11	18	62	222	93	13	16	284	38	12	1271
	(23)	15	14	42	35	45	816	(52)	15	18	255	45	15	1357
		16	14	75	70	48	1215	Q=2.9	16	24	305	43	12	1009
		18	6	56	49	47	779	C=2.9	17	18	304	39	11	1071
		21	15	80	63	44	461	cap=.7	19	18	350	51	13	1567
		22	9	35	26	43	729		20	22	492	68	12	1481
		23	22	114	112	50	487		22	12	203	73	26	1130
		27	16	46	87	65	328		26	18	50	3	6	1590
	Sum	13-	96	448	442	50	573		27	22	112	13	10	830
								Sum	13-	204	2367	382	14	1218
Q=1.2 C=1.3 cap=.5	89	10	16	144	82	36	885	94	17	9	118	45	28	689
	(44)	16	16	350	145	29	1584	(50)	18	9	64	24	27	855
		19	18	126	38	23	900	Q=2.9	19	17	165	47	22	592
		20	22	434	119	22	1455	C=1.0	20	12	51	18	26	525
		23	12	259	20	7	1213	cap=.7	21	17	39	10	20	215
	Sum	13-	68	1169	322	22	1339		22	24	93	26	22	397
									23	24	128	34	21	471
									24	24	63	20	24	276
									25	24	44	19	30	276
									26	24	39	19	33	278
Q=1.1 C=1.1 cap=.6	90	13	14	12	5	29	180		27	24	55	42	43	489
	(48)	14	22	33	12	27	135		28	24	65	54	45	560
		16	18	67	18	21	377		29	15	15	9	38	234
		17	24	145	42	22	519		30	15	5	2	29	159
		18	24	90	26	22	331	Sum	13-	262	944	369	28	437
		19	24	33	9	21	181							
		20	24	81	29	26	329	95	13	16	126	41	25	686
		21	24	118	57	33	417	(61)	14	8	23	5	18	1133
		22	24	118	35	23	448	Q=3.0	15	16	185	32	15	933
		23	24	104	47	31	354	C=1.4	16	16	72	14	16	417
Sum		24	22	87	76	47	363	cap=.7	17	16	47	10	18	265
		26	18	166	91	35	600		18	8	8	3	27	152
		28	5	17	6	26	597		19	18	14	2	13	163
	Sum	13-	267	1071	453	30	375		20	24	98	15	13	444
									21	24	139	28	17	494
									22	24	155	44	22	552
									23	24	153	36	19	534
									24	24	122	33	21	390
									25	24	83	18	18	333
									26	24	71	20	22	344
Q=1.6 C=1.2 cap=.6	91	15	16	121	45	27	574		27	24	40	14	26	500
	(42)	17	18	51	27	35	319		28	24	27	8	23	325
		18	24	104	49	32	600		29	24	22	6	21	294
		19	24	108	56	34	1494	Sum	13-	362	1404	334	19	468
		20	22	222	115	34	1040							
		23	18	184	49	21	1783							
		24	24	256	187	42	828							
		25	12	144	137	49	642							
	Sum	13-	158	1190	665	36	811							

Sockeye CPUE = catch/boat/24h; 1 purse seine = 3.28 drift gill nets (set nets excluded).

( ) = Bristol Bay run; Q = Unimak sockeye quota; C = Unimak sockeye catch; and cap = total chum cap (Unimak &amp; Shumagin) in millions.

Table 2. Comparison of the age compositions of sockeye salmon in Bristol Bay runs with age compositions from the False Pass fishery, in-season Port Moller test fishery, and the ADF&G pre-season forecast, 1987–1995.

Year		Age composition (%)						Bristol Bay run (millions)
		1.2	2.2	1.3	2.3	all .2	all .3	
1987	ADF&G pre-f'cast	26	24	33	17	50	50	16.1
	Moller in-f'cast	49	19	19	12	68	31	26.0
	False Pass catch	35	13	33	14	49	51	
	Bristol Bay run	49	12	24	13	61	39	27.3
1988	ADF&G pre-f'cast	30	27	34	9	57	43	26.5
	Moller in-f'cast	17	20	48	12	37	60	22.0
	False Pass catch	23	42	23	9	66	33	
	Bristol Bay run	20	22	41	13	43	55	23.0
1989	ADF&G pre-f'cast	22	45	24	9	67	33	28.9
	Moller in-f'cast	13	45	22	17	58	39	37.0
	False Pass catch	8	62	13	15	70	28	
	Bristol Bay run	11	62	16	9	73	26	43.8
1990	ADF&G pre-f'cast	19	42	26	13	61	39	25.4
	Moller in-f'cast	10	37	24	26	48	52	56.0
	False Pass catch	16	37	20	25	53	45	
	Bristol Bay run	14	41	21	20	56	43	47.8
1991	ADF&G pre-f'cast	28	25	31	16	53	47	30.0
	Moller in-f'cast	12	14	55	13	28	71	37.0
	False Pass catch	21	33	36	6	54	46	
	Bristol Bay run	19	20	46	11	39	60	42.1
1992	ADF&G pre-f'cast	19	39	27	13	58	42	37.1
	Moller in-f'cast	8	35	31	22	43	53	45.0
	False Pass catch	6	35	25	30	42	58	
	Bristol Bay run	13	34	27	22	47	50	44.9
1993	ADF&G pre-f'cast	23	41	21	14	64	35	41.8
	Moller in-f'cast	7	27	19	44	34	65	42.0
	False Pass catch	14	46	14	23	61	38	
	Bristol Bay run	13	33	18	33	46	53	51.9
1994	ADF&G pre-f'cast	14	43	19	22	57	43	52.5
	Moller in-f'cast	7	42	20	28	50	50	46.0
	False Pass catch	8	34	33	22	42	57	
	Bristol Bay run	8	56	14	18	65	34	50.1
1995	ADF&G pre-f'cast	16	53	17	13	69	31	55.1
	Moller in-f'cast	14	51	15	19	65	34	49.2
	False Pass catch	19	57	12	11	76	24	
	Bristol Bay run	16	56	12	15	72	27	60.7
Means	ADF&G pre-f'cast	22	38	26	14	60	40	34.8
	Moller in-season	15	32	28	21	48	51	40.0
	False Pass catch	17	40	23	17	57	42	
	Bristol Bay run	18	37	24	17	56	43	43.5

Age composition for Port Moller is for June 11-30 only, whereas the forecast is the one used about July 2-3.



Table 3. Percent chums in sockeye and chum salmon catches and runs (in millions), 1977–1995.

Year	Bristol Bay run			Western Alaska run			South Peninsula June catch			Port Moller Test Boat CPUE		
	Sockeye	Chum	% C	Sockeye	Chum	% C	Sockeye	Chum	% C	Sockeye	Chum	% C
77	9.6	4.0	29.4	10.8	9.0	45.5	0.24	0.12	32.4	6.9	2.3	25.0
78	19.8	2.3	10.4	22.1	7.2	24.6	0.49	0.12	19.7	3.2	0.8	20.0
79	39.8	1.7	4.0	43.6	7.5	14.7	0.86	0.11	10.9	9.6	0.2	2.0
80	62.4	3.3	5.1	65.4	12.0	15.5	3.30	0.53	13.8	4.6	1.6	25.8
81	34.3	2.1	5.8	37.9	11.6	23.4	1.83	0.58	23.9	7.6	2.0	20.8
82	22.1	1.3	5.7	24.6	7.4	23.1	2.12	1.09	34.0	5.1	1.1	17.7
83	45.7	2.2	4.5	48.8	8.0	14.1	1.96	0.78	28.5	4.4	0.4	8.3
84	40.7	3.5	7.8	43.9	11.4	20.6	1.39	0.34	19.7	27.1	5.0	15.6
85	36.6	2.0	5.3	40.7	8.9	17.9	1.86	0.48	20.5	17.9	0.8	4.3
86	23.6	2.2	8.6	27.1	8.9	24.7	0.47	0.35	42.7			
87	27.3	2.9	9.5	29.7	8.0	21.2	0.79	0.44	35.8	12.2	0.8	6.2
88	23.2	2.5	9.8	26.0	10.9	29.5	0.76	0.53	41.1	8.0	1.2	13.0
89	43.9	2.2	4.9	46.8	9.1	16.3	1.75	0.46	20.8	19.0	0.9	4.5
90	47.8	1.7	3.4	51.6	6.2	10.7	1.35	0.52	27.8	26.2	1.3	4.7
91	42.2	2.0	4.6	46.3	7.8	14.4	1.55	0.77	33.2	18.8	1.6	7.8
92	45.0	1.4	3.0	49.9	6.3	11.2	2.46	0.43	14.7	23.0	1.5	6.1
93	52.1	1.0	1.9	57.2	4.1	6.7	2.97	0.53	15.1	28.8	1.3	4.3
94	50.3	1.3	2.5	54.7	7.7	12.3	1.49	0.59	28.2	22.8	1.7	6.9
95	60.7	1.5	2.4	65.5	11.7	15.2	2.11	0.54	20.3	25.8	0.7	2.6
Means 83-95	41.5	2.0	5.2	45.2	8.4	16.5	1.61	0.52	26.8	19.5	1.4	7.0

Table 4. Annual sockeye salmon runs (millions) to the eastern Bering Sea (Western Alaska), 1970–1995.

Year	Kuskokwim		Bristol Bay runs					Bristol Bay Total	North Pen. Run	Total Run	June catch	
	Catch	Run	Togiak	Nushagak	Nak/Kvi	Egegik	Ugashik				Number	%
70	.013	.03	.37	3.15	32.65	2.32	.91	39.40	.66	40.1	1.68	3.4
71	.006	.02	.42	2.61	9.37	1.94	1.48	15.82	.79	16.6	.61	3.0
72	.004	.01	.16	.91	2.85	1.39	.10	5.41	.37	5.8	.52	7.1
73	.005	.01	.21	.85	.79	.55	.04	2.44	.35	2.8	.26	7.3
74	.028	.07	.25	2.78	6.43	1.45	.06	10.97	.58	11.6	.00	0.0
75	.018	.05	.38	2.92	18.35	2.14	.44	24.23	.75	25.0	.24	0.8
76	.014	.04	.50	2.75	5.92	1.84	.53	11.54	1.17	12.7	.31	2.0
77	.019	.05	.42	1.84	4.69	2.47	.29	9.71	1.01	10.8	.24	1.9
78	.014	.04	.79	6.62	10.32	2.10	.09	19.92	2.11	22.1	.49	1.9
79	.039	.10	.69	6.40	27.43	3.29	2.10	39.91	3.55	43.6	.86	1.7
80	.043	.11	1.21	12.81	40.57	3.68	4.22	62.49	2.78	65.4	3.30	4.1
81	.106	.27	1.01	10.34	14.63	5.06	3.44	34.48	3.19	37.9	1.82	3.9
82	.096	.24	.94	7.93	7.54	3.48	2.32	22.21	2.15	24.6	2.12	6.8
83	.089	.22	.83	7.07	26.11	7.55	4.35	45.91	2.67	48.8	1.96	3.3
84	.081	.20	.52	3.81	26.50	6.36	3.93	41.12	2.56	43.9	1.39	2.6
85	.121	.30	.40	2.99	17.36	8.63	7.48	36.86	3.50	40.7	1.86	3.7
86	.142	.36	.58	4.85	6.28	6.01	6.02	23.74	3.04	27.1	.47	1.5
87	.171	.43	.66	5.15	12.27	6.63	2.82	27.53	1.76	29.7	.79	2.2
88	.150	.38	1.16	3.23	8.85	8.01	2.19	23.44	2.14	26.0	.76	2.4
89	.080	.20	.21	5.05	23.56	10.31	4.90	44.03	2.53	46.8	1.74	3.1
90	.204	.41	.52	5.71	26.36	12.28	2.89	47.76	3.45	51.6	1.35	2.2
91	.202	.40	.80	7.69	18.64	9.59	5.50	42.22	3.71	46.3	1.55	2.8
92	.194	.39	.80	5.19	15.89	17.62	5.53	45.03	4.44	49.9	2.46	4.0
93	.167	.33	.70	7.62	14.78	23.34	5.67	52.11	4.80	57.2	2.97	4.2
94	.191	.38	.50	5.86	25.83	12.70	5.45	50.34	3.94	54.7	1.48	2.2
95	.198	.40	.73	6.69	31.78	15.73	5.81	60.74	4.41	65.5	2.10	2.7
Means												
70-79		.04	.42	3.08	11.88	1.95	.60	17.94	1.13	19.1	.52	2.9
80-89		.27	.75	6.32	18.37	6.57	4.17	36.18	2.63	39.1	1.62	3.4
90-95		.39	.68	6.46	22.21	15.21	5.14	49.70	4.13	54.2	1.99	3.0

Kuskokwim run estimated by catch/ 0.4 (1970-89) and catch/0.5 (1990-94).

South Peninsula percent= (SP catch\*.85)/ (SP catch\*.85+ WA total)\*100.

Table 5. North Pacific runs of sockeye salmon, 1970–1995, catch and escapement (in millions).

Year	Bristol Bay run	Alaska runs		Japan high seas catch	Russian run	North Pacific total run	SE Alaska and British Columbia	Total Pacific run	Percent Western Alaska
		Western	Central						
70	39	42	7	10	3	62	9	71	59
71	16	17	6	7	2	32	12	44	39
72	5	6	5	7	1	19	8	27	22
73	2	3	4	6	1	14	15	29	10
74	11	12	4	5	1	22	14	36	33
75	24	25	3	5	2	35	7	42	60
76	12	13	7	6	1	27	10	37	35
77	10	11	10	3	3	27	13	40	28
78	20	22	9	3	4	38	14	52	42
79	40	44	7	3	3	57	12	69	64
80	62	68	8	3	4	83	7	90	76
81	34	40	10	3	4	57	15	72	56
82	22	26	14	3	3	46	20	66	39
83	46	51	15	2	5	73	10	83	61
84	41	45	14	2	7	68	11	79	57
85	37	42	15	1	8	66	23	89	47
86	24	27	17	1	6	51	18	69	39
87	27	30	22	1	8	61	11	72	42
88	23	27	17	<1	5	49	10	59	46
89	44	48	17	<1	6	71	24	95	51
90	48	53	18	<1	12	83	24	107	50
91	42	48	19	<1	8	75	20	95	51
92	45	52	23	0	11	86	18	104	50
93	52	60	19	0	11	90	29	119	50
94	50	56	15	0	8	79	20	99	57
95	61	66	16	0	10	92	9	101	65
Means									
70-79	18	20	6	6	2	33	11	45	39
80-89	36	40	15	2	6	63	15	77	51
90-95	50	56	18	0	10	84	20	104	54

Western Alaska includes Bristol Bay, North Peninsula and 85% of South Peninsula catch.

Japan high seas catches since 1992 are included in Russian run.

Table 6. Estimated runs of chum salmon (catch and escapement in millions) to the eastern Bering Sea, 1970–1995.

Year	Kotzebue	Norton Sound	Yukon River		Arctic/ Yukon Region	Kuskokwim	Togiak	Nushagak	Naknek/ Kvichak	Egegik	Ugashik	Bristol Bay total	North Alaska Penins.	Total run
70	.60	.75	.92	.82	3.09	.60	.22	1.14	.22	.07	.09	1.74	.22	5.7
71	.37	.44	.82	.80	2.43	.42	.24	.75	.24	.04	.02	1.29	.17	4.3
72	.50	.30	.74	.59	2.13	.43	.38	.74	.30	.07	.06	1.55	.21	4.3
73	.55	.35	1.36	.90	3.16	.69	.44	1.06	.59	.06	.07	2.22	.28	6.4
74	1.27	.37	1.45	.99	4.08	.92	.14	.89	.51	.03	.07	1.64	.14	6.8
75	.97	.44	2.87	1.78	6.06	.78	.18	.68	.47	.01	.07	1.41	.12	8.4
76	.34	.19	1.82	.74	3.09	.90	.25	1.74	.74	.07	.03	2.83	.37	7.2
77	.30	.44	1.49	.97	3.20	.97	.52	2.65	.74	.12	.01	4.04	.81	9.0
78	.27	.47	2.04	.87	3.65	.79	.47	1.38	.37	.08	.01	2.31	.47	7.2
79	.23	.27	1.71	1.63	3.84	1.57	.33	.85	.36	.06	.06	1.66	.37	7.4
80	.92	.44	2.44	.98	4.78	2.45	.57	1.94	.55	.11	.17	3.34	1.47	12.0
81	1.10	.48	3.79	1.28	6.65	1.62	.36	1.11	.47	.10	.06	2.10	1.24	11.6
82	.61	.40	2.13	.76	3.90	1.38	.23	.57	.30	.12	.11	1.33	.79	7.4
83	.53	.62	2.14	1.05	4.34	.79	.45	1.01	.42	.14	.14	2.16	.74	8.0
84	.57	.54	2.88	.86	4.85	1.31	.55	1.63	.81	.22	.31	3.52	1.67	11.4
85	.70	.35	2.85	1.15	5.05	.74	.38	.91	.45	.15	.15	2.04	1.02	8.9
86	.68	.34	3.41	.90	5.33	.89	.51	.88	.57	.12	.13	2.21	.51	8.9
87	.18	.25	1.72	1.00	3.15	1.02	.81	.67	1.09	.18	.13	2.88	.88	7.9
88	.57	.20	3.70	.75	5.22	2.24	.66	.70	.74	.30	.14	2.54	.89	10.9
89	.46	.21	3.31	1.14	5.12	1.34	.49	.93	.53	.16	.13	2.24	.37	9.1
90	.31	.20	1.64	.90	3.05	1.00	.22	.71	.65	.16	.04	1.78	.35	6.2
91	.56	.28	2.16	1.02	4.02	1.17	.38	.75	.77	.10	.10	2.10	.49	7.8
92	.43	.19	2.02	.63	3.27	.79	.29	.62	.38	.13	.09	1.51	.69	6.3
93	.26	.26	1.14	.62	2.28	.26	.22	.63	.07	.05	.09	1.06	.53	4.1
94	.33	.28	2.80	1.02	4.43	1.23	.35	.67	.32	.07	.06	1.47	.56	7.7
95	.94	.38	4.61	1.69	7.62	1.81	.31	.58	.37	.07	.08	1.41	.85	11.7
Means														
70-79	.54	.40	1.52	1.01	3.47	.81	.32	1.19	.45	.06	.05	2.07	.32	6.7
80-89	.63	.38	2.84	.99	4.84	1.38	.50	1.04	.59	.16	.15	2.44	.96	9.6
90-95	.47	.27	2.40	.98	4.11	1.04	.30	.66	.43	.10	.08	1.56	.58	7.3

Table 7. North Pacific runs of chum salmon, 1970–1995, catch and escapement (in millions).

Year	Bristol Bay run	Alaska runs			Japan catch		Russian run (catch/.5)	North Pacific total run	SE Alaska B.C. and Wash.	Total Pacific run	Percent Asia
		Western	Central	S.P.	High seas	Coastal					
70	1.7	5.7	5.2	0.5	17	7	7	43	11	54	58
71	1.3	4.3	6.5	0.7	17	10	7	45	7	52	65
72	1.6	4.3	4.5	0.6	22	9	4	45	17	62	57
73	2.2	6.4	3.5	0.2	16	12	3	42	15	57	56
74	1.6	6.8	1.9	0.0	22	13	5	48	10	58	68
75	1.4	8.4	2.1	0.1	19	20	4	54	5	59	73
76	2.8	7.2	3.4	0.4	22	12	8	53	9	62	68
77	4.0	9.0	5.9	0.1	12	15	9	51	5	56	64
78	2.3	7.2	4.3	0.1	7	18	11	47	9	56	63
79	1.7	7.4	4.0	0.1	6	28	12	58	4	62	75
80	3.3	12.0	5.1	0.5	6	26	7	57	11	68	58
81	2.1	11.6	8.3	0.6	6	34	9	70	6	76	65
82	1.3	7.4	8.9	1.1	7	30	7	61	9	70	62
83	2.2	8.0	7.0	0.8	6	37	12	71	6	77	72
84	3.5	11.4	6.5	0.3	6	38	7	70	13	83	62
85	2.0	8.9	5.5	0.5	4	51	12	82	17	99	68
86	2.2	8.9	8.1	0.4	3	46	14	80	17	97	65
87	2.9	7.9	6.2	0.4	3	43	13	73	12	85	69
88	2.5	10.9	8.7	0.5	2	47	13	83	20	103	61
89	2.2	9.1	4.9	0.5	1	50	13	78	9	87	74
90	1.8	6.2	4.6	0.5	1	62	13	88	13	101	76
91	2.1	7.8	5.3	0.8	1	51	10	76	11	87	71
92	1.5	6.3	4.4	0.4	0	46	17	74	16	90	70
93	1.1	4.1	3.8	0.5	0	59	21	88	21	109	73
94	1.5	7.7	6.2	0.4	0	64	20	98	21	119	70
95	1.4	11.7	6.5	0.5	0	68	10	97	20	117	67
Means											
70-79	2.1	6.7	4.1	0.3	16	14	7	49	9	58	65
80-89	2.4	9.6	6.9	0.6	4	40	11	73	12	85	66
90-95	1.6	7.3	5.1	0.5	0	58	15	87	17	104	71

Western Alaska includes Bristol Bay, North Peninsula and the Yukon-Kuskokwim region.

Japan coastal run does not include hatchery returns (brood stock) to Hokkaido and Honshu.

Japan high seas catches since 1992 included in Russian runs.

Table 8. Summary of length, weight and condition factors for chum salmon in the False Pass catches.

Location	Sex	Age	Sex/age percent				Mean length (mm)				Mean weight (kg)				Condition factor			
			92	93	94	95	92	93	94	95	92	93	94	95	92	93	94	95
Unimak	Male	0.2	0.4	1.0	0.4	1.6	491	488	498	538	1.75	1.41	1.88	2.61				
		0.3	26.9	31.4	23.6	21.2	550	557	568	580	3.00	2.55	3.14	3.32	.0179	.0145	.0169	.0168
		0.4	21.8	17.0	26.7	18.5	579	591	589	602	3.62	3.14	3.50	3.76	.0185	.0151	.0169	.0172
		0.5	0.1	0.6	2.0	2.0	628	599	611	619	4.42	3.16	3.85	4.07				
		0.6			0.1				652				4.90					
	Female	0.2	0.1	1.2	0.3	1.2	514	514	507	517	2.30	1.82	2.02	2.18				
		0.3	29.7	35.4	26.8	30.6	543	545	546	556	2.83	2.35	2.59	2.77	.0176	.0143	.0157	.0160
		0.4	20.8	13.3	19.2	23.9	568	574	563	581	3.23	2.84	2.84	3.19	.0178	.0147	.0158	.0162
		0.5	0.2	0.1	0.9	1.0	573	582	587	615	3.58	2.90	3.13	3.93				
	Comb.	0.2	0.5	2.2	0.7	2.8	495.6	502.2	501.9	529	1.86	1.63	1.94	2.43				
		0.3	56.6	66.8	50.4	51.8	546.3	550.6	556.3	565.8	2.91	2.44	2.85	3.00	.0177	.0144	.0163	.0163
		0.4	42.6	30.3	45.9	42.4	573.6	583.5	578.1	590.2	3.43	3.01	3.22	3.44	.0182	.0149	.0164	.0166
		0.5	0.3	0.7	2.9	3.0	591.3	596.6	603.6	617.7	3.86	3.12	3.63	4.02				
		0.6			0.1				652				4.90					
	Male	0.2	0.0	0.7	0.3	1.0		519	567	561		1.99	3.09	3.13				
		0.3	23.7	27.6	27.1	22.6	547	554	575	588	2.74	2.49	3.29	3.54	.0164	.0142	.0171	.0172
		0.4	21.6	20.7	28.8	23.4	589	586	589	604	3.47	2.88	3.52	3.84	.0167	.0139	.0169	.0173
		0.5	0.2	1.0	1.2	2.0	651	632	618	610	5.44	3.47	4.12	4.07				
	Female	0.2	0.0	0.1	0.1	0.6		534	532	527		2.31	2.59	2.36				
		0.3	32.0	33.2	21.2	28.4	543	547	550	563	2.62	2.31	2.71	2.92	.0162	.0139	.0162	.0163
		0.4	21.7	15.4	20.5	20.1	574	577	572	587	3.11	2.79	3.04	3.38	.0163	.0141	.0161	.0165
		0.5	0.8	1.3	0.8	1.7	609	662	595	604	3.39	4.25	3.33	3.68				
		0.6				0.2				595				4.08				
	Comb.	0.2	0.0	0.8	0.4	1.6		520.9	558.3	548.3		2.03	2.97	2.84				
		0.3	55.7	60.8	48.3	50.0	544.7	550.2	564	585.6	2.67	2.39	3.04	3.26	.0163	.0140	.0167	.0170
		0.4	43.3	36.1	49.3	43.5	581.5	582.2	581.9	596.1	3.29	2.84	3.32	3.63	.0165	.0140	.0166	.0169
		0.5	1.0	2.3	2.0	3.7	617.4	649	608.8	607.2	3.80	3.91	3.80	3.89				
		0.6				0.2				595				4.08				

Table 9. Age composition, mean length (mm), and weight (kg) of chum salmon from Nushagak catches.

Year	age 0.2			age 0.3			age 0.4			0.5 %	Number (millions)		
	%	Length	Weight	%	Length	Weight	%	Length	Weight		Chum salmon catch	Chum salmon run	Sockeye run
66	10.5		1.81	75.5		3.88	14.0		4.07	0.0	.13	.31	2.80
67	3.6	534	2.39	89.2	574	2.97	7.2	590	3.29	0.0	.34	.79	1.53
68	6.9	552	2.83	65.9	584	3.17	27.1	597	3.32	0.1	.18	.43	1.68
69	21.3	529	2.31	73.9	564	2.82	4.8	594	3.38	0.0	.21	.54	1.99
70	1.1	531	3.33	96.5	568	2.95	2.4	610	3.60	0.0	.44	1.14	3.15
71	5.5	542	2.28	68.5	570	2.91	26.0	585	3.15	0.0	.36	.84	2.61
72	8.2	551	2.72	67.9	579	3.09	23.5	590	3.14	0.4	.31	.74	0.91
73	0.2			71.6	575	3.08	26.7	592	3.39	1.5	.34	1.10	0.85
74	16.3	533	2.36	42.4	576	3.11	39.6	594	3.25	1.7	.16	.89	2.78
75	24.3	530	2.37	73.9	563	2.93	1.7	585	2.88	0.1	.15	.68	2.92
76	9.3	542	2.45	84.1	580	3.02	6.6	601	3.30	0.0	.80	1.74	2.75
77	3.1	553	2.52	93.3	583	3.26	3.6	596	3.53	0.0	.90	2.65	1.84
78	2.3	541	2.55	40.6	587	3.23	57.1	617	3.95	0.0	.65	1.38	6.62
79	6.7	532	2.33	62.8	568	2.93	29.9	599	3.33	0.6	.44	.85	6.40
80	0.9	523	2.29	98.3	558	2.94	0.8	588	3.01	0.0	.68	1.94	12.81
81	0.3			61.0	566	2.95	38.7	596	3.58	0.0	.80	1.11	10.34
82	1.3			44.2	572		53.5	576		1.0	.44	.57	7.93
83	2.0	535		34.5	571	3.18	61.5	585	3.45	2.0	.72	1.00	7.07
84	1.6	528		87.2	562	3.07	10.0	584	4.06	1.2	.85	1.57	3.81
85	32.7	572	2.92	54.4	573	3.19	12.4	571	2.96	0.5	.40	.91	2.99
86	0.3			85.2	558	2.93	14.5	574	3.39	0.0	.49	.88	4.85
87	0.0			40.2	560	3.02	57.3	582	3.37	2.5	.42	.67	5.15
88	6.9	535	2.65	62.3	566	3.07	30.0	580	3.40	0.8	.37	.70	3.23
89	0.4			82.0	557	2.82	17.3	577	3.35	0.3	.52	.93	5.05
90	0.5			78.8	553	2.87	20.2	587	3.47	0.5	.38	.71	5.71
91	2.3	526	2.47	67.4	548	2.71	30.3	573	3.18	0.0	.46	.75	7.69
92	0.2	479		55.2	549	2.80	44.1	565	2.97	0.4	.31	.62	5.19
93	0.2	502		42.6	545	2.61	53.6	570	2.94	3.6	.41	.63	7.62
94	0.4	512		51.2	553	2.81	47.0	562	2.83	1.5	.29	.67	5.86
95	7.1	533	2.44	52.7	552	2.75	36.6	568	3.06	3.6	.36	.58	6.70
Means													
70-95	5.2	532	2.55	65.3	565	2.97	28.7	585	3.30	0.9	.48	1.01	5.11

Sources: Yuen and Nelson (1984), annual ADF&G reports on Bristol Bay salmon (e.g., Stratton and Crawford 1992 and B. Cross [ADF&G] for 1992-1995).

About 55% of catch in 1994 was with king gear; AWL statistics given for sockeye gear only.

Table 10. Frequencies of focal scale resorption (holes) on chum salmon scales from the 1994 False Pass fisheries.

Location	Date	Number of normal scales (2)	Number with holes		Percent with holes (1 or 2)	Number with questionable holes (1 or 2)	Percent with holes including questionable	Number of normal scales (1)	Number with holes	Percent with holes	Number with question.	Percent including question.
			One scale	Both scales								
Unimak	6/16	170	4	3	3.95	2	5.03	40	2	4.76	1	6.98
	6/17	198	2	2	1.98	0	1.98	30	1	3.23	0	3.23
	6/22	181	0	0	0.00	0	0.00	19	0	0.00	0	0.00
	6/23	74	2	0	2.63	2	5.12	21	0	0.00	1	4.54
	6/24	168	1	0	0.59	1	1.18	29	0	0.00	0	0.00
	6/25	217	1	2	1.36	1	1.81	25	0	0.00	0	0.00
	6/26	202	2	1	1.46	2	2.42	35	0	0.00	0	0.00
	6/27	156	1	3	2.50	1	3.11	14	0	0.00	0	0.00
Totals		1366	13	11	1.73	10	2.43	213	3	1.39	2	2.29
Shumagin Is.	6/15	178	1	4	2.73	1	3.26	13	0	0.00	0	0.00
	6/20	86	0	0	0.00	4	4.44	20	0	0.00	3	13.04
	6/28	190	2	2	2.06	1	2.56	18	1	5.26	0	5.26
	Totals	454	3	6	1.94	6	3.20	51	1	1.92	3	7.27
False Pass		1820	16	17	1.78	16	2.62	264	4	1.49	5	3.30